

**PART B PERMIT RENEWAL APPLICATION FOR  
UNION PACIFIC RAILROAD  
HOUSTON WOOD PRESERVING WORKS**

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**I. GENERAL INFORMATION**

**Texas Commission on Environmental Quality**  
**ATTN: Industrial and Hazardous Waste Permits Section MC130**  
**Permits Division**  
**P. O. Box 13087**  
**Austin, Texas 78711-3087**  
**Industrial & Hazardous Waste Part B Permit Application**

I. General Information

A. Facility Name: Union Pacific Railroad Company Houston Wood Preserving Works  
(Individual, Corporation, or Other Legal Entity Name – Must match the Chief Clerk’s database records for the Facility)

Previous or former names of the facility, if applicable: Houston Tie Plant

Address: 4910 Liberty Road

City: State: Houston, TX Zip Code: 77026

Telephone Number: 281-350-7197

TCEQ Registration No.: 31547 EPA I.D. No.: TXD000820266

County: Harris

If the application is submitted on behalf of a corporation, please identify the Charter Number as recorded with the Office of the Secretary of State for Texas.

NA  
(Charter Number)

B. Facility Contact

1. List those persons or firms, including a complete mailing address and telephone number, who will act as primary contact for the applicant during the processing of the permit application.

**Mr. Geoffrey B. Reeder, P.G.**  
**Manager, Environmental Site Remediation**  
**Union Pacific Railroad Company**  
**24125 Aldine Westfield Rd.**  
**Spring, TX 77373**  
**Phone: 281-350-7197**  
**Fax: 402-233-2351**  
**gbreeder@up.com**

2. If the application is submitted by a corporation or by a person residing out of state, the applicant must register an Agent in Service or Agent of Service with the Texas Secretary of State’s office and provide a complete mailing address for the agent. The agent must be a Texas resident.

**CT Corporation System**  
**350 North St. Paul Street, Suite 2900**  
**Dallas, TX 75201**  
**Phone: (214) 932-3601**

3. List the individual who will be responsible for causing notice to be published in the newspaper and his/her mailing address, telephone number and fax number. If e-mail is available please provide an e-mail address.

**Mr. Geoffrey B. Reeder, P.G.**  
**Manager, Environmental Site Remediation**  
**Union Pacific Railroad Company**  
**24125 Aldine Westfield Rd.**  
**Spring, TX 77373**  
**Phone: 281-350-7197**  
**Fax: 402-233-2351**  
**gbreeder@up.com**

4. For applications for new permits, renewals, major amendments and Class 3 modifications a copy of the administratively complete application must be made available at a public place in the county where the facility is, or will be, located for review and copying by the public. Identify the public place in the county (e.g., public library, county court house, city hall), including the address, where the application will be made available for review and copying by the public.

**Tuttle Branch Library**  
**702 Kress**  
**Houston, TX 77020**

5. If an applicant proposes a new industrial or hazardous waste facility that would accept municipal solid waste, the applicant shall hold a public meeting in the county in which the facility is proposed to be located. This meeting must be held before the 45th day after the date the application is filed. In addition, the applicant shall publish notice of the public meeting in accordance with 30 TAC 39.503(e)(5).

**Not Applicable – application is for a renewal of an existing permit.**

C. Operator <sup>1</sup>: Identify the entity who will conduct facility operations.

Union Pacific Railroad Company

Address: 1400 Douglas St., STOP 1030

City: Omaha, NE

Zip Code: 68179

Telephone Number: 402-544-5000

<sup>1</sup>The operator has the duty to submit an application if the facility is owned by one person and operated by another [30 TAC 305.43(b)]. The permit will specify the operator and the owner who is listed on Part A of this application [Section 361.087, Texas Health and Safety Code].

D. Application Type and Facility Status

1.  permit  amendment  modification  
 new  major  Class 3  
 interim status  minor  Class 2  
 renewal  Class 11  
 RD&D  Class 1  
 Compliance Plan

2. Is this submittal part of a Consolidated Permit Processing request, in accordance with 30 TAC Chapter 33?

- Yes  No

**If Yes**, state the other TCEQ program authorizations requested.

3. Does the application contain confidential material?  Yes  No

**If Yes**, cross-reference the confidential material throughout the application to Section XIII: Confidential Material, and submit as a separate Section XIII document or binder conspicuously marked “CONFIDENTIAL”.

4. In either column, check all that apply.

- |   |  |
|---|--|
| <input type="checkbox"/> proposed hazardous waste management facility | <input checked="" type="checkbox"/> existing hazardous waste management facility |
| <input type="checkbox"/> on-site                                      | <input checked="" type="checkbox"/> on-site                                      |
| <input type="checkbox"/> off-site                                     | <input type="checkbox"/> off-site  |
| <input type="checkbox"/> commercial                                   | <input type="checkbox"/> commercial  |
| <input type="checkbox"/> recycle                                      | <input type="checkbox"/> recycle   |
| <input type="checkbox"/> land disposal                                | <input type="checkbox"/> land disposal   |
|   | <input type="checkbox"/> areal or capacity expansion                             |
|   | <input checked="" type="checkbox"/> compliance plan                              |

5. Is the facility within the Coastal Management Program boundary (for Class 3 Modifications, Permit Renewals, and New Permit applications only)?  Yes.  No.

6. Provide a brief description of the portion of the facility covered by this application, including the changes for which an amendment or modification is requested.

Permit/Compliance Plan Section	Brief Description of Proposed Change	Modification or Amendment Type	Supporting Regulatory Citation
Permit Section I	Information was updated, including changing the Site name from Houston Tie Plant to Houston Wood Preserving Works.	Minor Amendment	30 TAC §305.62(c)(2)
Permit Section II	Information was updated to include the most recent Flood Insurance Map.	Minor Amendment	30 TAC §305.62(c)(2)
Permit Section III	Inspection of SWMU 1 ceases, quarterly inspection of facility.	Minor Amendment	30 TAC §305.62(c)(2)

Permit/Compliance Plan Section	Brief Description of Proposed Change	Modification or Amendment Type	Supporting Regulatory Citation
Permit Section V	Information was updated and expanded to reflect the current Site boundary, conditions at the Site, address typographical errors, and administrative changes.	Minor Amendment	30 TAC §305.62(c)(2)
Permit Section VI	Information was updated to reflect current conditions at the Site and include investigative data collected since the previous permit update in 2003.	Minor Amendment	30 TAC §305.62(c)(2)
Permit Section VII	Information was updated to reflect current conditions at the Site including a request for the termination of sampling activities at SWMU No. 1 in accordance with TRRP Remedy Standard A. Post closure care activities then include only the plugging and abandonment of the eight monitoring wells associated with SWMU No. 1.	Major Amendment	30 TAC §305.62(c)(2)
Permit Section IX	The checklist information was consolidated from other sources and included in the permit.	Minor Amendment	30 TAC §305.62(c)(2)
Permit Section XI	Information was updated and expanded to reflect the current Site conditions, include the request for the termination of sampling activities at SWMU No. 1 and include the Response Action Plan prepared to address the facility wide soil and groundwater contamination.	Major Amendment	30 TAC §305.62(c)(1)

7. Total acreage of the facility being permitted: 128 acres

8. Identify the name of the drainage basin and segment where the facility is located:  
San Jacinto River basin, Segment No. 1007

E. Facility Siting Summary

Is the facility located or proposed to be located:

1. within a 100-year floodplain?  
 Yes  No
2. in wetlands?  
 Yes  No
3. in the critical habitat of an endangered species of plant or animal?  
 Yes  No

4. on the recharge zone of a sole-source aquifer?  
 Yes  No
5. in an area overlying a regional aquifer?  
 Yes  No
6. Within 0.5 of a mile (2,640 feet) of an established residence, church, school, day care center, surface water body used for a public drinking water supply, or dedicated public park? (Use only for a new commercial hazardous waste management facility or areal expansion of an existing commercial hazardous waste management facility or unit of that facility as defined in 30 TAC 335.202)  
 Yes  No **Not Applicable – not a new facility**
7. **If Yes**, the TCEQ shall not issue a permit for this facility.
8. In an area in which the governing body of the county or municipality has prohibited the processing or disposal of municipal hazardous waste or industrial solid waste?  
 Yes  No
9. **If Yes**, provide a copy of the ordinance or order.

F. Wastewater and Stormwater Disposition

1. Is the disposal of any waste to be accomplished by a waste disposal well at this facility?  
 No  Yes (WDW Permit No(s) \_\_\_\_\_ )
2. Will any point source discharge of effluent or rainfall runoff occur as a result of the proposed activities?  
 Yes  No
3. If Yes, is this discharge regulated by a TPDES or TCEQ permit?  
 Yes Permit No. \_\_\_\_\_ (TCEQ)  
Permit No. \_\_\_\_\_ ( TPDES)  
 No Date TCEQ discharge permit application filed \_\_\_\_\_  
Date TPDES discharge permit application filed \_\_\_\_\_

G. Information Required to Provide Notice

State Officials List

Provide the name and mailing address for the State Senator and State Representative in the district in which the facility is or will be located. Either local district addresses or capitol addresses are acceptable. [30 TAC 39.103(b)]

**State Senator, District 13**

**Rodney Ellis, P.O. Box 12068, Capitol Station, Austin, TX 78711**

**State Representative, District 142**

**Harold Dutton, P.O. Box 2910, Austin, Texas 78768**

Local Officials List

Provide the name and mailing address of the mayor and health authority of the municipality in whose territorial limits or extraterritorial jurisdiction the facility is or will be located. In addition, please provide the county judge and health authority of the county in which the facility is located. [30 TAC 39.103(c)]

**Mayor, City of Houston**

**Annise Parker, P.O. Box 1562, Houston, Texas 77251**

**Municipal Health Authority**

**Houston Department of Health and Human Services (HDHHS), 8000 North Stadium Drive, Houston, TX 77054**

**Harris County Judge**

**Honorable Ed Emmett, 101 Preston, Suite 911, Houston, TX 77002**

**County Health Authority**

**Harris County Public Health & Environmental Services, 2223 West Loop South, Houston, TX 77027**

**Regional Health Authority**

**Texas Department of State Health Services, Health Service Region 6/5 South, Brian Smith, M.D., M.P.H, Acting Regional Medical Director, 5425 Polk, Suite J, Houston, Texas 77023**

**Adjacent Landowners List – See Attachment I.G. A CD with MS Word compatible address labels has also been submitted with this application.**

Submit a map indicating the boundaries of all adjacent parcels of land, and a list (see samples in the instructions) of the names and mailing addresses of all adjacent landowners and other nearby landowners who might consider themselves affected by the activities described by this application. Cross-reference this list to the map through the use of appropriate keying techniques. The map should be a USGS map, a city or county plat, or another map, sketch, or drawing with a scale adequate enough to show the cross-referenced affected landowners. The list should be updated prior to any required public notice. For all applications (with the exception of Class 1 and Class 11 modifications) this mailing list should be submitted on:

1. a Compact Disk (CD) using software compatible with MS Word [30 TAC 39.5(b)]; or
2. four sets of printed labels.

If the adjacent landowners list is submitted on a compact disk (CD), please label the disk with the applicant's name and permit number. Within the file stored on the disk, type the permit number and applicant's name on the top line before typing the addresses. Names and addresses must be typed in the format indicated below. This format is required by the U.S. Postal Service for machine readability. Each letter in the name and address must be capitalized, contain no punctuation, and the appropriate two-character abbreviation must be used for the state. Each entity listed must be blocked and spaced consecutively as shown below. The list is to be 30 names, addresses, etc. (10 per column) per page (MS WORD Avery Standard 5160 – ADDRESS template).

Example:

Industrial Hazardous Waste Permit No. 50000, Texas Chemical Plant  
TERRY M JENKINS  
RR 1 BOX 34  
WACO TX 76710  
  
MR AND MRS EDWARD PEABODY  
1405 MONTAGUE LN  
WACO TX 76710-1234

A list submitted on compact disk (CD) should be the only item on that disk. Please do not submit a list on a disk that includes maps or other materials submitted with your application.



If you wish to provide the list on printed labels, please use sheets of labels that have 30 labels to a page (10 labels per column) (for example: Avery® Easy Peel® White Address Labels for Laser Printers 5160). Please provide four complete sets of labels of the adjacent landowners list.

#### H. TCEQ Core Data Form

The TCEQ requires that a Core Data Form (Form 10400) be submitted on all incoming applications unless a Regulated Entity and Customer Reference Number have been issued by the TCEQ and no core data information has changed. For more information regarding the Core Data Form, call (512) 239-1575 or go to the TCEQ Web site at [http://www.tceq.texas.gov/permitting/central\\_registry/guidance.html](http://www.tceq.texas.gov/permitting/central_registry/guidance.html)

**The facility already has the following Regulated Entity and Customer Reference Number issued by the TCEQ:**

**RN Number: RN100674613, CN Number: CN600131098**

#### I. Signature on Application

It is the duty of the operator to submit an application for a permit. The person who signs the application form will often be the operator himself; when another person signs on behalf of the applicant, his title or relationship to the applicant will be shown. In all cases, the person signing the form must be authorized to do so by the applicant. An application submitted by a corporation must be signed by a responsible corporate officer such as a president, secretary, treasurer, vice president, or by his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the activity described in the form originates. In the case of a partnership or a sole proprietorship, the application must be signed by a general partner or the proprietor, respectively. In the case of a municipal, state, federal, or other public facility, the application must be signed by a principal executive officer, a ranking elected official, or another duly authorized employee. A person signing an application on behalf of an applicant must provide notarized proof of authorization.

**Signature Page**

I, Bob Grimalta, UP Safety,  
(Operator) (Title)

certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: R M Grimalta Date: 12/5/14

**To Be Completed By The Operator If The Application Is Signed By An Authorized Representative For The Operator**

I, \_\_\_\_\_, hereby designate \_\_\_\_\_  
(Print or Type Name) (Print or Type Name)

as my representative and hereby authorize said representative to sign any application, submit additional information as may be requested by the Commission; and/or appear for me at any hearing or before the Texas Commission on Environmental Quality in conjunction with this request for a Texas Water Code or Texas Solid Waste Disposal Act permit. I further understand that I am responsible for the contents of this application, for oral statements given by my authorized representative in support of the application, and for compliance with the terms and conditions of any permit which might be issued based upon this application.

\_\_\_\_\_  
Printed or Typed Name of Operator or Principal Executive Officer

\_\_\_\_\_  
Signature

SUBSCRIBED AND SWORN to before me by the said Robert M. Grimalta

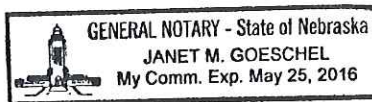
On this 5<sup>th</sup> day of December, 2014.

My commission expires on the 25<sup>th</sup> day of May, 2016

Notary Public in and for Douglas County, Nebraska

Janet M. Goeschel

(Note: Application Must Bear Signature & Seal of Notary Public)



**Attachment I.G**

**NOTIFICATION LIST AND MAP**

Union Pacific Houston Wood Preserving Works  
Houston, Texas

**TABLE I-1**  
**LANDOWNERS CROSS REFERENCED TO ADJACENT LANDOWNER MAP**  
**UNION PACIFIC HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TEXAS**

MAP ID <sup>1</sup>	HCAD ID <sup>2</sup>	PARCEL ADDRESS	PARCEL OWNER	OWNER MAILING ADDRESS		
				Street/PO #	City, State	Zip Code
1	0140410000002	5311 Liberty Rd	ELMER PRESTON TRUST	3319 LIBERTY RD.	HOUSTON, TX	77026
2	0140410000007	5301 Liberty Rd	GENEVA HENRY	5301 LIBERTY RD.	HOUSTON, TX	77026
3	0141420000006	2809 Erastus St. #1	CHARITY BAPTIST CHURCH	2809 ERASTUS ST. #1	HOUSTON, TX	77026
4	0141420000008	5201 Liberty Rd	FULL GOSPEL CHRISTIAN ASSN	5201 LIBERTY RD.	HOUSTON, TX	77026
5	0141420000009	5201 Liberty Rd	FULL GOSPEL CHRISTIAN ASSN	5201 LIBERTY RD.	HOUSTON, TX	77026
6	0141430000006	5117 Liberty Rd	JORGE D RIVERA	5117 LIBERTY RD.	HOUSTON, TX	77026
7	0141430000011	5113 Liberty Rd	HARRIS COUNTY CAUSE NO. 2003-22512	PO BOX 1525	HOUSTON, TX	77521
8	0141430000007	5109 Liberty Rd	JOE H MARTINEZ	5109 LIBERTY RD.	HOUSTON, TX	77026
9	0141430000008	5105 Liberty Rd	ALEJANDRO GONZALEZ	4088 PAMELA WAY	MONTGOMERY, TX	77316
10	0141430000010	5101 Liberty Rd	WALLACE R & JANIE LONGORIA	1510 BEALL ST.	HOUSTON, TX	77008
11	0141440000004	5005 Liberty Rd.	GREATER MOUNT NEBO BAPTIST CHURCH	4511 EDDIE ST.	HOUSTON, TX	77026
12	0402660100001	2904 Lavender St.	GREATER MOUNT NEBO MISSIONARY BAPTIST	5005 LIBERTY RD.	HOUSTON, TX	77026
13	0402660100007	2909 Lavender St.	2013 COTTAGE LLC	PO BOX 74109	HOUSTON, TX	77274
14	0040580000001	2902 Wipprecht St. #18	2902 WIPPRECHT LLC	4110 RAND ST.	HOUSTON, TX	77026
15	0040570000005	4713 Liberty Rd.	RAY P MONTALBANO	14814 HEATHER VALLEY WA	HOUSTON, TX	77062
16	0040570000008	4705 Liberty Rd.	JOANNETTA HALL	4705 LIBERTY RD.	HOUSTON, TX	77026
17	0040560000006	4615 Liberty Rd.	SHARON ANN BOLDEN	3215 MARKET ST.	HOUSTON, TX	77020
18	0040560000007	4605 Liberty Rd.	ROY ONTIVEROS	4606 WYLIE ST.	HOUSTON, TX	77026
19	0040560000008	0 Liberty St.	ROY ONTIVEROS	4606 WYLIE ST.	HOUSTON, TX	77026
20	0040560000009	4603 Liberty Rd.	ROY ONTIVEROS	4606 WYLIE ST.	HOUSTON, TX	77026
21	0040560000010	4601 Liberty Rd.	OSCAR ZEPEDA	320 W. 34TH ST.	HOUSTON, TX	77018
22	0040550000006	4517 Liberty Rd. #1	ROBERTY REYES	4517 LIBERTY RD.	HOUSTON, TX	77026
23	0040590000022	0 Liberty Rd.	FIRST MACEDONIA MISSIONARY CHURCH	4511 EDDIE ST.	HOUSTON, TX	77026
24	0040590000005	4518 Liberty Rd.	CHAK R HSUI	800 COUNTRY PLACE DR. #100	HOUSTON, TX	77079
25	0040590000006	0 Courtney St.	WILLIE MAE BOOKER	1618 OJEMAN RD. APT. 2	HOUSTON, TX	77055
26	0040630000005	4518 Courtney St.	ANTHONY TYRONE ROSIGNON	4518 COURTNEY ST.	HOUSTON, TX	77026
27	0040630000006	2803 Kashmere St.	SHIRLEY A WHITEHEAD	PO BOX 51	THOMPSONS, TX	77481

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LANDOWNERS CROSS REFERENCED TO ADJACENT LANDOWNER MAP  
UNION PACIFIC HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

MAP ID <sup>1</sup>	HCAD ID <sup>2</sup>	PARCEL ADDRESS	PARCEL OWNER	OWNER MAILING ADDRESS		
				Street/PO #	City, State	Zip Code
28	0141380000008	4508 Eddie St.	HESTER HENDERSON	4508 EDDIE ST.	HOUSTON, TX	77026
29	0141380000004	2604 Amboy St.	MARY L CRAIN WILEY ESTATE	2604 AMBOY ST.	HOUSTON, TX	77026
30	0402530000055	2603 Amboy St.	ROBERT L MILLS	2603 AMBOY ST.	HOUSTON, TX	77026
31	0402530000056	2603 Amboy St.	ROBERT L MILLS	2603 AMBOY ST.	HOUSTON, TX	77026
32	0402530000030	0 Quitman St.	MICHAEL L PROLER	4401 CLINTON DR.	HOUSTON, TX	77020
33	0082430000001	0 1st St.	CENTERPOINT ENERGY INTRASTATE PIPELINE INC. ATTN:	PO BOX 1475	HOUSTON, TX	77251
34	0402530000040	4428 Quitman St.	EUSTAQUIO BANDA	4428 QUITMAN ST.	HOUSTON, TX	77026
35	0402530000034	4424 Quitman St.	ESTATE OF WILSON BOATWRIGHT	7027 FALLING CHERRY PL.	HOUSTON, TX	77049
36	0402530000033	4422 Quitman St.	RE MART INVESTMENT	PO BOX 65	BARKER, TX	77413
37	0402530000032	4420 Quitman St.	DIANE V. WILLIAMS	4420 QUITMAN ST.	HOUSTON, TX	77026
38	0402530000058	4416 Quitman St.	ISAAC WILLIAMS	1325 DIXIELAND RD. UNIT 79	HARLINGEN, TX	78552
39	0402530000031	4414 Quitman St.	BETTY LOUISE WILLIAMS	4414 QUITMAN ST.	HOUSTON, TX	77026
40	0402530000067	0 Kirk St.	LIGHT OF THE WORLD CDC	PO BOX 416	HUMBLE, TX	77347
41	0402530000020	2202 Kirk St.	HILDA MAE JENKINS	2202 KIRK ST.	HOUSTON, TX	77026
42	0402530000021	2200 Kirk St.	ROBERT LEE WILLIAMS	2200 KIRK ST.	HOUSTON, TX	77026
43	0402530000023	2120 Kirk St.	SIDNEY WILLIAMS	549 S. LUCERNE BLVD.	LOS ANGELES, CA	90020
44	0402530000022	2118 Kirk St.	LIGHT OF THE WORLD CDC	PO BOX 416	HUMBLE, TX	77347
45	0402530000024	2114 Kirk St.	L. MICHAEL PROLER	4401 CLINTON DR.	HOUSTON, TX	77020
46	0402530000039	2114 Kirk St.	BEHZAD NASIZADEH	615 KELLEY ST.	HOUSTON, TX	77009
47	0402530000059	2115 Kirk St.	T. T. MAI	12819 BONNIE LN.	STAFFORD, TX	77477
48	0402530000009	2316 Altoona St.	MRS. NANETTE C. LIPPER	PO BOX 35773	HOUSTON, TX	77235
49	0720900040019	2316 Waco St.	ESTHER L. JONES	10618 WOODWICK ST.	HOUSTON, TX	77016
50	0720900040002	0 Lee	T J ET UX DAVIS	6702 COVINGTON DR.	HOUSTON, TX	77091
51	0720900040003	4410 Lee St.	YOUN SOYOUN	12625 MEMORIAL DR. APT. 91	HOUSTON, TX	77024
52	0720900040004	4414 Lee St.	WELDON R. THOMAS JR.	5207 KINGSBURY ST.	HOUSTON, TX	77021
53	0720900040005	4418 Lee St.	EARNEST POLLARD	3817 WAYNE ST.	HOUSTON, TX	77026
54	0720900040006	4422 Lee St.	IVORY J MCALPIN	4422 LEE ST.	HOUSTON, TX	77020
55	0720900040007	4434 Lee St.	JAMES AND DORIS MURPHY	8747 COWART ST.	HOUSTON, TX	77029

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HOUSTON, TEXAS**

MAP ID <sup>1</sup>	HCAD ID <sup>2</sup>	PARCEL ADDRESS	PARCEL OWNER	OWNER MAILING ADDRESS		
				Street/PO #	City, State	Zip Code
56	0720900040008	4438 Lee St.	SOUTH BY NORTHWEST LIMITED PARTNERSHIP	1529 MARYLAND ST.	HOUSTON, TX	77006
57	0720900040009	4440 Lee St.	BEULAH MC GOWEN	5214 LYONS AVE.	HOUSTON, TX	77020
58	0720900040020	4448 Lee St.	GENTRY THOMAS	5826 THRUSH DR.	HOUSTON, TX	77033
59	0040910000001	2318 Dan St.	ARTHUR LEE AND MARY SMITH	PO BOX 311387	HOUSTON, TX	77231
60	0040910000002	4506 Lee St.	CORINE A AND TOMMIE HEADS JR.	4506 LEE ST.	HOUSTON, TX	77020
61	0040910000003	4512 Lee St.	SOUTH BY NORTHWEST LP	1529 MARYLAND ST.	HOUSTON, TX	77006
62	0040910000004	4520 Lee St.	HOUSTON HABITAT FOR HUMANITY INC.	3750 N. MCCARTY ST.	HOUSTON, TX	77029
63	0040910000011	0 Lee St.	HOUSTON HABITAT FOR HUMANITY INC.	3750 N. MCCARTY ST.	HOUSTON, TX	77029
64	0040920000001	4602 Lee St.	HAROLD AND IRMA WASHINGTON	7610 S. HALL ST.	HOUSTON, TX	77028
65	0040920000003	0 Lee	E. DAVIS	ADDRESS UNKNOWN	--	--
66	0040920000004	0 Lee	ANNIE MEEKS	9918 BERTWOOD ST.	HOUSTON, TX	77016
67	1284110010001	2311 Schweikhardt St.	LYNN R. AND ROSA E. BOLING	3785 ROBINHOOD ST.	HOUSTON, TX	77005
68	0040930000001	4700 Lee St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
69	0040930000002	4702 Lee St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
70	0040930000003	4710 Lee St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
71	0040930000005	4722 Lee St.	GREAT MT. SHARON MISSIONARY BAPTIST CHURCH	4722 LEE ST.	HOUSTON, TX	77020
72	0040940000001	4800 Lee St.	GREGORY K. RICHARD	4800 LEE ST.	HOUSTON, TX	77020
73	0040940000002	4806 Lee St.	COUNTY OF HARRIS ET AL. SUIT NO. 2012-25155	PO BOX 1525	HOUSTON, TX	77251
74	0040940000003	4810 Lee St.	FRANKIE L. PATTERSON	10011 LOST TRAIL ST.	HOUSTON, TX	77088
75	0150640000011	4902 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021
76	0150640000012	4904 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021
77	0150640000014	4906 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021
78	0150640000015	4908 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021

**TABLE I-1  
LANDOWNERS CROSS REFERENCED TO ADJACENT LANDOWNER MAP  
UNION PACIFIC HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

MAP ID <sup>1</sup>	HCAD ID <sup>2</sup>	PARCEL ADDRESS	PARCEL OWNER	OWNER MAILING ADDRESS		
				Street/PO #	City, State	Zip Code
79	0150640000016	4910 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021
80	0150640000017	4912 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021
81	0150640000018	4914 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021
82	0150640000019	4916 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021
83	0150640000020	4918 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021
84	0150640000021	4920 Lee St.	TEXAS REAL ESTATE DEVELOPMENTS LP	4702 OLD SPANISH TRAIL	HOUSTON, TX	77021
85	0150630000001	5002 Lee St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
86	0150630000002	5006 Lee St.	MATTIE LEE NELMS	5006 LEE ST.	HOUSTON, TX	77020
87	0150630000003	5010 Lee St.	ESTATE OF RENDIE EDWARDS ESTATE OF JEFF EDWARDS	5010 LEE ST.	HOUSTON, TX	77020
88	0150630000005	2111 Clementine St.	CORNELL HARRIS	6210 DARLINGHURST DR.	HOUSTON, TX	77085
89	0150620000001	5102 Lee St.	L. WHITAKER JR.	5102 LEE ST.	HOUSTON, TX	77020
90	0150620000003	5114 Lee St.	WILLIAM E. JOHNSON	4903 LEFFINGWELL ST.	HOUSTON, TX	77026
91	0150620000004	5118 Lee St.	ISAAC HENSLEY, ESTATE OF MARY RICE HENSLEY	5163 VILLAGE CT.	SAN ANTONIO, TX	78218
92	0150620000005	5120 Lee St.	RICHARD LEWIS	ADDRESS UNKNOWN	--	--
93	0150610000001	0 Lee St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
94	0150610000002	0 Lee St.	CINCO CAPITAL CORP.	PO BOX 262581	HOUSTON, TX	77207
95	0150610000003	5210 Lee St.	ULYSSES JONES	4304 NICHOLS ST.	HOUSTON, TX	77020
96	0150610000004	5214 Lee St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
97	0150610000005	2215 Erastus St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
98	0131220000004	2222 Erastus St. #7	ALBERT J. ZARZANA	12322 KIMBERLEY LN.	HOUSTON, TX	77024
99	0131190000001	5301 Lee St.	GLORIA EATMON	5301 LEE ST.	HOUSTON, TX	77020
100	0131190000002	2308 Erastus St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
101	0131190000003	2310 Erastus St.	EDISON A. BROOKS	7727 MILEY ST.	HOUSTON, TX	77028
102	0131190000004	2316 Erastus St.	FORTINO AND M. CONSUELO SALDANA	2316 ERASTUS ST.	HOUSTON, TX	77020
103	0131190000005	2318 Erastus St.	RVP REALTY GROUP LLC	2450 LOUISIANA ST. STE 400-918	HOUSTON, TX	77006
104	0131160000001	5301 Suez St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006

**TABLE I-1  
LANDOWNERS CROSS REFERENCED TO ADJACENT LANDOWNER MAP  
UNION PACIFIC HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

MAP ID <sup>1</sup>	HCAD ID <sup>2</sup>	PARCEL ADDRESS	PARCEL OWNER	OWNER MAILING ADDRESS		
				Street/PO #	City, State	Zip Code
105	0131160000004	2416 Erastus St.	ROBBIE M. JOHNSON	25611 VELVET ROSE	SAN ANTONIO, TX	78260
106	0131160000005	2418 Erastus St.	MARCOS AND MIREYRA REYES	2418 ERASTUS ST.	HOUSTON, TX	77020
107	0131160000006	2420 Erastus St.	ISAAC CARTER REV ESTATE RUBY A. YOUNG	9219 OAK KNOLL LN.	HOUSTON, TX	77078
108	0131160000007	2423 Harlem St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
109	0131170000006	2426 Harlem St.	TRUDIE D. THOMAS	PO BOX 1473	LA PORTE, TX	77572
110	0131140000001	5401 Sudan St.	JOYCE M. BRYAN	10910 BRIDLEPARK CIR.	HOUSTON, TX	77016
111	0131140000002	2504 Harlem St.	SOUTH BY NORTHWEST LTD	1529 MARYLAND ST.	HOUSTON, TX	77006
112	0131140000003	2506 Harlem St.	RE-MART INVESTMENT	PO BOX 65	BARKER, TX	77413
113	0131140000004	0 Harlem	GEORGE SAMUEL	4614 WIPPRECHT ST.	HOUSTON, TX	77026
114	0131140000005	9215 Lockwood	HAROLD J HENRY	9215 LOCKWOOD DR.	HOUSTON, TX	77016
115	0131140000006	2522 Harlem St.	GEORGE SAMUEL	2522 HARLEM ST.	HOUSTON, TX	77020

Notes:

<sup>1</sup>Map ID numbers as shown on Figure I-1.

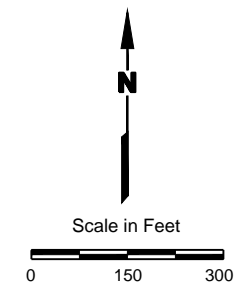
<sup>2</sup>Parcel locations, descriptions, addresses and owner information from Houston Central Appraisal District (<http://www.hcad.org/records/default.asp>), November 2014.





**EXPLANATION**

- UPRR Property Boundary
- UPRR Facility Boundary
- Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- Fence
- Railroad
- Adjacent Landowner Parcel (See Table I-1 for parcel and landowner information)



SOURCE:  
Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.

 **UNION PACIFIC RAILROAD CO.**  
HOUSTON WOOD PRESERVING WORKS

Figure I-1  
**ADJACENT LANDOWNERS MAP**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

ELMER PRESTON TRUST  
3319 LIBERTY RD.  
HOUSTON, TX 77026

GENEVA HENRY  
5301 LIBERTY RD.  
HOUSTON, TX 77026

CHARITY BAPTIST CHURCH  
2809 ERASTUS ST. #1  
HOUSTON, TX 77026

FULL GOSPEL CHRISTIAN ASSN  
5201 LIBERTY RD.  
HOUSTON, TX 77026

FULL GOSPEL CHRISTIAN ASSN  
5201 LIBERTY RD.  
HOUSTON, TX 77026

JORGE D RIVERA  
5117 LIBERTY RD.  
HOUSTON, TX 77026

HARRIS COUNTY CAUSE NO. 2003-  
22512  
PO BOX 1525  
HOUSTON, TX 77521

JOE H MARTINEZ  
5109 LIBERTY RD.  
HOUSTON, TX 77026

ALEJANDRO GONZALEZ  
4088 PAMELA WAY  
MONTGOMERY, TX 77316

WALLACE R & JANIE LONGORIA  
1510 BEALL ST.  
HOUSTON, TX 77008

GREATER MOUNT NEBO BAPTIST  
CHURCH  
4511 EDDIE ST.  
HOUSTON, TX 77026

GREATER MOUNT NEBO  
MISSIONARY BAPTIST  
5005 LIBERTY RD.  
HOUSTON, TX 77026

2013 COTTAGE LLC  
PO BOX 74109  
HOUSTON, TX 77274

2902 WIPPRECHT LLC  
4110 RAND ST.  
HOUSTON, TX 77026

RAY P MONTALBANO  
14814 HEATHER VALLEY WAY  
HOUSTON, TX 77062

JOANNETTA HALL  
4705 LIBERTY RD.  
HOUSTON, TX 77026

SHARON ANN BOLDEN  
3215 MARKET ST.  
HOUSTON, TX 77020

ROY ONTIVEROS  
4606 WYLIE ST.  
HOUSTON, TX 77026

ROY ONTIVEROS  
4606 WYLIE ST.  
HOUSTON, TX 77026

ROY ONTIVEROS  
4606 WYLIE ST.  
HOUSTON, TX 77026

OSCAR ZEPEDA  
320 W. 34TH ST.  
HOUSTON, TX 77018

ROBERTY REYES  
4517 LIBERTY RD.  
HOUSTON, TX 77026

FIRST MACEDONIA MISSIONARY  
CHURCH  
4511 EDDIE ST.  
HOUSTON, TX 77026

CHAK R HSUI  
800 COUNTRY PLACE DR. #1007  
HOUSTON, TX 77079

WILLIE MAE BOOKER  
1618 OJEMAN RD. APT. 2  
HOUSTON, TX 77055

ANTHONY TYRONE ROSIGNON  
4518 COURTNEY ST.  
HOUSTON, TX 77026

SHIRLEY A WHITEHEAD  
PO BOX 51  
THOMPSONS, TX 77481

HESTER HENDERSON  
4508 EDDIE ST.  
HOUSTON, TX 77026

MARY L CRAIN WILEY ESTATE  
2604 AMBOY ST.  
HOUSTON, TX 77026

ROBERT L MILLS  
2603 AMBOY ST.  
HOUSTON, TX 77026

ROBERT L MILLS  
2603 AMBOY ST.  
HOUSTON, TX 77026

MICHAEL L PROLER  
4401 CLINTON DR.  
HOUSTON, TX 77020

CENTERPOINT ENERGY  
ATTN: AD VALOREM TAX DEPT.  
PO BOX 1475  
HOUSTON, TX 77251

EUSTAQUIO BANDA  
4428 QUITMAN ST.  
HOUSTON, TX 77026

ESTATE OF WILSON  
BOATWRIGHT  
7027 FALLING CHERRY PL.  
HOUSTON, TX 77049

RE MART INVESTMENT  
PO BOX 65  
BARKER, TX 77413

DIANE V. WILLIAMS  
4420 QUITMAN ST.  
HOUSTON, TX 77026

ISAAC WILLIAMS  
1325 DIXIELAND RD. UNIT 79  
HARLINGEN, TX 78552

BETTY LOUISE WILLIAMS  
4414 QUITMAN ST.  
HOUSTON, TX 77026

LIGHT OF THE WORLD CDC  
PO BOX 416  
HUMBLE, TX 77347

HILDA MAE JENKINS  
2202 KIRK ST.  
HOUSTON, TX 77026

ROBERT LEE WILLIAMS  
2200 KIRK ST.  
HOUSTON, TX 77026

SIDNEY WILLIAMS  
549 S. LUCERNE BLVD.  
LOS ANGELES, CA 90020

LIGHT OF THE WORLD CDC  
PO BOX 416  
HUMBLE, TX 77347

L. MICHAEL PROLER  
4401 CLINTON DR.  
HOUSTON, TX 77020

BEHZAD NASIZADEH  
615 KELLEY ST.  
HOUSTON, TX 77009

T. T. MAI  
12819 BONNIE LN.  
STAFFORD, TX 77477

MRS. NANETTE C. LIPPER  
PO BOX 35773  
HOUSTON, TX 77235

ESTHER L. JONES  
10618 WOODWICK ST.  
HOUSTON, TX 77016

T J ET UX DAVIS  
6702 COVINGTON DR.  
HOUSTON, TX 77091

YOUN SOYOUN  
12625 MEMORIAL DR. APT. 91  
HOUSTON, TX 77024

WELDON R. THOMAS JR.  
5207 KINGSBURY ST.  
HOUSTON, TX 77021

EARNEST POLLARD  
3817 WAYNE ST.  
HOUSTON, TX 77026

IVORY J MCALPIN  
4422 LEE ST.  
HOUSTON, TX 77020

JAMES AND DORIS MURPHY  
8747 COWART ST.  
HOUSTON, TX 77029

SOUTH BY NORTHWEST LIMITED  
PARTNERSHIP  
1529 MARYLAND ST.  
HOUSTON, TX 77006

BEULAH MC GOWEN  
5214 LYONS AVE.  
HOUSTON, TX 77020

GENTRY THOMAS  
5826 THRUSH DR.  
HOUSTON, TX 77033

ARTHUR LEE AND MARY SMITH  
PO BOX 311387  
HOUSTON, TX 77231

CORINE A AND TOMMIE HEADS  
JR.  
4506 LEE ST.  
HOUSTON, TX 77020

SOUTH BY NORTHWEST LP  
1529 MARYLAND ST.  
HOUSTON, TX 77006

HOUSTON HABITAT FOR  
HUMANITY INC.  
3750 N. MCCARTY ST.  
HOUSTON, TX 77029

HOUSTON HABITAT FOR  
HUMANITY INC.  
3750 N. MCCARTY ST.  
HOUSTON, TX 77029

HAROLD AND IRMA  
WASHINGTON  
7610 S. HALL ST.  
HOUSTON, TX 77028

E. DAVIS  
ADDRESS UNKNOWN  
-- --

ANNIE MEEKS  
9918 BERTWOOD ST.  
HOUSTON, TX 77016

LYNN R. AND ROSA E. BOLING  
3785 ROBINHOOD ST.  
HOUSTON, TX 77005

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

GREAT MT. SHARON MISSIONARY  
BAPTIST CHURCH  
4722 LEE ST.  
HOUSTON, TX 77020

GREGORY K. RICHARD  
4800 LEE ST.  
HOUSTON, TX 77020

COUNTY OF HARRIS ET AL. SUIT  
NO. 2012-25155  
PO BOX 1525  
HOUSTON, TX 77251

FRANKIE L. PATTERSON  
10011 LOST TRAIL ST.  
HOUSTON, TX 77088

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

TEXAS REAL ESTATE  
DEVELOPMENTS LP  
4702 OLD SPANISH TRAIL  
HOUSTON, TX 77021

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

MATTIE LEE NELMS  
5006 LEE ST.  
HOUSTON, TX 77020

ESTATE OF RENDIE EDWARDS  
ESTATE OF JEFF EDWARDS  
5010 LEE ST.  
HOUSTON, TX 77020

CORNELL HARRIS  
6210 DARLINGHURST DR.  
HOUSTON, TX 77085

L. WHITAKER JR.  
5102 LEE ST.  
HOUSTON, TX 77020

WILLIAM E. JOHNSON  
4903 LEFFINGWELL ST.  
HOUSTON, TX 77026

ISAAC HENSLEY, ESTATE OF  
MARY RICE HENSLEY  
5163 VILLAGE CT.  
SAN ANTONIO, TX 78218

RICHARD LEWIS  
ADDRESS UNKNOWN  
-- --

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

CINCO CAPITAL CORP.  
PO BOX 262581  
HOUSTON, TX 77207

ULYSSES JONES  
4304 NICHOLS ST.  
HOUSTON, TX 77020

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

ALBERT J. ZARZANA  
12322 KIMBERLEY LN.  
HOUSTON, TX 77024

GLORIA EATMON  
5301 LEE ST.  
HOUSTON, TX 77020

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

EDISON A. BROOKS  
7727 MILEY ST.  
HOUSTON, TX 77028

FORTINO AND M. CONSUELO  
SALDANA  
2316 ERASTUS ST.  
HOUSTON, TX 77020

RVP REALTY GROUP LLC  
2450 LOUISIANA ST. STE 400-918  
HOUSTON, TX 77006

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

ROBBIE M. JOHNSON  
25611 VELVET ROSE  
SAN ANTONIO, TX 78260

MARCOS AND MIREYRA REYES  
2418 ERASTUS ST.  
HOUSTON, TX 77020

ISAAC CARTER REV ESTATE  
RUBY A. YOUNG  
9219 OAK KNOLL LN.  
HOUSTON, TX 77078

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

TRUDIE D. THOMAS  
PO BOX 1473  
LA PORTE, TX 77572

JOYCE M. BRYAN  
10910 BRIDLEPARK CIR.  
HOUSTON, TX 77016

SOUTH BY NORTHWEST LTD  
1529 MARYLAND ST.  
HOUSTON, TX 77006

RE-MART INVESTMENT  
PO BOX 65  
BARKER, TX 77413

GEORGE SAMUEL  
4614 WIPPRECHT ST.  
HOUSTON, TX 77026

HAROLD J HENRY  
9215 LOCKWOOD DR.  
HOUSTON, TX 77016

GEORGE SAMUEL  
2522 HARLEM ST.  
HOUSTON, TX 77020

**Attachment I.H**

**UPDATED CORE DATA FORM**

Union Pacific Houston Wood Preserving Works  
Houston, Texas



TCEQ Use Only

# TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

## SECTION I: General Information

<b>1. Reason for Submission</b> (If other is checked please describe in space provided)			
<input type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application)			
<input checked="" type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)		<input checked="" type="checkbox"/> Other <b>Regulated Entity Name Change</b>	
<b>2. Attachments</b> Describe Any Attachments: (ex. Title V Application, Waste Transporter Application, etc.)			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
<b>3. Customer Reference Number (if issued)</b>		<b>4. Regulated Entity Reference Number (if issued)</b>	
CN 600131098		RN 100674613	
<a href="#">Follow this link to search for CN or RN numbers in Central Registry**</a>			

## SECTION II: Customer Information

<b>5. Effective Date for Customer Information Updates (mm/dd/yyyy)</b>			
<b>6. Customer Role</b> (Proposed or Actual) – as it relates to the <u>Regulated Entity</u> listed on this form. Please check only <u>one</u> of the following:			
<input type="checkbox"/> Owner	<input type="checkbox"/> Operator	<input checked="" type="checkbox"/> Owner & Operator	
<input type="checkbox"/> Occupational Licensee	<input type="checkbox"/> Responsible Party	<input type="checkbox"/> Voluntary Cleanup Applicant	<input type="checkbox"/> Other: _____
<b>7. General Customer Information</b>			
<input type="checkbox"/> New Customer		<input checked="" type="checkbox"/> Update to Customer Information	
<input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State)		<input type="checkbox"/> Change in Regulated Entity Ownership	
<input type="checkbox"/> No Change**			
<b>**If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.</b>			
<b>8. Type of Customer:</b>		<input checked="" type="checkbox"/> Corporation	<input type="checkbox"/> Individual
<input type="checkbox"/> City Government	<input type="checkbox"/> County Government	<input type="checkbox"/> Federal Government	<input type="checkbox"/> Sole Proprietorship- D.B.A
<input type="checkbox"/> Other Government	<input type="checkbox"/> General Partnership	<input type="checkbox"/> Limited Partnership	<input type="checkbox"/> Other: _____
<b>9. Customer Legal Name</b> (If an individual, print last name first: ex: Doe, John)			<i>If new Customer, enter previous Customer below</i> <b>End Date:</b>
Union Pacific Railroad Company			
<b>10. Mailing Address:</b>	1400 Douglas Street, STOP 1030		
	<b>City</b>	Omaha	<b>State</b> NE
	<b>ZIP</b>	68179	<b>ZIP + 4</b> 1030
<b>11. Country Mailing Information</b> (if outside USA)		<b>12. E-Mail Address</b> (if applicable)	
<b>13. Telephone Number</b>		<b>14. Extension or Code</b>	
( ) -		( ) -	
<b>15. Fax Number</b> (if applicable)			
( ) -			
<b>16. Federal Tax ID</b> (9 digits)	<b>17. TX State Franchise Tax ID</b> (11 digits)	<b>18. DUNS Number</b> (if applicable)	<b>19. TX SOS Filing Number</b> (if applicable)
<b>20. Number of Employees</b>			<b>21. Independently Owned and Operated?</b>
<input type="checkbox"/> 0-20	<input type="checkbox"/> 21-100	<input type="checkbox"/> 101-250	<input type="checkbox"/> 251-500
<input type="checkbox"/> 501 and higher	<input type="checkbox"/> Yes <input type="checkbox"/> No		

## SECTION III: Regulated Entity Information

<b>22. General Regulated Entity Information</b> (If "New Regulated Entity" is selected below this form should be accompanied by a permit application)			
<input type="checkbox"/> New Regulated Entity <input checked="" type="checkbox"/> Update to Regulated Entity Name <input type="checkbox"/> Update to Regulated Entity Information <input type="checkbox"/> No Change** (See below)			
<b>**If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.</b>			
<b>23. Regulated Entity Name</b> (name of the site where the regulated action is taking place)			
Union Pacific Railroad Company Houston Wood Preserving Works			

24. Street Address of the Regulated Entity: (No P.O. Boxes)	4910 Liberty Road						
	City	Houston	State	TX	ZIP	77026	ZIP + 4
25. Mailing Address:	24125 Aldine Westfield Rd.						
	City	Spring	State	TX	ZIP	77373	ZIP + 4
26. E-Mail Address:	GBREEDER@UP.COM						
27. Telephone Number	28. Extension or Code			29. Fax Number (if applicable)			
( 281 ) 350-7197				( 402 ) 233-2351			
30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)		32. Primary NAICS Code (5 or 6 digits)		33. Secondary NAICS Code (5 or 6 digits)		
4011			482111				
34. What is the Primary Business of this entity? (Please do not repeat the SIC or NAICS description.)							

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:							
36. Nearest City	County			State		Nearest ZIP Code	
37. Latitude (N) In Decimal:	38. Longitude (W) In Decimal:						
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds		

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

<input type="checkbox"/> Dam Safety	<input type="checkbox"/> Districts	<input type="checkbox"/> Edwards Aquifer	<input type="checkbox"/> Industrial Hazardous Waste	<input type="checkbox"/> Municipal Solid Waste
<input type="checkbox"/> New Source Review – Air	<input type="checkbox"/> OSSF	<input type="checkbox"/> Petroleum Storage Tank	<input type="checkbox"/> PWS	<input type="checkbox"/> Sludge
<input type="checkbox"/> Stormwater	<input type="checkbox"/> Title V – Air	<input type="checkbox"/> Tires	<input type="checkbox"/> Used Oil	<input type="checkbox"/> Utilities
<input type="checkbox"/> Voluntary Cleanup	<input type="checkbox"/> Waste Water	<input type="checkbox"/> Wastewater Agriculture	<input type="checkbox"/> Water Rights	<input type="checkbox"/> Other:


#### SECTION IV: Preparer Information

40. Name:	Geoffrey Reeder		41. Title:	Manager, Site Remediation	
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address		
( 281 ) 350-7197		( 402 ) 233-2351	GBREEDER@UP.COM		

#### SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	Union Pacific Railroad Company		Job Title:	Manager, Site Remediation	
Name (In Print):	Geoffrey Reeder			Phone:	( 281 ) 350-7197
Signature:				Date:	12/05/14



## II. Facility Siting Criteria

For all new hazardous waste management facilities or areal expansions of existing hazardous waste management facilities provide a Site Selection Report for the facility which includes all information regarding Unsuitable Site Characteristics found in 30 TAC 335 Subchapter G. The report must address each requirement applicable to the type of activity submitted in the application. Reference specific rule numbers whenever possible. Supporting information may be cross-referenced to other parts of this application such as Section V - Engineering Report or Section VI - Geology Report, but information submitted in previous applications must be fully reproduced herein. In addition, provide the information in Sections II.A through II.G below.

For permit renewals provide a Site Selection Report for the facility which includes all information regarding Unsuitable Site Characteristics found in 30 TAC 335 Subchapter G. In addition, provide the information in Sections II.A through II.B below. The applicant may resubmit the information submitted with the original permit application provided this information has not changed. For a renewal this information is necessary to ensure a complete application is received.

Existing hazardous waste management facilities and capacity expansions of existing facilities need only complete Section II.F. and the applicable portions of II.G. Please note however, that additional technical information may be requested to address any facility siting characteristics noted in Section I.E.

### A. Requirements for Storage or Processing Facilities, Land Treatment Facilities, Waste Piles, Storage Surface Impoundments, and Landfills.

**Not Applicable – Closed Surface Impoundment was clean closed. Request for No Further Action for the unit provided in Section VII and Section XI (Compliance Plan Attachment D).**

Is the facility located or proposed to be located:

1. in wetlands? [as applicable: 30 TAC 335.204(a)(2), (b)(2), (c)(2), (d)(2), and/or (e)(2)]  
 Yes  No

Provide the source of information.

**If Yes**, the TCEQ shall not issue a permit for a new hazardous waste management facility or areal expansion of an existing facility into wetlands, pursuant to 30 TAC 335.205(a)(1).

2. in the critical habitat of an endangered species of plant or animal? [as applicable: 30 TAC 335.204(a)(8), (b)(10), (c)(9), (d)(9), and/or (e)(11)]  
 Yes  No

Provide the source of information.

**If Yes**, then submit in Section V information demonstrating that design, construction, and operational features will prevent adverse effects on such critical habitat.

3. on the recharge zone of a sole-source aquifer? [30 TAC 335.204(a)(3), (b)(3), (c)(3), (d)(3), and/or (e)(3)]  
 Yes  No

Provide the source of the information.

**If Yes**, then for storage and processing facilities (excluding storage surface impoundments), submit in Section V information demonstrating that secondary containment is provided to preclude migration to groundwater from spills, leaks, or discharges.

**Note:** Land treatment facilities, waste piles, storage surface impoundments, and landfills may not be located on the recharge zone of a sole-source aquifer.

4. in an area overlying a regional aquifer? [as applicable: 30 TAC 335.204(a)(4), (b)(4), (c)(4), (d)(4), and/or (e)(4)]  
 Yes  No

Provide the source of information.

**If Yes**, then submit site-specific information in Section V and/or Section VI demonstrating compliance with 30 TAC 335.205(a)(1).

5. in areas where soil unit(s) are within five feet of the containment structure, or treatment zone, as applicable, that have a Unified Soil Classification of GW, GP, GM, GC, SW, SP, or SM, or a hydraulic conductivity greater than 10-5 cm/sec? [as applicable: 30 TAC 335.204(a)(5), (b)(5), (c)(5), (d)(5), and/or (e)(5)]  
 Yes  No

Provide information to verify the above.

**If Yes**, then provide additional information in Sections V and/or Section VI demonstrating compliance with 30 TAC 335.205(a)(1)

6. in areas of direct drainage within one mile of a lake at its maximum conservation pool level, if the lake is used to supply public drinking water through a public water system? [as applicable: 30 TAC 335.204 (a)(6), (b)(7), (c)(6), and/or (e)(8)].  
 Yes  No

Provide information to verify the above.

**If Yes**, then provide information in Section V demonstrating compliance with 30 TAC 335.205(a)(1).

7. in areas of active geologic processes, including but not limited to erosion, submergence, subsidence, faulting, karst formation, flooding in alluvial flood wash zones, meandering river bank cuttings, or earthquakes? [as applicable: 30 TAC 335.204(a)(7), (b)(8) ,(c)(7), (d)(7), and/or (e)(9)]  
 Yes  No

Provide the source of the information.

**If Yes**, then specify in Section V the design, construction, and operational features of the facility that will prevent adverse effects resulting from the geologic processes.

8. within 30 feet of the upthrown side or 50 feet of the downthrown side of the actual or inferred surface expression of a fault that has reasonably been shown to have caused displacement of shallow Quaternary sediments or of man-made structures? [as applicable: 30 TAC 335.204(a)(9), (b)(12) ,(c)(11), (d)(11), and/or (e)(13)]  
 Yes  No

Provide the source of information.

**If Yes**, then specify in Section V the design, construction, and operational features that will prevent adverse effects resulting from any fault movement.

If a fault is found to be present, the width and location of the actual or inferred surface expression of the fault, including both the identified zone of deformation and the combined uncertainties in locating a fault trace, must be determined by a qualified geologist or geotechnical engineer and reported in Section VI.

## B. Additional Requirements for Land Treatment Facilities [30 TAC 335.204(b)]

### Not Applicable

Is the land treatment facility located or proposed to be located:

1. Within 1000 feet of an established residence, church, school, day care center, surface water body used for a public drinking water supply, or dedicated public park which is in use at the time the notice of intent to file a permit application is filed with the commission, or which is in use at the time the permit application is filed with the commission?  
 Yes  No

**If Yes**, the TCEQ shall not issue a permit for a new hazardous waste land treatment unit or an areal expansion of an existing land treatment unit, pursuant to 30 TAC 335.204(b)(6) and 335.205(a).

2. either
  - a. within 1000 feet of an area subject to active coastal shoreline erosion even though the area is protected by a barrier island or peninsula?  
 Yes  No

**If Yes**, then submit in Section V.F design, construction, and operational features which will prevent adverse effects resulting from storm surge and erosion or scouring by water.

- b. within 5000 feet of a coastal shoreline subject to active shoreline erosion and which is unprotected by a barrier island or peninsula.  
 Yes  No

**If Yes**, then submit Section V.F design, construction and operational features, which will prevent adverse effects resulting from storm surge and erosion or scouring by water.

3. on a barrier island or peninsula?  
 Yes  No

**If Yes**, the TCEQ shall not issue a permit for a new hazardous waste land treatment unit or an areal expansion of an existing land treatment unit, pursuant to 30 TAC 335.204(b)(11) and 335.205(a)(1).

#### C. Additional Requirements for Waste Piles [30 TAC 335.204(c)]

##### **Not Applicable**

Is the waste pile located or proposed to be located:

1. either
  - a. within 1000 feet of an area subject to active coastal shoreline erosion even though the area is protected by a barrier island or peninsula?  
 Yes  No

**If Yes**, then submit in Section V.E design, construction, and operational features on the facility which will prevent adverse effects resulting from storm surge and erosion or scouring by water.

- b. within 5000 feet of a coastal shoreline subject to active shoreline erosion and which is unprotected by a barrier island or peninsula.  
 Yes  No

**If Yes**, then submit Section V.E design, construction, and operational features which will prevent adverse effects resulting from storm surge and erosion or scouring by water.

2. on a barrier island or peninsula?  
 Yes  No

**If Yes**, the TCEQ shall not issue a permit for a new hazardous waste pile or an areal expansion of an existing waste pile, pursuant to 30 TAC 335.204(c)(10) and 335.205(a)(1).

#### D. Additional Requirements for Storage Surface Impoundments [30 TAC 335.204(d)]

Is the storage surface impoundment located or proposed to be located:

1. either

- c. within 1000 feet of an area of active coastal shoreline erosion even though the area is protected by a barrier island or peninsula?

Yes  No

**If Yes**, then submit in Section V.D design, construction and operational features of the facility which will prevent adverse effects resulting from storm surge and erosion or scouring by water.

- d. within 5000 feet of a coastal shoreline subject to active shoreline erosion and which is unprotected by a barrier island or peninsula?

Yes  No

**If Yes**, then submit in Section V.D design, construction and operational features which will prevent adverse effects resulting from storm surge and erosion or scouring by water.

2. on a barrier island or peninsula?

Yes  No

**If Yes**, the TCEQ shall not issue a permit for a new hazardous waste storage surface impoundment or an areal expansion of an existing storage surface impoundment, pursuant to 30 TAC 335.204(d)(10) and 335.205(a)(1).

E. Additional Requirements for Landfills (and Surface Impoundments Closed as Landfills with Wastes in Place)

**Not Applicable**

Is the landfill located or proposed to be located:

1. within 1000 feet of an established residence, church, school, day care center, surface water body used for a public drinking water supply, or dedicated public park which is in use at the time the notice of intent to file a permit application is filed with the commission, or which is in use at the time the permit application is filed with the commission?

Yes  No

**If Yes**, the TCEQ shall not issue a permit for a new hazardous waste landfill or an areal expansion of an existing landfill, pursuant to 30 TAC 335.204(e)(6) and 335.205(a)(1).

2. (for commercial hazardous waste landfills) in the 100-year flood plain of a perennial stream that is delineated on a flood map adopted by the Federal Emergency Management Agency after September 1, 1985, as zone A1-99, VO, or V1-30?

Yes  No

**If Yes**, the TCEQ shall not issue a permit for a new hazardous waste landfill or an areal expansion of an existing landfill, pursuant to 30 TAC 335.204(e)(7) and 335.205(a)(1).

3. Either

- a. Within 1000 feet of an area subject to active coastal shoreline erosion even though the area is protected by a barrier island or peninsula?

Yes  No

**If Yes**, then submit in Section V.G design, construction, and operational features which will prevent adverse effects resulting from storm surge and erosion or scouring by water.

- b. Within 5000 feet of a coastal shoreline subject to active shoreline erosion and which is unprotected by a barriers island or peninsula.  
 Yes  No

**If Yes**, then submit in Section V.G design, construction, and operational features which will prevent adverse effects resulting from storm surge and erosion or scouring by water.

4. On a barrier island or peninsula?  
 Yes  No

**If Yes**, the TCEQ shall not issue a permit for a new hazardous waste landfill or an areal expansion of an existing landfill, pursuant to 30 TAC 335.204(e)(12) and 335.205(a)(1).

## F. Flooding

1. Identify whether the facility is located within a 100-year flood plain [40 CFR 270.14(b)(11)(iii)]. This identification must indicate the source of data for such determination and include a copy of relevant documentation (e.g., flood maps, if used and/or calculations). The boundaries of the hazardous waste management facility must be shown on the flood plain map. If the facility is not subject to inundation as a result of a 100-year flood event, do not complete F.2. through F.4. below. An applicant for a proposed hazardous waste landfill, areal expansion of a hazardous waste landfill, or a commercial hazardous waste land disposal unit may not rely solely on flood plain maps prepared by the Federal Emergency Management Agency (FEMA) or a successor agency for this determination.

**According to the June 9, 2014 Federal Emergency Management Agency Flood Insurance Rate Map (Map Number 48201C0690M), the facility is not located within the 100-year flood plain. The northern portion of the facility is identified as being located in an area with 0.2% chance of flooding annually. The southern portion of the Site is in an area of minimal flood hazard. Figure II.F.1 included in the attached Section II.F shows the boundaries of the facility within the flood plain map.**

2. If the facility is located within the 100-year flood plain the applicant must provide information detailing the specific flooding levels and other events (e.g., Design Hurricane projected by Corps of Engineers) which impact the flood protection of the facility. Information shall also be provided identifying the 100-year flood level and any other special flooding factors (e.g., wave action) which must be considered in designing, construction, operating, or maintaining the facility to withstand washout from a 100-year flood.

### **Not Applicable**

3. State whether any flood protection devices exist at the facility (e.g., flood walls, dikes, etc.), designed to prevent washout from the 100-year flood.
- a. **If Yes**, provide in Section V an engineering analysis to indicate the various hydrodynamic and hydrostatic forces expected to result at the facility as a consequence of a 100-year flood. [40 CFR 270.14(b)(11)(iv)(A)]
- Include structural or other engineering studies showing the design of operational units (e.g., tanks, incinerators) and flood protection devices (e.g., flood walls, dikes) at the facility and how these will prevent washout. [40 CFR 270.14(b)(11)(iv)(B)]
- b. **If No**, the applicant shall provide in Section V a plan for constructing flood protection devices and a schedule including specific time frames for completion. Provide engineering analyses to indicate the various hydrodynamic and hydrostatic forces

expected to result at the facility as a consequence of a 100-year flood. [40 CFR 270.14(b)(11)(iv)(A)]

Include structural or other engineering studies showing the design of operational units (e.g., tanks, incinerators) and flood protection devices (e.g., flood walls, dikes) at the facility and how these will prevent washout. [40 CFR 270.14(b)(11)(iv)(B)]

**Not Applicable**

4. If applicable, and in lieu of the flood protection devices from above, provide a detailed description of the procedures to be followed to remove hazardous waste to safety before the facility is flooded. [40 CFR 270.14(b)(11)(iv)(c)] The procedures should include:
  - a. Timing of such movement relative of flood levels, including estimated time to move the waste, to show that such movement can be completed before flood waters reach the facility. Indicate which specific events shall be use to begin waste movement (e.g., Hurricane warning, Flash Flood watch, etc.);
  - b. A description of the location(s) to which the waste will be moved and a demonstration that these facilities will be eligible to receive hazardous waste in accordance with appropriate regulations (i.e., a permitted facility);
  - c. The planned procedures, equipment, and personnel to be used and the means to ensure that such resources will be available in time for use; and
  - d. The potential for accidental discharges of the waste during movement and precautions taken to preclude accidental discharges.

**Not Applicable**

**G. Additional Information Requirements**

1. For a new hazardous waste management facility, include a map of relevant local land-use plans and descriptions of the major routes of travel in the vicinity of the facility to be used for the transportation of hazardous waste to and from the facility covering at least a five (5)-mile radius from the boundaries of the facility. [30 TAC 305.50(a)(10)(A)&(D)]

**Not Applicable**

2. For a new commercial hazardous waste management facility as defined in 30 TAC 335.202 or the subsequent areal expansion of such a facility or unit of that facility, indicate on the map the nearest established residence, church, school, day care center, surface water body used for a public drinking water supply, and dedicated public park.

**Not Applicable**

3. For new commercial hazardous waste management facilities, submit the following: [30 TAC 305.50(a)(12)(A)]
  - a. the average number, gross weight, type, and size of vehicles used to transport hazardous waste;
  - b. the major highways nearest the facility irrespective of distance; and
  - c. the public roadways used by vehicles traveling to and from the facility within a minimum radius of 2.5 miles from the facility.

**Not Applicable**

4. Include the names and locations of industrial and other waste-generating facilities within 0.5 miles for a new on-site hazardous waste management facility and the approximate quantity of hazardous waste generated or received annually at those facilities. [30 TAC 305.50(a)(10)(B)&(C)]

**Not Applicable**

5. Include the names and locations of industrial and other waste-generating facilities within 1.0 miles for a new commercial hazardous waste management facility and the approximate quantity of hazardous waste generated or received annually at those facilities. [30 TAC 305.50(a)(10)(B)&(C)]

**Not Applicable**

6. For existing land disposal facility units provide documentation that the information required by 30 TAC 335.5 has been placed in the county deed records. If previously submitted, please reference the submittal by date and registration number.

**Not Applicable**

7. If a surface impoundment or landfill (including post-closure) is to be permitted, provide exposure information to accompany this application and in accordance with 30 TAC 305.50(a)(8) and 40 CFR 270.10(j). This information will be considered separately from the TCEQ application completeness determination.

**Not Applicable – Hazardous waste is not stored, treated or disposed in the closed surface impoundment. In 1984 surface impoundment was clean closed by excavating the soils and materials contained within. See Section VII and Section XI (Compliance Plan Attachment D) for details of the NFA request for the closed surface impoundment.**

8. For a requested capacity expansion of an existing hazardous waste management facility, please provide in Section VI.A.1.a the requested fault delineation information. [30 TAC 305.50(a)(4)(F)]

**Not Applicable**





## **II. FACILITY SITING CRITERIA**

**FACILITY SITING CRITERIA  
PART B PERMIT APPLICATION  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

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## LIST OF FIGURES

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II.F.1. Floodplain Map

## **II.F. FLOODING**

According to the June 9, 2014 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (Map Number 48201C0690M), the facility is not located within the 100-year flood plain. The northern portion of the facility is identified as being located in an area with 0.2% chance of flooding annually. The southern portion of the Site is in an area of minimal flood hazard. Figure II.F.1 shows the boundaries of the facility within the flood plain map (FEMA, 2014).

## **II.G. ADDITIONAL INFORMATION REQUIREMENTS**

### **II.G.7. Exposure Information**

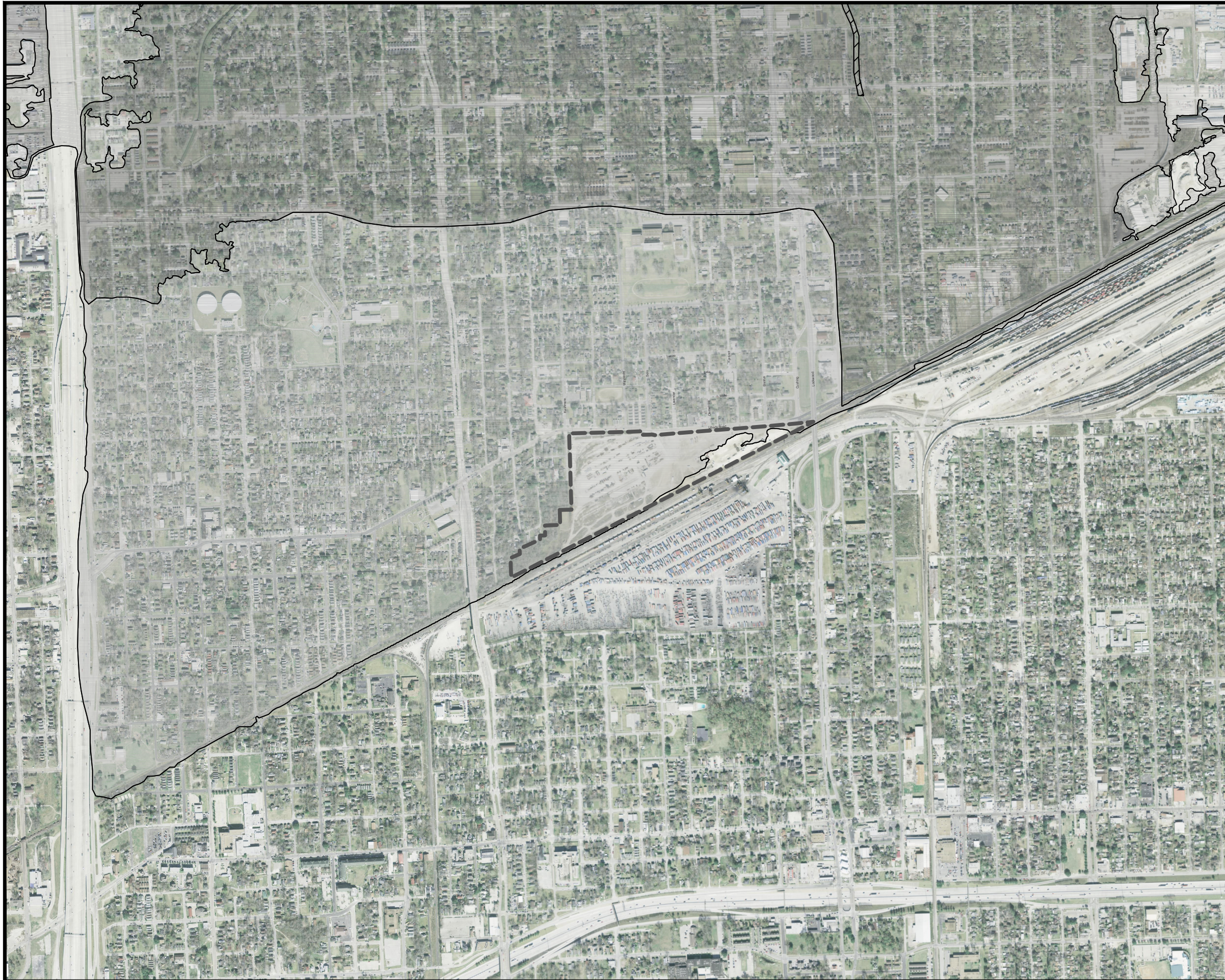
Hazardous waste is not stored, treated or disposed in the closed surface impoundment. In 1984 the surface impoundment was clean closed by excavating the soils and materials previously placed in the unit. The facility then began investigating and monitoring the shallow ground water in the vicinity of the surface impoundment. Between 1984 and 1991, nine groundwater monitoring wells were installed in the upper zone, and three piezometers were installed in the lower permeable zone. Hydrogeological data collected from these wells and piezometers indicate hydraulic conductivity between the zones. Analytical data compiled from 1984 until 1991 indicated that benzene, toluene, naphthalene, 2,4-dimethylphenol, and phenol were the most frequently detected parameters and that naphthalene was the parameter detected at the highest concentrations.

The facility entered into post-closure care in 1994, updated in 2005, and groundwater monitoring has taken place on a semi-annual basis since that time. Analytical results are compared to the TCEQ Texas Risk Reduction Program Protective Concentration Limits (TRRP PCLs). Since 2006, constituent concentrations have been below their respective PCLs, compliant with the TCEQ Remedy Standard A requirements for groundwater protection. It is recommended at this time that groundwater monitoring of SWMU No. 1 sampling activities be terminated. A request for No Further Action is included in Section VII and in Section XI (Compliance Plan Attachment D).




## **II.H. REFERENCES**

Federal Emergency Management Agency (FEMA), 2014. *Flood Insurance Rate Map, Harris County, Texas and Incorporated Areas, Panel 690 of 1150*. Map No. 48201C0960M. June 9.

## **FIGURES**



**EXPLANATION**

- UPRR Facility Boundary
-  100 Yr Flood Plain - Zone AE (1% Annual Chance Flood Event)
-  Floodway Areas in Zone AE
-  Other Flood Areas - Zone X (0.2% Annual Chance Flood)

Note:  
 Source of Flood Plain Area, <http://www.fema.gov>,  
 FIRM map # 48201C0690M, Harris County, 2014.



Approx. Scale in Feet  
 0 500 1000

Source:  
 Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.

 **UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure II.F.1

**FLOODPLAIN MAP**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
 CONSULTING ENGINEERS AND SCIENTISTS



### III. Facility Management

#### A. Compliance History and Applicant Experience

Provide listings of all solid waste management sites in Texas owned, operated, or controlled by the applicant as required by 30 TAC 305.50(a)(2).

For a new commercial hazardous waste management facility, provide a summary of the applicant's experience in hazardous waste management as required by 30 TAC 305.50(a)(12)(F).

#### B. Personnel Training Plan

**Not Applicable – This application is a renewal of a post-closure application for a closed unit.**

Provide an outline of the facility training plan which includes all the information required by 40 CFR 264.16. Indicate which training will be repeated annually.

#### C. Security

Describe how the facility complies with the security requirements of 40 CFR 264.14 or submit a justification demonstrating the reasons for requesting a waiver of these requirements.

#### D. Inspection Schedule

Provide an inspection schedule summary for the facility which reflects the requirements of 40 CFR 264.15(b), 264.33 and, where applicable, the specific requirements in 40 CFR 264.174, 264.193(i), 264.195, 264.226, 264.254, 264.273, 264.303, 264.347, 264.552, 264.574, 264.602, 264.1033(f), 264.1034, 264.1052, 264.1053(e), 264.1057, 264.1058, 264.1063, 264.1084, 264.1085, 264.1086, 264.1088, 264.1101(c)(4) and 270.14(b)(5). The inspection schedule should reflect the requirements described below. The schedule should encompass each type of hazardous waste management (HWM) unit (i.e., facility component) and its inspection requirements. For incorporation into a permit, complete Table III.D. - Inspection Schedule for all units to be permitted.

The owner or operator must inspect the facility for malfunctions and deterioration, operator errors, and discharges which may be causing or may lead to the release of hazardous waste constituents to the environment or which may pose a threat to human health. The owner or operator must conduct these inspections often enough to identify problems in time to correct them before they harm human health or the environment.

The owner or operator must develop and follow a written schedule for inspecting other basic elements such as monitoring equipment, safety and emergency equipment, security devices, the presence of liquids in leak detection systems, where installed, and operating and structural equipment (such as dikes and sump pumps) that are important to preventing, detecting, or responding to environmental or human health hazards.

If the owner or operator of a facility which contains a waste pile wishes to pursue an exemption from the groundwater monitoring requirements for that waste management unit, the inspection schedule must include examination of the base for cracking, deterioration, or other conditions that may result in leaks. The frequency of inspection must be based on the potential for the liner (base) to crack or otherwise deteriorate under the conditions of operation (e.g., waste type, rainfall, loading rates, and subsurface stability).

#### E. Contingency Plan

**Not Applicable – This application is a renewal of a post-closure application for a closed unit.**

*(This portion of the application does not apply to post closure applications.)* If the owner or operator has already prepared a Spill Prevention, Control, and Countermeasures (SPCC) Plan or some other emergency or contingency plan, he need only amend that plan to incorporate hazardous waste management provisions that are sufficient to comply with the requirements of this section. Provide a Contingency Plan which includes all the information required by 40 CFR Part 264 Subparts C and D, except for 40 CFR 264.56(d)(1) and 30 TAC 335.153(2). This plan must also include a drawing of the facility which shows the location of all emergency equipment. In addition, complete the following tables to summarize information expressed in more detail in the plan.

1. Arrangements with Local Authorities

Complete Table III.E.1. - Arrangements With Local Authorities to indicate arrangements (if made) with local authorities to familiarize local fire and police departments, local hospitals, equipment suppliers, and local and State emergency response teams with the layout of the facility, properties of hazardous waste handled at the facility and associated hazards, places where facility personnel would normally be working, entrances to and roads inside the facility, and possible evacuation routes. Provide documentation of the attempts and any arrangements made with local authorities and emergency response teams.

2. Emergency Coordinator's List

For inclusion into a permit, list in Table III.E.2. - Emergency Coordinators the persons qualified to act as emergency coordinator. List the alternates in the order in which they will assume responsibility.

3. Emergency Equipment List

For inclusion into a permit, list in Table III.E.3. - Emergency Equipment all types of emergency equipment at the facility [such as fire-extinguishing systems, spill-control equipment, communications and alarm systems (internal and external), and decontamination equipment], if this equipment is required. Briefly outline the equipment capabilities.

4. Waiver from Preparedness and Prevention Requirements

If the owner or operator wishes to request a waiver from any of the preparedness and prevention requirements, he must submit a justification demonstrating the reasons for requesting the waiver, as discussed below.

F. Emergency Response Plan

**Not Applicable – This application is a renewal of a post-closure application for a closed unit.**

For a new commercial hazardous waste management facility, the application shall contain evidence sufficient to demonstrate that emergency response capabilities are available or will be available before the facility first receives waste. An emergency response plan must be provided which satisfies the requirements of 30 TAC 305.50(a)(12)(C) and (D). This plan must show that the proposed facility has sufficient emergency response capabilities for managing a reasonable worst-case emergency condition associated with the operation of the facility. (For financial assurance requirements associated with the emergency response activities, please see Section VIII.C.3.)

1. Practice Drills

In addition to the contingency plan required under 40 Code of Federal Regulations Part 270.14(b)(7), provisions specifying procedures and timing of practice facility evacuation drills are required. Provide a description and a frequency for facility evacuation drills.

2. If a private corporation, municipality or county group will provide emergency response actions at the proposed facility, include a copy of the contract for this type of agreement with this application or state that documentation will be submitted before the facility accepts wastes.
3. Historical weather data for the area should be documented and submitted. Information regarding how emergency response operations may be affected by weather conditions should be included. (Local rainfall extremes, average rainfall amounts, average wind speeds and directions, potential for major weather events such as hurricanes, tornados, icy conditions, flash flooding etc., should be addressed.)
4. A definition of a worst-case emergency for the proposed facility should be described in the application. This worst-case emergency should take into account the possible complications involved with a facility emergency compounded by adverse weather conditions. It should also detail spills, fires, explosions, etc. This worst case scenario should be developed with the help of local governmental entities where possible. Emergency planning should include both unexpected emergencies and emergencies occurring as a result of a predictable event such as a flood or hurricane. For areas which are prone to hurricanes and flash flooding, the worst case which allows for a realistic situation should be used. For example, response teams should be well versed in reacting to events such as a 100-year flood.
5. A training program for personnel who will respond to these types of emergencies must be provided and must include the requirements described in OSHA Federal Register 1910 and EPA Federal Register 311, the Texas Hazard Communication Act, SARA Title III 302, 304, 311, 312, and 313. If emergency response actions are contracted out, the contracted employees must be properly trained and documentation of this training must be maintained on-site. All responders to emergencies at the proposed facility must be involved in training and drills at the facility in order to be thoroughly familiar with the facility and its operations.
6. The application must include a description and identification of first-responders (i.e. all pertinent facility personnel, local responders, and contractors). The duties of the facility employee who is to be the on-scene coordinator (OSC) must be described. Additional information must be provided detailing the OSC's role in the emergency response activities. This person must have the authority to commit the resources needed to carry out the Emergency Response Plan. His duties must be thoroughly described so that it is clear whether he will remain in control once the emergency response team arrives or whether he will relinquish control to another incident commander upon that person's arrival on the scene. Additionally, there must be a qualified OSC on-site or on call 24 hours a day. The name, address and phone numbers (home and work) of the OSC(s) must be listed in the Emergency Response Plan. Where more than one person is listed, one must be named as the primary OSC and others must be listed in the order in which they will assume responsibility as alternates.
7. Local or regional emergency medical services or hospitals which have experience in hazardous materials training must be identified in the application. The names, addresses and phone numbers of the hospitals or medical centers should be listed here and updated as necessary. Additionally, maps showing the quickest routes to the medical services must be provided. A description of decontamination procedures for injured personnel prior to transport to medical services must also be provided. The decontamination and transport of injured people to appropriate medical centers must be included in the emergency evacuation training and drills.

8. A pre-disaster plan which includes training drills must be included in the application. This plan should include a schedule for staging evacuations of the facility and for emergency response training drills. At least two evacuations and two emergency response drills should occur annually. The plan should also include additional drills for responding to “predictable” emergencies such as floods and hurricanes. The plan must include the following (or must reference applicable sections of the Contingency Plan): a description of arrangements already in place with local authorities; emergency phone numbers; internal communication or alarm systems and proper alarm codes; a list of all types of emergency equipment at the facility, including a physical description and the capabilities of each item on the list, and the location of each item (a map would be useful here); a description of decontamination equipment; an evacuation plan including signals, evacuation routes and alternate evacuation routes; listing of pertinent first responder emergency phone numbers, and codes for other types of communication devices; and a description of actions that will be performed in the event that a “predictable” emergency occurs.
9. Describe the mechanism which will be used to notify first responders and appropriate local governmental entities that an emergency has occurred. Also describe the mechanism which will be used to notify all applicable governmental agencies when an incident occurs (i.e., TCEQ, Texas Parks and Wildlife, General Land Office, TCEQ Office of Air Quality, Texas Department of Health, and the Texas Railroad Commission).
10. Evidence must be provided that shows coordination with the Local Emergency Planning Committee (LEPC) and any local comprehensive emergency management plan. The applicants should be able to show compliance with SARA Title III.
11. Any medical response capabilities proposed for the facility property must be detailed in the application.



### **III. FACILITY MANAGEMENT**

**TABLE III.D. - INSPECTION SCHEDULE**

<i>Facility Unit(s) and Basic Elements</i>	<i>Possible Error, Malfunction, or Deterioration</i>	<i>Frequency of Inspection</i>
Security Fencing	Damaged, broken/loose fencepost	Semi-annually & after major storm/flood event
Security Fencing	Loose or broken barbed wire	Semi-annually & after major storm/flood event
Security Fencing	Damaged fence	Semi-annually & after major storm/flood event
Security Fencing	Damaged gate	Semi-annually & after major storm/flood event
Security Fencing	Inoperable gate locks	Semi-annually & after major storm/flood event
Warning Signs	Missing, damaged or illegible signs	Semi-annually & after major storm/flood event
Surveyed Benchmarks	Benchmarks missing or damaged	Semi-annually & after major storm/flood event
Groundwater Monitor Wells	Well cap condition poor, broken, poor seal	Semi-annually & after major storm/flood event
Groundwater Monitor Wells	Lock function sticks, inoperable	Semi-annually & after major storm/flood event
Groundwater Monitor Wells	Casing condition bent, torn, missing	Semi-annually & after major storm/flood event
Groundwater Monitor Wells	Concrete pad cracked, broken, missing	Semi-annually & after major storm/flood event
Final Cover and Cap	Settlement or subsidence	Semi-annually & after major storm/flood event
Final Cover and Cap	Damage or erosion to clay cap	Semi-annually & after major storm/flood event
Final Cover and Cap	Erosion/undercutting at cap perimeters	Semi-annually & after major storm/flood event
Final Cover and Cap	Shrubs/trees with long root systems present	Semi-annually & after major storm/flood event
Drainage Structures	Grass requires mowing, treatment or repairs	Semi-annually & after major storm/flood event
Drainage Structures	Debris or sediment restrict flow	Semi-annually & after major storm/flood event
Drainage Structures	Erosion or undercutting	Semi-annually & after major storm/flood event
Drainage Structures	Inadequate drainage away from clay cap	Semi-annually & after major storm/flood event

**FACILITY MANAGEMENT  
PART B PERMIT APPLICATION  
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HOUSTON WOOD PRESERVING WORKS  
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Table

III.D. Inspection Schedule

### **III.A. COMPLIANCE HISTORY AND APPLICANT EXPERIENCE**

Title 30 of the Texas Administrative Code (TAC) Chapter 305.50(2), and renewal application instructions require a listing of all solid waste management sites in Texas owned, operated or controlled by the applicant. The following is the only site owned by Union Pacific Railroad (UPRR) Company:

<b>SWR #</b>	<b>Site Name</b>	<b>Location</b>
31547	Union Pacific Railroad Houston Tie Plant	4910 Liberty Road, Houston, TX 77026

### **III.C. SECURITY**

As required by 40 CFR 264.14, site access to the former Houston Wood Preserving Works (HWPW) facility is controlled by chain link fences approximately 6 feet in height with a 1-foot high top guard of barbed wire (3 horizontal wire lines). Warning signs of sufficient size to be legible from 25 feet were posted in sufficient number to be seen from any approach. The signs are labeled “Danger: Unauthorized Personnel Keep Out” and alternate between English and Spanish. Access is gained by an entry gate. The gate is locked and keys are held by UPRR personnel.

### **III.D. INSPECTION SCHEDULE**

With the closed surface impoundment closure and the request to cease post-closure care (see Section VII and Section XI (Compliance Plan Attachment D)), inspections for the closed surface impoundment will not be necessary. The inspection and maintenance schedule included here pertain to the HWPW facility and corrective actions as described in the Section XI - Compliance Plan.

Specific components will be inspected and maintained at the facility during corrective action activities. Components to be inspected and maintained include the cap and vegetative cover, the groundwater monitoring wells, and the fences surrounding the facility. Inspections will occur semi-annually or following a major storm or flood event. The schedule of inspections is included in Table III.D.

#### **III.D.1. Cap and Vegetative Cover**

The cap on each of the three closed units will be inspected semi-annually for proper drainage, signs of erosion, and loss of vegetative cover.

### **III.D.2. Groundwater Monitoring Wells**

Monitoring wells will be inspected semi-annually for surface damage to casings, missing or damaged locks, and bent casings which result in an inability to sample the well. Malfunctions will be promptly repaired.

### **III.D.3. Fencing**

The integrity of the fencing will be inspected semi-annually. The base of the fenced areas will be inspected for erosion which may result in space beneath the fence large enough for passage of animals or people. Hinges and locks on gates will be checked for signs of wear or breakage. Warning signs will be checked for fading or vandalism.

## IV. Wastes and Waste Analysis

*(Sections IV.A, IV.C, and IV.D of the application do not apply to post closure applications.)*

### A. Waste Management Information

For a new hazardous waste management facility or for a facility hazardous waste management capacity expansion, complete Table IV.A. - Waste Management Information for each waste, source, and volume of waste to be stored, processed, or disposed of in the facility units to be permitted as required by 30 TAC 305.50(a)(9). For on-site facilities, list “on-site” for the waste source. For off-site facilities, list the source of the waste. If unknown, identify potential sources (e.g., industries/processes to be serviced).

### B. Waste Managed In Permitted Units

For all hazardous waste management facilities and for inclusion into a permit, complete Table IV.B. - Wastes Managed In Permitted Units for each waste and debris to be managed in a permitted unit. Provide a description, EPA waste codes, and TCEQ waste form codes and classification codes. Guidelines for the Classification & Coding of Industrial Wastes and Hazardous Wastes, TCEQ publication RG-22, contains guidance for how to properly classify and code industrial waste and hazardous waste in accordance with 30 TAC 335.501-335.515 (Subchapter R).

Applicants need not specify the complete 8-digit waste code formulas for their wastes but only the 3-digit form codes and 1-digit classification codes. This allows the applicant to specify major categories of wastes in an overall manner without having to list all the specific waste streams as generated.

### C. Sampling and Analytical Methods

For inclusion into a permit, complete Table IV.C. - Sampling and Analytical Methods for each waste and debris proposed to be sampled and analyzed and include sampling location, sampling method, sample frequency, analytical method, and desired accuracy level for each waste and debris to be managed in a permitted, storage, processing, or disposal unit at the facility.

### D. Waste Analysis Plan

The Waste Analysis Plan must address the requirements of 40 CFR 264.13 and 268.7. The Plan should include supplemental and coordinating information on how the facility will analyze wastes and debris (as listed in Table IV.B) to be managed in permitted units. The plan must address the determination of land disposal restrictions. Generators must determine and certify with the manifest the land disposal restriction status of a waste, even if the waste or debris is not intended for land disposal. Land disposal treatment facilities must identify the treatment process and analytical procedures to be used, and include them in the waste analysis plan. Land disposal restriction records must be maintained at the facility until closure of the facility [40 CFR 264.73(b)]. Landfill facilities must determine through the Paint Filter Liquids Test (SW-846 Method 9095) if there is free liquid in a bulk or containerized waste to be landfilled. If so, it must be stabilized; adding adsorbents alone is not acceptable, even for containerized waste.

For off-site facilities the waste analysis plan must specify procedures which will be used to inspect and, if necessary, analyze each movement of industrial and hazardous waste or hazardous debris received at the facility to ensure it matches the identity of the waste designated on the accompanying shipping ticket. The plan must describe methods which will be used to determine the identity of each movement of waste and debris managed at the facility and sampling method used if the identification method includes sampling in order to store, process, or dispose of the wastes and debris in accordance with 40 CFR Parts 264 and 268 and any abnormal characteristics which may upset further treatment or processing operations. Include rejection criteria for shipments of waste and debris received at the facility

For on-site facilities the waste analysis plan must specify the normal characteristics of the waste (including EPA hazardous waste codes, EPA hazard codes, and 40 CFR 261 Appendix VIII Hazardous Constituents) which must be known to store, process, or dispose of the wastes and debris in accordance with 40 CFR Parts 264 and 268 and any abnormal characteristics which may upset further treatment or processing operations.

The methods and equipment used for sampling waste materials will vary with the form and consistency of the waste materials to be sampled. Those sampling methods listed in 40 CFR 261 Appendix I, for sampling waste with properties similar to the indicated materials, or equivalent sampling methods approved by EPA under 40 CFR 260.20 and 260.22, will be considered by the TCEQ to be acceptable.



#### **IV. WASTES AND WASTE ANALYSIS**

**WASTES AND WASTE ANALYSIS  
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IV.B.	Wastes Managed In Permitted Units



#### **IV. WASTES AND WASTE ANALYSIS**

NOR 001 is entering post-closure care with one unit in year 20 of 30 in post closure care. However, with clean closure of the surface impoundment in 1984 and groundwater achieving Remedy Standard A response action objectives for the last three year, no further action is requested for this unit. As a result, Waste Management Information, Sampling and Analytical Methods and a Waste Analysis Plan are not required.

##### **IV.B. Waste Managed in Permitted Units**

Table IV.B. includes a complete list of the historical wastes that were managed in the solid waste management unit (SWMU) No. 1.

**TABLE IV.B. – WASTES MANAGED IN PERMITTED UNITS**

<b>No.</b>	<b>Waste</b>	<b>EPA Hazardous Waste Numbers</b>	<b>TCEQ Waste Form Codes and Classification Codes</b>
001/SWMU 1	Wood treatment (creosote) related wastes*	K001, F034, U051, U188	219, 301, 488, 609

\*Historical Wastes Managed, unit was clean closed in 1984 with releases to groundwater. Permit application request NFA for SWMU No. 1 (See Sections VII and XI (Response Action Plan)).

## V. Engineering Reports

The engineering report represents the conceptual basis for the storage, processing, or disposal units at the hazardous waste management (HWM) facility. It should include calculations and other such engineering information as may be necessary to follow the logical development of the facility design. Plans and specifications are an integral part of the report. They should include construction procedures, materials specifications, dimensions, design capacities relative to the volume of wastes (as appropriate), and the information required by 40 CFR 270.14(b)(8), 270.14(b)(10). Since these reports may be incorporated into any issued permit, the report should not include trade names, manufacturers, or vendors of specific materials, equipment, or services unless such information is critical to the technical adequacy of the material. Technical specifications and required performance standards are sufficient to conduct a technical review. For landfills, surface impoundments, and waste piles, a Construction Quality Assurance Plan, which considers the guidance in EPA publication 530-SW-85-014, Minimum Technology Guidance on Double Liner Systems for Landfills and Surface Impoundments; Design, Construction, and Operation, should be submitted.

For facilities which will receive wastes from off-site sources, the engineering report must also contain information on the units which will manage these off-site wastes in accordance with 30 TAC 335.45(a).

Certain ancillary components or appurtenant devices must be addressed in the Part B application. These include but are not limited to sumps, pipelines, ditches, and canals. The technical information and the level of detail required will vary with the nature, scope, and location of the ancillary component. At a minimum they should be included in descriptions of piping and process flow. More information may be required. A single area containing a large number of ancillary components or a remote appurtenant device in an unusually sensitive location may warrant some specific permit requirements. All ancillary components must be included in calculating closure cost estimates.

In each of the unit-specific sections, describe precautions taken to prevent accidental commingling of incompatible wastes. If reactive or ignitable wastes are to be managed, or if incompatible wastes are deliberately commingled, provide information to ensure that precautions are taken to avoid danger due to:

- generation of extreme heat or pressure, fire, explosion, or violent reaction;
- production of uncontrolled toxic mists, fumes, dusts, or gases in sufficient quantities to threaten human health;
- production of uncontrolled flammable fumes or gases in sufficient quantities to pose a risk of fire or explosion;
- damaging the structural integrity of the device or facility containing the waste; or
- threatening human health or the environment by any other means.

Comprehensive consideration should be given to ensure that the facility is designed in accordance with good public health and hazardous waste management practices. The application will be evaluated primarily for the aspects of design covered by the regulations. Nothing in any approval is intended to relieve the facility owner or operator of any liabilities or responsibilities with respect to the design, construction, or operation of the project.

### A. General Engineering Reports

#### 1. General Information

Provide an overall plan view of the entire facility. Identify each hazardous or industrial solid waste management unit (container storage area, tank, incinerator, etc.) to be permitted in relation to its location and the type of waste managed in that unit. Also provide a plan view at an appropriate scale to clearly show the location of all hazardous waste management units to be permitted on one or more 8.5" x 11" sheets. Indicate on this plan view how the design or

operation provides for buffer zones or waste segregation as appropriate for incompatible, ignitable, or reactive wastes.

Submit a topographic map or maps of the facility which clearly shows the information specified in 40 CFR 270.14(b)(19), 270.14(c)(3), and 270.14(d)(1)(i) (for large HWM facilities, the TCEQ will allow the use of other scales on a case-by-case basis). Please note that the term “facility” includes all contiguous land, structures, other appurtenances, and improvements on the land for storing, processing, or disposing of hazardous and industrial solid waste.

2. Features to Mitigate Unsuitable Site Characteristics

For all new hazardous waste management storage and/or processing facilities or areal expansions of existing hazardous waste management storage and/or processing facilities, include in the engineering report design, construction, and operational information specified in 30 TAC 335.204(a)(1) and (a)(3) through (9).

3. Construction Schedules

a. In order to meet the required design standards, extensive retrofitting of some facilities may be required. In the worst case, the applicant may elect to close certain operations rather than comply with the RCRA standards. Thus, the permit may specify a schedule of compliance requiring the accomplishment of given tasks within specific time frames. As required, indicate an appropriate schedule(s) of compliance in this application. The schedule should provide for facility compliance as soon as possible and in accordance with 40 CFR 270.33(a)(2) and 270.33(b).

b. For commercial hazardous waste management facilities, permit applications (new, renewal, or interim status applications), major amendments, and Class 3 modifications submitted after 11/23/94, must include a construction schedule. A construction schedule must be submitted even if the application does not include an addition of units or a revision to permitted units. This schedule should comply with the requirements of 30 TAC 305.149.

4. Provide detailed plans and specifications which when, accompanied by the engineering report, will be sufficiently detailed and complete to allow the Executive Director to ascertain whether the facility will be constructed and operated in compliance with all pertinent permitting requirements. Engineering plans and specifications must be prepared under the supervision of and sealed by a licensed Professional Engineer, with current license, along with the Registered Engineering Firm’s name and Registration Number as required by the Texas Engineering Practice Act. For some facilities, plans in the form of a standard piping and instrumentation diagram will be sufficient. Overall dimensions and materials of construction must be shown.

B. Container Storage Areas

1. Provide an engineering report which includes all of the information specified in 40 CFR 264.170-264.173, 264.175-264.177, and 270.15.

Complete Table V.B - Container Storage Areas and list the container storage areas covered by this application to be permitted. List the N.O.R. unit number, the rated capacity or size of each unit (including the maximum number of each type of container to be stored at each unit), the areal dimensions, containment volume, whether ignitable, reactive, or incompatible waste will be stored in each unit, and whether processing will occur within the unit.

2. Container storage areas must have a containment system that is capable of collecting and holding spills, leaks, and precipitation. In addition to the requirements of 40 CFR 270.15, the design report should include the following:
  - a. Capacity of the containment relative to the number and volume of containers to be stored; in addition, for unenclosed areas, the amount of rainfall collected prior to removal. The TCEQ recommends using a 25-year, 24-hour rainfall event for this extra capacity; and
  - b. Run-on into the containment system must be prevented, or a collection system with sufficient excess capacity must be provided. If run-on is collected within the containment system, delineate the area(s) from which run-on is collected. The 25-year, 24-hour rainfall event should be used to calculate the excess capacity.

3. Wastes Containing No Free Liquids

With the exception of 40 CFR 264.175(d), storage areas that hold only wastes that do not contain free liquids need not have a containment system, , provided that compliance with 40 CFR 264.175(c) is demonstrated. This demonstration must be submitted as part of the application and must include:

- a. test procedures and results or other documentation or information to show that the wastes do not contain free liquids; and
- b. a description of how the storage area is designed or operated to drain and remove liquids or how containers are kept from contact with standing liquids.

4. Managing Ignitable or Reactive Wastes

If a container storage area will manage ignitable or reactive waste, as indicated on Table V.B, provide in the engineering report drawings demonstrating compliance with the buffer zone requirement of 40 CFR 264.17 and 264.176.

5. Managing Incompatible Wastes

If a container storage area will manage incompatible waste, as indicated on Table V.B, provide in the engineering report a description of the procedures used to ensure compliance with 40 CFR 264.17 and 264.177.

## C. Tanks and Tank Systems

Provide an engineering report which includes all of the information specified in 40 CFR 264.190-264.194, 264.196, 264.198-264.199, and 270.16.

For inclusion into a permit, complete Table V.C - Tanks and Tank Systems and list the tanks covered by this application to be permitted. List the N.O.R. unit number, whether the unit is for storage and/or processing, the waste managed in each unit, the rated capacity of each unit, overall dimensions of each unit, containment volume, and whether ignitable, reactive, or incompatible waste will be stored in each unit.

If a tank will manage ignitable or reactive waste, as indicated on Table V.C, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.198 and provide drawings demonstrating compliance with any applicable buffer zone requirements and 40 CFR 264.17.

If a tank will manage incompatible waste, as indicated on Table V.C, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17 and 264.199.

Submit written assessments that were reviewed and certified by an independent, qualified licensed Professional Engineer that attests to the structural integrity and suitability of handling the hazardous waste for each tank system, as required under 40 CFR 264.191-264.192 for existing tanks which do not have

secondary containment meeting the standards of 40 CFR 264.193. The engineer signing the written assessment must make the certification specified in 40 CFR 270.11(d). The certification must be sealed by a licensed Professional Engineer, with current license, along with the Registered Engineering Firm's name and Registration Number as required by the Texas Engineering Practice Act.

If a tank has been de-rated or if the permitted capacity is otherwise different from the design capacity, specify in the engineering report.

#### D. Surface Impoundments

Provide an engineering report which includes all of the information specified in 30 TAC 305.50(a)(6), 335.168, 335.169, and 40 CFR 264.19, 264.220, 264.221, 264.222, 264.223, 264.226(a) and (c), 264.227, 264.229-264.231, and 270.17.

For storage surface impoundments at a new hazardous waste management facility or which are part of an areal expansion of an existing hazardous waste management facility, include in the engineering report design, construction, and operational information specified in 30 TAC 335.204(d). For any surface impoundment to be closed as a landfill (where wastes will remain after closure of the impoundment) at a new hazardous waste management facility or which are part of an areal expansion of an existing hazardous waste management facility, include in the engineering report design, construction, and operational information specified in 30 TAC 335.204(e).

For all impoundments, include in the report the following information.

1. Complete Table V.D.1 - Surface Impoundments and list the surface impoundments, covered by this application, to be permitted. List the waste(s) managed in each unit and the rated capacity or size of each unit.
2. If a surface impoundment will manage ignitable or reactive waste, as indicated on Table V.D.1., describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17 and 264.229.
3. If a surface impoundment will manage incompatible waste, as indicated on Table V.D.1., describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17 and 264.230.
4. If a surface impoundment will manage F020, F021, F022, F023, F026, and F027 waste, as indicated on Table V.D.1., describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.231.

5. Describe the surface impoundment. A plan view and cross-section of the surface impoundment should be included with the engineering report.

6. Freeboard

Specify the minimum freeboard to be maintained and the basis of the design to prevent overtopping resulting from normal or abnormal operations; overfilling; wind and wave action; rainfall; run-on; malfunctions of level controllers, alarms, and other equipment; and human error. [40 CFR 264.221(g)] Show that adequate freeboard will be available to prevent overtopping from a 100-year, 24-hour storm.

If the impoundment is inflow sensitive, it should be equipped with a high-level alarm based on a different level sensor than that used for automatic control.

7. Waste Flow

Describe the means that will be used to immediately shut off the flow of waste to the impoundment to prevent overtopping or in the event of liner failure, and include appropriate detailed drawings.

If the surface impoundment is a flow-through facility describe the flow of waste, including a hydraulic profile.

#### 8. Dike Construction

a. If dikes are used, include the following certification as part of the engineering report:

“I, (qualified licensed Professional Engineer) , Texas P.E. License Number , of Registered Firm (Name) Registered Firm No. (Registration Number) certify under penalty of law that I have personally examined and am familiar with the design and construction of the dikes that are a portion of (surface impoundment unit name) .

I further certify that I have evaluated the dike design and materials of construction using accepted engineering procedures, and have determined that the dike, including the portion of the dike providing freeboard, has structural integrity, and:

- (1) Will withstand the stress of the pressure exerted by the types and amounts of wastes to be placed in the impoundment; and
- (2) Will not fail due to scouring or piping, without dependence on any liner system included in the impoundment construction.

Date: \_\_\_\_\_”  
(Signature)

“(Seal)”

- b. The structural integrity of the dike system must be certified by a qualified Professional Engineer before a permit is issued. If the impoundment is not being used, the dike licensed system must be certified before it can be put into use. The certification must be sealed by a licensed Professional Engineer, with current license, along with the Registered Engineering Firm’s name and Registration Number as required by the Texas Engineering Practice Act.
- c. A report shall accompany the dike certification which summarizes the activities, calculations, and laboratory and field analyses performed in support of the dike certification. Describe the design basis used in construction of the dikes. Provide the following analyses as attachments to the engineering report (A Quality Assurance Project Plan <QAPP> should be included in the report to ensure that each analysis is performed appropriately):
  - (1) Slope Stability Analysis
  - (2) Hydrostatic and Hydrodynamic Analysis
  - (3) Storm Loading
  - (4) Rapid Drawdown
- d. Earthen dikes should have a protective cover to minimize wind and water erosion and to preserve the structural integrity of the dike. Describe the protective cover used and describe its installation and maintenance.

#### 9. Containment System

TCEQ Technical Guideline No. 6, Monitoring Systems and Leachate Collection, which can be obtained from the I&HW Permits Section, contains suggested methods of leak detection system construction and EPA publication 530-SW-85-014 provides design guidance for liner systems. The applicant is strongly encouraged to test each synthetic liner after installation by an electrical leak location test, such as the electric field method described in EPA Technical Guidance Document EPA/600/R-93/182, Quality Assurance and Quality Control for Waste Containment Facilities, or an equivalent method approved by the Executive Director. Construction above the liner may not proceed until any detected leaks are sealed.

- a. Complete Table V.D. 6. - Surface Impoundment Liner System for each surface impoundment to be permitted.
- b. In the engineering report, describe the design, installation and operation of liner and leak detection components. The description must demonstrate that the liner and leak detection system will prevent discharge to the land, and ground and surface water. Include the following analyses as attachments to the engineering report (A QAPP should be included in the report to ensure that each analysis is performed appropriately):

For artificial liners:

- (1) Seaming method
- (2) Surface preparation method
- (3) Tensile Strength
- (4) Impact Resistance
- (5) Compatibility Demonstration
- (6) Foundation Design (including Settlement Potential, Bearing Capacity and Stability, and Potential for Bottom Heave Blow-out)

For soil liners:

- (7) Waste Migration Analysis (based on head, porosity, and permeability) for the most mobile and least attenuated waste constituents
- (8) Atterberg Limits, % passing a #200 sieve, and Permeability
- (9) Moisture Content
- (10) Standard Proctor Density, Compaction Data

For leachate collection systems:

- (11) Pipe Material and Strength
- (12) Pipe Network Spacing and Grading
- (13) Collection Sump(s) Material and Strength
- (14) Drainage Media Specifications and Performance
- (15) Analyses showing that pipe and pipe perforation size will prevent clogging and allow free liquid access to the pipe.
- (16) Compatibility Demonstration
  - (a) Capacity of System
  - (b) rate of leachate removal
  - (c) capacity of sumps
  - (d) thickness of mounding and maximum hydraulic head

- c. Specify the liner system installation date and expected lifetime of liner system (years).
- d. Specify whether the liner is chemically resistant to the waste and how this resistance was determined. Attach any tests or documentation to the engineering report.
- e. Submit a quality assurance/quality control plan for all components to demonstrate that all components will be properly installed and will perform to design specifications.

10. Surface impoundments that receive waste on or after May 8, 1985 (or for newly-regulated units, the effective date of the new RCRA regulation) into new units and/or lateral expansions



or replacements of existing units must meet the minimum technological requirements of the Hazardous and Solid Waste Amendments of 1984, unless an appropriate waiver is granted by the Commission. Plans and specifications for both new and existing surface impoundments must demonstrate conformity with 30 TAC 335.168 and 40 CFR 264.221.

11. Run-on Diversion

Describe in detail how the surface impoundment system will manage stormwater run-on away from the surface impoundment. Stormwater run-on must be diverted away from a surface impoundment. Use at least a 100-year, 24-hour rainfall event in the design and analysis of diversion structures. Where dikes are used to divert run-on, they must be protected from erosion. Include all analyses used to calculate run-on volumes.

12. The Commission may approve an alternate design or operating practice for a surface impoundment if the owner or operator demonstrates that such design or operating practices, together with location characteristics [40 CFR 264.221(d)]:

- a. Will prevent the migration of hazardous constituents into the groundwater or surface water at least as effectively as the liners and leachate collection and removal system required by 40 CFR 264.221; and
- b. Will allow detection leaks of hazardous constituents through the top liner at least as effectively.

13. Exemption from Double-Liner Requirements for Monofills [264.221(e)]

Owners or operators of hazardous waste surface impoundment monofills will be exempted from the double-liner requirements if the Commission finds, based on a demonstration by the owner or operator, that alternative design and operating practices, together with location characteristics are at least as effective as a double liner in preventing migration of hazardous constituents to the groundwater or surface water. If an exemption is sought, submit detailed plans and engineering and hydrogeologic reports, as appropriate, describing alternate design and operating practices that will, in conjunction with location aspects, prevent the migration of any hazardous constituents into the groundwater or surface water at any future time.

E. Waste Piles

This section applies to owners or operators of industrial solid waste facilities that store or process hazardous waste in piles. A hazardous waste pile that will be closed with wastes left in place must be managed as a landfill. Existing portions of waste piles are those areas that were listed on the original Part A and on which wastes have been lawfully placed.

Provide an engineering report which includes all of the information specified in 30 TAC 335.170 and 40 CFR 264.19, 264.250, 264.251, 264.252-264.253, 264.254(a) and (c), 264.256, 264.257, 264.259, and 270.18.

For waste piles at a new hazardous waste management facility or which are part of any areal expansion of an existing hazardous waste management facility, include in the engineering report design, construction, and operational information specified in 30 TAC 335.204(c).

For all waste piles, include in the report the following information.

1. For inclusion into a permit, complete Table V.E.1 - Waste Piles and list the waste piles covered by this application. List the waste managed in each unit and the rated capacity or size of the unit.

If a waste pile will manage ignitable or reactive waste, as indicated on Table V.E.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17 and 264.256.

If a waste pile will manage incompatible waste, as indicated on Table V.E.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17 and 264.257.

If a waste pile will manage F020, F021, F022, F023, F026, and F027 waste, as indicated on Table V.E.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.259.

2. Describe the waste pile, including any structure surrounding or enclosing the waste pile.

3. Containment System

TCEQ Technical Guideline No. 6, Monitoring Systems and Leachate Collection, which can be obtained from the I&HW Permits Section, contains suggested methods of leak detection system construction and EPA publication 530-SW-85-014 provides design guidance for liner systems. The applicant is strongly encouraged to test each synthetic liner after installation by an electrical leak location test, such as the electric field method described in EPA Technical Guidance Document EPA/600/R-93/182, Quality Assurance and Quality Control for Waste Containment Facilities, or an equivalent method approved by the Executive Director. Construction above the liner may not proceed until any detected leaks are sealed.

- a. For inclusion into a permit, complete Table V.E. 3 - Waste Pile Liner System and specify the type of containment/liner system.
- b. In the engineering report, describe the design, installation, construction, and operation of the liner and leachate collection system. The description must demonstrate that containment systems will prevent discharge to the land, surface water, or groundwater. Include the following analyses as attachments to the engineering report, when applicable to the containment system being described (A QAPP should be included in the report to ensure that each analysis is performed appropriately):

For artificial liners:

- (1) Seaming method
- (2) Surface preparation method
- (3) Tensile Strength
- (4) Impact Resistance
- (5) Compatibility Demonstration
- (6) Foundation Design (including Settlement Potential, Bearing Capacity and Stability, and Potential for Bottom Heave Blow-out)

For soil liners:

- (7) Waste Migration Analysis (based on head, porosity, and permeability) for the most mobile and least attenuated constituents.
- (8) Atterberg Limits, % passing a #200 sieve, and Permeability
- (9) Moisture Content
- (10) Standard Proctor Density, Compaction Data

For leachate detection, collection, and removal system:

- (11) Capacity of system
  - (a) rate of leachate removal
  - (b) capacity of sumps
  - (c) thickness of mounding and maximum hydraulic head

- (12) Pipe Material and Strength
  - (13) Pipe Network Spacing and Grading
  - (14) Collection Sump(s) Material and Strength
  - (15) Drainage Media Specifications and Performance
  - (16) Analysis showing that pipe and perforation size will prevent clogging and allow free liquid access to the pipe.
  - (17) Compatibility Demonstration
- c. Containment/liner system installation date and expected lifetime of liner system (years).
  - d. Specify whether the containment/liner system is chemically resistant to the waste and how this resistance was determined. Attach any tests or documentation to the engineering report.
  - e. Submit a quality assurance/quality control plan for all components to demonstrate that all components will be properly installed and will perform to design specifications.
4. Wind Dispersal [30 TAC 335.170(j)]

Waste piles containing hazardous waste which could be subject to dispersal by wind must be covered or otherwise managed so that wind dispersal is minimized. Describe practices to control wind dispersal (e.g., cover or frequent wetting) of the hazardous waste.
  5. Run-on Diversion [30 TAC 335.170(g)]

Describe in detail the measures used to control and divert run-on from the unit. The owner or operator must design, construct, operate, and maintain a run-on control system capable of preventing flow onto the active portion of the pile during peak discharge from at least a 100-year, 24-hour storm.

Include all analyses used to calculate: rates of flow; run-on volume and depth; and back-water calculations for the ditches on plant property.

Any tanks or basins associated with the run-on control systems must be emptied or otherwise managed expeditiously after a storm to maintain the design capacity of the system. [30 TAC 335.170(i)]
  6. Run-off Control [30 TAC 335.170(h)]

Describe in detail the measures used to control run-off from the unit. Include all analyses used to calculate the run-off volumes.

The owner or operator must design, construct, operate, and maintain a run-off management system to collect and control at least the water volume resulting from a 100-year, 24-hour storm.

Collection and holding facilities (e.g., tanks or basins) associated with the run-off control systems must be emptied or otherwise managed expeditiously after storms to maintain the design capacity of the system. [30 TAC 335.170(i)]
  7. Give a description of design and operating procedures to properly manage and/or dispose of any residuals (e.g., leachate) that may be generated during waste management. Describe the management process and any equipment used.
  8. Provide a description and list of all equipment and procedures used to place the waste in or on the waste pile, and how the liner surface will be exposed for inspection, if necessary. A containment system must be protected from plant growth which could puncture any component of the system.

9. Exemption from Liner and Leachate Collection Requirements

The Commission may approve an alternate design or operating practice for a waste pile if the owner or operator demonstrates that such design or operating practices, together with location characteristics [40 CFR 264.251(d)]:

- a. Will prevent the migration of hazardous constituents into the groundwater or surface water at least as effectively as the liners and leachate collection and removal system; and
- b. Will allow detection leaks of hazardous constituents through the top liner at least as effectively.

10. Exemption from Groundwater Monitoring

A waste pile may be exempt from groundwater monitoring if the following standards are met:

- a. The waste pile (including its underlying liners) must be located entirely above the seasonal high water table; and
- b. The waste pile is inside or under a structure that provides protection from precipitation so that neither run-off nor leachate is generated, provided that:
  - (1) Liquids or materials containing free liquids are not placed in the pile;
  - (2) The waste pile is protected from surface water run-on by the structure or in some other manner;
  - (3) The waste pile is designed and operated to control dispersal of the waste by wind, where necessary, by means other than wetting; and
  - (4) The waste pile will not generate leachate through decomposition or other reactions; or
- c. The waste pile must have a leachate collection and removal system above the top liner; and
- d. underlayment:
  - (1) either
    - (a) The waste pile must be underlain by two liners, which are designed and constructed in a manner that prevents the migration of liquids into or out of the space between the liners and a leak detection system which must be designed, constructed, maintained, and operated between the liners to detect any migration of liquids into the space between the liners; and
    - (b) A demonstration must be made that there is a low potential for migration of liquid from the waste pile to the uppermost aquifer during the life of the waste pile (including the closure period). The owner or operator must base any predictions made on assumptions that maximize the rate of liquid migration; *or*
  - (2) either
    - (a) The waste pile must be underlain by a liner (base) that is designed, constructed, and installed in a manner that prevents the migration of liquids or waste beyond the liner; and
    - (b) The wastes in the waste pile must be removed periodically, and the liner must be inspected for deterioration, cracks, or other conditions that may result in leaks. The frequency of inspection will be specified in the inspection plan and must be based on the potential for the liner (base) to crack or otherwise deteriorate under the conditions of operation (e.g., waste type, rainfall, loading rates and subsurface stability).

The liner(s) used to satisfy V.D.13.d. must be of sufficient strength and thickness to prevent failure due to puncture, cracking, tearing, or other physical damage from equipment used to place waste in or on the pile or to clean and expose the liner surface for inspection.

#### F. Land Treatment Units

Provide an engineering report which includes all of the information specified in 30 TAC 305.50(a)(6), 335.171, 335.172, 40 CFR 264.270-264.272, 264.273, 264.276, 264.278, 264.279, 264.281-264.283, and 270.20 for each land treatment unit.

For land treatment units at a new hazardous waste management facility or which are part of an areal expansion of an existing hazardous waste management facility, include in the engineering report design, construction, and operational information specified in 30 TAC 335.204(b).

For all land treatment units, include in the report the following information.

1. Complete Tables V.F.1 - Land Treatment Units and V.F.2 - Land Treatment Unit Capacity and list the land treatment units covered by this application. List the waste(s) managed in each unit and the rated capacity or size of the unit. If different wastes are placed on separate portions of the land treatment area, each portion is considered a land treatment unit, and requires a separate summary form and engineering report.

The treatment zone is defined as the soil area of the unsaturated zone of a land treatment unit within which hazardous constituents are degraded, transformed, or immobilized. In this section, specify the depth of the treatment zone. The maximum depth of the treatment zone for new land treatment units must be [40 CFR 264.271(c)]:

- a. No more than 1.5 meters (5 feet) from the surface; and
- b. More than 1 meter (3 feet) above the seasonal high water table.

If a land treatment unit will manage ignitable or reactive waste, as indicated on Table V.F.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17 and 264.281.

If a land treatment unit will manage incompatible waste, as indicated on Table V.F.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17 and 264.282.

If a land treatment unit will manage F020, F021, F022, F023, F026 and F027 waste, as indicated on Table V.F.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.283.

2. Describe the land treatment unit. A plan view and cross-section of the unit should be included with the engineering report.
3. Complete Table V.F.3. - Land Treatment Principal Hazardous Constituents and list the wastes for which the treatment demonstration will be made and the principal hazardous constituents in each waste. Specify in the report the data sources to be used to make the demonstration such as laboratory data, field data, operating data, literature, or other.
4. Run-on Diversion

Describe in detail the measures used to control run-on and divert run-on from the unit. Include all the analyses used to calculate the run-on volumes.

The owner or operator must design, construct, operate, and maintain a run-on control system capable of preventing flow onto the active portion of the land treatment unit during peak discharge from a 100-year, 24-hour storm. [30 TAC 335.171(3)]

Any tanks or basins associated with the run-on control system must be emptied or otherwise managed expeditiously after storms to maintain the design capacity of the system. [30 TAC 335.171(5)]

5. Run-off Control

Describe in detail the measures used to control the run-off from the unit, and minimize hazardous constituents in the run-off, include all the analyses used to calculate the run-off volumes.

The owner or operator must design, construct, operate and maintain a run-off management system to collect and control at least the water volume resulting from a 100-year, 24-hour storm. [30 TAC 335.171(4)]

Collection and holding facilities (e.g., tanks or basins) associated with run-off control systems must be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system. [30 TAC 335.171(5)]

6. Wind Dispersal

The owner or operator of a land treatment unit containing hazardous waste which could be subject to dispersal by wind must cover or otherwise manage the land treatment unit so that wind dispersal is minimized. Describe practices to control wind dispersal (e.g., cover or frequent wetting) of the hazardous waste. [30 TAC 335.171(6)]

7. Treatment Demonstration

A description of the treatment demonstration required under 40 CFR 264.272 and 270.20(a) shall be included with the engineering report. If the owner or operator intends to conduct field tests or laboratory analyses in order to make the demonstration, he must obtain a treatment or disposal permit.

8. Food Chain Crops [40 CFR 264.276]

Several conditions must be satisfied if food-chain crops are to be grown in or on the treatment zone. A demonstration must be prepared similar to the one described in the Treatment Demonstration and submitted at least 90 days prior to the planting of crops. The demonstration need not be submitted with this application. However, a description of the demonstration must be included as part of the engineering report. This demonstration may be combined with the Treatment Demonstration description, as some of the information required is identical.

## G. Landfills

Provide an engineering report which includes all of the information specified in 30 TAC 305.50(a)(5), (6), (9), (10), and (12), 335.173, 40 CFR 264.19, 264.300, 264.301, 264.302, 264.303(a), 264.304, 264.309, 264.312, 264.313, 264.315-264.317, and 270.21(with the exception of 270.21(e), (g), (h), and (i)). The text of the report should be written to supplement engineering plans, specifications, and test results necessary to provide a detailed description of how the landfill will comply with these standards.

For landfills at a new hazardous waste management facility or which are part of an areal expansion of an existing hazardous waste management facility, include in the engineering report design, construction, and operational information specified in 30 TAC 335.204(e).

For all landfills, include in the report the following information.

Complete Table V.G.1 - Landfills and list the landfills (and number of cells, if applicable) covered by this application. List the waste(s) managed in each unit and the rated capacity or size of the unit. If wastes are segregated in some manner, list the cell number in which wastes are placed next to each waste type.

If a landfill will manage ignitable or reactive waste, as indicated on Table V.G.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17 and 264.312.

If a landfill will manage incompatible waste, as indicated on Table V.G.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17 and 264.313.

If a landfill will manage F020, F021, F022, F023, F026, and F027 waste, as indicated on Table V.G.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.317.

1. Describe the landfill. A plan view and cross-section of the landfill should be included with the engineering report.

2. Containment System

TCEQ Technical Guideline No. 6, Monitoring Systems and Leachate Collection, which can be obtained from the I&HW Permits Section, contains suggested methods of leak detection system construction and EPA publication 530-SW-85-014 provides design guidance for liner systems. The applicant is strongly encouraged to test each synthetic liner after installation by an electrical leak location test, such as the electric field method described in EPA Technical Guidance Document EPA/600/R-93/182, Quality Assurance and Quality Control for Waste Containment Facilities, or an equivalent method approved by the Executive Director. Construction above the liner may not proceed until any detected leaks are sealed.

- a. Complete Table V.G.3. - Landfill Liner System and specify the type of liner used for the landfill.
- b. In the engineering report, describe the design, installation, construction, and operation of the liner and leachate collection system. The description must demonstrate that the liner system will prevent discharge to the land, groundwater, and surface water. The following analyses should be included as attachments to the engineering report (A QAPP should be included in the report to ensure that each analysis is performed appropriately):

For artificial liners:

- (1) Seaming method
- (2) Surface preparation method
- (3) Tensile Strength
- (4) Impact Resistance
- (5) Compatibility Demonstration
- (6) Foundation Design (including Settlement Potential, Bearing Capacity and Stability, and Potential for Bottom Heave Blow-out)

For soil liners:

- (7) Waste Migration Analysis (based on head, porosity, and permeability) for the most mobile and least attenuated waste constituents
- (8) Atterberg Limits, % passing a #200 sieve, and Permeability
- (9) Moisture Content
- (10) Standard Proctor Density, Compaction Data

For Leachate Collection System

For incorporation into the permit, complete Table V.G.4. - Landfill Leachate Collection System used for the landfill.

- (11) Capacity of the system:
    - (a) rate of leachate removal
    - (b) capacity of sumps
    - (c) thickness of mounding and maximum hydraulic head
  - (12) Pipe Material and Strength
  - (13) Pipe Network Spacing and Grading
  - (14) Collection Sump(s) Material and Strength
  - (15) Drainage Media Specifications and Performance
  - (16) Analyses showing that pipe and pipe perforation size will prevent clogging and allow free liquid access to the pipe.
  - (17) Compatibility Demonstration
- c. State whether the liner system components are chemically resistant to the waste and how this resistance was determined. Attach any tests or documentation to the engineering report.
  - d. Submit a quality assurance/quality control plan for all components to demonstrate that all components will be properly installed and will perform to design specifications.
  - e. Whether the leachate collection components are chemically resistant to the waste and how this resistance was determined. Attach any tests or documentation to the engineering report.
3. For Dikes:
    - a. Slope Stability Analysis;
    - b. Hydrostatic and Hydrodynamic Analyses
    - c. Ability to withstand scouring from leaking liner.
  4. Landfills that receive waste on or after May 8, 1985 (or for newly-regulated units, the effective date of the new RCRA regulation) into new units and/or lateral expansions or replacements of existing units must meet the minimum technological requirements of the Hazardous and Solid Waste Amendments of 1984, unless an appropriate waiver is granted by the Commission. The minimum technological requirements include the installation of two or more liners and a leachate collection system above and between the liners [40 CFR 264.301(c)]. Plans and specifications for both new and existing landfills must demonstrate conformity with 30 TAC 335.173.
  5. Site Development Plan

Describe the methods used to deposit waste in the landfill. This description should include rate of waste deposition, waste segregation, average lift size, maximum lift, average cell or trench size, maximum cell or trench size, and other information necessary to depict how the landfill will be developed. Do not include liner or leachate collection system information, closure information, or handling of special wastes. This will be included elsewhere in the report.
  6. Run-on Control [30 TAC 335.173(g)]

The owner or operator must design, construct, operate, and maintain a run-on control system capable of preventing flow onto the active portion of the landfill during peak discharge from at least a 100-year, 24-hour storm.

In the engineering report, include the following analyses:



- a. Run-on volume and depth calculations from the peak discharge of the 100-year, 24-hour storm; and
- b. For ditches on the plant property, back-water calculations.

Collection and holding facilities associated with the run-on control system must be emptied or otherwise managed expeditiously. [30 TAC 335.173(i)]

7. Run-off Control [30 TAC 335.173(h)]

The owner or operator must design, construct, operate, and maintain a run-off management system to collect and control the water volume resulting from a 100-year, 24-hour storm.

Include all analyses used to calculate run-off volumes.

Collection and holding facilities (e.g., tanks or basins) associated with run-off control systems must be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system. [30 TAC 335.173(i)]

8. Wind Dispersal [30 TAC 335.173(j)]

If the landfill contains any particulate matter which may be subject to wind dispersal, the owner or operator must cover or otherwise manage the landfill to minimize wind dispersal. Based upon the characteristics of the material to be landfilled describe the likelihood of wind dispersal occurring. Describe in detail any method and/or control mechanism used to prevent wind dispersal.

9. Liquid Waste

If liquid waste or waste containing free liquids is to be stabilized and then placed in the landfill, the procedures used to stabilize the waste must be described in the engineering report. The waste must be treated prior to landfilling using a treatment technology that does not solely involve the use of a material that functions primarily as a sorbent. Provide supporting documentation to verify that an appropriate stabilization procedure is used to comply with 30 TAC 335.175.

10. The Commission may approve an alternate design or operating practice for a landfill if the owner or operator demonstrates that such design or operating practices, together with location characteristics [40 CFR 264.301(d)]:

- a. Will prevent the migration of hazardous constituents into the groundwater or surface water at least as effectively as the liners and leachate collection and removal system; and
- b. Will allow detection leaks of hazardous constituents through the top liner at least as effectively.

11. Exemption from Double-Liner Requirements for Monofills [264.301(e)]

Owners or operators of hazardous waste monofills will be exempted from the double-liner requirements if the Commission finds, based on a demonstration by the owner or operator, that alternative design and operating practices, together with location characteristics are at least as effective as a double liner in preventing migration of hazardous constituents to the groundwater or surface water. If an exemption is sought, submit detailed plans and engineering and hydrogeologic reports, as appropriate, describing alternate design and operating practices that will, in conjunction with location aspects, prevent the migration of any hazardous constituents into the groundwater or surface water at any future time.

## 12. Above-grade Benefits

The engineering report must evaluate the benefits, if any, associated with the construction of the landfill above existing grade at the proposed site, the costs associated with the above-grade construction, and the potential adverse effects, if any, which would be associated with the above-grade construction. [TX. Health and Safety Code 361.108]

## H. Incinerators

Provide an engineering report which includes all of the information specified in 30 TAC 305.171-305.175, 40 CFR 264.340, 264.342-264.346, 264.347(a), and 270.19.

**Note:** A permit is not required prior to conducting a trial burn for existing incinerator operating under 30 TAC 335.2(c). However, without the prior approval of the Executive Director the operator cannot be certain that the trial burn data will be sufficient to demonstrate compliance with regulations. Applicants are encouraged to obtain approval prior to conducting a test burn. For any trial burn plan approved by the TCEQ or EPA, the applicant shall submit a certification that the previously conducted trial burn was conducted in accordance with the approved trial burn plan.

1. Complete Table V.H.1 - Incinerators and list the incinerators covered by this application and list the waste managed in each unit.

Complete Table V.H.2 - Incinerator Permit Conditions, Monitoring, and Automatic Waste Feed Cutoff Systems.

Complete Table V.H.3 - Maximum Constituents Feed Rate.

Complete Table V.H.4 - Maximum Allowable Emission Rates

For use during the shakedown period, the trial burn period and the period after completion of the initial trial burn, complete Table V.H.5 - Incinerator Permit Conditions, Monitoring, and Automatic Waste Feed Cutoff-Short-Term Operation.

If an incinerator will manage reactive or incompatible waste, as indicated on Table V.H.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17.

If an incinerator will manage F020, F021, F022, F023, F026, and F027 waste, as indicated on Table V.H.1, the DRE requirement is 99.9999%.

2. If a trial burn will be performed, designate one or more of the 40 CFR 261 Appendix VIII organic compounds present in the wastes to be incinerated as Principal Organic Hazardous Constituents (POHCs). Selection will be based upon the degree of difficulty of incineration of these compounds and upon their concentration or mass in the waste feed. These POHCs will be used to determine the destruction and removal efficiency (DRE) specified in the performance standards of 40 CFR 264.343. In addition, complete Table V.H.8 - Principal Organic Hazardous Constituents.
3. Submit a Quality Control/Quality Assurance Plan for all sampling, analysis, and monitoring activities which will occur in conjunction with the trial burn.

## I. Boilers and Industrial Furnaces

Provide an engineering report which includes all of the information specified in 30 TAC 305.50(13), 305.571-573, 40 CFR 266.100 and 266.102 (as incorporated by reference in 30 TAC 335.221 through 335.225), 266.104-266.112, and 270.22.

1. Complete Table V.I.1 - Boilers and Industrial Furnaces and list the boilers and/or industrial furnaces covered by this application to be permitted and list the waste managed in each unit.  
Complete Table V.I.2 - Boiler and Industrial Furnace Permit Conditions, Monitoring, and Automatic Waste Feed Cutoff Systems.  
Complete Table V.I.3 - Maximum Constituent Feed Rate.  
Complete Table V.I.4 - Maximum Allowable Emission Rates.  
For use during the shakedown period, trial burn period and the period after completion of the initial trial burn, complete Table V.I.5 - Boiler and Industrial Furnace Permit Conditions, Monitoring, and Automatic Waste Feed Cutoff Systems-Short-Term Operation.  
If a boiler or industrial furnace will manage reactive or incompatible waste, as indicated on Table V.I.1, describe in the engineering report the procedures used to ensure compliance with 40 CFR 264.17.  
If a boiler and industrial furnace will manage F020, F021, F022, F023, F026, and F027 waste, as indicated on Table V.I.1, the DRE requirement is 99.9999%.
2. If a trial burn will be performed, designate one or more of the 40 CFR 261 Appendix VIII organic compounds present in the wastes to be incinerated as Principal Organic Hazardous Constituents (POHCs). Selection will be based upon the degree of difficulty of incineration of these compounds and upon their concentration or mass in the waste feed. These POHCs will be used to determine the destruction and removal efficiency (DRE) specified in the performance standards of 40 CFR 266.104. In addition, complete Table V.I.8 - Principal Organic Hazardous Constituents.
3. Submit a Quality Control/Quality Assurance Plan for all sampling, analysis, and monitoring activities.

## J. Drip Pads

Provide an engineering report which includes all of the information specified in 40 CFR 264.570-573 and 270.26.

1. Complete Table V.J.1. - Drip Pads and list the drip pads, covered by this application, to be permitted. List the N.O.R. unit number, the waste managed in each unit, the rated capacity of each unit, and the overall dimensions of the unit (including perimeter curb or berm height) that will be in contact with the waste.
2. For either new drip pads<sup>2</sup> or existing drip pads for which the owner/operator elects to comply with the synthetic liner requirement of 40 CFR 264.573(b), please complete Table V.J.2. - Drip Pad Synthetic Liner System.
3. In the engineering report, describe the design, installation, construction, and operation of the liner and leakage collection system. The description must demonstrate that the liner system will prevent discharge to the land, groundwater, and surface water. The following analyses

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<sup>2</sup>New drip pads are those drip pads constructed after 12/06/90 and which had no binding contract for construction. If electing to comply with 40 CFR 264.573(b), the requirement to install a leakage collection system of 40 CFR 264.573(b)(3) applies only to those drip pads constructed after 12/24/92 and which had no binding contract for construction.

should be included as attachments to the engineering report (A QAPP should be included in the report to ensure that each analysis is performed appropriately):

For artificial liners:

- a. Seaming method
- b. Surface preparation method
- c. Tensile Strength
- d. Impact Resistance
- e. Compatibility Demonstration
- f. Foundation Design (including Settlement Potential, Bearing Capacity and Stability, and Potential for Bottom Heave Blow-out)

For Leakage Collection System

- g. Capacity of the system:
  - (1) rate of leachate removal
  - (2) capacity of sumps
  - (3) thickness of mounding and maximum hydraulic head
- h. Pipe Material and Strength
- i. Pipe Network Spacing and Grading
- j. Collection Sump(s) Material and Strength
- k. Drainage Media Specifications and Performance
- l. Analyses showing that pipe and pipe perforation size will prevent clogging and allow free liquid access to the pipe.
- m. Compatibility Demonstration

## K. Miscellaneous Units

A miscellaneous unit is a unit other than a container, tank, incinerator, boiler, industrial furnace, landfill, surface impoundment, waste pile, underground injection well, land treatment area, drip pad, or unit eligible for an R, D & D permit that is used to process, store, or dispose of hazardous waste.

For each miscellaneous unit for which an operating permit is sought, provide an engineering report which includes all of the information specified in 40 CFR 264.600-264.602, and 270.23.

1. Complete Table V.K - Miscellaneous Units and list the miscellaneous units covered by this application. List the waste managed in each unit and the rated capacity or size of the unit. If the information requested is not applicable, an explanation must be submitted.
2. Provide any other information which is descriptive of the relationship between the miscellaneous unit and the environment. Application information may include design requirements of 30 TAC 305 and 335, 40 CFR Part 264 Subparts I through O, and Part 270 that are appropriate for the miscellaneous unit or portions of the unit being permitted.
3. For a unit which involves combustion, please provide emissions data or a trial burn plan. Tables V.H.1-5 for incinerators or Tables V.I.1-5 for boilers and industrial furnaces may be adapted as appropriate to provide operation, monitoring, and emission information for a miscellaneous combustion unit.

## L. Containment Buildings

Provide an engineering report which includes all of the information specified in 40 CFR 264.1100-1101(c)(3), and 264.1101(d)-(e).

Complete Table V.L. - Containment Buildings and list the containment buildings covered by this application to be permitted. List the N.O.R. unit number, whether the unit is for storage and/or processing, the waste or debris managed in each unit, the rated capacity of each unit, and the overall dimensions of the unit (including containment wall height) that will be in contact with the waste or debris.



**V. ENGINEERING REPORT**

**Table V.D.1. - Surface Impoundments**

Permit Unit No.	Surface Impoundment	N.O.R. No.	Waste Nos. <sup>1</sup>	Rated Capacity	Dimensions	Distance from lowest liner to groundwater	Action Leakage Rate (if required)	Unit will manage Ignitable, Reactive, Incompatible, or F020, F021, F022, F023, F026, and F027 Waste (state all that apply)
1	Closed Surface Impoundment	001	No waste stored.	Closed (rated capacity before closure was 5065 yd <sup>3</sup> ) <sup>2</sup>	180 ft x 106 ft x 7ft (before closure)	Clean Closed. No waste or liner system in place.	Not Required	No Waste stored. The surface impoundment was clean closed in 1984.

<sup>1</sup>from Table IV.B, first column

<sup>2</sup>Estimated amount of waste and contaminated soil removed in 1984.



**ENGINEERING REPORT FOR THE  
PART B PERMIT APPLICATION  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

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V.A.1 Site Map

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## **V.A. GENERAL ENGINEERING REPORTS**

### **V.A.1. General Information**

Solid Waste Management Unit (SWMU) No. 1 is an inactive surface impoundment and is a grass-covered section of land located at the southwest corner of the facility property (Figure V.A.1). SWMU No. 1 was built in 1979 for the disposal of contaminated surface soils remediated from an adjacent low-lying ponding area (AOC 6). Surface soils from the ponding area were remediated in response to a fire in 1979 and the discovery of contaminated soils. Installation of SWMU No. 1 was based on an agreement with the Texas Department of Water Resources (TDWR) for disposal of the soils.

In 1984, Southern Pacific Transportation Company (SPTCo) closed SWMU No. 1 by excavating the soils and materials contained within. The visual hazardous material was removed along with apparent contaminated soil. An additional 3-inches of soil was then removed. When soil confirmation sample concentrations were lower than those of background samples, the excavated area was backfilled with compacted clay and a groundwater monitoring system was installed.

### **V.A.2. Features to Mitigate Unsuitable Site Characteristics**

This section does not apply since the unit is closed.

### **V.A.3. Construction Schedules**

This section does not apply since the unit is closed.

## V.D. SURFACE IMPOUNDMENTS

### V.D.1. SWMU No. 1

The surface impoundment SWMU No. 1 was not an engineered structure, nor was it designated to serve as a landfill. It was used from 1979 to 1982 for the disposal of contaminated surface soils containing K001 type wastes.

SWMU No. 1 is bordered on the southern side by an earthen berm, which is about 2 feet by 3 feet by about 80 to 100 feet long. The berm extends about 100 feet south of the southwest corner of the SWMU No. 1. A chain-link security fence is located along the northern and western margins of SWMU No. 1. The original dimensions of the unit were about 180 feet by 106 feet at the surface, extending to a depth of about 7 feet bgs (SPTCo, 1991). Based on these dimensions, SWMU No. 1 would have a capacity of 133,560 cubic feet (about 4,950 cubic yards). According to SPTCo facility representatives, a clay liner was installed during the original construction of SWMU No. 1. No information was available concerning the thickness and engineering properties of the liner.

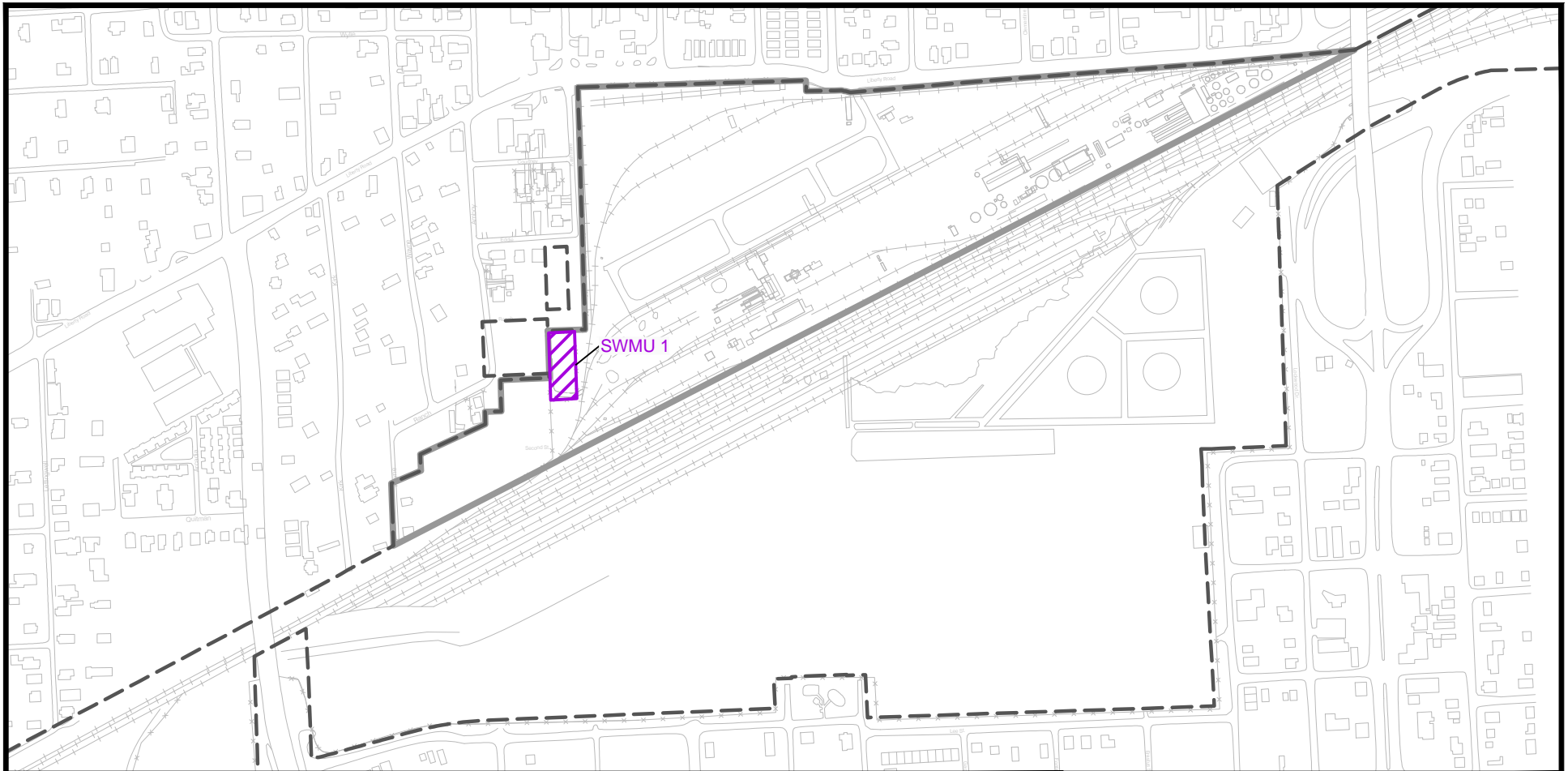
In 1984 SWMU No. 1 was clean-closed by excavating the soils and materials contained within and groundwater sample results have been compliant with the TCEQ Remedy Standard A requirements for groundwater protection for the past eight years.

It is recommended at this time that groundwater monitoring of SWMU No. 1 sampling activities be terminated and the monitoring wells associated with the unit be plugged and abandoned (See Section VII and Section XI (Compliance Plan Attachment D)).

## **V.E REFERENCES**

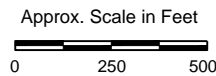
Southern Pacific Transportation Company (SPTCo), 1991. *Part B Permit Application – Post Closure Care and Compliance Plan for the Closed Surface Impoundment*. Volumes I-III. May 13.

## FIGURES



**EXPLANATION**

- UPRR Property Boundary
- UPRR Facility Boundary
- Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- \*\*\*\*\* Fence
- + + + + + Railroad



**SOURCE:**  
Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.



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Figure V.A.1

**SITE MAP**

PROJECT: 1358

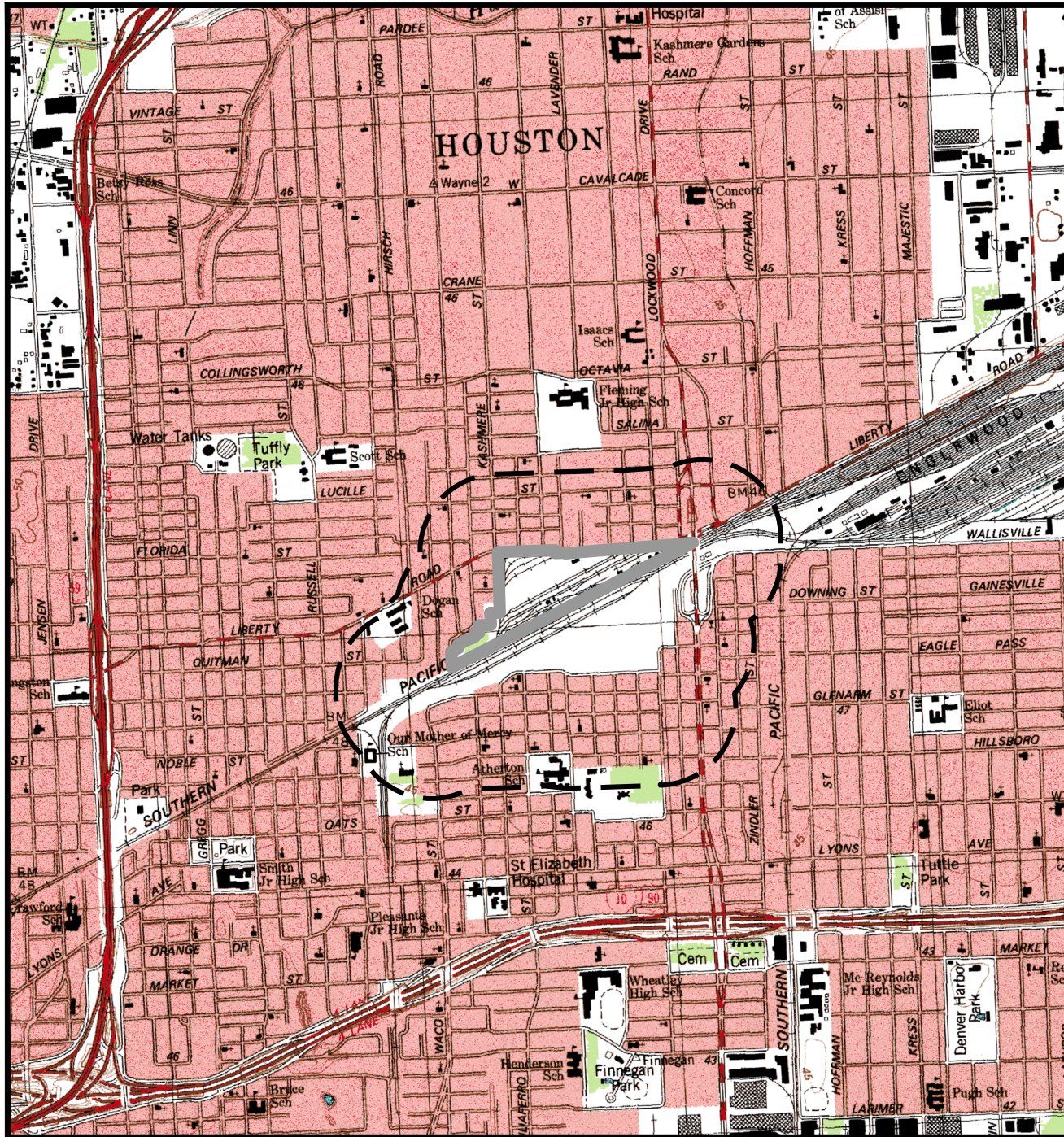
BY: AJD

REVISIONS

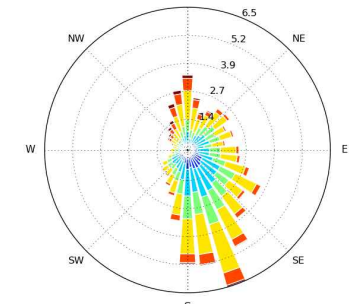
DATE: NOV., 2014

CHECKED: ECM

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS



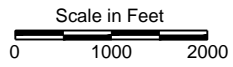
[HOU] Houston Hobby  
 Windrose Plot [All Year]  
 Period of Record: 31 Dec 1972 - 07 Jun 2014  
 Obs Count: 361022 Calm: 14.2% Avg Speed: 8.1 mph



Generated: 08 Jun 2014  
 Wind Speed (mph)  
 2-5 5-7 7-10 10-15 15-20 20+

**EXPLANATION**

- Site Property Boundary, Fence
- 1000 Ft Radius
- Residential (All other surrounding property land use is industrial)



SOURCE:  
 Base map from www.tnris.gov, Settegast, TX 7.5 min. USGS quadrangle dated 1982.

<b>UNION PACIFIC RAILROAD CO.</b>		
<b>HOUSTON WOOD PRESERVING WORKS</b>		
Figure V.A.2		
<b>TOPOGRAPHIC MAP</b>		
PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	
<b>PASTOR, BEHLING &amp; WHEELER, LLC</b> CONSULTING ENGINEERS AND SCIENTISTS		



## VI. Geology Report

This portion of the application applies to owners or operators of new hazardous waste management facilities; areal and/or capacity expansions of existing hazardous waste management facilities; and existing industrial solid waste facilities that store, process or dispose of hazardous waste in surface impoundments, landfills, land treatment units, waste piles (except those waste piles that meet the requirements of Section V.E.10.b. of this application), and tanks or drip pads which require a contingent post-closure plan.

For a new Compliance Plan or modification/amendment to an existing Compliance Plan of Section XI of this application, submit a Geology Report which contains updated site geologic information derived from on-going investigations since submittal of the last Permit modification/amendment application.

Submit a Geology Report which includes at a minimum the following information. This report and all specifications, details, calculations/estimates and each original sheet of plans, drawings, maps, cross-sections, other graphics, such as limits of contamination maps, etc. or any other geoscientific work must be signed and sealed by a Professional Geoscientist licensed in the State of Texas under the Professional Geoscientists Practice Act.

### A. Geology and Topography

#### 1. Active Geologic Processes

Provide a description and interpretation of the active geologic processes in the vicinity of the facility. This description should include:

- a. An identification of any faults (active or otherwise) in the area of the facility. The preparer should determine which Holocene sediments or man-made structures have been displaced. The report should contain a description of the investigation techniques used to identify faults and should assess the degree, if any, to which a particular fault increases the long-term potential for waste migration. The clearance required from active faults to ensure that liner systems will not be disrupted will be based upon site specific factors such as the zone of significant surface deformation, uncertainty in locating the fault, activity of the fault, and a distance to provide a reasonable margin of safety. These issues should be addressed when discussing the offset of an industrial solid waste facility unit from an active fault.

To satisfy the requirements of 30 TAC 305.50(a)(4)(F) and 305.50(a)(10)(E), for a proposed hazardous waste management facility or a modification or amendment of a permit which includes a capacity expansion of an existing hazardous waste management facility, submit the following.

- (1) A geologic literature review should be conducted, from which useful information on the possibility of faulting at a given site may be revealed. This includes, but is not limited to, maps of surface faults, subsurface structure, and field investigations by the author(s).
- (2) Descriptions and maps of faulting, fracturing, and lineations in the area are necessary. An aerial photo with lineation interpretations is suggested.
- (3) The maps and cross-sections are to be constructed using an amount of data necessary to adequately describe the geology of the area. Surface data, including data regarding known surface expressions, such as surface faults, gas seeps, lineations, etc., should be accounted for in the subsurface interpretations. A surface structure map should be prepared, incorporating all of the subsurface data as well as known surface features.
- (4) A minimum of two structural cross-sections, utilizing available oil field and/or water well electric log data, shall be made perpendicular to each other, crossing at the

- proposed surface unit location. These cross-sections should define geologic units, indicating especially Holocene sediments and Underground Sources of Drinking Water (USDWs), as well as lithology. The cross-sections should be constructed from the surface, down through the shallowest major structure or the base of the Holocene, whichever is deeper. These cross-sections need to be on a scale necessary to depict the local geology (3000' radius from the site location minimum). If needed to adequately describe the local geology, then a larger radius or deeper area of review may be necessary.
- (5) A minimum of two structural subsurface maps need to be prepared. One map should be made on the shallowest mappable subsurface marker, the other on a deeper horizon that shows the underlying major structure. Additional maps may be necessary.
  - (6) Field surveillance will be necessary to check the area of the facility for surface features, such as lineations, and to investigate potential surface faults as indicated by, but not limited to, aerial photos, topographic maps, and seismic and subsurface structural maps.
  - (7) The above requirements do not limit the use of any additional information, such as seismic data, isopach maps, or potentiometric maps, that may help in defining the geology of the area of review.
  - (8) If faulting exists within 3000 feet of the surface unit, it must be demonstrated that the fault has not had displacement within Holocene time. If such a fault does exist, it cannot pass within 200 feet of the surface unit.
  - (9) If a fault that has been active within the Holocene is located within 3000 feet of the surface unit, it must be demonstrated that, a.) the fault is not transmissive, i.e., it will not provide for groundwater movement that would result in endangerment to human health or the environment, and b.) there is no actual and/or potential problem of subsidence, which could endanger the stability of the surface unit.
- b. A discussion of the extent of land surface subsidence in the vicinity of the facility including total recorded subsidence and past and projected rates of subsidence. For facilities located at low elevations along the coast which have experienced appreciable rates of subsidence, the potential for future submergence beneath Gulf water should be addressed.
  - c. A discussion of the degree to which the facility is subject to erosion. The potential for erosion due to surface water processes such as overland flow, channeling, gullyng, and fluvial processes such as meandering streams and undercut banks should be evaluated. If the facility is located in a low-lying coastal area, historical rates of shoreline erosion should also be provided.
  - d. Complete Table VI.A.1. – Major Geologic Formations.
2. Regional Physiography and Topography (applicable only to owners or operators of facilities that store, process, or dispose of hazardous waste in surface impoundments, landfills, land treatment units, waste piles, except waste piles exempt from groundwater monitoring requirements, and tanks which require a contingent post-closure plan)
    - a. Distance and direction to nearest surface water body
    - b. Slope of land surface
    - c. Direction of slope
    - d. Maximum elevation of facility
    - e. Minimum elevation of facility

3. Regional Geology (applicable only to owners or operators of facilities that store, process, or dispose of hazardous waste in surface impoundments, landfills, land treatment units, waste piles, except waste piles exempt from groundwater monitoring requirements, and tanks which require a contingent post-closure plan)

Provide a description of the regional geology of the area. This section should include:

- a. A geologic map of the region with text describing the stratigraphic and lithologic properties of the map units. An appropriate section of a published map series such as the Geologic Atlas of Texas prepared by the Bureau of Economic Geology is acceptable.
- b. A description of the generalized stratigraphic column in the facility area from the base of the lowermost aquifer capable of providing usable groundwater to the land surface. At least the uppermost 1,000 feet of section below the facility should be described. The geologic age, lithology, variation in lithology, thickness, depth, geometry, hydraulic conductivity, and depositional history of each geologic unit should be described based upon available geologic information. Regional stratigraphic cross sections should be provided, where available.

4. Subsurface Soils Investigation Report

This section should contain the results of an investigation of subsurface conditions for each land based unit and/or unit which requires contingent closure and post-closure care. If several units are in close proximity, a single investigation for the area will suffice. This report should include:

- a. The logs of borings performed at the waste management area. All borings must be conducted in accordance with established field exploration methods. Investigation procedures should be discussed in the report. A sufficient number of borings should be performed to establish subsurface stratigraphy and to identify and allow assessment of potential pathways for pollution migration. Borings must be sufficiently deep to allow identification of the uppermost aquifer and underlying hydraulically interconnected aquifers. Borings should penetrate through the uppermost aquifer and all deeper hydraulically interconnected aquifers, deep enough to identify the aquiclude at the lower boundary. Borings should be completed to a depth at least 30 feet below the deepest excavation planned at the waste management area. The required number of borings will increase or decrease depending on the heterogeneity of subsurface materials. Locations with stratigraphic complexities such as non-uniform beds which pinch out, vary significantly in thickness, coalesce, or grade into other units, will require a significantly greater degree of subsurface investigation than areas with simple hydrogeologic frameworks. Boring logs should include a detailed description of materials encountered including any discontinuities such as fractures, fissures, slickensides, lenses or seams. Whenever possible, electric logs should be run on each borehole. The hollow stem auger boring method is recommended in those instances where an accurate determination of initial water levels is important. A key explaining both the symbols used on the boring logs and the classification terminology for soil type, consistency, and structure should be provided.
- b. Cross-sectional drawings prepared from the borings depicting the generalized soil strata profile at the site. For small waste management areas two cross sections prepared perpendicular to each other will normally suffice.
- c. A text which describes the investigator's interpretations of the subsurface stratigraphy based upon the field investigation. If appropriate, soils may be assigned to generalized strata to aid in the discussion.
- d. Complete Table VI.A.4. - Waste Management Area Subsurface Conditions and provide in the report data which describes the geotechnical properties of the subsurface soil materials. All laboratory and field tests must be performed in accordance with recognized

procedures. A brief discussion of test procedures should be included. All major strata encountered during the field investigation phase should be characterized with regard to: Unified Soil Classification, moisture content, percent less than number 200 sieve, Atterberg limits (liquid limit, plastic limit, and plasticity index), and coefficient of permeability. Field permeability tests should be used to determine the coefficient of permeability of sand or silt units and should also be used to supplement laboratory tests for more clay-rich soils. In addition, particle size distribution and relative density based upon penetration resistance should be determined for coarse-grained soils. For fine-grained soils the following parameters should also be determined: cohesive shear strength based upon either penetrometer or unconfined compression tests, dry unit weight, and degree of saturation(s). For the major soil strata encountered, the maximum, minimum, and average for each of these variables should be compiled.

- e. For land treatment units, provide a description of the surficial soils at the site which includes:
  - (1) The name and description of the soil series at the site;
  - (2) Important physical properties of the series such as depth, permeability, available water capacity, soil pH, and erosion factors;
  - (3) Engineering properties and classifications such as USDA texture, Unified Soil Classification, size gradation, and Atterberg limits (liquid limit, plastic limit, and plasticity index); and
  - (4) The cation exchange capacity (CEC) of the soil(s) expressed in units of meq/100g.

Much of this information may be obtained by consulting the county soil survey published by the United States Department of Agriculture, Soil Conservation Service. If available, a copy of an aerial photograph showing soil series units on the land treatment area should be provided.

If an aerial photograph is not available, include a soil series map as an attachment to this subsurface soils investigation report.

## B. Facility Groundwater

If past monitoring has shown the presence of hazardous constituents in the groundwater, the owner or operator must submit a Compliance Plan Application with this application. The Compliance Plan Application and instructions can be found in Section XI of this application form.

### 1. Regional Aquifers

Provide a description of the regional aquifers in the vicinity of the facility based upon available geologic references. The section should provide:

- a. Aquifer names and their association with geologic units described in Section VI.A.3.b.;
- b. A description of the constituent materials of the aquifer(s);
- c. A description of the water-bearing and transmitting properties of the aquifer(s);
- d. Whether the aquifers are under water table or artesian conditions;
- e. Whether the aquifers are hydraulically connected;
- f. A regional water table contour map or potentiometric surface map for each aquifer, if available, from published references;
- g. An estimate of the rate of groundwater flow in units of ft/yr;
- h. Values for total dissolved solids content of groundwater from the aquifers;
- i. Identification of areas of recharge to the aquifers; and

(An application for a new hazardous waste surface impoundment, waste pile, land treatment unit, or landfill, which is to be located in the apparent recharge zone of a major or minor aquifer, as designated by the Texas Water Development Board in the publication entitled *Water for Texas, Today and Tomorrow* (1990) or subsequent revision must include a hydrogeologic report documenting the potential effects, if any, on the regional aquifer in the event of a release from the waste containment system. (30 TAC 305.50(6))

j. The present use of groundwater withdrawn from aquifers in the vicinity of the facility.

The preparer should update Section III.C.1.e. of the Part A permit application to ensure that all water wells within 1 mile of the property boundaries of the facility have been located. The aquifer(s) yielding water should be identified for each well.

2. Provide groundwater conditions for each land based unit or unit which requires post closure care which includes all the information specified in 30 TAC 335.156-335.167. This discussion should also include:
  - a. Records of water level measurements in borings. The boring logs prepared in response to Section VI.A.4.a. should be annotated to note the level at which groundwater is first encountered and the level of groundwater after equilibration. Normally a 24-hour period is adequate for equilibration of groundwater but an extended period may be required for saturated clay deposits. This information should also be presented on the cross-sections required in Section VI.A.4.b. and recorded and retained in the facility groundwater monitoring record.
  - b. Records of maximum and minimum static water level measurements in monitor wells. Historic water level measurements made during any previous groundwater monitoring should be presented in a table for each well.
  - c. Upper and lower limits of the uppermost aquifer and deeper aquifers which are hydraulically interconnected to it beneath the facility boundary. In most cases this identification would include surface contour maps of the top and bottom surfaces.
  - d. A site specific water table contour map or potentiometric surface map for the uppermost aquifer, and the basis for such identification (the information obtained from hydrogeologic investigations of the facility area). The predicted groundwater flow direction and rate should be indicated.
  - e. A discussion of the variation of hydraulic gradient across the site, including vertical gradient. Calculations for the maximum, minimum, and average groundwater flow velocities for each aquifer identified should also be provided, including pump test data where appropriate.
  - f. An analysis of the most likely pathway(s) for pollutant migration in the event that the primary barrier liner system is penetrated.
3. Description of the Detection Monitoring Program

The groundwater monitoring standards apply to owners and operators of facilities that treat, store, or dispose of hazardous waste in surface impoundments, waste piles, land treatment units, landfills, or tanks without satisfactory secondary containment for which a post-closure care plan or permit is required. If a waste management unit meets certain standards it may qualify for an exemption to the groundwater monitoring requirements. An exemption for a unit does not exempt an entire facility. (See the instructions for each type of unit for a specific exemption.) A facility-wide exemption is described in Section VI.C.

It is important to note that even if the proposed program may use the same well system as the present program, the sampling parameters may be different.

- a. Include in the design report a description of the proposed detection monitoring program. This description should contain all requirements of 30 TAC 335.163-335.164. Provide a justification for the selected suite of waste specific parameters specified in Table VI.B.3.c. - Groundwater Sample Analysis based on toxicity, mobility, persistence, and concentrations in light and dense non-aqueous phase components of the waste. Describe the proposed sampling, analysis, and statistical comparison procedures to be utilized in evaluating groundwater monitoring data. Specify the statistical method and process for determining whether constituent concentrations in groundwater are above background, in accordance with 30 TAC 335.163. Refer to the EPA guidance document entitled ***Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities – Unified Guidance (March 2009)*** (document # EPA 530-F-09-020) for recommended methods.

All data submitted to the TCEQ shall be in a manner consistent with the latest version of the “*Quality Assurance Project Plan for Environmental Monitoring and Measurement Activities Relating to the Resource Conservation Recovery Act and Underground Injection Control*” (TCEQ QAPP) which can be found on the agency’s website.

Monitoring samples and measurements shall be taken at times and in a manner so as to be representative of the monitored activity. The method used to obtain a representative sample of the material to be analyzed shall be the appropriate method from Ground Water, Volume II: Methodology, (document # EPA/625/6-90/016b) or an equivalent method approved by the Executive Director of the TCEQ. Laboratory methods shall be those specified in ***Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, 1987***, as revised; ***Standard Methods for the Examination of Water and Wastewater, Fifteenth Edition, 1980***, and ***1981 supplement***, or current adopted edition; ***RCRA Ground-Water Monitoring: Draft Technical Guidance, 1992, OSWER Directive 9950.1***, or an equivalent method approved in writing prior to use by the Executive Director. [30 TAC Section 305.125(11)(A)]

- b. For inclusion into a permit, complete Table VI.B.3.b. - Unit Groundwater Detection Monitoring System to specify the proposed well system for each unit or waste management area which requires groundwater monitoring.
- c. For inclusion into a permit, complete Table VI.B.3.c to specify:
- (1) the suite of waste specific parameters (indicator parameters, waste constituents, or reaction products) which will be analyzed at each sampling event for each well or group of wells. These parameters must provide a reliable indication of the presence of hazardous constituents in the groundwater;
  - (2) the sampling frequencies and calendar intervals (e.g., monthly; quarterly within the second 30 days of each quarter; semiannually within the first 30 days of the 2nd and 4th quarters, etc.);
  - (3) the analytical method and the achievable detection limit of the sample preparation and analysis methods for the selected parameters. This detection limit will represent the capability of the sampling and analysis to reliably and accurately determine the presence of the selected parameters in the sample; and
  - (4) the concentration limit which will be the basis for determining whether a release has occurred from the waste management unit/area. Concentration limits shall be based on background values for the waste management unit/area, or Practical Quantitation Limit (PQL) values developed through laboratory data obtained using practices consistent with the latest version of the TCEQ QAPP. If background values are lower than PQLs, the applicant may choose respective PQLs as concentration limits for hazardous constituents.
- d. Submit drawings depicting the monitoring well design, current and proposed.

- e. Submit at least one map of the entire facility and additional maps or drawings if necessary on one or more 8.5" x 11" sheets of sufficient scale to show the following in adequate detail:
  - (1) Monitoring well locations, current and proposed;
  - (2) Soil-pore liquid and core sampling points, current and proposed;
  - (3) Waste management unit(s)/area;
  - (4) Property boundary;
  - (5) Point of compliance;
  - (6) Direction of groundwater flow; and
  - (7) Extent of any known plume of contamination

### C. Exemption from Groundwater Monitoring for an Entire Facility

In accordance with 30 TAC 335.156(b)(4), a waste management facility may be exempt from groundwater monitoring if the owner or operator can demonstrate that there is no potential for migration of liquid from any regulated unit to the uppermost aquifer during the active life of the regulated unit (including the closure period) and post-closure care period. This demonstration must be submitted with the permit application, and must be certified by a qualified geologist or geotechnical engineer.

This exemption does not apply to Unsaturated Zone Monitoring. Owners and operators of Land Treatment Units must monitor the unsaturated zone under all circumstances.

The following areas should be addressed in the demonstration, and any predictions must be made on assumptions that maximize the rate of liquid migration:

1. Thickness of soil between the base of the unit and saturated zone;
2. Thickness of saturated zone;
3. Head pressure of the fluids;
4. Properties of the saturated and unsaturated zone (including permeability, effective porosity, and homogeneity), and
5. Total life of facility

The criteria used for the evaluation of this demonstration are more stringent than those used for evaluations of demonstrations submitted prior to permitting. Thus it is necessary for an owner or operator to submit another demonstration even if one was submitted and approved previously.

This type of exemption differs from the exemptions described in Sections V.D. (Surface Impoundments), V.E. (Waste Piles), and V.G. (Landfills). An owner or operator may pursue a facility-wide exemption as well as an exemption for a particular unit, if the owner or operator wishes.

### D. Unsaturated Zone Monitoring

This section applies only to facilities which contain land treatment units. Attach any previous monitoring data to the monitoring report.

1. List all hazardous constituents that have been or will be monitored.
  - a. Current parameters.
  - b. Proposed parameters.

2. Number of soil-pore liquid sampling points.
  - a. Depth of sampling points.
  - b. Equipment used for soil pore liquid monitoring.
  
3. Number of soil core sampling points.
  - a. Depth of soil core sampling points.
  - b. Indicate on a facility map locations of all sampling points.



**Table VI.A.1. – Major Geologic Information**

Names Of Major Geologic Formation(s) Beneath The Facility	Lithology Of The Major Geologic Formation	Formation Thickness (Feet)	Depth To Top Of Formation	
			Feet/MSL <sup>(1)</sup>	Feet/BGS <sup>(2)</sup>
1. Formation: Fill & Alluvium Series: Holocene System: Quaternary Era: Cenozoic	Well-sorted, fin-rained sand with some silt and clay; typically includes some fill material on site	9 ft	15 ft MSL	30-39 ft
2. Formation: Beaumont Series: Pleistocene System: Quaternary Era: Cenozoic	Mostly clay and silt with discontinuous sand layers or lenses (cannel sands, point bar deposits or reworked barrier islands)	>200 ft	Approximately -3 ft to -30 ft MSL	Varies; approximately 50 ft to 80 feet MSL
3. Formation: Lissie (upper Lissie = Montgomery; Lower Lissie = Bently) Series: Pleistocene System: Quaternary Era: Cenozoic	Fluvial clay, silt, sand and gravel (minor amounts). Upper Lissie is locally calcareous; Lower Lissie is non-calcareous	Unknown	No information; not differentiated	No information
4. Formation: Willis Series: Pleistocene System: Quaternary Era: Cenozoic	Fluvial clay, silt and fine gravel, locally cemented with iron oxide, non-calcareous	75-100 ft	No information; not differentiated	No information
5. Formation: Goliad Sand Series: Pliocene System: Tertiary Era: Cenozoic	Coarse sand interbedded with siliceous gravel and silty or clayey zones	Approximately 1600 ft	-550(±) ft MSL	Approximately 550 ft

(1) MSL = Mean Sea Level  
 MLGL = Mean Low-tide Gulf Level

(2) BGS = Below Ground Surface

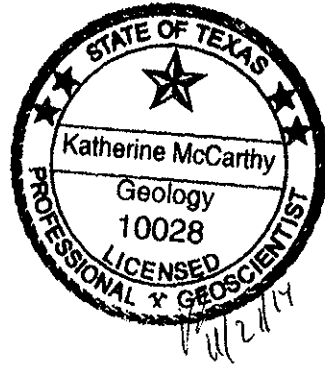
Source: *Compliance Plan Application and Amendments*, ERM, 2003.



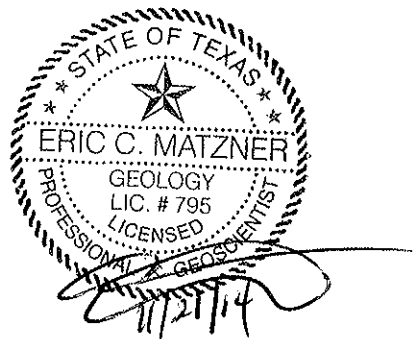
## **VI. GEOLOGY REPORT**

### PROFESSIONAL CERTIFICATIONS

This report has been prepared by Pastor, Behling & Wheeler, LLC under the professional supervision of Katherine J. McCarthy, P.G. and Eric Matzner, P.G. based on information previously developed by others. The findings, recommendations, and/or professional opinions presented in this report have been prepared in accordance with generally accepted professional practices and within the scope of the project.



Katherine J. McCarthy, P.G.  
Senior Staff Geologist  
Pastor, Behling & Wheeler, LLC



Eric Matzner, P.G.  
Associate Hydrogeologist  
Pastor, Behling & Wheeler, LLC

Texas Geoscience Firm No. 50248  
Texas Engineering Firm No. 4760

**Table VI.A.1. – Major Geologic Information**

Names Of Major Geologic Formation(s) Beneath The Facility	Lithology Of The Major Geologic Formation	Formation Thickness (Feet)	Depth To Top Of Formation	
			Feet/MSL <sup>(1)</sup>	Feet/BGS <sup>(2)</sup>
1. Formation: Fill & Alluvium Series: Holocene System: Quaternary Era: Cenozoic	Well-sorted, fin-rained sand with some silt and clay; typically includes some fill material on site	9 ft	15 ft MSL	30-39 ft
2. Formation: Beaumont Series: Pleistocene System: Quaternary Era: Cenozoic	Mostly clay and silt with discontinuous sand layers or lenses (cannel sands, point bar deposits or reworked barrier islands)	>200 ft	Approximately -3 ft to -30 ft MSL	Varies; approximately 50 ft to 80 feet MSL
3. Formation: Lissie (upper Lissie = Montgomery; Lower Lissie = Bently) Series: Pleistocene System: Quaternary Era: Cenozoic	Fluvial clay, silt, sand and gravel (minor amounts). Upper Lissie is locally calcareous; Lower Lissie is non-calcareous	Unknown	No information; not differentiated	No information
4. Formation: Willis Series: Pleistocene System: Quaternary Era: Cenozoic	Fluvial clay, silt and fine gravel, locally cemented with iron oxide, non-calcareous	75-100 ft	No information; not differentiated	No information
5. Formation: Goliad Sand Series: Pliocene System: Tertiary Era: Cenozoic	Coarse sand interbedded with siliceous gravel and silty or clayey zones	Approximately 1600 ft	-550(±) ft MSL	Approximately 550 ft

(1) MSL = Mean Sea Level  
 MLGL = Mean Low-tide Gulf Level

(2) BGS = Below Ground Surface

Source: *Compliance Plan Application and Amendments*, ERM, 2003.

**GEOLOGY REPORT  
PART B PERMIT APPLICATION  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

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## **VIA. GEOLOGY AND TOPOGRAPHY**

### **VIA.1. Active Geologic Processes**

#### **VIA.1.a. Identification of Faults**

A review of the Harris County Flood Control District's (HCFCD) map, *Principle Active Faults in Harris County* (2006) and the *Geologic Atlas of Texas, Houston Sheet* (BEG, 1982) showed no active faults within one mile of the of Houston Wood Preserving Works (HWPW) (the Site). Surface geology of the Site area is shown on Figure VI.A.

#### **VIA.1.b. Extent of Land Surface Subsidence**

The principal active geologic process in the vicinity which could affect the Site would be subsidence. Subsidence in this portion of Harris County, while once substantial (up to six feet of subsidence was measured in northwest Houston between 1906 and 1987), has been minimized in recent years by the action of the Harris-Galveston Coastal Subsidence District (HGCSA) in limiting groundwater pumpage.

An extensometer located in northeast Houston (LJ65-14-746) within about three miles of the Site that continuously records the compaction of the upper 2,170 feet of the subsurface has recorded subsidence of about 0.85 feet since its installation in 1980. Subsidence at this location has remained relatively stable since about 2000. The long-term water-level trends from 1977 to 2013 for the Chicot and Evangeline aquifer, centered in southeastern Harris County, have shown a stabilized area of rebound (Kasmarek, Johnson and Ramage, 2014) further reducing the risk of subsidence in the area.

#### **VIA.1.c. Erosion Potential**

Based on the Soil Survey of Harris County, 1976, Site soils are primarily the Urban land complex (Map Unit Ur). As observed, the Site is well sodded with indigenous vegetation, showing no serious evidence of erosion across the surface or adjacent to the Site.

No creeks or rivers trace through the Site area, further limiting erosion. Finally, the natural land topography and slope, discussed below, are relatively flat, with little potential for erosion due to channeling or gullying.

## **VI.A.2. Regional Physiography and Topography**

### **VI.A.2.a. Physiography**

The Site is located within the Brazos Deltaic Plain of the Western Gulf Coast Plain physiographic province as shown on Figure VI.B (Bernard and Major, 1956). The physiography consists primarily of a relatively flat coastal plain located inland from coastal marshes and inclined gulfward at about five feet or less per mile. The Site is composed of surficial clays (compacted fill) underlain by a relict fluvial-deltaic complex which consists of clay, silt, sand and clayey sand deposits.

The main physiographic limitation of the Site is one that is common to the Gulf Coast area, i.e. poor drainage resulting from the generally flat topography.

### **VI.A.2.b. Topography**

The nearest surface water body to the Site is Buffalo Bayou, located approximately 1.6 miles to the southwest. Based on a review of the USGS (1982) topographic map for the Settegast Quadrangle (Figure VI.C), the regional topography in the vicinity of the Site is flat with a slope of the natural land surface of less than 1% toward the east. A Site specific topographic survey performed in 2012 showed the Facility ranged in elevation from 49.9 feet AMSL to 46.2 feet AMSL with the highest elevations in the center of the Site along the railroad tracks sloping gently to the northwest and southeast.

## **VI.A.3. Regional Geology**

The surficial soils of this region are deposits of the Pleistocene fluvial-deltaic system. The generalized stratigraphic column of the upper 1,000 feet of the Site consists primarily of sand, silt, clay and shell which have been deposited within the last 1.8 million years (Quaternary Period). The youngest sediments comprise the Recent-Holocene (post glacial) depositional surface which is composed of deltaic and coastal interdeltic plains. The Pleistocene coastal plain occurs between the recent formations near the coast and the youngest Tertiary formation inland. A regional geologic map is presented as Figure VI.A. A stratigraphic column of surface and subsurface units for Gulf Coast is shown on Figure VI.D.

Pleistocene soils underlying the Site consist of fluvial, deltaic and associated marginal marine sediments deposited during interglacial stages of rising sea level within the Beaumont, Montgomery, Bentley and Willis formations. In general, these formations are all comprised of similar lithologic material and for the

most part do not have persistent individual characteristics that can be recognized in the subsurface, consequently, they have not been correlated satisfactorily in the subsurface of the Harris-Galveston County area (ERM, 2003).

#### **VI.A.4. Subsurface Soils Investigations**

The Site has undergone a number of investigations attributed to historical releases associated with the Site activities that occurred between 1911 and 1984. These investigations are summarized in the Site Chronology included in Appendix VI.A. To date, an estimated 210 soil borings, 95 current groundwater monitoring wells and 99 Cone Penetration Testing/Rapid Optical Screening Tool (CPT/ROST) have been drilled around the Site. Boring logs and well completion logs are included in Appendix VI.B. A comprehensive listing of the current monitoring wells is presented as Table VI.A. A list of soil borings, CPT/ROST, hydropunch, AOC soil samples and plugged and abandoned monitoring wells are listed in Table VI.B. Cross-sectional drawings developed from boring logs and CPT/ROST borings are included as Figures VI.E.1 through VI.E.5.

The stratigraphy at the Site from the ground surface to a total depth of approximately 135 feet below ground surface is separated into the following units:

- **Fill Material** – Fill material is present from ground surface to a typical depth of approximately three ft bgs. Visual observations of the fill material indicate that the fill is primarily a mixture of gravel, clay, construction debris, and railroad ties. The fill material is underlain by the A-CZ.
- **A-Cohesive Zone (A-CZ)** – The A-CZ ranges in thickness from approximately 8 to 15 feet and was encountered in all of the CPT soundings and borings. Based on lithologic descriptions from boring logs for MW-10A, MW-10B, and MW-11A, the A-CZ generally consists of gray silty clay. The silty clay is stiff to very stiff, laminated, moist, and contains indications of plant material, calcium carbonate, iron oxide nodules, roots, and sandy clay lenses. The A-CZ is underlain by the A-TZ.
- **A-Transmissive Zone (A-TZ)** – The CPT soundings and boring logs indicate that the A-TZ is a continuous silty sand and sand layer beneath the Site. The A-TZ is thickest on the eastern portion of the property (approximately 21 feet thick), and gradually thins from east to west (to less than four feet thick). Based on lithologic descriptions from boring logs for MW-10A, MW-10B, and MW-11A, the A-TZ consists of light greenish-gray to light gray sand and silty sand that is very fine-grained, wet, and contains some natural organic debris and approximately 10 to 25 percent clay. The A-TZ is underlain by the B-CZ.
- **B-Cohesive Zone (B-CZ)** – The B-CZ is a layer of cohesive soils (mostly clays, silty clays, sandy clays, and clayey silts) ranging in thickness from approximately 6 to 19 feet. The B-CZ was encountered in all the CPT soundings. Based on the boring logs from the Point of Compliance (POC) well nests (i.e., MW-10A/MW-10B and MW-11A/MW-11B), the B-CZ in the area is

comprised of clay, silty clay, and sandy clay. It is mottled gray and reddish brown, very stiff to hard, and moist with a high plasticity. The unit also contains thin seams of silty sand, thin carbonate clayey gravel and nodule seams (~0.1 feet thick), and slickensides, as seen in boring logs MW-33B and MW-63B. The B-CZ is underlain by the B-TZ or the C-CZ where the B-TZ is absent (i.e., toward the northeast portion of the Site). Where the B-TZ is absent, the clay zone is referred to as the B/C-CZ, and ranges in thickness from 34 to 39 feet.

- B-Transmissive Zone (B-TZ) – The B-TZ is a discontinuous sand layer that underlies the B-CZ in the western portion of the Site only, and is not present in the eastern portion of the Site. The B-TZ appears to pinch out between MW-35B and MW-33B. Where present, the B-TZ is approximately 3 to 10 feet thick and is present at approximately 25 to 35 ft bgs. The B-TZ consists of silty sand and sand that is mottled brown and gray, very fine-grained, and very dense in consistency. Where present, the B-TZ is underlain by the C-CZ.
- C-Cohesive Zone (C-CZ) – The C-CZ is a layer of cohesive soils (primarily) that underlie the B-TZ to the west and the B-CZ to the east. The C-CZ is approximately 8 to 20 feet thick. Based on boring logs from MW-12C and MW-18C, the C-CZ consists of silt and clayey silt that is reddish brown, firm in consistency, has low plasticity, and contains minor amounts of sand. The top of the C-CZ occurs at depths ranging from 35 to 50 ft bgs and is underlain by the C-TZ.
- C-Transmissive Zone (C-TZ) - The C-TZ is a silt and silty sand layer 10 to 13 feet thick that underlies the C-CZ and is present at approximately 60 to 75 ft bgs. Based on the boring logs from MW-12C and MW-18C, the C-TZ consists of silty sand that is reddish brown, and very fine-grained. The C-TZ overlies reddish brown clay.
- D-Cohesive Zone (D-CZ) – The underlying clay below the C-TZ has been designated the D-CZ. The unit was fully described in four locations (GB-1, MW-59D, MW-665D, and MW-66D). The unit consists of clay and silty clay, red to yellowish-red in color, and very hard and stiff. The D-CZ ranges in thickness from 17 feet to 36 feet thick.
- D-Transmissive Zone (D-TZ) – The D-TZ is a series of silty sand layers with minor amounts of thin clay intervals underlying the D-CZ unit with the top of the unit present at approximately 85 to 104 ft bgs. The D-TZ consists of silty sand that is light yellowish brown to light brown, and very fine to fine grained. The zone also has interbedded reddish brown and gray silty clay intervals. The base of the unit was encountered in MW-59D at 116.8 feet bgs and at GB-1 at 120 feet bgs. The underlying clay is greenish-gray and hard.

## **VI.B. FACILITY GROUNDWATER**

### **VI.B.1. Regional Aquifers and Characteristics**

#### **VI.B.1.a. Aquifer Names**

According to the latest nomenclature by the U.S. Geological Survey, the formations which supply water wells in the Harris County area are from the oldest to youngest: the Fleming Formation of Miocene Age; the Goliad Sand of Pliocene Age; the Willis Sand, Bentley Formation, Montgomery Formation, and Beaumont Clay of Pleistocene Age; and Alluvium of Pleistocene and Recent Ages. Three of these four subdivisions are identified as aquifers and one is identified as a confining layer. From oldest to youngest, and deepest to shallowest, the subdivisions are the Jasper Aquifer, the Burkeville Confining Layer, the Evangeline Aquifer, and the Chicot Aquifer (Kasmarek and Strom, 2002).

The Jasper Aquifer and the Burkeville Confining Layer are considered to be parts of the Fleming Formation. The Evangeline Aquifer includes the upper part of the Fleming Formation and the Goliad Sand. The Chicot aquifer includes the remaining formations up to the land surface. Figure VI.D shows the aquifers and how they correlate to the geologic units in the Gulf Coast Aquifer system.

#### **VI.B.1.b. Constituent Materials**

The Evangeline and the Chicot Aquifers are made up of sand and clay beds with the relative proportions varying throughout the area. Generally, they average half sands and half clays with the Evangeline having a lower sand to clay ration than the overlying Chicot. The aquifers are geologically similar and as a result, the basis for separating them is primarily a difference in hydraulic conductivity (Meyer and Carr, 1979).

#### **VI.B.1.c. Aquifer Description**

The hydraulic conductivity of the Chicot can be up to twice that of the Evangeline, however the transmissivity of the aquifers is similar. The Chicot Aquifer has an estimated transmissivity of between 3,000 to 50,000 ft<sup>2</sup>/d while the transmissivity of the Evangeline is between 3,000 to 15,000 ft<sup>2</sup>/d. Storativity for the Chicot is about 0.0004 to 0.1 while it ranges from about 0.0005 to 0.1 for the Evangeline (Kasmarek and Strom, 2002).

#### **VI.B.1.d. Aquifer Conditions**

The Chicot and the Evangeline Aquifers have shallow water-table conditions in their up dip areas and become confined down dip (Kasmarek and Strom, 2002), including in the vicinity of the Site.

#### **VI.B.1.d. Hydraulic Connection**

Sand beds in the Chicot Aquifer are hydraulically connected to some extent with the sand beds in the underlying Evangeline Aquifer and water moves slowly through circuitous routes from one aquifer to another in response to head differences between the aquifers. The two aquifers have been separately identified by the USGS on the basis of production screenings, and the degree of hydraulic connection between the aquifers is not high (ERM, 2003).

#### **VI.B.1.f. Regional Water Table Contour Map**

The USGS has maintained records of the potentiometric surface elevations in wells in the Chicot and Evangeline Aquifers in this area over a period of years. The potentiometric surface elevations for 2013 shown on Figures VI.F.1 and VI.F.2 are those interpreted for the Chicot and Evangeline Aquifers in this part of the region. The potentiometric surface elevations in aquifers in the area have risen substantially since 1977. Chicot potentiometric surfaces have risen approximately 100 feet during the period 1977-2013, and Evangeline potentiometric surfaces have risen approximately 140 to 160 feet in the same period in the vicinity of the Site (Kasmarek, Johnson and Ramage, 2013).

#### **VI.B.1.g. Flow Rate**

Using simulated 1996 Chicot aquifer flow rates, Kasmarek and Strom (2002) found that a net flow of 562.5 ft<sup>3</sup>/s enters the Chicot aquifer in the outcrop area as discussed in Section VI.B.1.i. A net flow of 459.5 ft<sup>3</sup>/s passes through the Chicot aquifer into the Evangeline aquifer. The remaining 103.0 ft<sup>3</sup>/s of flow is withdrawn as well pumpage, with a shortfall of about 84.9 ft<sup>3</sup>/s supplied to the wells from storage in sands and clays.

For the Evangeline aquifer, simulated 1996 flow rates indicate that a net flow of 14.8 ft<sup>3</sup>/s enters the Evangeline aquifer in the outcrop area. A total inflow of 474.3 ft<sup>3</sup>/s was estimated for the Evangeline aquifer made up of inflow from the outcrop area and the Chicot. A greater amount, 528.6 ft<sup>3</sup>/s, is

withdrawn by wells; the shortfall of about 54.8 ft<sup>3</sup>/s is supplied from storage in sands and clays (Kasmerek and Strom, 2002).

#### **VI.B.1.h. Dissolved Solids Content of Groundwater**

A total of 90 total dissolved solids (TDS) analyses have been performed for the three upper groundwater transmissive zones at the Site (ERM, 2004). The TDS values for the A-TZ, B-TZ and C-TZ ranged from 294 mg/L to 1,566 mg/L.

#### **VI.B.1.i. Recharge Areas**

The Chicot Aquifer recharge area is in northwestern Harris County, southern Montgomery County and adjacent areas. The Evangeline recharges farther northwest in Grimes, Walker, and northern Montgomery counties as shown on Figure VI.G (Gabrysch, 1977). The Beaumont Clay near land surface in much of southern Harris County restricts the amount of recharge to the Chicot Aquifer from the land directly above it.

#### **VI.B.1.j. Groundwater Withdrawal**

Through a review of the available water well records within a one mile radius of the Site, 26 water wells were identified within the search radius. Details of the water wells are summarized in Table VI.C and their locations are shown on Figure VI.H. Of the 26 wells identified, 11 are reported as unused, plugged or destroyed, five additional wells are listed as USGS observation wells and eight are industrial or irrigation wells. Two wells (Well ID 65-14-7 and 65-14-8F), located at a residence, are used to operate a heat-pump according to the well logs.

One water well (Well ID 65-14-809) is located within the Site and is destroyed (plugged and abandoned), and five other water wells (Well IDs HGSDHG1967, HGSDHG1968, 65-14-801, 65-14-802 and 65-14-814) are located east of the Site (associated with the UPRR Englewood Yard). None of the wells in the Englewood Yard are in use. One water well (Well ID 65-14-8A) is located south of the Site, and is owned by Houston Power and Light. There were no domestic or public water supply wells in use within a one-mile radius of the Site.

The HGCSO (1998) requires notification and permits for the drilling of new groundwater supply wells, discouraging the use of private water supply wells in those areas adequately served by the City of Houston municipal water supply system.

## **VI.B.2. Site Specific Groundwater Conditions**

### **VI.B.2.a. Records of Water Level Measurements in Borings and Wells**

Table VI.B is a comprehensive listing of soil borings, piezometers and monitoring wells. Water level observations in the wells and piezometers as encountered during drilling are presented on the respective boring logs where recorded. Water levels are also shown on the attached cross-sections (Figures VI.E.1 through VI.E.5)

### **VI.B.2.b. Records of Maximum and Minimum Static Water Levels in Wells**

Records of the minimum and maximum water levels from the current well system are presented on Table VI.D.

### **VI.B.2.c. Upper and Lower Limits of Aquifers**

The Chicot, the uppermost aquifer in the vicinity of the Site, extends from the surface to approximately 600 feet below ground surface (bgs). Site stratigraphy from the ground surface to a depth of approximately 135 feet has been characterized and is described in detail in Section VI.A.4. – Subsurface Soils Investigations. The lithology at the Site is consistent with the published descriptions of the Beaumont Formation, part of the Chicot aquifer.

Below the Chicot is the Evangeline Aquifer which in the vicinity of the Site is estimated to extend from approximately 600 ft bgs to 2,000 feet bgs (Kasmarek, Johnson and Ramage, 2013). Figure VI.I shows a cross section of the Gulf Coast Aquifer system in Harris and surrounding counties.

### **VI.B.2.d. Water Table Contour Map**

A water table contour map for each of the transmissive zones is presented as Figures VI.J.1 through VI.J.4 for water levels measured in the current well system on July 15, 2014.



**VI.B.2.e. Hydraulic Gradients and Groundwater Flow Velocities**

Based on a review of the contour maps for the A-TZ, B-TZ and B-CZ, C-TZ and D-TZ (Figures VI.J.1 through VI.J.4, respectively), groundwater flow along the western property boundary appears to be to the west and northwest. In the A-TZ, groundwater flow from the Tie Storage Area and Former Process Area appears to converge in the Former Process Area near MW-17. Groundwater flow from the north and northeast of the Site is toward the northeastern corner of the Former Process Area.

Based on the July 2014 gauging data, the horizontal hydraulic gradients are very slight.

<b>Transmissive Zone</b>	<b>Hydraulic Gradient (ft/ft)</b>	<b>Hydraulic Conductivities (ft/day)</b>
A-TZ	0.0009 - 0.011	2.8 <sup>1</sup>
B-TZ	0.005 - 0.011	3.7 <sup>1</sup>
B-CZ	0.005 - 0.011	0.0014 <sup>2</sup>
C-TZ	0.001	NA
D-TZ	0.002 - 0.003	0.085 <sup>3</sup>

<sup>1</sup>ERM, 2004

<sup>2</sup>PBW, 2010

<sup>3</sup>PBW, 2011

Based on these horizontal gradients and the hydraulic conductivities and an assumed effective porosity of 30% (ERM, 2004), the calculated groundwater Darcy velocities are approximately:

- 17.0 to 34.0 ft/yr in the A-TZ;
- 18.0 to 49.5 ft/yr in the B-TZ;
- 0.00004 ft/yr in the B-CZ;
- 0.2 to 0.3 ft/yr in the D-TZ.

The hydraulic conductivity of the C-TZ zone has not been determined, so no groundwater Darcy velocity was calculated.

**Transmissive Zone A-TZ**

Groundwater in the A-TZ generally flows from west to east across the Site at a gradient ranging from approximately 0.005 to 0.01 ft/ft, with groundwater divide on the east side of the Site just west of the Lockwood Road Bridge (Figure VI.J.1). Identified just west of the bridge is the 60-in wastewater line that runs north to south and appears to intersect the A-TZ (PBW, 2010). Groundwater flow in the A-TZ flows to the east on the west side of the wastewater line, and flows to the west on the east side of the wastewater line. The highest groundwater elevations in the A-TZ are generally near SWMU No.1 (42.85

feet relative to the City of Houston Vertical Datum (HVD) (MW-22A, July 2014)), with the lowest elevations near the east side of the Site along Lockwood Drive (33.43 feet HVD (MW-18A, July 2014)) near the area where the wastewater line is located.

### **Transmissive Zone B-TZ/Cohesive Zone B-CZ**

Groundwater in the B-TZ/B-CZ generally flows from west to east across the Site at a gradient of approximately 0.004 ft/ft, and flows to the west on the far west side of the Site at a gradient approximately 0.011 ft/ft (Figure VI.J.2). As shown on Figure VI.J.2, there is a piezometric high near the west perimeter of the Site, similar to the A-TZ. The highest groundwater elevation in the B-TZ in 2014 was 43.15 feet HVD (MW-42B near SWMU No. 1, July 2014), and lowest elevation in the B-TZ wells was 32.71 feet HVD (MW-67B, July 2014).

Four wells were installed in 2007 and 2009 in the B-CZ clay unit east of where the B-TZ pinches out to evaluate dissolved phase chemicals of concern (COCs) and potential dense non-aqueous phase liquid (DNAPL) migration in the clay unit: MW-33B, MW-35B, MW-49B, and MW-63B. Three additional wells were installed in June 2010 in the B-CZ to evaluate COC concentrations in the clay: MW-36B, MW-59B, and MW-67B. At each location, groundwater was encountered in very thin carbonate seams (typically less than 0.1 feet thick) within the B-CZ clay unit. Groundwater flow in the B-CZ clay unit based on the January 2014 measurements is to the east-northeast, with a component of flow from the northeast to the southwest off-site to the north (wells MW-36B and MW-57B) (Figure VI.J.2). Groundwater flow during the July 2014 gauging event shows flow to the east-northeast on the east portion of the Site; however, with groundwater potentiometric elevations from the wells east of the Site (i.e., MW-36B and MW-59B), there is a component of groundwater flow to the southwest from MW-36B and flow to the northwest from MW-59B (Figure VI.J.2).

As detailed in the APAR Addendum (PBW, 2011), the B-CZ yields less than 0.1 gallons per minute (GPM) (i.e., behaves as a Class 3 Groundwater-Bearing Unit (GWBU)) in those areas east of MW-35B. Additional groundwater yield testing was conducted on the three new B-CZ wells (MW-36B, MW-59B, and MW-67B) installed in 2010 (See attachment 1A of Section XI (Compliance Plan Attachment D)). Based on the aquifer testing results, the hydraulic conductivity estimated using the Bouwer-Rice analysis ranged from  $6 \times 10^{-8}$  cm/sec to  $1 \times 10^{-7}$  cm/sec for six of the seven wells completed in the B-CZ. The only well with a hydraulic conductivity greater than  $1 \times 10^{-5}$  cm/sec (criteria for saturated soils) was well MW-35B, which had a hydraulic conductivity estimate at  $1 \times 10^{-4}$  cm/sec. MW-35B appears to be installed in the area of the lateral

transitional boundary where the B-TZ pinches out into the B-CZ with some hydraulic connection between the more transmissive sands to the southwest and the carbonate seams encountered in MW-35B.

Based on the potentiometric elevations within the A-TZ and B-TZ, there appears to be communication between the two GWBUs on the west side of the Site as shown with the relatively similar groundwater elevations shown for the two units on Figures VI.J.1 for the A-TZ wells, and Figure VI.J.2 for the B-TZ/B-CZ wells. Groundwater elevations in the B-CZ on the east side of the Site are generally higher relative to the groundwater elevations in the A-TZ, indicating an upward vertical gradient between the B-CZ and the A-TZ.

### **Transmissive Zone C-TZ**

Groundwater in the C-TZ flows from northeast to southwest across the Site (Figure VI.J.3) at a gradient ranging from 0.0006 ft/ft to 0.0009 ft/ft. Groundwater elevations measured in 2014 ranged from a high of approximately 28.12 feet (MW-53C, July 2014) to 22.60 feet (MW-45C, January 2014). This flow pattern has been consistent at the Site since 2004. There does not appear to be significant communication between the upper A-TZ/B-TZ/CZ and C-TZ with the groundwater flow direction significantly different and potentiometric elevations 10 to 15 feet deeper than the upper zones.

### **Transmissive Unit D-TZ**

Groundwater in the D-TZ appears to flow from the southeast to northwest (Figure VI.J.4) at a gradient of 0.002 ft/ft (January 2014) to 0.003 ft/ft (July 2014). Groundwater elevations range from a high of -38.82 feet HVD (MW-59D, Jan 2014) to a low of -41.60 feet HVD (MW-36D, July 2014).

Aquifer testing in MW-36D resulted in an average hydraulic conductivity of  $3 \times 10^{-5}$  cm/sec (PBW, 2011). However, yield is likely greater at the other D-TZ where the sand unit is thicker relative to MW-36D.

### **VI.B.2.f. Analysis of Most Likely Pathways of Migration**

An on-site field survey and water-well data search was conducted, indicating no potential artificial penetrations that would act as a conduit for migration of shallow groundwater into the underlying groundwater formation. However, as discussed in the APAR Addendum (PBW, 2010), two sets of fiber optic lines, Level 3 Communications and Qwest, run along the north side of the rail main lines across the entire length of the Site. Based on conversations with both Level 3 Communications and Qwest

representatives, the fiber lines run underneath SWMUs 2, 5, 4, 8, and 10/11. The fiber lines run directly underneath the drainage ditch southwest of the Site and under the southern drainage ditch about 3 to 5 feet bgs. The Level 3 Communications line reportedly was directionally bored to a depth of 40 to 45 feet bgs underneath the Original and Recent Process Areas (SWMU Nos. 5 and 4, respectively) and under the AST Area (SWMU No. 8). The Qwest fiber line reportedly runs 10 to 15 feet northwest and parallel of the main rail line, and is about 5 to 10 feet bgs through the Site. Just east of SWMU No. 8, the both fiber lines return to approximately 4 to 6 feet below grade and continue running northeast parallel to the rail main line. The Level 3 Communications line may act as an artificial penetration since the reported depths of the line go through both the A-TZ and into the B-CZ immediately below the primary source areas.

In addition to the fiber lines, three City of Houston utilities were identified in the previous APAR (PBW, 2010) that cut across the Site oriented north-south just west of the Lockwood Street Bridge: 1) 60-in wastewater line, 2) 84-in water line, and 3) a 42-in storm sewer line (PBW, 2010). Through a review of the utility drawing files obtained from the City of Houston Public Works Survey Department, two of the underground utility lines (the 60-in sanitary sewer line and the 84-in water line) appear to be at depths that potentially intersect the uppermost GWBU A-TZ. The estimated depths of the utilities based on the city drawings are shown on the Geologic Cross Sections A-A', B-B', and C-C' (Figure VI.E.1). The estimated base depth of the 60-in wastewater line and the 84-in water line where Cross Section B-B' crosses the utility lines is approximately 23 feet bgs (approximate elevation of 26 feet HVD). It is highly unlikely that A-TZ groundwater is seeping into the 84-in water line, given the line is under pressure (flow is south to north), constructed with welded steel pipe, and is relatively new (constructed in 2000). Sampling of the 60-in sanitary sewer line was conducted in 2010.

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## **TABLES**

**TABLE VI.A  
CURRENT MONITORING WELL SYSTEM  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TX**

Well/Boring ID	Date Installed	Northing	Easting	Top of Casing Elevation (FT HVD)	Total Depth (FT BGS)	Top Screen Interval (FT BGS)	Bottom Screen Interval (FT BGS)	Zone
<b><i>SWMU No. 1 Monitoring Wells</i></b>								
MW-01A	1/0/1900	728,006	3,165,936	47.92	19	8.5	18.5	A-TZ
MW-02	4/17/1984	728,007	3,165,857	47.97	18.5	8.5	18.5	A-TZ
MW-07	3/27/1991	727,779	3,165,867	48.86	23	14.1	19.1	A-TZ
MW-08	3/27/1991	727,903	3,165,972	49.33	24	14.2	19.2	A-TZ
MW-10A	9/13/1994	727,921	3,165,866	49.86	23	11	20.5	A-TZ
MW-10B	9/14/1994	727,916	3,165,866	49.94	46	27.1	41.6	B-TZ
MW-11A	9/15/1994	727,849	3,165,869	50.05	22	10	19.3	A-TZ
MW-11B	9/19/1994	727,845	3,165,869	50.18	44	27.5	41.2	B-TZ
P-10	3/26/1991	727,786	3,165,866	47.69	50	36.2	38.2	B-TZ
P-12	3/27/1991	727,912	3,166,127	48.78	50	36.3	38.3	B-TZ
<b><i>Site-Wide Monitoring Wells</i></b>								
MW-03	4/17/1984	727,985	3,165,857	48.34	18.5	8.5	18.5	A-TZ
MW-04	4/18/1984	727,813	3,165,938	49.85	21	11	21	A-TZ
MW-05	1/0/1900	727,715	3,166,026	49.24	26	10	25	A-TZ
MW-09	3/26/1991	727,908	3,166,130	49.26	24	14.8	19.8	A-TZ
MW-12A	2/27/1997	728,333	3,166,004	49.96	30	17.5	27.5	A-TZ
MW-12B	2/27/1997	728,328	3,166,004	50.02	45	32.5	42.5	B-TZ
MW-12C	4/21/1997	728,345	3,166,005	50.14	75.3	69	73.5	C-TZ
MW-13	2/25/1997	728,777	3,165,977	50.65	25	9	22.5	A-TZ
MW-14	2/27/1997	728,718	3,166,550	50.66	45	28	42.5	B-TZ
MW-15A	2/25/1997	728,755	3,166,931	50.41	30	12	26.1	A-TZ
MW-15B	12/19/2011	728,761	3,166,960	47.05	40	28	38	B-TZ
MW-15C	4/25/1997	728,761	3,166,947	50.01	75	64	73.5	C-TZ
MW-16	2/26/1997	728,305	3,167,235	51.51	30	12.5	27	A-TZ
MW-17	3/25/1997	728,787	3,167,447	50.92	35	18	32.5	A-TZ
MW-17C	12/10/2003	728,779	3,167,446	50.17	70	59.5	69.5	C-TZ
MW-18A	2/26/1997	728,839	3,168,227	51.57	35	18	32.5	A-TZ
MW-18C	4/25/1997	728,849	3,168,219	51.47	80.2	62	76.5	C-TZ
MW-19C	10/15/1998	728,620	3,167,727	53.05	73	63	73	C-TZ
MW-20A	9/28/1998	728,600	3,167,091	50.43	30	15	25	A-TZ
MW-21C	10/26/1998	727,730	3,165,884	49.05	72.5	62.5	72.5	C-TZ
MW-22A	10/1/1998	727,876	3,165,677	46.07	25	10	20	A-TZ
MW-22B	10/27/1998	727,871	3,165,678	45.86	38	27.5	37.5	B-TZ
MW-23C	10/14/1998	728,759	3,167,721	51.91	72.5	62.5	72.5	C-TZ
MW-25A	3/7/2000	729,089	3,168,524	44.65	29	18.5	28.5	A-TZ
MW-25C	3/7/2000	729,089	3,168,518	44.49	74	58	68	C-TZ



**TABLE VI.A  
CURRENT MONITORING WELL SYSTEM  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TX**

Well/Boring ID	Date Installed	Northing	Easting	Top of Casing Elevation (FT HVD)	Total Depth (FT BGS)	Top Screen Interval (FT BGS)	Bottom Screen Interval (FT BGS)	Zone
MW-26A	3/7/2000	729,159	3,167,519	44.62	26	14.5	24.5	A-TZ
MW-27A	3/26/2001	730,002	3,169,610	44.90	30	17	27	A-TZ
MW-27C	4/16/2001	730,009	3,169,610	45.04	73.5	60.5	70.5	C-TZ
MW-28A	3/26/2001	729,462	3,167,926	43.86	28	16	26	A-TZ
MW-28C	4/12/2001	729,461	3,167,920	43.96	88	75	85	C-TZ
MW-30A	12/8/2003	728,759	3,167,517	50.45	31	19.5	29.5	A-TZ
MW-31A	12/8/2003	728,648	3,167,477	52.08	33	21.5	31.5	A-TZ
MW-32AR	12/15/2011	728,925	3,167,400	44.74	22	10	20	A-TZ
MW-32B	12/15/2011	728,918	3,167,400	44.73	40	26	36	B-TZ
MW-33A	12/30/2003	728,989	3,167,668	44.25	25	13	23	A-TZ
MW-33BR	12/19/2011	729,142	3,167,662	44.86	40	28	38	B-CZ
MW-34CR	5/9/2014	728,982	3,168,227	46.47	70	60	70	C-TZ
MW-35A	2/21/2007	728,985	3,167,045	44.75	28	13	28	A-TZ
MW-35B	2/26/2007	728,988	3,167,045	44.83	42	32	42	B-CZ
MW-36A	2/22/2007	729,148	3,168,167	44.53	28	18	28	A-TZ
MW-36B	6/24/2010	729,161	3,168,172	44.07	43	38	43	B-CZ
MW-36D	6/23/2010	729,162	3,168,180	44.33	110	100	110	D-TZ
MW-38A	2/21/2007	728,402	3,165,934	46.39	22	12	22	A-TZ
MW-38B	12/31/2003	728,319	3,165,945	45.51	37	25.5	35.5	B-TZ
MW-39B	12/16/2003	728,424	3,166,019	49.58	40	29.5	39.5	B-TZ
MW-40B	12/15/2004	728,341	3,166,122	49.59	40	29.5	39.5	B-TZ
MW-41B	1/7/2003	728,176	3,166,003	49.37	40	29.5	39.5	B-TZ
MW-42B	8/24/2006	728,257	3,166,324	50.52	42	30	40	B-TZ
MW-44A	2/22/2007	729,021	3,168,349	45.11	28	18	28	A-TZ
MW-44C	1/16/2004	729,021	3,168,349	45.03	70	57.5	67.5	C-TZ
MW-45C	1/20/2004	729,155	3,168,512	44.73	70	58	68	C-TZ
MW-46C	1/9/2004	729,121	3,168,576	44.94	72	60	70	C-TZ
MW-47C	3/16/2007	728,725	3,168,535	45.61	71	61	71	C-TZ
MW-48C	2/2/2004	728,417	3,168,241	44.68	72	60	70	C-TZ
MW-49A	2/28/2007	728,345	3,168,191	46.18	30	20	30	A-TZ
MW-49B	1/24/2009	728,375	3,168,184	46.43	35	30	35	B-CZ
MW-50A	3/1/2007	727,501	3,167,958	46.96	25	15	25	A-TZ
MW-51A	2/28/2007	726,925	3,166,885	47.80	25	15	25	A-TZ
MW-51C	5/10/2014	726,935	3,166,894	47.48	80	62	72	C-TZ
MW-52A	2/27/2007	728,699	3,167,814	51.91	30	20	30	A-TZ
MW-53C	8/15/2006	729,613	3,168,481	45.49	72	60	70	C-TZ
MW-54C	8/15/2006	729,218	3,168,766	44.99	72	60	70	C-TZ
MW-55A	1/12/2009	728,540	3,167,482	52.01	25	10	25	A-TZ
MW-55B	12/14/2011	728,538	3,167,474	49.15	40	32	37	B-TZ
MW-57A	1/22/2009	728,858	3,167,974	47.72	27	12	27	A-TZ

**TABLE VI.A  
CURRENT MONITORING WELL SYSTEM  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TX**

Well/Boring ID	Date Installed	Northing	Easting	Top of Casing Elevation (FT HVD)	Total Depth (FT BGS)	Top Screen Interval (FT BGS)	Bottom Screen Interval (FT BGS)	Zone
MW-57B	12/21/2011	728,857	3,167,965	47.93	40	34	39	B-TZ
MW-58A	1/23/2009	728,875	3,168,176	47.76	29	14	29	A-TZ
MW-59A	1/28/2009	728,155	3,168,358	44.18	21	11	21	A-TZ
MW-59B	6/26/2010	728,145	3,168,358	44.36	33	28	33	B-CZ
MW-59D	1/27/2009	728,114	3,168,365	44.22	118	108	118	D-TZ
MW-60A	1/26/2009	728,825	3,168,823	46.79	28.5	18.5	28.5	A-TZ
MW-61A	1/26/2009	728,336	3,168,630	44.67	22	12	22	A-TZ
MW-62B	1/21/2009	728,190	3,165,880	48.16	35	25	35	B-TZ
MW-63B	1/28/2009	729,361	3,167,652	44.48	36	31	36	B-CZ
MW-64A	1/26/2009	727,496	3,165,573	44.55	19.5	14.5	19.5	A-TZ
MW-65D	1/17/2009	729,512	3,168,331	44.55	110	100	110	D-TZ
MW-66D	1/20/2009	729,137	3,169,381	46.51	103	93	103	D-TZ
MW-67B	6/26/2010	729,782	3,167,588	43.93	40	35	40	B-CZ
MW-68B	12/15/2011	729,162	3,167,328	44.93	40	28	38	B-TZ
MW-68C	6/25/2010	729,164	3,167,346	44.8	70	60	70	C-TZ
MW-69A	6/23/2010	728,136	3,168,234	45.71	18.5	8.5	18.5	A-TZ
MW-70B	12/14/2011	728,944	3,167,671	45.02	40	25	35	B-CZ
MW-71B	12/13/2011	728,956	3,167,951	45.06	40	32	37	B-TZ
MW-72B	12/21/2011	728,790	3,167,792	48.69	41	32	37	B-TZ
MW-73B	12/13/2011	728,419	3,167,123	48.66	55	47	52	B-TZ
MW-74B	12/20/2011	728,373	3,167,718	47.83	40	26.5	36.5	B-TZ
MW-75B	12/20/2011	728,066	3,168,022	47.18	40	32.2	37.2	B-TZ
MW-76C	5/7/2014	727,485	3,166,628	47.84	70	60	70	C-TZ
MW-77A	5/7/2014	727,672	3,166,981	49.05	25	13	23	A-TZ
MW-78A	5/6/2014	727,953	3,167,512	48.677	30	15	25	A-TZ
MW-79A	5/7/2014	728,237	3,167,666	48.946	30	17	27	A-TZ
MW-80B	5/8/2014	727,907	3,168,201	47.107	35	29	34	B-TZ
MW-81B	5/11/2014	727,292	3,167,926	46.766	40	29	34	B-TZ
P-11	3/25/1991	728,049	3,166,025	48.98	50	36.2	38.2	B-TZ
TW-41B	1/22/2009	728,222	3,166,002	49.67	40	30	40	B-TZ
TW-56A	1/23/2009	728,758	3,168,070	51.89	31	21	31	A-TZ

**Notes:**

BGS=Below Ground Surface

HVD = Elevations relative to Houston Vertical Datum, Houston Monument System

Northing/Easting = Coordinates based on NAD 1927 Texas State Plane, South Central Zone, US Survey Feet

**TABLE VI.B**  
**COMPREHENSIVE LISTING OF SOIL BORINGS AND PLUGGED AND ABANDONED MONITORING WELLS**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

<b>Well/Boring ID</b>	<b>Date Installed</b>	<b>Northing</b>	<b>Easting</b>	<b>Surface Elevation (FT HVD)</b>	<b>Total Depth (FT BGS)</b>
<b><i>Area of Concern Soil Sampling</i></b>					
AOC-3E	3/4/1997	728,870	3,168,119	47.97	5
AOC-3W	3/4/1997	728,868	3,168,110	48.00	5
AOC-4NE	3/3/1997	728,192	3,166,665	47.83	5
AOC-4NW	3/3/1997	728,183	3,166,657	48.00	5
AOC-4SE	3/3/1997	728,190	3,166,677	47.93	5
AOC-4SER	8/28/2006	728,190	3,166,677	47.93	
AOC-4SW	3/3/1997	728,179	3,166,674	48.06	5
AOC-5E	4/10/1997	728,835	3,168,053	47.11	
AOC-5W	3/4/1997	728,789	3,167,956	48.08	7
AOC-7	3/3/1997	728,747	3,167,544	47.71	10
<b><i>Cone Penetrometer Test (CPT) Locations</i></b>					
CPT-01E	11/14/1995	727,826	3,165,870	47.59	34.7
CPT-02E	11/15/1995	727,772	3,165,942	46.56	43.2
CPT-03E	11/15/1995	727,905	3,166,015	47.39	43.2
CPT-03R	11/15/1995	727,747	3,166,162	47.24	43.2
CPT-04E	11/15/1995	727,710	3,165,886	46.81	35
CPT-04R	11/15/1995	727,894	3,166,456	47.25	51
CPT-05E	11/15/1995	727,631	3,165,888	46.63	39.7
CPT-05R	11/18/1995	728,070	3,166,734	47.99	53
CPT-06E	11/14/1995	728,035	3,166,041	47.35	34.8
CPT-06R	11/18/1995	728,195	3,166,942	48.03	53.5
CPT-07E	11/15/1995	727,637	3,165,777	45.33	40
CPT-07R	11/16/1995	728,299	3,167,232	48.51	52.8
CPT-08E	11/15/1995	727,636	3,165,706	45.75	34
CPT-08R	11/16/1995	728,531	3,167,212	48.96	55.7
CPT-09E	11/15/1995	728,031	3,165,945	46.13	33
CPT-09R	11/17/1995	728,420	3,167,453	49.53	59
CPT-10E	11/16/1995	728,052	3,165,679	45.74	42.9
CPT-10R	11/16/1995	728,651	3,167,444	49.15	53.7
CPT-11E	11/16/1995	728,053	3,165,770	45.26	34.4
CPT-11R	11/17/1995	728,516	3,167,636	50.95	50.4
CPT-12E	11/16/1995	728,062	3,165,840	45.59	34.3
CPT-12R	11/16/1995	728,713	3,167,613	49.26	56
CPT-13E	11/16/1995	727,849	3,165,688	46.07	40.1
CPT-13R	11/18/1995	728,682	3,167,793	48.74	58.4
CPT-14E	11/16/1995	727,861	3,165,799	45.49	32.6
CPT-14R	11/16/1995	728,786	3,167,760	48.87	54.5
CPT-15R	11/18/1995	728,748	3,168,046	49.14	57.6
CPT-16R	11/17/1995	728,844	3,167,956	48.47	49.6
CPT-17R	11/17/1995	728,831	3,168,224	48.53	48.6
CPT-18R	11/14/1995	728,756	3,167,290	47.43	52
CPT-19R	11/17/1995	728,757	3,166,899	47.35	51.9
CPT-20R	11/17/1995	728,473	3,166,699	47.60	52.6
CPT-21R	11/17/1995	728,754	3,166,367	47.57	50
CPT-22R	11/18/1995	728,371	3,166,301	48.38	56
CPT-23R	11/18/1995	728,753	3,165,986	47.68	51.8
CPT-24R	11/18/1995	728,529	3,165,983	46.62	33.9
CPT-25R	11/18/1995	728,322	3,166,002	47.28	52.7
CPT-26R	11/17/1995	728,403	3,167,161	48.87	59.8
CPT-27R	11/19/1995	728,068	3,166,423	48.05	58.9

**TABLE VI.B**  
**COMPREHENSIVE LISTING OF SOIL BORINGS AND PLUGGED AND ABANDONED MONITORING WELLS**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

<b>Well/Boring ID</b>	<b>Date Installed</b>	<b>Northing</b>	<b>Easting</b>	<b>Surface Elevation (FT HVD)</b>	<b>Total Depth (FT BGS)</b>
CPT-28R	11/19/1995	728,710	3,166,555	47.54	59
CPT-29R	11/19/1995	728,659	3,167,262	47.43	56.2
CPT-30R	11/19/1995	728,355	3,167,044	48.52	55.8
CPT-31R	11/19/1995	728,546	3,167,050	47.84	53.4
CPT-32R	11/19/1995	728,531	3,167,477	49.30	21.8
CPT-33R	11/19/1995	728,604	3,167,624	49.14	59.1
CPT-34R	11/19/1995	728,529	3,167,436	49.18	22.2
CPT-35	5/8/1997	727,647	3,165,756	45.49	100
CPT-36	2/25/1997	728,474	3,166,702	47.59	65.35
CPT-37	2/25/1997	728,519	3,167,238	49.02	48.23
CPT-38	2/25/1997	728,682	3,167,798	48.89	68.24
CPT-39	2/25/1997	728,736	3,167,083	47.33	99.41
CPT-40	2/26/1997	728,347	3,166,009	47.21	65.09
CPT-41	2/26/1997	728,823	3,168,157	48.78	66.67
CPT-42	5/8/1997	728,122	3,165,771	45.78	64.37
CPT-01-13	2/11/2013	727,094	3,165,989		
CPT-02-13	2/11/2013	727,177	3,166,585		
CPT-03-13	2/11/2013	727,269	3,167,048		
CPT-04-13	2/11/2013	727,555	3,167,957		
CPT-05-13	2/11/2013	727,675	3,168,198		
CPT-06-13	2/12/2013	728,014	3,168,174		
CPT-07-13	2/12/2013	728,044	3,168,046		
CPT-08-13	2/12/2013	727,835	3,167,778		
CPT-09-13	2/12/2013	727,641	3,167,398		
CPT-10-13	2/15/2013	728,116	3,167,848		
CPT-11-13	2/12/2013	727,836	3,167,468		
CPT-12-13	2/13/2013	727,699	3,167,220		
CPT-13-13	2/13/2013	727,591	3,167,016		
CPT-14-13	2/14/2013	728,000	3,167,439		
CPT-15-13	2/14/2013	727,886	3,167,291		
CPT-16-13	2/13/2013	727,722	3,166,907		
CPT-17-13	2/15/2013	728,210	3,167,658		
CPT-18-13	2/14/2013	728,276	3,168,143		
CPT-19-13	2/14/2013	728,442	3,168,004		
CPT-20-13	2/14/2013	727,301	3,167,511		
CPT-21-13	2/15/2013	728,380	3,167,774		
CPT-23-13	2/15/2013	727,508	3,166,548		
<b>Hydropunch Sampling</b>					
HP01STZ	12/5/1995	727,638	3,165,770	45.47	36
HP01UTZ	12/5/1995	727,638	3,165,772	45.40	18
HP02STZA	12/4/1995	727,850	3,165,691	46.07	36
HP02STZB	12/4/1995	727,638	3,165,774	46.07	36
HP02UTZ	12/5/1995	727,850	3,165,690	46.09	19
HP03STZ	12/4/1995	728,052	3,165,680	45.81	36
HP03UTZ	12/4/1995	728,052	3,165,681	45.78	16
HP04STZ	12/4/1995	728,061	3,165,841	45.56	33
HP04UTZ	12/4/1995	728,060	3,165,840	45.55	16
HP05STZ	12/6/1995	728,040	3,166,042	47.35	33
HP05UTZ	12/6/1995	728,042	3,166,042	47.33	18
HP06STZ	12/6/1995	727,901	3,166,015	47.26	36
HP06UTZ	12/6/1995	727,902	3,166,015	47.42	21

**TABLE VI.B**  
**COMPREHENSIVE LISTING OF SOIL BORINGS AND PLUGGED AND ABANDONED MONITORING WELLS**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

<b>Well/Boring ID</b>	<b>Date Installed</b>	<b>Northing</b>	<b>Easting</b>	<b>Surface Elevation (FT HVD)</b>	<b>Total Depth (FT BGS)</b>
HP07STZ	12/5/1995	727,776	3,165,939	46.53	36
HP07UTZ	12/5/1995	727,770	3,165,937	46.59	21
HP08UTZ	12/5/1995	727,636	3,165,707	45.78	17
HP09UTZ	12/6/1997	728,748	3,165,984	47.68	16
HP10STZ	12/6/1997	728,758	3,166,904	47.32	33
HP10UTZ	12/6/1997	728,757	3,166,901	47.35	18
HP11UTZ	12/6/1995	728,844	3,167,959	48.42	16
HP12UTZ		728,849	3,167,797	47.29	
HP13UTZ	12/7/1995	728,303	3,167,234	48.43	16
HP14UCU	12/6/1995	728,529	3,167,212	49.02	
HP14UTZ	12/6/1995	728,527	3,167,213	49.06	22
HP15STZ	12/6/1995	728,066	3,166,420	48.09	35
HP15UTZ	12/6/1995	728,064	3,166,418	48.10	18
HP16LTZ	12/7/1995	728,193	3,166,936	47.98	50
HP16UTZ	12/7/1995	728,194	3,166,939	48.03	18
HP17STZ	5/8/1997	727,559	3,165,708	45.26	37
HP17UTZ	5/8/1997	727,561	3,165,707	45.28	18
HP18STZ	5/8/1997	727,933	3,165,833	45.89	32.5
HP18UTZ	5/8/1997	727,932	3,165,832	45.79	21
HP19STZ	5/9/1997	727,789	3,165,664	46.13	35
HP19UTZ	5/8/1997	727,791	3,165,666	46.25	17
HP20STZ	5/9/1997	728,119	3,165,775	45.70	37
HP20UTZ	5/9/1997	728,116	3,165,777	45.52	16.5
HP21STZ	5/9/1997	727,920	3,165,690	45.83	34
HP21UTZ	5/9/1997	727,924	3,165,685	45.72	16.5
<b>Soil Borings</b>					
SB-02	3/3/1997	728,477	3,166,697	47.63	55
SB-03	3/5/1997	728,514	3,167,240	49.03	57
SB-04	3/5/1997	728,689	3,167,804	48.28	60
SB-04		728,689	3,167,804		
SB-05	3/4/1997	728,348	3,166,002	47.30	60
SB-05		728,348	3,166,002		
SB-06	3/4/1997	728,353	3,167,040	48.36	57
SB-07	3/6/1997	728,525	3,167,431	49.07	25
SB-07R		728,528	3,167,410		
SB-08	3/6/1997	728,531	3,167,436	49.20	25
SB-21	10/9/1998	729,024	3,168,355	45.51	24
SB-22	9/29/1998	728,979	3,167,971	44.91	45
SB-23		728,746	3,167,736		
SB-24	9/28/1998	728,626	3,167,444	49.24	50
SB-25	9/29/1998	728,933	3,167,397	44.91	50
SB-26	10/26/1998	727,828	3,166,105	47.13	2
SB-27	10/29/1998	728,743	3,165,904	45.77	2
SB-28	9/30/1998	728,573	3,165,898	45.22	50
SB-29	9/30/1998	728,290	3,165,955	45.17	35
SB-30	10/12/1998	728,168	3,165,948	45.22	34
SB-31	10/29/1998	728,043	3,165,966	45.37	2
SB-32	10/26/1998	727,683	3,165,883	46.25	2
SB-33	10/27/1998	727,660	3,165,854	45.91	2
SB-34	10/27/1998	727,863	3,165,767	45.24	2
SB-35	10/9/1998	727,637	3,165,333	46.51	2

**TABLE VI.B**  
**COMPREHENSIVE LISTING OF SOIL BORINGS AND PLUGGED AND ABANDONED MONITORING WELLS**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

<b>Well/Boring ID</b>	<b>Date Installed</b>	<b>Northing</b>	<b>Easting</b>	<b>Surface Elevation (FT HVD)</b>	<b>Total Depth (FT BGS)</b>
SB-36	10/27/1998	727,653	3,165,720	45.99	2
SB-37	10/9/1998	727,592	3,165,341	46.42	24
SB-38	10/8/1998	727,513	3,165,745	47.52	33
SB-39	10/8/1998	727,454	3,165,636	47.32	30
SB-40	10/1/1998	727,773	3,165,514	46.35	54
SB-43	10/12/1998	727,397	3,165,534	47.58	24
SB-44	10/12/1998	727,297	3,165,375	46.88	24
SB-50		729,142	3,168,192	45.12	0
SB-51		728,812	3,167,439		
SB-52		728,822	3,167,559		
SB-53		728,857	3,168,071		
SB-54		728,869	3,168,216		
SB-55		728,729	3,167,971		
SB-56		728,295	3,167,026		
SB-57		728,824	3,168,231		
SB-58		728,871	3,168,339		
SB-59		728,948	3,168,211		
SB-60		728,931	3,168,055		
SB-61		728,908	3,167,717		
SB-62		728,885	3,167,480		
SB-64		728,807	3,167,317		
SB-65		729,088	3,167,413		
SB-66		728,624	3,167,805		
SB-67		728,619	3,167,480		
SB-70		729,214	3,168,334		
SB-72		728,509	3,167,169		
SB-73		728,578	3,167,360		
SB-74		728,517	3,167,495		
SB-75		728,686	3,167,405		
SB-76		728,748	3,167,651		
SB-77		728,827	3,167,796		
SB-78		728,684	3,167,866		
SB-79		727,556	3,165,621		
SB-80		727,590	3,165,720		
SB-81		727,616	3,165,666		
SB-82		727,605	3,165,787		
SB-83		727,526	3,165,676		
SB-84		727,530	3,165,567		
SB-85		727,574	3,165,886		
SB-86A		727,659	3,166,044		
SB-86A2	8/8/2006	727,654	3,166,035		
SB-86A9	8/10/2006	727,705	3,166,131		
SB-86B	8/8/2006	727,664	3,166,042		
SB-86C1	8/10/2006	727,674	3,166,048		
SB-87B		727,753	3,166,225		
SB-88B		727,844	3,166,397		
SB-89B		727,941	3,166,585		
SB-90B		728,046	3,166,765		
SB-91B		728,131	3,166,937		
SB-92B		728,232	3,167,119		
SB-93B		728,420	3,167,477		

**TABLE VI.B**  
**COMPREHENSIVE LISTING OF SOIL BORINGS AND PLUGGED AND ABANDONED MONITORING WELLS**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

Well/Boring ID	Date Installed	Northing	Easting	Surface Elevation (FT HVD)	Total Depth (FT BGS)
SB-94B		728,314	3,167,287		
SB-95B		728,509	3,167,654		
SB-95B1		728,508	3,167,659		
SB-95B2		728,513	3,167,668		
SB-95B3		728,518	3,167,679		
SB-95B4		728,524	3,167,688		
SB-95B5		728,529	3,167,697		
SB-95B6		728,534	3,167,710		
SB-95B7		728,539	3,167,719		
SB-95C		728,516	3,167,645		
SB-95D		728,524	3,167,640		
SB-96a		728,604	3,167,825		
SB-96B	8/28/2006	728,604	3,167,825		
SB-96B1		728,597	3,167,816		
SB-96B2		728,595	3,167,807		
SB-96B3		728,584	3,167,797		
SB-99		728,664	3,167,590		
SB-100		727,484	3,165,700		
SB-101		727,387	3,165,521		
SB-102		727,289	3,165,344		
SB-103		727,197	3,165,176		
SB-104		727,107	3,165,013		
SB-105	3/15/2007	727,621	3,165,583		
SB-106	3/15/2007	727,520	3,165,542		
SB-107	3/15/2007	727,425	3,165,578		
SB-108		727,528	3,165,512		
SB-109		727,498	3,165,512		
SB-110		727,133	3,165,063		
SB-111		727,051	3,164,898		
SB-112		726,988	3,164,805		
SB-113		726,821	3,164,498		
SB-114		726,654	3,164,190		
SB-115		727,570	3,165,473		
SB-116		727,486	3,165,457		
SB-117		727,430	3,165,481		
SB-118		728,815	3,167,395		
SB-119		728,833	3,167,482		
SB-120		728,842	3,167,583		
SB-121		728,847	3,167,678		
SB-122		728,848	3,167,786		
SB-123		728,863	3,167,881		
SB-124		728,877	3,168,080		
SB-125		728,883	3,168,278		
SB-126		728,480	3,168,202		
SB-127		728,080	3,168,216		
SB-128		727,681	3,168,230		
SB-129		727,545	3,167,961		
SB-130		727,145	3,167,981		
SB-131		726,806	3,167,938		
SB-132		726,793	3,167,538		
SB-133		726,779	3,167,139		

**TABLE VI.B**  
**COMPREHENSIVE LISTING OF SOIL BORINGS AND PLUGGED AND ABANDONED MONITORING WELLS**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

Well/Boring ID	Date Installed	Northing	Easting	Surface Elevation (FT HVD)	Total Depth (FT BGS)
SB-134		726,908	3,166,870		
SB-135		726,800	3,166,569		
SB-136		726,783	3,166,170		
SB-137		726,767	3,165,770		
SB-138	6/24/2010	728,907	3,167,791		
SB-139	6/24/2010	728,923	3,167,934		
SB-140	6/23/2010	728,933	3,168,027		
SB-141	6/23/2010	728,935	3,168,100		
SB-142	6/22/2010	728,947	3,168,183		
SB-143	6/22/2010	728,893	3,168,184		
SB-144	6/22/2010	728,854	3,167,787		
SB-145	6/22/2010	728,881	3,168,080		
SB-146	6/22/2010	728,849	3,167,715		
SB-147	6/22/2010	727,530	3,165,209		
SSO-11R		728,835	3,168,030		
SSO-11	4/9/1997	728,835	3,168,030	48.56	
SSO-A01	4/8/1997	728,718	3,165,974	46.85	
SSO-A02	4/8/1997	728,714	3,166,186	47.73	
SSO-A03	4/8/1997	728,730	3,166,401	47.43	
SSO-A04	4/8/1997	728,747	3,166,618	47.37	
SSO-A05	4/8/1997	728,750	3,166,832	46.99	
SSO-A06	4/8/1997	728,779	3,167,108	47.22	
SSO-B01	4/8/1997	728,438	3,165,999	47.57	
SSO-B02	4/8/1997	728,507	3,166,262	47.09	
SSO-B03	4/8/1997	728,504	3,166,466	47.68	
SSO-B04	4/8/1997	728,509	3,166,647	47.86	
SSO-B05	4/8/1997	728,571	3,166,920	47.33	
SSO-B06	4/8/1997	728,629	3,167,111	47.37	
SSO-C01	4/8/1997	728,234	3,166,038	47.22	
SSO-C02	4/8/1997	728,273	3,166,245	48.05	
SSO-C03	4/8/1997	728,294	3,166,469	47.31	
SSO-C04	4/8/1997	728,309	3,166,695	48.09	
SSO-C05	4/8/1997	728,402	3,167,025	48.31	
SSO-C06	4/8/1997	728,450	3,167,199	48.99	
SSO-D01	4/8/1997	728,040	3,166,092	46.98	
SSO-D02	4/8/1997	728,133	3,166,270	47.67	
SSO-F07	4/9/1997	728,564	3,167,263	48.66	
SSO-F08	4/9/1997	728,668	3,167,435	48.61	
SSO-F09	4/9/1997	728,761	3,167,615	48.10	
SSO-F10	4/9/1997	728,850	3,167,796	47.24	
SSO-G07	4/9/1997	728,383	3,167,348	49.27	
SSO-G08	4/9/1997	728,492	3,167,531	49.39	
SSO-G09	4/9/1997	728,589	3,167,720	50.23	
SSO-G10	4/9/1997	728,652	3,167,884	49.45	
SSO-G11	4/9/1997	728,748	3,168,092	48.80	
WPW-M-001-P	12/13/1995	700,000	3,000,000		
WPW-S-002P	12/13/1995	728,101	3,165,970	45.30	
WPW-S-003P	12/13/1995	728,504	3,165,954	44.37	
WPW-S-004P	12/13/1995	728,681	3,165,947	44.36	
WPW-S-007P	12/13/1995	728,764	3,167,613	47.79	
WPW-S-009P	12/13/1995	728,433	3,167,402	49.36	



**TABLE VI.B**  
**COMPREHENSIVE LISTING OF SOIL BORINGS AND PLUGGED AND ABANDONED MONITORING WELLS**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

Well/Boring ID	Date Installed	Northing	Easting	Surface Elevation (FT HVD)	Total Depth (FT BGS)
SB-1	3/12/2013	727,146	3,165,609		
SB-2	3/12/2013	727,564	3,166,416		
SB-3	3/12/2013	727,655	3,166,597		
SB-4	3/12/2013	727,421	3,165,919		
SB-5	3/12/2013	727,695	3,166,443		
SB-6	3/12/2013	727,969	3,166,952		
SB-7	3/12/2013	728,113	3,167,201		
SB-8	3/12/2013	728,254	3,167,501		
SB-9	3/12/2013	727,731	3,166,404		
SB-10	3/12/2013	727,902	3,166,725		
SB-11	3/12/2013	728,032	3,166,974		
SB-12	3/12/2013	728,148	3,167,189		
SW-1		727,089	3,165,461		
SW-2		727,299	3,165,688		
SW-3		727,591	3,166,241		
SW-4		727,792	3,166,838		
SW-5		727,386	3,166,068		
SW-6		727,777	3,166,595		
SW-7		727,920	3,167,094		
SW-8		728,134	3,167,483		
SW-9		728,140	3,167,284		
SB-22-13	2/15/2013	728,501	3,167,891		
<b><i>Plugged and Abandoned Wells</i></b>					
TW-01		728,540	3,167,423		
TW-02		728,821	3,168,081		
TW-03		727,734	3,167,007		
MW-24A	3/7/2000	727,549	3,165,205	46.11	25
MW-24AR	1/27/2009	727,531	3,165,207		
MW-24B	3/7/2000	727,534	3,165,208	46.46	50
MW-24C	3/8/2000	727,542	3,165,206	46.27	74
MW-32A	12/29/2003	728,914	3,167,401	44.54	33
MW-33B	12/30/2003	728,989	3,167,668	44.76	25.5
MW-34C	1/13/2004	728,934	3,168,160	45.63	60
MW-29A	4/19/2001	727,310	3,164,239	46.71	23
MW-29B	4/12/2001	727,303	3,164,239	46.73	57
MW-29C	4/27/2001	727,293	3,164,240	46.79	75

**TABLE VI.C**  
**LIST OF WELL OWNERS AND USES WITHIN 1-MILE RADUS**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TEXAS**

PBW Map ID	Well ID	Well Owner	Current Water Use	Depth Drilled	Completion Date	Reported Aquifer
1	65-14-809	Southern Pacific Railroad	Destroyed	947	01/01/1925	Evangeline
2	65-14-8A	Houston Lighting & Power	Industrial	1550	01/19/1982	Evangeline
3	HGSDHG1968	Southern Pacific Trans. Co.	Irrigation	1200	01/01/1954	Evangeline
	65-14-802	Southern Pacific Railroad	Industrial	1201	01/01/1954	Evangeline
	65-14-801	Southern Pacific Railroad	Industrial	1206	01/01/1954	Evangeline
	HGSDHG1967	Southern Pacific Trans. Co.	Irrigation	1200	01/01/1981	Evangeline
4	65-14-814	Southen Pacific Railroad	Destroyed	919	01/01/1941	Evangeline
5	65-14-7	Dr. Carroll	Other	530	12/06/1984	Chicot
	65-14-8F	Dr. Carroll	Other	223	08/28/1984	Chicot
6	65-14-759, G1010013HH, USGS-294728095200101	City of Houston Northeast #2	Plugged	1291	01/01/1938	Evangeline
	USGS-294728095200102	USGS	Observation	1596	02/01/1980	Evangeline
	USGS-294728095200103	USGS	Observation	487	02/15/1980	Chicot
	USGS-294728095200104	USGS	Observation	1035	02/15/1980	Evangeline
	USGS-294728095200105	USGS	Observation	298	02/01/1980	Chicot
	USGS-294728095200106	USGS	Observation	2170	04/25/1980	Evangeline
	65-14-7	Williams Brothers Const.	Plugged	280	6/5/1992	NA
7	65-14-727, G1010013HG	City of Houston Northeast #1	Plugged	1876	01/01/1931	Evangeline
8	65-14-517, 65-06-8D	Corbett Fabricating Co	Industrial	344	03/04/1966	Chicot
9	65-14-508	General Metals Corp.	Unused	912	01/01/1938	Evangeline
	65-14-505	General Metals Corp.	Unused	217	01/01/1943	Chicot
10	HGSDHG1084, 65-14-406, USGS-294745095201001	City of Houston Northeast #3	Plugged	1993	05/15/1944	Evangeline
11	65-14-507, G1010013ND	City of Houston Kashmere Gardens	Plugged	544	01/01/1940	Chicot
	65-14-501, G1010013NC	City of Houston Kashmere Gardens	Plugged	1035	07/01/1948	Evangeline
12	65-14-823, 65-14-8, USGS-294609095194601	National Vinegar Co.	Industrial	506	04/14/1987	Chicot
	HGSDHG4117	National Vinegar Company	Industrial	350	01/01/1990	Chicot
	65-14-4	National Vinegar	Plugged	200	04/14/1998	Chicot

**TABLE VLD  
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Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-01A	47.92	2-Sep-93	6.96			40.99
	47.92	21-Dec-93	3.28			44.67
	47.92	24-Mar-94	3.95			44
	47.92	22-Jun-94	5.30			42.65
	47.92	28-Sep-94	7.10			40.85
	47.92	13-Oct-94	7.26			40.69
	47.92	24-Jan-95	2.63			45.32
	47.92	11-Apr-95	2.61			45.34
	47.92	11-Jul-95	4.78			43.17
	47.92	23-Jan-96	5.67			42.28
	47.92	19-Jul-96	7.84			40.11
	47.92	17-Sep-96	8.33			39.62
	47.92	31-Oct-96	6.90			41.05
	47.92	22-Nov-96	8.63			39.32
	47.92	27-Dec-96	5.50			42.45
	47.92	22-Jan-97	3.41			44.54
	47.92	21-Feb-97	2.68			45.27
	47.92	25-Mar-97	2.96			44.99
	47.92	23-Apr-97	4.27			43.68
	47.92	24-Apr-97	4.47			43.48
	47.92	13-May-97	2.91			45.04
	47.92	20-Jun-97	4.88			43.07
	47.92	25-Jun-97	2.59			45.36
	47.92	1-Jul-97	4.04			43.91
	47.92	24-Jul-97	6.80			41.15
	47.92	16-Aug-97	7.84			40.11
	47.92	22-Aug-97	9.52			38.43
	47.92	25-Sep-97	6.02			41.93
	47.92	22-Oct-97	4.89			43.06
	47.92	25-Nov-97	4.88			43.07
	47.92	19-Dec-97	4.26			43.69
	47.92	20-Jan-98	3.10			44.85
	47.92	3-Mar-98	2.87			45.08
	47.92	18-Mar-98	2.68			45.27
	47.92	24-Apr-98	6.73			41.22
	47.92	21-May-98	6.89			41.06
	47.92	30-Jul-98	7.96			39.99
	47.92	25-Aug-98	6.87			41.08
	47.92	21-Sep-98	4.70			43.25
	47.92	26-Oct-98	5.98			41.97
	47.92	23-Nov-98	4.11			43.84
	47.92	29-Jan-99	3.01			44.94
	47.92	26-Feb-99	3.20			44.75
	47.92	16-Mar-99	3.71			44.24
	47.92	29-Apr-99	3.93			44.02
	47.92	1-Jun-99	3.98			43.97
	47.92	30-Jul-99	4.31			43.64
	47.92	27-Aug-99	4.11			43.84
	47.92	27-Sep-99	9.67			38.28
	47.92	29-Oct-99	10.67			37.28
	47.92	29-Dec-99	10.00			37.95
	47.92	4-Feb-00	12.71			35.24
	47.92	25-Feb-00	9.10			38.85
	47.92	27-Mar-00	7.38			40.57
	47.92	7-Apr-00	7.00			40.95
	47.92	31-May-00	7.15			40.8
	47.92	1-Jun-00	7.00			40.95
	47.92	28-Jul-00	7.11			40.84
	47.92	30-Aug-00	10.33			37.62
	47.92	19-Sep-00	11.56			36.39
	47.92	27-Oct-00	9.01			38.94
	47.92	21-Nov-00	8.49			39.46
	47.92	1-May-01	6.60			41.35
	47.92	1-Oct-01	6.85			41.1
	47.92	11-Mar-02	3.31			44.64
	47.92	23-Sep-02	3.23			44.72
	47.92	10-Mar-03	2.48			45.44
	47.92	23-Sep-03	4.29			43.63
	47.92	15-Mar-04	3.49			44.43
	47.92	13-Sep-04	8.26			39.66
	47.92	18-Jul-05	3.73			44.19
	47.92	4-Jan-06	8.54			39.38
	47.92	27-Jul-06	3.10			44.82
	47.92	23-Jan-07	2.26			45.66
	47.92	7-Mar-07	2.36			45.56
	47.92	27-Jul-07	4.05			43.87

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UNION PACIFIC RAILROAD COMPANY  
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Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-01A	47.92	28-Jan-08	2.51			45.41
	47.92	16-Jul-08	7.21			40.71
	47.92	22-Jan-09	6.21			41.71
	47.92	22-Jul-09	6.96			40.96
	47.92	8-Jan-10	3.07			44.85
	47.92	12-Jul-10	3.87			44.05
	47.88	12-Jan-11	3.63			44.25
	47.88	13-Jul-11	9.94			37.94
	47.88	27-Jan-12	3.19			44.69
	47.88	10-Jul-13	9.96			37.92
	47.88	8-Jan-14	5.21			42.67
	47.88	2-Jul-14	6.81			41.07
	MW-02	47.97	2-Sep-93	7.45		
47.97		21-Dec-93	2.58			45.45
47.97		24-Mar-94	4.08			43.95
47.97		22-Jun-94	5.85			42.18
47.97		28-Sep-94	7.05			40.98
47.97		13-Oct-94	7.69			40.34
47.97		24-Jan-95	2.12			45.91
47.97		11-Apr-95	2.53			45.5
47.97		11-Jul-95	5.34			42.69
47.97		23-Jan-96	5.69			42.34
47.97		19-Jul-96	8.28			39.75
47.97		17-Sep-96	8.84			39.19
47.97		31-Oct-96	7.11			40.92
47.97		22-Nov-96	8.99			39.04
47.97		27-Dec-96	5.42			42.61
47.97		22-Jan-97	3.08			44.95
47.97		21-Feb-97	2.60			45.43
47.97		25-Mar-97	2.98			45.05
47.97		23-Apr-97	4.60			43.43
47.97		24-Apr-97	4.78			43.25
47.97		13-May-97	2.89			45.14
47.97		20-Jun-97	5.45			42.58
47.97		25-Jun-97	2.59			45.44
47.97		1-Jul-97	4.48			43.55
47.97		24-Jul-97	7.42			40.61
47.97		16-Aug-97	8.42			39.61
47.97		22-Aug-97	9.20			38.83
47.97		25-Sep-97	4.53			43.5
47.97		22-Oct-97	4.95			43.08
47.97		25-Nov-97	4.97			43.06
47.97		19-Dec-97	4.33			43.7
47.97		20-Jan-98	3.05			44.98
47.97		3-Mar-98	2.88			45.15
47.97		18-Mar-98	2.66			45.37
47.97		24-Apr-98	7.09			40.94
47.97		21-May-98	7.00			41.03
47.97		30-Jul-98	8.11			39.92
47.97		25-Aug-98	7.33			40.7
47.97		21-Sep-98	4.18			43.85
47.97		26-Oct-98	6.85			41.18
47.97		23-Nov-98	4.63			43.4
47.97		29-Jan-99	3.51			44.52
47.97		26-Feb-99	3.61			44.42
47.97		16-Mar-99	3.55			44.48
47.97		29-Apr-99	3.76			44.27
47.97		1-Jun-99	3.76			44.27
47.97		30-Jul-99	4.61			43.42
47.97		27-Aug-99	3.96			44.07
47.97		27-Sep-99	10.12			37.91
47.97		29-Oct-99	11.33			36.7
47.97	29-Dec-99	10.66			37.37	
47.97	4-Feb-00	13.19			34.84	
47.97	25-Feb-00	9.57			38.46	
47.97	27-Mar-00	7.73			40.3	
47.97	7-Apr-00	7.30			40.73	
47.97	31-May-00	7.33			40.7	
47.97	1-Jun-00	7.31			40.72	
47.97	28-Jul-00	7.35			40.68	
47.97	30-Aug-00	10.55			37.48	
47.97	19-Sep-00	11.93			36.1	
47.97	27-Oct-00	9.04			38.99	
47.97	21-Nov-00	8.66			39.37	
47.97	1-May-01	6.91			41.12	
47.97	1-Oct-01	8.22			39.81	
47.97	11-Mar-02	3.33			44.7	
47.97	23-Sep-02	3.16			44.87	
47.97	10-Mar-03	2.54			45.43	

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Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-02	47.97	23-Sep-03	3.29			44.68
	47.97	15-Mar-04	2.87			45.1
	47.97	13-Sep-04	8.71			39.26
	47.97	18-Jul-05	2.98			44.99
	47.97	4-Jan-06	8.77			39.2
	47.97	27-Jul-06	2.87			45.1
	47.97	23-Jan-07	2.34			45.63
	47.97	7-Mar-07	2.23			45.74
	47.97	27-Jul-07	4.40			43.57
	47.97	28-Jan-08	2.42			45.55
	47.97	16-Jul-08	7.72			40.25
	47.97	22-Jan-09	6.31			41.66
	47.97	22-Jul-09	7.56			40.41
	47.97	8-Jan-10	3.91			44.06
	47.97	12-Jul-10	4.37			43.6
	48.00	12-Jan-11	3.63			44.37
	48.00	13-Jul-11	10.28			37.72
	48.00	27-Jan-12	2.67			45.33
	48.00	10-Jul-13	10.58			37.42
	48.00	8-Jan-14	5.47			42.53
MW-03	48.00	2-Jul-14	7.51			40.49
	48.34	2-Sep-93	8.17			40.17
	48.34	21-Dec-93	3.81			44.53
	48.34	24-Mar-94	4.74			43.6
	48.34	22-Jun-94	6.35			41.99
	48.34	28-Sep-94	7.56			40.78
	48.34	13-Oct-94	8.21			40.13
	48.34	24-Jan-95	3.18			45.16
	48.34	11-Apr-95	3.22			45.12
	48.34	11-Jul-95	7.90			40.44
	48.34	23-Jan-96	6.27			42.07
	48.34	19-Jul-96	8.77			39.57
	48.34	17-Sep-96	9.31			39.03
	48.34	31-Oct-96	7.61			40.73
	48.34	22-Nov-96	9.48			38.86
	48.34	27-Dec-96	6.14			42.2
	48.34	22-Jan-97	5.68			42.66
	48.34	21-Feb-97	3.13			45.21
	48.34	25-Mar-97	3.48			44.86
	48.34	23-Apr-97	5.17			43.17
	48.34	24-Apr-97	5.25			43.09
	48.34	13-May-97	3.41			44.93
	48.34	20-Jun-97	5.91			42.43
	48.34	25-Jun-97	3.11			45.23
	48.34	1-Jul-97	4.91			43.43
	48.34	24-Jul-97	7.90			40.44
	48.34	16-Aug-97	8.91			39.43
	48.34	22-Aug-97	9.65			38.69
	48.34	25-Sep-97	6.96			41.38
	48.34	22-Oct-97	5.50			42.84
	48.34	25-Nov-97	5.55			42.79
	48.34	19-Dec-97	5.10			43.24
	48.34	20-Jan-98	3.58			44.76
	48.34	3-Mar-98	3.37			44.97
	48.34	18-Mar-98	3.16			45.18
	48.34	24-Apr-98	7.54			40.8
	48.34	21-May-98	7.50			40.84
	48.34	30-Jul-98	8.44			39.9
	48.34	25-Aug-98	7.56			40.78
	48.34	21-Sep-98	5.28			43.06
	48.34	26-Oct-98	6.96			41.38
	48.34	23-Nov-98	5.11			43.23
	48.34	29-Jan-99	4.21			44.13
	48.34	26-Feb-99	4.32			44.02
48.34	16-Mar-99	4.16			44.18	
48.34	29-Apr-99	4.33			44.01	
48.34	1-Jun-99	4.39			43.95	
48.34	30-Jul-99	5.88			42.46	
48.34	27-Aug-99	4.57			43.77	
48.34	27-Sep-99	10.48			37.86	
48.34	29-Oct-99	11.61			36.73	
48.34	29-Dec-99	10.11			38.23	
48.34	4-Feb-00	13.22			35.12	
48.34	25-Feb-00	9.14			39.2	
48.34	27-Mar-00	8.06			40.28	
48.34	7-Apr-00	7.64			40.7	
48.34	31-May-00	7.70			40.64	
48.34	1-Jun-00	7.66			40.68	
48.34	28-Jul-00	7.71			40.63	

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Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-03	48.34	30-Aug-00	10.59			37.75
	48.34	19-Sep-00	12.29			36.05
	48.34	27-Oct-00	9.09			39.25
	48.34	21-Nov-00	9.11			39.23
	48.34	1-May-01	7.26			41.08
	48.34	1-Oct-01	7.57			40.77
	48.34	11-Mar-02	7.40			40.94
	48.34	23-Sep-02	4.60			43.74
	48.34	10-Mar-03	2.89			45.45
	48.34	23-Sep-03	3.74			44.6
	48.34	15-Mar-04	3.27			45.07
	48.34	13-Sep-04	9.03			39.31
	48.34	18-Jul-05	3.94			44.4
	48.34	4-Jan-06	9.13			39.21
	48.34	27-Jul-06	3.30			45.04
	48.34	7-Mar-07	2.62			45.72
	48.34	27-Jul-07	3.74			44.6
	48.34	30-Jan-08	2.85			45.49
	48.34	16-Jul-08	7.96			40.38
	48.34	4-Feb-09	7.18			41.16
	48.34	24-Jul-09	7.63			40.71
	48.34	8-Jan-10	5.06			43.28
	48.34	12-Jul-10	3.86			44.48
	48.34	12-Jan-11	3.71			44.63
	48.34	12-Jul-11	6.42			41.92
	48.34	26-Jan-12	--			
	48.34	9-Jul-12	4.06			44.28
	48.34	7-Jan-13	5.09			43.25
	48.34	22-Jul-13	8.24			40.1
	48.34	7-Jan-14	8.09			40.25
48.34	15-Jul-14	8.78			39.56	
MW-04	49.85	2-Sep-93	8.57			41.28
	49.85	21-Dec-93	5.42			44.43
	49.85	24-Mar-94	5.85			44
	49.85	22-Jun-94	6.77			43.08
	49.85	28-Sep-94	8.18			41.67
	49.85	13-Oct-94	8.93			40.92
	49.85	24-Jan-95	4.72			45.13
	49.85	11-Apr-95	4.57			45.28
	49.85	11-Jul-95	6.47			43.38
	49.85	23-Jan-96	7.85			42
	49.85	19-Jul-96	9.62			40.23
	49.85	17-Sep-96	10.09			39.76
	49.85	31-Oct-96	7.93			41.92
	49.85	22-Nov-96	10.62			39.23
	49.85	27-Dec-96	8.06			41.79
	49.85	22-Jan-97	6.07			43.78
	49.85	21-Feb-97	4.86			44.99
	49.85	25-Mar-97	5.16			44.69
	49.85	23-Apr-97	6.25			43.6
	49.85	24-Apr-97	6.45			43.4
	49.85	13-May-97	5.07			44.78
	49.85	20-Jun-97	6.69			43.16
	49.85	25-Jun-97	4.68			45.17
	49.85	1-Jul-97	5.91			43.94
	49.85	24-Jul-97	8.61			41.24
	49.85	16-Aug-97	9.62			40.23
	49.85	22-Aug-97	10.35			39.5
	49.85	25-Sep-97	8.13			41.72
	49.85	22-Oct-97	7.23			42.62
	49.85	25-Nov-97	7.25			42.6
	49.85	19-Dec-97	6.76			43.09
	49.85	20-Jan-98	5.40			44.45
	49.85	3-Mar-98	5.00			44.85
	49.85	18-Mar-98	4.82			45.03
	49.85	24-Apr-98	8.63			41.22
	49.85	21-May-98	9.30			40.55
	49.85	30-Jul-98	10.19			39.66
	49.85	25-Aug-98	9.05			40.8
	49.85	21-Sep-98	7.05			42.8
	49.85	26-Oct-98	8.12			41.73
49.85	23-Nov-98	6.01			43.84	
49.85	29-Jan-99	5.19			44.66	
49.85	26-Feb-99	5.22			44.63	
49.85	16-Mar-99	6.21			43.64	
49.85	29-Apr-99	6.33			43.52	
49.85	1-Jun-99	6.39			43.46	
49.85	30-Jul-99	7.79			42.06	

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UNION PACIFIC RAILROAD COMPANY  
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Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-04	49.85	27-Aug-99	6.51			43.34
	49.85	27-Sep-99	11.32			38.53
	49.85	29-Oct-99	12.21			37.64
	49.85	29-Dec-99	11.52			38.33
	49.85	4-Feb-00	14.33			35.52
	49.85	25-Feb-00	10.63			39.22
	49.85	27-Mar-00	9.38			40.47
	49.85	7-Apr-00	9.09			40.76
	49.85	31-May-00	9.13			40.72
	49.85	1-Jun-00	9.10			40.75
	49.85	28-Jul-00	9.18			40.67
	49.85	30-Aug-00	12.17			37.68
	49.85	19-Sep-00	13.39			36.46
	49.85	27-Oct-00	10.69			39.16
	49.85	21-Nov-00	9.61			40.24
	49.85	1-May-01	8.41			41.44
	49.85	1-Oct-01	8.68			41.17
	49.85	11-Mar-02	5.41			44.44
	49.85	23-Sep-02	5.29			44.56
	49.85	10-Mar-03	4.36			45.49
	49.85	23-Sep-03	5.28			44.57
	49.85	15-Mar-04	4.80			45.05
	49.85	13-Sep-04	9.80			40.05
	49.85	18-Jul-05	5.84			44.01
	49.85	4-Jan-06	10.48			39.37
	49.85	27-Jul-06	5.30			44.55
	49.85	7-Mar-07	4.10			45.75
	49.85	27-Jul-07	5.36			44.49
	49.85	29-Jan-08	4.18			45.67
	49.85	16-Jul-08	8.66			41.19
	49.85	4-Feb-09	8.93			40.92
	49.85	24-Jul-09	9.27			40.58
	49.85	8-Jan-10	6.34			43.51
49.85	12-Jul-10	5.02			44.83	
49.85	12-Jan-11	5.26			44.59	
49.85	12-Jul-11	8.06			41.79	
49.85	26-Jan-12	--				
49.85	9-Jul-12	3.74			46.11	
49.85	7-Jan-13	4.62			45.23	
49.85	22-Jul-13	7.59			42.26	
49.85	7-Jan-14	7.16			42.69	
49.85	15-Jul-14	7.62			42.23	
MW-05	49.24	2-Sep-93	4.90			44.34
	49.24	21-Dec-93	2.21			47.03
	49.24	24-Mar-94	2.30			46.94
	49.24	22-Jun-94	2.80			46.44
	49.24	28-Sep-94	3.90			45.34
	49.24	13-Oct-94	5.05			44.19
	49.24	24-Jan-95	1.36			47.88
	49.24	11-Apr-95	3.90			45.34
	49.24	11-Jul-95	5.33			43.91
	49.24	23-Jan-96	7.42			41.82
	49.24	19-Jul-96	8.61			40.63
	49.24	17-Sep-96	9.01			40.23
	49.24	31-Oct-96	7.84			41.4
	49.24	22-Nov-96	9.68			39.56
	49.24	27-Dec-96	7.66			41.58
	49.24	22-Jan-97	5.89			43.35
	49.24	21-Feb-97	4.45			44.79
	49.24	25-Mar-97	4.65			44.59
	49.24	23-Apr-97	5.53			43.71
	49.24	24-Apr-97	5.68			43.56
	49.24	13-May-97	4.39			44.85
	49.24	20-Jun-97	5.67			43.57
	49.24	25-Jun-97	3.97			45.27
	49.24	1-Jul-97	5.06			44.18
	49.24	24-Jul-97	7.46			41.78
	49.24	16-Aug-97	8.57			40.67
	49.24	22-Aug-97	9.20			40.04
	49.24	25-Sep-97	7.28			41.96
	49.24	22-Oct-97	6.70			42.54
	49.24	25-Nov-97	6.70			42.54
	49.24	19-Dec-97	6.26			42.98
	49.24	20-Jan-98	5.05			44.19
	49.24	4-Mar-98	4.54			44.7
49.24	18-Mar-98	4.36			44.88	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-05	49.24	24-Apr-98	7.67			41.57
	49.24	21-May-98	8.80			40.44
	49.24	30-Jul-98	9.90			39.34
	49.24	25-Aug-98	8.86			40.38
	49.24	21-Sep-98	6.59			42.65
	49.24	26-Oct-98	7.77			41.47
	49.24	23-Nov-98	5.79			43.45
	49.24	29-Jan-99	4.88			44.36
	49.24	26-Feb-99	4.96			44.28
	49.24	16-Mar-99	5.81			43.43
	49.24	29-Apr-99	5.91			43.33
	49.24	1-Jun-99	5.99			43.25
	49.24	30-Jul-99	7.00			42.24
	49.24	27-Aug-99	6.13			43.11
	49.24	27-Sep-99	10.17			39.07
	49.24	29-Oct-99	11.65			37.59
	49.24	29-Dec-99	10.90			38.34
	49.24	4-Feb-00	13.77			35.47
	49.24	25-Feb-00	9.46			39.78
	49.24	27-Mar-00	8.62			40.62
	49.24	7-Apr-00	8.20			41.04
	49.24	31-May-00	8.26			40.98
	49.24	1-Jun-00	8.21			41.03
	49.24	28-Jul-00	8.26			40.98
	49.24	30-Aug-00	11.33			37.91
	49.24	19-Sep-00	12.33			36.91
	49.24	27-Oct-00	9.94			39.3
	49.24	21-Nov-00	9.21			40.03
	49.24	1-May-01	7.47			41.77
	49.24	1-Oct-01	7.79			41.45
	49.24	11-Mar-02	4.92			44.32
	49.24	23-Sep-02	4.76			44.48
	49.24	10-Mar-03	3.77			45.47
	49.24	23-Sep-03	4.61			44.63
	49.24	15-Mar-04	4.22			45.02
	49.24	13-Sep-04	8.58			40.66
	49.24	18-Jul-05	5.61			43.63
	49.24	4-Jan-06	9.76			39.48
	49.24	27-Jul-06	4.85			44.39
	49.24	7-Mar-07	5.94			43.3
	49.24	27-Jul-07	4.53			44.71
	49.24	29-Jan-08	3.71			45.53
49.24	15-Jul-08	7.77			41.47	
49.24	4-Feb-09	8.33			40.91	
49.24	24-Jul-09	8.67			40.57	
49.24	8-Jan-10	6.06			43.18	
49.24	12-Jul-10	4.86			44.38	
49.24	12-Jan-11	5.06			44.18	
49.24	12-Jul-11	10.96			38.28	
49.24	2-Feb-12	4.9			44.34	
49.24	9-Jul-12	4.61			44.63	
49.24	7-Jan-13	7.58			41.66	
49.24	22-Jul-13	10.44			38.8	
49.24	7-Jan-14	6.92			42.32	
49.24	16-Jul-14	8.46			40.78	
MW-07	48.86	2-Sep-93	8.09			40.77
	48.86	21-Dec-93	4.60			44.26
	48.86	24-Mar-94	5.06			43.8
	48.86	22-Jun-94	6.03			42.83
	48.86	28-Sep-94	7.52			41.34
	48.86	13-Oct-94	8.13			40.73
	48.86	24-Jan-95	3.81			45.05
	48.86	11-Apr-95	3.41			45.45
	48.86	11-Jul-95	5.74			43.12
	48.86	23-Jan-96	6.99			41.87
	48.86	19-Jul-96	8.89			39.97
	48.86	17-Sep-96	9.41			39.45
	48.86	31-Oct-96	8.04			40.82
	48.86	22-Nov-96	9.94			38.92
	48.86	27-Dec-96	7.30			41.56
	48.86	22-Jan-97	5.25			43.61
	48.86	21-Feb-97	4.00			44.86
	48.86	25-Mar-97	4.32			44.54
	48.86	23-Apr-97	5.51			43.35
	48.86	24-Apr-97	5.67			43.19
48.86	13-May-97	4.26			44.6	
48.86	20-Jun-97	6.00			42.86	



**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-07	48.86	25-Jun-97	3.86			45
	48.86	1-Jul-97	5.21			43.65
	48.86	24-Jul-97	7.99			40.87
	48.86	16-Aug-97	8.92			39.94
	48.86	22-Aug-97	9.72			39.14
	48.86	25-Sep-97	7.50			41.36
	48.86	22-Oct-97	6.48			42.38
	48.86	25-Nov-97	6.50			42.36
	48.86	19-Dec-97	6.12			42.74
	48.86	20-Jan-98	4.52			44.34
	48.86	4-Mar-98	4.14			44.72
	48.86	18-Mar-98	3.94			44.92
	48.86	24-Apr-98	7.85			41.01
	48.86	21-May-98	8.61			40.25
	48.86	30-Jul-98	9.54			39.32
	48.86	25-Aug-98	8.63			40.23
	48.86	21-Sep-98	6.34			42.52
	48.86	26-Oct-98	7.56			41.3
	48.86	23-Nov-98	5.91			42.95
	48.86	29-Jan-99	4.71			44.15
	48.86	26-Feb-99	4.76			44.1
	48.86	16-Mar-99	5.32			43.54
	48.86	29-Apr-99	5.41			43.45
	48.86	1-Jun-99	5.49			43.37
	48.86	30-Jul-99	6.98			41.88
	48.86	27-Aug-99	5.61			43.25
	48.86	27-Sep-99	10.64			38.22
	48.86	29-Oct-99	11.56			37.3
	48.86	29-Dec-99	9.90			38.96
	48.86	4-Feb-00	14.21			34.65
	48.86	25-Feb-00	8.86			40
	48.86	27-Mar-00	8.62			40.24
	48.86	7-Apr-00	8.15			40.71
	48.86	31-May-00	8.21			40.65
	48.86	1-Jun-00	8.22			40.64
	48.86	28-Jul-00	8.29			40.57
	48.86	30-Aug-00	11.55			37.31
	48.86	19-Sep-00	12.65			36.21
	48.86	27-Oct-00	10.00			38.86
	48.86	21-Nov-00	9.46			39.4
	48.86	1-May-01	7.64			41.22
	48.86	1-Oct-01	8.00			40.86
	48.86	11-Mar-02	4.56			44.3
	48.86	23-Sep-02	4.69			44.17
	48.86	10-Mar-03	3.52			45.34
	48.86	23-Sep-03	4.70			44.16
	48.86	15-Mar-04	3.89			44.97
48.86	13-Sep-04	9.04			39.82	
48.86	18-Jul-05	5.27			43.59	
48.86	4-Jan-06	9.91			38.95	
48.86	27-Jul-06	4.60			44.26	
48.86	23-Jan-07	3.46			45.4	
48.86	7-Mar-07	3.82			45.04	
48.86	27-Jul-07	4.94			43.92	
48.86	29-Jan-08	3.39			45.47	
48.86	16-Jul-08	7.94			40.92	
48.86	22-Jan-09	7.49			41.37	
48.86	24-Jul-09	NM			NM	
48.86	8-Jan-10	4.02			44.84	
48.86	12-Jul-10	4.72			44.14	
48.92	12-Jan-11	4.56			44.36	
48.92	12-Jul-11	10.91			38.01	
48.92	27-Jan-12	3.86			45.06	
48.92	10-Jul-13	10.62			38.30	
48.92	8-Jan-14	6.42			42.50	
MW-08	48.92	2-Jul-14	7.61			41.31
	49.33	2-Sep-93	8.18			41.19
	49.33	21-Dec-93	5.02			44.35
	49.33	24-Mar-94	5.53			43.84
	49.33	22-Jun-94	6.38			42.99
	49.33	28-Sep-94	7.72			41.65
	49.33	13-Oct-94	8.43			40.94
	49.33	24-Jan-95	4.15			45.22
	49.33	11-Apr-95	4.02			45.35
	49.33	11-Jul-95	5.95			43.42
	49.33	23-Jan-96	7.20			42.17
	49.33	19-Jul-96	9.06			40.31
	49.33	17-Sep-96	9.51			39.86
	49.33	31-Oct-96	7.99			41.38

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UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-08	49.33	22-Nov-96	9.98			39.39
	49.33	27-Dec-96	7.24			42.13
	49.33	22-Jan-97	5.25			44.12
	49.33	21-Feb-97	4.21			45.16
	49.33	25-Mar-97	4.48			44.89
	49.33	23-Apr-97	5.61			43.76
	49.33	24-Apr-97	5.76			43.61
	49.33	13-May-97	4.45			44.92
	49.33	20-Jun-97	6.09			43.28
	49.33	25-Jun-97	4.56			44.81
	49.33	1-Jul-97	5.06			44.31
	49.33	24-Jul-97	7.97			41.4
	49.33	16-Aug-97	8.05			41.32
	49.33	22-Aug-97	9.73			39.64
	49.33	25-Sep-97	7.57			41.8
	49.33	22-Oct-97	6.43			42.94
	49.33	25-Nov-97	6.48			42.89
	49.33	19-Dec-97	5.22			44.15
	49.33	20-Jan-98	4.70			44.67
	49.33	4-Mar-98	4.38			44.99
	49.33	18-Mar-98	4.18			45.19
	49.33	24-Apr-98	8.00			41.37
	49.33	21-May-98	8.45			40.92
	49.33	30-Jul-98	9.33			40.04
	49.33	25-Aug-98	8.46			40.91
	49.33	21-Sep-98	6.31			43.06
	49.33	26-Oct-98	7.66			41.71
	49.33	23-Nov-98	5.96			43.41
	49.33	29-Jan-99	4.80			44.57
	49.33	26-Feb-99	4.89			44.48
	49.33	16-Mar-99	5.45			43.92
	49.33	29-Apr-99	5.66			43.71
	49.33	1-Jun-99	5.66			43.71
	49.33	30-Jul-99	7.20			42.17
	49.33	27-Aug-99	5.85			43.52
	49.33	27-Sep-99	10.78			38.59
	49.33	29-Oct-99	11.76			37.61
	49.33	29-Dec-99	11.03			38.34
	49.33	4-Feb-00	14.66			34.71
	49.33	25-Feb-00	10.33			39.04
	49.33	27-Mar-00	8.75			40.62
	49.33	7-Apr-00	8.37			41
	49.33	31-May-00	8.40			40.97
	49.33	1-Jun-00	8.36			41.01
	49.33	28-Jul-00	8.40			40.97
	49.33	30-Aug-00	11.29			38.08
	49.33	19-Sep-00	12.82			36.55
	49.33	27-Oct-00	12.63			36.74
	49.33	21-Nov-00	9.64			39.73
	49.33	1-May-01	7.83			41.54
	49.33	1-Oct-01	8.05			41.32
	49.33	11-Mar-02	4.75			44.62
	49.33	23-Sep-02	4.69			44.68
	49.33	10-Mar-03	3.84			45.49
	49.33	23-Sep-03	4.73			44.6
	49.33	15-Mar-04	4.31			45.02
	49.33	13-Sep-04	9.31			40.02
	49.33	18-Jul-05	5.32			44.01
	49.33	4-Jan-06	10.63			38.7
	49.33	27-Jul-06	4.79			44.54
	49.33	22-Jan-07	3.81			45.52
	49.33	7-Mar-07	3.96			45.37
	49.33	27-Jul-07	5.06			44.27
	49.33	29-Jan-08	3.71			45.62
	49.33	16-Jul-08	8.32			41.01
	49.33	22-Jan-09	7.71			41.62
	49.33	24-Jul-09	NM			NM
	49.33	8-Jan-10	4.17			45.16
	49.33	12-Jul-10	4.96			44.37
	49.33	12-Jan-11	5.32			44.01
	49.33	12-Jul-11	11.24			38.09
	49.33	27-Jan-12	4.68			44.65
	49.33	10-Jul-13	11.07			38.26
	49.33	8-Jan-14	6.87			42.46
	49.33	2-Jul-14	8.16			41.17
MW-09	49.26	2-Sep-93	7.43			41.86
	49.26	21-Dec-93	4.89			44.4
	49.26	24-Mar-94	4.92			44.37
	49.26	22-Jun-94	5.51			43.78

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HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-09	49.26	28-Sep-94	6.90			42.39
	49.26	13-Oct-94	7.66			41.63
	49.26	24-Jan-95	4.10			45.19
	49.26	11-Apr-95	3.74			45.55
	49.26	11-Jul-95	5.08			44.21
	49.26	23-Jan-96	7.09			42.2
	49.26	19-Jul-96	8.27			41.02
	49.26	17-Sep-96	8.58			40.71
	49.26	31-Oct-96	7.27			42.02
	49.26	22-Nov-96	9.17			40.12
	49.26	27-Dec-96	7.05			42.24
	49.26	22-Jan-97	5.42			43.87
	49.26	21-Feb-97	4.09			45.2
	49.26	25-Mar-97	4.17			45.12
	49.26	23-Apr-97	5.05			44.24
	49.26	24-Apr-97	5.21			44.08
	49.26	13-May-97	4.16			45.13
	49.26	20-Jun-97	5.32			43.97
	49.26	25-Jun-97	3.80			45.49
	49.26	1-Jul-97	4.57			44.72
	49.26	24-Jul-97	7.03			42.26
	49.26	16-Aug-97	8.26			41.03
	49.26	22-Aug-97	8.67			40.62
	49.26	25-Sep-97	6.99			42.3
	49.26	22-Oct-97	6.10			43.19
	49.26	25-Nov-97	6.12			43.17
	49.26	19-Dec-97	5.62			43.67
	49.26	20-Jan-98	4.60			44.69
	49.26	4-Mar-98	4.15			45.14
	49.26	18-Mar-98	4.02			45.27
	49.26	24-Apr-98	7.32			41.97
	49.26	21-May-98	8.10			41.19
	49.26	30-Jul-98	9.12			40.17
	49.26	25-Aug-98	8.41			40.88
	49.26	21-Sep-98	6.11			43.18
	49.26	26-Oct-98	7.61			41.68
	49.26	23-Nov-98	5.43			43.86
	49.26	29-Jan-99	4.60			44.69
	49.26	26-Feb-99	4.68			44.61
	49.26	16-Mar-99	5.46			43.83
	49.26	29-Apr-99	5.66			43.63
	49.26	1-Jun-99	5.66			43.63
	49.26	30-Jul-99	7.11			42.18
	49.26	27-Aug-99	5.86			43.43
	49.26	27-Sep-99	9.81			39.48
	49.26	29-Oct-99	10.63			38.66
	49.26	29-Dec-99	9.99			39.3
	49.26	4-Feb-00	12.44			36.85
	49.26	25-Feb-00	8.88			40.41
	49.26	27-Mar-00	8.22			41.07
	49.26	7-Apr-00	8.10			41.19
	49.26	31-May-00	8.15			41.14
	49.26	1-Jun-00	8.00			41.29
	49.26	28-Jul-00	8.11			41.18
	49.26	30-Aug-00	11.10			38.19
	49.26	19-Sep-00	11.91			37.38
	49.26	27-Oct-00	9.84			39.45
	49.26	21-Nov-00	8.89			40.4
	49.26	1-May-01	7.16			42.13
	49.26	1-Oct-01	7.39			41.9
	49.26	11-Mar-02	4.61			44.68
	49.26	23-Sep-02	4.45			44.84
	49.26	10-Mar-03	3.59			45.67
	49.26	23-Sep-03	4.31			44.95
	49.26	15-Mar-04	4.18			45.08
	49.26	13-Sep-04	8.39			40.87
	49.26	18-Jul-05	5.53			43.73
	49.26	4-Jan-06	9.46			39.8
	49.26	27-Jul-06	4.85			44.41
	49.26	7-Mar-07	5.58			43.68
	49.26	27-Jul-07	3.78			45.48
	49.26	29-Jan-08	3.52			45.74
	49.26	15-Jul-08	7.04			42.22
	49.26	4-Feb-09	8.01			41.25
	49.26	24-Jul-09	8.34			40.92
	49.26	8-Jan-10	5.89			43.37
	49.26	12-Jul-10	4.32			44.94

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-09	49.26	12-Jan-11	4.61			44.65
	49.26	12-Jul-11	10.71			38.55
	49.26	26-Jan-12	4.73			44.53
	49.26	9-Jul-12	4.23			45.03
	49.26	7-Jan-13	6.73			42.53
	49.26	22-Jul-13	9.16			40.1
	49.26	7-Jan-14	8.72			40.54
	49.26	16-Jul-14	8.17			41.09
MW-10A	49.86	28-Sep-94	8.69			41.21
	49.86	13-Oct-94	9.36			40.54
	49.86	24-Jan-95	4.62			45.28
	49.86	11-Apr-95	4.60			45.3
	49.86	11-Jul-95	7.00			42.9
	49.86	23-Jan-96	7.74			42.16
	49.86	19-Jul-96	9.98			39.92
	49.86	17-Sep-96	10.54			39.36
	49.86	31-Oct-96	7.94			41.96
	49.86	22-Nov-96	10.82			39.08
	49.86	27-Dec-96	7.81			42.09
	49.86	22-Jan-97	5.45			44.45
	49.86	21-Feb-97	4.63			45.27
	49.86	25-Mar-97	5.01			44.89
	49.86	23-Apr-97	6.39			43.51
	49.86	24-Apr-97	6.58			43.32
	49.86	13-May-97	4.93			44.97
	49.86	20-Jun-97	7.08			42.82
	49.86	25-Jun-97	4.58			45.32
	49.86	1-Jul-97	6.13			43.77
	49.86	24-Jul-97	9.11			40.79
	49.86	16-Aug-97	10.10			39.8
	49.86	22-Aug-97	10.81			39.09
	49.86	25-Sep-97	8.47			41.43
	49.86	22-Oct-97	7.02			42.88
	49.86	25-Nov-97	7.05			42.85
	49.86	19-Dec-97	6.89			43.01
	49.86	20-Jan-98	5.10			44.8
	49.86	3-Mar-98	4.87			45.03
	49.86	18-Mar-98	4.65			45.25
	49.86	24-Apr-98	8.84			41.06
	49.86	21-May-98	9.10			40.8
	49.86	30-Jul-98	10.23			39.67
	49.86	25-Aug-98	9.11			40.79
	49.86	21-Sep-98	6.82			43.08
	49.86	26-Oct-98	8.19			41.71
	49.86	23-Nov-98	6.12			43.78
	49.86	29-Jan-99	5.61			44.29
	49.86	26-Feb-99	5.69			44.21
	49.86	16-Mar-99	5.91			43.99
49.86	29-Apr-99	6.11			43.79	
49.86	1-Jun-99	6.10			43.8	
49.86	30-Jul-99	7.70			42.2	
49.86	27-Aug-99	6.31			43.59	
49.86	27-Sep-99	11.73			38.17	
49.86	29-Oct-99	12.69			37.21	
49.86	29-Dec-99	12.00			37.9	
49.86	4-Feb-00	14.30			35.6	
49.86	25-Feb-00	11.44			38.46	
49.86	27-Mar-00	9.57			40.33	
49.86	7-Apr-00	9.27			40.63	
49.86	31-May-00	9.31			40.59	
49.86	1-Jun-00	9.10			40.8	
49.86	28-Jul-00	9.30			40.6	
49.86	30-Aug-00	12.09			37.81	
49.86	19-Sep-00	13.70			36.2	
49.86	27-Oct-00	10.69			39.21	
49.86	21-Nov-00	10.49			39.41	
49.86	1-May-01	8.64			41.26	
49.86	1-Oct-01	8.93			40.97	
49.86	11-Mar-02	5.30			44.6	
49.86	23-Sep-02	5.19			44.71	
49.86	10-Mar-03	4.43			45.43	
49.86	23-Sep-03	5.31			44.55	
49.86	15-Mar-04	4.69			45.17	
49.86	13-Sep-04	10.30			39.56	
49.86	18-Jul-05	5.57			44.29	
49.86	4-Jan-06	9.68			40.18	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-10A	49.86	27-Jul-06	5.01			44.85
	49.86	23-Jan-07	4.29			45.57
	49.86	7-Mar-07	4.13			45.73
	49.86	27-Jul-07	6.03			43.83
	49.86	28-Jan-08	4.22			45.64
	49.86	16-Jul-08	9.31			40.55
	49.86	22-Jan-09	8.27			41.59
	49.86	24-Jul-09	NM			NM
	49.86	8-Jan-10	4.64			45.22
	49.86	12-Jul-10	5.23			44.63
	49.82	12-Jan-11	5.72			44.10
	49.82	13-Jul-11	11.96			37.86
	49.82	12-Jul-11	12.07			37.75
	49.82	27-Jan-12	4.88			44.94
	49.82	10-Jul-13	12.07			37.75
	49.82	8-Jan-14	7.33			42.49
	49.82	2-Jul-14	8.92			40.90
MW-10B	49.94	28-Sep-94	8.77			41.2
	49.94	13-Oct-94	9.45			40.52
	49.94	24-Jan-95	4.72			45.25
	49.94	11-Apr-95	4.72			45.25
	49.94	11-Jul-95	7.13			42.84
	49.94	23-Jan-96	7.84			42.13
	49.94	19-Jul-96	10.27			39.7
	49.94	17-Sep-96	10.64			39.33
	49.94	31-Oct-96	8.01			41.96
	49.94	22-Nov-96	10.93			39.04
	49.94	27-Dec-96	7.99			41.98
	49.94	22-Jan-97	5.72			44.25
	49.94	21-Feb-97	4.78			45.19
	49.94	25-Mar-97	5.13			44.84
	49.94	23-Apr-97	6.52			43.45
	49.94	24-Apr-97	6.71			43.26
	49.94	13-May-97	5.09			44.88
	49.94	20-Jun-97	7.21			42.76
	49.94	25-Jun-97	4.71			45.26
	49.94	1-Jul-97	6.27			43.7
	49.94	24-Jul-97	9.15			40.82
	49.94	16-Aug-97	10.19			39.78
	49.94	22-Aug-97	10.92			39.05
	49.94	25-Sep-97	8.69			41.28
	49.94	22-Oct-97	7.18			42.79
	49.94	25-Nov-97	7.21			42.76
	49.94	19-Dec-97	6.56			43.41
	49.94	20-Jan-98	5.25			44.72
	49.94	3-Mar-98	5.00			44.97
	49.94	18-Mar-98	4.79			45.18
	49.94	24-Apr-98	8.95			41.02
	49.94	21-May-98	9.30			40.67
	49.94	30-Jul-98	10.30			39.67
	49.94	25-Aug-98	9.20			40.77
	49.94	21-Sep-98	7.06			42.91
	49.94	26-Oct-98	8.31			41.66
	49.94	23-Nov-98	6.25			43.72
	49.94	29-Jan-99	5.71			44.26
	49.94	26-Feb-99	5.76			44.21
	49.94	16-Mar-99	6.05			43.92
	49.94	29-Apr-99	6.10			43.87
	49.94	1-Jun-99	6.10			43.87
	49.94	30-Jul-99	7.61			42.36
49.94	27-Aug-99	6.33			43.64	
49.94	27-Sep-99	11.90			38.07	
49.94	29-Oct-99	12.60			37.37	
49.94	29-Dec-99	12.10			37.87	
49.94	4-Feb-00	14.29			35.68	
49.94	25-Feb-00	11.15			38.82	
49.94	27-Mar-00	9.67			40.3	
49.94	7-Apr-00	9.32			40.65	
49.94	31-May-00	9.38			40.59	
49.94	1-Jun-00	9.21			40.76	
49.94	28-Jul-00	9.33			40.64	
49.94	30-Aug-00	12.11			37.86	
49.94	19-Sep-00	13.77			36.2	
49.94	27-Oct-00	10.63			39.34	
49.94	21-Nov-00	10.64			39.33	
49.94	1-May-01	8.75			41.22	
49.94	1-Oct-01	9.12			40.85	
49.94	11-Mar-02	5.47			44.5	
49.94	23-Sep-02	5.40			44.57	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-10B	49.94	10-Mar-03	4.59			45.35
	49.94	23-Sep-03	5.58			44.36
	49.94	15-Mar-04	5.78			44.16
	49.94	13-Sep-04	10.41			39.53
	49.94	18-Jul-05	5.97			43.97
	49.94	4-Jan-06	10.75			39.19
	49.94	27-Jul-06	5.73			44.21
	49.94	23-Jan-07	4.45			45.49
	49.94	7-Mar-07	4.61			45.33
	49.94	27-Jul-07	6.15			43.79
	49.94	28-Jan-08	4.44			45.5
	49.94	16-Jul-08	9.42			40.52
	49.94	22-Jan-09	8.39			41.55
	49.94	24-Jul-09	NM			NM
	49.94	8-Jan-10	4.91			45.03
	49.94	12-Jul-10	5.33			44.61
	49.95	12-Jan-11	5.96			43.99
	49.95	13-Jul-11	12.07			37.88
	49.95	27-Jan-12	5.02			44.93
	49.95	10-Jul-13	12.18			37.77
49.95	8-Jan-14	7.46			42.49	
49.95	2-Jul-14	8.96			40.99	
MW-11A	50.05	28-Sep-94	8.66			41.38
	50.05	13-Oct-94	9.35			40.69
	50.05	24-Jan-95	4.88			45.16
	50.05	11-Apr-95	4.81			45.23
	50.05	11-Jul-95	6.67			43.37
	50.05	23-Jan-96	8.01			42.03
	50.05	19-Jul-96	10.09			39.95
	50.05	17-Sep-96	10.56			39.48
	50.05	31-Oct-96	8.16			41.88
	50.05	22-Nov-96	10.98			39.06
	50.05	27-Dec-96	8.21			41.83
	50.05	22-Jan-97	6.06			43.98
	50.05	21-Feb-97	4.98			45.06
	50.05	25-Mar-97	5.32			44.72
	50.05	23-Apr-97	6.59			43.45
	50.05	24-Apr-97	6.77			43.27
	50.05	13-May-97	5.31			44.73
	50.05	20-Jun-97	7.15			42.89
	50.05	25-Jun-97	4.88			45.16
	50.05	1-Jul-97	6.29			43.75
	50.05	24-Jul-97	9.12			40.92
	50.05	16-Aug-97	10.11			39.93
	50.05	22-Aug-97	10.82			39.22
	50.05	25-Sep-97	8.70			41.34
	50.05	22-Oct-97	7.40			42.64
	50.05	25-Nov-97	7.41			42.63
	50.05	19-Dec-97	6.10			43.94
	50.05	20-Jan-98	5.49			44.55
	50.05	3-Mar-98	5.16			44.88
	50.05	18-Mar-98	4.96			45.08
	50.05	24-Apr-98	8.98			41.06
	50.05	21-May-98	9.40			40.64
	50.05	30-Jul-98	10.56			39.48
	50.05	25-Aug-98	9.32			40.72
	50.05	21-Sep-98	7.28			42.76
	50.05	26-Oct-98	8.43			41.61
	50.05	23-Nov-98	6.41			43.63
	50.05	29-Jan-99	5.31			44.73
	50.05	26-Feb-99	5.39			44.65
	50.05	16-Mar-99	6.32			43.72
	50.05	29-Apr-99	6.51			43.53
	50.05	1-Jun-99	6.57			43.47
	50.05	30-Jul-99	8.00			42.04
	50.05	27-Aug-99	6.79			43.25
50.05	27-Sep-99	11.73			38.31	
50.05	29-Oct-99	12.81			37.23	
50.05	29-Dec-99	12.11			37.93	
50.05	4-Feb-00	14.33			35.71	
50.05	25-Feb-00	11.10			38.94	
50.05	27-Mar-00	9.66			40.38	
50.05	7-Apr-00	9.40			40.64	
50.05	31-May-00	9.50			40.54	
50.05	1-Jun-00	9.30			40.74	
50.05	28-Jul-00	9.47			40.57	
50.05	30-Aug-00	12.44			37.6	
50.05	19-Sep-00	13.74			36.3	
50.05	27-Oct-00	11.01			39.03	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)	
MW-11A	50.05	21-Nov-00	10.69			39.35	
	50.05	1-May-01	8.78			41.26	
	50.05	1-Oct-01	9.12			40.93	
	50.05	11-Mar-02	5.59			44.45	
	50.05	23-Sep-02	5.60			44.44	
	50.05	10-Mar-03	4.66			45.39	
	50.05	23-Sep-03	5.73			44.32	
	50.05	15-Mar-04	4.99			45.06	
	50.05	13-Sep-04	10.28			39.77	
	50.05	18-Jul-05	6.66			43.39	
	50.05	5-Jan-06	10.85			39.2	
	50.05	27-Jul-06	5.02			45.03	
	50.05	23-Jan-07	4.54			45.51	
	50.05	7-Mar-07	4.26			45.79	
	50.05	27-Jul-07	6.09			43.96	
	50.05	28-Jan-08	4.46			45.59	
	50.05	16-Jul-08	9.25			40.8	
	50.05	22-Jan-09	8.57			41.48	
	50.05	24-Jul-09	NM			NM	
	50.05	8-Jan-10	4.97			45.08	
	50.05	12-Jul-10	5.51			44.54	
	50.07	12-Jan-11	6.21			43.86	
	50.07	12-Jul-11	12.02			38.05	
	50.07	27-Jan-12	5.31			44.76	
	50.07	10-Jul-13	12.01			38.06	
	50.07	8-Jan-14	7.46			42.61	
	50.07	2-Jul-14	9.02			41.05	
	MW-11B	50.18	28-Sep-94	8.92			41.27
		50.18	13-Oct-94	9.59			40.6
		50.18	24-Jan-95	5.04			45.15
		50.18	11-Apr-95	5.01			45.18
		50.18	11-Jul-95	7.23			42.96
50.18		23-Jan-96	8.20			41.99	
50.18		19-Jul-96	8.92			41.27	
50.18		17-Sep-96	10.83			39.36	
50.18		31-Oct-96	9.34			40.85	
50.18		22-Nov-96	11.23			38.96	
50.18		27-Dec-96	8.45			41.74	
50.18		22-Jan-97	6.28			43.91	
50.18		21-Feb-97	5.16			45.03	
50.18		25-Mar-97	5.51			44.68	
50.18		23-Apr-97	6.81			43.38	
50.18		24-Apr-97	6.99			43.2	
50.18		13-May-97	5.46			44.73	
50.18		20-Jun-97	7.40			42.79	
50.18		25-Jun-97	5.06			45.13	
50.18		1-Jul-97	6.52			43.67	
50.18		24-Jul-97	9.36			40.83	
50.18		16-Aug-97	10.36			39.83	
50.18		22-Aug-97	11.11			39.08	
50.18		25-Sep-97	8.96			41.23	
50.18		22-Oct-97	7.61			42.58	
50.18		25-Nov-97	7.63			42.56	
50.18		19-Dec-97	7.11			43.08	
50.18		20-Jan-98	5.70			44.49	
50.18		3-Mar-98	5.35			44.84	
50.18		18-Mar-98	5.14			45.05	
50.18		24-Apr-98	9.19			41	
50.18		21-May-98	9.61			40.58	
50.18		30-Jul-98	10.72			39.47	
50.18		25-Aug-98	9.48			40.71	
50.18		21-Sep-98	7.49			42.7	
50.18		26-Oct-98	8.57			41.62	
50.18		23-Nov-98	6.32			43.87	
50.18		26-Feb-99	5.32			44.87	
50.18		16-Mar-99	6.49			43.7	
50.18		29-Apr-99	6.66			43.53	
50.18		1-Jun-99	6.66			43.53	
50.18		30-Jul-99	8.12			42.07	
50.18		27-Aug-99	6.88			43.31	
50.18	27-Sep-99	12.04			38.15		
50.18	29-Oct-99	13.00			37.19		
50.18	29-Dec-99	12.33			37.86		
50.18	4-Feb-00	15.61			34.58		
50.18	25-Feb-00	11.49			38.7		
50.18	27-Mar-00	9.93			40.26		
50.18	7-Apr-00	9.54			40.65		
50.18	31-May-00	9.61			40.58		
50.18	1-Jun-00	9.51			40.68		

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)	
MW-11B	50.18	28-Jul-00	9.60			40.59	
	50.18	30-Aug-00	12.76			37.43	
	50.18	19-Sep-00	13.97			36.22	
	50.18	27-Oct-00	11.23			38.96	
	50.18	21-Nov-00	10.88			39.31	
	50.18	1-May-01	5.97			44.22	
	50.18	1-Oct-01	9.33			40.86	
	50.18	11-Mar-02	5.80			44.39	
	50.18	23-Sep-02	5.79			44.4	
	50.18	10-Mar-03	4.85			45.33	
	50.18	23-Sep-03	5.95			44.23	
	50.18	15-Mar-04	5.16			45.02	
	50.18	13-Sep-04	10.53			39.65	
	50.18	18-Jul-05	5.45			44.73	
	50.18	4-Jan-06	11.01			39.17	
	50.18	27-Jul-06	5.26			44.92	
	50.18	23-Jan-07	4.13			46.05	
	50.18	7-Mar-07	4.42			45.76	
	50.18	27-Jul-07	6.29			43.89	
	50.18	28-Jan-08	4.69			45.49	
	50.18	16-Jul-08	9.49			40.69	
	50.18	22-Jan-09	8.72			41.46	
	50.18	24-Jul-09	NM			NM	
	50.18	8-Jan-10	5.15			45.03	
	50.18	12-Jul-10	5.67			44.51	
	50.23	12-Jan-11	6.37			43.86	
	50.23	12-Jul-11	12.23			38.00	
	50.23	27-Jan-12	5.38			44.85	
	50.23	10-Jul-13	12.22			38.01	
	50.23	8-Jan-14	7.82			42.41	
	50.23	2-Jul-14	9.14			41.09	
	MW-12A	49.96	25-Mar-97	5.52			44.44
		49.96	23-Apr-97	6.51			43.45
49.96		24-Apr-97	6.66			43.3	
49.96		13-May-97	5.47			44.49	
49.96		20-Jun-97	6.81			43.15	
49.96		25-Sep-97	8.08			41.88	
49.96		22-Oct-97	7.10			42.86	
49.96		25-Nov-97	7.12			42.84	
49.96		19-Dec-97	6.96			43	
49.96		20-Jan-98	5.69			44.27	
49.96		4-Mar-98	4.52			45.44	
49.96		18-Mar-98	5.28			44.68	
49.96		24-Apr-98	8.70			41.26	
49.96		21-May-98	9.10			40.86	
49.96		25-Aug-98	10.05			39.91	
49.96		21-Sep-98	7.11			42.85	
49.96		26-Oct-98	9.11			40.85	
49.96		23-Nov-98	6.01			43.95	
49.96		29-Jan-99	5.44			44.52	
49.96		26-Feb-99	5.52			44.44	
49.96		16-Mar-99	6.21			43.75	
49.96		29-Apr-99	6.38			43.58	
49.96		1-Jun-99	6.31			43.65	
49.96		30-Jul-99	7.88			42.08	
49.96		27-Aug-99	6.56			43.4	
49.96		27-Sep-99	11.61			38.35	
49.96		29-Oct-99	12.79			37.17	
49.96		18-Nov-99	13.18			36.78	
49.96		29-Dec-99	12.03			37.93	
49.96		4-Feb-00	15.43			34.53	
49.96		25-Feb-00	11.34			38.62	
49.96		27-Mar-00	9.22			40.74	
49.96		7-Apr-00	8.80			41.16	
49.96		31-May-00	8.84			41.12	
49.96		1-Jun-00	8.81			41.15	
49.96		28-Jul-00	8.87			41.09	
49.96		30-Aug-00	11.76			38.2	
49.96		19-Sep-00	13.22			36.74	
49.96		27-Oct-00	10.54			39.42	
49.96		21-Nov-00	10.16			39.8	
49.96		1-May-01	8.60			41.36	
49.96		1-Oct-01	8.73			41.23	
49.96		11-Mar-02	6.01			43.95	
49.96	23-Sep-02	5.87			44.09		
49.96	10-Mar-03	5.37			44.59		
49.96	23-Sep-03	5.96			44		
49.96	15-Mar-04	5.54			44.42		
49.96	13-Sep-04	10.30			39.66		



**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-12A	49.96	18-Jul-05	7.01			42.95
	49.96	4-Jan-06	10.57			39.39
	49.96	27-Jul-06	6.60			43.36
	49.96	7-Mar-07	6.94			43.02
	49.96	27-Jul-07	5.79			44.17
	49.96	30-Jan-08	5.29			44.67
	49.96	15-Jul-08	9.19			40.77
	49.96	4-Feb-09	8.81			41.15
	49.96	24-Jul-09	9.13			40.83
	49.96	8-Jan-10	5.47			44.49
	49.96	12-Jul-10	9.72			40.24
	49.96	12-Jan-11	5.59			44.37
	49.96	12-Jul-11	12.46			37.5
	49.96	26-Jan-12	5.78			44.18
	49.96	9-Jul-12	5.96			44
	49.96	7-Jan-13	9.04			40.92
	49.96	22-Jul-13	11.64			38.32
	49.96	7-Jan-14	7.38			42.58
	49.96	16-Jul-14	9.82			40.14
	MW-12B	50.02	25-Mar-97	5.60		
50.02		23-Apr-97	6.64			43.38
50.02		24-Apr-97	6.74			43.28
50.02		13-May-97	5.55			44.47
50.02		20-Jun-97	7.01			43.01
50.02		25-Sep-97	8.32			41.7
50.02		22-Oct-97	7.25			42.77
50.02		25-Nov-97	7.29			42.73
50.02		19-Dec-97	6.86			43.16
50.02		20-Jan-98	5.88			44.14
50.02		4-Mar-98	5.64	44.08	1.72	44.38
50.02		18-Mar-98	5.38	44.07	1.73	44.64
50.02		9-Apr-98	7.87		0.98	42.15
50.02		16-Apr-98	8.31		1.35	41.71
50.02		24-Apr-98	8.72	43.82	1.98	41.3
50.02		8-May-98	NM		0.50	NM
50.02		12-May-98	NM		0.50	NM
50.02		21-May-98	10.48			39.54
50.02		25-May-98	NM		1.00	NM
50.02		9-Jun-98	NM		1.00	NM
50.02		16-Jun-98	NM		1.20	NM
50.02		26-Jun-98	NM		1.50	NM
50.02		2-Jul-98	NM		1.50	NM
50.02		10-Jul-98	NM		2.00	NM
50.02		14-Jul-98	NM		2.00	NM
50.02		23-Jul-98	NM		2.00	NM
50.02		5-Aug-98	NM		2.00	NM
50.02		13-Aug-98	NM		2.00	NM
50.02		18-Aug-98	NM		2.00	NM
50.02		25-Aug-98	10.22			39.8
50.02		15-Sep-98	NM		2.00	NM
50.02		21-Sep-98	7.73			42.29
50.02		30-Sep-98	NM		4.00	NM
50.02		8-Oct-98	NM		4.00	NM
50.02		16-Oct-98	NM		4.00	NM
50.02		26-Oct-98	8.88			41.14
50.02		6-Nov-98	NM		4.00	NM
50.02		13-Nov-98	NM		1.49	NM
50.02		19-Nov-98	NM		4.00	NM
50.02		23-Nov-98	6.11			43.91
50.02		16-Dec-98	NM		4.00	NM
50.02		7-Jan-99	NM		4.00	NM
50.02		15-Jan-99	NM		4.00	NM
50.02		22-Jan-99	NM		4.00	NM
50.02		26-Jan-99	NM		4.00	NM
50.02		29-Jan-99	5.70			44.32
50.02		4-Feb-99	NM		4.00	NM
50.02		9-Feb-99	NM		3.00	NM
50.02		26-Feb-99	5.83	39.95	5.85	44.19
50.02		16-Mar-99	6.30	43.60	2.20	43.72
50.02	29-Apr-99	6.44	38.90	6.90	43.58	
50.02	21-May-99	7.40	36.90	8.90	42.62	
50.02	27-May-99	7.38	36.90	8.90	42.64	
50.02	1-Jun-99	6.40	37.90	7.90	43.62	
50.02	10-Jun-99	7.36	36.90	8.90	42.66	
50.02	30-Jul-99	7.98			42.04	
50.02	27-Aug-99	6.61	38.90	6.90	43.41	
50.02	27-Sep-99	11.71	42.34	3.46	38.31	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-12B	50.02	29-Oct-99	12.76	41.84	3.96	37.26
	50.02	18-Nov-99	13.22			36.8
	50.02	29-Dec-99	12.01	41.84	3.96	38.01
	50.02	4-Feb-00	13.22	41.84	3.96	36.8
	50.02	25-Feb-00	11.44	41.84	3.96	38.58
	50.02	27-Mar-00	NM			NM
	50.02	7-Apr-00	8.73	41.81	3.99	41.29
	50.02	31-May-00	8.77	41.81	3.99	41.25
	50.02	1-Jun-00	8.73	41.81	3.99	41.29
	50.02	28-Jul-00	8.77	41.89	3.91	41.25
	50.02	30-Aug-00	11.66	41.82	3.98	38.36
	50.02	19-Sep-00	13.33	40.89	4.91	36.69
	50.02	27-Oct-00	11.75	41.80	4.00	38.27
	50.02	21-Nov-00	10.64	43.48	2.32	39.38
	50.02	1-May-01	8.71	43.46	2.34	41.31
	50.02	1-Oct-01	8.37		15.00	41.65
	50.02	14-Mar-02	6.37	36.99	8.81	43.65
	50.02	23-Sep-02	6.10	40.03	5.77	43.92
	50.02	10-Mar-03	5.45			44.57
	50.02	24-Sep-03	6.29	39.85	5.95	43.73
	50.02	15-Mar-04	5.63			44.39
	50.02	13-Sep-04	10.44	38.72	7.08	39.58
	50.02	18-Jul-05	7.14	38.40	7.40	42.88
	50.02	4-Jan-06	10.75	35.98	9.82	39.27
	50.02	27-Jul-06	6.07	35.74	10.06	43.95
	50.02	7-Mar-07	6.96	34.60	11.20	43.06
	50.02	27-Jul-07	5.36	33.45	12.35	44.66
	50.02	31-Jan-08	5.75	33.34	12.46	44.27
	50.02	15-Jul-08	9.38	38.88	6.92	40.64
	50.02	4-Feb-09	8.89	38.14	7.66	41.13
	50.02	24-Jul-09	9.18	38.51	7.29	40.84
	50.02	8-Jan-10	6.81	37.46	8.34	43.21
	50.02	27-May-10	7.29	39.5	6.30	42.73
	50.02	28-Jun-10	7.39	44.1	1.70	42.63
	50.02	12-Jul-10	7.47	44.25	1.55	42.55
	50.02	31-Aug-10	7.26	45.42	0.38	42.76
	50.02	12-Jan-11	7.01	45.39	0.41	43.01
	50.02	12-Jul-11	10.09	45.39	0.41	39.93
	50.02	8-Mar-12	6.87	40.2	5.60	43.15
	50.02	9-Jul-12	7.16	40.1	5.70	42.86
50.02	7-Jan-13	9.17	39.86	5.94	40.85	
50.02	22-Jul-13	11.16	39.04	6.76	38.86	
50.02	7-Jan-14	11.34	45.12	0.68	38.68	
50.02	15-Jul-14	10.59	44.89	0.91	39.43	
MW-12C	50.14	13-May-97	39.34			10.8
	50.14	20-Jun-97	38.94			11.2
	50.14	25-Sep-97	36.70			13.44
	50.14	22-Oct-97	36.09			14.05
	50.14	25-Nov-97	36.13			14.01
	50.14	19-Dec-97	35.34			14.8
	50.14	20-Jan-98	32.60			17.54
	50.14	4-Mar-98	31.56			18.58
	50.14	18-Mar-98	31.64			18.5
	50.14	24-Apr-98	31.06			19.08
	50.14	21-May-98	38.20			11.94
	50.14	25-Aug-98	31.00			19.14
	50.14	21-Sep-98	29.86			20.28
	50.14	26-Oct-98	30.12			20.02
	50.14	23-Nov-98	28.38			21.76
	50.14	29-Jan-99	27.61			22.53
	50.14	26-Feb-99	27.69			22.45
	50.14	16-Mar-99	28.00			22.14
	50.14	29-Apr-99	28.21			21.93
	50.14	1-Jun-99	28.20			21.94
	50.14	30-Jul-99	29.80			20.34
	50.14	27-Aug-99	28.41			21.73
	50.14	27-Sep-99	29.20			20.94
	50.14	29-Oct-99	29.78			20.36
	50.14	18-Nov-99	30.17			19.97
	50.14	29-Dec-99	29.09			21.05
	50.14	4-Feb-00	29.66			20.48
	50.14	25-Feb-00	30.32			19.82
	50.14	27-Mar-00	28.91			21.23
	50.14	7-Apr-00	27.40			22.74
	50.14	31-May-00	27.44			22.7
	50.14	1-Jun-00	27.43			22.71
50.14	28-Jul-00	27.45			22.69	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)	
MW-12C	50.14	30-Aug-00	33.61			16.53	
	50.14	19-Sep-00	30.03			20.11	
	50.14	27-Oct-00	33.94			16.2	
	50.14	21-Nov-00	29.12			21.02	
	50.14	1-May-01	26.85			23.29	
	50.14	1-Oct-01	26.85			23.29	
	50.14	11-Mar-02	25.59			24.55	
	50.14	23-Sep-02	26.57			23.57	
	50.14	10-Mar-03	24.85			25.29	
	50.14	23-Sep-03	26.06			24.08	
	50.14	15-Mar-04	24.31			25.83	
	50.14	13-Sep-04	26.15			23.99	
	50.14	18-Jul-05	26.23			23.91	
	50.14	4-Jan-06	22.26			27.88	
	50.14	27-Jul-06	25.28			24.86	
	50.14	7-Mar-07	23.78			26.36	
	50.14	27-Jul-07	22.05			28.09	
	50.14	30-Jan-08	22.69			27.45	
	50.14	15-Jul-08	24.41			25.73	
	50.14	4-Feb-09	24.59			25.55	
	50.14	24-Jul-09	24.91			25.23	
	50.14	8-Jan-10	23.03			27.11	
	50.14	12-Jul-10	23.91			26.23	
	50.14	12-Jan-11	23.76			26.38	
	50.14	12-Jul-11	25.98			24.16	
	50.14	26-Jan-12	25.76			24.38	
	50.14	9-Jul-12	24.59			25.55	
	50.14	7-Jan-13	26.04			24.1	
	50.14	22-Jul-13	27.09			23.05	
	50.14	7-Jan-14	26.52			23.62	
	50.14	16-Jul-14	25.15			24.99	
	MW-13	50.65	25-Mar-97	9.43			41.22
		50.65	23-Apr-97	9.87			40.78
50.65		24-Apr-97	9.92			40.73	
50.65		13-May-97	9.30			41.35	
50.65		20-Jun-97	10.11			40.54	
50.65		25-Sep-97	10.75			39.9	
50.65		22-Oct-97	10.09			40.56	
50.65		25-Nov-97	10.11			40.54	
50.65		19-Dec-97	10.01			40.64	
50.65		20-Jan-98	9.32			41.33	
50.65		4-Mar-98	9.23			41.42	
50.65		18-Mar-98	8.90			41.75	
50.65		24-Apr-98	10.74			39.82	
50.65		21-May-98	12.11			38.54	
50.65		25-Aug-98	12.00			38.56	
50.65		21-Sep-98	10.13			40.43	
50.65		26-Oct-98	11.15			39.41	
50.65		23-Nov-98	9.22			41.34	
50.65		29-Jan-99	8.00			42.65	
50.65		26-Feb-99	8.11			42.54	
50.65		16-Mar-99	9.51			41.14	
50.65		29-Apr-99	9.79			40.86	
50.65		1-Jun-99	9.70			40.95	
50.65		30-Jul-99	11.01			39.64	
50.65		27-Aug-99	9.96			40.69	
50.65		27-Sep-99	12.84			37.81	
50.65		29-Oct-99	13.88			36.77	
50.65		17-Nov-99	14.00			36.65	
50.65		29-Dec-99	13.08			37.57	
50.65		4-Feb-00	15.61			35.04	
50.65		25-Feb-00	12.17			38.48	
50.65		27-Mar-00	10.95			39.7	
50.65		7-Apr-00	10.51			40.14	
50.65	31-May-00	10.57			40.08		
50.65	1-Jun-00	10.51			40.14		
50.65	28-Jul-00	10.54			40.11		
50.65	30-Aug-00	13.63			37.02		
50.65	19-Sep-00	14.57			36.08		
50.65	27-Oct-00	11.11			39.54		
50.65	21-Nov-00	11.44			39.21		
50.65	1-May-01	10.70			39.95		
50.65	1-Oct-01	10.31			40.34		
50.65	11-Mar-02	9.62			41.03		
50.65	23-Sep-02	9.17			41.48		
50.65	10-Mar-03	9.17			41.48		
50.65	23-Sep-03	9.14			41.51		

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-13	50.65	15-Mar-04	9.30			41.35
	50.65	13-Sep-04	11.98			38.67
	50.65	18-Jul-05	10.25			40.4
	50.65	4-Jan-06	12.03			38.62
	50.65	27-Jul-06	8.82			41.83
	50.65	7-Mar-07	9.95			40.7
	50.65	27-Jul-07	8.90			41.75
	50.65	30-Jan-08	8.85			41.8
	50.65	15-Jul-08	10.89			39.76
	50.65	4-Feb-09	10.59			40.06
	50.65	23-Jul-09	11.07			39.58
	50.65	8-Jan-10	9.22			41.43
	50.65	12-Jul-10	11.12			39.53
	50.65	12-Jan-11	8.89			41.76
	50.65	12-Jul-11	12.96			37.69
	50.65	26-Jan-12	9.31			41.34
	50.65	9-Jul-12	9.14			41.51
	50.65	7-Jan-13	10.68			39.97
	50.65	22-Jul-13	12.13			38.52
	50.65	7-Jan-14	10.13			40.52
50.65	16-Jul-14	11.04			39.61	
MW-14	50.66	25-Mar-97	7.71			42.95
	50.66	23-Apr-97	8.31			42.35
	50.66	24-Apr-97	8.34			42.32
	50.66	13-May-97	7.83			42.83
	50.66	20-Jun-97	8.64			42.02
	50.66	25-Sep-97	9.95			40.71
	50.66	22-Oct-97	8.89			41.77
	50.66	25-Nov-97	8.86			41.8
	50.66	19-Dec-97	8.62			42.04
	50.66	20-Jan-98	8.08			42.58
	50.66	4-Mar-98	7.72			42.94
	50.66	18-Mar-98	7.66			43
	50.66	24-Apr-98	9.75			40.91
	50.66	21-May-98	11.00			39.66
	50.66	25-Aug-98	12.00			38.66
	50.66	21-Sep-98	9.41			41.25
	50.66	26-Oct-98	11.10			39.56
	50.66	23-Nov-98	8.08			42.58
	50.66	29-Jan-99	7.10			43.56
	50.66	26-Feb-99	7.21			43.45
	50.66	16-Mar-99	8.74			41.92
	50.66	29-Apr-99	8.93			41.73
	50.66	1-Jun-99	8.92			41.74
	50.66	30-Jul-99	10.44			40.22
	50.66	27-Aug-99	9.21			41.45
	50.66	27-Sep-99	12.56			38.1
	50.66	29-Oct-99	13.56			37.1
	50.66	17-Nov-99	13.63			37.03
	50.66	29-Dec-99	12.88			37.78
	50.66	4-Feb-00	14.22			36.44
	50.66	25-Feb-00	11.73			38.93
	50.66	27-Mar-00	10.54			40.12
	50.66	7-Apr-00	10.14			40.52
	50.66	31-May-00	10.17			40.49
	50.66	1-Jun-00	10.13			40.53
	50.66	28-Jul-00	10.17			40.49
	50.66	30-Aug-00	13.22			37.44
	50.66	19-Sep-00	14.27			36.39
	50.66	27-Oct-00	11.56			39.1
	50.66	21-Nov-00	11.17			39.49
	50.66	1-May-01	9.71			40.95
	50.66	1-Oct-01	10.64			40.02
50.66	11-Mar-02	8.45			42.21	
50.66	23-Sep-02	7.90			42.76	
50.66	10-Mar-03	8.59			42.07	
50.66	23-Sep-03	7.70			42.96	
50.66	15-Mar-04	7.96			42.7	
50.66	13-Sep-04	11.05			39.61	
50.66	18-Jul-05	9.55			41.11	
50.66	4-Jan-06	11.83			38.83	
50.66	27-Jul-06	7.80			42.86	
50.66	7-Mar-07	8.96			41.7	
50.66	27-Jul-07	8.01			42.65	
50.66	30-Jan-08	7.66			43	
50.66	15-Jul-08	10.41			40.25	
50.66	4-Feb-09	10.27			40.39	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-14	50.66	23-Jul-09	10.67			39.99
	50.66	8-Jan-10	8.24			42.42
	50.66	12-Jul-10	10.54			40.12
	50.66	12-Jan-11	18.09			32.57
	50.66	12-Jul-11	12.93			37.73
	50.66	26-Jan-12	8.57			42.09
	50.66	9-Jul-12	8.61			42.05
	50.66	7-Jan-13	10.46			40.2
	50.66	22-Jul-13	11.91			38.75
	50.66	7-Jan-14	9.39			41.27
	50.66	16-Jul-14	10.58			40.08
MW-15A	50.41	25-Mar-97	8.22			42.19
	50.41	23-Apr-97	8.28			42.13
	50.41	24-Apr-97	8.51			41.9
	50.41	13-May-97	8.06			42.35
	50.41	20-Jun-97	8.64			41.77
	50.41	25-Sep-97	9.75			40.66
	50.41	22-Oct-97	9.09			41.32
	50.41	25-Nov-97	9.13			41.28
	50.41	19-Dec-97	8.89			41.52
	50.41	20-Jan-98	8.35			42.06
	50.41	4-Mar-98	8.09			42.32
	50.41	18-Mar-98	7.98			42.43
	50.41	24-Apr-98	9.57			40.84
	50.41	21-May-98	11.10			39.31
	50.41	25-Aug-98	11.78			38.63
	50.41	21-Sep-98	9.59			40.82
	50.41	26-Oct-98	10.69			39.72
	50.41	23-Nov-98	8.46			41.95
	50.41	29-Jan-99	7.11			43.3
	50.41	26-Feb-99	7.23			43.18
	50.41	16-Mar-99	9.17			41.24
	50.41	29-Apr-99	9.29			41.12
	50.41	1-Jun-99	9.29			41.12
	50.41	30-Jul-99	10.83			39.58
	50.41	27-Aug-99	9.39			41.02
	50.41	27-Sep-99	12.02			38.39
	50.41	29-Oct-99	13.11			37.3
	50.41	17-Nov-99	13.44			36.97
	50.41	29-Dec-99	12.49			37.92
	50.41	4-Feb-00	15.71			34.7
	50.41	25-Feb-00	11.34			39.07
	50.41	27-Mar-00	10.66			39.75
	50.41	7-Apr-00	10.20			40.21
	50.41	31-May-00	10.23			40.18
	50.41	1-Jun-00	10.22			40.19
	50.41	28-Jul-00	10.23			40.18
	50.41	30-Aug-00	13.34			37.07
	50.41	19-Sep-00	14.01			36.4
	50.41	27-Oct-00	11.77			38.64
	50.41	21-Nov-00	11.09			39.32
	50.41	1-May-01	9.85			40.56
	50.41	1-Oct-01	9.73			40.68
	50.41	11-Mar-02	8.81			41.6
50.41	23-Sep-02	8.21			42.2	
50.41	10-Mar-03	7.76			42.65	
50.41	23-Sep-03	7.87			42.54	
50.41	15-Mar-04	7.94			42.47	
50.41	13-Sep-04	10.72			39.69	
50.41	18-Jul-05	9.33			41.08	
50.41	4-Jan-06	11.66			38.75	
50.41	27-Jul-06	7.92			42.49	
50.41	7-Mar-07	9.19			41.22	
50.41	27-Jul-07	7.88			42.53	
50.41	30-Jan-08	8.02			42.39	
50.41	15-Jul-08	10.26			40.15	
50.41	4-Feb-09	10.59			39.82	
50.41	23-Jul-09	11.01			39.4	
50.41	8-Jan-10	8.64			41.77	
50.41	12-Jul-10	10.81			39.6	
50.41	12-Jan-11	8.77			41.64	
50.41	12-Jul-11	12.78			37.63	
50.41	26-Jan-12	9.29			41.12	
50.41	9-Jul-12	5.92			44.49	
50.41	7-Jan-13	10.77			39.64	
50.41	22-Jul-13	12.21			38.2	
50.41	7-Jan-14	9.85			40.56	
50.41	16-Jul-14	10.65			39.76	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-15B	50.20	26-Jan-12	10.13			40.07
	50.20	9-Jul-12	8.32			41.88
	50.20	7-Jan-13	10.71			39.49
	50.20	22-Jul-13	11.97			38.23
	50.20	7-Jan-14	9.81			40.39
	50.20	15-Jul-14	10.36			39.84
MW-15C	50.01	13-May-97	33.46			16.55
	50.01	20-Jun-97	34.18			15.83
	50.01	25-Sep-97	33.77			16.24
	50.01	22-Oct-97	32.89			17.12
	50.01	25-Nov-97	32.95			17.06
	50.01	19-Dec-97	32.01			18
	50.01	20-Jan-98	29.90			20.11
	50.01	4-Mar-98	28.56			21.45
	50.01	18-Mar-98	28.53			21.48
	50.01	24-Apr-98	28.46			21.55
	50.01	21-May-98	35.00			15.01
	50.01	25-Aug-98	29.30			20.71
	50.01	21-Sep-98	28.15			21.86
	50.01	26-Oct-98	28.11			21.9
	50.01	23-Nov-98	26.50			23.51
	50.01	29-Jan-99	25.44			24.57
	50.01	26-Feb-99	25.51			24.5
	50.01	16-Mar-99	26.11			23.9
	50.01	29-Apr-99	26.33			23.68
	50.01	1-Jun-99	26.39			23.62
	50.01	30-Jul-99	27.99			22.02
	50.01	27-Aug-99	26.51			23.5
	50.01	27-Sep-99	27.46			22.55
	50.01	29-Oct-99	28.26			21.75
	50.01	17-Nov-99	28.55			21.46
	50.01	29-Dec-99	27.61			22.4
	50.01	4-Feb-00	28.11			21.9
	50.01	25-Feb-00	28.23			21.78
	50.01	27-Mar-00	27.45			22.56
	50.01	7-Apr-00	26.11			23.9
	50.01	31-May-00	26.13			23.88
	50.01	1-Jun-00	26.03			23.98
	50.01	28-Jul-00	26.14			23.87
	50.01	30-Aug-00	29.11			20.9
	50.01	19-Sep-00	28.67			21.34
	50.01	27-Oct-00	27.64			22.37
	50.01	21-Nov-00	27.56			22.45
	50.01	1-May-01	25.24			24.77
	50.01	1-Oct-01	25.40			24.61
	50.01	11-Mar-02	24.17			25.84
	50.01	23-Sep-02	25.35			24.66
	50.01	10-Mar-03	23.52			26.49
	50.01	23-Sep-03	24.88			25.13
	50.01	15-Mar-04	22.97			27.04
	50.01	13-Sep-04	24.80			25.21
	50.01	18-Jul-05	25.17			24.84
	50.01	4-Jan-06	26.23			23.78
50.01	27-Jul-06	24.31			25.7	
50.01	7-Mar-07	22.76			27.25	
50.01	27-Jul-07	21.03			28.98	
50.01	30-Jan-08	21.80			28.21	
50.01	15-Jul-08	23.63			26.38	
50.01	4-Feb-09	23.73			26.28	
50.01	23-Jul-09	23.96			26.05	
50.01	8-Jan-10	21.88			28.13	
50.01	12-Jul-10	23.08			26.93	
50.01	12-Jan-11	23.04			26.97	
50.01	12-Jul-11	25.09			24.92	
50.01	26-Jan-12	24.37			25.64	
50.01	9-Jul-12	24.41			25.6	
50.01	7-Jan-13	25.21			24.8	
50.01	22-Jul-13	26.10			23.91	
50.01	7-Jan-14	25.26			24.75	
50.01	16-Jul-14	24.15			25.86	
MW-16	51.51	25-Mar-97	7.41			44.1
	51.51	23-Apr-97	8.44			43.07
	51.51	24-Apr-97	8.52			42.99
	51.51	13-May-97	8.29			43.22
	51.51	20-Jun-97	8.41			43.1
	51.51	25-Sep-97	10.71			40.8
	51.51	22-Oct-97	9.53			41.98
	51.51	25-Nov-97	9.55			41.96

**TABLE VLD  
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UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-16	51.51	19-Dec-97	9.10			42.41
	51.51	20-Jan-98	8.60			42.91
	51.51	4-Mar-98	8.13			43.38
	51.51	18-Mar-98	8.59			42.92
	51.51	24-Apr-98	9.96			41.55
	51.51	21-May-98	11.43			40.08
	51.51	30-Jul-98	12.56			38.95
	51.51	25-Aug-98	11.53			39.98
	51.51	21-Sep-98	9.81			41.7
	51.51	26-Oct-98	10.44			41.07
	51.51	23-Nov-98	8.98			42.53
	51.51	29-Jan-99	7.12			44.39
	51.51	26-Feb-99	7.23			44.28
	51.51	16-Mar-99	10.06			41.45
	51.51	29-Apr-99	10.16			41.35
	51.51	1-Jun-99	10.16			41.35
	51.51	30-Jul-99	11.76			39.75
	51.51	27-Aug-99	10.33			41.18
	51.51	27-Sep-99	11.79			39.72
	51.51	29-Oct-99	12.93			38.58
	51.51	17-Nov-99	13.71			37.8
	51.51	29-Dec-99	12.20			39.31
	51.51	4-Feb-00	15.11			36.4
	51.51	25-Feb-00	11.10			40.41
	51.51	27-Mar-00	11.48			40.03
	51.51	7-Apr-00	11.09			40.42
	51.51	31-May-00	11.11			40.4
	51.51	1-Jun-00	11.00			40.51
	51.51	28-Jul-00	11.11			40.4
	51.51	30-Aug-00	13.10			38.41
	51.51	19-Sep-00	14.83			36.68
	51.51	27-Oct-00	11.66			39.85
	51.51	21-Nov-00	11.29			40.22
	51.51	1-May-01	9.92			41.59
	51.51	1-Oct-01	9.93			41.58
	51.51	11-Mar-02	9.12			42.39
	51.51	23-Sep-02	8.65			42.86
	51.51	10-Mar-03	7.74			43.77
	51.51	23-Sep-03	8.48			43.03
	51.51	15-Mar-04	8.09			43.42
	51.51	13-Sep-04	10.38			41.13
	51.51	18-Jul-05	10.42			41.09
	51.51	4-Jan-06	12.48			39.03
	51.51	27-Jul-06	9.37			42.14
	51.51	7-Mar-07	9.66			41.85
	51.51	27-Jul-07	7.85			43.66
	51.51	31-Jan-08	8.42	25.40	3.40	43.09
	51.51	15-Jul-08	10.16			41.35
	51.51	5-Feb-09	11.93			39.58
	51.51	23-Jul-09	12.67			38.84
	51.51	8-Jan-10	8.66			42.85
	51.51	12-Jul-10	10.31			41.2
	51.51	12-Jan-11	9.89			41.62
	51.51	12-Jul-11	12.98			38.53
	51.51	26-Jan-12	9.92			41.59
	51.51	9-Jul-12	9.68			41.83
	51.51	7-Jan-13	11.41			40.1
	51.51	22-Jul-13	12.39			39.12
	51.51	7-Jan-14	12.02			39.49
	51.51	15-Jul-14	9.69			41.82
MW-17	50.92	25-Mar-97	9.97			40.95
	50.92	23-Apr-97	10.41			40.51
	50.92	24-Apr-97	10.51			40.41
	50.92	13-May-97	10.32			40.6
	50.92	20-Jun-97	11.07			39.85
	50.92	25-Sep-97	12.39			38.53
	50.92	22-Oct-97	11.19			39.73
	50.92	25-Nov-97	11.21			39.71
	50.92	19-Dec-97	11.01			39.91
	50.92	20-Jan-98	10.25			40.67
	50.92	4-Mar-98	9.93			40.99
	50.92	18-Mar-98	9.94			40.98
	50.92	9-Apr-98	11.32			39.6
	50.92	16-Apr-98	11.52			39.4
	50.92	24-Apr-98	11.80			39.12
	50.92	8-May-98	NM			NM
	50.92	12-May-98	NM			NM

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HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-17	50.92	21-May-98	13.30			37.62
	50.92	25-May-98	NM			NM
	50.92	9-Jun-98	NM			NM
	50.92	16-Jun-98	NM			NM
	50.92	26-Jun-98	NM			NM
	50.92	2-Jul-98	NM			NM
	50.92	10-Jul-98	NM			NM
	50.92	14-Jul-98	NM			NM
	50.92	23-Jul-98	NM			NM
	50.92	5-Aug-98	NM			NM
	50.92	13-Aug-98	NM			NM
	50.92	25-Aug-98	13.78			37.14
	50.92	15-Sep-98	NM			NM
	50.92	21-Sep-98	11.49			39.43
	50.92	30-Sep-98	NM			NM
	50.92	8-Oct-98	NM			NM
	50.92	16-Oct-98	NM			NM
	50.92	26-Oct-98	12.22			38.7
	50.92	6-Nov-98	NM			NM
	50.92	13-Nov-98	NM			NM
	50.92	19-Nov-98	NM			NM
	50.92	23-Nov-98	10.21			40.71
	50.92	16-Dec-98	NM			NM
	50.92	7-Jan-99	NM			NM
	50.92	15-Jan-99	NM			NM
	50.92	22-Jan-99	NM			NM
	50.92	26-Jan-99	NM			NM
	50.92	29-Jan-99	10.88			40.04
	50.92	4-Feb-99	NM			NM
	50.92	9-Feb-99	NM			NM
	50.92	26-Feb-99	10.93			39.99
	50.92	16-Mar-99	11.18			39.74
	50.92	29-Apr-99	11.00			39.92
	50.92	21-May-99	11.25			39.67
	50.92	27-May-99	11.31			39.61
	50.92	1-Jun-99	11.07			39.85
	50.92	10-Jun-99	11.28			39.64
	50.92	30-Jul-99	12.67			38.25
	50.92	27-Aug-99	11.27			39.65
	50.92	27-Sep-99	14.67			36.25
	50.92	29-Oct-99	15.11			35.81
	50.92	17-Nov-99	16.08			34.84
	50.92	29-Dec-99	14.43			36.49
	50.92	4-Feb-00	17.21			33.71
	50.92	25-Feb-00	13.63			37.29
	50.92	27-Mar-00	13.08	32.60	0.70	37.84
	50.92	7-Apr-00	12.63	32.30	1.00	38.29
	50.92	31-May-00	12.67	32.30	1.00	38.25
	50.92	1-Jun-00	12.61	32.30	1.00	38.31
	50.92	28-Jul-00	12.69	32.30	1.00	38.23
	50.92	30-Aug-00	15.56			35.36
	50.92	19-Sep-00	16.24	32.20	1.10	34.68
	50.92	27-Oct-00	14.10			36.82
	50.92	21-Nov-00	13.12			37.8
	50.92	1-May-01	11.82	32.44	0.86	39.1
	50.92	1-Oct-01	12.55	32.30	1.00	38.37
	50.92	14-Mar-02	10.91	31.79	1.51	40.01
	50.92	23-Sep-02	10.48			40.44
	50.92	10-Mar-03	9.76			41.16
	50.92	24-Sep-03	10.59	32.85	0.45	40.33
	50.92	15-Mar-04	10.15			40.77
	50.92	13-Sep-04	13.09			37.83
	50.92	18-Jul-05	12.06	32.90	0.40	38.86
	50.92	4-Jan-06	13.90	32.90	0.40	37.02
	50.92	27-Jul-06	10.71	33.28	0.02	40.21
	50.92	7-Mar-07	10.91	33.00	0.30	40.01
	50.92	27-Jul-07	9.33	33.02	0.28	41.59
	50.92	31-Jan-08	10.00	31.17	2.13	40.92
	50.92	15-Jul-08	12.95	33.08	0.23	37.97
	50.92	4-Feb-09	12.64	Trace	Trace	38.28
	50.92	12-Jul-10	12.96			37.96
	50.92	8-Jan-10	10.62			40.3
	50.92	12-Jul-10	12.96			37.96
	50.92	12-Jan-11	11.06			39.86
	50.92	12-Jul-11	14.93			35.99
	50.92	26-Jan-12	11.2			39.72



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HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-17	50.92	9-Jul-12	11.02			39.9
	50.92	7-Jan-13	13.14			37.78
	50.92	22-Jul-13	14.62			36.3
	50.92	7-Jan-14	12.36			38.56
	50.92	15-Jul-14	12.54			38.38
MW-17C	50.17	15-Mar-04	22.75			27.42
	50.17	13-Sep-04	24.56			25.61
	50.17	18-Jul-05	25.02			25.15
	50.17	4-Jan-06	26.07			24.1
	50.17	27-Jul-06	24.15			26.02
	50.17	7-Mar-07	22.51			27.66
	50.17	27-Jul-07	20.93			29.24
	50.17	30-Jan-08	21.74			28.43
	50.17	15-Jul-08	23.65			26.52
	50.17	4-Feb-09	23.72			26.45
	50.17	23-Jul-09	24.08			26.09
	50.17	8-Jan-10	21.98			28.19
	50.17	12-Jul-10	23.03			27.14
	50.17	12-Jan-11	23.16			27.01
	50.17	12-Jul-11	25.11			25.06
	50.17	26-Jan-12	24.27			25.9
	50.17	9-Jul-12	24.32			25.85
	50.17	7-Jan-13	24.76			25.41
	50.17	22-Jul-13	25.89			24.28
	50.17	7-Jan-14	25.06			25.11
50.17	15-Jul-14	23.98			26.19	
MW-18A	51.57	25-Mar-97	15.41			36.16
	51.57	23-Apr-97	15.80			35.77
	51.57	13-May-97	14.92			36.65
	51.57	20-Jun-97	16.02			35.55
	51.57	25-Sep-97	15.15			36.42
	51.57	22-Oct-97	16.38			35.19
	51.57	25-Nov-97	16.37			35.2
	51.57	19-Dec-97	16.11			35.46
	51.57	20-Jan-98	15.49			36.08
	51.57	4-Mar-98	15.19			36.38
	51.57	18-Mar-98	14.28			37.29
	51.57	24-Apr-98	17.53			34.04
	51.57	21-May-98	18.41			33.16
	51.57	30-Jul-98	18.59			32.98
	51.57	25-Aug-98	16.95			34.62
	51.57	21-Sep-98	16.39			35.18
	51.57	26-Oct-98	15.77			35.8
	51.57	23-Nov-98	16.26			35.31
	51.57	29-Jan-99	17.02			34.55
	51.57	26-Feb-99	17.11			34.46
	51.57	29-Apr-99	16.01			35.56
	51.57	1-Jun-99	16.11			35.46
	51.57	30-Jul-99	17.55			34.02
	51.57	27-Aug-99	16.39			35.18
	51.57	27-Sep-99	19.13			32.44
	51.57	29-Oct-99	20.50			31.07
	51.57	17-Nov-99	21.63			29.94
	51.57	29-Dec-99	19.83			31.74
	51.57	4-Feb-00	23.71			27.86
	51.57	25-Feb-00	18.80			32.77
	51.57	27-Mar-00	17.98			33.59
	51.57	7-Apr-00	17.61			33.96
	51.57	31-May-00	17.65			33.92
	51.57	1-Jun-00	17.60			33.97
	51.57	28-Jul-00	17.67			33.9
	51.57	30-Aug-00	20.30			31.27
	51.57	19-Sep-00	19.54			32.03
	51.57	27-Oct-00	18.75			32.82
	51.57	21-Nov-00	16.52			35.05
	51.57	1-May-01	17.91	27.85	7.94	33.66
51.57	1-Oct-01	17.47			34.1	
51.57	11-Mar-02	16.68			34.89	
51.57	23-Sep-02	15.30			36.27	
51.57	10-Mar-03	15.77			35.8	
51.57	23-Sep-03	25.08			26.49	
51.57	15-Mar-04	15.58			35.99	
51.57	13-Sep-04	18.32			33.25	
51.57	18-Jul-05	14.88			36.69	
51.57	4-Jan-06	17.96			33.61	
51.57	27-Jul-06	14.15			37.42	
51.57	7-Mar-07	17.32			34.25	
51.57	27-Jul-07	15.22			36.35	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-18A	51.57	30-Jan-08	15.63			35.94
	51.57	15-Jul-08	17.43			34.14
	51.57	5-Feb-09	18.67			32.9
	51.57	23-Jul-09	19.03			32.54
	51.57	8-Jan-10	16.51			35.06
	51.57	12-Jul-10	18.11			33.46
	51.57	12-Jan-11	15.82			35.75
	51.57	12-Jul-11	19.02			32.55
	51.57	26-Jan-12	16.9			34.67
	51.57	9-Jul-12	15.06			36.51
	51.57	7-Jan-13	18.39			33.18
	51.57	22-Jul-13	18.74			32.83
	51.57	7-Jan-14	18.06			33.51
	51.57	16-Jul-14	18.14			33.43
	MW-18C	51.47	13-May-97	29.45		
51.47		20-Jun-97	30.37			21.1
51.47		25-Sep-97	31.53			19.94
51.47		22-Oct-97	30.71			20.76
51.47		25-Nov-97	30.75			20.72
51.47		19-Dec-97	30.10			21.37
51.47		20-Jan-98	28.30			23.17
51.47		4-Mar-98	27.03			24.44
51.47		18-Mar-98	26.81			24.66
51.47		9-Apr-98	27.04			24.43
51.47		16-Apr-98	27.03			24.44
51.47		24-Apr-98	27.25			24.22
51.47		8-May-98	NM			NM
51.47		12-May-98	NM			NM
51.47		21-May-98	27.68			23.79
51.47		25-May-98	NM			NM
51.47		9-Jun-98	NM			NM
51.47		16-Jun-98	NM			NM
51.47		26-Jun-98	NM			NM
51.47		2-Jul-98	NM			NM
51.47		10-Jul-98	NM			NM
51.47		14-Jul-98	NM			NM
51.47		23-Jul-98	NM			NM
51.47		30-Jul-98	28.40			23.07
51.47		5-Aug-98	NM			NM
51.47		13-Aug-98	NM			NM
51.47		25-Aug-98	28.88			22.59
51.47		15-Sep-98	NM			NM
51.47		21-Sep-98	27.94			23.53
51.47		30-Sep-98	NM			NM
51.47		8-Oct-98	NM			NM
51.47		16-Oct-98	NM			NM
51.47		26-Oct-98	27.62			23.85
51.47		6-Nov-98	NM			NM
51.47		11-Nov-98	26.85		0.67	24.62
51.47		19-Nov-98	NM			NM
51.47		23-Nov-98	26.21			25.26
51.47		16-Dec-98	NM			NM
51.47		7-Jan-99	NM			NM
51.47		15-Jan-99	NM			NM
51.47		22-Jan-99	NM			NM
51.47		26-Jan-99	NM			NM
51.47		29-Jan-99	25.36			26.11
51.47		4-Feb-99	NM			NM
51.47		9-Feb-99	NM			NM
51.47	26-Feb-99	25.41			26.06	
51.47	29-Apr-99	26.33			25.14	
51.47	21-May-99	25.75			25.72	
51.47	27-May-99	25.76			25.71	
51.47	1-Jun-99	26.38			25.09	
51.47	10-Jun-99	25.68			25.79	
51.47	30-Jul-99	25.61			25.86	
51.47	27-Aug-99	26.51			24.96	
51.47	27-Sep-99	27.28			24.19	
51.47	29-Oct-99	27.95			23.52	
51.47	17-Nov-99	28.42			23.05	
51.47	29-Dec-99	27.26			24.21	
51.47	4-Feb-00	27.84			23.63	
51.47	25-Feb-00	27.83			23.64	
51.47	27-Mar-00	27.48			23.99	
51.47	7-Apr-00	25.80			25.67	
51.47	31-May-00	25.83			25.64	
51.47	1-Jun-00	25.81			25.66	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-18C	51.47	28-Jul-00	25.86			25.61
	51.47	30-Aug-00	28.42			23.05
	51.47	19-Sep-00	28.77	80.44	0.97	22.7
	51.47	27-Oct-00	28.69			22.78
	51.47	21-Nov-00	27.67			23.8
	51.47	1-May-01	25.20			26.27
	51.47	1-Oct-01	25.59			25.8
	51.47	14-Mar-02	24.35			27.12
	51.47	25-Sep-02	25.45			26.02
	51.47	10-Mar-03	23.60			27.87
	51.47	24-Sep-03	25.15			26.32
	51.47	15-Mar-04	24.23			27.24
	51.47	13-Sep-04	25.12	78.22	1.70	26.35
	51.47	18-Jul-05	25.50	66.20	0.30	25.97
	51.47	4-Jan-06	26.71			24.76
	51.47	27-Jul-06	24.80			26.67
	51.47	7-Mar-07	23.11			28.36
	51.47	27-Jul-07	24.80			26.67
	51.47	30-Jan-08	22.64			28.83
	51.47	15-Jul-08	24.43			27.04
	51.47	5-Feb-09	24.34			27.13
	51.47	23-Jul-09	24.61			26.86
	51.47	8-Jan-10	22.56			28.91
	51.47	12-Jul-10	23.77			27.7
	51.47	12-Jul-11	25.87			25.6
	51.47	26-Jan-12	26.82			24.65
	51.47	12-Jan-11	24.03			27.44
	51.47	9-Jul-12	24.82			26.65
	51.47	7-Jan-13	25.61			25.86
	51.47	22-Jul-13	26.76			24.71
51.47	7-Jan-14	25.68			25.79	
51.47	16-Jul-14	24.60			26.87	
MW-19C	53.05	23-Nov-98	28.84			24.21
	53.05	29-Jan-99	28.21			24.84
	53.05	26-Feb-99	28.28			24.77
	53.05	16-Mar-99	28.31			24.74
	53.05	29-Apr-99	28.56			24.49
	53.05	1-Jun-99	28.48			24.57
	53.05	30-Jul-99	30.00			23.05
	53.05	27-Aug-99	28.61			24.44
	53.05	27-Sep-99	29.72			23.33
	53.05	29-Oct-99	30.46			22.59
	53.05	17-Nov-99	30.76			22.29
	53.05	29-Dec-99	29.44			23.61
	53.05	4-Feb-00	30.22			22.83
	53.05	25-Feb-00	29.93			23.12
	53.05	27-Mar-00	29.80			23.25
	53.05	7-Apr-00	28.40			24.65
	53.05	31-May-00	28.44			24.61
	53.05	1-Jun-00	28.33			24.72
	53.05	28-Jul-00	28.37			24.68
	53.05	30-Aug-00	29.99			23.06
	53.05	19-Sep-00	30.97			22.08
	53.05	27-Oct-00	28.49			24.56
	53.05	21-Nov-00	29.88			23.17
	53.05	1-May-01	27.61	71.55	3.56	25.44
	53.05	1-Oct-01	27.84			25.21
	53.05	11-Mar-02	26.68			26.37
	53.05	23-Sep-02	27.66			25.39
	53.05	10-Mar-03	25.77			27.28
	53.05	23-Sep-03	27.21			25.84
	53.05	15-Mar-04	25.36			27.69
53.05	13-Sep-04	27.20			25.85	
53.05	18-Jul-05	27.71			25.34	
53.05	4-Jan-06	28.78			24.27	
53.05	27-Jul-06	26.91			26.14	
53.05	7-Mar-07	25.22			27.83	
53.05	27-Jul-07	23.71			29.34	
53.05	31-Jan-08	24.57			28.48	
53.05	15-Jul-08	26.38			26.67	
53.05	4-Feb-09	26.44			26.61	
53.05	23-Jul-09	26.81			26.24	
53.05	9-Jan-10	24.47			28.58	
53.05	12-Jul-10	25.67			27.38	
53.05	12-Jan-11	25.86			27.19	
53.05	12-Jul-11	27.81			25.24	
53.05	26-Jan-12	26.74			26.31	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-19C	53.05	9-Jul-12	27.26			25.79
	53.05	7-Jan-13	27.73			25.32
	53.05	22-Jul-13	28.58			24.47
	53.05	7-Jan-14	27.71			25.34
	53.05	15-Jul-14	26.65			26.40
MW-20A	50.43	23-Nov-98	8.31			42.116
	50.43	29-Jan-99	8.70			41.726
	50.43	26-Feb-99	8.81			41.616
	50.43	16-Mar-99	9.26			41.166
	50.43	29-Apr-99	9.33			41.096
	50.43	1-Jun-99	9.30			41.126
	50.43	30-Jul-99	10.91			39.516
	50.43	27-Aug-99	9.56			40.866
	50.43	27-Sep-99	10.79			39.636
	50.43	29-Oct-99	11.96			38.466
	50.43	17-Nov-99	13.06			37.366
	50.43	29-Dec-99	11.11			39.316
	50.43	4-Feb-00	14.89			35.536
	50.43	25-Feb-00	10.33			40.096
	50.43	27-Mar-00	10.79			39.636
	50.43	7-Apr-00	10.41			40.016
	50.43	31-May-00	10.46			39.966
	50.43	1-Jun-00	10.41			40.016
	50.43	28-Jul-00	10.47			39.956
	50.43	30-Aug-00	12.56			37.866
	50.43	19-Sep-00	13.68			36.746
	50.43	27-Oct-00	11.01			39.416
	50.43	21-Nov-00	10.64			39.786
	50.43	1-May-01	9.40			41.03
	50.43	1-Oct-01	10.42			40.01
	50.43	11-Mar-02	8.59			41.836
	50.43	23-Sep-02	8.51			41.916
	50.43	10-Mar-03	7.42			43.006
	50.43	23-Sep-03	7.95			42.476
	50.43	15-Mar-04	7.72			42.706
	50.43	13-Sep-04	10.22			40.206
	50.43	18-Jul-05	9.88			40.546
	50.43	4-Jan-06	11.72			38.706
	50.43	27-Jul-06	8.59			41.836
50.43	7-Mar-07	8.91			41.516	
50.43	27-Jul-07	7.63			42.796	
50.43	30-Jan-08	7.91			42.516	
50.43	15-Jul-08	10.05			40.376	
50.43	4-Feb-09	10.18			40.246	
50.43	23-Jul-09	10.47			39.956	
50.43	9-Jan-10	8.23			42.196	
50.43	12-Jul-10	10.62			39.806	
50.43	12-Jan-11	8.76			41.666	
50.43	12-Jul-11	12.53			37.896	
50.43	26-Jan-12	11.61			38.816	
50.43	9-Jul-12	9.18			41.246	
50.43	7-Jan-13	10.66			39.766	
50.43	22-Jul-13	12.17			38.256	
50.43	7-Jan-14	11.62			38.806	
50.43	15-Jul-14	9.83			40.60	
MW-21C	49.05	23-Nov-98	27.83			21.223
	49.05	29-Jan-99	27.11			21.943
	49.05	26-Feb-99	27.26			21.793
	49.05	16-Mar-99	27.42			21.633
	49.05	29-Apr-99	27.99			21.063
	49.05	1-Jun-99	27.80			21.253
	49.05	30-Jul-99	29.00			20.053
	49.05	27-Aug-99	27.99			21.063
	49.05	27-Sep-99	28.43			20.623
	49.05	29-Oct-99	29.12			19.933
	49.05	18-Nov-99	29.25			19.803
	49.05	29-Dec-99	10.89			38.163
	49.05	4-Feb-00	28.94			20.113
	49.05	25-Feb-00	11.43			37.623
	49.05	27-Mar-00	28.13			20.923
	49.05	7-Apr-00	26.79			22.263
	49.05	31-May-00	26.83			22.223
	49.05	1-Jun-00	26.83			22.223
	49.05	28-Jul-00	26.88			22.173
	49.05	30-Aug-00	29.91			19.143
49.05	19-Sep-00	29.15			19.903	
49.05	27-Oct-00	30.21			18.843	
49.05	21-Nov-00	28.33			20.723	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-21C	49.05	1-May-01	26.01			23.04
	49.05	1-Oct-01	26.05			23
	49.05	11-Mar-02	24.80			24.253
	49.05	23-Sep-02	25.50			23.553
	49.05	10-Mar-03	23.82			25.233
	49.05	23-Sep-03	25.08			23.973
	49.05	15-Mar-04	23.48			25.573
	49.05	13-Sep-04	25.44			23.613
	49.05	18-Jul-05	25.33			23.723
	49.05	4-Jan-06	26.44			22.613
	49.05	27-Jul-06	24.55			24.503
	49.05	7-Mar-07	22.91			26.143
	49.05	27-Jul-07	21.29			27.763
	49.05	29-Jan-08	22.09			26.963
	49.05	15-Jul-08	23.31			25.743
	49.05	4-Feb-09	24.03			25.023
	49.05	24-Jul-09	24.29			24.763
	49.05	9-Jan-10	21.89			27.163
	49.05	12-Jul-10	23.01			26.043
	49.05	12-Jan-11	23.21			25.843
	49.05	12-Jul-11	25.09			23.963
	49.05	26-Jan-12	24.48			24.573
	49.05	9-Jul-12	23.39			25.663
	49.05	7-Jan-13	25.17			23.883
	49.05	22-Jul-13	26.49			22.563
	49.05	7-Jan-14	25.94			23.113
49.05	15-Jul-14	24.61			24.44	
MW-22A	46.07	23-Nov-98	NM			NM
	46.07	29-Jan-99	2.10			43.969
	46.07	26-Feb-99	2.21			43.859
	46.07	16-Mar-99	2.65			43.419
	46.07	29-Apr-99	2.71			43.359
	46.07	1-Jun-99	2.68			43.389
	46.07	30-Jul-99	4.12			41.949
	46.07	27-Aug-99	2.81			43.259
	46.07	27-Sep-99	8.53			37.539
	46.07	29-Oct-99	10.23			35.839
	46.07	18-Nov-99	9.92			36.149
	46.07	29-Dec-99	9.56			36.509
	46.07	4-Feb-00	12.31			33.759
	46.07	25-Feb-00	8.72			37.349
	46.07	27-Mar-00	6.30			39.769
	46.07	7-Apr-00	6.03			40.039
	46.07	31-May-00	6.12			39.949
	46.07	1-Jun-00	6.00			40.069
	46.07	28-Jul-00	6.13			39.939
	46.07	30-Aug-00	9.09			36.979
	46.07	19-Sep-00	10.12			35.949
	46.07	27-Oct-00	8.64			37.429
	46.07	21-Nov-00	7.69			38.379
	46.07	1-May-01	5.15			40.92
	46.07	1-Oct-01	5.49			40.58
	46.07	11-Mar-02	2.34			43.729
	46.07	23-Sep-02	2.11			43.959
	46.07	10-Mar-03	1.68			44.389
	46.07	23-Sep-03	2.30			43.769
	46.07	15-Mar-04	2.05			44.019
	46.07	14-Sep-04	6.89			39.179
	46.07	18-Jul-05	3.65			42.419
	46.07	6-Jan-06	7.29			38.779
	46.07	27-Jul-06	1.65			44.419
46.07	7-Mar-07	NM			NM	
46.07	27-Jul-07	2.84			43.229	
46.07	29-Jan-08	1.05			45.019	
46.07	14-Jul-08	5.33			40.739	
46.07	3-Feb-09	5.24			40.829	
46.07	23-Jul-09	5.91			40.159	
46.07	9-Jan-10	1.32			44.749	
46.07	12-Jul-10	6.52			39.549	
46.07	12-Jan-11	3.21			42.859	
46.07	11-Jul-11	8.39			37.679	
46.07	27-Jan-12	0.98			45.089	
46.07	10-Jul-12	1.74		63.88	44.326	
46.07	8-Jan-13	3.09			42.979	
46.07	22-Jul-13	NM			NM	
46.07	7-Jan-14	3.81			42.259	
46.07	15-Jul-14	3.22			42.85	

**TABLE VLD  
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UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-22B	45.86	23-Nov-98	2.25			43.606
	45.86	29-Jan-99	2.28			43.576
	45.86	26-Feb-99	2.34			43.516
	45.86	16-Mar-99	2.42			43.436
	45.86	29-Apr-99	2.56			43.296
	45.86	1-Jun-99	2.60			43.256
	45.86	30-Jul-99	4.31			41.546
	45.86	27-Aug-99	2.83			43.026
	45.86	27-Sep-99	8.45			37.406
	45.86	29-Oct-99	10.11			35.746
	45.86	18-Nov-99	9.75			36.106
	45.86	29-Dec-99	9.43			36.426
	45.86	4-Feb-00	12.56			33.296
	45.86	25-Feb-00	8.63			37.226
	45.86	27-Mar-00	6.00			39.856
	45.86	7-Apr-00	5.64			40.216
	45.86	31-May-00	5.69			40.166
	45.86	1-Jun-00	5.61			40.246
	45.86	28-Jul-00	5.67			40.186
	45.86	30-Aug-00	8.57			37.286
	45.86	19-Sep-00	9.94			35.916
	45.86	27-Oct-00	7.03			38.826
	45.86	21-Nov-00	7.63			38.226
	45.86	1-May-01	4.93			40.93
	45.86	1-Oct-01	5.40			40.46
	45.86	11-Mar-02	1.75			44.106
	45.86	23-Sep-02	2.11			43.746
	45.86	10-Mar-03	1.02			44.836
	45.86	23-Sep-03	2.99			42.866
	45.86	15-Mar-04	1.20			44.656
	45.86	14-Sep-04	NM			NM
	45.86	18-Jul-05	NM			NM
	45.86	6-Jan-06	7.05			38.806
	45.86	27-Jul-06	1.58			44.276
	45.86	7-Mar-07	NM			NM
	45.86	27-Jul-07	2.85			43.006
	45.86	29-Jan-08	0.85			45.006
	45.86	14-Jul-08	5.45			40.406
	45.86	3-Feb-09	4.78			41.076
	45.86	23-Jul-09	5.39			40.466
	45.86	9-Jan-10	3.27			42.586
	45.86	12-Jul-10	6.21			39.646
	45.86	12-Jan-11	0.37			45.486
	45.86	11-Jul-11	8.32			37.536
	45.86	27-Jan-12	0.06			45.796
	45.86	10-Jul-12	1.27			44.586
	45.86	8-Jan-13	NM			NM
45.86	22-Jul-13	NM			NM	
45.86	7-Jan-14	4.14			41.716	
45.86	15-Jul-14	3.79			42.07	
MW-23C	51.91	23-Nov-98	27.41			24.504
	51.91	29-Jan-99	26.80			25.114
	51.91	26-Feb-99	26.88			25.034
	51.91	16-Mar-99	26.93			24.984
	51.91	29-Apr-99	27.09			24.824
	51.91	1-Jun-99	27.00			24.914
	51.91	30-Jul-99	29.55			22.364
	51.91	27-Aug-99	27.29			24.624
	51.91	27-Sep-99	28.40			23.514
	51.91	29-Oct-99	29.11			22.804
	51.91	17-Nov-99	29.49			22.424
	51.91	29-Dec-99	28.46			23.454
	51.91	4-Feb-00	28.96			22.954
	51.91	25-Feb-00	28.96			22.954
	51.91	27-Mar-00	28.61			23.304
	51.91	7-Apr-00	27.10			24.814
	51.91	31-May-00	27.15			24.764
	51.91	1-Jun-00	27.11			24.804
	51.91	28-Jul-00	27.15			24.764
	51.91	30-Aug-00	29.96			21.954
	51.91	19-Sep-00	29.77			22.144
	51.91	27-Oct-00	28.44			23.474
	51.91	21-Nov-00	28.61			23.304
51.91	1-May-01	26.26			25.65	
51.91	1-Oct-01	26.50			25.41	
51.91	11-Mar-02	25.33		0.60	26.584	
51.91	23-Sep-02	26.43			25.484	
51.91	10-Mar-03	24.53			27.384	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-23C	51.91	23-Sep-03	25.95			25.964
	51.91	15-Mar-04	24.15			27.764
	51.91	13-Sep-04	25.97			25.944
	51.91	18-Jul-05	26.46			25.454
	51.91	4-Jan-06	27.53			24.384
	51.91	7-Mar-07	23.96			27.954
	51.91	27-Jul-07	22.41			29.504
	51.91	31-Jan-08	23.22	75.98	1.71	28.694
	48.89 <sup>1</sup>	4-Feb-09	22.11	72.05	1.47	26.78
	48.89 <sup>1</sup>	23-Jul-09	22.93	73.01	0.51	25.961
	48.89 <sup>1</sup>	9-Jan-10	20.29	71.8	1.72	28.601
	48.89 <sup>1</sup>	27-May-10	22.81	71.5	2.02	26.081
	48.89 <sup>1</sup>	28-Jun-10	22.93	72.15	1.37	25.961
	48.89 <sup>1</sup>	12-Jul-10	21.41	72.4	1.12	27.481
	48.89 <sup>1</sup>	31-Aug-10	21.61	72.65	0.87	27.281
	48.89 <sup>1</sup>	12-Jan-11	21.7	71.25	1.45	27.191
	48.89	12-Jul-11	23.11	70.65	2.05	25.782
	48.89	26-Jan-12	22.81	71.57	1.13	26.082
	48.89	9-Jul-12	22.31	71.45	1.25	26.582
	48.89	7-Jan-13	23.32	71.06	1.64	25.572
48.89	22-Jul-13	24.38			24.512	
48.89	7-Jan-14	23.51	70.8	2.30	25.382	
48.89	15-Jul-14	24.06	70.96	2.14	24.83	
MW-24A	45.79	27-Mar-00	7.87			37.92
	45.79	7-Apr-00	7.63			38.16
	45.79	31-May-00	7.65			38.14
	45.79	1-Jun-00	7.43			38.36
	45.79	28-Jul-00	7.60			38.19
	45.79	30-Aug-00	10.44			35.35
	45.79	19-Sep-00	10.57			35.22
	45.79	27-Oct-00	NM			NM
	45.79	21-Nov-00	7.09			38.7
	45.79	1-May-01	6.72			39.07
	45.79	1-Oct-01	7.81			37.98
	45.79	11-Mar-02	3.91			41.88
	45.79	23-Sep-02	5.04			40.75
	45.79	10-Mar-03	2.76			43.03
	45.79	23-Sep-03	4.66			41.13
	45.79	15-Mar-04	3.10			42.69
	45.79	14-Sep-04	8.24			37.55
	45.79	18-Jul-05	6.03			39.76
	45.79	6-Jan-06	8.93			36.86
	45.79	27-Jul-06	4.21			41.58
45.79	7-Mar-07	3.86			41.93	
45.79	30-Jan-08	NM			NM	
MW-24AR	45.65	5-Feb-09	5.18			40.47
	45.65	23-Jul-09	7.36			38.29
	45.65	9-Jan-10	3.72			41.93
	45.65	12-Jul-10	4.29			41.36
	45.65	13-Jan-11	3.58			42.07
	45.65	11-Jul-11	6.38			39.27
	45.65	27-Jan-12	4.59			41.06
	45.65	10-Jul-12	4.38			41.27
	45.65	8-Jan-13	5.59			40.06
	45.65	23-Jul-13	10.14	71.06		35.51
45.65	8-Jan-14	7.11			38.54	
MW-24B	46.06	27-Mar-00	11.91			34.15
	46.06	7-Apr-00	11.60			34.46
	46.06	31-May-00	11.63			34.43
	46.06	1-Jun-00	11.51			34.55
	46.06	28-Jul-00	11.69			34.37
	46.06	30-Aug-00	13.91			32.15
	46.06	19-Sep-00	14.72			31.34
	46.06	27-Oct-00	12.44			33.62
	46.06	21-Nov-00	11.38			34.68
	46.06	1-May-01	10.71			35.35
	46.06	1-Oct-01	11.75			34.31
	46.06	11-Mar-02	9.01			37.05
	46.06	23-Sep-02	9.69			36.37
	46.06	10-Mar-03	7.83			38.23
	46.06	23-Sep-03	8.98			37.08
	46.06	15-Mar-04	7.33			38.73
	46.06	14-Sep-04	9.24			36.82
	46.06	18-Jul-05	9.54			36.52
	46.06	6-Jan-06	11.86			34.2
	46.06	27-Jul-06	10.50			35.56
46.06	7-Mar-07	8.88			37.18	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-24B	46.06	27-Jul-07	9.85			36.21
	46.06	28-Jan-08	7.37			38.69
	46.06	14-Jul-08	11.41			34.65
	46.06	3-Feb-09	11.18			34.88
	46.06	23-Jul-09	12.26			33.8
	46.06	9-Jan-10	9.89			36.17
	46.06	12-Jul-10	12.82			33.24
	46.06	13-Jan-11	11.1			34.96
	46.06	11-Jul-11	14.09			31.97
	46.06	27-Jan-12	11.36			34.7
	46.06	10-Jul-12	10.49			35.57
	46.06	8-Jan-13	12.96			33.1
	46.06	23-Jul-13	8.49			37.57
	MW-24C	46.05	27-Mar-00	25.77		
46.05		7-Apr-00	24.27			21.78
46.05		31-May-00	24.30			21.75
46.05		1-Jun-00	24.22			21.83
46.05		28-Jul-00	24.26			21.79
46.05		30-Aug-00	27.34			18.71
46.05		19-Sep-00	26.59			19.46
46.05		27-Oct-00	27.64			18.41
46.05		21-Nov-00	25.43			20.62
46.05		1-May-01	23.90			22.15
46.05		1-Oct-01	23.71			22.34
46.05		11-Mar-02	22.40			23.65
46.05		23-Sep-02	23.04			23.01
46.05		10-Mar-03	21.71			24.34
46.05		23-Sep-03	23.04			23.01
46.05		15-Mar-04	21.45			24.6
46.05		14-Sep-04	22.45			23.6
46.05		18-Jul-05	22.19			23.86
46.05		6-Jan-06	23.57			22.48
46.05		27-Jul-06	22.61			23.44
46.05		7-Mar-07	21.07			24.98
46.05		27-Jul-07	19.62			26.43
46.05		28-Jan-08	19.43			26.62
46.05		14-Jul-08	20.63			25.42
46.05		3-Feb-09	21.68			24.37
46.05		23-Jul-09	23.07			22.98
46.05		9-Jan-10	20.46			25.59
46.05		12-Jul-10	20.44			25.61
46.05		13-Jan-11	20.26			25.79
46.05		11-Jul-11	21.59			24.46
46.05	27-Jan-12	21.23			24.82	
46.05	10-Jul-12	20.81			25.24	
46.05	8-Jan-13	22.42			23.63	
46.05	23-Jul-13	23.81			22.24	
MW-25A	44.65	27-Mar-00	9.15			35.5
	44.65	7-Apr-00	8.79			35.86
	44.65	31-May-00	8.81			35.84
	44.65	1-Jun-00	8.86			35.79
	44.65	28-Jul-00	8.84			35.81
	44.65	30-Aug-00	11.43			33.22
	44.65	19-Sep-00	11.12			33.53
	44.65	27-Oct-00	10.09			34.56
	44.65	21-Nov-00	8.10			36.55
	44.65	1-May-01	8.94			35.71
	44.65	1-Oct-01	8.81			35.84
	44.65	11-Mar-02	7.23			37.42
	44.65	23-Sep-02	5.65			39
	44.65	10-Mar-03	5.84			38.81
	44.65	23-Sep-03	5.35			39.3
	44.65	15-Mar-04	5.75			38.9
	44.65	14-Sep-04	7.00			37.65
	44.65	18-Jul-05	6.42			38.23
	44.65	6-Jan-06	9.29			35.36
	44.65	27-Jul-06	5.10			39.55
	44.65	7-Mar-07	4.76			39.89
	44.65	27-Jul-07	4.22			40.43
	44.65	28-Jan-08	4.25			40.4
	44.65	14-Jul-08	8.59			36.06
	44.65	3-Feb-09	8.90			35.75
	44.65	23-Jul-09	8.71			35.94
	44.65	9-Jan-10	6.84			37.81
	44.65	12-Jul-10	7.78			36.87
	44.65	12-Jan-11	6.26			38.39



**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-25A	44.65	11-Jul-11	10.22			34.43
	44.65	27-Jan-12	5.24			39.41
	44.65	10-Jul-12	4.56			40.09
	44.65	8-Jan-13	8.62			36.03
	44.65	23-Jul-13	9.37			35.28
	44.65	8-Jan-14	8.92			35.73
	44.65	16-Jul-14	8.61			36.04
MW-25C	44.49	27-Mar-00	19.92			24.57
	44.49	7-Apr-00	19.50			24.99
	44.49	31-May-00	19.56			24.93
	44.49	1-Jun-00	19.51			24.98
	44.49	28-Jul-00	19.54			24.95
	44.49	30-Aug-00	22.14			22.35
	44.49	19-Sep-00	21.30	66.73	0.90	23.19
	44.49	27-Oct-00	20.63			23.86
	44.49	21-Nov-00	27.63			16.86
	44.49	1-May-01	18.14			26.35
	44.49	1-Oct-01	18.29		0.40	26.2
	44.49	14-Mar-02	17.39	64.32	4.13	27.1
	44.49	23-Sep-02	17.81	61.41	6.00	26.68
	44.49	10-Mar-03	16.73			27.76
	44.49	23-Sep-03	22.35			22.14
	44.49	15-Mar-04	16.15			28.34
	44.49	14-Sep-04	17.00	60.14	2.56	27.49
	44.49	18-Jul-05	15.57			28.92
	44.49	6-Jan-06	18.49			26
	44.49	27-Jul-06	15.32	60.64	2.03	29.17
	44.49	7-Mar-07	15.87	59.82	2.18	28.62
	44.49	27-Jul-07	14.25	60.61	1.04	30.24
	44.49	28-Jan-08	14.91	60.88	0.67	29.58
	44.49	14-Jul-08	17.24	60.95	0.60	27.25
	44.49	3-Feb-09	15.97	TRACE	TRACE	28.52
	44.49	23-Jul-09	16.39			28.1
	44.49	9-Jan-10	13.68	61.45	0.65	30.81
	44.49	27-May-10	16.09			28.4
	44.49	28-Jun-10	16.26			28.23
	44.49	12-Jul-10	16.05			28.44
	44.49	31-Aug-10	16.21			28.28
	44.49	12-Jan-11	16.29			28.2
	44.49	11-Jul-11	18.81			25.68
44.49	27-Jan-12	17.29			27.2	
44.49	10-Jul-12	16.53			27.96	
44.49	8-Jan-13	18.34			26.15	
44.49	23-Jul-13	18.74			25.75	
44.49	8-Jan-14	18.23			26.26	
44.49	16-Jul-14	18.66			25.83	
MW-26A	44.62	27-Mar-00	7.40			37.22
	44.62	7-Apr-00	6.99			37.63
	44.62	31-May-00	7.10			37.52
	44.62	1-Jun-00	7.00			37.62
	44.62	28-Jul-00	7.11			37.51
	44.62	30-Aug-00	9.69			34.93
	44.62	19-Sep-00	11.43			33.19
	44.62	27-Oct-00	8.11			36.51
	44.62	21-Nov-00	8.24			36.38
	44.62	1-May-01	6.01			38.61
	44.62	1-Oct-01	6.34			38.28
	44.62	11-Mar-02	4.05			40.57
	44.62	23-Sep-02	4.29			40.33
	44.62	10-Mar-03	2.84			41.78
	44.62	23-Sep-03	4.84			39.78
	44.62	15-Mar-04	3.30			41.32
	44.62	14-Sep-04	6.80			37.82
	44.62	18-Jul-05	6.72			37.9
	44.62	6-Jan-06	9.34			35.28
	44.62	27-Jul-06	4.42			40.2
	44.62	7-Mar-07	4.70			39.92
	44.62	27-Jul-07	3.98			40.64
	44.62	29-Jan-08	2.37			42.25
	44.62	14-Jul-08	7.87			36.75
	44.62	3-Feb-09	6.89			37.73
	44.62	23-Jul-09	7.88			36.74
	44.62	9-Jan-10	4.31			40.31
	44.62	12-Jul-10	8.12			36.5
	44.62	13-Jan-11	2.38			42.24
	44.62	11-Jul-11	10.27			34.35
	44.62	27-Jan-12	3.09			41.53
	44.62	10-Jul-12	2.77			41.85
	44.62	8-Jan-13	7.27			37.35
44.62	23-Jul-13	9.72			34.9	
44.62	8-Jan-14	6.33			38.29	
44.62	16-Jul-14	7.64			36.98	

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HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-27A	44.90	1-May-01	6.41			38.49
	44.90	1-Oct-01	5.31			39.59
	44.90	11-Mar-02	4.21			40.69
	44.90	23-Sep-02	3.31			41.59
	44.90	10-Mar-03	4.05			40.85
	44.90	23-Sep-03	3.24			41.66
	44.90	15-Mar-04	2.99			41.91
	44.90	14-Sep-04	5.09			39.81
	44.90	18-Jul-05	4.45			40.45
	44.90	6-Jan-06	4.55			40.35
	44.90	27-Jul-06	4.26			40.64
	44.90	7-Mar-07	3.01			41.89
	45.04	27-Jul-07	2.12			42.92
	45.04	28-Jan-08	1.88			43.16
	45.04	14-Jul-08	4.57			40.47
	45.04	3-Feb-09	4.27			40.77
	45.04	23-Jul-09	4.36			40.68
	45.04	9-Jan-10	3.69			41.35
	45.04	12-Jul-10	5.31			39.73
	45.04	12-Jan-11	3.76			41.28
	45.04	12-Jul-11	6.72			38.32
	45.04	26-Jan-12				NM
	45.04	10-Jul-12	well covered			NM
	45.04	7-Jan-13	well covered			NM
	45.04	23-Jul-13	NM			NM
	45.04	-	-			
MW-27C	45.04	1-May-01	17.82			27.22
	45.04	1-Oct-01	17.82			27.22
	45.04	11-Mar-02	16.36			28.68
	45.04	23-Sep-02	16.49			28.55
	45.04	10-Mar-03	18.68			26.36
	45.04	23-Sep-03	16.89			28.15
	45.04	15-Mar-04	14.35			30.69
	45.04	14-Sep-04	14.49			30.55
	45.04	18-Jul-05	16.12			28.92
	45.04	6-Jan-06	18.07			26.97
	45.04	27-Jul-06	17.13			27.91
	45.04	7-Mar-07	15.47			29.57
	44.90	27-Jul-07	14.85			30.05
	45.04	28-Jan-08	14.31			30.73
	45.04	14-Jul-08	17.51			27.53
	45.04	3-Feb-09	15.76			29.28
	45.04	23-Jul-09	16.38			28.66
	45.04	9-Jan-10	14.82			30.22
	45.04	12-Jul-10	16.12			28.92
	45.04	12-Jan-11	15.84			29.2
	45.04	11-Jul-11	18.17			26.87
	45.04	27-Jan-12	17.14			27.9
	45.04	10-Jul-12	16.56			28.48
	45.04	8-Jan-13	17.04			28
	45.04	23-Jul-13	18.61			26.43
	45.04	8-Jan-14	18.12			26.92
45.04	16-Jul-14	16.94			28.10	
MW-28A	43.86	1-May-01	7.45			36.41
	43.86	1-Oct-01	8.26			35.6
	43.86	11-Mar-02	4.90			38.96
	43.86	23-Sep-02	5.71			38.15
	43.86	10-Mar-03	3.11			40.75
	43.86	23-Sep-03	5.81			38.05
	43.86	14-Sep-04	9.34			34.52
	43.86	18-Jul-05	7.52			36.34
	43.86	6-Jan-06	9.32			34.54
	43.86	27-Jul-06	5.54			38.32
	43.86	7-Mar-07	5.06			38.8
	43.86	27-Jul-07	2.86			41
	43.86	29-Jan-08	2.61			41.25
	43.86	14-Jul-08	8.74			35.12
	43.86	3-Feb-09	8.36			35.5
	43.86	23-Jul-09	8.94			34.92
	43.86	9-Jan-10	4.54			39.32
	43.86	12-Jul-10	8.66			35.2
	43.86	12-Jan-11	3.87			39.99
	43.86	11-Jul-11	11.43			32.43
	43.86	27-Jan-12	2.66			41.2
	43.86	10-Jul-12	4.52			39.34
	43.86	8-Jan-13	8.11			35.75
	43.86	23-Jul-13	10.78			33.08
	43.86	8-Jan-14	7.71			36.15
	43.86	16-Jul-14	8.19			35.67

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)	
MW-28C	43.96	1-May-01	17.14			26.82	
	43.96	1-Oct-01	17.51			26.45	
	43.96	11-Mar-02	16.29			27.67	
	43.96	23-Sep-02	17.75			26.21	
	43.96	10-Mar-03	15.84			28.12	
	43.96	23-Sep-03	17.48			26.48	
	43.96	15-Mar-04	15.56			28.4	
	43.96	14-Sep-04	17.20			26.76	
	43.96	18-Jul-05	16.60			27.36	
	43.96	6-Jan-06	17.61			26.35	
	43.96	27-Jul-06	17.73			26.23	
	43.96	7-Mar-07	15.59			28.37	
	43.96	27-Jul-07	12.90			31.06	
	43.96	29-Jan-08	14.35			29.61	
	43.96	14-Jul-08	16.26			27.7	
	43.96	3-Feb-09	16.03			27.93	
	43.96	23-Jul-09	16.53			27.43	
	43.96	9-Jan-10	14.89			29.07	
	43.96	12-Jul-10	15.89			28.07	
	43.96	12-Jan-11	18.37			25.59	
	43.96	11-Jul-11	18.16			25.8	
	43.96	27-Jan-12	16.12			27.84	
	43.96	10-Jul-12	16.79			27.17	
	43.96	8-Jan-13	17.62			26.34	
	43.96	23-Jul-13	18.87			25.09	
	43.96	8-Jan-14	17.59			26.37	
	43.96	16-Jul-14	16.98			26.98	
	MW-29A	46.59	1-May-01	5.01			41.58
		46.59	1-Oct-01	5.38			41.21
		46.59	11-Mar-02	1.51			45.08
46.59		23-Sep-02	1.65			44.94	
46.59		10-Mar-03	1.42			45.17	
46.59		23-Sep-03	1.50			45.09	
46.59		15-Mar-04	1.85			44.74	
46.59		14-Sep-04	6.35			40.24	
46.59		18-Jul-05	3.12			43.47	
46.59		6-Jan-06	6.57			40.02	
46.59		27-Jul-06	1.44			45.15	
46.59		7-Mar-07	1.95			44.64	
46.59		27-Jul-07	2.49			44.1	
46.59		28-Jan-08	1.28			45.31	
46.59		14-Jul-08	4.14			42.45	
46.59		3-Feb-09	3.50			43.09	
46.59		23-Jul-09	4.09			42.5	
46.59		9-Jan-10	1.76			44.83	
46.59		12-Jul-10	3.62			42.97	
46.59		13-Jan-11	3.07			43.52	
46.59		11-Jul-11	7.14			39.45	
		Plugged				NM	
46.59		10-Jul-12	4.17			42.42	
46.59		8-Jan-13	4.91			41.68	
46.59		23-Jul-13	--			--	
MW-29B		46.26	1-May-01	19.01			27.25
	46.26	1-Oct-01	19.41			26.85	
	46.26	11-Mar-02	18.04			28.22	
	46.26	23-Sep-02	18.82			27.44	
	46.26	10-Mar-03	17.21			29.05	
	46.26	23-Sep-03	18.09			28.17	
	46.26	15-Mar-04	17.10			29.16	
	46.26	14-Sep-04	17.76			28.5	
	46.26	18-Jul-05	18.11			28.15	
	46.26	6-Jan-06	18.83			27.43	
	46.26	27-Jul-06	18.41			27.85	
	46.26	7-Mar-07	17.21			29.05	
	46.26	27-Jul-07	15.49			30.77	
	46.26	28-Jan-08	15.32			30.94	
	46.26	14-Jul-08	18.23			28.03	
	46.26	3-Feb-09	17.72			28.54	
	46.26	23-Jul-09	16.19			30.07	
	46.26	9-Jan-10	16.02			30.24	
	46.26	12-Jul-10	19.29			26.97	
	46.26	13-Jan-11	17.73			28.53	
	46.26	11-Jul-11	20.06			26.2	
		Plugged				NM	
	46.26	10-Jul-12	9.71			36.55	
	46.26	8-Jan-13	9.92			36.34	
	46.26	23-Jul-13	--			--	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-29C	46.46	1-May-01	25.51			20.95
	46.46	1-Oct-01	25.04			21.42
	46.46	11-Mar-02	23.51			22.95
	46.46	23-Sep-02	24.10			22.36
	46.46	10-Mar-03	22.71			23.75
	46.46	23-Sep-03	23.48			22.98
	46.46	15-Mar-04	22.24			24.22
	46.46	14-Sep-04	24.12			22.34
	46.46	18-Jul-05	23.75			22.71
	46.46	6-Jan-06	25.12			21.34
	46.46	27-Jul-06	23.35			23.11
	46.46	7-Mar-07	22.38			24.08
	46.46	27-Jul-07	20.42			26.04
	46.46	28-Jan-08	21.08			25.38
	46.46	14-Jul-08	22.38			24.08
	46.46	3-Feb-09	22.86			23.6
	46.46	23-Jul-09	22.81			23.65
	46.46	9-Jan-10	20.71			25.75
	46.46	12-Jul-10	21.32			25.14
	46.46	13-Jan-11	20.39			26.07
	46.46	11-Jul-11	23.17			23.29
		Plugged				NM
	46.46	10-Jul-12	20.69			25.77
46.46	8-Jan-13	21.27			25.19	
46.46	23-Jul-13	--			--	
MW-30A	50.45	15-Mar-04	9.71			40.74
	50.45	13-Sep-04	12.76			37.69
	50.45	18-Jul-05	11.80			38.65
	50.45	4-Jan-06	13.52			36.93
	50.45	27-Jul-06	10.45			40
	50.45	7-Mar-07	10.98			39.47
	50.45	27-Jul-07	9.49			40.96
	50.45	30-Jan-08	9.62			40.83
	50.45	15-Jul-08	12.52			37.93
	50.45	4-Feb-09	13.01			37.44
	50.45	23-Jul-09	13.71			36.74
	50.45	9-Jan-10	10.87			39.58
	50.45	12-Jul-10	12.61			37.84
	50.45	12-Jan-11	10.06			40.39
	50.45	12-Jul-11	14.76			35.69
	50.45	26-Jan-12	10.78			39.67
	50.45	9-Jul-12	11.13			39.32
	50.45	8-Jan-13	12.91			37.54
50.45	23-Jul-13	14.16			36.29	
50.45	8-Jan-14	13.81			36.64	
50.45	15-Jul-14	12.10			38.35	
MW-31A	52.08	15-Mar-04	10.97			41.11
	52.08	13-Sep-04	13.00			39.08
	52.08	18-Jul-05	13.05			39.03
	52.08	4-Jan-06	14.77			37.31
	52.08	27-Jul-06	11.83			40.25
	52.08	7-Mar-07	12.43			39.65
	52.08	27-Jul-07	10.83			41.25
	52.08	31-Jan-08	10.99			41.09
	52.08	15-Jul-08	13.68			38.4
	52.08	4-Feb-09	14.23			37.85
	52.08	23-Jul-09	14.73			37.35
	52.08	9-Jan-10	12.31			39.77
	52.08	12-Jul-10	14.06			38.02
	52.08	12-Jan-11	11.62			40.46
	52.08	12-Jul-11	15.92			36.16
	52.08	26-Jan-12	12.24			39.84
	52.08	9-Jul-12	12.79			39.29
	52.08	8-Jan-13	14.14			37.94
52.08	23-Jul-13	16.24			35.84	
52.08	8-Jan-14	15.96			36.12	
52.08	15-Jul-14	13.19			38.89	
MW-32A	43.77	15-Mar-04	1.00			42.77
	43.77	14-Sep-04	6.03	29.00	3.48	37.74
	43.77	18-Jul-05	5.82	26.56	5.92	37.95
	43.77	6-Jan-06	6.93	24.92	7.57	36.84
	43.77	27-Jul-06	12.96	25.71	6.74	30.81
	43.77	7-Mar-07	4.03	25.26	7.19	39.74
	43.77	27-Jul-07	1.95	30.76	1.70	41.82
	43.77	28-Jan-08	2.18			41.59
	43.77	14-Jul-08	6.14	26.25	6.20	37.63
	43.77	3-Feb-09	5.71	26.29	6.16	38.06
	43.77	23-Jul-09	6.29	26.51	5.94	37.48
	43.77	9-Jan-10	3.55	25.41	7.04	40.22
	43.77	27-May-10	5.86	26.2	6.25	37.91
43.77	28-Jun-10	6.02	29.1	3.35	37.75	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-32A	43.77	12-Jul-10	6.12	29.45	3.00	37.65
	43.77	31-Aug-10	5.43	30.67	1.78	38.34
	43.77	13-Jan-11	2.63	29.15	3.30	41.14
	43.77	11-Jul-11	5.92	28.82	3.63	37.85
	Plugged					
MW-32AR	44.56	27-Jan-12	3.22			41.34
	44.56	10-Jul-12	3.73			40.83
	44.56	8-Jan-13	6.64			37.92
	44.56	23-Jul-13	9.42			35.14
	44.56	8-Jan-14	5.64			38.92
	44.56	16-Jul-14	6.74			37.82
MW-32B	44.41	27-Jan-12	3.11	30.52	5.77	41.3
	44.41	10-Jul-12	3.81	30.16	6.13	40.6
	44.41	8-Jan-13	6.34	30.02	6.38	38.07
	44.41	23-Jul-13	7.14			37.27
	44.41	8-Jan-14	6.72	34.82	1.58	37.69
	44.41	16-Jul-14	6.72	34.29	2.11	37.69
MW-33A	44.25	15-Mar-04	3.90			40.35
	44.25	14-Sep-04	7.85			36.4
	44.25	18-Jul-05	6.35			37.9
	44.25	6-Jan-06	8.00			36.25
	44.25	27-Jul-06	4.73			39.52
	44.25	7-Mar-07	5.22			39.03
	44.25	27-Jul-07	3.48			40.77
	44.25	29-Jan-08	3.34			40.91
	44.25	14-Jul-08	7.42	25.19	0.03	36.83
	44.25	3-Feb-09	7.28			36.97
	44.25	23-Jul-09	7.63			36.62
	44.25	9-Jan-10	4.79			39.46
	44.25	12-Jul-10	7.61			36.64
	44.25	13-Jan-11	3.19			41.06
	44.25	11-Jul-11	9.87			34.38
	44.25	27-Jan-12	2.69			41.56
	44.25	10-Jul-12	3.86			40.39
44.25	8-Jan-13	6.76			37.49	
44.25	23-Jul-13	9.83			34.42	
44.25	8-Jan-14	6.71			37.54	
44.25	16-Jul-14	7.09			37.16	
MW-33B	44.35	7-Mar-07	4.21			40.04
	44.35	27-Jul-07	3.72			40.53
	44.35	29-Jan-08	2.37	39.12	3.37	41.88
	44.35	14-Jul-08	5.74	37.44	5.05	38.51
	44.35	3-Feb-09	9.28	36.91	5.58	34.97
	44.35	23-Jul-09	NM			NM
	44.35	9-Jan-10	4.61	35.21	7.28	39.74
	44.35	27-May-10	6.82			37.53
	44.35	28-Jun-10	6.91			37.44
	44.35	12-Jul-10	7.02			37.33
	44.35	31-Aug-10	7.22			37.13
	44.35	13-Jan-11	3.11	29.7		41.24
	44.35	11-Jul-11	10.19	29.75		34.16
	Plugged					
MW-33BR	44.35	27-Jan-12	4.07			40.28
	44.35	10-Jul-12	2.59			41.76
	44.35	8-Jan-13	3.86			40.49
	44.35	23-Jul-13	9.68			34.67
	44.35	8-Jan-14	7.41			36.94
	44.35	16-Jul-14	6.72			37.63
MW-34C	45.31	15-Mar-04	17.40			27.91
	45.31	14-Sep-04	18.82			26.49
	45.31	18-Jul-05	19.41	65.29	7.19	25.9
	45.31	6-Jan-06	20.54	65.27	8.38	24.77
	45.31	27-Jul-06	18.55	63.84	8.61	26.76
	45.31	9-Apr-07	16.34	62.06	10.39	28.97
	45.31	27-Jul-07	NM			NM
	45.31	29-Jan-08	16.32			28.99
	45.31	15-Jul-08	18.13	43.49	29.01	27.18
	45.31	5-Feb-09	18.08	61.79	10.71	27.23
	45.31	23-Jul-09	NM			NM
	45.31	9-Jan-10	16.41	69.20	3.30	28.9
	45.31	12-Jul-10	NM			NM
	45.31	12-Jan-11	16.41	64.90		28.9
	45.31	11-Jul-11	19.08	65.26		26.23
	45.31	8-Feb-12	18.41			26.9
	45.31	10-Jul-12	NM			NM
45.31	8-Jan-13	NM			NM	
45.31	23-Jul-13	NM			NM	
MW-34CR	46.47	16-Jul-14	19.17			27.30
MW-35A	45.31	7-Mar-07	3.49			41.82
	45.31	27-Jul-07	3.05			42.26
	45.31	29-Jan-08	1.82			43.49
	45.31	14-Jul-08	6.21			39.1
	45.31	3-Feb-09	5.54			39.77
	45.31	23-Jul-09	5.76			39.55

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-35A	45.31	9-Jan-10	4.14			41.17
	45.31	12-Jul-10	6.04			39.27
	45.31	13-Jan-11	2.46			42.85
	45.31	11-Jul-11	8.44			36.87
	45.31	27-Jan-12	1.35			43.96
	45.31	10-Jul-12	2.33			42.98
	45.31	8-Jan-13	5.37			39.94
	45.31	23-Jul-13	9.18			36.13
	45.31	8-Jan-14	5.06			40.25
	45.31	15-Jul-14	6.51			38.80
MW-35B	44.83	7-Mar-07	3.31			41.52
	44.83	27-Jul-07	3.29			41.54
	44.83	29-Jan-08	1.95			42.88
	44.83	14-Jul-08	6.40			38.43
	44.83	3-Feb-09	5.79			39.04
	44.83	23-Jul-09	6.42			38.41
	44.83	9-Jan-10	3.51			41.32
	44.83	12-Jul-10	6.39			38.44
	44.83	13-Jan-11	2.96			41.87
	44.83	11-Jul-11	8.67			36.16
	44.83	27-Jan-12	1.59			43.24
	44.83	10-Jul-12	2.74			42.09
	44.83	8-Jan-13	6.09			38.74
	44.83	23-Jul-13	9.22			35.61
	44.83	8-Jan-14	5.31			39.52
	44.83	15-Jul-14	6.75			38.08
MW-36A	44.53	7-Mar-07	8.71			35.82
	44.53	27-Jul-07	6.54			37.99
	44.53	29-Jan-08	5.59			38.94
	44.53	14-Jul-08	9.33			35.2
	44.53	3-Feb-09	10.69			33.84
	44.53	23-Jul-09	12.03			32.5
	44.53	9-Jan-10	9.23			35.3
	44.53	12-Jul-10	9.14			35.39
	44.53	13-Jan-11	8.62			35.91
	44.53	11-Jul-11	12.16			32.37
	44.53	27-Jan-12	6.82			37.71
	44.53	10-Jul-12	6.68			37.85
	44.53	8-Jan-13	7.61			36.92
	44.53	23-Jul-13	11.36			33.17
	44.53	8-Jan-14	9.23			35.3
44.53	16-Jul-14	8.62			35.91	
MW-36B	44.07	12-Jul-10	1.32			42.75
	44.07	13-Jan-11	9.71			34.36
	44.07	11-Jul-11	11.57			32.5
	44.07	27-Jan-12	0.46			43.61
	44.07	10-Jul-12	6.64			37.43
	44.07	8-Jan-13	6.71			37.36
	44.07	23-Jul-13	9.39			34.68
	44.07	8-Jan-14	4.09			39.98
44.07	16-Jul-14	3.61			40.46	
MW-36D	44.33	12-Jul-10	85.39			-41.06
	44.33	13-Jan-11	85.03			-40.7
	44.33	11-Jul-11	85.33			-41
	44.33	27-Jan-12	85.62			-41.29
	44.33	10-Jul-12	85.17			-40.84
	44.33	8-Jan-13	85.37			-41.04
	44.33	23-Jul-13	85.93			-41.6
	44.33	8-Jan-14	85.32			-40.99
44.33	16-Jul-14	84.77			-40.44	
MW-38A	46.39	7-Mar-07	3.26			43.13
	46.39	27-Jul-07	3.08			43.31
	46.39	29-Jan-08	1.85			44.54
	46.39	14-Jul-08	5.84			40.55
	46.39	3-Feb-09	5.15			41.24
	46.39	23-Jul-09	5.06			41.33
	46.39	9-Jan-10	2.27			44.12
	46.39	12-Jul-10	6.42			39.97
	46.39	13-Jan-11	1.76			44.63
	46.39	11-Jul-11	8.16			38.23
	46.39	27-Jan-12	1.8			44.59
	46.39	10-Jul-12	2.52			43.87
	46.39	8-Jan-13	4.62			41.77
	46.39	23-Jul-13	8.34			38.05
	46.39	8-Jan-14	4.77			41.62
46.39	15-Jul-14	6.20			40.19	
MW-38B	45.51	15-Mar-04	1.07			44.44
	45.51	14-Sep-04	6.10			39.41
	45.51	18-Jul-05	2.41			43.1
	45.51	6-Jan-06	6.33			39.18
	45.51	27-Jul-06	1.27			44.24
	45.51	7-Mar-07	2.38			43.13
	45.51	27-Jul-07	2.25			43.26
	45.51	29-Jan-08	0.61			44.9
45.51	14-Jul-08	4.86			40.65	

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HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-38B	45.51	3-Feb-09	4.33			41.18
	45.51	23-Jul-09	4.47			41.04
	45.51	9-Jan-10	1.44			44.07
	45.51	12-Jul-10	5.72			39.79
	45.51	13-Jan-11	0.68			44.83
	45.51	11-Jul-11	7.82			37.69
	45.51	27-Jan-12	0.85			44.66
	45.51	10-Jul-12	0.74			44.77
	45.51	8-Jan-13	3.97			41.54
	45.51	23-Jul-13	7.51			38
	45.51	8-Jan-14	3.47			42.04
	45.51	15-Jul-14	5.50			40.01
	MW-39B	49.58	15-Mar-04	5.48		
49.58		13-Sep-04	10.02			39.56
49.58		18-Jul-05	7.21			42.37
49.58		4-Jan-06	10.37			39.21
49.58		27-Jul-06	6.08			43.5
49.58		7-Mar-07	6.91			42.67
49.58		27-Jul-07	5.74			43.84
49.58		30-Jan-08	6.34			43.24
49.58		15-Jul-08	8.96			40.62
49.58		4-Feb-09	8.60			40.98
49.58		24-Jul-09	9.13			40.45
49.58		8-Jan-10	5.61			43.97
49.58		12-Jul-10	9.31			40.27
49.58		12-Jan-11	5.64			43.94
49.58		12-Jul-11	11.97			37.61
49.58		26-Jan-12	5.84			43.74
49.58		9-Jul-12	5.77			43.81
49.58		7-Jan-13	8.68			40.9
49.58		22-Jul-13	11.17			38.41
49.58		7-Jan-14	7.23			42.35
49.58	16-Jul-14	9.46			40.12	
MW-40B	49.59	15-Mar-04	5.46			44.13
	49.59	13-Sep-04	9.72			39.87
	49.59	18-Jul-05	7.19			42.4
	49.59	4-Jan-06	10.25			39.34
	49.59	27-Jul-06	6.18			43.41
	49.59	7-Mar-07	6.81			42.78
	49.59	27-Jul-07	5.00			44.59
	49.59	30-Jan-08	5.23			44.36
	49.59	15-Jul-08	8.76			40.83
	49.59	4-Feb-09	8.57			41.02
	49.59	24-Jul-09	9.06			40.53
	49.59	8-Jan-10	5.37			44.22
	49.59	12-Jul-10	9.17			40.42
	49.59	12-Jan-11	5.81			43.78
	49.59	12-Jul-11	11.46			38.13
	49.59	26-Jan-12	5.68			43.91
	49.59	9-Jul-12	5.74			43.85
	49.59	7-Jan-13	8.63			40.96
	49.59	22-Jul-13	11.06			38.53
	49.59	7-Jan-14	7.24			42.35
49.59	16-Jul-14	9.27			40.32	
MW-41B	49.37	15-Mar-04	4.66			44.71
	49.37	13-Sep-04	9.76	35.01	9.80	39.61
	49.37	18-Jul-05	5.96	32.23	12.58	43.41
	49.37	4-Jan-06	10.03	32.21	12.60	39.34
	49.37	27-Jul-06	5.65	29.55	15.26	43.72
	49.37	7-Mar-07	4.41	29.13	15.68	44.96
	49.37	27-Jul-07	5.27	12.00	32.81	44.1
	49.37	22-Feb-08	5.04	25.14	19.67	44.7
	49.37	15-Jul-08	8.87	25.09	19.72	40.5
	49.37	4-Feb-09	8.93	23.79	21.02	40.44
	49.37	24-Jul-09	9.46	23.91	20.90	39.91
	49.37	8-Jan-10	5.92	23.65	21.16	43.45
	49.37	27-May-10	6.13	25.45	19.36	43.24
	49.37	28-Jun-10	6.21	38.2	6.61	43.16
	49.37	12-Jul-10	6.32	38.45	6.36	43.05
	49.37	31-Aug-10	6.26	39.22	5.59	43.11
	49.37	12-Jan-11	6.02	39.6	5.21	43.35
	49.37	12-Jul-11	8.86	39.75	5.06	40.51
	49.37	8-Mar-12	6.31	20.67	24.14	43.06
	49.37	9-Jul-12	8.23			41.14
49.37	7-Jan-13	9.09	41.13	3.68	40.28	
49.37	22-Jul-13	10.31	39.29	5.52	39.06	
49.37	7-Jan-14	9.06	39.17	5.64	40.31	
49.37	15-Jul-14	8.62	37.86	6.95	40.75	
MW-42B	50.52	7-Mar-07	7.31			43.21
	50.52	27-Jul-07	5.74			44.78
	50.52	30-Jan-08	6.62			43.9
	50.52	15-Jul-08	8.73			41.79
	50.52	4-Feb-09	9.32			41.2

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-42B	50.52	24-Jul-09	9.61			40.91
	50.52	8-Jan-10	6.02			44.5
	50.52	12-Jul-10	7.13			43.39
	50.52	12-Jan-11	6.33			44.19
	50.52	12-Jul-11	11.76			38.76
	50.52	26-Jan-12	6.62			43.9
	50.52	9-Jul-12	6.81			43.71
	50.52	7-Jan-13	9.23			41.29
	50.52	22-Jul-13	11.08			39.44
	50.52	7-Jan-14	8.02			42.5
50.52	15-Jul-14	7.37			43.15	
MW-44A	45.11	7-Mar-07	10.86			34.25
	45.11	27-Jul-07	7.46			37.65
	45.11	30-Jan-08	8.44			36.67
	45.11	14-Jul-08	10.75			34.36
	45.11	3-Feb-09	12.55			32.56
	45.11	23-Jul-09	12.76			32.35
	45.11	9-Jan-10	10.23			34.88
	45.11	12-Jul-10	11.24			33.87
	45.11	12-Jan-11	9.63			35.48
	45.11	11-Jul-11	12.59			32.52
	45.11	27-Jan-12	9.27			35.84
	45.11	10-Jul-12	10.11			35
	45.11	8-Jan-13	11.01			34.1
	45.11	23-Jul-13	12.24			32.87
	45.11	8-Jan-14	11.91			33.2
45.11	16-Jul-14	11.32			33.79	
MW-44C	45.03	15-Mar-04	17.54			27.49
	45.03	14-Sep-04	18.35			26.68
	45.03	18-Jul-05	18.90	64.77	5.35	26.13
	45.03	6-Jan-06	20.03	66.50	5.37	25
	45.03	27-Jul-06	18.47	63.35	6.75	26.56
	45.03	7-Mar-07	16.02	62.30	7.75	29.01
	45.03	27-Jul-07	14.83	65.45	5.50	30.2
	45.03	29-Jan-08	15.95			29.08
	45.03	14-Jul-08	17.91	64.95	6.18	27.12
	45.03	3-Feb-09	16.72	64.15	6.98	28.31
	45.03	23-Jul-09	17.12	64.05	6.75	27.91
	45.03	9-Jan-10	15.57	63.81	6.99	29.46
	45.03	27-May-10	16.67	64.7	6.10	28.36
	45.03	28-Jun-10	16.77	67.85	2.95	28.26
	45.03	12-Jul-10	16.91	70.35	0.45	28.12
	45.03	31-Aug-10	16.89	70.63	0.17	28.14
	45.03	12-Jan-11	16.77	70.05	0.75	28.26
	45.03	11-Jul-11	19.31	70.05	0.75	25.72
	45.03	27-Jan-12	17.91	63.88	6.92	27.12
	45.03	10-Jul-12	17.61	63.7	7.10	27.42
45.03	8-Jan-13	19.02	62.94	7.86	26.01	
45.03	23-Jul-13	20.36	70.26	0.54	24.67	
45.03	8-Jan-14	19.67	70.42	0.38	25.36	
45.03	16-Jul-14	18.72	69.31	1.49	26.31	
MW-45C	44.73	15-Mar-04	17.15			27.58
	44.73	14-Sep-04	17.82	61.66	9.02	26.91
	44.73	18-Jul-05	18.38	60.76	9.89	26.35
	44.73	6-Jan-06	19.51	62.87	8.87	25.22
	44.73	27-Jul-06	17.92	61.64	8.94	26.81
	44.73	7-Mar-07	15.95	60.81	9.79	28.78
	44.73	27-Jul-07	14.38			30.35
	44.73	29-Jan-08	14.86	61.39	9.46	29.87
	44.73	14-Jul-08	17.22	61.25	9.88	27.51
	44.73	3-Feb-09	17.00	61.24	9.61	27.73
	44.73	23-Jul-09	17.46	61.30	9.55	27.27
	44.73	9-Jan-10	14.98	61.56	9.29	29.75
	44.73	27-May-10	16.31	61.1	9.75	28.42
	44.73	28-Jun-10	16.42	63.45	7.40	28.31
	44.73	12-Jul-10	16.61	68.8	2.05	28.12
	44.73	31-Aug-10	16.46	69.62	1.23	28.27
	44.73	12-Jan-11	16.31	69.1	1.75	28.42
	44.73	11-Jul-11	18.29	69.3	1.55	26.44
	44.73	8-Mar-12	16.31	70.6	0.25	28.42
	44.73	10-Jul-12	20.69	70.21	0.64	24.04
44.73	8-Jan-13	21.39	69.91	0.69	23.34	
44.73	23-Jul-13	22.72	70.39	0.21	22.01	
44.73	8-Jan-14	22.13	70.35	0.25	22.6	
44.73	16-Jul-14	21.32	69.91	0.69	23.41	
MW-46C	44.94	15-Mar-04	16.16	ND	ND	28.78
	44.94	14-Sep-04	17.97	ND	ND	26.97
	44.94	18-Jul-05	18.50	69.05	3.78	26.44
	44.94	13-Jan-06	19.66	70.20	3.22	25.28
	44.94	27-Jul-06	17.96	68.89	3.90	26.98
	44.94	7-Mar-07	16.01	69.32	3.43	28.93
	44.94	27-Jul-07	14.54	69.31	3.59	30.4
	44.94	30-Jan-08	15.68	70.81	2.00	29.26



**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-46C	44.94	14-Jul-08	17.38	69.97	2.84	27.56
	44.94	3-Feb-09	16.78	69.28	3.53	28.16
	44.94	23-Jul-09	17.59	69.35	3.55	27.35
	44.94	9-Jan-10	14.53	68.74	4.16	30.41
	44.94	27-May-10	16.26	69.4	3.50	28.68
	44.94	28-Jun-10	16.39	70.85	2.05	28.55
	44.94	12-Jul-10	16.29	72.25	0.65	28.65
	44.94	31-Aug-10	16.13	72.46	0.44	28.81
	44.94	12-Jan-11	15.96	71.75	1.15	28.98
	44.94	11-Jul-11	18.07	71.65	1.25	26.87
	44.94	26-Jan-12	16.54	ND	ND	28.4
	44.94	10-Jul-12	20.34	72.8	0.10	24.6
	44.94	8-Jan-13	21.18	71.31	1.59	23.76
	44.94	23-Jul-13	21.96	72.16	0.74	22.98
	44.94	8-Jan-14	21.81	72.55	0.35	23.13
	44.94	16-Jul-14	20.86	71.39	1.51	24.08
MW-47C	45.61	27-Jul-07	16.62			28.99
	45.61	29-Jan-08	16.04			29.57
	45.61	14-Jul-08	18.15			27.46
	45.61	4-Feb-09	18.39			27.22
	45.61	23-Jul-09	18.61			27
	45.61	9-Jan-10	16.46			29.15
	45.61	12-Jul-10	18.33			27.28
	45.61	12-Jan-11	17.86			27.75
	45.61	11-Jul-11	19.94			25.67
	45.61	26-Jan-12	18.77			26.84
	45.61	9-Jul-12	18.17			27.44
	45.61	8-Jan-13	19.47			26.14
	45.61	23-Jul-13	20.61			25
	45.61	8-Jan-14	19.57			26.04
45.61	16-Jul-14	19.02			26.59	
MW-48C	44.68	15-Mar-04	17.31			27.37
	44.68	14-Sep-04	18.60			26.08
	44.68	18-Jul-05	19.17			25.51
	44.68	6-Jan-06	20.33			24.35
	44.68	27-Jul-06	18.73			25.95
	44.68	7-Mar-07	16.52			28.16
	44.68	27-Jul-07	15.22			29.46
	44.68	29-Jan-08	16.32			28.36
	44.68	14-Jul-08	17.63			27.05
	44.68	4-Feb-09	17.97			26.71
	44.68	24-Jul-09	18.39			26.29
	44.68	9-Jan-10	15.81			28.87
	44.68	12-Jul-10	17.42			27.26
	44.68	12-Jan-11	17.52			27.16
	44.68	11-Jul-11	19.58			25.1
	44.68	26-Jan-12	18.52			26.16
	44.68	9-Jul-12	17.12			27.56
	44.68	8-Jan-13	18.26			26.42
44.68	23-Jul-13	20.17			24.51	
44.68	8-Jan-14	19.19			25.49	
44.68	16-Jul-14	18.38			26.30	
MW-49A	46.18	7-Mar-07	12.91			33.27
	46.18	27-Jul-07	8.86			37.32
	46.18	31-Jan-08	12.02			34.16
	46.18	15-Jul-08	12.99			33.19
	46.18	4-Feb-09	13.29			32.89
	46.18	24-Jul-09	13.71			32.47
	46.18	9-Jan-10	11.07			35.11
	46.18	12-Jul-10	11.62			34.56
	46.18	12-Jan-11	10.82			35.36
	46.18	11-Jul-11	12.31			33.87
	46.18	26-Jan-12	9.48			36.7
	46.18	9-Jul-12	9.79			36.39
	46.18	8-Jan-13	11.31			34.87
	46.18	23-Jul-13	11.92			34.26
	46.18	8-Jan-14	11.56			34.62
46.18	16-Jul-14	10.57			35.61	
MW-49B	46.22	4-Feb-09	11.65			34.57
	46.22	24-Jul-09	11.93			34.29
	46.22	9-Jan-10	9.73			36.49
	46.22	12-Jul-10	11.36			34.86
	46.22	12-Jan-11	8.04			38.18
	46.22	11-Jul-11	12.29			33.93
	46.22	26-Jan-12	10.74			35.48
	46.22	9-Jul-12	7.38			38.84
	46.22	8-Jan-13	11.27	33.56	1.19	34.95
	46.22	23-Jul-13	11.83	33.91	0.84	34.39
	46.22	8-Jan-14	11.24			34.98
46.22	16-Jul-14	9.62			36.60	
MW-50A	46.96	7-Mar-07	8.16			38.8
	46.96	27-Jul-07	4.70			42.26
	46.96	31-Jan-08	5.68			41.28
	46.96	16-Jul-08	7.99			38.97

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-50A	46.96	4-Feb-09	9.31			37.65
	46.96	24-Jul-09	9.49			37.47
	46.96	9-Jan-10	7.02			39.94
	46.96	12-Jul-10	8.74			38.22
	46.96	12-Jan-11	5.61			41.35
	46.96	11-Jul-11	9.86			37.1
	46.96	26-Jan-12	7.21			39.75
	46.96	9-Jul-12	4.63			42.33
	46.96	8-Jan-13	5.91			41.05
	46.96	23-Jul-13	7.13			39.83
	46.96	8-Jan-14	6.71			40.25
	46.96	16-Jul-14	6.29			40.67
	MW-51A	47.80	7-Mar-07	6.96		
47.80		27-Jul-07	5.45			42.35
47.80		31-Jan-08	5.92			41.88
47.80		15-Jul-08				NM
47.80		4-Feb-09	9.98			37.82
47.80		24-Jul-09	10.34			37.46
47.80		9-Jan-10	7.83			39.97
47.80		12-Jul-10	9.16			38.64
47.80		12-Jan-11	8.56			39.24
47.80		11-Jul-11	12.74			35.06
47.80		26-Jan-12	7.33			40.47
47.80		9-Jul-12	7.26			40.54
47.80		8-Jan-13	7.62			40.18
47.80		23-Jul-13	10.54			37.26
47.80		8-Jan-14	10.21			37.59
47.80	16-Jul-14	8.51			39.29	
MW-51C	47.48	16-Jul-14	22.21			25.27
MW-52A	51.91	7-Mar-07	13.66			38.25
	51.91	27-Jul-07	11.76			40.15
	51.91	31-Jan-08	12.60			39.31
	51.91	15-Jul-08	14.42			37.49
	51.91	5-Feb-09	15.52			36.39
	51.91	23-Jul-09	16.39			35.52
	51.91	9-Jan-10	12.57			39.34
	51.91	12-Jul-10	14.19			37.72
	51.91	12-Jan-11	9.06			42.85
	51.91	12-Jul-11	16.53			35.38
	51.91	26-Jan-12	12.99			38.92
	51.91	9-Jul-12	12.43			39.48
	51.91	7-Jan-13	14.94			36.97
	51.91	22-Jul-13	16.29			35.62
	51.91	7-Jan-14	16.01			35.9
51.91	15-Jul-14	15.39			36.52	
MW-53C	45.49	7-Mar-07	16.12			29.37
	45.49	27-Jul-07	14.55			30.94
	45.49	29-Jan-08	15.12			30.37
	45.49	14-Jul-08	16.86			28.63
	45.49	3-Feb-09	16.69			28.8
	45.49	23-Jul-09	17.62			27.87
	45.49	9-Jan-10	15.19			30.3
	45.49	12-Jul-10	15.71			29.78
	45.49	12-Jan-11	16.58			28.91
	45.49	11-Jul-11	18.61			26.88
	45.49	27-Jan-12	17.54			27.95
	45.49	10-Jul-12	17.73			27.76
	45.49	8-Jan-13	18.14			27.35
	45.49	23-Jul-13	19.28			26.21
	45.49	8-Jan-14	21.12			24.37
45.49	16-Jul-14	17.37			28.12	
MW-54C	44.99	7-Mar-07	15.74			29.25
	44.99	27-Jul-07	14.63			30.36
	44.99	28-Jan-08	15.28			29.71
	44.99	14-Jul-08	16.68			28.31
	44.99	3-Feb-09	16.87			28.12
	44.99	23-Jul-09	17.84			27.15
	44.99	9-Jan-10	15.46			29.53
	44.99	12-Jul-10	16.49			28.5
	44.99	12-Jan-11	16.46			28.53
	44.99	11-Jul-11	18.23			26.76
	44.99	27-Jan-12	17.42			27.57
	44.99	10-Jul-12	17.36			27.63
	44.99	8-Jan-13	17.81			27.18
	44.99	23-Jul-13	18.89			26.1
	44.99	8-Jan-14	18.14			26.85
44.99	16-Jul-14	17.49			27.50	
MW-55A	52.01	4-Feb-09	13.79			38.22
	52.01	23-Jul-09	14.06			37.95
	52.01	9-Jan-10	10.83			41.18
	52.01	12-Jul-10	12.72			39.29
	52.01	12-Jan-11	10.13			41.88
	52.01	12-Jul-11	15.18			36.83
	52.01	26-Jan-12	11.71			40.3
52.01	9-Jul-12	12.29			39.72	

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HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
	52.01	7-Jan-13	13.34			38.67
	52.01	22-Jul-13	14.19			37.82
	52.01	7-Jan-14	12.73			39.28
	52.01	15-Jul-14	11.30			40.71
MW-55B	52.04	26-Jan-12	13.28			38.76
	52.04	9-Jul-12	13.93			38.11
	52.04	7-Jan-13	13.73			38.31
	52.04	22-Jul-13	14.59			37.45
	52.04	7-Jan-14	12.89			39.15
	52.04	15-Jul-14	12.49			39.55
MW-57A	47.72	5-Feb-09	12.73		0.00	34.99
	47.72	23-Jul-09	12.91		0.00	34.81
	47.72	9-Jan-10	9.78		0.00	37.94
	47.72	12-Jul-10	8.56	24.55	2.55	39.16
	47.72	12-Jan-11	9.83	22.76	4.14	37.89
	47.72	12-Jul-11	13.88	22.79	4.11	33.84
	47.72	26-Jan-12	10.54	22.78	4.12	37.18
	47.72	9-Jul-12	9.72	22.65	4.25	38
	47.72	7-Jan-13	10.61	22.14	4.76	37.11
	47.72	22-Jul-13	13.21	23.05	3.85	34.51
	47.72	7-Jan-14	11.79	26.15	0.75	35.93
	47.72	15-Jul-14	10.42	26.09	0.81	37.30
MW-57B	50.90	26-Jan-12	28.83	42.51	0.44	22.07
	50.90	9-Jul-12	27.93	42.45	0.50	22.97
	50.90	7-Jan-13	28.63	41.36	1.59	22.27
	50.90	22-Jul-13	16.34	41.67	1.28	34.56
	50.90	7-Jan-14	15.04			35.86
	50.90	15-Jul-14	15.71			35.19
MW-58A	47.76	5-Feb-09	14.55			33.21
	47.76	23-Jul-09	14.04			33.72
	47.76	9-Jan-10	12.29			35.47
	47.76	12-Jul-10	14.03			33.73
	47.76	12-Jan-11	11.88			35.88
	47.76	12-Jul-11	16.16			31.6
	47.76	26-Jan-12	12.26			35.5
	47.76	9-Jul-12	11.62			36.14
	47.76	7-Jan-13	11.91			35.85
	47.76	22-Jul-13	13.71			34.05
	47.76	7-Jan-14	13.26			34.5
	47.76	15-Jul-14	13.06			34.70
MW-59A	44.18	5-Feb-09	10.71			33.47
	44.18	23-Jul-09	9.96			34.22
	44.18	9-Jan-10	8.62			35.56
	44.18	12-Jul-10	9.97			34.21
	44.18	12-Jan-11	8.06			36.12
	44.18	11-Jul-11	10.54			33.64
	44.18	26-Jan-12	6.36			37.82
	44.18	9-Jul-12	7.63			36.55
	44.18	8-Jan-13	9.09			35.09
	44.18	23-Jul-13	9.76			34.42
	44.18	8-Jan-14	9.34			34.84
	44.18	16-Jul-14	9.17			35.01
MW-59B	44.36	12-Jul-10	7.43			36.93
	44.36	12-Jan-11	6.89			37.47
	44.36	11-Jul-11	11.03			33.33
	44.36	26-Jan-12	4.44			39.92
	44.36	9-Jul-12	7.48			36.88
	44.36	8-Jan-13	9.36			35
	44.36	23-Jul-13	9.94			34.42
	44.36	8-Jan-14	9.52			34.84
	44.36	16-Jul-14	8.67			35.69
MW-59D	44.22	5-Feb-09	84.17			-39.95
	44.22	23-Jul-09	83.53			-39.31
	44.22	9-Jan-10	81.73			-37.51
	44.22	12-Jul-10	82.16			-37.94
	44.22	12-Jan-11	82.83			-38.61
	44.22	11-Jul-11	82.89			-38.67
	44.22	26-Jan-12	82.93			-38.71
	44.22	9-Jul-12	82.36			-38.14
	44.22	8-Jan-13	82.81			-38.59
	44.22	23-Jul-13	83.04			-38.82
	44.22	8-Jan-14	83.14			-38.92
	44.22	16-Jul-14	82.67			-38.45
MW-60A	46.79	4-Feb-09	9.56			37.23
	46.79	23-Jul-09	9.71			37.08
	46.79	9-Jan-10	7.72			39.07
	46.79	12-Jul-10	8.61			38.18
	46.79	12-Jan-11	5.82			40.97
	46.79	11-Jul-11	9.86			36.93
	46.79	26-Jan-12	4.34			42.45
	46.79	9-Jul-12	5.42			41.37
	46.79	8-Jan-13	6.91			39.88
	46.79	23-Jul-13	10.42			36.37
	46.79	8-Jan-14	8.06			38.73
	46.79	16-Jul-14	7.29			39.50
MW-61A	44.67	3-Feb-09	8.35			36.32
	44.67	23-Jul-09	8.47			36.2
	44.67	9-Jan-10	6.49			38.18

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-61A	44.67	12-Jul-10	8.09			36.58
	44.67	12-Jan-11	6.56			38.11
	44.67	11-Jul-11	9.67			35
	44.67	26-Jan-12	2.48			42.19
	44.67	9-Jul-12	4.55			40.12
	44.67	8-Jan-13	6.72			37.95
	44.67	23-Jul-13	9.16			35.51
	44.67	8-Jan-14	7.04			37.63
	44.67	16-Jul-14	6.34			38.33
MW-62B	48.16	4-Feb-09	6.99			41.17
	48.16	24-Jul-09	7.39			40.77
	48.16	8-Jan-10	5.13			43.03
	48.16	12-Jul-10	5.79			42.37
	48.16	12-Jan-11	4.21			43.95
	48.16	12-Jul-11	11.06			37.1
	48.16	26-Jan-12	3.18			44.98
	48.16	9-Jul-12	4.87			43.29
	48.16	8-Jan-13	5.92			42.24
	48.16	23-Jul-13	7.01			41.15
	48.16	8-Jan-14	6.52			41.64
	48.16	15-Jul-14	6.06			42.10
MW-63B	44.48	5-Feb-09	31.54			12.94
	44.48	23-Jul-09	9.52			34.96
	44.48	9-Jan-10	1.34			43.14
	44.48	12-Jul-10	5.71			38.77
	44.48	13-Jan-11	7.13			37.35
	44.48	11-Jul-11	4.21			40.27
	44.48	27-Jan-12	2.96			41.52
	44.48	10-Jul-12	1.32			43.16
	44.48	8-Jan-13	8.54			35.94
	44.48	23-Jul-13	9.43			35.05
	44.48	8-Jan-14	7.72			36.76
	44.48	16-Jul-14	7.03			37.45
MW-64A	48.31	4-Feb-09	9.02			39.29
	48.31	24-Jul-09	9.13			39.18
	48.31	9-Jan-10	6.52			41.79
	48.31	12-Jul-10	6.82			41.49
	48.31	12-Jan-11	4.77			43.54
	48.31	12-Jul-11	8.17			40.14
	48.31	26-Jan-12	4.81			43.5
	48.31	9-Jul-12	5.93			42.38
	48.31	7-Jan-13	7.03			41.28
	48.31	22-Jul-13	8.79			39.52
	48.31	7-Jan-14	8.39			39.92
	48.31	15-Jul-14	7.72			40.59
MW-65D	44.55	5-Feb-09	86.72			-42.17
	44.55	23-Jul-09	86.47			-41.92
	44.55	9-Jan-10	84.39			-39.84
	44.55	12-Jul-10	84.39			-39.84
	44.55	12-Jan-11	83.96			-39.41
	44.55	11-Jul-11	85.81			-41.26
	44.55	27-Jan-12	85.76			-41.21
	44.55	8-Jan-13	85.81			-41.26
	44.55	23-Jul-13	85.83			-41.28
	44.55	8-Jan-14	85.78			-41.23
	44.55	16-Jul-14	84.91			-40.36
	MW-66D	46.51	5-Feb-09	86.18		
46.51		23-Jul-09	85.82			-39.31
46.51		9-Jan-10	84.02			-37.51
46.51		12-Jul-10	84.86			-38.35
46.51		12-Jan-11	NM			NM
46.51		11-Jul-11	84.93			-38.42
46.51		26-Jan-12	84.88			-38.37
46.51		9-Jul-12	85.02			-38.51
46.51		8-Jan-13	86.09			-39.58
46.51		23-Jul-13	86.42			-39.91
46.51		8-Jan-14	86.09			-39.58
46.51		16-Jul-14	85.26			-38.75
MW-67B	43.93	12-Jul-10	5.76			38.17
	43.93	13-Jan-11	10.62			33.31
	43.93	11-Jul-11	17.64			26.29
	43.93	27-Jan-12	9.87			34.06
	43.93	10-Jul-12	11.19			32.74
	43.93	8-Jan-13	11.72			32.21
	43.93	23-Jul-13	10.69			33.24
	43.93	8-Jan-14	10.64			33.29
	43.93	16-Jul-14	11.22			32.71
MW-68B	44.63	27-Jan-12	1.16			43.47
	44.63	10-Jul-12	3.82			40.81
	44.63	8-Jan-13	6.76			37.87
	44.63	23-Jul-13	10.33			34.3
	44.63	8-Jan-14	5.82			38.81
	44.63	16-Jul-14	7.41			37.22
MW-68C	44.80	12-Jul-10	16.52			28.28
	44.80	13-Jan-11	16.92			27.88
	44.80	11-Jul-11	19.34			25.46
	44.80	27-Jan-12	17.66			27.14

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
MW-68C	44.80	10-Jul-12	17.96			26.84
	44.80	8-Jan-13	19.39			25.41
	44.80	23-Jul-13	19.87			24.93
	44.80	8-Jan-14	19.29			25.51
	44.80	16-Jul-14	18.39			26.41
MW-69A	45.71	12-Jul-10	11.81			33.9
	45.71	12-Jan-11	11.16			34.55
	45.71	11-Jul-11	NM			--
	45.71	26-Jan-12	10.44			35.27
	45.71	9-Jul-12	4.21			41.5
	45.71	8-Jan-13	5.31			40.4
	45.71	23-Jul-13	7.34			38.37
	45.71	8-Jan-14	7.02			38.69
	45.71	16-Jul-14	6.34			39.37
MW-70B	44.86	27-Jan-12	6.51	34.26	1.21	38.35
	44.86	10-Jul-12	6.06	34.17	1.30	38.8
	44.86	8-Jan-13	6.67	34.02	1.68	38.19
	44.86	23-Jul-13	8.22	34.07	1.63	36.64
	44.86	8-Jan-14	7.89	35.51	0.14	36.97
	44.86	16-Jul-14	6.16	34.71	0.94	38.70
MW-71B	44.59	27-Jan-12	7.08			37.51
	44.59	10-Jul-12	8.16			36.43
	44.59	8-Jan-13	4.09			40.5
	44.59	23-Jul-13	8.61			35.98
	44.59	8-Jan-14	16.36			28.23
	44.59	16-Jul-14	16.02			28.57
MW-72B	51.97	26-Jan-12	38.76			13.21
	51.97	9-Jul-12	27.27			24.7
	51.97	7-Jan-13	20.08			31.89
	51.97	22-Jul-13	18.39			33.58
	51.97	7-Jan-14	17.31			34.66
	51.97	15-Jul-14	16.91			35.06
MW-73B	51.42	26-Jan-12	25.48			25.94
	51.42	9-Jul-12	25.03			26.39
	51.42	7-Jan-13	26.11			25.31
	51.42	22-Jul-13	26.87			24.55
	51.42	7-Jan-14	26.19			25.23
	51.42	15-Jul-14	25.14			26.28
MW-74B	47.58	26-Jan-12	7.63			39.95
	47.58	9-Jul-12	7.15			40.43
	47.58	8-Jan-13	9.62			37.96
	47.58	23-Jul-13	11.72			35.86
	47.58	8-Jan-14	9.59			37.99
	47.58	16-Jul-14	9.01			38.57
MW-75B	46.78	26-Jan-12	9.07	35.26	1.84	37.71
	46.78	9-Jul-12	9.32	35.2	1.90	37.46
	46.78	8-Jan-13	10.16	34.13	2.97	36.62
	46.78	23-Jul-13	9.74	35.71	1.39	37.04
	46.78	8-Jan-14	10.13	36.72	0.43	36.65
	46.78	16-Jul-14	11.41	35.71	1.44	35.37
MW-76C	47.84	16-Jul-14	22.68			25.16
MW-77A	49.05	16-Jul-14	6.62			42.43
MW-78A	48.68	16-Jul-14	8.02	28.72	1.38	40.66
MW-79A	48.95	16-Jul-14	7.26			41.69
MW-80B	47.11	16-Jul-14	5.29			41.82
MW-81B	46.77	16-Jul-14	6.47			40.30
P-10	47.69	2-Sep-93	6.87			40.85
	47.69	21-Dec-93	3.32			44.4
	47.69	24-Mar-94	3.88			43.84
	47.69	22-Jun-94	4.98			42.74
	47.69	28-Sep-94	6.38			41.34
	47.69	13-Oct-94	7.07			40.65
	47.69	24-Jan-95	2.67			45.05
	47.69	11-Apr-95	2.59			45.13
	47.69	11-Jul-95	4.69			43.03
	47.69	23-Jan-96	5.84			41.88
	47.69	19-Jul-96	10.04			37.68
	47.69	17-Sep-96	8.34			39.38
	47.69	31-Oct-96	6.97			40.75
	47.69	22-Nov-96	8.84			38.88
	47.69	27-Dec-96	6.20			41.52
	47.69	22-Jan-97	4.10			43.62
	47.69	21-Feb-97	2.86			44.86
	47.69	25-Mar-97	3.19			44.53
	47.69	23-Apr-97	4.42			43.3
	47.69	24-Apr-97	4.57			43.15
	47.69	13-May-97	3.14			44.58
	47.69	20-Jun-97	4.94			42.78
	47.69	25-Jun-97	2.74			44.98
	47.69	1-Jul-97	4.13			43.59
	47.69	24-Jul-97	7.91			39.81
	47.69	16-Aug-97	7.86			39.86
	47.69	22-Aug-97	8.67			39.05
	47.69	25-Sep-97	6.54			41.18
	47.69	22-Oct-97	5.36			42.36
	47.69	25-Nov-97	5.36			42.36
47.69	19-Dec-97	4.72			43	

**TABLE VLD  
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UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
P-10	47.69	20-Jan-98	3.40			44.32
	47.69	29-Jan-98	3.11			44.61
	47.69	18-Mar-98	2.84			44.88
	47.69	24-Apr-98	6.80			40.92
	47.69	21-May-98	7.35			40.37
	47.69	30-Jul-98	8.23			39.49
	47.69	25-Aug-98	7.34			40.38
	47.69	21-Sep-98	5.25			42.47
	47.69	26-Oct-98	6.11			41.61
	47.69	23-Nov-98	4.10			43.62
	47.69	26-Feb-99	3.21			44.51
	47.69	16-Mar-99	4.21			43.51
	47.69	29-Apr-99	4.53			43.19
	47.69	1-Jun-99	4.53			43.19
	47.69	30-Jul-99	6.00			41.72
	47.69	27-Aug-99	4.72			43
	47.69	27-Sep-99	9.58			38.14
	47.69	29-Oct-99	10.61			37.11
	47.69	29-Dec-99	11.55			36.17
	47.69	4-Feb-00	13.71			34.01
	47.69	25-Feb-00	10.44			37.28
	47.69	27-Mar-00	7.53			40.19
	47.69	7-Apr-00	7.09			40.63
	47.69	31-May-00	7.14			40.58
	47.69	1-Jun-00	7.11			40.61
	47.69	28-Jul-00	7.15			40.57
	47.69	30-Aug-00	10.15			37.57
	47.69	19-Sep-00	11.56			36.16
	47.69	27-Oct-00	8.66			39.06
	47.69	21-Nov-00	9.64			38.08
	47.69	1-May-01	6.52			41.2
	47.69	1-Oct-01	6.85			40.87
	47.69	11-Mar-02	3.41			44.31
	47.69	23-Sep-02	3.54			44.18
	47.69	10-Mar-03	2.43			45.26
	47.69	23-Sep-03	1.61			46.08
	47.69	15-Mar-04	2.85			44.84
	47.69	13-Sep-04	7.99			39.7
	47.69	18-Jul-05	4.20			43.49
	47.69	4-Jan-06	8.58			39.11
	47.69	27-Jul-06	3.46			44.23
	47.69	23-Jan-07	2.36			45.33
	47.69	7-Mar-07	NM			NM
	47.69	27-Jul-07	3.75			43.94
	47.69	29-Jan-08	2.30			45.39
	47.69	16-Jul-08	6.91			40.78
	47.69	22-Jan-09	6.35			41.34
47.69	23-Jul-09	NM			NM	
47.69	8-Jan-10	4.06			43.63	
47.69	12-Jul-10	2.06			45.63	
47.73	12-Jan-11	4.13			43.60	
47.73	12-Jul-11	9.84			37.89	
47.73	27-Jan-12	3.12			44.61	
47.73	10-Jul-13	10.79			36.94	
47.73	8-Jan-14	5.51			42.22	
47.73	2-Jul-14	7.74			39.99	
P-11	48.98	2-Sep-93	7.87			41.15
	48.98	21-Dec-93	4.57			44.45
	48.98	24-Mar-94	5.04			43.98
	48.98	22-Jun-94	6.19			42.83
	48.98	28-Sep-94	7.40			41.62
	48.98	13-Oct-94	8.14			40.88
	48.98	24-Jan-95	3.90			45.12
	48.98	11-Apr-95	3.77			45.25
	48.98	11-Jul-95	5.69			43.33
	48.98	23-Jan-96	6.81			42.21
	48.98	19-Jul-96	7.81			41.21
	48.98	17-Sep-96	9.15			39.87
	48.98	31-Oct-96	7.52			41.5
	48.98	22-Nov-96	9.46			39.56
	48.98	27-Dec-96	6.64			42.38
	48.98	22-Jan-97	4.70			44.32
	48.98	21-Feb-97	3.88			45.14
	48.98	25-Mar-97	4.09			44.93
	48.98	23-Apr-97	5.27			43.75
	48.98	24-Apr-97	5.41			43.61
	48.98	13-May-97	4.12			44.9
	48.98	20-Jun-97	5.79			43.23
	48.98	25-Jun-97	3.83			45.19
	48.98	1-Jul-97	5.01			44.01
	48.98	24-Jul-97	7.56			41.46
	48.98	16-Aug-97	8.74			40.28
	48.98	22-Aug-97	9.37			39.65
48.98	25-Sep-97	7.24			41.78	
48.98	22-Oct-97	5.98			43.04	
48.98	25-Nov-97	6.00			43.02	

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UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
P-11	48.98	19-Dec-97	5.52			43.5
	48.98	20-Jan-98	4.30			44.72
	48.98	4-Mar-98	4.08			44.94
	48.98	18-Mar-98	3.92			45.1
	48.98	24-Apr-98	7.61			41.41
	48.98	21-May-98	8.10			40.92
	48.98	30-Jul-98	9.21			39.81
	48.98	25-Aug-98	8.44			40.58
	48.98	21-Sep-98	5.91			43.11
	48.98	26-Oct-98	7.59			41.43
	48.98	23-Nov-98	5.41			43.61
	48.98	29-Jan-99	4.11			44.91
	48.98	26-Feb-99	4.22			44.8
	48.98	16-Mar-99	4.96			44.06
	48.98	29-Apr-99	5.15			43.87
	48.98	1-Jun-99	5.15			43.87
	48.98	30-Jul-99	6.66			42.36
	48.98	27-Aug-99	5.23			43.79
	48.98	27-Sep-99	10.49			38.53
	48.98	29-Oct-99	11.91			37.11
	48.98	29-Dec-99	11.12			37.9
	48.98	4-Feb-00	12.13			36.89
	48.98	25-Feb-00	10.46			38.56
	48.98	27-Mar-00	8.32			40.7
	48.98	7-Apr-00	7.91			41.11
	48.98	31-May-00	7.96			41.06
	48.98	1-Jun-00	7.93			41.09
	48.98	28-Jul-00	7.97			41.05
	48.98	30-Aug-00	10.88			38.14
	48.98	19-Sep-00	12.32			36.7
	48.98	27-Oct-00	10.94			38.08
	48.98	21-Nov-00	9.77			39.25
	48.98	1-May-01	7.48			41.54
	48.98	1-Oct-01	7.74			41.28
	48.98	11-Mar-02	4.51			44.51
	48.98	23-Sep-02	4.46			44.56
	48.98	10-Mar-03	3.69			45.29
	48.98	23-Sep-03	4.54			44.44
	48.98	15-Mar-04	4.51			44.47
	48.98	13-Sep-04	9.14			39.84
	48.98	18-Jul-05	5.27			43.71
	48.98	4-Jan-06	9.56			39.42
	48.98	27-Jul-06	4.54			44.44
	48.98	7-Mar-07	NM			NM
	48.98	27-Jul-07	4.61			44.37
	48.98	30-Jan-08	2.71			46.27
	48.98	15-Jul-08	7.93			41.05
	48.98	4-Feb-09	7.82			41.16
	48.98	24-Jul-09	7.74			41.24
	48.98	8-Jan-10	5.67			43.31
48.98	12-Jul-10	6.78			42.2	
48.98	12-Jan-11	4.21			44.77	
48.98	12-Jul-11	11.51			37.47	
48.98	26-Jan-12	4.25			44.73	
48.98	7-Jan-13	7.96			41.02	
48.98	22-Jul-13	10.96			38.02	
48.98	7-Jan-14	6.52			42.46	
48.98	16-Jul-14	8.87			40.11	
P-12	48.78	2-Sep-93	7.02			41.8
	48.78	21-Dec-93	4.30			44.52
	48.78	24-Mar-94	4.45			44.37
	48.78	22-Jun-94	5.06			43.76
	48.78	28-Sep-94	6.46			42.36
	48.78	13-Oct-94	7.19			41.63
	48.78	24-Jan-95	3.63			45.19
	48.78	11-Apr-95	3.25			45.57
	48.78	11-Jul-95	4.62			44.2
	48.78	23-Jan-96	6.62			42.2
	48.78	19-Jul-96	8.64			40.18
	48.78	17-Sep-96	8.12			40.7
	48.78	31-Oct-96	6.81			42.01
	48.78	22-Nov-96	8.70			40.12
	48.78	27-Dec-96	6.57			42.25
	48.78	22-Jan-97	4.93			43.89
	48.78	21-Feb-97	3.61			45.21
	48.78	25-Mar-97	3.70			45.12
	48.78	23-Apr-97	4.58			44.24
	48.78	24-Apr-97	4.74			44.08
48.78	13-May-97	3.69			45.13	
48.78	20-Jun-97	4.86			43.96	
48.78	25-Jun-97	3.35			45.47	

**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

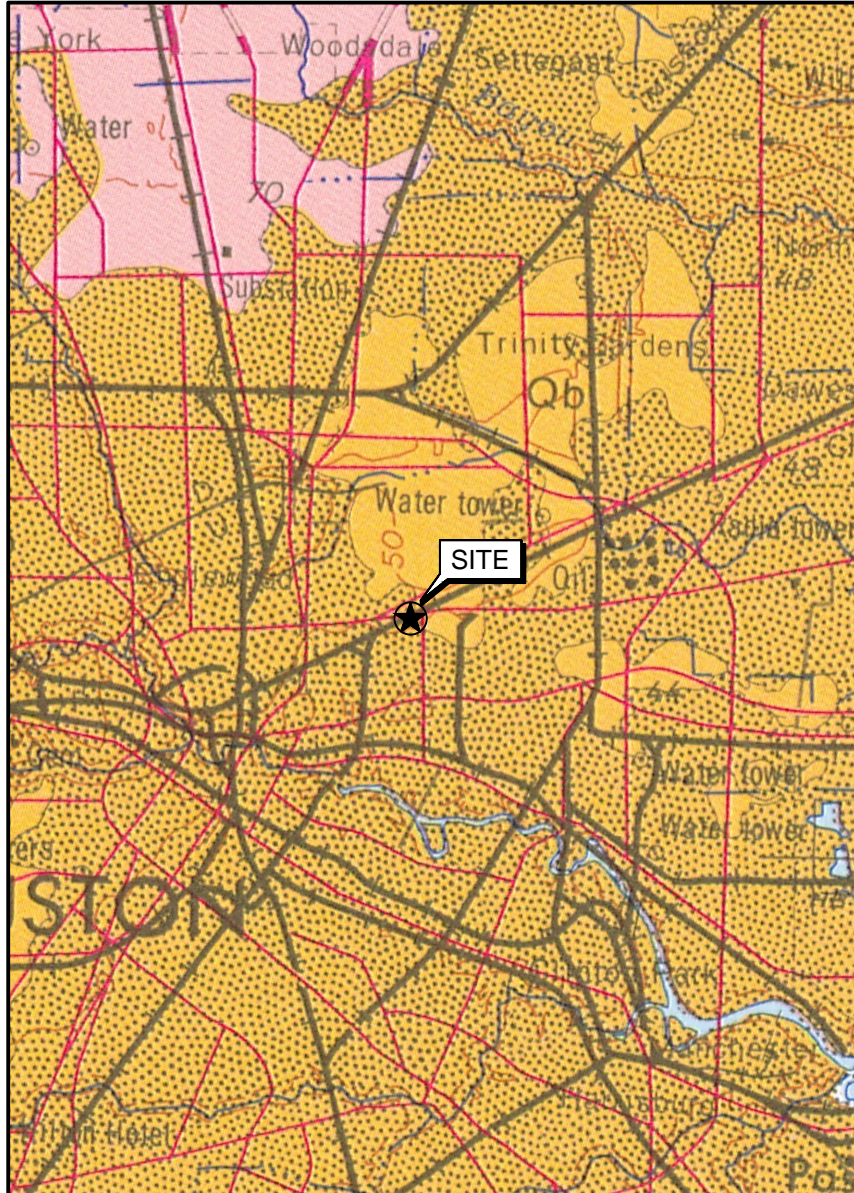
Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
P-12	48.78	1-Jul-97	4.11			44.71
	48.78	24-Jul-97	6.58			42.24
	48.78	16-Aug-97	7.80			41.02
	48.78	22-Aug-97	8.22			40.6
	48.78	25-Sep-97	6.54			42.28
	48.78	22-Oct-97	5.66			43.16
	48.78	25-Nov-97	5.70			43.12
	48.78	19-Dec-97	5.13			43.69
	48.78	20-Jan-98	4.15			44.67
	48.78	4-Mar-98	3.78			45.04
	48.78	18-Mar-98	3.61			45.21
	48.78	24-Apr-98	6.90			41.92
	48.78	21-May-98	7.80			41.02
	48.78	30-Jul-98	8.15			40.67
	48.78	25-Aug-98	8.31			40.51
	48.78	21-Sep-98	5.64			43.18
	48.78	26-Oct-98	7.66			41.16
	48.78	23-Nov-98	5.65			43.17
	48.78	29-Jan-99	4.20			44.62
	48.78	26-Feb-99	4.31			44.51
	48.78	16-Mar-99	4.99			43.83
	48.78	29-Apr-99	5.10			43.72
	48.78	1-Jun-99	5.10			43.72
	48.78	30-Jul-99	6.75			42.07
	48.78	27-Aug-99	5.34			43.48
	48.78	27-Sep-99	9.36			39.46
	48.78	29-Oct-99	10.11			38.71
	48.78	29-Dec-99	9.44			39.38
	48.78	4-Feb-00	12.10			36.72
	48.78	25-Feb-00	8.63			40.19
	48.78	27-Mar-00	7.76			41.06
	48.78	7-Apr-00	7.35			41.47
	48.78	31-May-00	7.39			41.43
	48.78	1-Jun-00	7.34			41.48
	48.78	28-Jul-00	7.37			41.45
	48.78	30-Aug-00	10.66			38.16
	48.78	19-Sep-00	11.45			37.37
	48.78	27-Oct-00	10.94			37.88
	48.78	21-Nov-00	8.93			39.89
	48.78	1-May-01	6.70			42.12
	48.78	1-Oct-01	6.93			41.89
	48.78	11-Mar-02	4.15			44.67
	48.78	23-Sep-02	3.90			44.92
	48.78	10-Mar-03	3.13			45.65
	48.78	23-Sep-03	3.86			44.92
	48.78	15-Mar-04	NM			NM
	48.78	13-Sep-04	7.93			40.85
	48.78	18-Jul-05	5.06			43.72
	48.78	4-Jan-06	8.98			39.8
	48.78	27-Jul-06	4.35			44.43
	48.78	22-Jan-07	3.19			45.59
	48.78	7-Mar-07	NM			NM
	48.78	27-Jul-07	4.22			44.56
	48.78	29-Jan-08	3.03			45.75
	48.78	16-Jul-08	6.78			42
	48.78	22-Jan-09	6.99			41.79
	48.78	24-Jul-09	NM			NM
	48.78	8-Jan-10	4.13			44.65
	48.78	12-Jul-10	3.93			44.85
	48.80	12-Jan-11	4.83			43.97
	48.80	12-Jul-11	10.02			38.78
	48.80	27-Jan-12	4.52			44.28
	48.80	9-Jul-12	5.15			43.65
	48.80	10-Jul-13	9.73			39.07
	48.80	8-Jan-14	6.41			42.39
	48.80	2-Jul-14	6.46			42.34



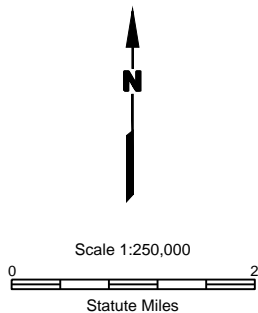
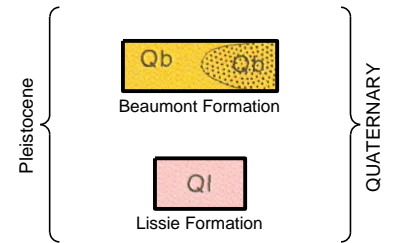
**TABLE VLD  
HISTORICAL WATER LEVELS FOR CURRENT SITE MONITORING WELLS  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

Well ID	TOC Elevation (ft)	Date	Depth to Water (ft)	Depth to DNAPL (ft BTOC)	DNAPL Thickness (ft)	GW Elevation (ft)
TW-01		27-Jul-07	8.45			
		31-Jan-08	8.17			
		23-Jul-09	12.16			
		8-Jan-10	10.03			
		12-Jul-10	NM			
TW-02		27-Jul-07	11.64	10.04 <sup>2</sup>	1.57 <sup>2</sup>	
		31-Jan-08	10.96	9.81 <sup>2</sup>	1.15 <sup>2</sup>	
		15-Jul-08	11.42			
		4-Feb-09	12.31			
		24-Jul-09	NM			
		8-Jan-10	NM			
		12-Jul-10	NM			
TW-41B	49.67	4-Feb-09	8.44			41.23
	49.67	24-Jul-09	8.34			41.33
	49.67	8-Jan-10	4.86			44.81
	49.67	12-Jul-10	6.12			43.55
	49.67	12-Jan-11	5.17			44.5
	49.67	12-Jul-11	12.02			37.65
	49.67	26-Jan-12	5.27			44.4
	49.67	9-Jul-12	6.23			43.44
	49.67	7-Jan-13	8.54			41.13
	49.67	22-Jul-13	11.53			38.14
	49.67	7-Jan-14	7.32			42.35
	49.67	16-Jul-14	9.65			40.02
	TW-55A	49.67	9-Jul-12	13.44		
TW-56A	51.89	5-Feb-09	17.48			34.41
	51.89	23-Jul-09	17.17			34.72
	51.89	8-Jan-10	14.53			37.36
	51.89	12-Jul-10	15.78			36.11
	51.89	12-Jan-11	14.09			37.8
	51.89	12-Jul-11	17.89			34
	51.89	26-Jan-12	15.06			36.83
	51.89	7-Jan-13	16.92			34.97
	51.89	22-Jul-13	18.12			33.77
	51.89	7-Jan-14	-			-
	51.89	15-Jul-14	16.05			35.84


## **FIGURES**

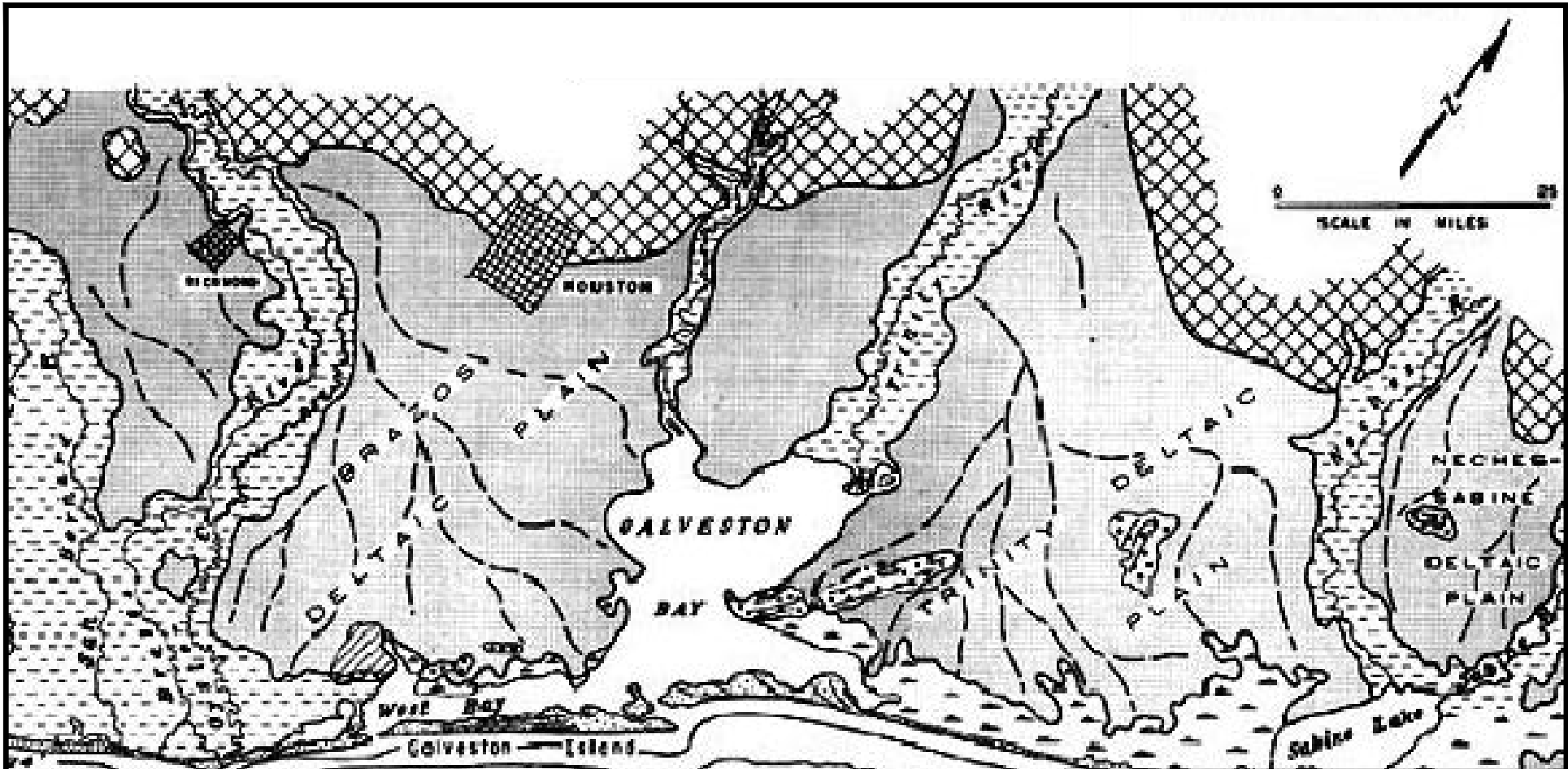


**EXPLANATION**



Source: Geologic Atlas of Texas, Houston Sheet (1982).

 <b>UNION PACIFIC RAILROAD CO.</b>		
<b>HOUSTON WOOD PRESERVING WORKS</b>		
Figure VI.A		
<b>GEOLOGIC MAP</b>		
PROJECT: 1358	BY: AJD	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	
<b>PASTOR, BEHLING &amp; WHEELER, LLC</b> CONSULTING ENGINEERS AND SCIENTISTS		



SYMBOLS		RECENT	LATE PLEISTOCENE	OLDER PLEISTOCENE
	Abandoned beaches			
	Abandoned Pleistocene distributaries			(Contour interval in feet)
	Recent Streams			

**UNION PACIFIC RAILROAD CO.**

HOUSTON WOOD PRESERVING WORKS

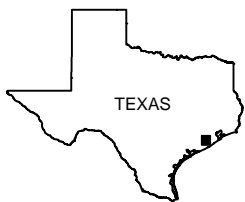
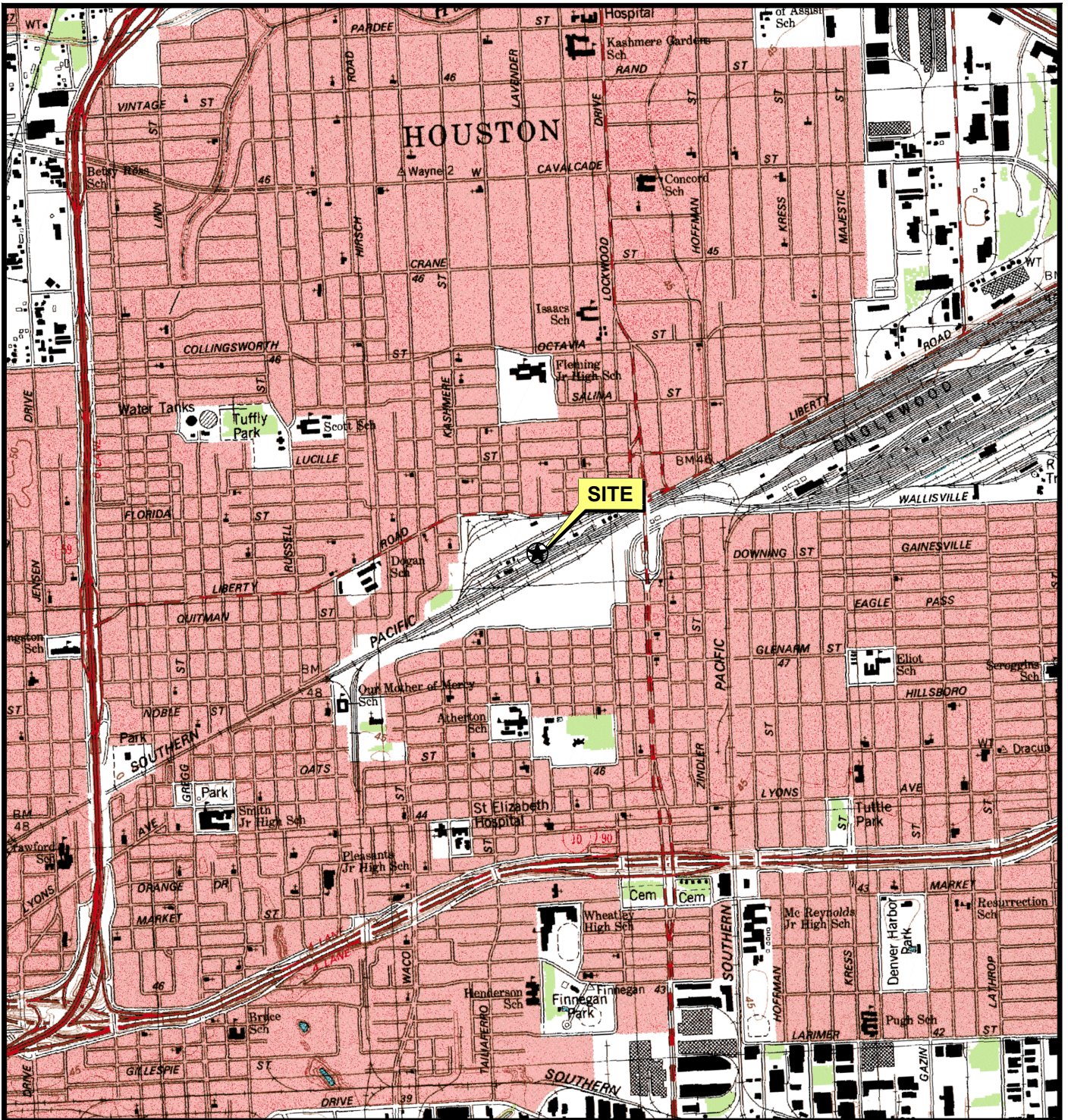
Figure VI.B

**REGIONAL PHYSIOGRAPHIC MAP**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

Source:  
Bernard, H.A. and Major, C.F., 1956. Sedimentary Features Diagnostic of Alluvial Point Bar Sands.  
EPR Memorandum Report 23, October.



QUADRANGLE LOCATIONS



Scale in Feet  
0 1000 2000

SOURCE:  
Base map from www.tnris.gov, Settegast, TX 7.5 min. USGS quadrangle dated 1982.



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure VI.C

**TOPOGRAPHIC MAP**

PROJECT: 1358

BY: AJD


REVISIONS

DATE: OCT., 2014

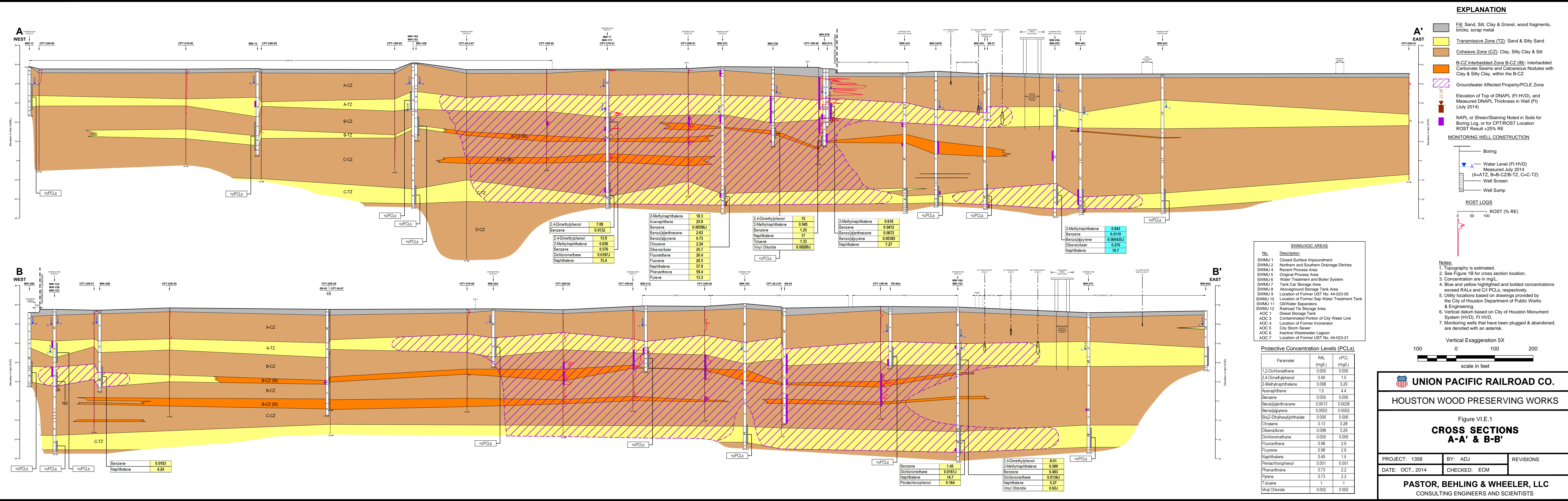
CHECKED: ECM

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Geologic units					Hydrogeologic units
Erathem	System	Series	Group	Formation	Aquifers and confining units
Cenozoic	Quaternary	Holocene	Houston	Alluvium	Chicot aquifer
		Pleistocene	Houston	Beaumont Clay	
				Montgomery Formation	
				Bentley Formation	
	Willis Sand				
	Tertiary	Pliocene	Citronelle	Goliad Sand	Evangeline aquifer
		Miocene	Fleming	Fleming Formation	Burkeville confining unit
					Jasper aquifer

 <b>UNION PACIFIC RAILROAD CO.</b>		
HOUSTON WOOD PRESERVING WORKS		
Figure VI.D		
<b>GENERALIZED STRATIGRAPHIC COLUMN OF THE GULF COAST AQUIFER</b>		
PROJECT: 1358	BY: AJD	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	
<b>PASTOR, BEHLING &amp; WHEELER, LLC</b> CONSULTING ENGINEERS AND SCIENTISTS		

Source:  
Kasmarek, M.C. and Storm, E.W., 2002. Hydrogeology and Simulation of Ground-Water Flow and Land-Surface Subsidence in the Chicot and Evangeline Aquifers, Houston Area, Texas. U.S. Geological Survey Water Resources Investigation Report 02-4022.



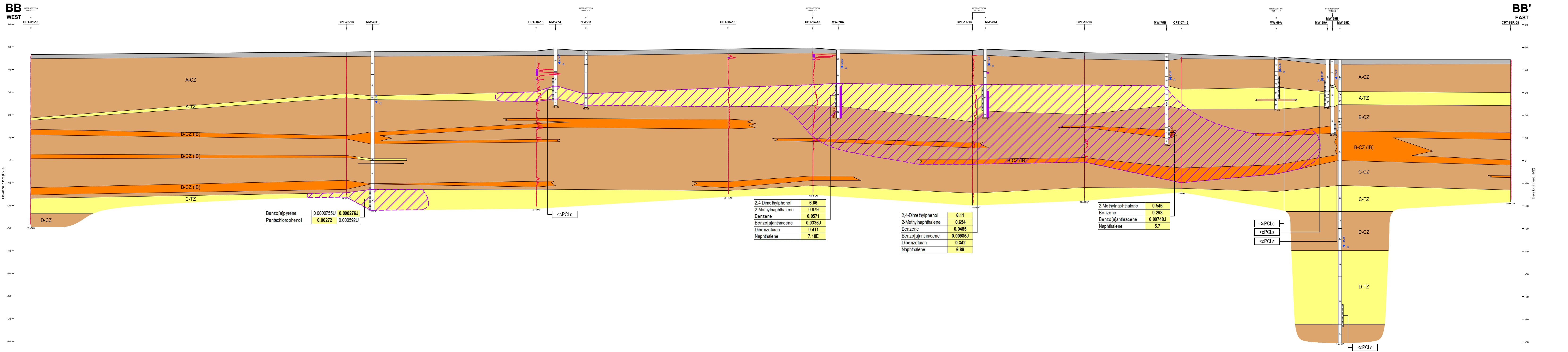
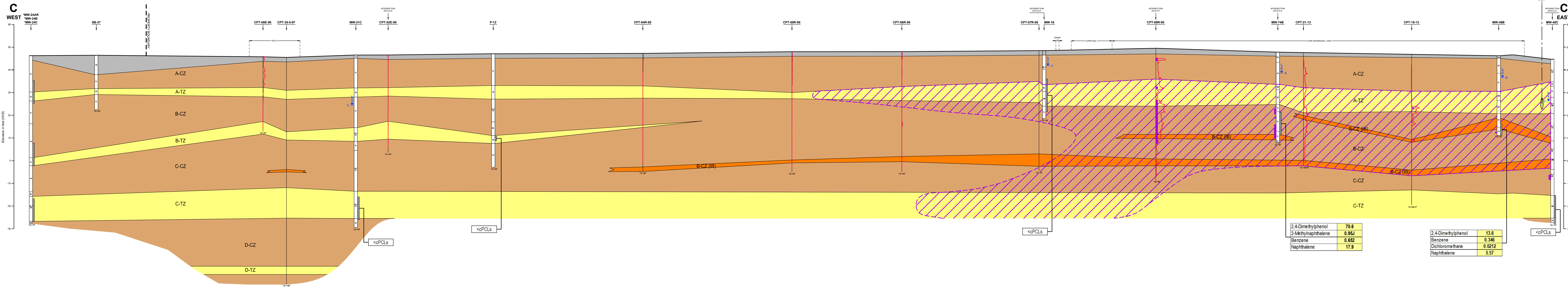
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**HOUSTON WOOD PRESERVING WORKS**

Figure VI.E.1  
**CROSS SECTIONS A-A' & B-B'**

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### EXPLANATION

- Fill: Sand, Silt, Clay & Gravel, wood fragments, bricks, scrap metal
- Transmissive Zone (TZ): Sand & Silty Sand
- Cohesive Zone (CZ): Clay, Silty Clay & Silt
- B-CZ Interbedded Zone B-CZ (IB): Interbedded Carbonate Seams and Calcareous Nodules with Clay & Silty Clay, within the B-CZ
- Groundwater Affected Property/PCLE Zone
- Elevation of Top of DNAPL (Fl HVD), and Measured DNAPL Thickness in Well (Ft) (July 2014)
- NAPL or Sheen/Staining Noted in Soils for Boring Log, or for CPT/ROST Location ROST Result >25% RE

### MONITORING WELL CONSTRUCTION

- Boring
- Water Level (Ft HVD) Measured July 2014 (A=ATZ, B=B-CZ/B-TZ, C=C-TZ)
- Well Screen
- Well Sump

### ROST LOGS

0 50 100 ROST (% RE)

### SWMU/AOC AREAS

No.	Description
SWMU 1	Closed Surface Impoundment
SWMU 2	Northern and Southern Drainage Ditches
SWMU 4	Recent Process Area
SWMU 5	Original Process Area
SWMU 6	Water Treatment and Boiler System
SWMU 7	Tank Car Storage Area
SWMU 8	Aboveground Storage Tank Area
SWMU 9	Location of Former UST No. 44-023-05
SWMU 10	Location of Former Sap Water Treatment Tank
SWMU 11	Oil/Water Separators
SWMU 12	Railroad Tie Storage Area
AOC 1	Diesel Storage Tank
AOC 3	Contaminated Portion of City Water Line
AOC 4	Location of Former Incinerator
AOC 5	City Storm Sewer
AOC 6	Inactive Wastewater Lagoon
AOC 7	Location of Former UST No. 44-023-21

### Protective Concentration Levels (PCLs)

Parameter	RAL (mg/L)	cPCL (mg/L)
1,2-Dichloroethane	0.005	0.005
2,4-Dimethylphenol	0.49	1.5
2-Methylnaphthalene	0.098	0.29
Acenaphthene	1.5	4.4
Benzene	0.005	0.005
Benzo[a]anthracene	0.0013	0.0028
Benzo[a]pyrene	0.0002	0.0002
Bis[2-Ethylhexyl]phthalate	0.006	0.006
Chrysene	0.13	0.28
Dibenzofuran	0.098	0.29
Dichloromethane	0.005	0.005
Fluoranthene	0.98	2.9
Fluorene	0.98	2.9
Naphthalene	0.49	1.5
Pentachlorophenol	0.001	0.001
Phenanthrene	0.73	2.2
Pyrene	0.73	2.2
Toluene	1	1
Vinyl Chloride	0.002	0.002

Vertical Exaggeration 5X

100 0 100 200 scale in feet

**UNION PACIFIC RAILROAD CO.**

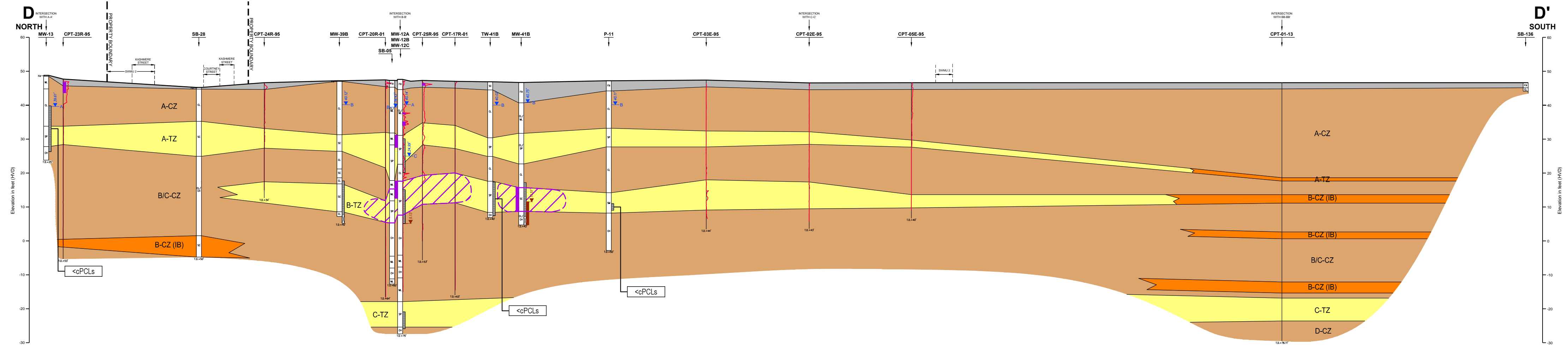
**HOUSTON WOOD PRESERVING WORKS**

Figure VI.E.2  
**CROSS SECTIONS C-C' & BB-BB'**

PROJECT: 1358	BY: ADJ	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	

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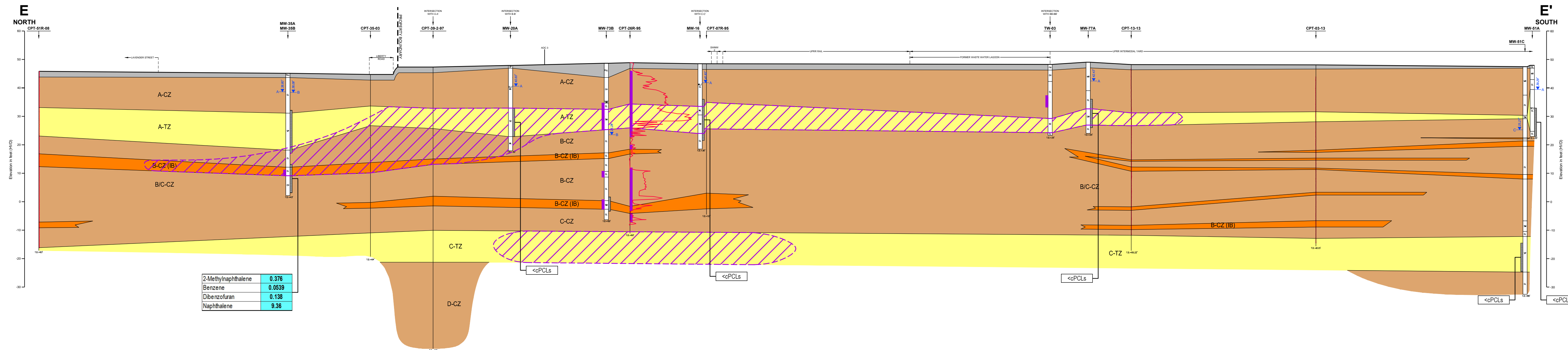
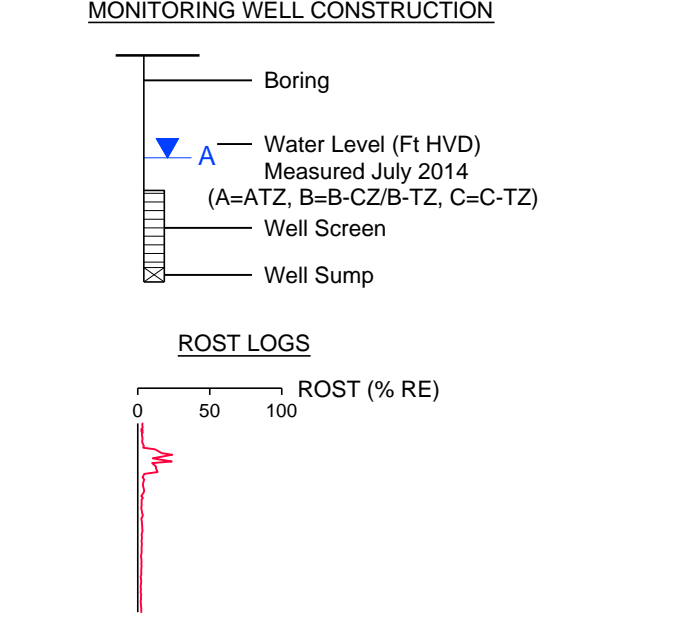
**Protective Concentration Levels (PCLs)**

Parameter	RAL (mg/L)	cPCL (mg/L)
1,2-Dichloroethane	0.005	0.005
2,4-Dimethylphenol	0.49	1.5
2-Methylnaphthalene	0.098	0.29
Acenaphthene	1.5	4.4
Benzene	0.005	0.005
Benzo[a]anthracene	0.0013	0.0028
Benzo[a]pyrene	0.0002	0.0002
Bis(2-Ethylhexyl)phthalate	0.006	0.006
Chrysene	0.13	0.28
Dibenzofuran	0.098	0.29
Dichloromethane	0.005	0.005
Fluoranthene	0.98	2.9
Fluorene	0.98	2.9
Naphthalene	0.49	1.5
Pentachlorophenol	0.001	0.001
Phenanthrene	0.73	2.2
Pyrene	0.73	2.2
Toluene	1	1
Vinyl Chloride	0.002	0.002

- EXPLANATION**
- Fill: Sand, Silt, Clay & Gravel, wood fragments, bricks, scrap metal
  - Transmissive Zone (TZ): Sand & Silty Sand
  - Cohesive Zone (CZ): Clay, Silty Clay & Silt
  - B-CZ Interbedded Zone B-CZ (IB): Interbedded Carbonate Seams and Calcareous Nodules with Clay & Silty Clay, within the B-CZ
  - Groundwater Affected Property/PCL Zone
  - Elevation of Top of DNAPL (Ft HVD), and Measured DNAPL Thickness in Well (Ft) (July 2014)
  - NAPL or Sheen/Staining Noted in Soils for Boring Log, or for CPT/ROST Location ROST Result >25% RE

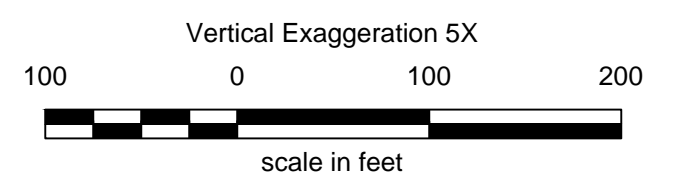
**SWMU/AOC AREAS**

No.	Description
SWMU 1	Closed Surface Impoundment
SWMU 2	Northern and Southern Drainage Ditches
SWMU 4	Recent Process Area
SWMU 5	Original Process Area
SWMU 6	Water Treatment and Boiler System
SWMU 7	Tank Car Storage Area
SWMU 8	Aboveground Storage Tank Area
SWMU 9	Location of Former UST No. 44-023-05
SWMU 10	Location of Former Sap Water Treatment Tank
SWMU 11	Oil/Water Separators
SWMU 12	Railroad Tie Storage Area
AOC 1	Diesel Storage Tank
AOC 3	Contaminated Portion of City Water Line
AOC 4	Location of Former Incinerator
AOC 5	City Storm Sewer
AOC 6	Inactive Wastewater Lagoon
AOC 7	Location of Former UST No. 44-023-21



2-Methylnaphthalene	0.378
Benzene	0.0539
Dibenzofuran	0.138
Naphthalene	9.38

- Notes:**
- Topography is estimated.
  - See Figure 1B for cross section location.
  - Concentration are in mg/L.
  - Blue and yellow highlighted and bolded concentrations exceed RALs and C/I PCLs, respectively.
  - Utility locations based on drawings provided by the City of Houston Department of Public Works & Engineering.
  - Vertical datum based on City of Houston Monument System (HVD), Ft HVD.
  - Monitoring wells that have been plugged & abandoned, are denoted with an asterisk.



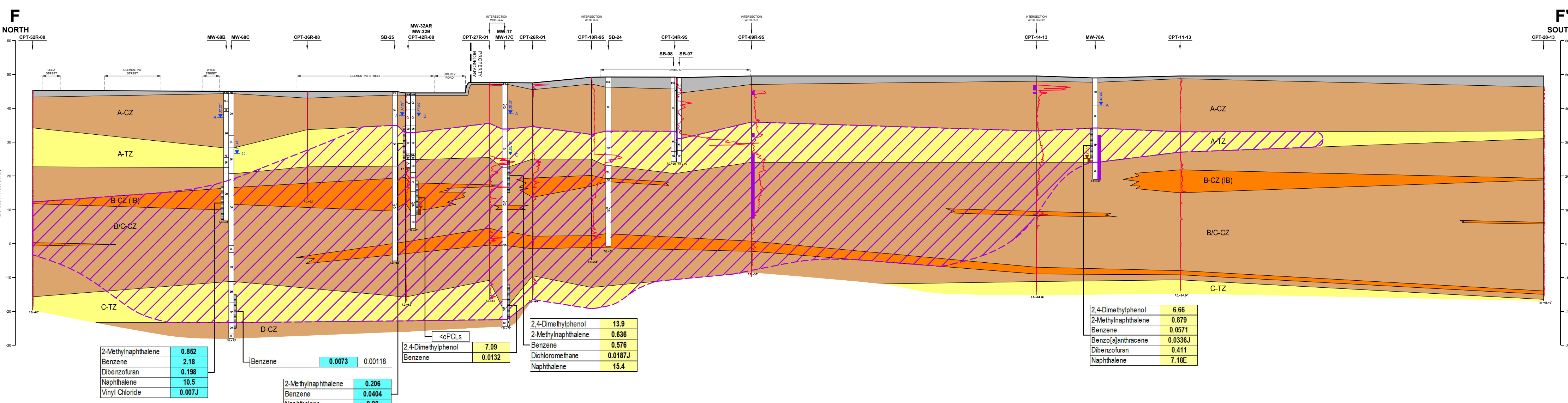
**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure VI.E.3  
**CROSS SECTIONS D-D' & E-E'**

PROJECT: 1358	BY: ADJ	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

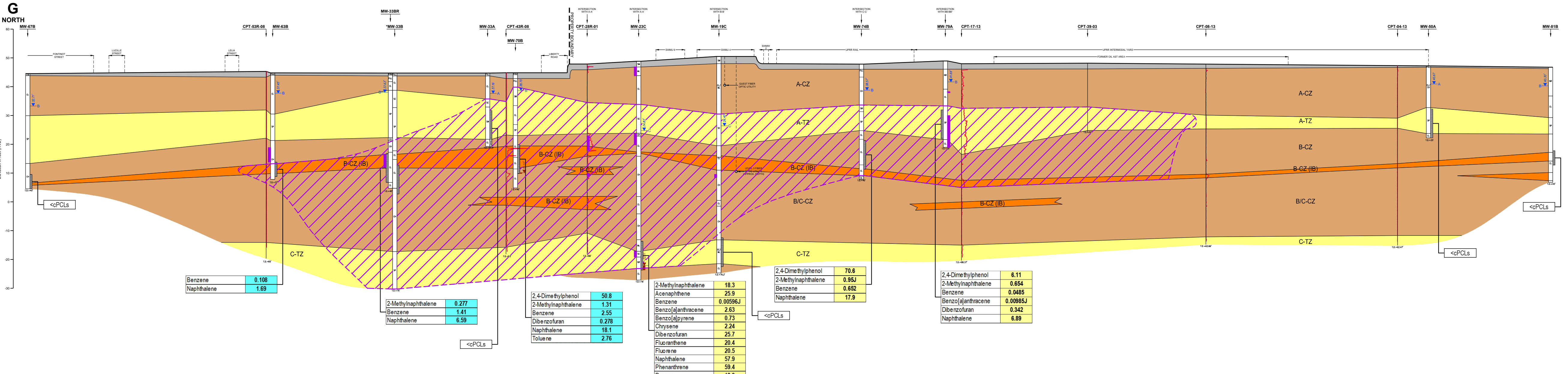


### EXPLANATION

- Fill: Sand, Silt, Clay & Gravel, wood fragments, bricks, scrap metal
- Transmissive Zone (TZ): Sand & Silty Sand
- Cohesive Zone (CZ): Clay, Silty Clay & Silt
- B-CZ Interbedded Zone B-CZ (IB): Interbedded Carbonate Seams and Calcareous Nodules with Clay & Silty Clay, within the B-CZ
- Groundwater Affected Property/PCLE Zone
- Elevation of Top of DNAPL (F1 HVD), and Measured DNAPL Thickness in Well (F1) (July 2014)
- NAPL or Sheen/Staining Noted in Soils for Boring Log, or for CPT/ROST Location ROST Result >25% RE

### MONITORING WELL CONSTRUCTION

### ROST LOGS



### Notes:

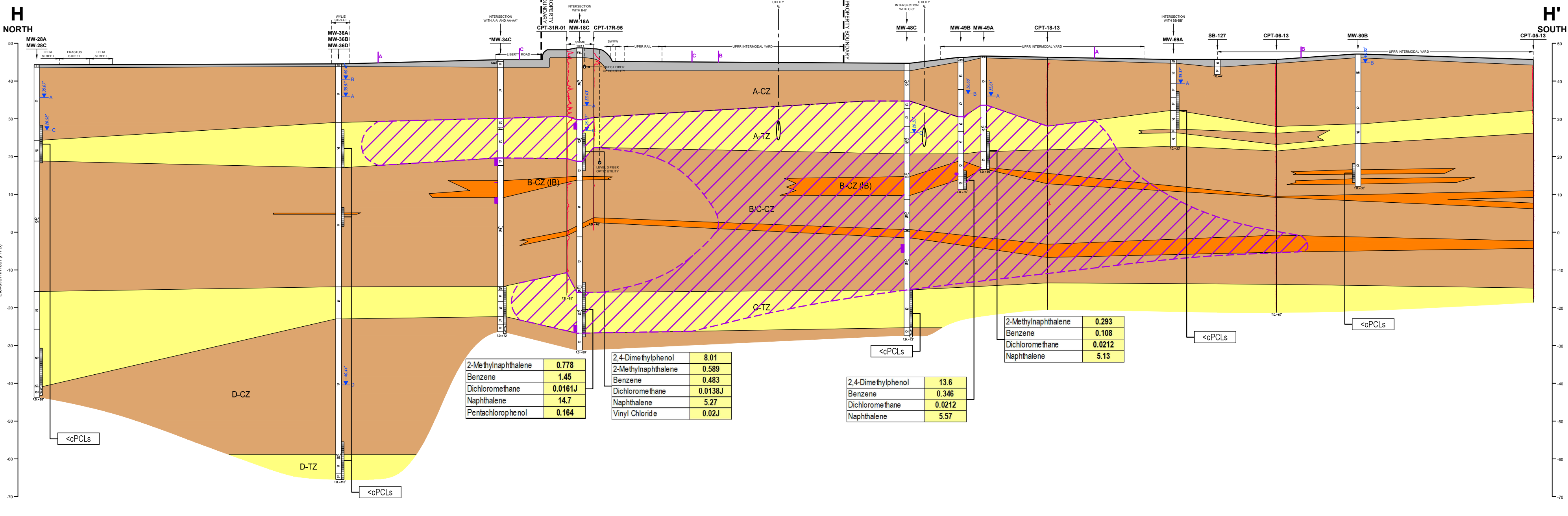
- Topography is estimated.
- See Figure 1B for cross section location.
- Concentration are in mg/L.
- Blue and yellow highlighted and bolded concentrations exceed RALs and C/I PCLs, respectively.
- Utility locations based on drawings provided by the City of Houston Department of Public Works & Engineering.
- Vertical datum based on City of Houston Monument System (HVD), Ft HVD.
- Monitoring wells that have been plugged & abandoned, are denoted with an asterisk.

### SWMU/AOC AREAS

No.	Description
SWMU 1	Closed Surface Impoundment
SWMU 2	Northern and Southern Drainage Ditches
SWMU 4	Recent Process Area
SWMU 5	Original Process Area
SWMU 6	Water Treatment and Boiler System
SWMU 7	Tank Car Storage Area
SWMU 8	Aboveground Storage Tank Area
SWMU 9	Location of Former UST No. 44-023-05
SWMU 10	Location of Former Sap Water Treatment Tank
SWMU 11	Oil/Water Separators
SWMU 12	Railroad Tie Storage Area
AOC 1	Diesel Storage Tank
AOC 2	Contaminated Portion of City Water Line
AOC 4	Location of Former Incinerator
AOC 5	City Storm Sewer
AOC 6	Inactive Wastewater Lagoon
AOC 7	Location of Former UST No. 44-023-21

### Protective Concentration Levels (PCLs)

Parameter	RAL (mg/L)	cPCL (mg/L)
1,2-Dichloroethane	0.005	0.005
2,4-Dimethylphenol	0.49	1.5
2-Methylnaphthalene	0.098	0.29
Acenaphthene	1.5	4.4
Benzene	0.005	0.005
Benzo[a]anthracene	0.0013	0.0028
Benzo[a]pyrene	0.0002	0.0002
Bis(2-Ethylhexyl)phthalate	0.006	0.006
Chrysene	0.13	0.28
Dibenzofuran	0.098	0.29
Dichloromethane	0.005	0.005
Fluoranthene	0.98	2.9
Fluorene	0.98	2.9
Naphthalene	0.49	1.5
Pentachlorophenol	0.001	0.001
Phenanthrene	0.73	2.2
Pyrene	0.73	2.2
Toluene	1	1
Vinyl Chloride	0.002	0.002



### Vertical Exaggeration 5X

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**HOUSTON WOOD PRESERVING WORKS**

Figure VI.E.4  
**CROSS SECTIONS F-F', G-G' & H-H'**

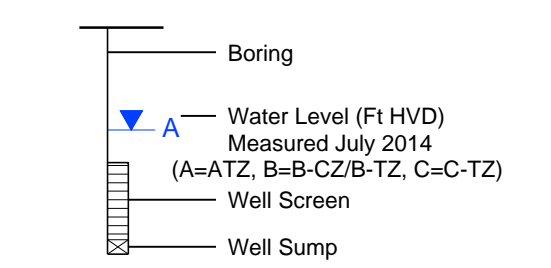
PROJECT: 1358	BY: ADJ	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

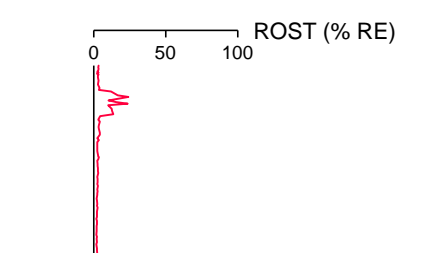
**EXPLANATION**

- Fill: Sand, Silt, Clay & Gravel, wood fragments, bricks, scrap metal
- Transmissive Zone (TZ): Sand & Silty Sand
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- B-CZ Interbedded Zone B-CZ (IB): Interbedded Carbonate Seams and Calcareous Nodules with Clay & Silty Clay, within the B-CZ
- Groundwater Affected Property/PCLE Zone
- Elevation of Top of DNAPL (Ft HVD), and Measured DNAPL Thickness in Well (Ft) (July 2014)
- NAPL or Sheen/Staining Noted in Soils for Boring Log, or for CPT/ROST Location ROST Result >25% RE

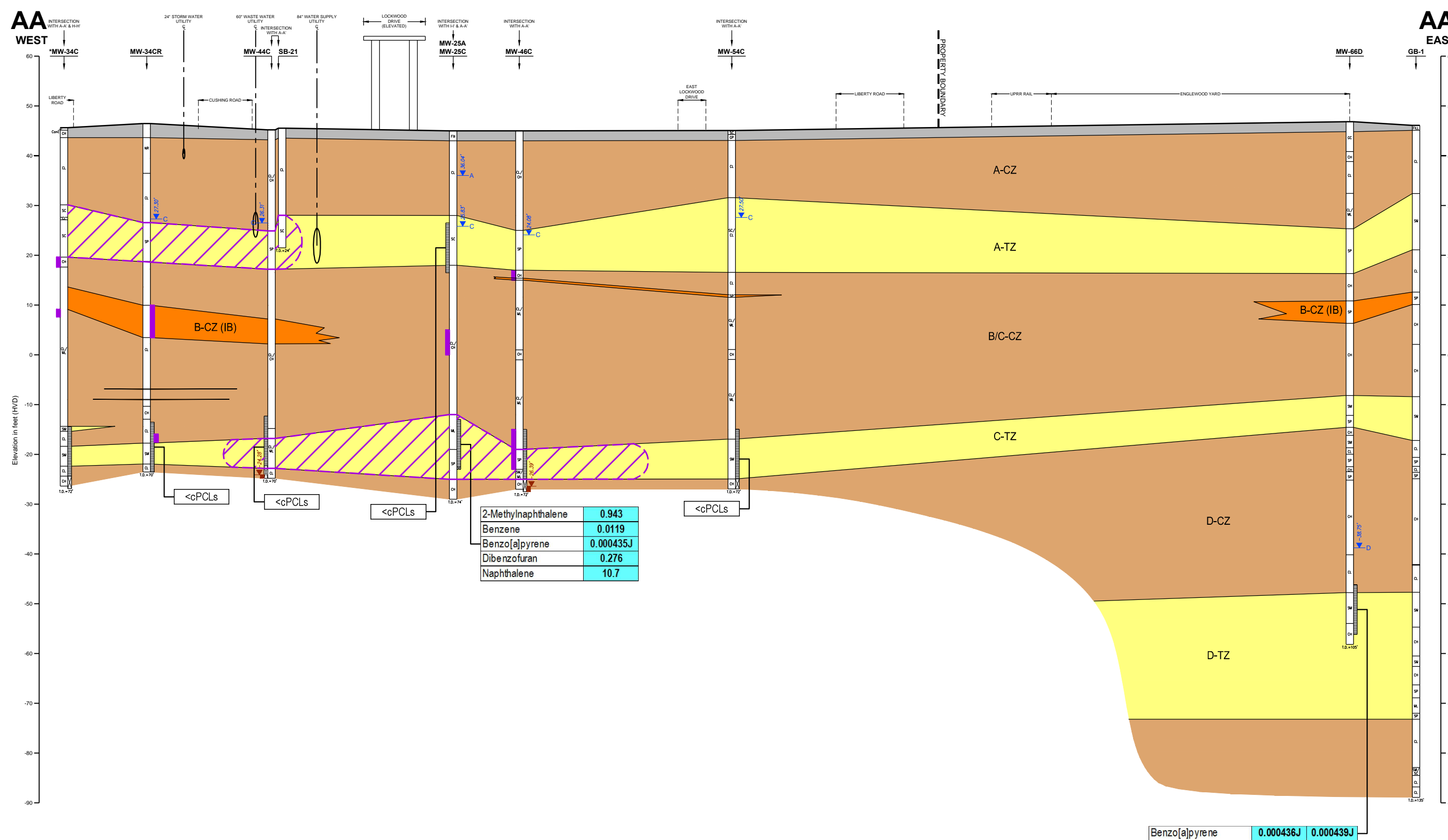
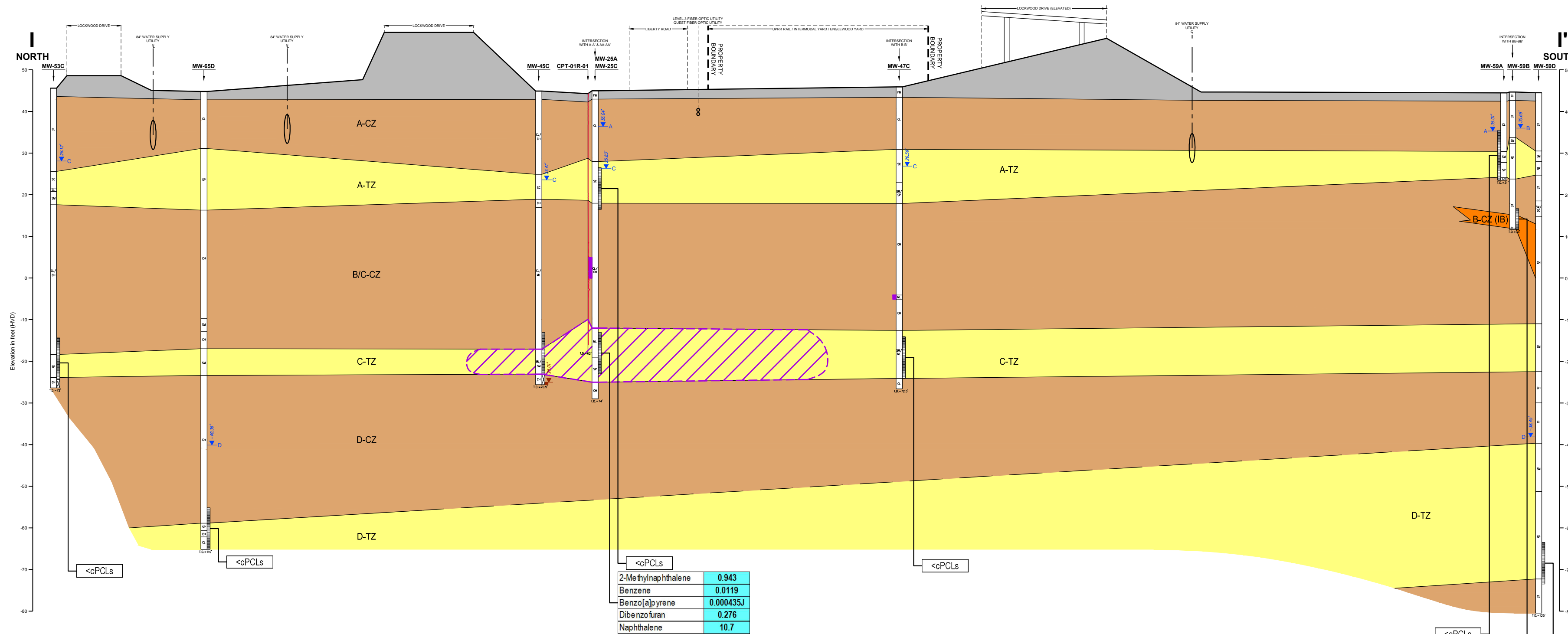
**MONITORING WELL CONSTRUCTION**



**ROST LOGS**



- Notes:**
1. Topography is estimated.
  2. See Figure 1B for cross section location.
  3. Concentration are in mg/L.
  4. Blue and yellow highlighted and bolded concentrations exceed RALs and C/I PCLs, respectively.
  5. Utility locations based on drawings provided by the City of Houston Department of Public Works & Engineering.
  6. Vertical datum based on City of Houston Monument System (HVD), Ft HVD.
  7. Monitoring wells that have been plugged & abandoned, are denoted with an asterisk.

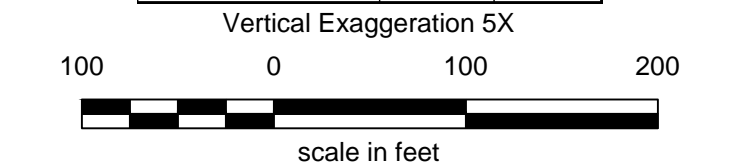


**SWMU/AOC AREAS**

No.	Description
SWMU 1	Closed Surface Impoundment
SWMU 2	Northern and Southern Drainage Ditches
SWMU 4	Recent Process Area
SWMU 5	Original Process Area
SWMU 6	Water Treatment and Boiler System
SWMU 7	Tank Car Storage Area
SWMU 8	Aboveground Storage Tank Area
SWMU 9	Location of Former UST No. 44-023-05
SWMU 10	Location of Former Sap Water Treatment Tank
SWMU 11	Oil/Water Separators
SWMU 12	Railroad Tie Storage Area
AOC 1	Diesel Storage Tank
AOC 3	Contaminated Portion of City Water Line
AOC 4	Location of Former Incinerator
AOC 5	City Storm Sewer
AOC 6	Inactive Wastewater Lagoon
AOC 7	Location of Former UST No. 44-023-21

**Protective Concentration Levels (PCLs)**

Parameter	RAL (mg/L)	cPCL (mg/L)
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Bis(2-Ethylhexyl)phthalate	0.006	0.006
Chrysene	0.13	0.28
Dibenzofuran	0.098	0.29
Dichloromethane	0.005	0.005
Fluoranthene	0.98	2.9
Fluorene	0.98	2.9
Naphthalene	0.49	1.5
Pentachlorophenol	0.001	0.001
Phenanthrene	0.73	2.2
Pyrene	0.73	2.2
Toluene	1	1
Vinyl Chloride	0.002	0.002



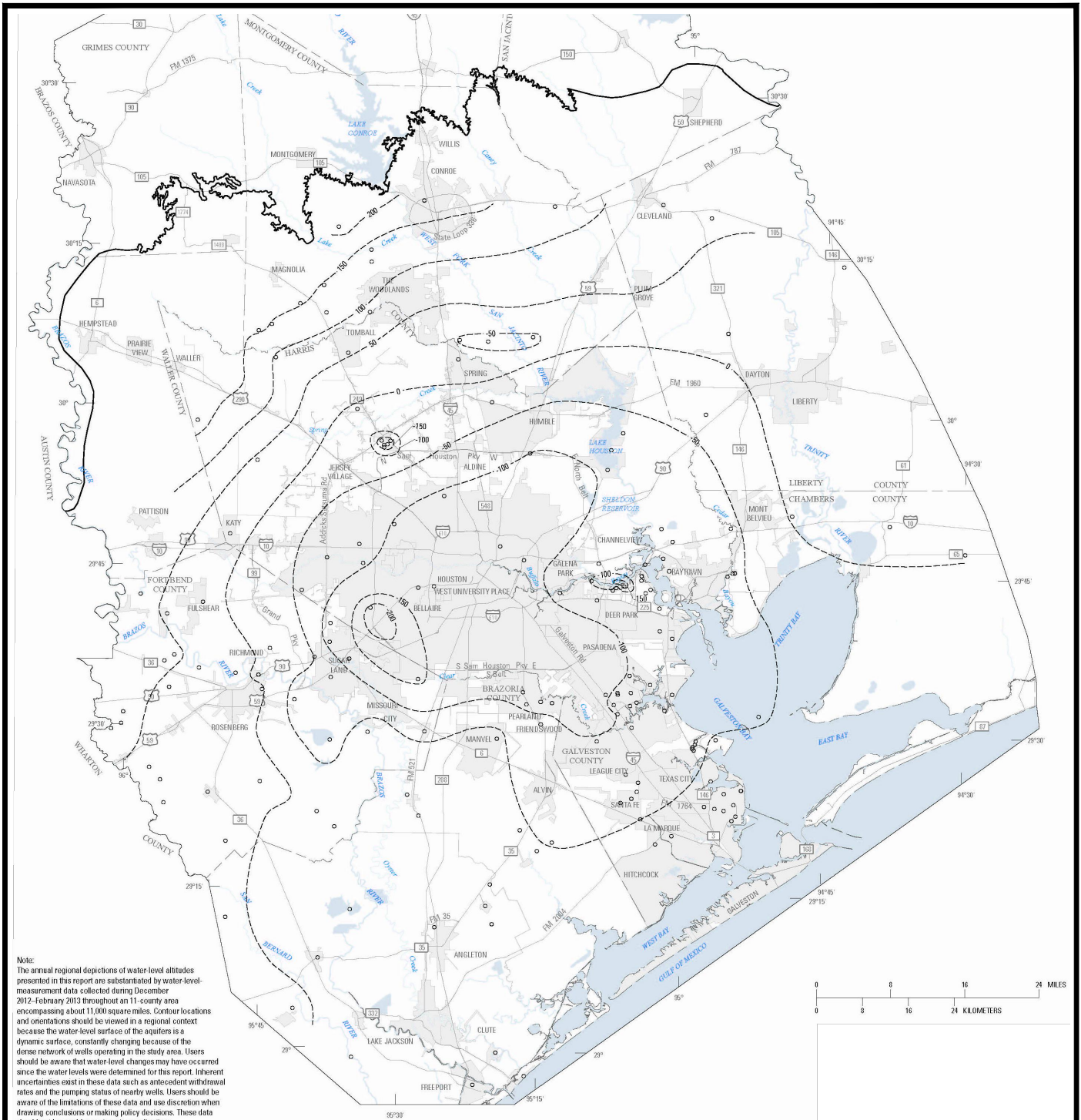
**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure VI.E.5  
**CROSS SECTIONS I-I' & AA-AA'**

PROJECT: 1358	BY: ADJ	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	

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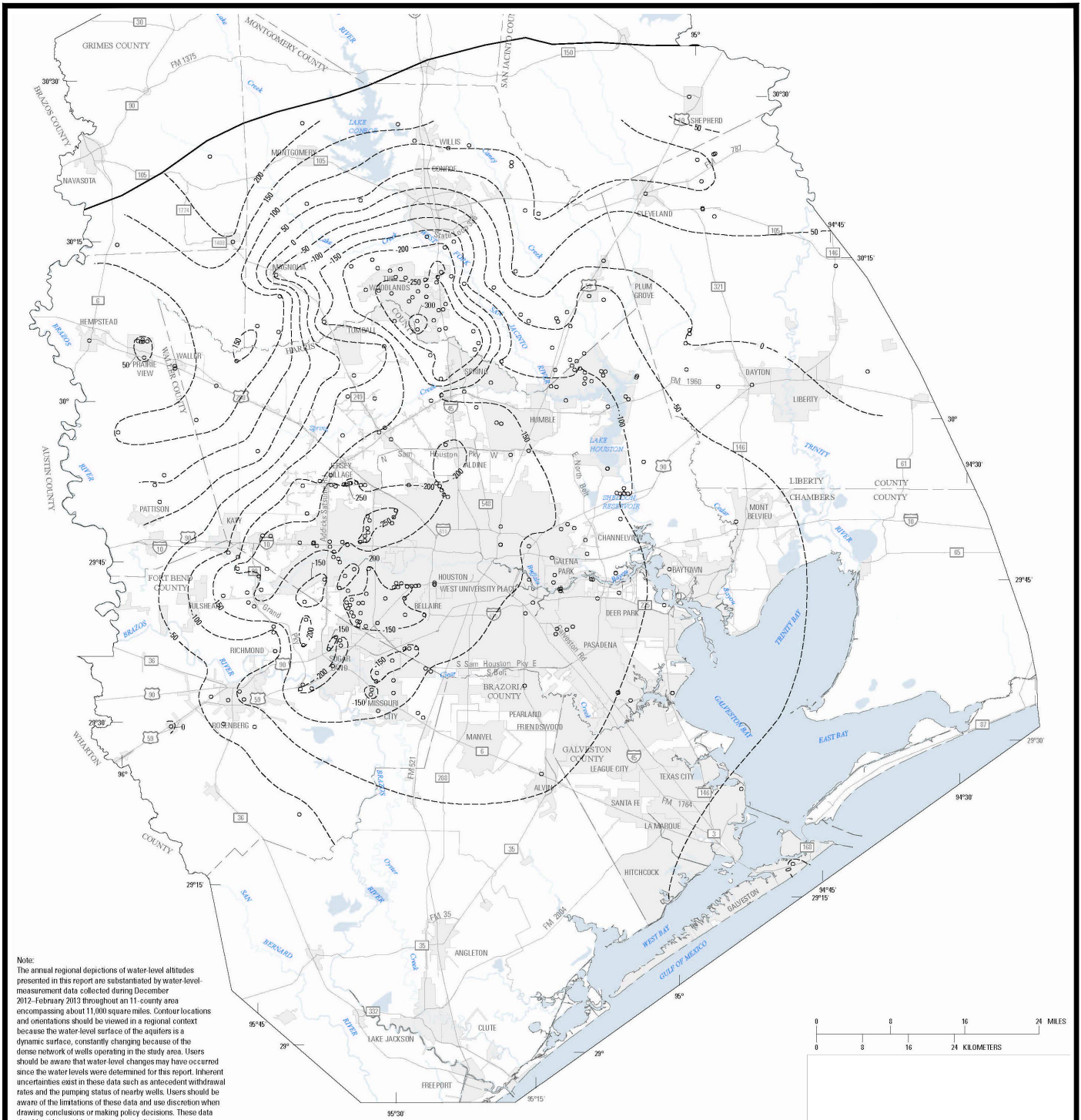


Note:  
 The annual regional depictions of water-level altitudes presented in this report are substantiated by water-level measurement data collected during December 2012-February 2013 throughout an 11-county area encompassing about 11,000 square miles. Contour locations and orientations should be viewed in a regional context because the water-level surface of the aquifers is a dynamic surface, constantly changing because of the dense network of wells operating in the study area. Users should be aware that water-level changes may have occurred since the water levels were determined for this report. Inherent uncertainties exist in these data such as antecedent withdrawal rates and the pumping status of nearby wells. Users should be aware of the limitations of these data and use discretion when drawing conclusions or making policy decisions. These data should not be used for engineering applications.

- EXPLANATION**
- 50 - - - - **Water-level contour**—Shows altitude at which water level would have stood in tightly cased well. Contour intervals 50 and 100 feet. Datum is North American Vertical Datum of 1988
  - Boundary of study area**
  - Uppd limit of Chicot aquifer (Baker, 1979; University of Texas, Bureau of Economic Geology, 1968)**
  - Data point**—Well in which water-level measurement was made. One point can represent more than one well

Source:  
 Kasmarek, M.C., Johnson, M.R., and Ramage, J.K., 2013. Water-level altitudes 2013 and water-level changes in the Chicot, Evangeline, and Jasper aquifers and compaction 1973-2012 in the Chicot and Evangeline aquifers, Houston-Galveston region, Texas. U.S. Geological Survey Scientific Investigation Map 3263, 19 p., 16 sheets.

<b>UNION PACIFIC RAILROAD CO.</b>		
<b>HOUSTON WOOD PRESERVING WORKS</b>		
Figure VI.F.1		
<b>APPROXIMATE 2013 WATER-LEVEL ALTITUDES IN THE CHICOT AQUIFER</b>		
PROJECT: 1358	BY: AJD	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	
<b>PASTOR, BEHLING &amp; WHEELER, LLC</b> CONSULTING ENGINEERS AND SCIENTISTS		



Note:  
 The annual regional depictions of water-level altitudes presented in this report are substantiated by water-level measurement data collected during December 2012-February 2013 throughout an 11-county area encompassing about 11,000 square miles. Contour locations and orientations should be viewed in a regional context because the water-level surface of the aquifers is a dynamic surface, constantly changing because of the dense network of wells operating in the study area. Users should be aware that water-level changes may have occurred since the water levels were determined for this report. Inherent uncertainties exist in these data such as antecedent withdrawal rates and the pumping status of nearby wells. Users should be aware of the limitations of these data and use discretion when drawing conclusions or making policy decisions. These data should not be used for engineering applications.



**EXPLANATION**

- 200 --- **Water-level contour**—Shows altitude at which water level would have stood in tightly cased well. Contour interval 50 feet. Datum is North American Vertical Datum of 1988
- **Boundary of study area**
- **Udpip limit of Evangeline aquifer (Baker, 1979)**
- **Data point**—Well in which water-level measurement was made. One point can represent more than one well

Source:  
 Kasmarek, M.C., Johnson, M.R., and Ramage, J.K., 2013. Water-level altitudes 2013 and water-level changes in the Chicot, Evangeline, and Jasper aquifers and compaction 1973-2012 in the Chicot and Evangeline aquifers, Houston-Galveston region, Texas. U.S. Geological Survey Scientific Investigation Map 3263, 19 p., 16 sheets.

<b>UNION PACIFIC RAILROAD CO.</b>		
<b>HOUSTON WOOD PRESERVING WORKS</b>		
Figure VI.F.2		
<b>APPROXIMATE 2013 WATER-LEVEL ALTITUDES IN THE EVANGELINE AQUIFER</b>		
PROJECT: 1358	BY: AJD	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	
<b>PASTOR, BEHLING &amp; WHEELER, LLC</b> CONSULTING ENGINEERS AND SCIENTISTS		



EXPLANATION	
	Burkeville confining system (basal part of Fleming Formation, area of little or no recharge)
	Recharge area of the Evangeline aquifer system (includes the landward Willis Formation and coastward part of Fleming Formation)
	Recharge area of the Chicot aquifer system (includes Montgomery and Bentley Formations and coastward Willis Formation)
	Beaumont Clay (area of little or no recharge)
	Coastward extent of incision in the Beaumont Clay

SOURCE:  
 Department of the Interior, United States Geological Survey, Report 77-754,  
 R.K. Gabrysch, November 1977.

**UNION PACIFIC RAILROAD CO.**

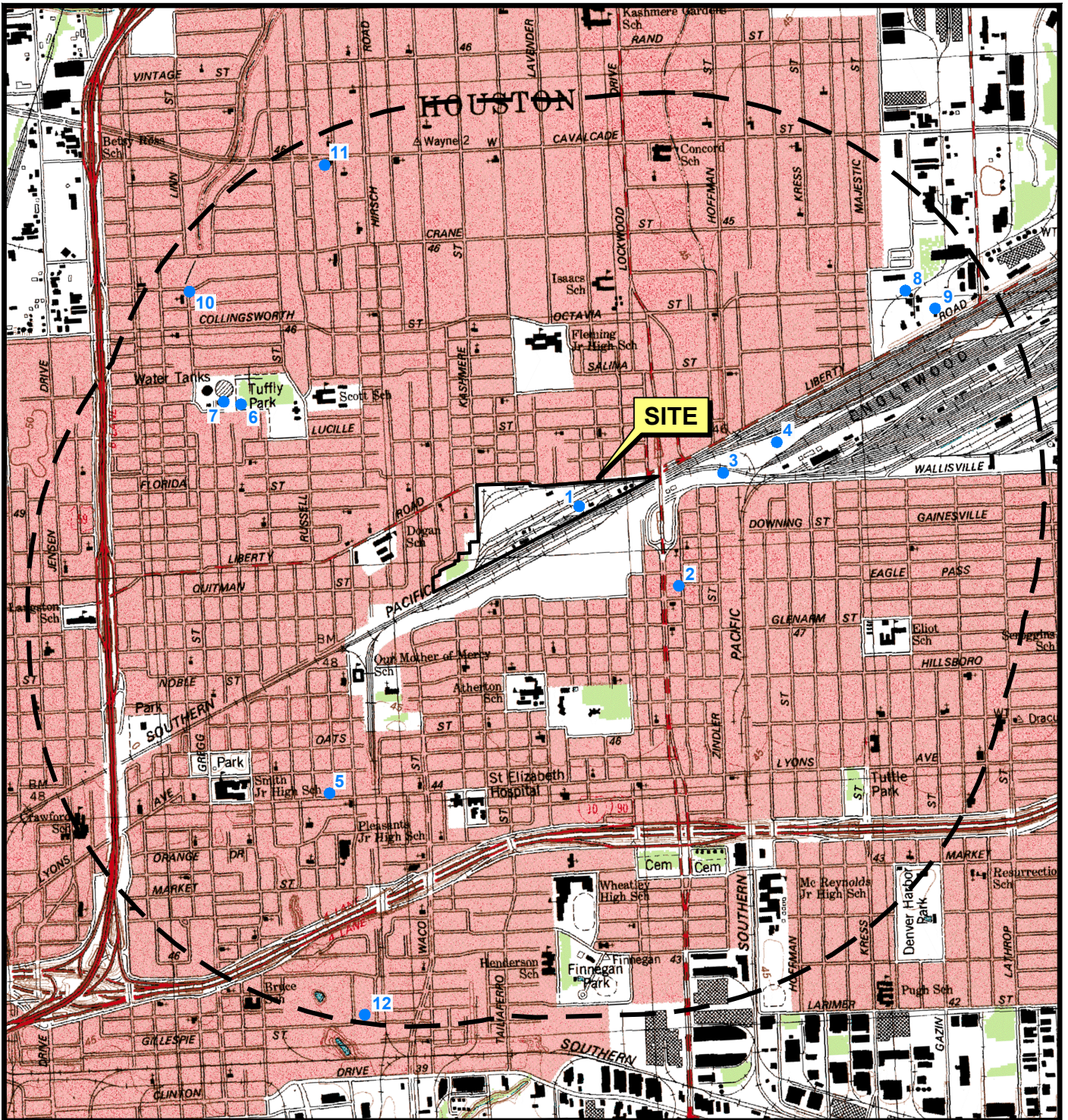
**HOUSTON WOOD PRESERVING WORKS**

Figure VI.G

**APPROXIMATE RECHARGE  
 AREAS OF THE CHICOT  
 AND EVANGELINE AQUIFERS**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
 CONSULTING ENGINEERS AND SCIENTISTS



**EXPLANATION**

1 ● Water Well Location

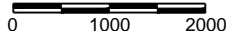


QUADRANGLE LOCATION

Note:  
Water well inventory within 1 mile  
of Site (Banks, 2014).



Scale in Feet



SOURCE:  
Base map from www.tnris.gov, Settegast, TX 7.5 min. USGS quadrangle dated 1982.



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**HOUSTON WOOD PRESERVING WORKS**

Figure VI.H

**WATER WELL MAP**

PROJECT: 1358

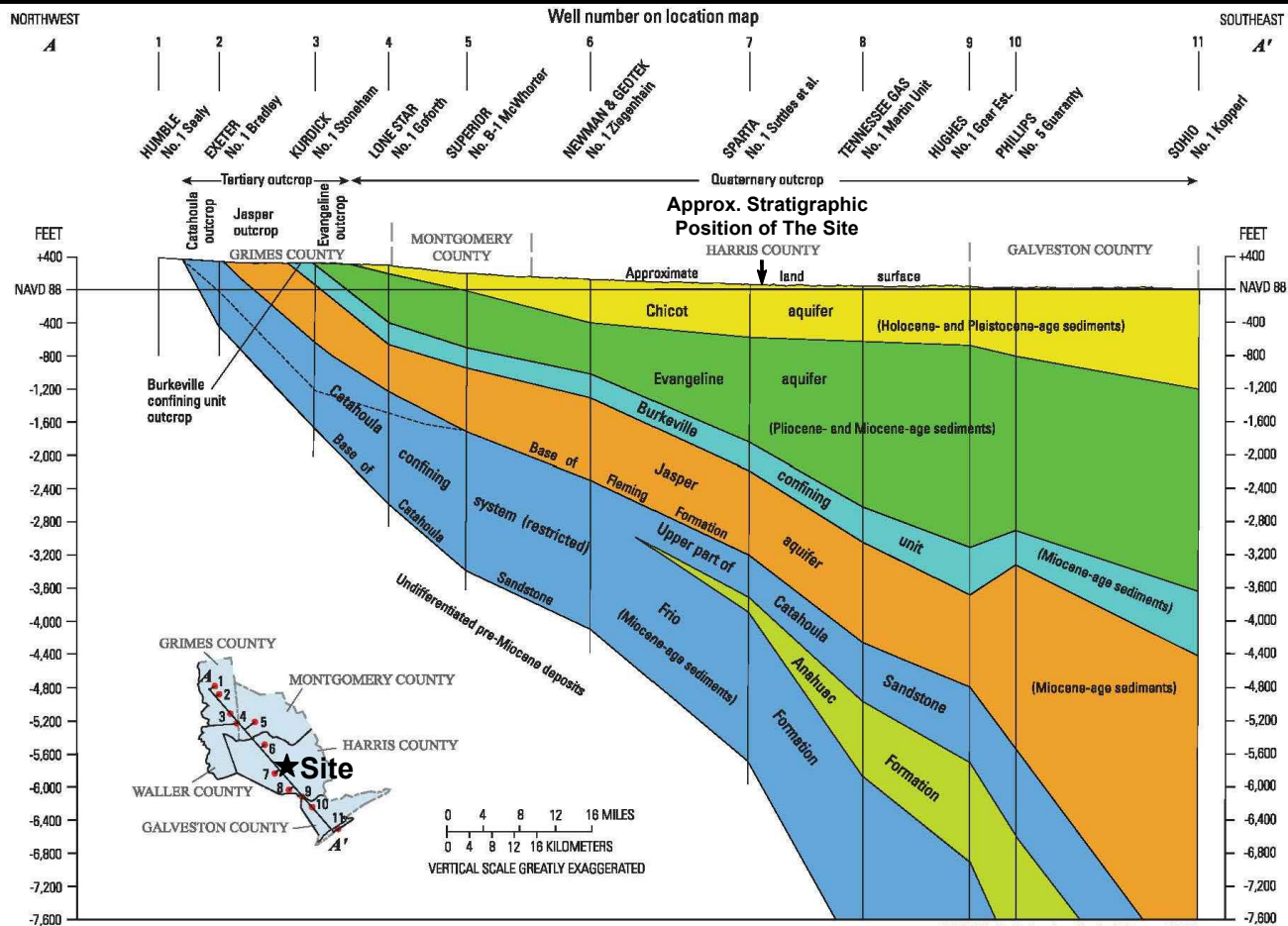
BY: AJD

REVISIONS

DATE: NOV., 2014

CHECKED: ECM

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure VI.1

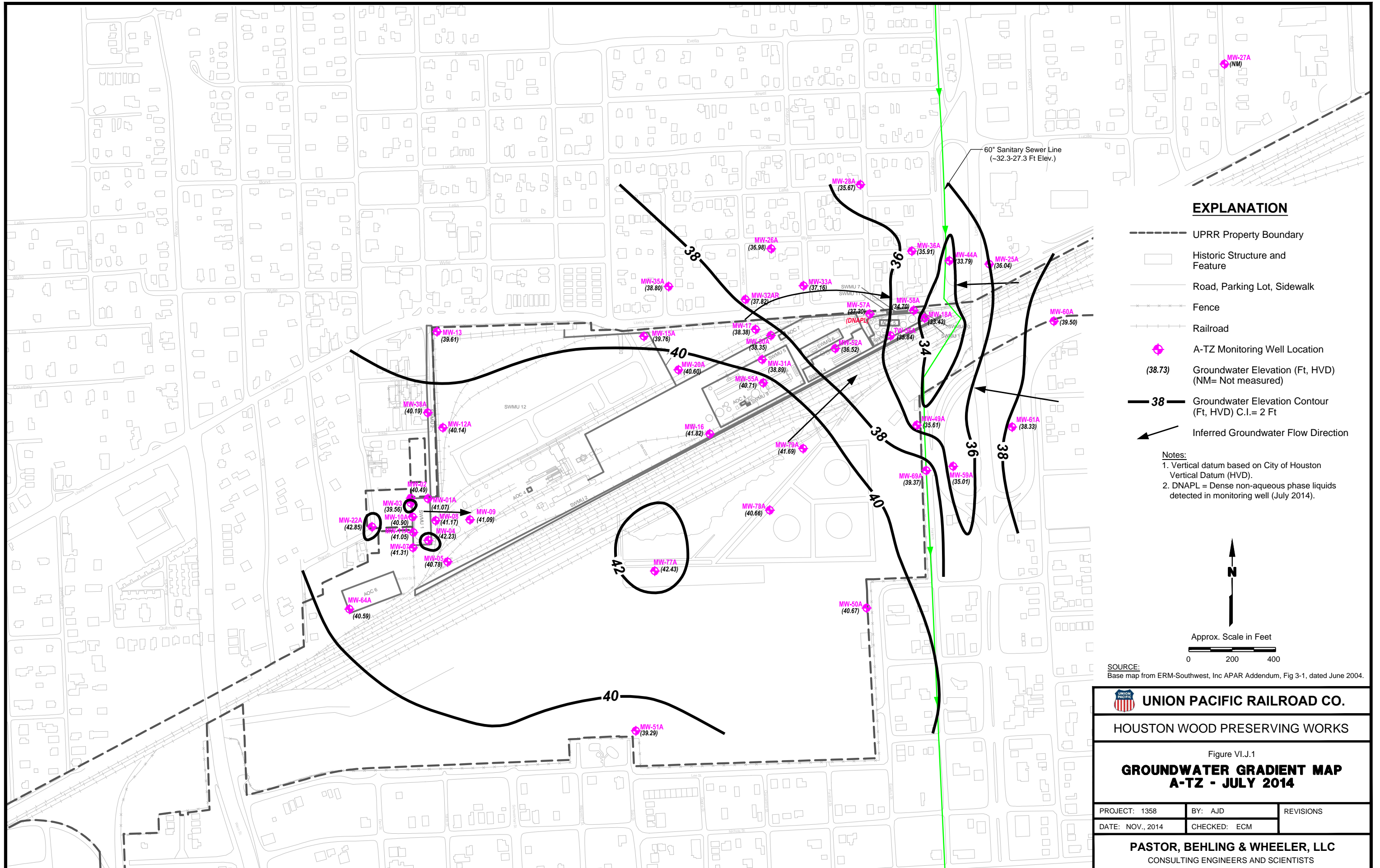
**HYDROGEOLOGIC CROSS SECTION OF THE GULF COAST AQUIFER SYSTEM IN HARRIS COUNTY**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: OCT., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
 CONSULTING ENGINEERS AND SCIENTISTS

Source: modified from Baker, 1979.

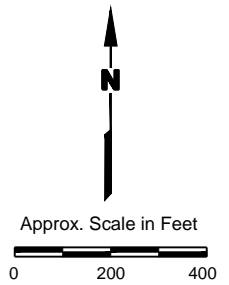




**EXPLANATION**

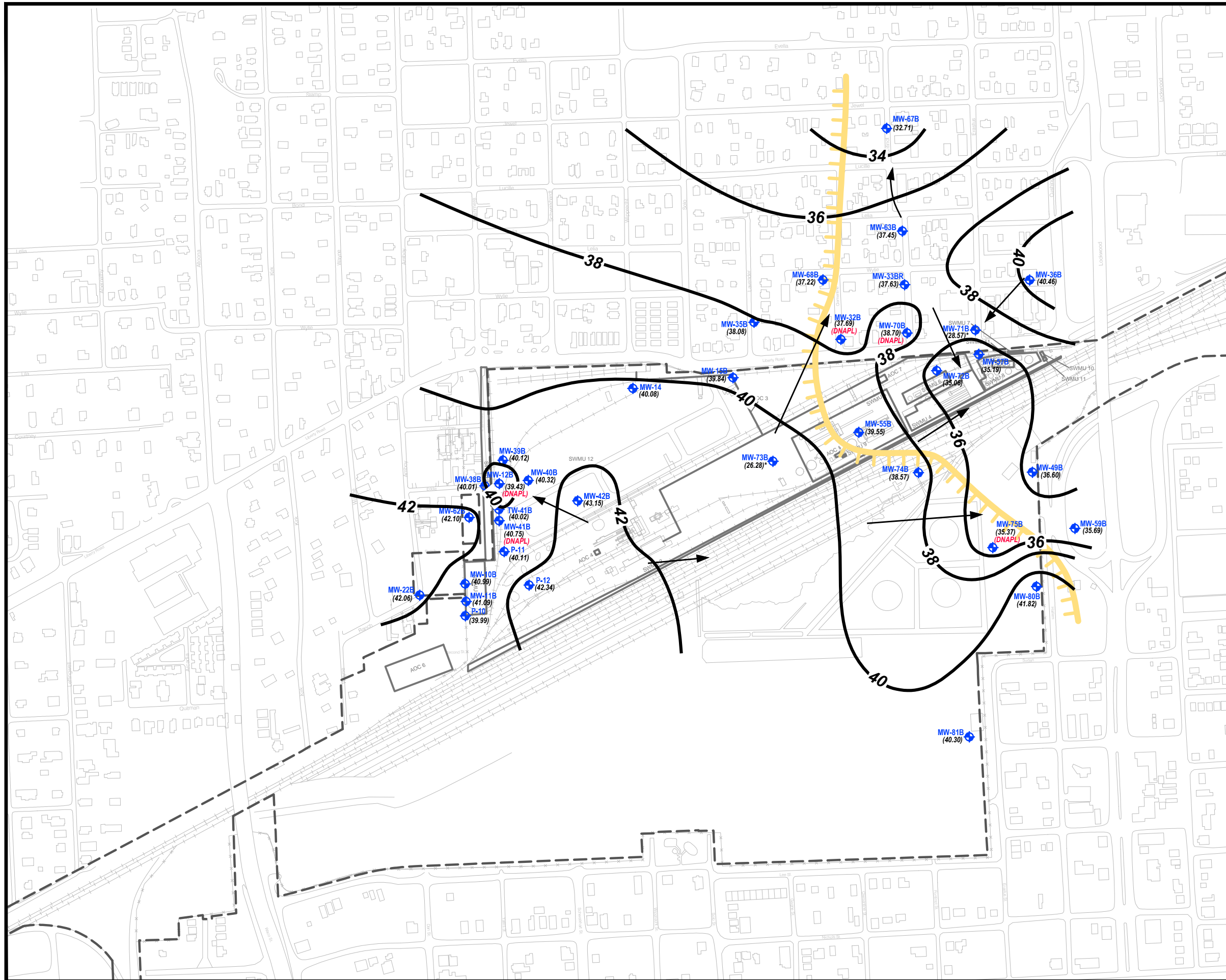
- UPRR Property Boundary
- ▭ Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- Fence
- Railroad
- ◆ A-TZ Monitoring Well Location
- (38.73) Groundwater Elevation (Ft, HVD) (NM= Not measured)
- 38 — Groundwater Elevation Contour (Ft, HVD) C.I.= 2 Ft
- ↖ Inferred Groundwater Flow Direction

Notes:  
 1. Vertical datum based on City of Houston Vertical Datum (HVD).  
 2. DNAPL = Dense non-aqueous phase liquids detected in monitoring well (July 2014).



SOURCE:  
 Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.

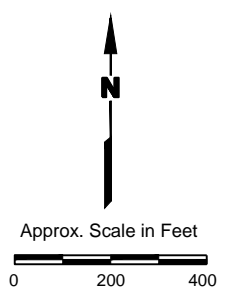
<b>UNION PACIFIC RAILROAD CO.</b>		
HOUSTON WOOD PRESERVING WORKS		
Figure VI.J.1		
<b>GROUNDWATER GRADIENT MAP</b> <b>A-TZ - JULY 2014</b>		
PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	
<b>PASTOR, BEHLING &amp; WHEELER, LLC</b> CONSULTING ENGINEERS AND SCIENTISTS		



**EXPLANATION**

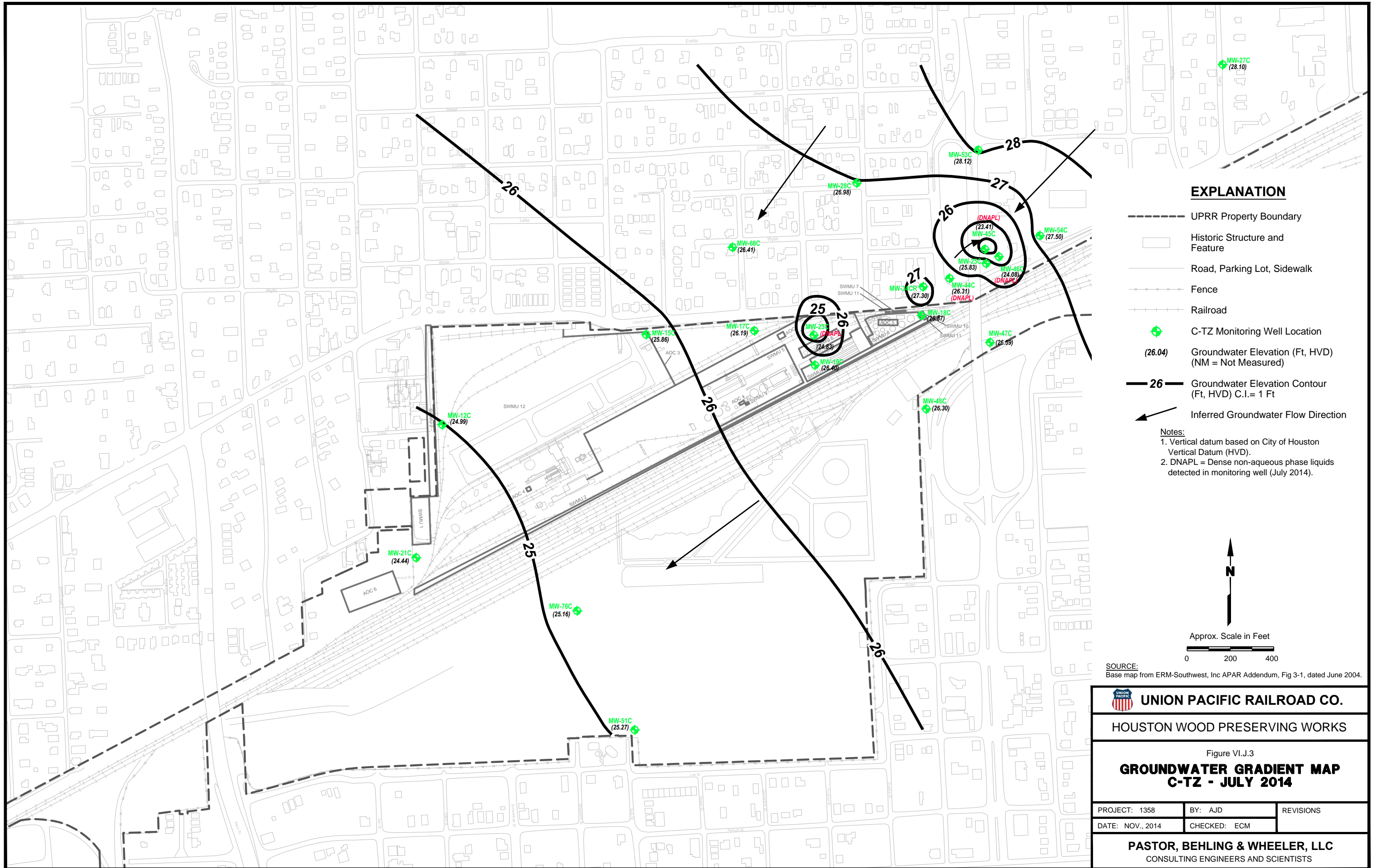
- UPRR Property Boundary
- ▭ Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- Fence
- Railroad
- ◆ B-TZ Monitoring Well Location
- B-CZ
- B-TZ
- (39.98) Groundwater Elevation (Ft, HVD)  
(NM= Not measured)  
(\* Not used for contour)
- 36 — Groundwater Elevation Contour  
(Ft, HVD) C.I.= 2 Ft  
(Dashed where inferred)
- ← Inferred Groundwater Flow Direction

Notes:  
 1. Vertical datum based on City of Houston Vertical Datum (HVD).  
 2. DNAPL = Dense non-aqueous phase liquids detected in monitoring well (July 2014).



SOURCE:  
 Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.

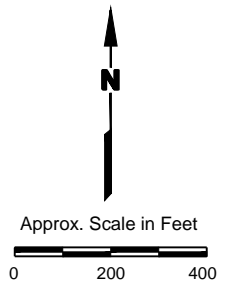
<b>UNION PACIFIC RAILROAD CO.</b>		
HOUSTON WOOD PRESERVING WORKS		
Figure VI.J.2		
<b>GROUNDWATER GRADIENT MAP B-TZ AND B-CZ - JULY 2014</b>		
PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	
<b>PASTOR, BEHLING &amp; WHEELER, LLC</b> CONSULTING ENGINEERS AND SCIENTISTS		



**EXPLANATION**

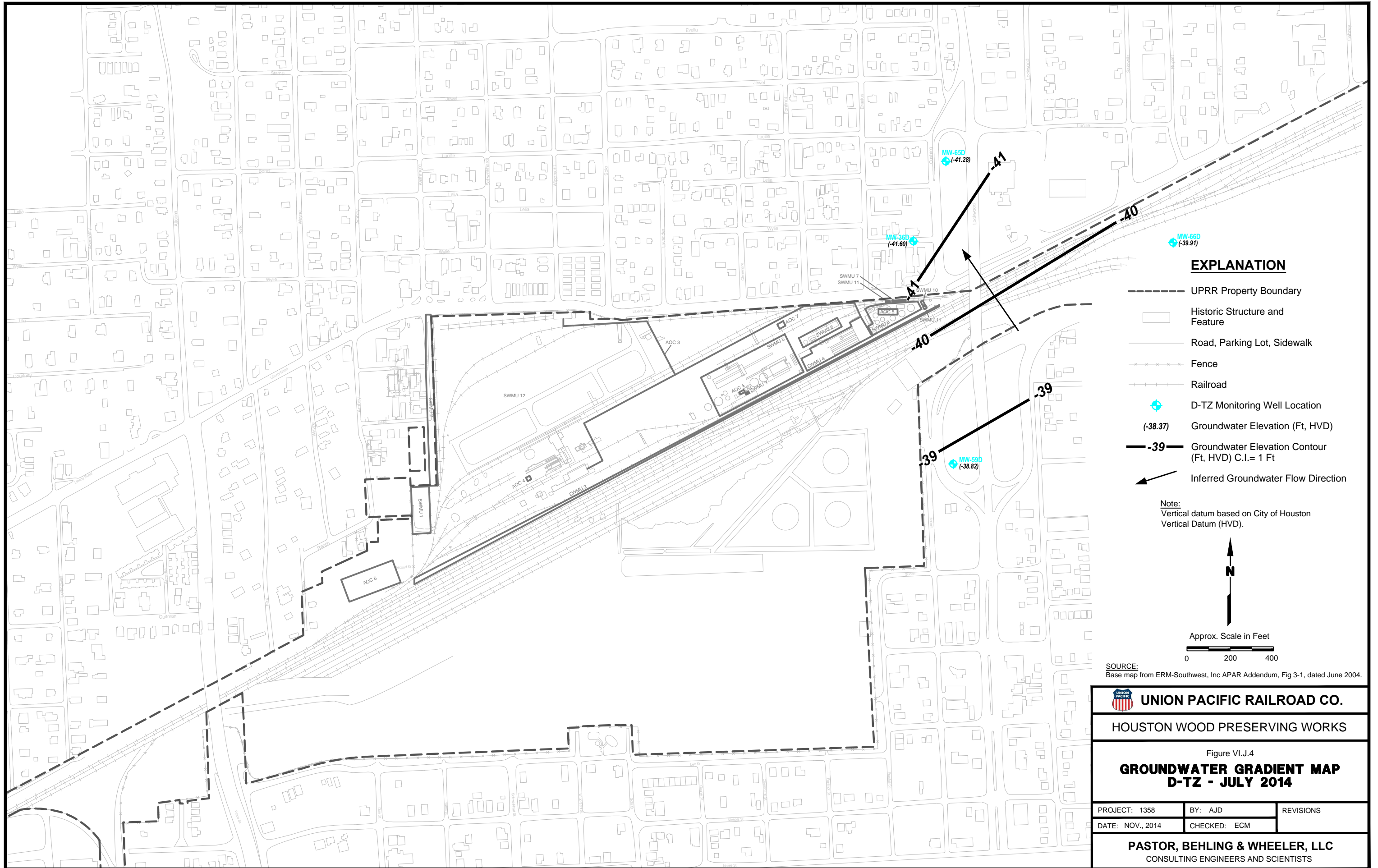
- UPRR Property Boundary
- ▭ Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- Fence
- Railroad
- ⊕ C-TZ Monitoring Well Location
- (26.04) Groundwater Elevation (Ft, HVD) (NM = Not Measured)
- 26 — Groundwater Elevation Contour (Ft, HVD) C.I.= 1 Ft
- ↖ Inferred Groundwater Flow Direction

Notes:  
 1. Vertical datum based on City of Houston Vertical Datum (HVD).  
 2. DNAPL = Dense non-aqueous phase liquids detected in monitoring well (July 2014).



SOURCE:  
 Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.

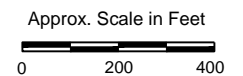
<b>UNION PACIFIC RAILROAD CO.</b>		
HOUSTON WOOD PRESERVING WORKS		
Figure VI.J.3		
<b>GROUNDWATER GRADIENT MAP</b>		
<b>C-TZ - JULY 2014</b>		
PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	
<b>PASTOR, BEHLING &amp; WHEELER, LLC</b>		
CONSULTING ENGINEERS AND SCIENTISTS		



**EXPLANATION**

- UPRR Property Boundary
- ▭ Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- Fence
- Railroad
- ◆ D-TZ Monitoring Well Location
- (-38.37) Groundwater Elevation (Ft, HVD)
- -39 — Groundwater Elevation Contour (Ft, HVD) C.I.= 1 Ft
- ↖ Inferred Groundwater Flow Direction

Note:  
Vertical datum based on City of Houston  
Vertical Datum (HVD).



SOURCE:  
Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.

<b>UNION PACIFIC RAILROAD CO.</b>		
HOUSTON WOOD PRESERVING WORKS		
Figure VI.J.4		
<b>GROUNDWATER GRADIENT MAP D-TZ - JULY 2014</b>		
PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	
<b>PASTOR, BEHLING &amp; WHEELER, LLC</b> CONSULTING ENGINEERS AND SCIENTISTS		

## **APPENDICES**

**Appendix VI.A**

**SITE CHRONOLOGY**

Houston Wood Preserving Works  
Houston, Texas

## CHRONOLOGY

Below is a summary of the Site investigation and regulatory chronology at the UPRR Former Houston Wood Preserving Works facility (the Site).

<b>Date</b>	<b>Description</b>
September 2014	Union Pacific Railroad (UPRR) holds public meeting with residents near the Site to detail institutional controls for off-site groundwater Plume Management Zone (PMZ).
July/August 2014	Pastor, Behling & Wheeler, LLC (PBW) conducts site-wide groundwater sampling event.
May 2014	PBW oversees installation of seven new monitoring wells (MW-51C, MW-76C, MW-77A, MW-78A, MW-79A, MW-80B, and MW-81B) in the Englewood Intermodal Yard to evaluate DNAPL extent and extent of chemicals of concern (COCs) in the B-CZ unit to the southeast, and one replacement well MW-34CR to replace MW-34C. Soil samples also collected from City of Houston right of way (ROW) along north perimeter of the Site.
January 2014	PBW conducts site-wide groundwater sampling event.
July 2013	PBW conducts site-wide groundwater sampling event.
February/March 2013	Pastor, Behling & Wheeler, LLC (PBW) conducts cone penetrometer testing (CPT)/rapid optical screening tool (ROST) and soil investigation at the Englewood Intermodal Yard adjacent to the UPRR Houston Wood Preserving Works (HWPW) site.
January/February 2013	PBW conducts site-wide groundwater sampling event (95 wells). PBW submits Proposed DNAPL Recovery Pilot Test letter to Texas Commission on Environmental Quality (TCEQ) dated February 5, 2013, and initiates monthly dense non-aqueous phase liquid (DNAPL) recovery from on-site and off-site wells (10-12 wells) (planned for 24 months).
November 2012	Meet with TCEQ regarding proposed CPT/ROST investigation of Englewood Intermodal Yard based on DNAPL detected from the December 2011 investigation.
July 2012	PBW conducts site-wide groundwater sampling event.
January 2012	PBW conducts site-wide groundwater sampling event.
July 2012	PBW conducts site-wide groundwater sampling event.
December 2011	PBW installs additional monitoring wells in the cohesive zone B-CZ to evaluate extent of DNAPL in the B-CZ.

<b>Date</b>	<b>Description</b>
July 2011	PBW conducts site-wide groundwater sampling event.
April 2011	TCEQ approves the Affected Property Assessment Report (APAR) (including updates and addendums).
March 2011	PBW submits the Revised Updated APAR Addendum to the TCEQ. UPRR repairs fence around site.
January 2011	PBW conducts site-wide groundwater sampling event.
December 2010/ January 2011	UPRR/PBW submits Off-Site Notification Letters to off-site properties indicating Notice of Information Availability for the site, as required with the submittal of the Updated APAR Addendum (Oct 2012) .
October 22, 2010	PBW submits the Updated APAR Addendum to the TCEQ.
June/July 2010	PBW conducts additional soil (along northeast portion of Site) and groundwater investigation (A-TZ, B-CZ, C-TZ and D-TZ wells); including site-wide groundwater monitoring event.
February 16, 2010	UPRR Response to TCEQ Comment Letter dated November 18, 2009.
January 2010	PBW conducts site-wide groundwater sampling event; selected wells are analyzed for Volatile Organic Compounds (VOCs) by EPA Method 8620.
November 18, 2009	TCEQ Comment Letter on Revised APAR.
July 2009	PBW submits APAR Addendum to TCEQ.
January 2009	PBW conducts additional soil and groundwater investigation.
July 2008	PBW conducts additional CPT-ROST and groundwater investigation
January 2007	PBW conducts additional soil and groundwater investigation
August 2006	ERM-Southwest, Inc. (ERM) conducted additional soil and groundwater investigation
April 2006	ERM conducted additional soil and groundwater investigation
September 6, 2005	UPRR Response to TCEQ Response Letter dated August 1, 2005
August 2005	TCEQ Response to UPRR Response Letter dated June 9, 2005
June 9, 2005	UPRR Response to TCEQ Letter dated April 15, 2005
April 15, 2005	TCEQ Response to UPRR Response Letter dated November 19, 2004
November 19, 2004	UPRR Response to October 8, 2004 TCEQ Letter



<b>Date</b>	<b>Description</b>
October 8, 2004	TCEQ Comment Letter on Revised APAR
June 10, 2004	Revised APAR submitted to the TCEQ by ERM, Inc. on behalf of UPRR
November 7, 2001	Texas Natural Resources Conservation Commission (TNRCC) provides comments to July 5, 2001 response letter.
July 5, 2001	Follow-up response to November 6, 2000 TNRCC comment letter on the On-Site APAR submitted to TNRCC on behalf of UPRR.
January 9, 2001	Initial response to November 6, 2000 TNRCC comments.
November 6, 2000	TNRCC provides comments to On-Site APAR.
July 10, 2000	Affected Property Assessment Report for On-Site Property (On-Site APAR) submitted to TNRCC on behalf of UPRR by ERM.
February 20, 2000	Letter submitted to the TNRCC regarding proposed Phase 2-C investigation for further delineation of off-site areas
September 10, 1999	Phase 2-B RFI/EOC Investigation Report submitted to TNRCC on behalf of UPRR by ERM
April 27, 1998	Interim Stabilization Measures Report – Southern Drainage Ditch, submitted to TNRCC on behalf of UPRR by ERM.
February 13, 1998	Phase 2-A RFI/EOC Investigation Report submitted to TNRCC on behalf of UPRR by ERM.
January 13, 1997	RFI portion of the Phase 1 RFI/EOC Investigation Report approved by TNRCC
November 26, 1996	EOC portion of the Phase 1 RFI/EOC Investigation Report approved by TNRCC
May 23, 1996	Phase 1 RFI/EOC Report submitted on behalf of Southern Pacific Transportation Company (SPTCo) by Terranext
October 16, 1995	RFI Work Plan approved by TNRCC
September 29, 1995	EOC Work Plan approved by TNRCC
January 10, 1995	Operation and Maintenance Plan approved by TNRCC
November 3, 1994	Revised Compliance Schedule approved by TNRCC
October 14, 1994	RCRA Facility Investigation (RFI) Work Plan submitted on behalf of SPTCo
September 16, 1994	Extent of Contamination (EOC) Work Plan submitted on behalf of SPTCo
September 7, 1994	Revised Compliance Schedule submitted on behalf of SPTCo

<b>Date</b>	<b>Description</b>
August 19, 1994	Operation and Maintenance Plan and Compliance Schedule submitted on behalf of SPTCo
June 20, 1994	Permit No. HW-50343-000 and Compliance Plan CP-50343-000 issued by TNRCC.
October 1993	RCRA Facility Assessment completed on behalf of U.S. EPA by PRC Environmental Management, Inc.
May 13, 1991	RCRA Permit Application submitted by SPTCo

Note: Not all groundwater sampling events are listed in the chronology

**Appendix VI.B**

**SOIL BORING LOGS AND WELL COMPLETION RECORDS**

Houston Wood Preserving Works  
Houston, Texas



LOG OF BORING No.: SB02

SHEET NUMBER 1 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram: [ ]

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Perserving Works

DRILLING METHOD: Hollow Stem Auger

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

BORING LOCATION: SB02 HWPW

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 3/3/97 FINISH DATE: 3/3/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB1	1-5		3.8	1	FILL	Asphalt - very weathered	Boring Advanced with 8 1/4" O.D., 4 1/4" I.D. hollow stem augers
				2		Gravel, dk. brown, loose with trace sand and silt and cinders (Fill)	
				3			
				4	CL	Gravelly CLAY; dk. gray; firm; moist (Fill)	
	5.0			5	CL	Silty CLAY; lt. gray; very stiff, low plasticity; moist; grades dk. gray at 4.7'	
CB2	5-10		4.8	6		Grades lt. gray with sparse 1/2" dia. CaCO3 nodules	Collect soil sample for chemical analysis at 7-8'
				7			
				8		Grades with numerous peaseize CaCO3 nodules and trace sand	
	10.0			10		CaCO3 nodules grade out	
CB3	10-15		5.0	11		Iron oxide staining in fractures	
				12			
				13			
	15.0			15	ML	Clayey SILT; lt. gray; firm; low plasticity; moist with trace sand	
CB4	15-20		0.8	16			
				17			
				18	ML	SILT; lt. gray; firm; low plasticity; moist with trace sand; lt. gray; fine grained	
				19			
	20.0			20	SP	Silty SAND; lt. gray; very fine grained; wet	

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: SB02

SHEET NUMBER 2 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: SB02 HWPW

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 3/3/97 FINISH DATE: 3/3/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	COMPLETION INTERVAL	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB5			4.5	21			Grades very fine to fine grained; wet with mild creosote odor	Mild Creosote odor; collect soil sample from 21.0-21.5'
				22				
				23				
				24				
				25				
	25.0						Collect soil sample 24.0-24.5' for chemical analysis	
CB6			4.7	26	ML		Silty CLAY; lt. gray; v.stiff; low plasticity; moist with some sand with iron oxide staining Grading hard; lt. brown sand grades out Grades lt. gray and lt. brown mottled	
				27				
				28				
				29				
				30				
	30.0							
CB7			3.7	31				
				32				
				33				
				34				
				35				
	35.0							
CB8			5.0	36				
				37				
				38				
				39				
				40				
	40.0				CL	Silty CLAY; reddish brown; very stiff; low plasticity; moist	Collected sample 37.5-38.0' for chemical analysis Collect soil sample for chemical analysis from 38.5-39.0'	

Geologist: R. Lamo  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: SB02

SHEET NUMBER 3 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: SB02 HWPW

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 3/3/97 FINISH DATE: 3/3/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
CB9			4.9	41		
				42		
				43		
				44		
	45.0			45		
CB10			4.0	46		
				47		
				48		
				49		
	50.0			50		
CB11			3.2	51		
				52		
				53		
				54		
	55.0			55		
				56		
				57		
				58		
				59		
				60		

SOIL DESCRIPTION AND DRILLING CONDITIONS:

NOTES:

SILT; reddish brown; firm non-plastic; moist

Collect soil sample for chemical analysis  
49. - 49.5'

Bottom of boring at 55.0'

Backfilled with cement/  
bentonite grout on 3/3/97

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: SB03

SHEET NUMBER 1 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Southern Pacific Lines  
Houston Wood Perserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 03/05/97 FINISH DATE: 03/05/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

				SOIL DESCRIPTION AND DRILLING CONDITIONS			NOTES:
SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	
CB1	1 - 5		3.1	1			Gravel
				2	SM		SAND, brown, fine grained creosote impacted moist
				3	FILL		CINDERS: black:
				4	CL		Silty CLAY; dark brown, low plasticity, moist, with creosote odor
	5.0			5			Collect sample for chemical analysis for 5 - 6 feet
CB2			5.0	6			
				7			
				8			
				9			grades gray and brown, mottled light trace CaCO3 nodules
	10.0			10			grades with iron oxide staining
CB3			5.0	11			
				12			~ 1/2" sandy silt lens containing creosote
				13			~ 1/2" sandy silt lens containing creosote
				14			~ 1/4" sandy silt lens containing creosote
				15			
CB4			3.9'	16	ML		SILT, gray and reddish brown, mottled, low plasticity, moist, varved with ~0.1" thick sand seams creosote odor
				17			
				18			
				19			Collect sample for chemical analysis at 19 - 20 feet
	20.0			20			

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: SB03

SHEET NUMBER 2 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

DRILLING METHOD: Hollow Stem Auger

Client: Southern Pacific Lines  
 Project Name: Houston Wood Preserving Works

SAMPLING METHOD: CME Sampler

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 03/05/97 FINISH DATE: 03/05/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB5			3.9	21	SP	Silty SAND, grayish brown, very fined grained, wet, with creosote odor	
				22			
				23			
				24			
				25			
	25.0						Collect soil sample for chemical analysis @ 24 - 25'
CB6			3.8	26	CL	Silty CLAY, gray and brown mottled; very stiff, low plasticity, moist creosote odor	
				27			
				28			
	30.0						
CB7			5.0	31			
				32			
				33			
				34			
				35			
	35.0						
CB8				36		grading with creosote in hairline fractures comprises ~ 1% of sample	
				37			
				38			
				39			
				40			
	40.0						0.1" thick silt/sand lenses contain creosote Collect soil sample for chemical analysis @ 39.5 - 40'

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing





LOG OF BORING No.: SB03  
 SHEET NUMBER 3 OF 3  
 DRILLING CONTRACTOR: Best Drilling Services  
 Location: Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX  
 BORING LOCATION:  
 START DATE: 03/05/97 FINISH DATE: 03/05/97  
 START TIME: FINISH TIME:

DRILLING METHOD: Hollow Stem Auger  
 SAMPLING METHOD: CME Sampler  
 SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL:  
 WATER ELEVATION:  
 DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB9			4.2	41			silt/sand lenses grade out	
				42				
				43				
				44				
	45			45				
CB10			5.0	46				
				47				
				48				
				49				
	50.0			50	ML		SILT, reddish brown; non-plastic firm, wet; with trace of sand; creosote odor	
CB11			5.0	51				
				52	CL		Silty CLAY; reddish brown; low plasticity, very stiff, creosote odor	
				53				
				54			3" thick sandy silt, lens @ ~ 52' contains oil sheen & creosote odor	
				55			3" thick sandy silt, lens @ ~ 54' contains oil sheen & creosote odor	Collected soil sample for chemical analysis from silt lenses
ST12			1.5	56			grading with creosote in fractures ~ 1% of mass	
				57				
				58				Bottom of boring @ 57.0'
				59				Borehole backfilled with cement/bentonite grout on 3/5/97
				60				

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: S204

SHEET NUMBER 1 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION:

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 03/05/97 FINISH DATE: 03/05/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB1	1 - 5		38.0	1			Clayey GRAVEL	Boring Advanced with 8 1/4-inch O.D., 4 1/4-inch I.D. HSA
				2				
				3		SM	SAND, black, medium grained, moist, contains creosote	Collect soil sample for chemical analysis @ 2' - 3'
						FILL	CINDERS, black, creosote odor	
				4		SM	SAND: lt. brown, fine grained; moist, creosote odor	
	5.0			5		CL	Silty CLAY; black, stiff, low plasticity; moist, creosote creosote odor, grading black and dark brown, mottled	
CB2			5.0	6				
				7				
				8				
				9			grading - gray and dark brown, mottled with slight creosote odor	
	10.0			10			grading light gray and gray, mottled with iron oxide staining, creosote odor, grades out	
CB3			5.0	11			grading with 1/10" diameter CaCO3 nodules	
				12				
				13				
				14				
	15.0			15				
CB4			2.5	16				
				17				
				18				
				19		ML	Clayey SILT; gray and reddish brown mottled, low plasticity; firm with trace sand, moist	
	20			20				

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: SB04

SHEET NUMBER 2 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION:

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 03/05/97 FINISH DATE: 03/05/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
CB5			32	21		
				22	SP	
				23		
				24		
	25			25		
CB6			4.5	26		
				27		
				28		
				29		
				30		
CB7			5.0	31	CL	
				32		
				33		
				34		
	35			35		
CB8			5.0	36		
				37		
				38		
				39		
	40.0			40		

SOIL DESCRIPTION AND DRILLING CONDITIONS

NOTES:

Silty SAND; light gray, very fine to fine grained wet, with mild creosote odor

clay lens ~ 3" thick @ ~ 24.5

creosote in sand lens ~ 2" thick @ ~ 24.8'

collect sample not submitted  
25.5 - 26.0' for bio analysis

grading with strong creosote odor  
oil sheen

collect soil sample for  
chemical analysis from  
27 - 30 feet

collect sample for chemical  
analysis @ 29.0 - 30.0'

Silty CLAY; reddish brown & gray, mottled,  
low plasticity; moist with creosote in  
hairline fractures ~ 0.1% at mass

collect sample for chemical  
analysis @ 31.0 - 32.0'

creosote grades out

mild creosote odor

grading with creosote in hairline fractures  
~1% at mass

collect soil sample for  
chemical analysis from  
39.5 - 40.0'

0.1" thick silt/sand lenses contains creosote

Geologist: R. Lamb  
Checked By:

LEGEND:

SS - Split Spoon

CI - Completion Interval

OVM - Organic Vapor Meter

PP - Pocket Penetrometer

TOC - Top Of Casing



LOG OF BORING No.: SB04

SHEET NUMBER 3 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

DRILLING METHOD: Hollow Stem Auger

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: CME Sampler

BORING LOCATION: SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL:  
 WATER ELEVATION:  
 START DATE: 03/05/97 FINISH DATE: 03/05/97  
 START TIME: FINISH TIME: DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB9			5.0	41				
				42	CL		Silty CLAY reddish brown; stiff; low plasticity; moist; with creosote odor	
				43				
				44			grading very stiff	
	45.0			45	CH		CLAY; reddish brown; medium plasticity; hard; moist; with creosote in fractures ~0.5% of mass	
CB10			5.0	46				
				47				
				48				
				49				
	50.0			50	ML		SILT; reddish brown; low plasticity; firm; moist with creosote ~5% of mass in fractures and trace clay	collected sample @ 51-52' for chemical analysis
CB11			5.0	51				
				52				
				53	CH		CLAY; reddish brown, medium plasticity; hard; moist, with creosote in fractures ~0.1% of mass	
				54				
	55.0			55				
CB12			5.0	56				
				57				
				58				
				59				
	60.0			60			Bottom of boring @ 60' Boring with cement/bentonite grout	Collect soil samples for chemical analysis 58 - 60'

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: SB05

SHEET NUMBER 1 OF 3

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX

SAMPLING METHOD: CME Sampler

BORING LOCATION: SB05 HWPW

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 3/4/97 FINISH DATE: 3/4/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

NOTES:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB1	1-5		4.0	1	FILL	Gravel; brown and dk. brown; loose; moist; with some sand and silt (Fill)	Boring Advanced with 8 1/4" O.D., 4 1/4" I.D. hollow stem augers . .
				2	L		
				3	CL	Silty CLAY; dk. brown; very stiff; low plasticity; moist; grading brownish gray with iron oxide staining; trace CaCO3 nodules	
				4			
	5.0			5	ML	Clayey SILT; brownish gray; firm; low plasticity; moist	
CB2	5 - 10		5.0	6	CL	Silty CLAY; brownish gray; stiff; low plasticity; moist with trace sand CaCO3 nodules at approx. 6.5'	
				7			
				8		2" layer of CaCO3 nodules at approx. 8'	
				9		Grading lt. brownish gray	
	10.0			10		3" layer of CaCO3 nodules at 10'	
CB3	10 - 15		5.0	11		2" thick clayey silt lens	
				12		Grading soft	
				13		Grading stiff	
				14		Grading soft	
				15		Approx. 1" thick clayey silt lens	
	15.0			15		Grading very stiff	
				16		Grading firm	
CB4	15 - 20		5.0	16	ML	SILT; brownish gray, soft, non-plastic; wet w/ trace sand and clay	
				17		Trace clay nodules	
				18			
				19			
	20.0			20	SP	Silty SAND; loose; lt. gray; with fine grained wet with creosote odor	Collect soil sample for chemical analysis from 19.5-20'

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: SB05

SHEET NUMBER 2 OF 3

DRILLING CONTRACTOR: Best Drilling Services

DRILLING METHOD: Hollow Stem Auger

Location: Diagram

NT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

SECT NAME: Houston Wood Perserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road Houston, TX

BORING LOCATION: SB05 HWPW

START DATE: 3/4/97 FINISH DATE: 3/4/97

START TIME: FINISH TIME:

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

WATER ELEVATION:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB5			5.0	21			Grades very fine to fine grained	Collect soil sample at 24.0-24.5' for chemical analysis
				22				
				23				
				24				
	5.0			25				
CB6	5 - 10		5.0	26			Clayey SILT; gray and reddish brown; stiff; low plasticity; moist with sandy silt lens approx. 0.1" thick Varved	
				27				
				28				
				29				
	10.0			30	ML		SILT; reddish brown with gray mottling; non-plastic; wet with trace sand	Collect soil sample for chemical analysis from 34.5-35.0'
CB7	10 - 15		3.5	31				
				32				
				33	ML		Silty SAND; reddish brown; loose; very fine to fine grained; wet	Collect soil sample for chemical analysis from 39-40'
				34				
				35				
CB8	15 - 20		4.0	36	SP			
				37				
				38				
				39				
	40.0			40				

Geologist: R. Lamb

Checked By:

LEGEND: CI - Completion Interval SS - Split Spoon OVM - Organic Vapor Meter PP - Pocket Penetrometer TOC - Top Of Casing



LOG OF BORING No.: S805

SHEET NUMBER 3 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: SB05 HWPW

START DATE: 3/4/97 FINISH DATE: 3/4/97

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB9			5.0	41			
				42			
				43	CH	CLAY; reddish brown; hard; medium plasticity; moist	Collect soil sample at 24.0-24.5' for chemical analysis
				44			
	45.0			45			
CB10			2.0	46		Possible sand lens (no recovery)	
				47			
				48			
				49		2" thick silt lens at approx. 49.0	
	50.0			50			
CB11			2.5	51			
				52			
				53	ML	SILT; reddish brown non-plastic, wet; with trace sand	
				54			Collect soil sample for chemical analysis 54-55'
				55			
CB12			3.2	56	CH	CLAY; reddish brown; medium plasticity; firm; moist	
				57			
				58			Bottom of boring at 60'
				59	ML	Clayey SILT; reddish brown; low plasticity; firm; wet	Boring backfilled with cement/grout bentonite
	60.0			60			

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: SB06

SHEET NUMBER 1 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: SB06 HWPW

START DATE: 3/4/97 FINISH DATE: 3/4/97

SURFACE ELEVATION:  
TOC ELEVATION:  
WATER LEVEL:  
WATER ELEVATION:

START TIME: FINISH TIME:

SOIL DESCRIPTION AND DRILLING CONDITIONS

NOTES:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
				1	FILL		Gravel	Boring Advanced with 8 1/4" O.D., 4 1/4" I.D. hollow stem augers
CB1	1-5		3.5		SM		SAND - lt. brown; loose, moist; mild creosote odor	
				2				
				3				
				4	FILL		Cinders	Collect samples from 4' to 5' for chemical analysis
					CL		Silty CLAY; black; stiff, low plasticity; moist; creosote odor	
	5.0			5			Grading dark gray	
CB2	5-10		5.0	6			Grading lt. gray with iron oxide staining; creosote odor	
				7			Grades out	
				8				
				9				
	10.0			10				
CB3			5.0	11			Silt lens approx. 2" creosote impacted	
				12				
				13			Silt lens approx. 3" creosote impacted	
				14			Silt lens approx. 2" creosote impacted	
	15.0			15				
CB4			4.5	16			Sand lens approx. 1" creosote impacted	
				17				
				18			Silt lens approx. 2" creosote impacted	
				19			Silt lens approx. 3" creosote impacted	
				20	ML		SILT; gray; firm; non-plastic; moist with trace sand creosote impacted	Collected soil sample from 19.5-20' for chemical analysis

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing





LOG OF BORING No.: SB06

SHEET NUMBER 2 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

DRILLING METHOD: Hollow Stem Auger

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: CME Sampler

BORING LOCATION: SB06 HWPW

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

WATER ELEVATION:

START DATE: FINISH DATE:

START TIME: FINISH TIME:

DATE: SOIL DESCRIPTION AND DRILLING CONDITIONS

NOTES:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
C85			4.2	21	SP	Silty SAND; lt. gray; loose; very fine to fine grained; wet with mild creosote odor	
				22			
				23			
				24	CL		Collect samples from 24' to 25' for chemical analysis
				25			
C86	5 - 10		3.1	26			
				27	CL	Silty CLAY; light gray; very stiff; low plasticity; moist with iron oxide staining	
				28			
				29			
				30			
C87			2.0	31			
				32			
				33	SP	Silty SAND; lt. gray; very fine to fine grained; wet; with creosote odor	Collect soil sample for geotech analysis
				34			
				35			
C88			5.0	36	CH	CLAY; reddish brown; hard; medium plasticity; moist; with trace hairline fractures; creosote in fractures	
				37			
				38		1" thick lens CaCO3 nodules	
				39			
				40		Creosote in fractures grades out	

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: SB06

SHEET NUMBER 3 OF 3

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

CLIENT: Southern Pacific Lines  
PROJECT NAME: Houston Wood Perserving

DRILLING METHOD: Hollow Stem Auger

Works

PROJECT NUMBER: 44102069.07  
PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

SAMPLING METHOD: CME Sampler

BORING LOCATION: SB06 HWPW

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: FINISH DATE:

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SOIL DESCRIPTION AND DRILLING CONDITIONS:

NOTES:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB9			5.0	41			Grading with creosote in hairline fractures	
				42				
				43				
				44				
	45.0'			45			Approx. 2" thick layer of CaCO3 nodules	
CB10			4.7	46			Creosote in fractures grades out	
				47				
				48				
				49	ML		Clayey SILT; reddish brown; low plasticity; moist	Collect soil sample from 49 to 50' for chemical analysis
	50.0			50				
				51				
				52				
				53				
				54				
				55				
ST11			2.0	56				Collect soil sample for geotech analysis
	57.0'			57				
				58				
				59				Bottom of boring at 57'
				60				Backfilled with bentonite

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: SB07

SHEET NUMBER 1 OF 2

CLIENT:	Southern Pacific Lines	DRILLING CONTRACTOR:	Best Drilling Services
PROJECT NAME:	Houston Wood Preserving Works	DRILLING METHOD:	Hollow Stem Auger
PROJECT NUMBER:	44102069.07	SAMPLING METHOD:	CME Sampler
PROJECT LOCATION:	4910 Liberty Road Houston, TX	SURFACE ELEVATION:	
BORING LOCATION:	SB07 HWPW	TOC ELEVATION:	
START DATE:	3/06/97	FINISH DATE:	3/06/97
START TIME:		FINISH TIME:	
DATE:			

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
				1			Gravel (Fill)	Boring advanced with 8 1/4" O.D. 4 1/4" I.D. hollow stem augers
				2			Railroad Ties (Fill)	
CB1			2.8'	3			Gravel (Fill)	Collect soil sample for chemical analysis 2.5-3.0'
				4	SM		SAND; Black; fine grained; moist with creosote odor; grading brown (Fill)	
	5.0			5		CL	Silty CLAY; dk. brown/black mottled; stiff; low plasticity; moist; creosote odor	
CB2			3.4'	6			Grading black very stiff	
				7				
				8				
				9			Grading - gray with iron oxide staining	
	10.0			10				
CB3			4.1'	11			Grading lt. gray; stiff	
				12				
				13				
				14				
	15.0			15				
CB4			3.5'	16				
				17				
				18				
				19		ML	Clayey SILT; lt. gray; firm; low plasticity; moist; contains oil sheen; creosote odor	Collect soil sample 19-20' for chemical analysis
				20				

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: SB07

SHEET NUMBER 2 OF 2

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

Location: Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: CME Sampler

BORING LOCATION: SB07 HWPW

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 3/06/97 FINISH DATE: 3/06/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
C85			4.2	21		
				22	SP	
				23		
				24		
	25.0			25		
				26		
				27		
				28		
				29		

SOIL DESCRIPTION AND DRILLING CONDITIONS

NOTES:

Collect soil sample at 21-22' for chemical analysis

Silty SAND; brownish gray; fine grained; wet  
 Contains creosote

Collect soil sample at 22-23' for chemical analysis

Collect soil sample at 24-25' for chemical analysis

2" layer cemented sand - contains creosote

Bottom of boring @ 25.0'

boring backfilled with cement/bentonite grout

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: SB08

SHEET NUMBER 1 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

DRILLING METHOD: Hollow Stem Auger

ENT: Southern Pacific Lines  
PROJECT NAME: Houston Wood Perserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: SB08 HWPW

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 3/6/97 FINISH DATE: 3/6/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
				1	FILL	Gravel; Railroad ties	Boring advanced with 8 1/4" O.D. 4 1/4" I.D. hollow stem augers
				2			
CB1	2-5		2.5	3	SM	SAND; black; fine grained; moist, creosote odor	
				4	CL	Silty SANDY CLAY; black; firm; low plasticity; moist; strong creosote odor	Collect soil sample at 4-5' for chemical analysis
	5.0			5			
CB2	5 - 10		5.0	6	CL	Silty CLAY; black; very stiff; low plasticity; moist; strong creosote odor	
				7			
				8			
				9		Grading gray with iron oxide staining	
	10.0			10			
CB3	10 - 15		4.5	11		Grading with creosote in hairline fractures	
				12		Grading with pea to gravel size CaCO3 nodules	
				13			
				14		grading with varved bedding	Collect soil sample 14-15' for chemical analysis
	15.0			15			
CB4	15 - 20		4.2	16			
				17	ML	Clayey SILT; brownish gray; firm; low plasticity; moist; creosote odor	Collect soil sample 18-19' for chemical analysis
				18			
				19			
	20.0			20			

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: SB08

SHEET NUMBER 2 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Perserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: SB08 HWPW

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 3/6/97

FINISH DATE: 3/6/97

WATER ELEVATION:

START TIME:

FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:
CB5			4.1'	21				
				22				
				23	SP		Silty SAND; lt. gray; very fine to fine grained; wet; with creosote odor and oil sheen	
				24				
				25				
				26				Bottom of boring at 25.0'
				27				Boring backfilled with cement/bentonite grout
				28				
				29				
				30				
				31				
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				
				40				

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



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## SB21 DRILLING LOG

W.O. NO. 422-09 Boring/Well ID SB21 Date Drilled 10/09/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 24' Boring Diam. 2"  
 N. Coord. 729023.67' E. Coord. 3168355.13' Surface Elevation 45.51' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Ylagan

SKETCH MAP

NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVN READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)				
45.51	0					0-3	0-1.4	SANDY SILTY CLAY: Very dark gray 2.5Y3/1; hard; low plasticity; moist; small roots; small gravel (<0.3" diameter); small shell fragments; friable; no odor. At 0-1' collect surface soil sample SB21-00 and SPLP.				
45	1.4-3					SILTY CLAY: Very dark gray 2.5Y3/1; stiff PP=1.5-2.0; plastic; moist; trace small roots.						
	3-6						3-8	SILTY CLAY: Dark gray 2.5Y4/1; stiff PP=1.25-2.0; plastic; moist; some small caliche nodules (0.1-0.5" diameter); no odor.				
	5					6-9	8-14		SILTY CLAY: Light gray 5Y7/1 mottled light olive brown 2.5Y5/6 and dark gray 2.5Y4/1; stiff PP=1.0-2.0; very plastic; moist; no odor.			
	10					9-12	12-15	SANDY SILTY CLAY: Light gray 5Y7/2; very stiff; plastic; moist; trace to some Mn-concretions and black speckles. Some Mn-concretions have reddish brown 5YR4/4 halos.				
	15					14-17.5	15-18		CLAYEY SILTY SAND: Light greenish gray 5GY7/1; medium dense; moist; very fine grained; no odor.			
	20					17.5-19.2	18-21	CLAYEY SAND: Brown 10YR5/3; wet; loose to very loose; fine grained; well sorted; subrounded to rounded; no odor.  At 21' collect ground water grab sample SB21-A and duplicate				
	25					19.2-24	21-24					
	25											T.D. = 24'



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**SB22  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB22 Date Drilled 09/29/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 45' Boring Diam. 8.25"  
 N. Coord. 728979.34' E. Coord. 3167971.31' Surface Elevation 44.91' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVN READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
44.91	0					0-3	0-1	ASPHALT: Asphalt pavement; some small gravel, subangular, 0.25 to 0.5" diameter; sand, gray 7.5YR5/1, loose.
							1-5	SILTY CLAY: Very dark gray 10YR3/1; stiff PP=1.25-2.0; plastic; moist. At 1-2' Collect surface soil sample SB22-00
						3-5		At 3.0' grades with some caliche nodules (0.25-0.5" diameter), rounded to subrounded
40	5					5-10	5-15	At 4.7' grades gray 10YR5/1 SANDY CLAY: Gray 2.5YR6/1 mottled with greenish gray 10GY6/1; stiff PP=1.5-2.0; plastic; moist; some iron-like coloration as dark yellowish brown 10YR4/6. At 7.0' trace to some small caliche nodules (0.125-0.5" diameter), subrounded.
35	10					10-15		At 10.0' grades gray 10YR6/1 mottled with yellowish brown 10YR5/8;
					1			At 13.0' grades to wet
30	15					15-20	15-27	At 15' Collect ground water grab sample SB22-A CLAYEY SAND: Light olive gray 5Y6/2; loose; fine grained; well rounded; well sorted; wet; very slight odor.
25	20				2	20-25		At 20.0' grades to olive gray 5Y5/2
20	25				4			





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**SB22  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB22 Date Drilled 09/29/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 45' Boring Diam. 8.25"  
 N. Coord. 728979.34' E. Coord. 3167971.31' Surface Elevation 44.91' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25						25-27		At 25.0' grades to olive 5Y4/3 mottled with greenish gray 10GY6/1.
					36	27-29	27-30	SILTY SANDY CLAY: Brown 10YR5/3 mottled with light gray 2.5Y7/1; very stiff to hard PP=2.25-4.5; plastic; moist; slight odor; trace small black nodules.
					57	29-30		At 29.0' grades to light gray 2.5Y7/1 mottled with brown 10YR5/3; no black nodules.
15	30				101	30-35	30-35	SILTY CLAY: Strong brown 7.5YR4/6 mottled with gray 7.5YR6/1; very stiff to hard PP=3.0-4.0; moist; with sand lenses; light yellowish brown 2.5Y6/3; very fine to fine grained; well sorted; well rounded; no visible staining; odorless. At 32-33' Collect soil sample SB22-32
10	35					35-40	35-45	CLAY: Strong brown 7.5YR4/6 mottled with light olive gray 5Y6/2; very stiff to hard PP=3.5-4.5; plastic; moist; with some silt; very slight to no odor.
5	40					40-45		
0	45				6			At 44-45' collect soil sample SB22-44 with SPLP T.D. = 45'
-5	50							



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**SB24  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB24 Date Drilled 09/28/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 50' Boring Diam. 8.25"  
 N. Coord. 728626.38' E. Coord. 3167443.77' Surface Elevation 49.24' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
49.24	0					0-3	0-1 1-3	SILTY SAND: White to gray; loose; subangular to angular; dry; some gravel (Fill). GRAVEL: loose; subangular; some sand; some silt; dominant black staining; sticky; trace wood; faint fluorescence; odorous.
	5				71	3-5 5-10	3-5.6 5.6-7	SILTY CLAY: Very dark gray 10YR3/1; firm; plastic; moist; trace black staining; odorous At 4.5' grades with very fine grained sand, trace wood fragments At 5.0' grades with trace gravel, diameter 0.5-1.0*
	10				151	10-15	10-15	SANDY CLAY: Light brownish gray 2.5Y6/2 mottled with light olive brown 2.5Y5/6; firm PP=1.0-2.25; plastic; moist; very fine grained sand; no fluorescence; odorous.
	15				62	15-20	15-16 16-22	SANDY SILTY CLAY: Greenish gray; soft; plastic; moist; odorous. CLAYEY SAND: Greenish gray; very loose; wet; fine grained; well sorted.
	20					20-25		At 20.0' grades to olive gray 5Y5/2; odorous
	25				191		22-23 23-26.2	SILTY CLAY: Olive 5Y4/3; stiff PP=1.25; plastic; moist; some very fine grained sand. CLAYEY SAND: Olive 5Y4/3; very loose; wet; fine grained; dark brown staining; sheen on water; odorous.



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**SB24  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB24 Date Drilled 09/28/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 50' Boring Diam. 8.25"  
 N. Coord. 728626.38' E. Coord. 3167443.77' Surface Elevation 49.24' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVN READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25						25-30		At 25.0' grades to medium grained sand
							26.2-30	SILTY CLAY: Light olive gray 5Y6/2 mottled with olive brown 2.5Y4/4; very stiff PP=2.5-4.0; plastic; moist.
20						30-35		
							30-31	CLAYEY SAND: Olive 5Y5/3; loose; wet; fine to medium grained sand; well sorted.
							31-35	SILTY CLAY: Gray 2.5Y6/1 mottled with yellowish red 5YR4/6; stiff PP=1.0-2.0; plastic; moist; with fine grained sand; some dark brown staining.
15					222	35-40		At 34.0-36' collect soil sample SB24-34 At 34.5' grades to dark reddish brown 5YR3/4 CLAY: dark reddish brown 5YR3/4 mottled with olive gray 5Y5/2; very stiff PP=3.0-4.0; plastic; moist; very slight odor.
							35-50	
10						40-45		At 40.0' grades to yellowish red 5YR4/6 mottled light olive gray 5Y6/2
5						45-50		
					23			
0								At 49.0-50' collect soil sample SB24-49 T.D. = 50'
50								



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**SB25  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB25 Date Drilled 09/29/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 50' Boring Diam. 8.25"  
 N. Coord. 728932.90' E. Coord. 3167697.23' Surface Elevation 44.91' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
44.91	0					0-1	0-1	ASPHALT: Asphalt pavement; sand, loose.
						1-3	1-2	CLAYEY SILT: Very dark gray 2.5Y3/1; hard to very hard PP>4.0; plastic; moist.
						3-5	2-5	SILTY CLAY: Gray 2.5Y6/1 mottled with light olive brown 2.5Y5/6; very stiff PP=2.0-3.0; plastic; moist; trace caliche nodules (0.5" diameter). At 3' grades to gray 2.5Y5/1 mottled with light olive brown 2.5Y5/6; some caliche nodules (<0.5" diameter).
40	5					5-10	5-10	SILTY CLAY: Dark gray 2.5Y4/1 mottled with greenish gray 5BG6/1 and yellowish brown 10YR5/8; firm to stiff PP=0.5-1.25; plastic; moist; some sand, fine grained.  At 7.7' some caliche nodules (<0.3" diameter)
35	10				1	10-15	10-15	CLAYEY SAND: Greenish gray 10GY6/1; dense; very fine grained; well sorted; subrounded to rounded; very moist.  At 14' grades to wet
30	15					15-20	15-22	CLAYEY SAND: Olive gray 5Y5/2; loose; well sorted; rounded; fine grained; wet; no odor. At 15' Collect ground water grab sample SB25-A
25	20				4	20-22		At 20' grades to olive gray 5Y4/2, very slight odor
						22-24	22-24	SILTY SANDY CLAY: Greenish gray 10Y6/1; very stiff PP=2.5-3.5; plastic; moist At 23' some caliche nodules (0.2-0.7" diameter)
					61	24-25	24-25	SILTY CLAY: Reddish brown mottled with red 2.5YR4/8, greenish gray 5G6/1, and olive 5Y5/4; very stiff PP=3.0-3.75; moist; some caliche nodules (<0.3" diameter).
20	25				45			



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**SB25  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB25 Data Drilled 09/29/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 50' Boring Diam. 8.25"  
 N. Coord. 728932.90' E. Coord. 3167697.23' Surface Elevation 44.91' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25	25	[Hatched pattern]	[Triangle pattern]		134	25-30	25-35	SANDY SILTY CLAY: Red 2.5YR4/8 mottled with greenish gray 10Y6/1; very stiff to hard PP=2.25-4.5; plastic; moist. At 26' some caliche nodules (0.2-0.7" diameter)
15	30	[Hatched pattern]	[Triangle pattern]		165	30-35		
10	35	[Hatched pattern]	[Triangle pattern]		283	35-40	35-50	CLAY: Dark red 2.5YR3/6 mottled with light brownish gray 10YR6/2; firm to very stiff PP=0.5-3.75; very plastic; moist; trace black staining from magnesium-like nodules; no fluorescence. At 35-36' slight odor. Collect soil sample SB25-35
5	40	[Hatched pattern]	[Triangle pattern]			40-45		At 40' grades with no Mg-like nodules, no odor
0	45	[Hatched pattern]	[Triangle pattern]			45-50		At 45' grades to reddish brown 5YR4/4, very hard
-5	50	[Hatched pattern]	[Triangle pattern]		24			At 48-50' Collect soil sample SB25-48
								T.D. = 50'



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**SB28  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB28 Date Drilled 09/30/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 50' Boring Diam. 8.25"  
 N. Coord. 728573.27' E. Coord. 3165897.88' Surface Elevation 45.22' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVN READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45.22	0					0-5	0-0.5 0.5-3.2	CLAYEY SILTY SAND: Black 10YR2/1; loose; poorly sorted; many small roots; some small angular shell fragments; organic; moist; no odor. At 0-1' collect surface soil sample SB28-00
	5					5-10	3.2-10	SILTY SANDY CLAY: Dark gray 10YR4/1; homogeneous; plastic; moist; some small roots; no odor. SILTY CLAY: Gray 2.5Y6/1 mottled with olive yellow 2.5Y6/8; firm to stiff PP=0.5-2.0; plastic; moist; no roots; no odor.  At 7.0-8.0' very small to very large caliche nodules (0.1-1.5" diameter)  At 9-10' medium to large caliche nodules (0.5-1.5" diameter)
	10					10-15	10-20.3	CLAYEY SAND: Light gray 2.5Y7/1 mottled with olive yellow 2.5Y6/8; dense; very fine grained; well sorted; moist; no odor.
	15					15-20		At 15' grades to wet.  At 17' Collect ground water grab sample SB28-A
	20					20-25	20.3-25	SANDY SILTY CLAY: Light gray 2.5Y7/1 mottled with olive yellow 2.5Y6/8; very stiff to hard PP=2.0-4.5; plastic; moist; very fine grained sand; no odor.
	25							



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**SB28  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB28 Date Drilled 09/30/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 50' Boring Diam. 8.25"  
 N. Coord. 728573.27' E. Coord. 3165897.88' Surface Elevation 45.22' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
20	25					25-30	25-31	SILTY CLAY: Yellowish red 5YR4/6 mottled with light gray 10YR7/2; very stiff PP=1.25-3.5; very plastic; moist.
15	30					30-35	31-43.7	CLAY: Red 2.5 YR4/6; stiff to hard PP=1.25-4.5; very plastic; moist; some very fine grained sand lenses, buff.
10	35					35-40		At 36.3' some small white and black nodules, 0.125-0.25" diameter
5	40					40-45		At 40-42' Collect soil sample SB28-40
0	45					45-50	43.7-50	CLAYEY SAND: Yellowish red 5YR4/6; dense; very fine grained; well sorted; moist; no odor. At 45' grades to wet  At 47.0' collect ground water grab sample SB28-B  At 49-50' collect soil sample SB28-49 T.D. = 50'

**SB29  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB29 Date Drilled 09/30/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 35' Boring Diam. 8.25"  
 N. Coord. 728289.77' E. Coord. 3165954.87' Surface Elevation 45.17' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45.17	0					0-3	0-1.5	CLAYEY SILTY SAND: Black 5Y2.5/1; loose; plastic; moist; many roots; many gravel, 1-2" diameter, subangular. (Organic layer). At 0-1' collect surface soil sample SB29-00
							1.5-6.3	SILTY CLAY: Very dark gray 5Y3/1; firm to stiff PP=0.5-2.0; very plastic; moist; some very fine grained sand; trace very small roots.
						3-5		
						5-10		
40	5						6.3-11	SILTY CLAY: Light gray 5Y7/1 mottled with olive yellow 2.5Y6/8; stiff PP=1.25-1.75; very plastic; moist. At 6.3-6.5' some small caliche nodules
						10-15		At 9.5-9.7 some small caliche nodules; trace small black Mg-like or Fe-like nodules.
						11-15		SANDY CLAY: Greenish gray 10G6/1 mottled with gray 2.5Y5/1 and light olive brown 2.5Y5/6; firm PP=0.25-1.0; plastic; moist.
						15-20	15-21	CLAYEY SAND: Gray 5Y6/1; loose; very fine to fine grained; well sorted; subrounded to rounded; wet.
						20-25		At 20' collect ground water grab sample SB29-A
							21-22.5	SILTY SANDY CLAY: Light gray 5Y7/2 mottled with olive yellow 2.5Y6/8; very stiff PP=2.0-3.0; plastic; moist.
							22.5-27	SILTY CLAY: Light gray 5Y7/2 mottled with yellowish red 5YR4/6; very stiff PP=3.0-4.0; plastic; moist.
	25							





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**SB29  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB29 Date Drilled 09/30/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 35' Boring Diam. 8.25"  
 N. Coord. 728289.77' E. Coord. 3165954.87' Surface Elevation 45.17' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
20	25					25-30	27-28.8	SANDY SILTY CLAY: Light gray 5Y7/2 mottled yellowish red 5YR4/6; stiff to very stiff PP=1.0-2.5; plastic; moist.
15	30					28.8-30	CLAYEY SAND: Light gray 5Y7/2; dense; very fine to fine grained; well sorted; subrounded to rounded; moist.	
10	35					30-35	30-35	CLAYEY SAND: Yellowish red 5YR4/6 mottled light gray 5Y7/2; loose to medium dense; very fine to fine grained; well sorted; subrounded to rounded; wet.
5	40							
0	45							
	50							



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**SB30  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB30 Date Drilled 10/12/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728167.71' E. Coord. 3165947.86' Surface Elevation 45.22' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45.22	0					0-3	0-3	SILTY CLAY: Black 10YR2/1; soft to very soft; high plasticity; moist; many organics; no staining; no odor.
						3-6	3-6	SILTY CLAY: Dark gray 2.5Y4/1 mottled with light olive brown 2.5Y5/6; firm; high plasticity; moist; trace small roots; no staining; no odor.
40	5					6-9	6-10.2	SILTY CLAY: Gray 2.5Y6/1 mottled with olive yellow 2.5Y6/8; firm; plastic; moist; trace black nodules (Fe?) (0.3" diameter); no staining; no odor.
						9-12	10.2-12	SILTY SANDY CLAY: Greenish gray 5GY6/1; firm; plastic; moist; no staining; no odor.
						12-15	12-14	SILTY SANDY CLAY: Gray 2.5Y6/1 mottled light olive brown 2.5Y5/6; hard; plastic; moist; trace black concretions (Fe?) with reddish brown halos; no odor.
						14-15	15-18	CLAYEY SAND: Greenish gray 5GY6/1; medium dense; moist to wet; very fine grained; well sorted; no staining; no odor.
30	15					15-20.5	15-20.5	CLAYEY SAND: Light gray 2.5Y7/1; loose; wet; very fine to fine grained; well sorted; subrounded to rounded; no staining; no odor
						18-21		
25	20					20.5-27	20.5-27	SILTY SANDY CLAY: Greenish gray 10Y6/1; very stiff to hard; plastic; moist; no staining; no odor.
						24-27		At 22.7' grades with mottling of yellowish brown 10YR5/8



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**SB30  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB30 Date Drilled 10/12/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728167.71' E. Coord. 3165947.86' Surface Elevation 45.22' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
20	25					27-31	27-34	At 26.0' yellowish brown mottling grades to strong brown 7.5YR4/6 NO RECOVERY: collect ground water grab sample from B-zone using hydropunch; SB30-B
15	30					31-34		
10	35							T.D. = 34'
5	40							
0	45							
	50							



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**SB37  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB37 Date Drilled 10/09/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 24' Boring Diam. 2"  
 N. Coord. 727591.98' E. Coord. 3165340.67' Surface Elevation 46.42' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING PPM	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
46.42	0					0-3	0-0.2 0.2-1.9	CLAYEY SANDY SILT: Very dark grayish brown 10YR3/2; loose; moist; with some pebbles and gravel; roots; no odor.
45						3-6	1.9-6	At 0-1' collect surface soil sample SB37-00 with duplicate and SPLP FILL: White 5Y8/1; crushed shell fragments (0.1 to 1" diameter) with clayey sand; loose to dense; moist; no odor.
5						6-9	6-6.2 6.2-8.5	SILTY CLAY: Dark gray 5Y4/1 mottled with olive 5Y4/4; stiff PP=1.75; plastic; moist; trace lenses of fine grained sand; trace small roots; no odor.
40						9-12	8.5-9 9-12.7	CONCRETE: with small pebbles CLAYEY GRAVEL: Light gray 2.5Y7/2; loose; wet; subangular; poorly sorted (0.1-1.0" diameter); no odor.
10					2.5	12-15	12.7-14.7	SILTY CLAY: Light brownish gray 2.5Y6/2 mottled olive yellow 2.5Y8/8; stiff PP=1.0; plastic; moist; some small gravel (0.1" diameter); no roots; no odor.
35					4	15-18	14.7-17.3	SILTY CLAY: Light gray 2.5Y7/1 mottled with yellow 2.5Y7/8; stiff to very stiff PP=1.75-3.25; plastic; moist; no odor.
15						18-21	17.3-24	At 10.4-11.5' with some medium to large caliche nodule (up to 0.8" diameter). At 12-14' Collect soil sample SB37-12 SILTY CLAY: Light gray 5Y7/2 mottled reddish brown 5YR4/4; very stiff; plastic; moist; no odor.
30						21-24		At 13.8-14.7' white silty clay lenses; white mottled with pale yellow 5Y8/2; soft to firm; moist CLAYEY SAND: Light brown 7.5YR6/4; loose; moist to wet; fine grained; subrounded; well sorted; no odor.
20					3			At 15.0' Collect ground water grab sample SB37-A and duplicate SILTY CLAY: Light gray 5Y7/2 mottled with yellowish brown 10YR5/6; stiff PP=1.5; very plastic; moist; no odor.
25					3			At 18.0' grades light gray 2.5Y7/2 mottled with strong brown 7.5YR5/6; firm to hard.
25								At 22.5-24' Collect soil sample SB37-22.5 and duplicate T.D. = 24'



**SB38  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB38 Date Drilled 10/08/98  
 Project Phase 2B RFI Owner Southern Pacific RR  
 Location Houston Wood Preserving Works Boring T.D. 33' Boring Diam. 2"  
 N. Coord. 727513.09' E. Coord. 3165745.29' Surface Elevation 47.52' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
47.52	0					0-3	0-0.5	CLAYEY SILTY SAND: Light yellowish brown 10YR6/4; dense; moist; trace small pebbles; no vegetation. At 0-1' Collect surface soil sample SB38-00
							0.5-3.9	
45					25	3-6		SANDY SILTY CLAY: Dark gray 10YR4/1 mottled with yellowish brown 10YR5/8; firm PP=0.5; plastic; moist.
5					24	6-9		SILTY CLAY: Dark gray 7.5YR4/1; very stiff PP=2.0; plastic; moist; slight odor.
40					32	7.2-16		SILTY CLAY: Greenish gray 10G6/1 mottled with light olive brown 2.5Y5/6; very stiff PP2.5-3.0; plastic; moist; slight odor. At 8.1' with small caliche to 8.3'
10					31	9-12		At 9.8' visible dark brown liquid stain with odor At 10' grades to greenish gray 10Y6/1 mottled with light olive brown 2.5Y5/6 At 10' trace dark brown staining in microfractures; slight fluorescence At 10-12' Collect soil sample SB38-10 At 11.9' small caliche nodules (<0.3" diameter) At 12.5-12.9' some small to medium caliche nodules (0.2-0.7" diameter) At 13.5-13.7' many small caliche nodules (<0.3" diameter) At 13.5' some dark brown liquid; slight fluorescence
35					13	12-15		At 14' grades to very hard PP=4.0-4.5
15						15-18		SILTY CLAY: Strong brown 7.5YR4/6 mottled with light greenish gray 5GY7/1; very hard; very plastic; moist; odor.
30						16-17.6		SANDY SILTY CLAY: Greenish gray 5GY6/1; firm to hard; plastic; moist; very fine grained sand; no odor.
20						17.6-18.9		At 18' grades to wet; no fluorescence
25						18.9-20		CLAYEY SAND: Greenish gray 10GY6/1; medium dense; very fine grained; well sorted; subrounded to rounded; moist to wet; very slight odor.
25						20-33		SANDY SILTY CLAY: Strong brown 7.5YR4/4 mottled with light gray 10YR7/1; very stiff to hard PP=1.5-4.0; plastic; moist; odor. At 18' grades to light gray 2.5Y7/1, very slight odor At 22' grades no odor
						21-24		
						24-27		



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**SB38  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB38 Date Drilled 10/08/98  
 Project Phase 2B RFI Owner Southern Pacific RR  
 Location Houston Wood Preserving Works Boring T.D. 33' Boring Diam. 2"  
 N. Coord. 727513.09' E. Coord. 3165745.29' Surface Elevation 47.52' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVN READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25						27-30		At 26' grades to mottled strong brown 7.5YR4/6; very faint odor
30					6	30-33		At 30' grades light gray 2.5Y7/1 mottled strong brown 7.5YR4/6; very faint odor; trace dark brown shiny staining in microfractures, fluorescence in microfractures At 31' no fluorescence At 31-33' Collect soil sample SB38-31 and duplicate T.D. = 33'
15								
35								
10								
40								
5								
45								
0								
50								



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**SB39  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB39 Date Drilled 10/08/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 30' Boring Diam. 2"  
 N. Coord. 727453.63' E. Coord. 3165635.93' Surface Elevation 47.32' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
47.32	0					0-3	0-0.5 0.5-2.5	SILTY CLAY: Dark yellowish brown 10YR4/4 mottled with dark gray 2.5Y4/1; hard; plastic; moist; some large grained sand; one piece wood (0.5" by 1"); no odor. At 0-1' Collect surface soil sample SB39-00 and SPLP
45	5				26	3-6	2.5-5	CLAYEY SAND: Brown 7.5YR5/4; loose; moist to wet; large grained; angular; some large gravel (1"); no odor.
40	10				26	6-9	5-9.5	SANDY CLAY: Black; soft; plastic; moist; homogeneous; organic odor (Organic). At 3.0' with shiny brown staining; with some small roots; odor SILTY CLAY: Very dark gray 5Y3/1; firm to stiff; plastic; moist; shiny brown staining in microfractures; some small roots. At 6' grades gray 5Y5/1. One piece wood (1"x9").
35	15				41	9-12	9.5-15	At 9' grades dark gray 2.5Y4/1; some small to medium roots. SILTY CLAY: Blueish gray 5B6/1 mottled with olive yellow 2.5Y6/8; firm to stiff; plastic; moist; no roots; At 9.5' 10.6' trace caliche nodules (0.1-1.3")
30	20				42	12-15		At 12' with trace dark brown staining in microfractures; with some small to large caliche nodules (0.2-1.0" diameter). At 12-14' Collect soil sample SB39-12 and duplicate
25	25				41	15-18	15-18	SILTY CLAY: Greenish gray 10GY 6/1 mottled with yellowish brown 10YR5/8; stiff to very stiff PP=1.75-3.0; plastic; moist; trace brown staining in microfractures; odor. At 15.4' some caliche nodules (0.5" diameter)
					27	18-21	18-24	At 17.5' grades to greenish gray 10GY7/1 SILTY CLAY: Light greenish gray 10Y7/1; firm to stiff PP=2.0; plastic; moist; trace dark brown shiny staining; odor. At 19' grades no staining
					12	21-24		
					17	24-27	24-26.1	At 23' trace dark brown to black staining in microfractures; fluorescence. CLAYEY SAND: Yellowish brown 10YR5/4; loose; moist; fine grained; homogeneous; no staining; odor.



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**SB39  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB39 Date Drilled 10/08/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 30' Boring Diam. 2"  
 N. Coord. 727453.63' E. Coord. 3165635.93' Surface Elevation 47.32' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25	25				8	27-30	26.1-30	SILTY CLAY: Greenish gray 10G6/1; hard; plastic; moist; no staining; very slight to no odor. At 27' grades no odor At 27-30' Collect soil sample SB39-27 At 28.5' grades with brown 7.5YR4/4 mottling T.D. = 30'
20	20							
30	30							
15								
35								
10								
40								
5								
45								
0								
50								





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**SB40  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB40 Date Drilled 10/01/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 54' Boring Diam. 8.25"  
 N. Coord. 727773.02' E. Coord. 3165514.37' Surface Elevation 46.35' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
46.35	0					0-2	0-1.5	COARSE SAND: Light brownish gray 2.5Y6/2; loose; moist; with small shell fragments; some medium and large shell fragments (.5-1"); some clay (Fill).
45						2-4	1.5-12.7	SILTY CLAY: Very dark gray 2.5Y3/1; firm to stiff PP=1.0-2.0; plastic; moist; some to many red brick fragments (Fill). At 2' grades to very dark gray 10YR5/1. At 2-3' Collect surface soil sample SB40-02 At 3.5' grades to gray 10YR5/1 mottled with yellowish brown 10YR5/8 At 4.0' grades to gray 10YR6/1 mottled with yellowish brown 10YR5/8 At 6.6' some small caliche nodules (<0.3" diameter); trace medium to large caliche nodules (0.5-1.0" diameter)
	5					4-9		At 9.0' grades with trace black staining from Mg-like nodules
40						9-14		
35					2	12.7-15	14-19	CLAYEY SAND: Light gray 5Y7/2 mottled with olive yellow 2.5Y6/8; very fine to fine grained, loose to medium dense; well sorted, subrounded to rounded; moist. At 14' grades to wet; collect ground water grab sample SB40-A
30	15					15-18	18-24	SILTY CLAY: Yellowish red 5YR4/6 mottled with light gray 5Y7/2; very stiff PP=2.0-3.25; very plastic; moist.
25						19-24	24-33	CLAY: Pale yellow 2.5Y7/3; firm to stiff PP=0.5-2.5; plastic; moist; some silt. SILTY CLAY: Light gray 5Y7/2 mottled with brownish yellow 10YR6/6; stiff to very stiff PP=1.5-2.5; very plastic; moist.
25	20					24-29		



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**SB40  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB40 Date Drilled 10/01/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 54' Boring Diam. 8.25"  
 N. Coord. 727773.02' E. Coord. 3165514.37' Surface Elevation 46.35' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25								
20						29-34		At 28.0' grades to yellowish red 5YR4/6 mottled with light gray 2.5Y7/2 and olive yellow 2.5Y6/8 At 29.0' grades to brownish yellow 10YR6/6 mottled with light gray 5Y7/2
30					6	33-34		SILTY SANDY CLAY: Yellowish red 5YR4/6; very stiff PP=2.75; plastic; moist.
15						34-39	34-38.3	At 33-34' Collect soil sample SB40-33 and duplicate SILTY CLAY; Yellowish red 5YR5/6 mottled with light gray 5Y7/2; stiff to very stiff PP=1.25-3.0; plastic; moist; blocky.
35						39-44	38.3-54	CLAY: Red 2.5YR4/6; very stiff to hard PP=3.5-4.25; very plastic; moist.
10						44-49		
5					5	49-54		
40								
45								
0								
50								



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**SB40  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB40 Date Drilled 10/01/98  
 Project Phase 2B RF1 Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 54' Boring Diam. 8.25"  
 N. Coord. 727773.02' E. Coord. 3165514.37' Surface Elevation 46.35' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVN READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
50	-5				4			At 53-54' Collect soil sample SB40-53 T.D. = 54'
55	-10							
60	-15							
65	-20							
70	-25							
75								



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**SB43  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB43 Date Drilled 10/12/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 24' Boring Diam. 2"  
 N. Coord. 727396.83' E. Coord. 3165534.13' Surface Elevation 47.58' MSL Datum

Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_

Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )

Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)	
47.58	0					0-3	0-1.2	SANDY SILTY CLAY: Light yellowish brown 2.5Y6/3; firm to hard; plastic; moist; some small gravel; trace small roots; no staining; no odor. At 0-1' Collect surface soil sample SB43-00, duplicate, SPLP	
							1.2-1.8	CLAYEY GRAVEL: Clay is yellowish brown 10YR5/4; soft; moist. Gravel is white; subangular; large (0.5"-1.5" diameter). No staining, no odor.	
45						3-6	1.8-3	SILTY CLAYEY SAND: Black to brown to red; fine to medium grained; moist. Black and brown sand is loose. Red sand is cemented (old brick?); sewer-gas-like odor.	
	5				16		3-6	SANDY SILTY CLAY: Dark gray 2.5Y4/1; soft to firm; plastic; moist; trace small roots; odor.	
							6-9	6-9.7	At 3.6' black to dark brown shiny staining throughout the core. stained areas fluoresce. At 4.1' staining only visible in the microfracture, typically following the root; stained areas fluoresce
40					19		9-12	SILTY CLAY: Dark gray 2.5Y4/1; firm; plastic; moist; dark brown shiny staining in microfracture along root traces; odor.	
	10				13		9.7-13	At 7-9' Collect soil sample SB43-07	
							12-15	SILTY CLAY: Greenish gray 5GY6/1; hard; plastic; moist; some caliche nodules (0.3-1.5" diameter); very dark gray 5Y3/1 shiny staining starting in microfracture and spreading away from microfracture; odor.	
35					8		13-13.4	SANDY GRAVELLY CLAY: Dark olive gray 5Y3/2; soft; wet; fine to medium grained sand; faint rainbow-like sheen; odor.	
							13.4-14	At 13-15' Collect soil sample SB43-13	
	15				6		14-15	SILTY CLAY: Greenish gray 5GY6/1 mottled with strong brown 7.5YR5/8; hard; plastic; moist; trace small roots that are stained very dark greyish brown; odor.	
							15-18	CLAYEY SAND: Light greenish gray 5GY7/1; medium dense to dense; moist; fine grained; rounded; well sorted; trace dark staining; no roots; odor.	
30							18-21	18-20.5	SILTY CLAY: Greenish gray 5GY7/1 mottled with reddish brown 5YR4/6; very hard; plastic; moist; trace black staining in reddish brown area (Mg?); some sandy clay lenses (1" thick); very slight odor.
	20				3		20.5-24	SANDY CLAY: Greenish gray 5GY7/1; loose to dense; low plasticity; moist; no staining; very slight to no odor. At 19' grades to brown 7.5YR5/4	
								SILTY CLAY: Greenish gray 5GY7/1; soft to firm; high plasticity; moist; no staining; no odor. At 21-24' Collect soil sample SB43-21 and SPLP T.D. = 24'	
25									



**SB44  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID SB44 Date Drilled 10/12/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 24' Boring Diam. 2"  
 N. Coord. 727297.04' E. Coord. 3165374.86' Surface Elevation 46.88' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. FL \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Alfredo Palacios  
 Drilling Method Direct Push Sampling Log By M. Ylagan

SKETCH MAP

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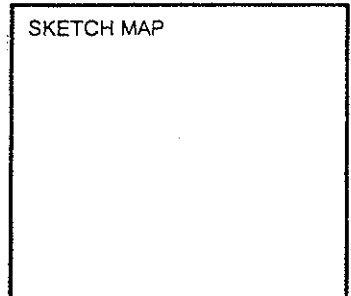
NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
46.88	0					0-3	0-0.7 0.7-1.5 1.5-6.8	CLAYEY SILTY SAND: Light olive brown 2.5Y5/4; medium dense; fine grained; rounded; well sorted; moist; some small roots; trace small pebbles; no odor. At 0-1' Collect surface soil sample SB44-00 and SPLP
45	3-6					CLAYEY GRAVEL: Clay is dark grayish brown 2.5Y3/2; moist; Gravel is white to light pink; angular; 0.3-1.5" diameter. SILTY CLAY: Very dark gray 2.5Y3/1; soft; very plastic; moist; no staining; no odor.		
5	6-9					6.8-9	SILTY CLAY: Dark gray 2.5Y4/1 mottled with light olive brown 2.5Y5/6; firm to stiff; plastic; moist; no staining; no odor. At 8.0' dark gray grades gray 2.5Y6/1	
40	9-12					9-13	At 8.4' 1 large caliche nodule (1.5" diameter) SILTY SANDY CLAY: Gray 2.5Y6/1 mottled with olive yellow 2.5Y6/8; very stiff; plastic; moist; no odor At 10.0' 1" thick lens of small caliche nodules (<0.5" diameter)	
35	12-15					13-15	CLAYEY SAND: Light gray 2.5Y7/1; medium dense; subrounded to rounded; well sorted; moist; no staining; no odor.	
15	15-18					15-16.3	SANDY CLAY: Light gray 2.5Y7/1 mottled with olive yellow 2.5Y6/8; very stiff; plastic; moist; no staining, no odor. At 15-17' Collect soil sample SB44-15 and SPLP	
30	17-18					17-18	CLAYEY SAND: Light gray 2.5Y7/1; dense; subrounded to rounded; well sorted; moist; no staining; no odor.	
20	18-21					18-21	CLAY: Yellowish red 5YR4/6; hard; very plastic; moist; no staining; no odor. CLAYEY SAND: Light yellowish brown 2.5Y6/3; loose; well sorted; subrounded to rounded; wet; no staining; no odor	
25	21-24					21-21.7 21.7-24	SANDY CLAY: Brown 10YR5/4; soft; non-plastic; moist; very fine grained; no staining; no odor. SILTY SANDY CLAY: Light gray 10YR7/1 mottled with olive yellow 2.5Y6/8; very stiff to hard; plastic; moist; no staining; no odor. At 22-24' Collect soil sample SB44-22 T.D. = 24'	
25								




**SB-50  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID SB-50 Date Drilled 03/07/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 31' Boring Diam. 8"  
 N. Coord. 729142.28' E. Coord. 3168191.52' Surface Elevation 45.12' MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_  
 Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_  
 Top of Casing Elevation \_\_\_\_\_ Stickup \_\_\_\_\_  
 Depth to Water: 1. Ft. 20 (ATD \_\_\_\_\_) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method Hollow Stem Auger Log By M. Ylagan

SKETCH MAP



NOTES  
 NAPL = Non-Aqueous Phase Liquid  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
100	0					0-5	0-2	FILL: asphalt
					0		2-15	SILTY CLAY: dark gray 7.5YR4/1; stiff PP=1.5 tsf; plastic; moist; no NAPL staining; no odor. At 3' grades to mottled with gray 10YR6/1; firm PP=0.5 tsf; some small caliche nodules (1/8" diam)
95	5				0	5-10		At 6.0-6.5' many small caliche nodules (1/8"); trace medium (1/4-1/2") caliche nodules At 6-10" grades to light gray 10YR7/1 mottled with brownish yellow 10YR6/8 At 7-9' Collect soil sample SB50-07 At 10-15' grades firm PP=1.0 tsf
90	10				0	10-15		
					0		15-20	At 14-15' trace Fe-concretions CLAY: light gray 2.5Y7/2, mottled with yellowish-red 5YR4/6; very stiff PP=2.5 tsf; plastic; moist; many small caliche nodules (1/8"); some medium caliche nodules (1/4-1/2"); angular-blocky ped structure; rare, light yellow-brown staining in microfractures between ped structures; no odor.
85	15				0	15-20	15-17.5	
					0		17.5-20	SANDY CLAY: light greenish gray (2G7/10BG); very stiff PP=2.0 tsf; plastic; moist; very fine grained; trace light yellow-brown circular staining; no odor.
80	20				0	20-25	20-30	CLAYEY SAND: yellowish brown 10YR5/6; saturated; loose (fluidized); very fine grained; angular to subangular, well sorted; no sheen on standing water; no odor.
75	25				0	25-30		At 25' grades wet; medium dense
70	30				0			



**SB-50  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID SB-50 Date Drilled 03/07/00

Project Phase 2C RFI Owner Southern Pacific Trans. Co.

Location Houston Wood Preserving Works Boring T.D. 31' Boring Diam. 8"

N. Coord. 729142.28' E. Coord. 3168191.52' Surface Elevation 45.12' MSL Datum

Screen: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Slot Size \_\_\_\_\_

Casing: Type \_\_\_\_\_ Diam. \_\_\_\_\_ Length \_\_\_\_\_ Sump Length \_\_\_\_\_

Top of Casing Elevation \_\_\_\_\_ Slickup \_\_\_\_\_

Depth to Water: 1. Ft. 20 (ATD \_\_\_\_\_) 2. Ft. \_\_\_\_\_ (\_\_\_\_\_)

Drilling Company Best Drilling Services Driller Keith Barge

Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

NAPL = Non-Aqueous Phase Liquid  
PP = Pocket Penetrometer  
tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
70	30				0	30-31	30-31	SILTY CLAY: strong brown 7.5YR4/6; very stiff PP=2.5 tsf; plastic; moist; no NAPL staining; no odor. At 30-31' Collect soil sample SB50-30 T.D. = 31'
65	35							
60	40							
55	45							
50	50							
45	55							
40	60							

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**ERM** Environmental Resources Management

**SB-56  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-56 Date Drilled 8/25/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 20' Boring Diam. 2"  
 N. Coord. 728295.4' E. Coord. 3167025.99' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

**NOTES**  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-20	0-3.9	FILL: fill, gravelly sandy silt, very dark brown gray (7.5 YR ), saturated with dark brown fluid, strong odor, gravel pieces 5-10mm
					52		3.9-5	SILTY CLAY: silty clay, very dark gray (7.5 YR 3/1), moist, pp=1.0tsf, very plastic, strong odor, sample SB-56 (4") collected @ 13:50
-5	5				110		5-10	SANDY CLAY: sandy clay, gray (7.5 YR 5/1), mottled with strong brown (7.5 YR 5/8), moist, pp=2.5tsf, very plastic, brown concretions <2mm, white calcareous nodules @ 10ft
					120			
-10	10				61		10-15	SANDY CLAY: sandy clay, gray (7.5 YR 5/1), sand content increases with depth, mottled with strong brown (7.5 YR 5/8), moist, pp=2.5tsf, very plastic
					216			
-15	15							





**ERM** Environmental Resources Management

**SB-56  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-56 Date Drilled 8/25/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 20' Boring Diam. 2"

N. Coord. 728295.4' E. Coord. 3167025.99' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

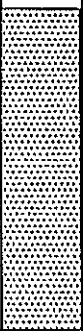

Drilling Company Fugro Geosciences, Inc. Driller Doug Isenharl

Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15				111.5		15-20	SAND: sand, greenish gray (1 Gley 5/10 GY), saturated, fine-grained sand, poorly sorted, subrounded, saturated with dark brown fluid and water. collected SB-56C19at 14:15 (strong odor)
					60			
-20	20				41			T.D. = 20'
-25	25							
-30	30							



# ERM Environmental Resources Management

## SB-59 DRILLING LOG

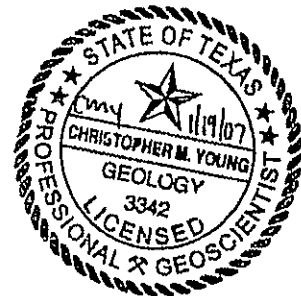
.oj. No. 0014419 Boring/Well ID SB-59 Date Drilled 8/21/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 1' Boring Diam. 2.5"  
 N. Coord. 728941.85' E. Coord. 3168210.72' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-1	0-0.2 0.2-1	CLAY: gray (1 for Gley 5/N), clay, moist, loose, slightly plastic, plant roots, 100% recovery SAND: pink (5 YR 7/4), sand, very fine-grained, sorted, rounded, moist, slightly cohesive, clay lenses, 100% recovery T.D. = 1'
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-60 DRILLING LOG

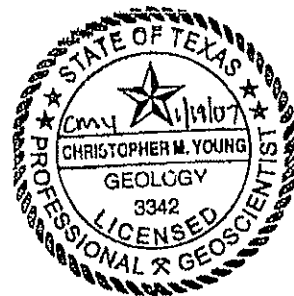
Proj. No. 0014419 Boring/Well ID SB-60 Date Drilled 8/21/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 5' Boring Diam. 2.5"  
 N. Coord. 728918.5' E. Coord. 3168055.04' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Blzuayehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-5	0-0.2	<p>SANDY CLAY: dark gray (1 for Gley 4/N), sandy clay, moist, plastic, some black mottles, sand grains very fine-grained, sorted, rounded, 100% recovery</p> <p>SANDY CLAY: dark gray (1 for Gley 4/N), sandy clay, moist, slightly plastic, sand grains medium to fine-grained, sorted, subangular to rounded, 100% recovery</p> <p>SANDY CLAY: dark gray (1 for Gley 4/N), sandy clay, moist, plastic, sand grains very fine-grained, sorted, rounded, clay lenses, 100% recovery</p> <p>SANDY CLAY: gray (1 for Gley 5/N), sandy clay, moist, plastic, dense and firm, sand grains very fine-grained, sorted, rounded, occasional gravels, 100% recovery</p> <p>SANDY CLAY: gray (1 for Gley 5/N), sandy clay, moist, plastic, dense and firm, sand grains very fine-grained, sorted, rounded, occasional gravels, some calcite lenses, 100% recovery</p> <p>SANDY CLAY: greenish gray (1 for Gley 6/1), sandy clay, with light olive brown (2.5 Y 5/6) mottles, sand grains are very fine grains, rounded, sorted, moist, plastic and firm, sand grains in microfractures, 100% recovery</p> <p>T.D. = 5'</p>
					2.4	0.2-1	1-2	
					0.0		2-3	
					0.0		3-4	
					0.0		4-5	
					0.0			
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-61 DRILLING LOG

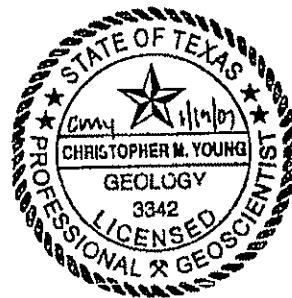
Proj. No. 0014419 Boring/Well ID SB-61 Date Drilled 8/22/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 0.5' Boring Diam. 2.5"  
 N. Coord. 728957.25' E. Coord. 3167661.25' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Blzuayehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-0.5	0-0.5	CLAYEY SAND: gray (1 for Gley 5/N), fine grained, sorted, rounded to subrounded, slightly cohesive, some gravel, moist, 100% recovery T.D. = 0.5'
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-62 DRILLING LOG

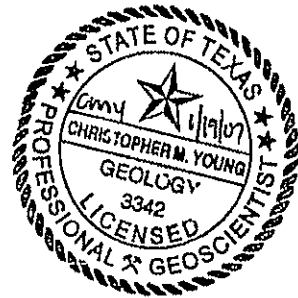
Proj. No. 0014419 Boring/Well ID SB-62 Date Drilled 8/21/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 0.5' Boring Diam. 2.5"  
 N. Coord. 728877.92' E. Coord. 3167485.01' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.5	0-0.5	0-0.5	SANDY CLAY: gray (1 for Gley 5/1), sandy clay, moist, plastic, some gravel, reddish brown (2.5 YR 4/4) mottles, 100% recovery T.D. = 0.5'





**ERM** Environmental Resources Management

**SB-64  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-64 Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728807.41' E. Coord. 3167316.72' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-34	0-2.2	FILL: gravelly, sandy silt, very dark gray (7.5 YR 5/1), moist, tan road base material, 5mm diameter gravel, medium to coarse sand, subangular
					1.6		2.2-5	CLAY: dark gray (7.5 YR 4/1), moist, pp=1.5 tsf, very plastic, white calcareous nodules <2mm diameter
-5	5				1.0		5-10	CLAY: greenish gray (1 Gley 5/10GY) mottled with strong brown (7.5 YR 5/6), moist, pp=2.5 tsf, very plastic, brown stains, white calcareous nodules ranging from <2mm and <5mm
					1.0			
-10	10				0.5		10-13.5	SAND: greenish gray (1 Gley 5/10 GY), saturated, pp=1.5 tsf, crumbly, very fine to medium-grained, subrounded, strong odor, traces of brown stains
					2.7			
							13.5-15	NO RECOVERY
-15	15							



Proj. No. 0014419 Boring/Well ID SB-64 Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728807.41' E. Coord. 3167316.72' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15				7.6	15-16.9	15-16.9	SAND: greenish gray (1 Gley 5/10 GY), saturated, pp=1.5 tsf, crumbly, very fine to medium-grained, subrounded, strong odor, traces of brown stains
					12	16.9-19.7	16.9-19.7	CLAY: greenish gray (1 Gley 5/10GY), mottled brown (7.5 YR 4/4), moist, pp=3.5 tsf, white concretions <4mm diameter
-20	20				39	19.7-20 20-25	19.7-20 20-25	SAND: brown (7.5 YR 4/4), saturated with dark brown fluid, loose, very fine to medium-grained, poorly sorted, subrounded, strong odor NO RECOVERY
					NM	25-26.7	25-26.7	SAND: brown (7.5 YR 4/4), saturated with less dark brown fluid, loose, very fine to medium-grained, poorly sorted, subrounded, strong odor
					25	26.7-28.5	26.7-28.5	CLAY: strong brown (7.5 YR 5/6) mottled with light gray (7.5 YR 7/1), moist, pp=3.5 tsf, very plastic, strong odor
						28.5-30	28.5-30	NO RECOVERY
-30	30							



**ERM** Environmental Resources Management

**SB-64  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-64 Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728807.41' E. Coord. 3167316.72' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30				16.8	30-34	30-34	CLAY: red (2.5 YR 4/6), moist, pp=>4.5 tsf, white concretion <2mm diameter, slightly plastic, collected sample SB-64(31'-33')
					63.5			
					64			T.D. = 34'
-35	35							
-40	40							
-45	45							

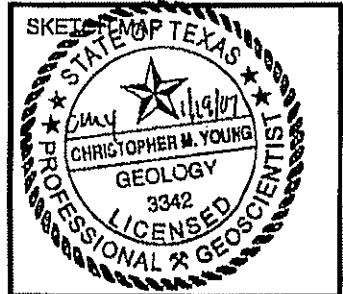




**ERM** Environmental Resources Management

**SB-67  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-67 Date Drilled 8/30/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728619.35' E. Coord. 3167479.83' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Fl. 0 (\_\_\_\_\_) 2. Fl. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire



NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-34	0-5	FILL: gravelly silty sand, very dark gray (7.5 YR 3/1) moist, gravel pieces 2mm to 50mm, slight odor, saturated with brown fluid in some locations, strong odor
					76			
-5	5				36.5		5-7.7	CLAY: very dark gray (7.5 YR 3/1), moist, pp=1.5 tsf, very plastic, rootlets, strong odor, traces of brown fluid
							7.7-10	CLAY: gray (7.5 YR 5/1), mottled with strong brown (7.5 YR 5/6), moist, pp=2.5 tsf, very plastic, strong odor
-10	10				40.8		10-12.8	SANDY CLAY: greenish gray (1 Gley) mottled with strong brown (7.5 YR 5/6), moist, pp=3.5 tsf, brown stains <2mm diameter, sand content increases with depth
					48.5		12.8-15	NO RECOVERY
-15	15							



# ERM Environmental Resources Management

## SB-67 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-67 Date Drilled 8/30/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 34' Boring Diam. 2"

N. Coord. 728619.35' E. Coord. 3167479.83' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Slickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt

Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

NOTES

pp = pocket penetrometer.

tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15				20.1		15-18.2	SAND: greenish gray (1 Gley 5/10GY) mottled with very dark greenish gray (1 Gley 3/10Y) and strong brown (7.5 YR 5/6), saturated, loose, very fine to medium-grained, subrounded, traces of brown fluid at 16.4', poorly sorted, strong odor
					42.9			
					19.5		18.2-20	NO RECOVERY
-20	20				NM		20-25	SAND: greenish gray (1 Gley 5/10GY), very dark brown staining in sand from 21.4' to 25', saturated, loose, very fine to medium-grained, subrounded, poorly sorted
					191			
-25	25				304		25-25.3 25.3-28.8	SAND: greenish gray (1 Gley 5/10GY), saturated, loose, very fine to medium-grained, subrounded, poorly sorted CLAY: strong brown (7.5 YR 5/6) mottled with gray (7.5 YR 6/1) moist, pp=4.5tsf, plastic, traces of white calcareous nodules, 2mm diameter
					230			
					119		28.8-30	NO RECOVERY
-30	30							



# ERM Environmental Resources Management

## SB-67 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-67 Date Drilled 8/30/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728619.35' E. Coord. 3167479.83' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30				NM		30-34	CLAY: strong brown (7.5 YR 5/6) mottled with gray (7.5 YR 6/1) moist, pp=>4.5 tsf, plastic, collected sample at 31'-33', At 32.2'-32.2' - a 1-inch calcareous zone
					40			
					75			T.D. = 34'
-35	35							
-40	40							
-45	45							



**ERM** Environmental Resources Management

**SB-72  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-72 Date Drilled 8/25/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 728508.52' E. Coord. 3167169.38' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-35	0-3	FILL: gravelly, silty, sand, very dark gray (7.5 YR 3/1), moist to wet, (sheen at 3'), wood fragments
							3-5	DEPRECATED: SANDY SILTY CLAY: very dark gray (7.5 YR 3/1), moist, pp=1.5 tsf, crumbly
-5	5				32		5-10	SILTY CLAY: gray (7.5 yr 5/1), moist, mottled with strong brown (7.5 YR 5/6), pp=2.5 tsf, very plastic, brown concretions <2mm, at 9.1' white calcareous nodules <2mm
					41			
-10	10				516		10-15	SANDY CLAY: greenish gray (1 Gley 5/10GY), mottled with strong brown (7.5 YR 5/6), moist, pp=2.25 tsf, very fine to medium-grained sand, subrounded, very plastic, from 11.5' to 12.1' white calcareous nodule zone, 2mm to 5mm diameter, sand content increases with depth, brown concretions <2mm
					2.4			
-15	15							



Proj. No. 0014419 Boring/Well ID SB-72 Date Drilled 8/25/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 728508.52' E. Coord. 3167169.38' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15	[Dotted pattern]	[Solid black]		2.5	15-18.1	SAND: greenish gray (1 Gley 5/10GY), mottled with gray (7.5 YR 6/1), saturated, pp=1.0 tsf subrounded, very fine to medium-grained, poorly sorted, strong odor	
		[Cross-hatch pattern]	[Solid black]		19	18.1-20	NO RECOVERY	
-20	20	[Dotted pattern]	[Solid black]		15	20-25	SAND: greenish gray (1 Gley 5/10GY), mottled with gray (7.5 YR 6/1), saturated, pp=1.0 tsf subrounded, very fine to medium-grained, poorly sorted, strong odor, collected sample SB-72(21')	
		[Dotted pattern]	[Solid black]		14.5			
-25	25	[Dotted pattern]	[Solid black]		8.7	25-25.4 25.4-28.6	SAND: greenish gray (1 Gley 5/10GY), mottled with gray (7.5 YR 6/1), saturated, pp=1.0 tsf subrounded, very fine to medium-grained, poorly sorted, strong odor CLAY: strong brown (7.5 YR 5/6) mottled with light gray (7.5 YR 7/1), moist, pp=>4.5 tsf, plastic,	
		[Cross-hatch pattern]	[Solid black]		7.1	28.6-30	NO RECOVERY	
-30	30	[Cross-hatch pattern]	[Solid black]					



# ERM Environmental Resources Management

## SB-72 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-72 Date Drilled 8/25/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 728508.52' E. Coord. 3167169.38' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30				2.0	30-31.8	CLAY: strong brown (7.5 YR 5/6) mottled with light gray (7.5 YR 7/1), moist, pp=>4.5 tsf, plastic, white calcareous nodules	
	2.5				31.8-35	CLAY: red (2.5 YR 4/6), moist, pp=>4.5 tsf, slightly plastic, white calcareous nodules, collected sample SB-72 (34')		
-35	35				11.3	T.D. = 35'		
-40	40							
-45	45							



# ERM Environmental Resources Management

## SB-73 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-73 Date Drilled 8/30/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 728578.23' E. Coord. 3167360.26' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP  
 STATE OF TEXAS  
 CHRISTOPHER M. YOUNG  
 GEOLOGY  
 3342  
 LICENSED PROFESSIONAL GEOSCIENTIST

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-35	0-5	FILL: concrete, road base to approximately 1.5', gravelly, silty sand, black (7.5 YR 2.5/1), saturated to wet, loose, large wood pieces (2inch), dark brownish fluid, strong odor
-5	5				43		5-8.3	SILTY CLAY: very dark gray (7.5 YR 3/1), moist, pp=1.5 tsf, very plastic, traces of rootlets, strong odor
					62.7		8.3-10	SILTY CLAY: gray (7.5 YR 5/1), moist, pp=3.0 tsf, plastic, trace fractures, few strong brown mottling (7.5 YR 5/6), brown stains (<3mm diameter), strong odor
-10	10				28		10-15	SANDY CLAY: greenish gray (1 Gley 5/10 Y) mottled with strong brown (7.5 YR 5/6), moist, pp=2.5 tsf, very plastic, brown stains (<2mm diameter), traces of brown fluid, very fine sand grains, subrounded, collected SB-73(14')
-15	15				23.4			



**ERM** Environmental Resources Management

**SB-73  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-73 Date Drilled 8/30/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 728578.23' E. Coord. 3167360.26' Surface Elevation 0' FL MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15	[Dotted pattern]	[Solid black]		54.8	15-19	15-19	SAND: greenish gray (1 Gley 6/10Y), saturated, loose, very fine to medium-grained, poorly sorted, slight odor, collected sample 18'-19'
					24.9			
		[Cross-hatch pattern]			16	19-20	19-20	NO RECOVERY
-20	20	[Dotted pattern]			NM	20-24	20-24	SAND: greenish gray (1 Gley 6/10Y), saturated, loose, very fine to medium-grained, poorly sorted, slight odor, collected sample 21'
					40			
		[Cross-hatch pattern]			150	24-25	24-25	NO RECOVERY
-25	25	[Diagonal lines]			NM	25-30	25-30	CLAY: gray (7.5 YR 6/1), moist, pp=2.5 tsf, very plastic, strong brown mottling (7.5 YR 5/6)
					10.2			
-30	30							





**ERM** Environmental Resources Management

**SB-73  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-73 Date Drilled 8/30/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 728578.23' E. Coord. 3167360.26' Surface Elevation 0' FL MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

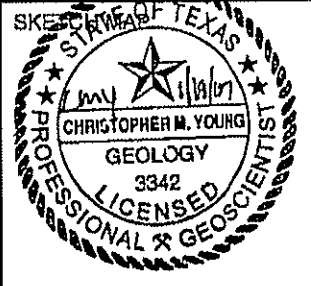
Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30				40		30-35	CLAY: strong brown (7.5 YR 5/6) moist, pp=4.5 tsf, slightly plastic, traces of white calcareous nodules <1mm diameter, collected sample 31'-33', collected sample 34'
-35	35				46.8			
					45.2			
-40	40							
-45	45							T.D. = 35'



**ERM** Environmental Resources Management

**SB-74  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-74 Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 22' Boring Diam. 2"  
 N. Coord. 728517.08' E. Coord. 3167494.85' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Jessica Rose



NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-22	0-0.3 0.3-1.5 1.5-5	SANDY CLAY: dark yellowish brown (10 YR 4/4) sandy clay, moist, poorly sorted sands and gravel, mica, odor SANDY CLAY: black (10 YR 2/1) sandy clay, moist, well rounded sand, traces of gravel, plastic, pp=0.5 tsf at 1' NO RECOVERY
-5	5				NM		5-10	DEPRECATED: SANDY SILTY CLAY: black (2.5 Y 2.5/1) sandy, silty clay, well sorted, very fine-grained sand, moist, plastic, pp=1.5 tsf at 6', pp=1.75 tsf at 7', pp=1.5 tsf at 8', pp=2.75 tsf at 9', pp=1.75 tsf at 10', carbonate lenses last three inches, mottled with light gray last foot
-10	10				30.2		10-13	SANDY CLAY: gray (3.5 Y 5/1) sandy clay, well sorted, well rounded, very fine-grained sand, moist, plastic, pp=3.0 tsf at 11', pp=2.5 tsf at 12', pp=2.55 tsf at 13', pp=1.5 tsf at 14', mottled, carbonate lense at 11.4'-11.5', increasing sand content
-15	15				48.8		13-15	SANDY CLAY: gray (2.5 Y 5/1) sandy clay, slightly plastic, loose, well rounded, fine-grained sand, moist, carbonate lenses throughout



SB-74  
DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-74 Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 22' Boring Diam. 2"  
 N. Coord. 728517.08' E. Coord. 3167494.85' Surface Elevation 0' FL MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Slickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Jessica Rose

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15				67.3		15-15.5	SILTY SANDY CLAY: grayish brown (2.5 Y 5/2) silty sand clay, moist, plastic, pp=1.0 tsf at 15.5', slightly mottled
					159		15.5-20	SILTY SAND: light olive brown (2.5 Y 5/4) silty sand, fine-grained, well rounded, well sorted sand, wet
-20	20				273		20-21	SILTY SAND: olive (5 Y 5/4) silty sand, very fine-grained sand, traces of clay, moist
					307		21-21.4	SANDY CLAY: strong brown (7.5 YR 4/6) sandy clay first 4 inches, well sorted sands, carbonate traces, loose, decreasing sand content with depth, moist
							21.4-22	CLAY: clay mottled, moist, plastic, pp=4.5 tsf at 21.5' T.D. = 22'
-25	25							
-30	30							



# ERM Environmental Resources Management

## SB-75 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-75 Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728685.63' E. Coord. 3167404.87' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-34	0-3	FILL: fill, gravelly silty sand, tan road fill packed material
							3-5	SANDY SILT: very dark gray (7.5 YR 3/1), sandy silty, moist, crumbly, pp=0.5 tsf, very fine to medium-grained, poorly sorted
-5	5				4.8		5-10	SILTY CLAY: silty clay, gray (7.5 YR 5/1) mottled with strong brown (7.5 YR 5/6) moist, pp=3.0 tsf, very plastic, brown concretions, <2mm diameter
					0.5			
-10	10				1.0		10-14.3	SANDY CLAY: sandy clay, greenish gray (1 Gley 5/10GY), mottled with strong brown (7.5 YR 5/6), moist, pp=2.5 tsf, plastic, very fine to medium-grained sand, sand content increases with depth
					1.0			
-15	15						14.3-15	SAND: sand, greenish gray (1 Gley 5/10GY), wet, saturated, pp=1.0 tsf, very fine to medium-grained sand, strong odor



**SB-75  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-75 Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728685.63' E. Coord. 3167404.87' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15	[Pattern]	[Pattern]		2.1		15-20	SAND: sand, greenish gray (1 Gley 5/10GY), wet, saturated, pp=1.0 tsf, very fine to medium-grained sand, strong odor
					2.1			
-20	20	[Pattern]	[Pattern]		5.4		20-23.4	SAND: sand, brown (7.5 YR 4/3) mottled with greenish gray (1 Gley 5/10GY) and strong brown (7.5YR5/6), saturated with brown fluid with sheen, loose, very fine to medium-grained, poorly sorted, subrounded
					95.3			
							23.4-25	CLAY: clay, greenish gray (1 Gley), mottled with strong brown (7.5 YR 5/6), moist, pp=>4.5 tsf, slightly plastic, brown concretions <5mm
-25	25	[Pattern]	[Pattern]		102.6		25-28.3	CLAY: clay, gray (7.5 YR 5/1), mottled with strong brown (7.5 YR 5/6), moist, pp=>4.5 tsf, slightly plastic, white calcareous nodules <2mm diameter, strong odor
					53.8			
							28.3-30	NO RECOVERY
-30	30	[Pattern]	[Pattern]					



**ERM** Environmental Resources Management

**SB-75  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-75 Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 34' Boring Diam. 2"  
 N. Coord. 728685.63' E. Coord. 3167404.87' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30				50.4	30-34		CLAY: clay, red (2.5 YR 4/6) mottled with gray (7.5 YR 5/1), moist, pp=>4.5 tsf, white concretions <2mm, slightly plastic, collected sample SB-75 (30') and SB-75 (31'-33')
					40.6			
					31.2			T.D. = 34'
-35	35							
-40	40							
-45	45							



# ERM Environmental Resources Management

## SB-76 DRILLING LOG

Proj. No. 0014419 Boring/Well ID: SB-76 Date Drilled 8/30/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 35' Boring Diam. 2"

N. Coord. 728748.25' E. Coord. 3167651.47' Surface Elevation 0' Fl. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

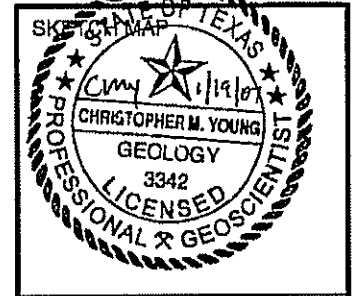
Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart

Drilling Method Geoprobe Log By Emmanuel Mkandawire



### NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-35	0-3.1	FILL: gravelly, silty, sand, very dark gray (7.5 YR 3/1), moist, crumbly-loose, gravel 5mm-20mm diameter
					37.9		3.1-5	SILTY CLAY: very dark gray (7.5 YR 3/1), moist to saturated, pp=1.0 tsf, very plastic, strong odor
-5	5				46		5-10	SILTY CLAY: gray (7.5 YR 5/1) mottled with strong brown (7.5 YR 5/6), moist, pp=<2.5 tsf, very plastic, brown stains, at 9.1' many white calcareous nodules
					56.7			
-10	10				66.2		10-15	SANDY CLAY: sandy clay, greenish gray (1 Gley 5/10GY), mottled with strong brown (7.5 YR 5/6) and gray (7.5 yr 6/1), moist, pp=2.5 tsf, very fine grained to medium-grained sand, strong odor, subrounded, traces of brown stains <3mm diameter, white calcareous nodules <2mm
					83.9			
-15	15							



**ERM Environmental Resources Management**

**SB-76  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-76 Date Drilled 8/30/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 728748.25' E. Coord. 3167651.47' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15	[Dotted pattern]	[Solid black]		48.2		15-20	SAND: greenish gray (1 Gley 5/10GY) mottled with strong brown (7.5 YR 5/6), saturated, loose, very fine to medium-grained, brown stain 50mm diameter @ 16.4'
					36.5			
-20	20	[Dotted pattern]	[Solid black]		3.7		20-25	SAND: greenish gray (1 Gley 5/10GY) mottled with strong brown (7.5 YR 5/6) saturated, loose, very fine to medium-grained, strong odor, from 20.4' to 21.6' clay layer present same as at 10-15' interval
					28.4			
-25	25	[Dotted pattern]	[Solid black]		159		25-25.8	SAND: greenish gray (1 Gley 5/10GY) mottled with strong brown (7.5 YR 5/6) saturated with dark brown fluid, loose, very fine to medium-grained, strong odor
							25.8-30	CLAY: strong brown (7.5 YR 5/6), mottled with gray (7.5 YR 6/1), moist, pp=4.5 tsf, slightly plastic
					358			
-30	30	[Diagonal lines]	[Solid black]					





**ERM** Environmental Resources Management

**SB-76  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-76 Date Drilled 8/30/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 728748.25' E. Coord. 3167651.47' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Emmanuel Mkandawire

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30				152.3	30-35		CLAY: strong brown (7.5 YR 5/6), mottled with gray (7.5 YR 6/1), moist, pp=4.5 tsf, slightly plastic, strong odor, sample 31'-33' collected @ 16:20  T.D. = 35'
					174.7			
-35	35				63			
-40	40							
-45	45							



Proj. No. 0014419 Boring/Well ID SB-85B Date Drilled 8/7/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"

N. Coord. 727573.83' E. Coord. 3165885.99' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Marcel St. Marie

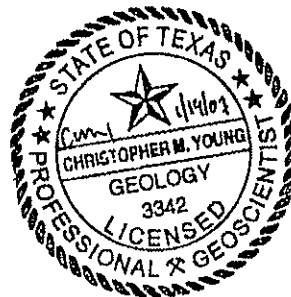
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				161.4 170 NM 186	0-2	0-0.5 0.5-1 1-2	GRAVELLY SAND: dark brown (10 YR 3/3) sandy, trace clay, lots of gravel, moist, trace roots, gravel is mainly angular, 100% recovery SAND: some clay, lighter in color, dark brown (7.5 YR 3/3), no gravel, small amount of well rounded pieces, moist, 100% recovery SILTY SAND: silty sand, dark brown (7.5 YR 3/3), very fine, well sorted, subrounded, trace gravel, moist, red paint at 2.0 (possible indicating buried line), NOTE refusal before line 2, 100% recovery T.D. = 2'
-5	5							
-10	10							
-15	15							





Proj. No. 0014419 Boring/Well ID SB-86A Date Drilled 8/8/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 3.5' Boring Diam. 2.5"

N. Coord. 727659.2' E. Coord. 3166044.1' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Jessica Rose and Marcel St. Marie

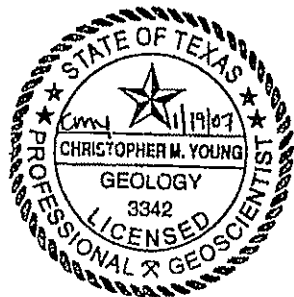
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				137.4	0-3.5	0-0.5	<p>SANDY CLAY: dark yellowish brown (10 YR 3/4) sandy clay, well sorted sand with non plastic clay, traces of rootlets, little to no gravel, moist, 100% recovery</p> <p>SANDY CLAY: Very dark gray (10 YR 3/1) sandy clay, well sorted sand with non plastic clay, traces of rootlets, no gravel, increasing clay content with depth, moist, odor, 100% recovery</p> <p>SANDY CLAY: very dark brown (10 YR 2/2) sandy clay, well sorted sand with non plastic clay, traces of rootlets, no gravel, increasing clay content with depth, wet, odor, micaceous, 100% recovery</p> <p>SANDY CLAY: very dark brown (10 YR 2/2) sandy clay, well sorted sand with non plastic clay, traces of rootlets, no gravel, increasing clay, wet, strong odor, micaceous, 100% recovery, appears to be product</p> <p>CLAY: native clay, black (2.5 Y 2.5), plastic pp = 1.0tsf, firm, moist, 100% recovery</p> <p>T.D. = 3.5'</p>
					201.4		0.5-1.5	
					224.0		1.5-2	
					202.0		2-2.5	
					155.0		2.5-3.5	

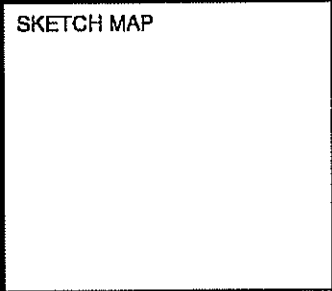




# ERM Environmental Resources Management

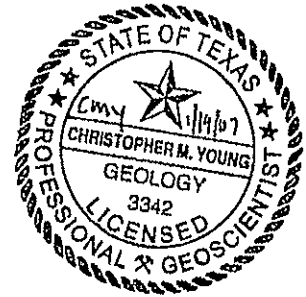
## SB-86A1 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-86A1 Date Drilled 8/8/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 1.5' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose and Marcel St. Marie



NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 8' Northeast of  
 SB-86A parallel to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				20.5 127.5	0-1.5	0-1 1-1.5	SANDY CLAY: light olive brown (2.5 YR 5/4) sandy clay, moist, clay is firm, plastic, pp=0.5 tsf, sand is very fine-grained, well sorted, includes large amounts of wood fragments CLAYEY SAND: black (10 YR 2/1) clayey sand, black, very fine grained, well sorted sand, wet, abundant wood fragments, strong odor, refusal - more wood fragments T.D. = 1.5'
-5	5							
-10	10							
-15	15							





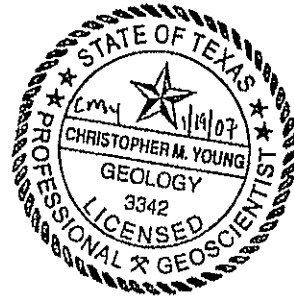
Proj. No. 0014419 Boring/Well ID SB-86A2 Date Drilled 8/9/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3.5' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Marcel St. Marie

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 10' Southwest of  
 SB-86A parallel to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-3.5	0-0.9 0.9-1 1-2 2-2.5 2.5-3.5	CLAYEY SAND: dark, yellowish brown (10 YR 3/4) clayey sand, sand grains are well sorted fine-grained, moist, clay is non-plastic, little to no gravel OTHER: black (10 YR 2/1), moist, firm, plastic (pp=1.75 tsf) SANDY CLAY: very dark brown (10 YR 2/2) sandy clay, sand is well sorted, moist, clay is non plastic, no gravel SAND: light olive brown (2.5 Y 5/4) sand, well rounded, fine grained sand with trace clay, moist, wood fragments, trace gravel, some rootlets, odor CLAY: black (2.5 Y 2.5/1) clay, moist, firm, plastic (pp=1.0 tsf) clay with some sand, odor T.D. = 3.5'
					17.0			
					45.5			
					2.9			
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-86A3 DRILLING LOG

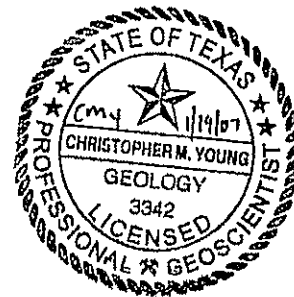
Proj. No. 0014419 Boring/Well ID SB-86A3 Date Drilled 8/9/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

SKETCH MAP

### NOTES

pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 10' Northeast of  
 SB-86A parallel to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-2	0-0.8	SAND: light yellowish brown (10 YR 6/1) from 0 to 0.8', sand, well sorted sand with traces of clay, moist, 100% recovery
					0.5		0.8-1	SAND: very dark brown (10 YR 2/2), sand with traces of clay, increasing with depth, moist, 100% recovery
					>252.0		1-2	CLAYEY SAND: black, clayey sand, appears to be product, strong odor, moist, 100% recovery T.D. = 2'
-5	5							
-10	10							
-15	15							



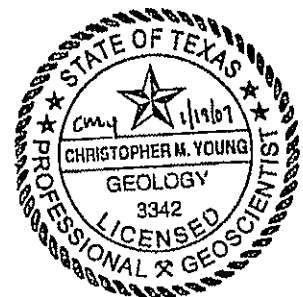


Proj. No. 0014419 Boring/Well ID SB-86A4 Date Drilled 8/9/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum \_\_\_\_\_  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 20' Northeast of  
 SB-86A parallel to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-2	0-1	CLAYEY SAND: yellowish brown (10 YR 5/4) clayey sand, very fine grained, well sorted sand, moist, firm, plastic clay (pp=0.25 tsf), wood fragments abundant last 4-5 inches, 100% recovery CLAYEY SAND: dark brown (10 YR 3/3), clayey sand, fine grained sand with non plastic clay, moist, wood fragments, appears to be product last 2 inches, 100% recovery T.D. = 2'
					2.0		1-2	
					46.4			
-5	5							
-10	10							
-15	15							





Proj. No. 0014419 Boring/Well ID SB-86A5 Date Drilled 8/9/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2.5' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

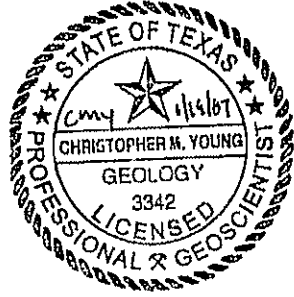
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 30' Northeast of  
 SB-86A parallel to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-2.5	0-0.8	SAND: yellowish brown (10 YR 5/6) sand, well sorted, clay traces, gravel is small and minimal, moist
					28.6		0.8-0.9	SAND: very dark brown (10 YR 2/2) sand, well sorted, clay traces, gravel is small and minimal, increasing clay content with depth, moist
					32.1		0.9-2	SAND: yellowish brown (10 YR 5/6) well sorted, clay traces, gravel is small and minimal, moist
							2-2.5	CLAYEY SAND: dark yellowish brown (10 YR 4/6) clayey sand, fine-grained, well sorted, no gravel CLAY: very dark brown (10 YR 2/2) native clay, intermittent layers of sand at (1-2). staining, product T.D. = 2.5'
-5	5							
-10	10							
-15	15							







Proj. No. 0014419 Boring/Well ID SB-86A6 Date Drilled 8/9/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 2.2' Boring Diam. 2.5"

N. Coord. E. Coord. Surface Elevation 0' Ft. MSL Datum

Screen: Type Diam. 0" Length 0' Slot Size 0"

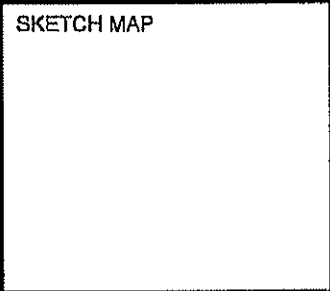
Casing: Type Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )

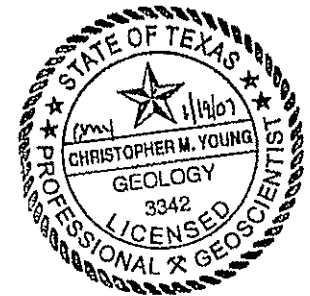
Drilling Company Driller

Drilling Method Hand Auger Log By Jessica Rose



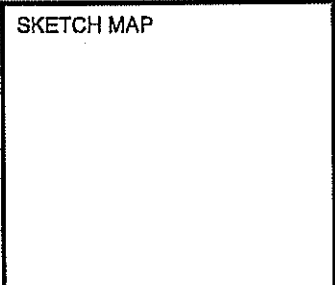
NOTES  
pp = pocket penetrometer.  
tsf = tons per square foot.  
Located 40' Northeast of  
SB-86A parallel to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				22.2	0-2.2	0-0.3	<p>SANDY CLAY: yellowish brown (10 YR 5/6) sandy clay, mottled rootlets, fine grained, trace mica, moist, slight plastic, soft, 100% recovery</p> <p>SILTY CLAY: black (10 YR 2/1) silty clay, some sand, moist, non plastic, loose, soft, 100% recovery</p> <p>SANDY CLAY: dark grayish brown (10 YR 4/2) sandy clay, moist, non plastic, trace gravels and rootlets, mica, loose, 100% recovery</p> <p>CLAYEY SAND: dark yellowish brown (10 YR 4/6) clayey sand, sand is well sorted, moist, clay is soft, non plastic, mica is abundant and coarse grained, 100% recovery</p> <p>CLAYEY SAND: black (10 YR 2/1) clayey sand, moist, non plastic, soft loose mica fine grained, 100% recovery</p> <p>SANDY CLAY: dark grayish brown (10 YR 4/2) sandy clay, moist, non plastic, trace gravels and rootlets, mica, loose, mica grain size increasing, 100% recovery</p> <p>CLAYEY SAND: black (10 YR 2/1) clayey sand, moist, odor, product, 100% recovery</p> <p>T.D. = 2.2'</p>
					2.5		0.3-0.4	
					59.6		0.4-0.5	
							1-1.3	
							1.3-1.5	
							1.5-2.2	



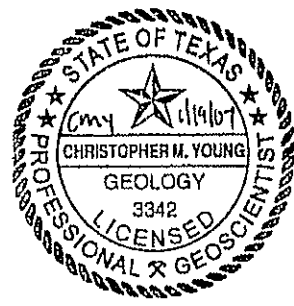


Proj. No. 0014419 Boring/Well ID SB-86A7 Date Drilled 8/9/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose



NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 54' Northeast of  
 SB-86A parallel to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-3	0-0.3 0.3-1 1-1.8 1.8-2 2-2.5 2.5-3	<p>SANDY CLAY: yellowish brown (10 YR 5.8) sandy clay, moist, slightly plastic, soft, rootlets, little to no gravel, 100% recovery</p> <p>CLAYEY SAND: black (10 YR 2/1) clayey sand, well sorted sand, moist, rootlets, clay is soft, non plastic, loose, minimal gravel, 100% recovery</p> <p>CLAYEY SAND: yellowish brown (10 YR 5/4) clayey sand, well sorted sand, fine grained, little to no gravel, clay increasing with depth, moist, 100% recovery</p> <p>CLAYEY SAND: very dark grayish brown (10 YR 3/2) clayey sand, well sorted sand, fine grained, little to no gravel, clay increasing with depth, moist, 100% recovery</p> <p>SANDY CLAY: very dark grayish brown (10 YR 3/) sandy clay, moist, slightly plastic, soft, no gravel, apparent product, odor, 100% recovery</p> <p>CLAY: black (10 YR 4/1) native clay, moist, plastic, soft, pp-0.25tsf, intermittent sand, no gravel, 100% recovery</p> <p>T.D. = 3'</p>
					403			
					64.7			
					120.4			
-5	5							
-10	10							
-15	15							





Proj. No. 0014419 Boring/Well ID SB-86A8 Date Drilled 8/10/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3.5' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum \_\_\_\_\_  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

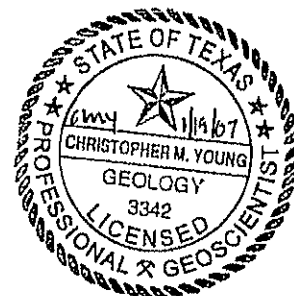
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 82' Northeast of  
 SB-86A parallel to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-3.5	0-0.3 0.3-0.9 0.9-1 1-1.25 1.25-1.5 1.5-2.5 2.3-3.5	<p>CLAYEY SAND: brown (10 YR 5/3) clayey sand, moist, well sorted sand, non plastic clay, soft, loose, rootlets, small gravel, odor, mica</p> <p>SILTY SAND: very dark gray (10 YR 3/1) silty sand, moist, non plastic, soft, loose, contains hard, tar-like substance, mica, odor</p> <p>CLAYEY SAND: dark brown (10 YR 3/3) from 0.9' to 1', clayey sand, moist, poorly sorted, large mica grains, small subangular gravel pieces, non plastic, soft, odor</p> <p>CLAYEY SAND: dark yellowish brown (10 YR 3/4) clayey sand, moist, well sorted, fine-grained sand, non plastic, soft, loose</p> <p>CLAYEY SAND: very dark brown (10 YR 2/2) clayey sand, moist, well sorted, fine-grained sand, non plastic, soft, loose</p> <p>CLAYEY SAND: very dark gray (5 Y 3/1) clayey sand, wet, fine-grained, well sorted sand, no gravel, non plastic, soft, loose, odor, apparent product</p> <p>SANDY CLAY: black (5 Y 2.5/1) sandy clay, wet, (pp=0.25tsf), plastic, slightly firm, very fine-grained, well sorted sand, no gravel, odor, product, moist from 2.5' to 3.5'</p> <p>T.D. = 3.5'</p>
					2.1			
					0.0			
					133.7			
					103.2			
-5	5							
-10	10							
-15	15							





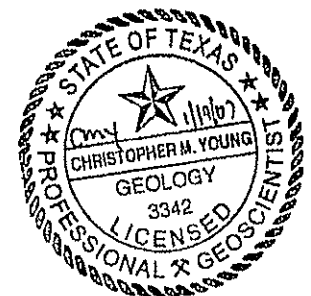
Proj. No. 0014419 Boring/Well ID SB-86A9 Date Drilled 8/10/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 98' Northeast of  
 SB-86A parallel to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-3	0-0.5 0.5-1 1-1.5 1.5-2.5 2.5-3	<p>CLAYEY SAND: black (7.5 YR 2.5/1) clayey sand, moist, fine-grained, well sorted sand with abundant rounded to subangular gravel, non plastic, soft, loose, intermittent sands lenses</p> <p>SAND: brown (7.5 YR 5/4) sand, moist, well sorted, traces of clay, minimal gravel, clay content decreasing</p> <p>SILTY SAND: black (10 YR 2/1) silty sand, non plastic, soft, loose intermittent sand lenses, moist, no gravel</p> <p>SAND: yellowish brown (10 YR 5/8) sand with traces of clay to no clay at all, moist, well rounded, well sorted, fine-grained sand, gravel, large subangular, mottled sand</p> <p>CLAY: very dark grayish brown (10 YR 3/2) clay, moist, plastic, firm (pp=1.25tsf), traces of sand, intermittent sand lenses, no gravels, no odor, no product</p> <p>T.D. = 3'</p>
					0.8			
					0.8			
					0.6			
-5	5							
-10	10							
-15	15							



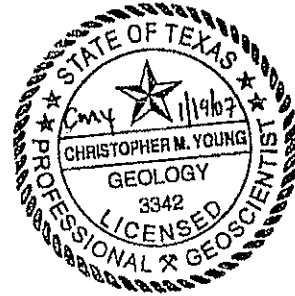


Proj. No. 0014419 Boring/Well ID SB-86B Date Drilled 8/8/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 5' Northwest of  
 SB-86A perpendicular to  
 ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				11.9	0-3	0-0.5	<p>SANDY CLAY: very dark grayish brown (10 YR 3/1) sandy clay, well sorted sand grains, moist, clay is slightly plastic, small, well rounded gravel pieces, 100% recovery</p> <p>SAND: yellowish brown (10 YR 4/4) sand, well rounded, well sorted fine-grained sand, traces of clay lenses, increasing clay content from 1.5' to 1.75', moist, 100% recovery</p> <p>SANDY CLAY: very dark grayish brown (10 YR 3/2) loose sandy clay, well rounded, well sorted fine-grained sand, higher clay content from previous interval, moist, plasticity increasing, 100% recovery</p> <p>CLAY: black (2.5 Y 2.5/1) clay, plastic, pp=1.0 tsf, firm, trace amounts of sand, no gravel, moist, 100% recovery</p> <p>T.D. = 3'</p>
					NM		0.5-1.75	
					105.6		1.75-2	
					NM		2-3	
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-86C DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-86C Date Drilled 8/8/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 2.5' Boring Diam. 2.5"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

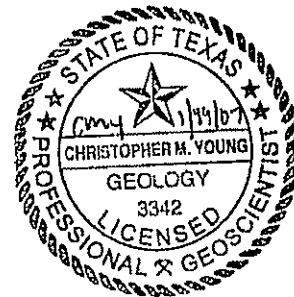
Drilling Method Hand Auger Log By Jessica Rose and Marcel St. Marie

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.  
Located 14' Northwest of  
SB-86A perpendicular to  
ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				94.9	0-2.5	0-0.5	<p>SANDY CLAY: dark yellowish brown (10 YR 3/4) sandy clay, well sorted sand with small amounts of clay, abundant mica grains, small well rounded to subangular gravel, moist, 100% recovery</p> <p>SANDY CLAY: very dark grayish brown (10 YR 3/2) sandy clay, well sorted sand with small amounts of clay, abundant mica grains, small well rounded to subangular gravel, increasing clay content with depth, moist, wood fragments, rounded gravel, 100% recovery</p> <p>SANDY CLAY: dark grayish brown (10 YR 4/2) sandy clay, well rounded sand grains, moist, non plastic clay, minimal clay, wood fragments</p> <p>CLAY: clay same as clay interval noted previously, moist</p> <p>T.D. = 2.5'</p>
					69.3		0.5-1	
							1-2	
					2.8		2-2.5	



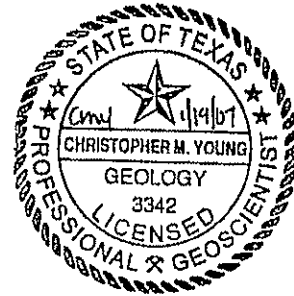


Proj. No. 0014419 Boring/Well ID SB-86C1 Date Drilled 8/10/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2.5' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose



NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located from SB-86A 10' Northeast parallel to ditch followed by 11' Northwest perpendicular to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				1.4	0-2.5	0-0.5	CLAYEY SAND: brown (7.5 YR 4/3) from 0 to 0.5', clayey sand, moist, coarse, poorly sorted sands and gravels, abundant mica, non plastic, loose CLAYEY SAND: dark brown (7.5 YR 3/3) clayey sand, moist, coarse-grained sand and gravel, soft, loose, non plastic, mica CLAYEY SAND: dark brown (7.5 YR 3/2) clayey sand, moist, coarse-grained sand and gravel, soft, loose, non plastic, mica, clay increasing SAND: dark olive brown (2.5 Y 3/3) sand, moist, well sorted, fine-grained, clay traces, intermittent clay layer, no gravel, little gravel, slight odor SANDY CLAY: dark gray (2.5 Y 4/1) sandy clay, moist, intermittent layers, plastic, firm pp=1.25tsf T.D. = 2.5'
					2.0	0.5-1		
					1.7	1-1.5		
					0.3	1.5-2		
						2-2.5		

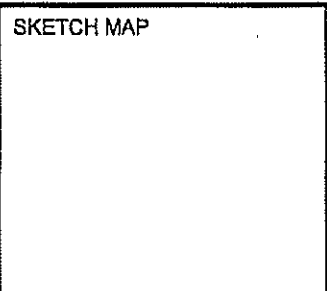




# ERM Environmental Resources Management

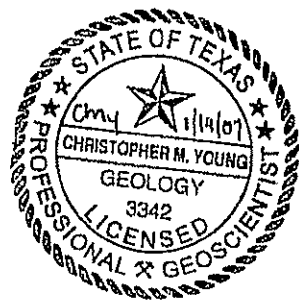
## SB-86C2 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-86C2 Date Drilled 8/10/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 1' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum \_\_\_\_\_  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose



**NOTES**  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located from SB-86A 30' Northeast parallel to ditch followed 10' Northwest perpendicular to ditch.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				1.0	0-1	0-0.9 0.9-1	CLAYEY SAND: dark brown (10 YR 3/3) clayey sand/gravel, moist, poorly sorted rounded to angular gravels, non plastic SILTY SAND: black (10 YR 2/1) silty sand, moist, very fine-grained sand, non plastic, soft, loose small round, subangular gravel T.D. = 1'
-5	5							
-10	10							
-15	15							







# ERM Environmental Resources Management

## SB-87B DRILLING LOG

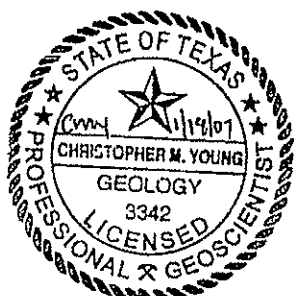
Proj. No. 0014419 Boring/Well ID SB-87B Date Drilled 8/9/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3.5' Boring Diam. 2.5"  
 N. Coord. 727753.49' E. Coord. 3166225.18' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-3.5	0-1	CLAYEY SAND: dark yellowish brown (10 YR 3/4) clayey soil, poorly sorted, large mica grains, sand is fine-grained, moist, clay is soft, non plastic, loose, gravel angular
					61.6		1-1.5	SANDSTONE: yellowish brown (10 YR 5/4) clayey soil, well sorted, moist, fine-grained mica, soft, non plastic
					20.0		1.5-2	SILTY SANDY CLAY: black (10 YR 2/1) silty, sandy, clay, very fine-grained traces of hard tar, moist, non plastic, firm pp=0.5 tsf
					0.7		2-2.25	
					0.1		2.25-2.5	
					0.0		2.5-3	SAND: brown (7.5 YR 5/4) well sorted, fine-grained sand, no gravel, traces of clay, moist
							3-3.5	CLAYEY SAND: dark brown (7.5 YR 3/2) clayey sand, poorly sorted, abundant gravel, rounded-angular, moist, soft, non plastic, loose
-5	5							SAND: brown (7.5 YR 5/4) well sorted, fine-grained sand, no gravel, traces of clay, moist
-10	10							CLAY: black (7.5 YR 2.5/1) clay, native, moist, plastic, firm, pp=0.5tsf, traces of sand
-15	15							T.D. = 3.5'





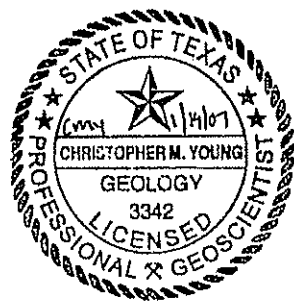
Proj. No. 0014419 Boring/Well ID SB-88B Date Drilled 8/11/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"  
 N. Coord. 727843.96' E. Coord. 3166397.32' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.4 0.2 0.0 0.3 0.9 0.0	0-3	0-0.5 0.5-1 1-1.5 1.5-1.75 1.75-2.5 2.5-3	<p>SANDY CLAY: dark yellowish brown (10 YR 4/4), sandy clay, moist, poorly sorted, slightly plastic, soft, small-large subangular to angular gravel, rootlets</p> <p>CLAYEY SAND: dark brown (10 YR 3/3) clayey sand, moist, poorly sorted, well sorted sand from 1' to 1.75', large mica grains, non plastic, loose, rounded to subangular gravel, rootlets</p> <p>CLAYEY SAND: very dark grayish brown (10 YR 3/2), clayey sand, moist, well sorted sand, non plastic, soft, loose, small rounded gravel pieces, clay content increasing with depth</p> <p>CLAYEY SAND: very dark grayish brown (10 YR 3/2), clayey sand, moist, well sorted sand, non plastic, soft, loose, small rounded gravel pieces, clay content increasing with depth</p> <p>SAND: light olive brown (2.5 Y 5/3), moist, well rounded, well sorted sand, increasing clay content from 2' to 2.5'</p> <p>CLAY: very dark gray (2.5 Y 3/1) clay, moist, with some sand, plastic, soft, pp=0.25 tsf</p> <p>T.D. = 3'</p>





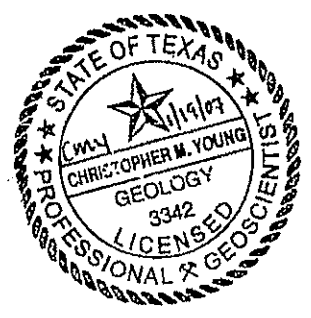
Proj. No. 0014419 Boring/Well ID SB-89B Date Drilled 8/11/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2.5' Boring Diam. 2.5"  
 N. Coord. 727941.38' E. Coord. 3166585.36' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-2.5	0-0.5	SANDY CLAY: brown (10 YR 4/3) sandy clay, wet, poorly sorted, large mica grains, plastic, soft, small rounded subangular gravel, tar-like, hard substance 0.5-1 FILL: yellowish brown (10 YR 5/4) sandy gravel fill material, wet 1-1.8 GRAVEL: yellowish brown (10 YR 5/4) sandy gravel fill material, wet 1.8-2 SANDY CLAY: very dark gray (10 YR 3/1) sandy clay, wet, poorly sorted sand and small amount of gravel, plastic, soft 2-2.5 SANDY CLAY: very dark gray (10 YR 3/1) sandy clay, moist, well sorted sand, plastic, soft T.D. = 2.5'
					0.0		0.5-1	
					0.0		1-1.8	
					0.0		1.8-2	
					0.0		2-2.5	





# ERM Environmental Resources Management

## SB-90B DRILLING LOG

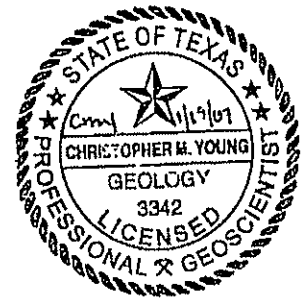
Proj. No. 0014419 Boring/Well ID SB-90B Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"  
 N. Coord. 728045.86' E. Coord. 3166764.69' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-2	0-1 1-2	SAND: Brown (7.5 R 5/4) sand, coarse-grained, subrounded, sorted, moist, tar-like material from 0 to 0.1', 100% recovery  SAND: Dark gray (1 gley 4/N), sand, fine-grained, well-rounded, well sorted, moist from 1' to 1.75', wet from 1.75' to 2', appears to be product, some gravel from 1' to 1.5', odor, 100% recovery T.D. = 2'
-5	5				NM			
-10	10							
-15	15							





SB-90B  
DRILLING LOG

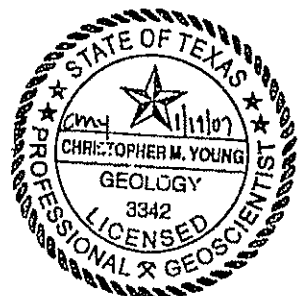
Proj. No. 0014419 Boring/Well ID SB-90B Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 0.5' Boring Diam. 2.5"  
 N. Coord. 728045.86' E. Coord. 3166764.69' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-0.5	0-0.2 0.2-0.5	CLAY: brownish yellow (10 YR 6/8), clay, moist, slightly plastic, some gravel, partially stained, 100% recovery SAND: reddish brown (5 YR 4/4), sand, medium to coarse-grained, poorly sorted, angular to rounded, moist, non-cohesive, 100% recovery NOTE: HOLE FILLED WITH WATER T.D. = 0.5'
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-90B DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-90B Date Drilled 8/29/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"  
 N. Coord. 728045.86' E. Coord. 3166764.69' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

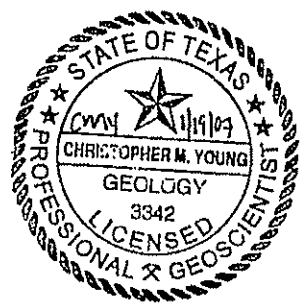
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-3	0-0.3	GRAVELLY CLAY: brownish yellow (10 YR 6/8), gravelly clay, moist, slightly plastic, abundant gravel, 100% recovery SAND: reddish brown (2.5 YR 5/4) sand, medium to coarse-grained, poorly sorted, subrounded to angular, abundant mica, carbonate gravels from 1.4 to 1.5, moist, 100% recovery GRAVELLY SAND: light gray (1 Gley 7/N), gravelly sand, medium to coarse-grained, poorly sorted, angular to rounded, moist, loose, non-cohesive, abundant carbonate & gravels, 100% recovery SAND: gray (1 Gley 5/N) with dark gray (1 Gley 4/N) mottles, sand, fine-grained, sorted, rounded, moist, some piece of wood, coarse-grained sand occurring as lens and stained with product from 2.5' to 2.6', 100% recovery SANDY CLAY: gray (1 Gley 5/N), sandy clay, moist, slightly plastic, firm, sand grains, very fine-grained, rounded, sorted, 100% recovery T.D. = 3'
					0.0		0.3-1.5	
					2.9		1.5-2	
					7.3		2-2.6	
					19.6		2.6-3	





# ERM Environmental Resources Management

## SB-91 DRILLING LOG

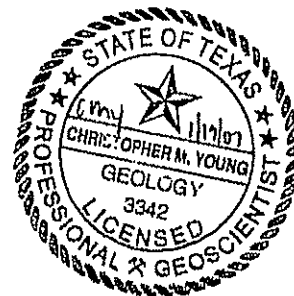
Proj. No. 0014419 Boring/Well ID SB-91 Date Drilled 8/7/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 1.5' Boring Diam. 2.5"  
 N. Coord. 728131.23' E. Coord. 3166937.31' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				1.2 NM	0-1.5	0-1 1-1.5	<p>FILL: fill material, dark gray (7.5R 4/1), moist, loose material, gravel with dark colored piece of wood &amp; scrap metal, angular and poorly sorted, some sand, some clay material</p> <p>FILL: Dark gray (7.5 R 4/1), gravelly, clayey and poorly sorted, moist, piece of wood, scrap metal, has odor, refusal at 1.5 T.D. = 1.5'</p>
-5	5							
-10	10							
-15	15							





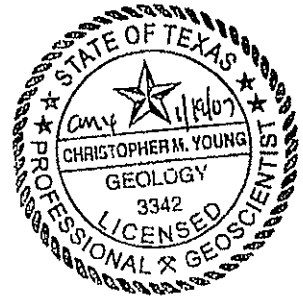
J. No. 0014419 Boring/Well ID SB-91B Date Drilled 8/7/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 4' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' FL MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Marcel St. Marie

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 6' North of SB-91 perpendicular to tracks.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-4	0-0.2	SANDY CLAY: dark brown (10 YR 3/3) sandy clay with subangular to well rounded gravel, moist
					1.0		0.2-0.5	SANDY CLAY: sandy clay, dark brown (10 YR 3/3), moist, clay content increasing with depth, plastic, firm
					42.4		0.5-1.5	SANDY CLAY: dark olive brown (25 Y 3/3) sandy clay, smaller gravel fragments, subangular gravel, moist, clay is non-plastic
					7.0		1.5-3	SANDY CLAY: sandy clay, well sorted, fine-grained, silty sand, black (10 YR 2/1), moist, sheen
							3-4	SANDY CLAY: sandy clay, less sand than above, increasing clay content with depth, black (10 YR 2/1), moist, clay is more plastic and firm than (1.5-2.0) interval, sheen T.D. = 4'







# ERM Environmental Resources Management

## SB-92B DRILLING LOG

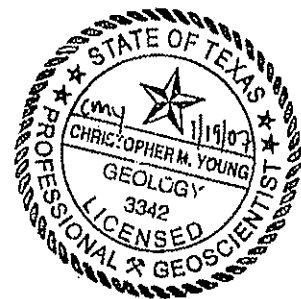
Proj. No. 0014419 Boring/Well ID SB-92B Date Drilled 8/11/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"  
 N. Coord. 728232.42' E. Coord. 3167118.92' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Jessica Rose

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-3	0-0.5	GRAVEL: dark olive brown (2.5 Y 3/3) sandy gravel, moist, poorly sorted sand and gravel
					0.0		0.5-0.75	GRAVEL: dark olive brown (2.5 Y 3/3) sandy gravel, wet, poorly sorted sand and gravel
					0.0		0.75-1	GRAVEL: dark olive brown (2.5 Y 3/3) sandy gravel, wet, poorly sorted sand and gravel
					0.0		1-1.2	GRAVELLY SAND: lightly yellowish brown (2.5 Y 6/4) very coarse-grained sand and gravel, moist
					0.0		1.2-1.5	GRAVELLY SAND: lightly yellowish brown (2.5 Y 6/4) very coarse-grained sand and gravel, moist
					0.0		1.5-2	FILL: very dark gray (2.5 Y 3/1) gravel and sand, moist, small gravel, angular-subangular [fill]
					0.0		2-2.5	SANDY CLAY: very dark sandy clay, wet, non plastic, soft, loose, contains small gravel, water in hole
					3.8		2.5-3	SANDY CLAY: very dark grey (2.5 Y 3/1) sandy clay, wet, fine-grained sand, small pebbles, plastic soft
								SANDY CLAY: very dark grey (2.5 Y 3/1) sandy clay, wet, fine-grained sand, small pebbles, plastic soft, clay increasing
								SANDY CLAY: very dark grey (2.5 Y 3/1) sandy clay, wet, fine-grained sand, small pebbles, plastic soft, clay increasing, wood fragments abundant, product
								T.D. = 3'





**ERM** Environmental Resources Management

**SB-92B  
DRILLING LOG**

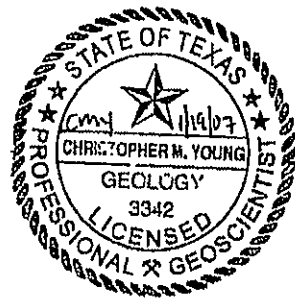
Proj. No. 0014419 Boring/Well ID SB-92B Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 1.5' Boring Diam. 2.5"  
 N. Coord. 728232.42' E. Coord. 3167118.92' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Elizuyehu Ayele

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-1.5	0-1 1-1.5	GRAVELLY CLAY: brownish yellow (10 YR 6/8), gravelly sandy clay, moist, slightly plastic, abundant gravel, with clayey sand lenses from 0.5' to 1', 100% recovery GRAVEL: dark gray (1 Gley 4/N), gravel, loose, poorly sorted, angular to subangular, medium to coarse-grained, wet, NOTE: hole filled with water at -1.5, sheen on water surface T.D. = 1.5'





# ERM Environmental Resources Management

## SB-92B DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-92B Date Drilled 8/29/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 4.5' Boring Diam. 2.5"

N. Coord. 728232.42' E. Coord. 3167118.92' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Bizuayehu Ayele

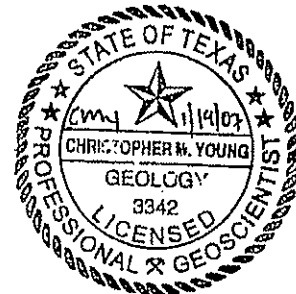
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-4.5	0-1	GRAVELLY CLAY: brownish yellow (10 YR 6/8), gravelly sandy clay, moist, slightly plastic, abundant gravel, sandy clay lenses from 0.9-1', 100% recovery
					0.0		1-2.3	GRAVEL: dark gray (1 Gley 4/N), gravel, loose, poorly sorted, angular to subangular, medium to coarse-grained, wet, shiny from 2' to 2.3', 100% recovery
					0.0		2.3-2.5	CLAYEY SAND: dark greenish gray (Gley 2 3/15 B6) clayey sand, very fine-grained, rounded, sorted, wet, stained, 100% recovery
					0.0		2.5-4.3	SAND: grayish brown (2.5 Y 5/2), sand, fine grained, rounded, sorted, wet from 2.5' to 3' and moist from 3' to 4.5', slightly cohesive, strong odor, product, stained dark gray (1 Gley 4/N), 100% recovery
					7.6		4.3-4.5	SANDY CLAY: dark gray (1 Gley 4/N), sandy clay, slightly plastic, sand grains very fine-grained, sorted and rounded, moist, cohesive, 100% recovery
					20.4			T.D. = 4.5'
					118.4			
					177.3			
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-93B(B) DRILLING LOG

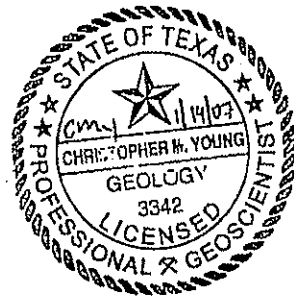
Proj. No. 0014419 Boring/Well ID SB-93B(B) Date Drilled 8/25/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"  
 N. Coord. 728411.9' E. Coord. 3167457.65' Surface Elevation 0' Fl. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-3	0-0.2 0.2-1 1-1.5 1.5-3	<p>SANDY CLAY: brownish yellow (10 YR 6/8), sandy clay, moist, slightly plastic, sand grains are fine-grained, rounded, sorted, abundant gravel, 100% recovery</p> <p>CLAYEY SAND: dark gray (1 Gley 4/N) clayey sand, medium to coarse-grained, poorly sorted, angular to subrounded, moist, stained, 100% recovery</p> <p>CLAYEY SAND: reddish gray (2.5 YR 5/1) clayey sand with dark gray (1 Gley 4/N) mottles, medium to coarse-grained, poorly sorted, angular to subrounded, moist, sand consists of abundant mica, stained, 100% recovery</p> <p>SANDY CLAY: greenish gray (1 Gley 5/1 10Y) with dark gray (1 Gley 4/N) mottles, clay, moist, plastic, firm, some sand grains, very dark gray (1 Gley 3/N), stained sand at the contact between clay and sand layers, stained clay at about 2.9', 100% recovery T.D. = 3'</p>
-5	5							
-10	10							
-15	15							





Proj. No. 0014419 Boring/Well ID SB-93B(C) Date Drilled 8/25/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"

N. Coord. 728413.86' E. Coord. 3167458.32' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Bizuayehu Ayele

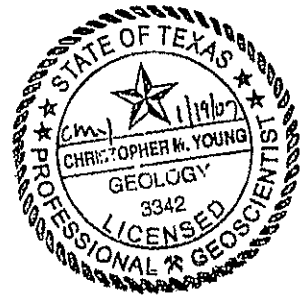
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-3	0-0.2 0.2-1 1-1.5 1.5-2.5 2.5-3	<p>CLAY: brownish yellow (10 YR 6/8), clay, moist, slightly plastic, abundant gravel, 100% recovery</p> <p>CLAYEY SAND: dark gray (1 for Gley 4/N) clayey sand, medium to coarse-grained, poorly sorted, angular to subrounded, moist, stained, 100% recovery</p> <p>CLAYEY SAND: reddish gray (2.5 YR 5/1) clayey sand with dark gray (1 GLEY 4/N) mottles, medium to coarse-grained, poorly sorted, angular to subrounded, moist, stained, sand consists of abundant mica, 100% recovery</p> <p>CLAY: greenish gray (Gley 1 10 Y 5/1) with dark gray (1 Gley 3/N) mottles, clay, moist, plastic, firm, some sand grain, very dark gray (1 Gley 3/N), stained horizon from 1.8 to 2, 100% recovery</p> <p>CLAY: greenish gray (Gley 1 10 Y 5/1) with dark gray (1 Gley 3/N) mottles, clay, moist, plastic, firm, some sand grains, very dark gray (1 Gley 3/N), stained horizon from 2.7' to 3', 100% recovery</p> <p>T.D. = 3'</p>
					0.0			
					0.0			
					0.0			
					0.7			
					11.9			
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-93B(D) DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-93B(D) Date Drilled 8/25/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"

N. Coord. 728410.18' E. Coord. 3167457.28' Surface Elevation 0' FL MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

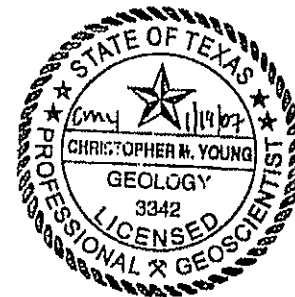
Drilling Method Hand Auger Log By Bizuyehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-3	0-3	NOT SAMPLED: similar to SB-93B(B) & SB-93B(C), refusal at about 3'
					NM			T.D. = 3'
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-93B(E) DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-93B(E) Date Drilled 8/25/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"  
 N. Coord. 728405.9' E. Coord. 3167449.74' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Blzuayehu Ayele

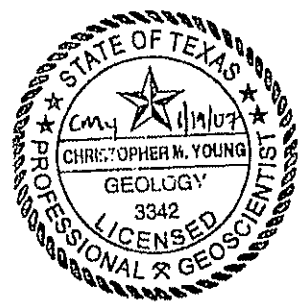
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-3	0-0.5 0.5-1 1-1.5 1.5-2 2-2.5 2.5-3	<p>CLAY: brownish yellow (10 YR 6/8), clay, moist, slightly plastic, abundant gravel, 100% recovery</p> <p>CLAYEY SAND: dark gray (1 for Gley 4/N), clayey sand, medium to coarse-grained, poorly sorted, angular to subrounded, moist, stained, 100% recovery</p> <p>CLAYEY SAND: dark gray (1 for Gley 4/N), clayey sand, fine to medium-grained, fairly sorted, rounded to subangular, moist, stained, 100% recovery</p> <p>CLAYEY SAND: dark gray (1 for Gley 4/N), clayey sand, fine to medium-grained, fairly sorted, rounded to subangular, moist, stained, sand, odor, 100% recovery</p> <p>CLAYEY SAND: dark gray (1 for Gley 4/N), clayey sand, medium to coarse-grained, fairly sorted, rounded to subangular, moist, sand stained with product, has strong odor, 100% recovery</p> <p>CLAYEY SAND: dark gray (1 for Gley 4/N), clayey sand with some clay lenses, medium to coarse-grained, fairly sorted, rounded to subangular, wet, abundant piece of wood, visible apparent product, 100% recovery T.D. = 3'</p>
					14.9 198.0 264.0 222.4 156.0			
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-94B DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-94B Date Drilled 8/24/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 5' Boring Diam. 2.5"

N. Coord. 728408.41' E. Coord. 3167468.37' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Bizuayehu Ayele

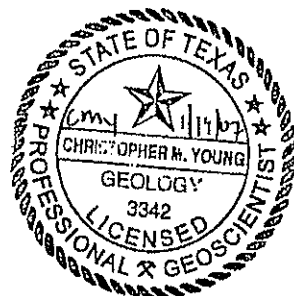
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-5	0-1	GRAVELLY CLAY: dark gray (1 for Gley 4/N), gravelly sandy clay, moist, slightly cohesive, loose, 100% recovery
							1-2	CLAYEY SAND: dark gray (1 for Gley 4/N), clayey sand, fine to medium-grained, fairly sorted, rounded, some clay lenses, moist, sheen, very dark gray (1 for Gley 3/N) from 1.8 to 2, 100% recovery
							2-2.5	SAND: very dark gray (1 for Gley 3/N) sand, fine-grained, fairly sorted, rounded, moist, sheen, occasional gravel, odor, 100% recovery
							2.5-3	SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, slightly cohesive, odor, 100% recovery
							3-3.5	SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, slightly cohesive, odor, 100% recovery
							3.5-4	SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, wet, slightly cohesive, odor, product, 100% recovery
							4-4.5	SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, wet, slightly cohesive, odor, product, sandy clay lenses of yellow (2.5 Y 7/8) color, 100% recovery
							4.5-5	SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, wet, slightly cohesive, odor, product, 100% recovery
					NM			SANDY CLAY: gray (1 for Gley 5/N) sandy clay, moist, slightly plastic, sand grains very fine-grained, sorted and rounded cohesive, 100% recovery
								T.D. = 5'







# ERM Environmental Resources Management

## SB-95B DRILLING LOG

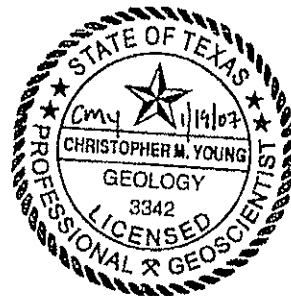
Proj. No. 0014419 Boring/Well ID SB-95B Date Drilled 8/16/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 5.5' Boring Diam. 2.5"  
 N. Coord. 728508.674' E. Coord. 3167654.406' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-5.5	0-0.5 0.5-2.5 2.5-4.75 4.75-5 5-5.5	<p>SANDY CLAY: dark gray (1 for GLEY 4/N), sandy clay, abundant gravel, moist, non plastic, slightly cohesive, piece of wood, plant roots, 100% recovery</p> <p>CLAYEY SAND: very dark gray (1 for GLEY 3/N), clayey sand, some gravel, medium to coarse-grained, moist, slightly cohesive, abundant tar-like substance, odor, some piece of wood, abundant mica, wet piece of wood from 2' to 2.5', patches of nodules of clay from 1.5' to 2', 100% recovery</p> <p>SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded to subangular, moist from 2.5' to 3', wet from 2.5' to 4.75', slightly cohesive, apparent product, 100% recovery</p> <p>CLAY: light olive gray (5 Y 6/2), clay, plastic, gray (5 y 5/1) mottles, moist, 100% recovery</p> <p>SANDY CLAY: gray (5 Y 5/1), sandy clay, moist, slightly plastic, sand grains, very fine-grained, uniformly layered, 100% recovery          T.D. = 5.5'</p>
-5	5				NM			
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-95B1 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-95B1 Date Drilled 8/17/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3.5' Boring Diam. 2.5"  
 N. Coord. 728508.223' E. Coord. 3167658.732' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayela

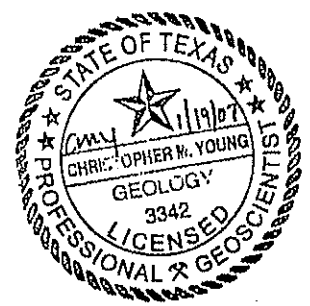
SKETCH MAP

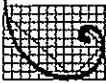
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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-3.5	0-0.5	GRAVELLY CLAY: gray (5 YR 6/1) gravelly sandy clay, moist, loose, non-plastic, 100% recovery
					0.0		0.5-1	CLAYEY SAND: gray (5 YR 6/1), clayey sand, non-cohesive patches of clay, some gravel, abundant mica, medium to coarse-grained, poorly sorted, moist, 100% recovery
					0.0		1-1.5	CLAYEY SAND: gray (5 YR 6/1), clayey sand, non-cohesive patches of clay, some gravel, abundant mica, medium to coarse-grained, poorly sorted, moist, 100% recovery
					45.1		1.5-2	CLAYEY SAND: gray (5 YR 6/1), clayey sand, non-cohesive patches of clay, some gravel, abundant mica, medium to coarse-grained, poorly sorted, moist, 100% recovery
					88.8		2-2.5	CLAYEY SAND: gray (5 YR 6/1), clayey sand, non-cohesive patches of clay, some gravel, abundant mica, medium to coarse-grained, poorly sorted, moist, 100% recovery
					113.1		2.5-2.8	SAND: dark gray (1 for Gley 4/N) sand, fine-grained, sorted, subangular to rounded, moist, stained to be dark gray, sheen, odor, 100% recovery
					206		2.8-3	SAND: dark gray (1 for Gley 4/N) sand, fine-grained, sorted, subangular to rounded, moist, stained to be dark gray, sheen, odor, some piece of wood, 100% recovery
							3-3.5	SAND: dark gray (1 for Gley 4/N) sand, fine-grained, sorted, subangular to rounded, moist, stained to be dark gray, sheen, odor, some piece of wood, 100% recovery
								SAND: grayish brown (2.5 Y 5/2) sand, fine-grained, sorted, rounded, moist, slightly cohesive, sheen, odor, 100% recovery
								SAND: grayish brown (2.5 Y 5/2) sand, fine-grained, sorted, rounded, moist, slightly cohesive, sheen, odor, product, 100% recovery
								T.D. = 3.5'





# ERM Environmental Resources Management

## SB-95B2 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-95B2 Date Drilled 8/17/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 4' Boring Diam. 2.5"  
 N. Coord. 728513.195' E. Coord. 3167667.507' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Blzuayehu Ayele

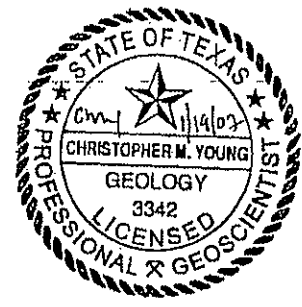
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-4	0-0.5	<p>CLAYEY SAND: dark reddish gray (10 R 4/1), clayey sand, medium to coarse-grained, slightly cohesive, some gravel, poorly sorted, subangular to rounded, moist, 100% recovery</p> <p>CLAYEY SAND: dark gray (1 for GLEY 4/N), clayey sand, fine-grained, sorted, subangular to rounded, slightly cohesive, sand stained to be dark gray, moist, 100% recovery</p> <p>SANDY CLAY: dark gray (1 for Gley 4/N), sandy clay, slightly plastic, patches of black stained sand, sand grains very fine-grained, sorted and rounded, some piece of wood, moist, 100% recovery</p> <p>SAND: dark gray (1 for Gley 4/N) sand, fine-grained, sorted, rounded, patches of clay, moist, odor, 100% recovery</p> <p>SAND: dark gray (1 for Gley 4/N) sand, fine-grained, sorted, rounded, patches of clay, wet, sand has sheen and strong odor, some coarsed-grained sand, 100% recovery</p> <p>SAND: dark gray (1 for Gley 4/N) sand, fine-grained, sorted, rounded, patches of clay, wet, sand has sheen and strong odor, some coarsed-grained sand, 100% recovery</p> <p>SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, wet, slightly cohesive, free flowing product, strong odor, 100% recovery</p> <p>T.D. = 4'</p>
					14.1	0.5-1	1-2	
					85.6	2-2.8	2-2.8	
					193.2	2.8-3	2.8-3	
					253.4	3-3.2	3-3.2	
						3.2-4	3.2-4	
-5	5							
-10	10							
-15	15							





SB-95B3  
DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-95B3 Date Drilled 8/17/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 5' Boring Diam. 2.5"  
 N. Coord. 728518.398' E. Coord. 3167678.705' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

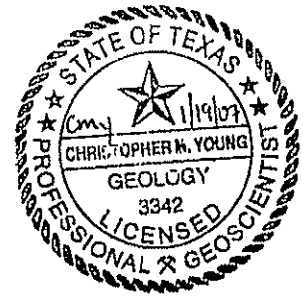
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0	[Pattern]	[Pattern]		0.0	0-5	0-0.5	SANDY CLAY: gray (5 YR 6/1), sandy clay, moist, non-plastic, some gravel, patches of clay, some gravel, 100% recovery
					1.3		0.5-1	CLAYEY SAND: gray (5 YR 6/1), clayey sand, coarse to medium-grained, poorly sorted, subangular to rounded, moist, slightly cohesive, nodules of tar-like material, 100% recovery
					49.3		1-1.5	SANDY CLAY: dark gray (1 for Gley 4/N), sandy clay, moist, plastic, patches of black stained sand, odor, 100% recovery
					179.3		1.5-2	SANDY CLAY: dark gray (1 for Gley 4/N), sandy clay, moist, plastic, patches of black stained sand, odor, 100% recovery
					25.4		2-2.5	SAND: dark gray (1 for Gley 4/N), sand, fine-grained, sorted, rounded, moist, slightly cohesive, odor, small patches of sandy clay, sheen, black stained, 100% recovery
					41.5		2.5-3	SAND: dark gray (1 for Gley 4/N), sand, fine-grained, sorted, rounded, moist, sheen, strong odor, 100% recovery
					349		3-3.5	SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, sheen, strong odor, 100% recovery
					433		3.5-4	SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, sheen, strong odor, 100% recovery
					433		4-4.5	SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, sheen, strong odor, 100% recovery
					312		4.5-5	SAND: dark gray (1 for Gley 4/N), sand, fine-grained, sorted, rounded, moist, slightly cohesive, odor, small patches of sandy clay, sheen, black stained, some pieces of wood, devoid of patches of clay, 100% recovery
-5	5	[Pattern]	[Pattern]		160.8			SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, sheen, strong odor, 100% recovery
								SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, sheen, strong odor, 100% recovery
								SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, sheen, strong odor, lower section of the sand has product, sand is wet at ~4.5', 100% recovery
								SANDY CLAY: dark gray (1 for Gley 4/N), sandy clay, moist, slightly plastic, sand grains very fine-grained, sorted and rounded, 100% recovery
								T.D. = 5'





Proj. No. 0014419 Boring/Well ID SB-95B4 Date Drilled 8/18/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 4.5' Boring Diam. 2.5"  
 N. Coord. 728523.783' E. Coord. 3167687.986' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Blzuayehu Ayele

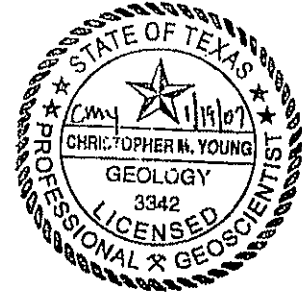
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-4.5	0-0.5	SANDY CLAY: light reddish brown (5 YR 6/3), sandy clay, mottled with dark gray (1 for Gley 4/N), moist, plastic, some gravel, 100% recovery SANDY CLAY: light gray (10 YR 7/2) mottled with dark gray (1 for Gley 4/N) clay, moist, plastic, some gravel, 100% recovery CLAYEY SAND: reddish brown (5 YR 4/4) with black (5 YR 1/1) mottles, clayey sand, medium to coarse-grained, poorly sorted, angular to rounded, moist, non-cohesive, some nodules of tar-like material, 100% recovery CLAYEY SAND: black (1 for Gley 2.5/N), clayey sand, fine to medium-grained, sorted, subangular to rounded, moist, slightly cohesive, some mica, light odor, 100% recovery SANDY CLAY: very dark gray (1 for Gley 3/N), clay with sand lenses, plastic, sand grains are medium to coarse grained, poorly sorted, angular to rounded, moist, odor, sand grains, sheen, 100% recovery SAND: very dark gray (1 for Gley 3/N), sand, very fine-grained, sorted, rounded, moist, cohesive, stained, sheen, odor, 100% recovery SAND: very dark gray (1 for Gley 3/N), sand, very fine-grained, sorted, rounded, moist, cohesive, stained, sheen, odor, 100% recovery SAND: very dark gray (1 for Gley 3/N), sand, medium to coarse-grained, poorly sorted, angular to rounded, moist, non-cohesive, stained, sheen, strong odor, 100% recovery SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, slightly cohesive, product, strong odor, 100% recovery T.D. = 4.5'
					0.0		0.5-1	
					0.0		1-1.5	
					64.9		1.5-2	
					110.5		2-2.5	
					269		2.5-3	
					206		3-3.5	
					178.1		3.5-4	
					192		4-4.5	
-5	5							
-10	10							
-15	15							





**ERM** Environmental Resources Management

**SB-95B5  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-95B5 Date Drilled 8/18/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 5' Boring Diam. 2.5"  
 N. Coord. 728528.81' E. Coord. 3167697.239' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Slickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Blzuayehu Ayele

SKETCHED BY \_\_\_\_\_

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-5	0-0.8	GRAVELLY CLAY: gray (5 YR 6/1), gravelly, sandy, clay, moist, loose, non-plastic, 100% recovery
					7.3		0.8-1	CLAYEY SAND: reddish brown (5 YR 4/4), clayey sand, medium to coarse-grained, poorly sorted, angular to rounded, moist, non-cohesive, some nodules of tar-like material, 100% recovery
					9.6		1-1.5	
					302		1.5-2	CLAYEY SAND: dark gray (1 Gley 4/N), clayey sand, medium to coarse-grained, poorly sorted, moist, slightly cohesive, subangular to rounded, stained, odor, 100% recovery
					250.9		2-2.5	
					198.1		2.5-3	SANDY CLAY: very dark gray (1 Gley 3/N), sandy clay, plastic, sand grains are medium to coarse-grained, poorly sorted, subangular to rounded, moist, stained with tar-like material, odor, 100% recovery
					219.3		3-3.5	
					244.1		3.5-4	SAND: very dark gray (1 Gley 3/N), sand, very fine-grained, sorted, rounded, moist, cohesive, stained, sheen, odor, 100% recovery
					112		4-4.5	CLAYEY SAND: dark gray (1 Gley 4/N), clayey sand, medium to coarse-grained, poorly sorted, angular to rounded, moist, non-cohesive, patches of greenish gray (1 Gley 6/1) clay, 100% recovery
					13.1		4.5-5	SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, slightly cohesive, dark gray (1 for Gley 4/N) mottles, strong odor, 100% recovery
								SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, saturated, slightly cohesive, dark gray (1 Gley 4/N) mottles, strong odor, 100% recovery
								SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, saturated, slightly cohesive, dark gray (1 Gley 4/N) mottles, strong odor, 100% recovery
								SANDY CLAY: gray (5 Y 5/1), sandy clay, moist, slightly plastic, sand grains, very fine-grained, sorted, rounded, uniformly layered, 100% recovery
								T.D. = 5'



# ERM Environmental Resources Management

## SB-95B6 DRILLING LOG

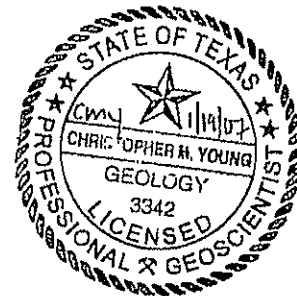
Proj. No. 0014419 Boring/Well ID SB-95B6 Date Drilled 8/18/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 5' Boring Diam. 2.5"  
 N. Coord. 728533.622' E. Coord. 3167709.932' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				2	0-5	0-0.2 0.2-0.5 0.5-1 1-1.5 1.5-4 4-4.5 4.5-5	GRAVELLY CLAY: gray (5 YR 6/1), gravely sandy clay, moist, loose, non-plastic, 100% recovery CLAY: light greenish gray (1 Gley 10GY) clay, moist, plastic, plnk (2.5YR 8/4) mottles, 100% recovery CLAYEY SAND: dark gray (1 Gley 4/N), clayey sand, medium to coarse-grained, poorly sorted, moist, slightly cohesive, subangular to rounded, stained, 100% recovery SAND: dark reddish gray (2.5 YR 4/1), sand, medium to coarse-grained, poorly sorted, angular to rounded, moist, non-cohesive, odor, stained, 100% recovery CLAYEY SAND: dark gray (1 Gley 4/N), clayey sand, medium to coarse-grained, poorly sorted, moist, slightly cohesive, subangular to rounded, stained, odor, piece of wood, scrap metals, 100% recovery SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, moist, slightly cohesive, dark gray (1 Gley 4/N) mottles, odor, 100% recovery SANDY CLAY: gray (5 Y 5/1), sandy clay, moist, slightly plastic, sand grains, very fine-grained, sorted, rounded, uniformly layered, 100% recovery T.D. = 5'
28.6								
225.5								
199.3								
212.8								
209.1								
252.9								
182.9								
122.5								
-5	5							
-10	10							
-15	15							





Proj. No. 0014419 Boring/Well ID SB-95B7 Date Drilled 8/18/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 4.5' Boring Diam. 2.5"  
 N. Coord. 728538.664' E. Coord. 3167718.795' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

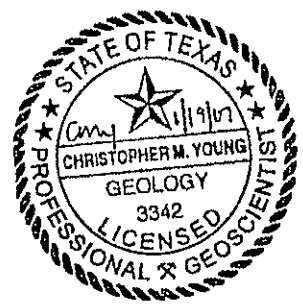
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				2.9	0-4.5	0-0.5 0.5-1 1-2.5 2.5-3 3-3.5 3.5-4 4-4.5	GRAVELLY CLAY: gray (5 YR 6/1), gravely, sandy clay, moist, loose, non-plastic, 100% recovery SAND: light reddish brown (2.5 YR 6/4), sand, medium to coarse-grained, poorly sorted, angular to rounded, moist, non-cohesive, 100% recovery CLAYEY SAND: dark gray (1 Gley 4/N), clayey sand, fine to medium-grained, poorly sorted, angular to rounded, moist, slightly cohesive, stained, odor, abundant piece of wood, scrap metal and coarse-grained sand lenses, no sand lenses from 2' to 2.5', 100% recovery GRAVELLY SAND: very dark gray (1 Gley 3/N), gravely sand, coarse-grained, poorly sorted, angular to subangular, moist, non-cohesive, stained, odor, shiny, 100% recovery, BORING STOPPED ON 8/18/2006 CONTINUED ON 8/22/2006 CLAYEY SAND: BORING CONTINUED ON 8/22/2006 dark gray (1 Gley 4/N), clayey sand, medium to coarse-grained, poorly sorted, wet, slightly cohesive subangular to rounded, stained, odor, 100% recovery SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded, wet, slightly cohesive, odor, product, 100% recovery NO RECOVERY: hole full of water, sample recovery impossible, i.e. sample falls off the auger T.D. = 4.5'
					224.4			
					201.8			
					211.3			
					199.2			
					178.9			
-5	5				NM			
-10	10							
-15	15							







# ERM Environmental Resources Management

## SB-96B DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-96B Date Drilled 8/11/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 2.5' Boring Diam. 2.5"

N. Coord. 728590.62' E. Coord. 3167830.51' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Jessica Rose

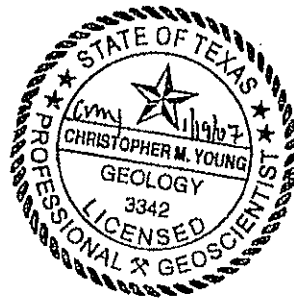
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.3 1.0 57.7 331.0 96.0	0-2.5	0-0.5 0.5-1.5 1.5-2 2-2.5	GRAVEL: dark olive brown (2.5 Y 3/3) sandy gravel, moist, poorly sorted sands and gravel SILTY SAND: black (10 YR 2/1) silty sand, moist, poorly sorted, non plastic, soft, loose, small to large rounded to subangular to angular gravels CLAYEY SAND: very dark grayish brown (10 YR 3/3) clayey sand, moist, very poorly sorted, coarsed-grained sand and gravel, non-plastic, soft, loose, odor SANDY CLAY: very dark grayish brown (10 YR 3/2) sandy clay, wet, poorly sorted, plastic, firm, (pp=1.0 tsf), odor, product T.D. = 2.5'
-5	5							
-10	10							
-15	15							





Proj. No. 0014419 Boring/Well ID SB-96B Date Drilled 8/28/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 5' Boring Diam. 2.5"

N. Coord. 728590.62' E. Coord. 3167830.51' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Slickup 0'

Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Blzuayehu Ayele

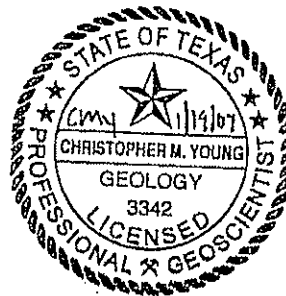
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-5	0-0.5 0.5-1 1-1.5 1.5-2.8 2.8-3.4 3.4-4.7 4.7-5	GRAVELLY CLAY: brownish yellow (10 YR 6/8), gravelly, sandy clay, moist, slightly plastic, 100% recovery SANDY CLAY: greenish gray (2 Gley 5/10G) with reddish yellow (7.5 YR 6/8) and dark gray (1 Gley 4/N) mottles, sandy clay, sand grains very fine, sorted and rounded, moist, 100% recovery CLAYEY SAND: dark gray (1 Gley 4/N), clayey sand, fine-grained, fairly sorted, rounded, angular to subrounded, abundant gravel, moist, 100% recovery SAND: dark gray (1 Gley 4/N), sand, medium to coarse-grained, poorly sorted, angular to rounded, some clayey sand lenses, moist, odor, sheen, 100% recovery SILTY CLAY: dark gray (1 Gley 4/N), silty clay, moist, plastic, soft, stained, odor, 100% recovery SAND: dark gray (1 Gley 4/N) from 3.4' to 4.2', grayish brown (2.5 Y 5/2) from 4.2' to 4.7', sand, fine to coarse-grained, poorly sorted, angular to rounded, stained, wet, sheen with product from 4' to 4.7', odor, 100% recovery SANDY CLAY: gray (1 Gley 5/N), sandy clay, moist, slightly plastic, sand grains very fine-grained, sorted and rounded, cohesive, 100% recovery T.D. = 5'
-5	5				NM			
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-96B1 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-96B1 Date Drilled 8/24/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3' Boring Diam. 2.5"  
 N. Coord. 728597.45' E. Coord. 3167815.93' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Blzuayehu Ayele

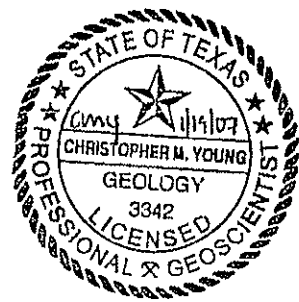
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0	0-3	0-0.5	CLAY: greenish gray (2 Gley 510G), clay, moist, plastic, soft, reddish yellow (7.5 YR 6/B) and dark gray (1 Gley 4/N) mottles, dark gray piece of wood, 100% recovery SANDY CLAY: greenish gray (2 Gley 510G) with reddish yellow (7.5 YR 6/B) and dark gray (1 Gley 4/N) mottles, sandy clay, sand grains very fine-grained, rounded, sorted, stained dark gray from 0.8 to 1, moist, 100% recovery SAND: dark gray (1 Gley 4/N), sand, fine to medium-grained, poorly sorted, angular to subangular, moist from 1' to 2', wet from 2' to 2.5, saturated from 2.5' to 3', stained, odor, clayey sand lenses, very dark gray (1 Gley 3/N) horizon having abundant piece of wood from 1.9 to 2, stained with product from 2' to 2.5', product from 2.5' to 3', 100% recovery T.D. = 3'
					0.0		0.5-1	
					0.0		1-3	
					7.2			
					64			
					128.2			
-5	5							
-10	10							
-15	15							





Proj. No. 0014419 Boring/Well ID SB-96B2 Date Drilled 8/24/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 1.5' Boring Diam. 2.5"

N. Coord. 728595.48' E. Coord. 3167807.31' Surface Elevation 0' FL. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Bizuayehu Ayele

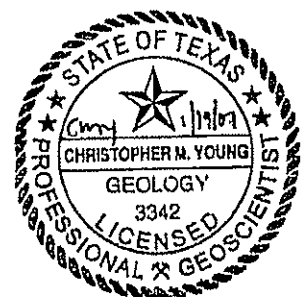
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				54.3 NM	0-1.5	0-1 1-1.5	SANDY CLAY: greenish gray (2 Gley 5/10G) with reddish yellow (7.5 YR 6/8) and dark gray (1 for Gley 4/N) mottles, sandy clay, sand grains fine-grained, rounded and sorted, moist, abundant piece of wood which is stained, 100% recovery NO RECOVERY: railroad ties encountered, hard, compacted layer of piece of wood T.D. = 1.5'
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-96B3 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-96B3 Date Drilled 8/24/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 2.5' Boring Diam. 2.5"

N. Coord. 728583.54' E. Coord. 3167797.09' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

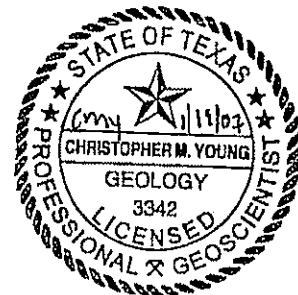
Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0 44.7 171.6	0-2.5	0-1 1-2.5	SANDY CLAY: greenish gray (2 Gley 5/10G) with reddish yellow (7.5 YR 6/8) and dark gray (1 Gley 4/N), sandy clay, sand grains, fine grained, rounded, sorted, moist, 100% recovery CLAYEY SAND: dark gray (1 Gley 4/N), clayey sand, fine to medium-grained, fairly sorted, angular to rounded, moist from 1' to 2', wet from 2' to 2.5', sheen from 1.8 to 2, stained, product, strong odor from 2' to 2.5', 100% recovery T.D. = 2.5'
-5	5							
-10	10							
-15	15							



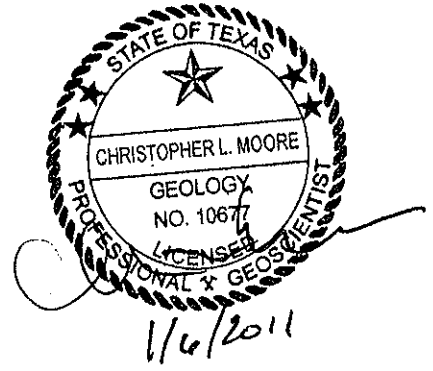


Union Pacific Railroad

# Log of Boring: SB-118

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
PBW Project No. 1358	Driller:	Keith Barge	Total Depth (ft):	4.5
	Driller's License:	4786	Northing:	728815.348
	Field Supervisor:	Tim Jennings	Easting:	3167394.652
	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, sandy/gravelly clay, dark brown, moist, fine-coarse gravel, brick fragments.
1	3.8	4.5/4.5	FILL	
2				
3	3.8		CL	SANDY CLAY, CL, dark gray, moist, soft.
4				



**PBW**  
 Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.

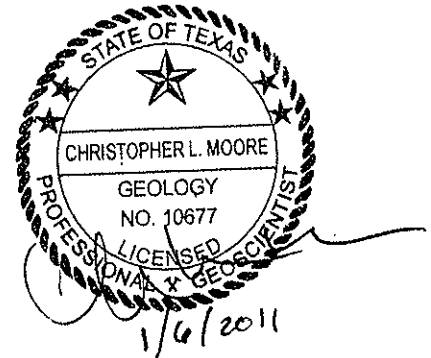


Union Pacific Railroad

# Log of Boring: SB-119

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
PBW Project No. 1358	Driller:	Keith Barge	Total Depth (ft):	5
	Driller's License:	4786	Northing:	728832.625
	Field Supervisor:	Tim Jennings	Easting:	3167482.45
	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, clayey/gravelly sand, dark brown, moist, fine gravel, soft.
1	3.3	4.5/5.0	FILL	
2				
3	1.3		CL	SANDY CLAY, CL, grayish brown, moist, soft.
4				
5				



<p><b>PBW</b>  <b>Pastor, Behling &amp; Wheeler, LLC</b>          2201 Double Creek Dr., Suite 4004          Round Rock, TX 78664          Tel (512) 671-3434 Fax (512) 671-3446</p>	<p>Notes:          Borehole plugged with bentonite chips upon completion.</p>
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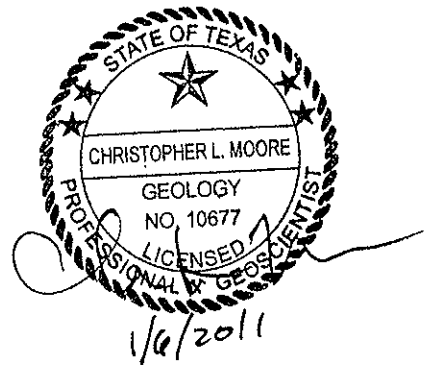


Union Pacific Railroad

# Log of Boring: SB-120

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
PBW Project No. 1358	Driller:	Keith Barge	Total Depth (ft):	5
	Driller's License:	4786	Northing:	728842.233
	Field Supervisor:	Tim Jennings	Easting:	3167582.927
	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	0		FILL	
2		5.0/5.0		
3			SM	SILTY SAND, SM, grayish brown, moist, soft.
4	0			
5			CL	SILTY CLAY, CL, grayish brown, moist, firm.



<p><b>PBW</b>          Pastor, Behling &amp; Wheeler, LLC          2201 Double Creek Dr., Suite 4004          Round Rock, TX 78664          Tel (512) 671-3434 Fax (512) 671-3446</p>	<p>Notes:          Borehole plugged with bentonite chips upon completion.</p>
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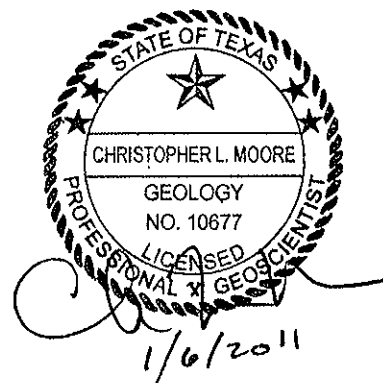


Union Pacific Railroad

# Log of Boring: SB-121

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
PBW Project No. 1358	Driller:	Keith Barge	Total Depth (ft):	5
	Driller's License:	4786	Northing:	728846.746
	Field Supervisor:	Tim Jennings	Easting:	3167677.527
	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	3.4	4.5/5.0	FILL	FILL, sandy/gravelly clay, dark brown, moist, fine-coarse gravel, brick fragments.
1				
2	4.8		CL	SANDY CLAY, CL, grayish brown, moist, soft.
3				
4				
5				



<p><b>PBW</b>          Pastor, Behling &amp; Wheeler, LLC          2201 Double Creek Dr., Suite 4004          Round Rock, TX 78664          Tel (512) 671-3434 Fax (512) 671-3446</p>	<p>Notes:          Borehole plugged with bentonite chips upon completion.</p>
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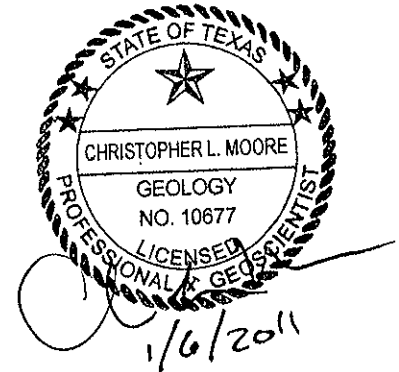


Union Pacific Railroad

# Log of Boring: SB-122

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
PBW Project No. 1358	Driller:	Keith Barge	Total Depth (ft):	4.5
	Driller's License:	4786	Northing:	728848.25
	Field Supervisor:	Tim Jennings	Easting:	3167786.131
	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, silty sand/sand, dark brown, moist, fine-coarse gravel, odor below 1.8'
1	4.2		FILL	
2		4.5/4.5		
3	6.8		CL	SILTY CLAY, CL, dark gray, moist, soft to firm, odor to 4.0'
4				



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 Pastor, Behling & Wheeler, LLC  
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 Round Rock, TX 78664  
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Notes:  
 Borehole plugged with bentonite chips upon completion.

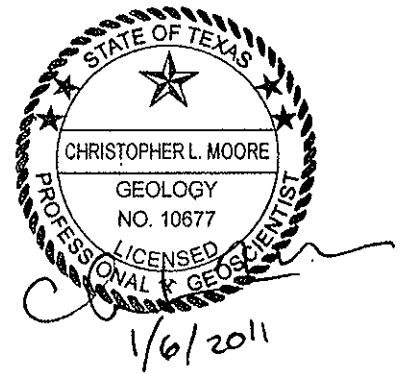


Union Pacific Railroad

# Log of Boring: SB-123

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
	Driller:	Keith Barge	Total Depth (ft):	4
	Driller's License:	4786	Northing:	728862.902
	Field Supervisor:	Tim Jennings	Easting:	3167880.66
PBW Project No. 1358	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PI/D (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	2.8	4.0/4.0	FILL	SANDY CLAY, CL, dark gray, moist, soft - firm.
2				
3	1.5		CL	
4				



## PBW

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 Round Rock, TX 78664  
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Notes:  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: SB-124

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
PBW Project No. 1358	Driller:	Keith Barge	Total Depth (ft):	5
	Driller's License:	4786	Northing:	728876.833
	Field Supervisor:	Tim Jennings	Easting:	3168079.741
	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PIV (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	3.6	5.0/5.0	FILL	
2				
3	2.5		CL	SANDY CLAY, CL, gray, moist, soft - firm.
4				
5				



<p><b>PBW</b> Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	<p>Notes: Borehole plugged with bentonite chips upon completion.</p>
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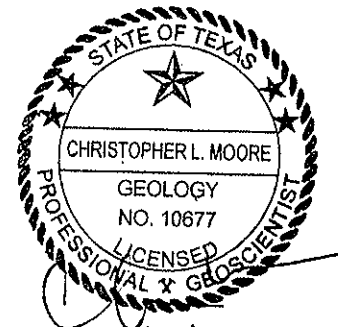


Union Pacific Railroad

# Log of Boring: SB-125

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
	Driller:	Keith Barge	Total Depth (ft):	4
	Driller's License:	4786	Northing:	728882.904
	Field Supervisor:	Tim Jennings	Easting:	3168277.883
PBW Project No. 1358	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	5.1	4.0/4.0	FILL	
2				
3	2.5		CL	SANDY CLAY, CL, gray, moist, soft - firm.
4				



1/6/2011

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.

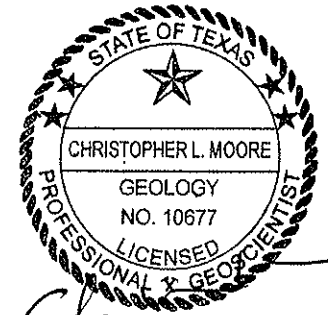


Union Pacific Railroad

# Log of Boring: SB-126

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
	Driller:	Keith Barge	Total Depth (ft):	4
	Driller's License:	4786	Northing:	728480.2176
	Field Supervisor:	Tim Jennings	Easting:	3168202.033
PBW Project No. 1358	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	2.4	4.0/4.0	FILL	
2			CL	SANDY CLAY, CL, gray, moist, soft - firm.
3	2.9			
4				



*CL*  
1/16/2011

## PBW

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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.

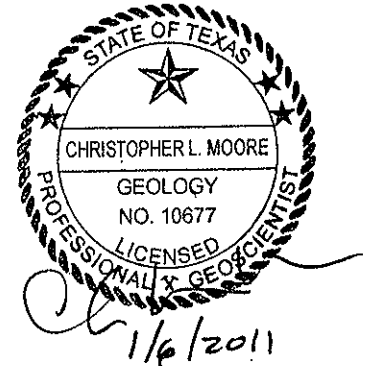


Union Pacific Railroad

# Log of Boring: SB-127

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/28/09	Drilling Method:	Hand Auger
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	--	Total Depth (ft):	4
	Driller's License:	--	Northing:	728080.4626
	Field Supervisor:	Tim Jennings	Easting:	3168215.787
	Sampling Method:	Hand Auger	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	0.6	4.0/4.0	FILL	
2				
3	0.8		CL	SANDY CLAY, CL, gray, moist, soft - firm.
4				



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 Round Rock, TX 78664  
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Notes:  
 Borehole plugged with bentonite chips upon completion.

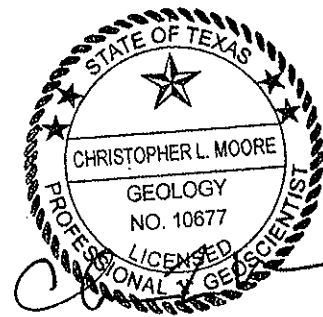


Union Pacific Railroad

# Log of Boring: SB-129

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/28/09	Drilling Method:	Hand Auger
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	4
PBW Project No. 1358	Driller:	--	Total Depth (ft):	4
	Driller's License:	--	Northing:	727544.891
	Field Supervisor:	Tim Jennings	Easting:	3167960.995
	Sampling Method:	Hand Auger	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	1.4		FILL	
2		4.0/4.0		SANDY CLAY, CL, gray, moist, soft - firm.
3	1.4		CL	
4				



1/6/2011

**PBW**  
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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
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Notes:  
 Borehole plugged with bentonite chips upon completion.



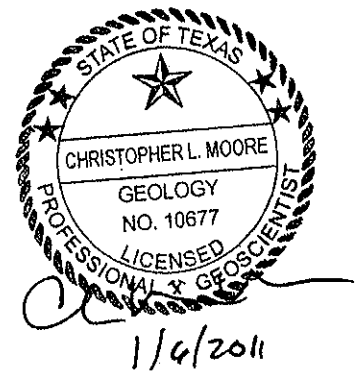


Union Pacific Railroad

# Log of Boring: SB-130

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
	Driller:	Keith Barge	Total Depth (ft):	3
	Driller's License:	4786	Northing:	727145.4023
	Field Supervisor:	Tim Jennings	Easting:	3167981.088
PBW Project No. 1358	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PI/D (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	0.8	3.0/3.0	FILL	FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1				
2	1.3			
3			CL	SANDY CLAY, CL, gray, moist, soft - firm, some gravel.



## PBW

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Notes:  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

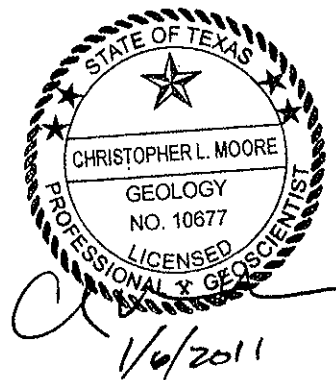
# Log of Boring: SB-131

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	1/27/09	Drilling Method:	Direct Sonic
Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
Driller:	Keith Barge	Total Depth (ft):	3.5
Driller's License:	4786	Northing:	726805.9605
Field Supervisor:	Tim Jennings	Easting:	3167938.124
Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

PBW Project No. 1358

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	0	3.5/3.5	FILL	
2				
3	0		CL	SANDY CLAY, CL, gray, moist, soft - firm, some gravel.



## PBW

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Notes:  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

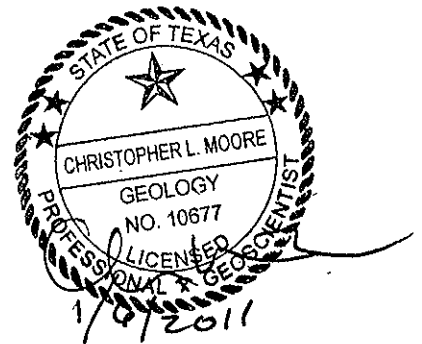
# Log of Boring: SB-132

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	1/27/09	Drilling Method:	Direct Sonic
Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
Driller:	Keith Barge	Total Depth (ft):	3
Driller's License:	4786	Northing:	726792.6815
Field Supervisor:	Tim Jennings	Easting:	3167538.344
Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

PBW Project No. 1358

Depth (ft)	PIID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	0	3.0/3.0	FILL	FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	2.2		CL	SANDY CLAY, CL, gray, moist, soft - firm, some gravel.
2			SP	SAND, SP, brown, moist, soft, fine to medium grained.
3				



## PBW

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Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
Borehole plugged with bentonite chips upon completion.

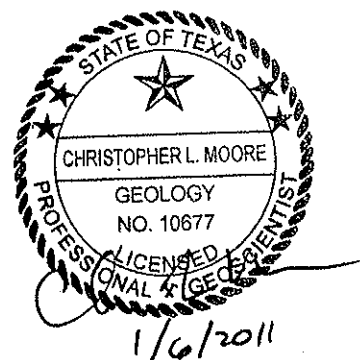


Union Pacific Railroad

# Log of Boring: SB-133

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
PBW Project No. 1358	Driller:	Keith Barge	Total Depth (ft):	2
	Driller's License:	4786	Northing:	726779.4024
	Field Supervisor:	Tim Jennings	Easting:	3167138.565
	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	2.1	2.0/2.0	FILL	
2				



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 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.

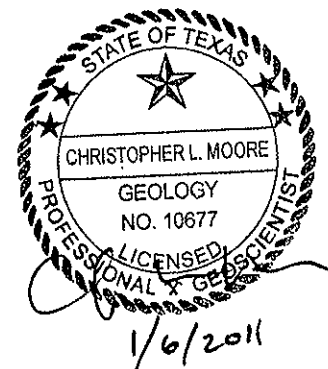


Union Pacific Railroad

# Log of Boring: SB-134

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
	Driller:	Keith Barge	Total Depth (ft):	4.5
	Driller's License:	4786	Northing:	726907.7051
PBW Project No. 1358	Field Supervisor:	Tim Jennings	Easting:	3166869.574
	Sampling Method:	2"x5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	1.9	4.5/4.5	FILL	FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1			CL	SANDY CLAY, CL, gray, moist, soft - firm, some gravel.
2	3.2			
3				SAND, SP, brown, moist, soft, fine to medium grained.
4				



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Notes:  
 Borehole plugged with bentonite chips upon completion.

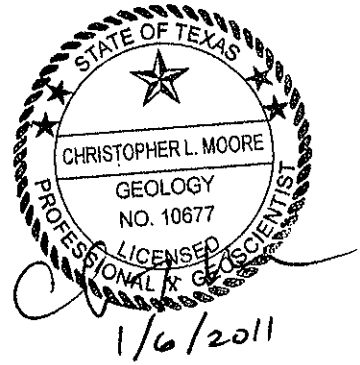


Union Pacific Railroad

# Log of Boring: SB-135

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/28/09	Drilling Method:	Hand Auger
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	--	Total Depth (ft):	3.3
	Driller's License:	--	Northing:	726799.59
	Field Supervisor:	Tim Jennings	Easting:	3166569.23
	Sampling Method:	Hand Auger	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	1.8	3.3/3.3	FILL	FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1			CL	SANDY CLAY, CL., gray, moist, soft - firm, some gravel.
2				
3				



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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.

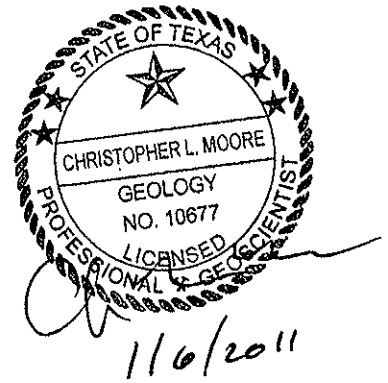


Union Pacific Railroad

# Log of Boring: SB-136

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/28/09	Drilling Method:	Hand Auger
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	3
	Driller:	--	Total Depth (ft):	2.5
	Driller's License:	--	Northing:	726783.22
	Field Supervisor:	Tim Jennings	Easting:	3166169.56
PBW Project No. 1358	Sampling Method:	Hand Auger	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	1	2.5/2.5	FILL	FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1			CL	SANDY CLAY, CL, gray, moist, soft - firm, some gravel.
2				



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 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.

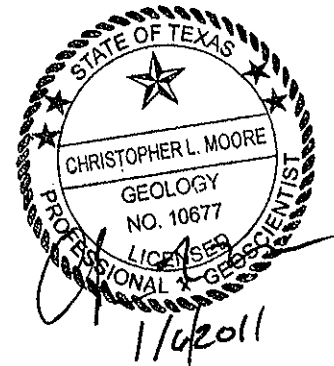


Union Pacific Railroad

# Log of Boring: SB-137

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/28/09	Drilling Method:	Hand Auger
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	3
	Driller:	--	Total Depth (ft):	2
PBW Project No. 1358	Driller's License:	--	Northing:	726766.78
	Field Supervisor:	Tim Jennings	Easting:	3165769.9
	Sampling Method:	Hand Auger	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0			FILL	FILL, gravelly sand, dark brown, moist, fine-coarse gravel.
1	--	2.0/2.0	CL	SANDY CLAY, CL, gray, moist, soft - firm, some gravel.
2				



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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
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Notes:  
 Borehole plugged with bentonite chips upon completion.



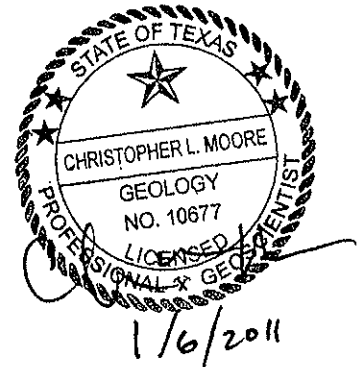


Union Pacific Railroad

# Log of Boring: SB-138

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/24/10	Drilling Method:	Geoprobe
	Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Clay Neal	Total Depth (ft):	20
	Driller's License:	56591	Northing:	728906.98
	Field Supervisor:	Tim Jennings	Easting:	3167790.59
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	0	2.4/4.0	FILL	FILL, sand and gravel.
0	0			SANDY CLAY, CL, brown, moist, firm.
5	0	3.5/4.0		SILTY CLAY, CL, gray, moist, hard, trace calcarous nodules.
	1.6			
10	0	3.3/4.0	CL	SANDY CLAY, CL, mottled gray and orange, moist, soft.
	0			SILTY/SANDY CLAY, gray, moist, soft.
15	0	2.9/4.0		
	0.3			
20	0.6	3.4/4.0	SP	SAND, SP, wet, soft, slight odor.



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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.

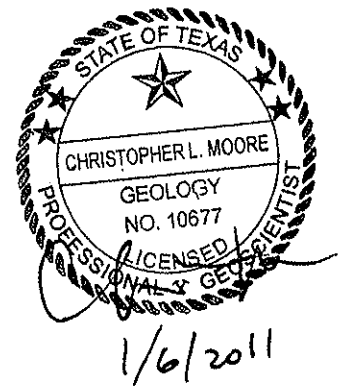


Union Pacific Railroad

# Log of Boring: SB-139

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/24/10	Drilling Method:	Geoprobe
	Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
	Driller:	Clay Neal	Total Depth (ft):	20
	Driller's License:	56591	Northing:	728923.38
PBW Project No. 1358	Field Supervisor:	Tim Jennings	Easting:	3167934.48
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	2.3	2.2/4.0	SM	SILTY SAND, SM, brown, dry, very soft.
0	0		CL	SANDY CLAY, CL, brown, moist, firm.
5	0			
0	3.2/4.0			
10	0			
0	4.0/4.0			
0	3.2/4.0			
15	0	2.0/4.0	SP	SAND, SP, light brown, wet, soft, few iron nodules.
0	0.9			
20	0			



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 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

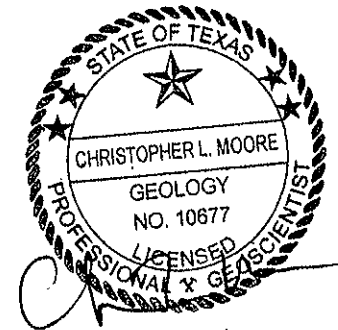
# Log of Boring: SB-140

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	6/23/10	Drilling Method:	Geoprobe
Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
Driller:	Clay Neal	Total Depth (ft):	20
Driller's License:	56591	Northing:	728933.29
Field Supervisor:	Tim Jennings	Easting:	3168026.86
Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	--

PBW Project No. 1358

Depth (ft)	PIID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	0.8	3.0/4.0	FILL	FILL, sand and gravel.
0	0			SANDY CLAY, CL, brown, moist, firm.
5	0	4.0/4.0	CL	SANDY/SILTY CLAY, CL, gray, moist, hard, trace calcaroues nodules.
0	0			SILTY CLAY, CL, mottled gray and orange, moist, hard.
10	0	4.0/4.0	SP	SILTY SAND, SP, light brown, wet, soft.
0	0			SAND, SP, light brown, wet, soft.
15	0	4.0/4.0	SP	SAND, SP, light brown, wet, soft.
0	0			SAND, SP, light brown, wet, soft.
20	0	4.0/4.0	SP	SAND, SP, light brown, wet, soft.



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## PBW

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2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
Borehole plugged with bentonite chips upon completion.

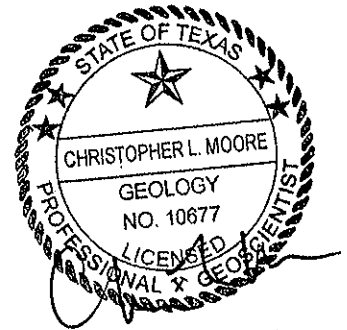


Union Pacific Railroad

# Log of Boring: SB-141

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/23/10	Drilling Method:	Geoprobe
	Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
	Driller:	Clay Neal	Total Depth (ft):	20
	Driller's License:	56591	Northing:	728934.74
	Field Supervisor:	Tim Jennings	Easting:	3168099.78
PBW Project No. 1358	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description	
0	0.6	2.0/4.0	SC	CLAYEY SAND, SC, brown, dry, very soft.	
0	0		CL	SILTY CLAY, CL, light brown, moist, hard, trace calcaroues nodules.	
5	0	3.0/4.0			
0	0				
10	0	4.0/4.0			
0	0				
15	0	4.0/4.0			
0	0				
20	1.9	4.0/4.0		SP	SANDY CLAY, CL, mottled gray and orange, moist, soft. SAND, SP, light brown, wet, soft.



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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

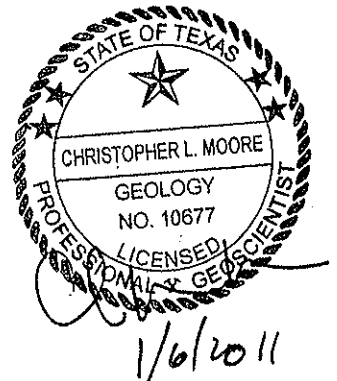
# Log of Boring: SB-142

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	6/22/10	Drilling Method:	Geoprobe
Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
Driller:	Clay Neal	Total Depth (ft):	20
Driller's License:	56591	Northing:	728946.89
Field Supervisor:	Tim Jennings	Easting:	3168183.17
Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	--

PBW Project No. 1358

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	0	2.9/4.0	SC	CLAYEY SAND, SC, brown, dry, very soft.
0	0	4.0/4.0	CL	SANDY CLAY, CL, brown, moist, firm.
5	0	4.0/4.0	CL	CLAY, light gray, moist, firm, with calcareous nodules.
10	0	4.0/4.0	CH	CLAY, CH, mottled gray and orange, moist, soft, trace calcareous nodules.
15	0	3.0/4.0	SM	SILTY SAND, SM, light brown, wet, soft.
0	0	4.0/4.0	SP	SAND, SP, light brown, wet, soft.
20	0			



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 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.

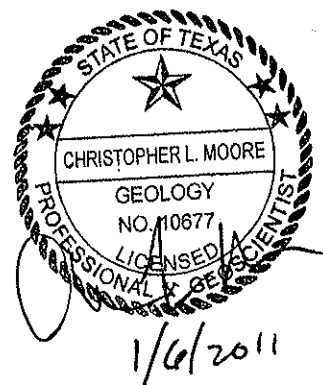


Union Pacific Railroad

# Log of Boring: SB-143

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/22/10	Drilling Method:	Geoprobe
	Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Clay Neal	Total Depth (ft):	20
	Driller's License:	56591	Northing:	728892.91
	Field Supervisor:	Tim Jennings	Easting:	3168184.12
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	0	2.5/4.0	FILL	FILL, sand and gravel.
0.6	0			SANDY CLAY, CL, brown, moist, firm.
5	0	4.0/4.0	CL	SANDY/SILTY CLAY, CL, gray, moist, hard, trace calcaroues nodules.
0	0			
10	0	2.0/4.0	CL	
0	0			
15	0	4.0/4.0	CL	
0	0			
20	0	3.3/4.0	SP	SAND, SP, gray, wet, soft.



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 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.

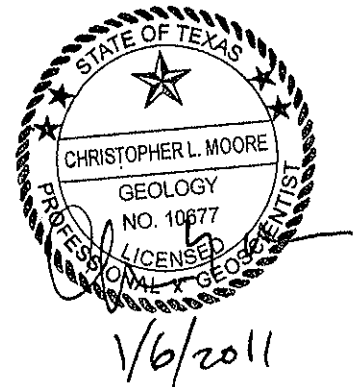


Union Pacific Railroad

# Log of Boring: SB-144

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/22/10	Drilling Method:	Geoprobe
	Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
	Driller:	Clay Neal	Total Depth (ft):	20
	Driller's License:	56591	Northing:	728854
PBW Project No. 1358	Field Supervisor:	Tim Jennings	Easting:	3167787
	Sampling Method:	2'x 5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	0.6	2.9/4.0	FILL	FILL, sand, soft, loose.
	0.6			SILTY CLAY, CL, light brown, moist, hard, below 5.6: strong odor.
5	0.6	3.7/4.0	CL	
	9.6			
10	4.8	4.0/4.0	CL	CLAY, CH, gray, moist, soft to firm, odor.
	1.5			
15	10.2	3.0/4.0	CL	SANDY CLAY, CL, gray, moist, firm.
	5.4			
20	8.9	4.0/4.0	SP	SAND, SP, gray, wet, soft, strong odor and sheen.
	10.3			



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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

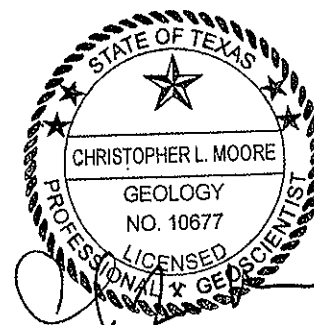
# Log of Boring: SB-145

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	6/22/10	Drilling Method:	Geoprobe
Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
Driller:	Clay Neal	Total Depth (ft):	20
Driller's License:	56591	Northing:	728880.61
Field Supervisor:	Tim Jennings	Easting:	3168080.44
Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	--

PBW Project No. 1358

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	1.8	2.5/4.0	FILL	FILL, gravelly clay, moist, soft.
	8.9			SANDY CLAY, CL, dark brown, moist, firm.
5	1.3	4.0/4.0		SILTY CLAY, CL, dark brown, moist, hard.
	0			
10	0.6	4.0/4.0	CL	CLAY, CL, gray, moist, hard, trace calcaroues nodules.
	0			
	0	4.0/4.0		SANDY CLAY, CL, gray, moist, firm.
15	0.6			
	0	4.0/4.0	SC	CLAYEY SAND, SC, light brown, wet, soft.
20	72.1			SP



1/6/2011

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Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
Borehole plugged with bentonite chips upon completion.



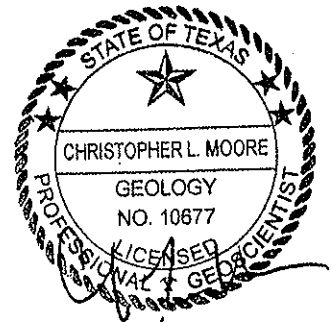


Union Pacific Railroad

# Log of Boring: SB-146

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/22/10	Drilling Method:	Geoprobe
	Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
	Driller:	Clay Neal	Total Depth (ft):	20
	Driller's License:	56591	Northing:	728848.61
PBW Project No. 1358	Field Supervisor:	Tim Jennings	Easting:	3167715.03
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	0	2.8/4.0	FILL	FILL, sand, soft, loose, some metal fragments.
0	0		CL	SILTY CLAY, CL, brown, moist, soft.
5	0	4.0/4.0		SILTY CLAY, CL, gray, moist, hard, trace calcareous nodules.
0	0	4.0/4.0		
10	0	4.0/4.0		SAND, SP, gray, wet, soft.
0	0	4.0/4.0		
15	0.6	SP		
0	0			4.0/4.0
20	0			4.0/4.0



1/4/2011

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Notes:  
 Borehole plugged with bentonite chips upon completion.

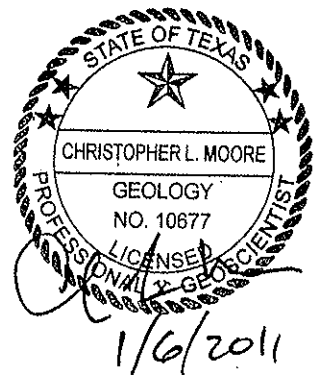


Union Pacific Railroad

# Log of Boring: SB-147

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/22/10	Drilling Method:	Geoprobe
	Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Clay Neal	Total Depth (ft):	20
	Driller's License:	56591	Northing:	727530
	Field Supervisor:	Tim Jennings	Easting:	3165209
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	--

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description	
0	0	2.9/4.0	FILL	FILL, sand, soft, loose, some shell fragments.	
0	0		CL	SANDY CLAY, CL, dark brown, moist, firm, slight odor.	
5	0	SANDY CLAY, CL, mottled gray and orange, moist, firm, slight odor.			
0	0	4.0/4.0		SM	SILTY SAND, SM, light brown, wet, soft.
10	0				
0	0	2.0/4.0			
15	0				
0	0				
20	0				



**PBW**  
**Pastor, Behling & Wheeler, LLC**  
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 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Borehole plugged with bentonite chips upon completion.



LOG OF BORING No.: AOC3-E

SHEET NUMBER 1 OF 1

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: Split Spoon

BORING LOCATION: AOC3 Area of Contaminated Portion of Water Line

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 03/04/97 FINISH DATE: 03/04/97

WATER ELEVATION:

START TIME: 08:39 FINISH TIME: 08:50

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I
SS	0 - 5	---	5.0	1	FILL	
				2	CL	
				3	FILL	
				4	ML	
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

SOIL DESCRIPTION AND DRILLING CONDITIONS

NOTES:

FILL, moist, 10YR5/4, yellowish, brown, ballast  
 CLAY, silty, slightly moist, 10YR4/1, dark gray  
 FILL, moist, 10YR2/1, black, layer of charred material, rocks, brick  
 SILT, very slightly moist 10YR3/2, very dark grayish brown  
 >50% limestone & granite  
 Boring TD @ 5.0'

Sample Composited And Retained For Chemical Analysis  
 PP = 1.5

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: AOC3-W

SHEET NUMBER 1 OF 1

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: Split Spoon

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: AOC3 Area of Contaminated  
Portion of Water Line

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 03/04/97 FINISH DATE: 03/04/97

WATER ELEVATION:

START TIME: 08:18 FINISH TIME: 08:39

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS:	NOTES:
SS	0 - 5	---	5.0	1	FILL	FILL, slightly moist, 10YR3/3, dark brown, ballast	Sample Composited And Retained For Chemical Analysis
					ML	SILT, moist, 10YR8/4, very pale brown	
				2	CL	CLAY, silty, moist, 10YR4/1, dark gray	
				3	FILL	FILL, moist, 10YR2/1, black, slight odor	
				4	CL	CLAY, silty, slightly moist, 10YR3/1, very dark gray	PP = 2.0
				5			
				6		Boring TD @ 5.0'	
				7			
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			
				17			
				18			
				19			
				20			

Geologist: B. Goldsby  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: AOC4-NE

SHEET NUMBER 1 OF 1

CLIENT:	Southern Pacific Lines	DRILLING CONTRACTOR:	Best Drilling Services	Location Diagram
PROJECT NAME:	Houston Wood Preserving Works	DRILLING METHOD:	Hollow Stem Auger	
PROJECT NUMBER:	44102069.07	SAMPLING METHOD:	Split Spoon	
PROJECT LOCATION:	4910 Liberty Road Houston, TX	SURFACE ELEVATION:		
BORING LOCATION:	AOC4 Former Incinerator Area	TOC ELEVATION:		
START DATE:	03/03/97	FINISH DATE:	03/03/97	WATER LEVEL:
START TIME:	11:39	FINISH TIME:	12:00	WATER ELEVATION:
				DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
SS	0 - 5	---	5.0	1	FILL	FILL, moist, 10YR3/6, dark yellowish brown	Sample Composited And Retained For Chemical Analysis
					ML	0.5-0.75' - ASH, burned material, 10YR2/1, black	
				2	SP	0.75-1.00' - SILT, moist, 10YR5/3, brown	
				3		1.00-1.50' - SHELL, moist, crushed up	
				4	CL	1.50-2.00 - SAND, silty, moist, 10YR5/8, yellowish brown	
				5		2.00 - 5.00 - CLAY, silty, 10YR2/2, very dark brown, wood pieces	PP = 2.0
				6		Boring TD @ 5.0'	
				7			
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			
				17			
				18			
				19			
				20			

Geologist:	B. Goldsby	LEGEND:	CI - Completion Interval
Checked By:		SS - Split Spoon	OVM - Organic Vapor Meter
			PP - Pocket Penetrometer
			TOC - Top Of Casing



LOG OF BORING No.: AOC4-NW

SHEET NUMBER 1 OF 1

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: Split Spoon

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: AOC4 Former Incinerator Area

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 03/03/97 FINISH DATE: 03/03/97

WATER ELEVATION:

START TIME: 12:00 FINISH TIME: 12:25

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:
SS	0 - 5	---	5.0	1	FILL	FILL, moist, 10YR3/6, dark yellowish brown	Sample Composited And Retained For Chemical Analysis
				2	SP	SAND, silty, moist, 10YR5/8 yellowish brown, pieces of crushed shell & gravel	
				3	SP	2.00 - 2.25' - SILT, sandy, moist, 10YR3/3 dark brown	
				4	CL	2.25 - 3.00' - SAND, silty, moist 10YR5/8, yellowish brown	
				5		3.00 - 5.00' - CLAY, silty, very slightly moist, 10YR2/2, very dark brown	PP = 2.0
				6		Boring TD @ 5.0'	
				7			
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			
				17			
				18			
				19			
				20			

Geologist: B. Goldsby  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: AOC4-SE

SHEET NUMBER 1 OF 1

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

Location Diagram

BORING LOCATION: AOC4 - Former Incinerator Area  
 START DATE: 03/03/97 FINISH DATE: 03/03/97  
 START TIME: 11:00 FINISH TIME: 11:20

SAMPLING METHOD: Split Spoon  
 SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL:  
 WATER ELEVATION:  
 DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
SS	0 - 5	---	5.0	1	FILL	
				2	SP	
				3	ML SP	
				4	CL	
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

SOIL DESCRIPTION AND DRILLING CONDITIONS

FILL, slightly moist, 10YR3/6, dark yellowish brown, gravel, sand, wood debris

SAND, moist, 10YR6/1, gray, coarse grained with gravel

2.5-2.75' SILT, sandy, moist, 10YR3/3 dark brown

2.75 - 3.00' SAND, very moist, 10YR6/2 light brownish gray, fine grained

3.00 - 5.00' CLAY, slightly silty, very slightly moist, 10YR2/2, very dark brown

Boring TD @ 5.0'

NOTES:

Sample Composited And Retained For Chemical Analysis

PP = 2.0

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: AOC4-SW

SHEET NUMBER 1 OF 1

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: Split Spoon

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

SURFACE ELEVATION:

BORING LOCATION: AOC4 - Former Incinerator Area

TOC ELEVATION:

START DATE: 03/03/97 FINISH DATE: 03/03/97

WATER LEVEL:

START TIME: 11:20 FINISH TIME: 11:39

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OMV (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
SS	0 - 5	---	5.0	1	FILL	
				2	SP	
				3	ML SP	
				4 y	CL	
				5		
				6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

SOIL DESCRIPTION AND DRILLING CONDITIONS

NOTES:

FILL, slightly moist, 10YR3/6, dark yellowish brown, gravel, sand, wood debris

SAND, moist, 10YR6/1, gray, coarse grained with gravel

2.5-2.75' SILT, sandy, moist, 10YR3/3 dark brown

2.75 - 3.00' SAND, very moist, 10YR6/2 light brownish gray, fine grained

3.00 - 5.00' CLAY, slightly silty, very slightly moist, 10YR2/2, very dark brown

Boring TD @ 5.0'

Sample Composited And Retained For Chemical Analysis

Geologist: B. Goldsby  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OMV - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing





LOG OF BORING No.: AOC5-W

SHEET NUMBER 1 OF 1  
Location Diagram

CLIENT: Southern Pacific Lines  
PROJECT NAME: Houston Wood Preserving Works  
PROJECT NUMBER: 44102069.07  
PROJECT LOCATION: 4910 Liberty Road Houston, TX

DRILLING CONTRACTOR: Best Drilling Services  
DRILLING METHOD: Hollow Stem Auger  
SAMPLING METHOD: Split Spoon

BORING LOCATION: AOC5 - Storm Sewer West  
START DATE: 03/04/97 FINISH DATE: 03/04/97  
START TIME: 09:24 FINISH TIME: 06:44

SURFACE ELEVATION:  
TOC ELEVATION:  
WATER LEVEL:  
WATER ELEVATION:  
DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I
SS	0 - 5	---	5.0	1	FILL	
				2	FILL	
				3	ML	
				4	SP MI	
				5	CL	
SS	5 - 7	---	2.0	6		
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

SOIL DESCRIPTION AND DRILLING CONDITIONS:

FILL, very slightly moist, gravel, crushed limestone  
Charred material, moist, 10YR6/1, gray, brick, rock  
SILT, moist, 10YR5/3, brown  
3.00 - 3.25' - SAND, moist, 10YR7/3, very pale brown  
3.25 - 3.50' SILT, sandy, moist  
3.50 - 7.00' - CLAY, silty, slightly moist, 10YR3/2, very dark grayish brown

Boring TD @ 7.0'

NOTES:

Sample Composited And Retained For Chemical Analysis

PP = 2.0

Geologist: B. Goldsby  
Checked By:

LEGEND:  
SS - Split Spoon  
CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: AOC7

SHEET NUMBER 1 OF 1

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX  
 BORING LOCATION: AOC7 Former UST No. 44-023-21 Area  
 START DATE: 03/03/97 FINISH DATE: 03/03/97  
 START TIME: 13:25 FINISH TIME: 14:00

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger  
 SAMPLING METHOD: Split Spoon  
 SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL:  
 WATER ELEVATION:  
 DATE:

Location Diagram

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
SS	0 - 5	—	5.0	1	FILL	
				2	ML	
				3		
				4		
				5		
SS	5 - 10	—	5.0	6	CL	
				7		
				8		
				9		
				10		
				11		
				12		
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

SOIL DESCRIPTION AND DRILLING CONDITIONS

FILL, slightly moist, 10YR3/3, dark brown, gravel and brick pieces

SILT, sandy, moist, 10YR3/3, dark brown

CLAY, silty, very slightly moist, 10YR2/2, very dark brown, 3" layer of treated wood @ 2.5'

No silt, slightly moist, 10YR6/1, gray, mottling with 10YR6/8, brownish yellow, and 10YR3/1, very dark gray

Boring TD @ 10.0'

NOTES:

Sample 0 - 5' And 5 - 10' Composited And Retained For Chemical Analysis

PP = 2.0

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



# ERM Environmental Resources Management

## SSO-A02R DRILLING LOG

Proj. No. 0014419 Boring/Well ID SSO-A02R Date Drilled 8/29/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"

N. Coord. 728714.3' E. Coord. 3166185.68' Surface Elevation 0' FL MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Slickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Bizuayehu Ayele

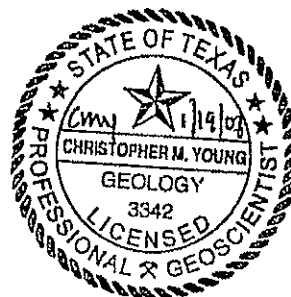
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				1 1.4 1.1 1.1	0-2	0-1 1-1.5 1.5-2	GRAVELLY SAND: light greenish gray (1 Gley 7/1 ) gravelly sand, poorly sorted, angular to subangular, fine to coarse-grained, moist, loose, non-cohesive, abundant shell from 0.8-1, 100% recovery SAND: light gray (1 Gley 7/N), calcareous sand, fine-grained, sorted, rounded, moist, abundant shell and fragments, 100% recovery SANDY CLAY: gray (1 Gley 5/N), sandy clay, moist, slightly plastic, firm, sand grains, very fine-grained, rounded and sorted, 100% recovery collect 0-2' for pcp confirmation analyses T.D. = 2'
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SSO-A04R DRILLING LOG

Proj. No. 0014419 Boring/Well ID SSO-A04R Date Drilled 8/28/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"

N. Coord. 728746.51' E. Coord. 3166617.83' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Bizuayehu Ayele

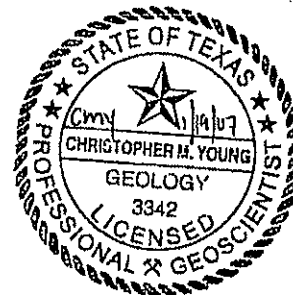
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				1.1 0.7	0-2	0-0.2 0.2-2	GRAVELLY SAND: light gray (2.5 Y 7/2), gravelly sand, fine-grained, sorted, rounded, moist, 100% recovery SANDY CLAY: gray (1 Clay 5/N), sandy clay, moist, slightly plastic, sand grains, very fine-grained, sorted, rounded, cohesive, 100% recovery  T.D. = 2'
-5	5							
-10	10							
-15	15							





SSO-A06R  
DRILLING LOG

Proj. No. 0014419 Boring/Well ID SSO-A06R Date Drilled 8/30/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"

N. Coord. 728778.57' E. Coord. 3167108.39' Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Bizuayehu Ayele

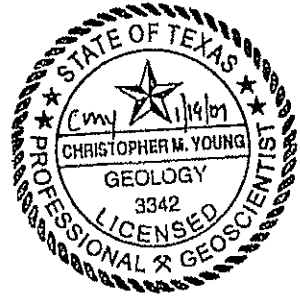
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0 2.2 3.4 0.1	0-2	0-0.5 0.5-1 1-1.7 1.7-2	GRAVELLY CLAY: light reddish gray (2.5 YR 7/1), gravelly, sandy clay, moist, loose, non-plastic, 100% recovery SAND: reddish gray (2.5 YR 5/1), sand, poorly sorted, angular to subangular, fine to medium-grained, moist, non-cohesive, loose, 100% recovery CLAYEY SAND: dark gray (1 Gley 4/N), clayey sand, fine grained, sorted, rounded, moist, slightly cohesive, 100% recovery SANDY CLAY: dark gray (1 Gley 4/N), sandy clay, moist, non-plastic, soft, sand grains are very fine-grained, rounded and sorted, 100% recovery collected 0-2' for PCP confirmation analyses T.D. = 2'
-5	5							
-10	10							
-15	15							





**ERM** Environmental Resources Management

**SSO-B03R  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SSO-B03R Date Drilled 8/30/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"  
 N. Coord. 728504.05' E. Coord. 3166466.31' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

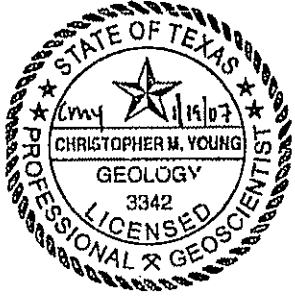
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-2	0-1.8	SAND: reddish brown (2.5 YR 5/4), sand, fine to medium-grained, fairly sorted, subangular to rounded, moist, loose, non-cohesive, 100% recovery
					NM		1.8-2	SANDY CLAY: dark gray (1 Gley 4/N), sandy clay, moist, non-plastic, firm, sand grains are very fine-grained, rounded, sorted, 100% recovery collect 0-2' for PCP confirmation analyses T.D. = 2'
-5	5							
-10	10							
-15	15							





SSO-C01R  
DRILLING LOG

Proj. No. 0014419 Boring/Well ID SSO-C01R Date Drilled 8/29/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"  
 N. Coord. 728233.87' E. Coord. 3166038.23' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

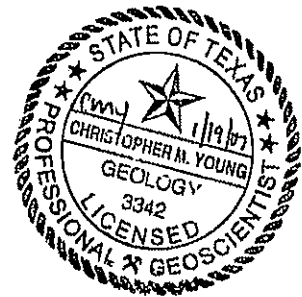
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.6 0.6 5.3 4.5	0-2	0-1 1-1.5 1.5-2	<p>SAND: red (10 R 5/6), sand, medium to coarse-grained, angular, poorly sorted, abundant gravel, moist, slightly cohesive, 100% recovery</p> <p>CLAYEY SAND: black ( 1 for Gley 2.5/N), clayey sand, fine to medium-grained, fairly sorted, subangular to rounded, moist, cohesive, 100% recovery</p> <p>SAND: dark gray (1 for Gley 4/N), sand, fine-grained, sorted, subangular to rounded, moist, slightly cohesive, 100% recovery NOTE 0-2' collect for pcp confirmation analyses T.D. = 2'</p>
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SSO-C03R DRILLING LOG

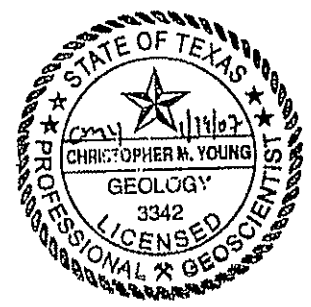
Proj. No. 0014419 Boring/Well ID SSO-C03R Date Drilled 8/29/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"  
 N. Coord. 728293.63' E. Coord. 3166468.91' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-2	0-2	SAND: gray ( 1 Gley 6/1) from 0 to 1.5', light greenish gray (1 Gley 8/1 10Y) from 1.5' to 2', sand, fine to medium-grained, rounded to subangular, very fine-grained, sorted, rounded, abundant clay lenses which are very dark gray (1 Gley 3/N) from 1.5' to 2', hard, compacted, mixed with concrete, gravel, moist, 100% recovery T.D. = 2'
-5	5							
-10	10							
-15	15							









AOC-4SER DRILLING LOG

Proj. No. 0014419 Boring/Well ID AOC-4SER Date Drilled 8/28/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"  
 N. Coord. 728190.29' E. Coord. 3166677.18' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuyehu Ayele

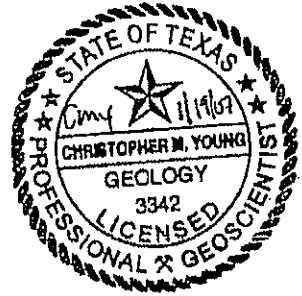
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0 0.6 0.6 1.1	0-2	0-1.5  1.5-2	<p>SAND: reddish yellow (7.5 YR 7/6) from 0 to 0.5', greenish gray (1 Gley 5/1 10Y) from 0.5' to 1.5', sand, fine-grained, fairly sorted, subangular to rounded, slightly cohesive, loose, dark gray (1 Gley 4/N) clayey sand lenses from 1' to 1.5', moist, 100% recovery</p> <p>SANDY CLAY: gray (1 Gley 5/N), sandy clay, moist, slightly plastic, sand grains very fine-grained, sorted and rounded, cohesive, 100% recovery T.D. = 2'</p>
-5	5							
-10	10							
-15	15							





**ERM Environmental Resources Management**

**SB-70  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-70 Date Drilled 8/17/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 45' Boring Diam. 2"  
 N. Coord. 729213.77' E. Coord. 3168334' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Jessica Rose

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-45	0-1	NO RECOVERY
					0		1-2	SANDY CLAY: very dark gray (7.5 YR 3/1) sandy clay, moist, very fine-grained sand, loose, rootlets, grass, trace carbonate nodule
							2-5	NO RECOVERY
-5	5				NM		5-5.9	DEPRECATED: SANDY SILTY CLAY: grayish brown (10YR 5/2) sandy silty clay, moist, very fine-grained sand, plastic pp=1.25tsf at 5', sand lense from 5.7-5.9', mottling
							5.9-7.6	DEPRECATED: SANDY SILTY CLAY: light yellowish brown (2.5 Y 6/3) sandy silty clay, moist, very fine-grained sand, plastic pp=2.0 tsf at 6.4', pp=0.5 tsf between 6.7-6.85', pp=2.5 tsf at 7'
					0		7.6-9.8	DEPRECATED: SANDY SILTY CLAY: light yellowish brown (2.5 Y 6/3) sandy silty clay, moist, very fine-grained sand, sand content decreasing, trace mottling, pp=2.5 tsf at 8.4', pp=2.5 tsf at 8.7', pp=<0.25 tsf at 8.8'-9.3', pp=0.5 tsf at 9.5', pp=0.75 tsf at 9.8', black and brown nodules
-10	10				NM		9.8-10	NO RECOVERY
							10-15	DEPRECATED: SANDY SILTY CLAY: light brownish gray (2.5 Y 6/2) sandy silty clay, moist, trace sand, very fine-grained sand, plastic, mottling, pp=0.75 tsf at 10', pp=0.5 tsf at 10.3 to 10.8, pp=1.75 tsf at 11.3', pp=1.75 tsf at 12.3', pp=3.5 tsf at 13.3', pp=1.75 tsf at 14', pp=0.5 tsf at 14.5', pp=2.5 tsf at 15', mottling, brown nodules
-15	15							



SB-70  
DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-70 Date Drilled 8/17/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. .45' Boring Diam. 2"  
 N. Coord. 729213.77' E. Coord. 3168334' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Jessica Rose

SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15					15-17	15-17	DEPRECATED: SANDY SILTY CLAY: light brownish gray (2.5 Y 6/2) sandy silty clay, moist, minimal sand, very fine-grained sand, carbonate nodule at 15.8'-16.6', pp=1.0 tsf at 16', pp=1.5 tsf at 16.9'
						17-18.3	17-18.3	SILTY SAND: olive yellow (2.5 Y 6/6) silty sand, saturated, well sorted, fine-grained
						18.3-20	18.3-20	NO RECOVERY
-20	20					20-25	20-25	SILTY SAND: olive yellow (2.5 Y 6/6) silty sand, saturated, well sorted, fine-grained
						25-25.7	25-25.7	SILTY SAND: olive yellow (2.5 Y 6/6) silty sand, saturated, well sorted, fine-grained
					0	25.7-29	25.7-29	CLAY: strong brown (7.5 YR 4/6) clay with traces of sand lenses, saturated, plastic, pp=3.5 tsf at 26', pp=3.5 tsf at 27', pp=3.75 tsf at 28', pp=4.25 tsf at 29', 0.5cm carbonate nodule at ~29', mottling
					NM	29-30	29-30	NO RECOVERY
-30	30							



SB-70  
DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-70 Date Drilled 8/17/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 45' Boring Diam. 2"  
 N. Coord. 729213.77' E. Coord. 3168334' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Slickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe Log By Jessica Rose

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30				0	30-30.4 30.4-35	30-30.4 30.4-35	CLAY: strong brown (7.5 YR 4/6) clay with traces of sand lenses, moist SILTY SANDY CLAY: yellowish brown (10 YR 5/6) silty sandy clay, moist, very fine-grained sand, plastic, pp=3.25 tsf at 31', pp=4.5 tsf at 32', pp=3.5 at 33', pp=4.5 tsf at 34', pp=4.5 tsf at 35', mottled, black nodules, carbonate nodules <1mm, <3mm, and 10mm
-35	35				0.7	35-35.3 35.3-38.2	35-35.3 35.3-38.2	SILTY SAND: brownish yellow (10 YR 6/4) silty sand with clay traces, moist, well sorted, fine-grained CLAY: dark yellowish brown (10 YR 4/6) clay, moist, plastic, pp=3.5 tsf at 36', pp=4.5 tsf at 37', pp=4.5 tsf at 38', carbonate nodules <1mm
-40	40					38.2-40	38.2-40	NO RECOVERY
-45	45				0	40-45	40-45	CLAY: strong brown (7.5 Y 4/6) clay, moist, mottled, plastic, pp=4.5 tsf at 45', pp=3.0 tsf at 44', pp=4.0 tsf at 43', pp=4.5 tsf at 42', pp=1.75 tsf at 40.5', cleavage surfaces
								T.D. = 45'



**ERM Environmental Resources Management**

**SB-63  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID SB-63 Date Drilled 8/17/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 729088.3338' E. Coord. 3167413.2507' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. FL 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Jessica Rose

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-35	0-1	SANDY CLAY: dark grayish brown (10 YR 4/2) sandy clay, moist, poorly sorted, small rounded to subangular gravel, loose at 1.4-1.6 and 1.8-2.0', iron or brown nodules
					0		1-2	SANDY CLAY: light olive brown (2.5 Y 5/2) sandy clay, moist, fine-grained sand, plastic pp=2.25tsf at 1.2', mottled
					0.7		2-3.6	SANDY CLAY: light olive brown (2.5 Y 5/2) sandy clay, moist, fine-grained sand, mottled, sand content decreasing, carbonate lense from 2.8-3.6, iron staining
							3.6-5	NO RECOVERY
-5	5				NM		5-7.4	SILTY CLAY: grayish brown (10 YR 5/2) iron nodules, silty clay with sand, moist, plastic, pp=0.75 at 5', pp=0.75 at 1.6', mottled, iron staining, carbonate lenses at 5.6-5.7" and 6.6-7
							7.4-10	SILTY SANDY CLAY: greenish gray (Gley 1 6/1 10GY) silty sandy clay, moist, plastic pp=1.75' at 7.7', pp=1.55 at 8.7', pp=0.75 at 9.7', mottled, iron nodules, traces of carbonate nodules
-10	10				2.1		10-12	NO RECOVERY
					NM		12-13	SILTY SANDY CLAY: greenish gray (Gley 1 6/1 10GY) silty sandy clay, moist, plastic, carbonate lense from 12.3-12.6, sand content increasing, pp=0.7
					2.8		13-15	CLAYEY SAND: greenish gray (Gley 1 6/1 5GY) clayey sand, moist, well sorted, fine-grained sand, increasing sand content, WET from 14-15, pp=0.25tsf
-15	15							



# ERM Environmental Resources Management

## SB-63 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-63 Date Drilled 8/17/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 729088.3338' E. Coord. 3167413.2507' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Jessica Rose

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15						15-17.2	CLAYEY SAND: greenish gray (Gley 1 6/1 10Y) sand with some clay, saturated, well sorted, fine-grained
					3.5	17.2-18	17.2-18	SILTY CLAY: light greenish gray (Gley 1 7/1 10GY) silty clay, moist, plastic pp=3.5 at 17.6'
						18-19	18-19	SILTY SAND: yellowish brown (10 YR 5/4) silty sand, wet, well sorted, fine-grained sand
						19-21.5	19-21.5	NO RECOVERY
-20	20				NM	21.5-23	21.5-23	SILTY SAND: brown (10 YR 5/3) silty sand, moist, well sorted, fine-grained
					4.9	23-25	23-25	SILTY CLAY: greenish gray (Gley 1 6/1 10Y) silty clay with sand, moist, plastic, pp=2.0tsf at 23', pp=4.5 at 24', pp=4.5 at 25', mottled
-25	25				2.1	25-27.7	25-27.7	SILTY CLAY: greenish gray (Gley 1 6/1 10Y) silty clay with sand, moist
					9.9	27.7-29	27.7-29	SILTY SANDY CLAY: strong brown (7.5 YR 4/6), carbonate lense from 27.7' to 27.9', silty sandy clay, moist, plastic pp=4.5 at 28', carbonate lense from 28.6' to 29.0', mottled
						29-33	29-33	NO RECOVERY
-30	30							



# ERM Environmental Resources Management

## SB-63 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-63 Date Drilled 8/17/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 35' Boring Diam. 2"  
 N. Coord. 729088.3338' E. Coord. 3167413.2507' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe Log By Jessica Rose

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30				26.4			
-35	35					33-35		SILTY SANDY CLAY: strong brown (7.5 YR 4/6), silty sandy clay, moist, pp=2.5tsf at 33', pp=3.6tsf at 35'
								T.D. = 35'
-40	40							
-45	45							





SB-91C  
DRILLING LOG

oj. No. 0014419 Boring/Well ID SB-91C Date Drilled 8/7/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 4' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Marcel St. Marie

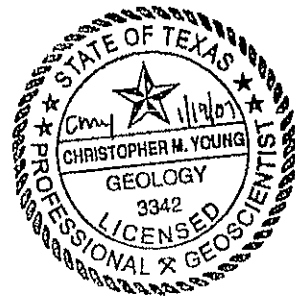
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 12' North of SB-91  
 perpendicular to tracks.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				18.4 30 0.0 76.0	0-4	0-1.8	FILL: very dark gray (7.5 YR 3/1), fill material clayey sand, some gravel, very fine-grained, well sorted, subangular, moist, trace rootlets; brown (7.5 YR 5/4) from 0.5 to 1; some cobbles, clay content increasing from 1.5' to 1.8', 100% recovery
							1.8-3.3	SAND: sand, very dark grayish brown (2.0 YR 3.2), fine, well sorted, subrounded, moist, odor, 100% recovery
					NM		3.3-4	CLAY: clay, very dark gray (2.5 Y 3/1), wet, plastic, soft, odor, 100% recovery T.D. = 4'
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-90D DRILLING LOG

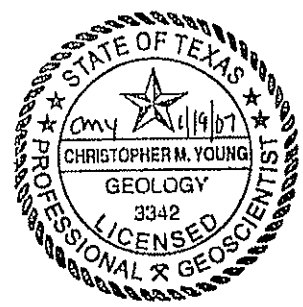
Proj. No. 0014419 Boring/Well ID SB-90D Date Drilled 8/16/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 4' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 20' North of  
 SB-90B.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-4	0-0.5 0.5-1 1-1.5 1.5-2 2-3 3-3.5 3.5-4	<p>GRAVELLY CLAY: gray (5 YR 6/1), gravely sandy clay, moist, loose, non-plastic, much gravel, 100% recovery</p> <p>GRAVELLY SAND: dark gray (1 Gley 4/N), gravely sand, moist, loose, non-cohesive, medium to coarse-grained, sand stained black, shiny, tar-like material, 100% recovery</p> <p>CLAYEY SAND: very dark gray (1 Gley 3/N), clayey sand, fine to medium-grained, moist, slightly cohesive, odor, some gravel, soil stained dark gray, occasional piece of wood, 100% recovery</p> <p>CLAYEY SAND: very dark gray (1 Gley 3/N), clayey sand, fine to medium-grained, moist, slightly cohesive, odor, some gravel, soil stained dark gray, occasional piece of wood, 100% recovery</p> <p>CLAYEY SAND: very dark gray (1 Gley 3/N), clayey sand, fine to medium-grained, moist, slightly cohesive, odor, some gravel, soil stained dark gray, relatively abundant piece of wood, 100% recovery</p> <p>CLAYEY SAND: very dark gray (1 Gley 3/N), clayey sand, fine to medium-grained, moist, slightly cohesive, odor, some gravel, soil stained dark gray, relatively abundant piece of wood, the sand becoming shiny and having strong odor, 100% recovery</p> <p>SAND: grayish brown (2.5 Y 5/2), sand, fine-grained, sorted, rounded to subangular, moist, slightly cohesive, sand is shiny, spot of product observed when water poured on sample, 100% recovery</p> <p>T.D. = 4'</p>





**ERM** Environmental Resources Management

**SB-90C  
DRILLING LOG**

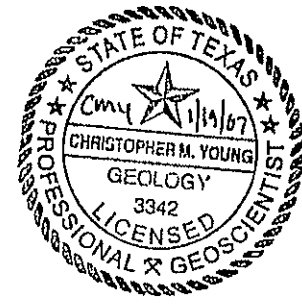
Proj. No. 0014419 Boring/Well ID SB-90C Date Drilled 8/16/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3.5' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Blizyehu Ayele

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 10' North of SB-90B.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-3.5	0-0.5 0.5-1.75 1.75-3 3-3.5	GRAVELLY CLAY: gray (5 YR 6/1), gravely sandy clay, loose, moist, non-plastic, 100% recovery GRAVELLY SAND: dark gray (1 Gley 4/N), gravely sand, moist, non-cohesive, medium to coarse-grained, gravel grains stained black, 100% recovery CLAYEY SAND: very dark gray (1 Gley 3/N), clayey sand, some gravel, fine to medium-grained, moist, slightly cohesive, odor, some gravel, rare piece of wood, soil stained dark gray, strong odor and product from 3' to 3.5', 100% recovery GRAVELLY SAND: very dark gray (1 Gley 3/N) gravely sand, medium to coarse-grained, poorly sorted, rounded to subangular, wet, slightly cohesive, sand stained to be shiny, dark gray, strong odor, product, 100% recovery T.D. = 3.5'
-5	5							
-10	10							
-15	15							





SB-90C  
DRILLING LOG

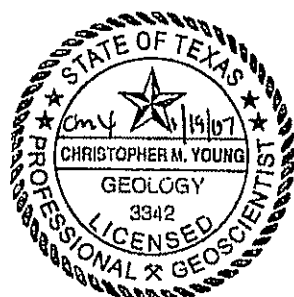
Proj. No. 0014419 Boring/Well ID SB-90C Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 2' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum \_\_\_\_\_  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

SKETCH MAP

NOTES

pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 10' North of  
 SB-90B.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-2	0-1 1-2	GRAVELLY CLAY: Dark gray (1 gley 4/N) gravelly sandy and clay, sand grains coarse-grained, rounded to angular, poorly sorted, moist, dark discoloration, slightly cohesive, some plant roots GRAVELLY SAND: Gray (1 gley 5/N) gravelly sand, medium to coarse-grained, poorly sorted, rounded to angular, moist to wet, slightly cohesive T.D. = 2'
-5	5				NM			
-10	10							
-15	15							





Proj. No. 0014419 Boring/Well ID SB-85D Date Drilled 8/8/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 1.5' Boring Diam. 2.5"

N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum

Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"

Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'

Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)

Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_

Drilling Method Hand Auger Log By Marcel St. Marie and Jessica Rose

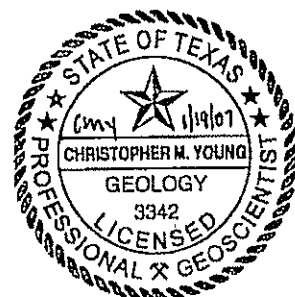
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.  
Located 18' North of SB-85B  
perpendicular to tracks.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				21.1 24.3 56.1	0-1.5	0-0.5 0.5-1.5	GRAVELLY SAND: dark brown (10 YR 3/6) sand with some gravel, moist, small amount of trace rootlets, sand is well sorted, little to no clay material SANDY CLAY: dark brown (10 YR 3/2) from 0.5' to 1.5', sandy clay, well sorted sand with clay, moist, non plastic (pp=1.5tsf), gravel - mixture of rounded and subangular T.D. = 1.5'
-5	5							
-10	10							
-15	15							





# ERM Environmental Resources Management

## SB-85C DRILLING LOG

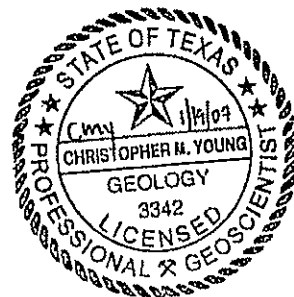
Proj. No. 0014419 Boring/Well ID SB-85C Date Drilled 8/7/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3.3' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Marcel St. Marie

SKETCH MAP

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NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 5' North of SB-85B  
 perpendicular to tracks.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-3.3	0-1	FILL: fill, gravel, angular, up to 1" diameter, some sand, fine, well sorted, subangular, dark brown (10 YR 3/3), moist, 100% recovery
					188		1-2.8	SILTY SAND: dark gray (2.5 Y 4/1) from 1' to 2', black (10 YR 2/1) from 2' to 2.8', silty sand, very fine, well sorted, subrounded, moist from 1' to 1.5', wet from 1.5' to 2.8', red paint at 2.0, strong odor from 2' to 2.8', 100% recovery
					189			
					175			
					213		2.8-3.3	SILTY CLAY: silty clay, very dark gray (7.5 YR 3/1), wet, plastic, firm, odor, 100% recovery T.D. = 3.3'
-5	5							
-10	10							
-15	15							

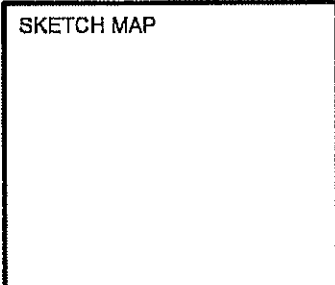




# ERM Environmental Resources Management

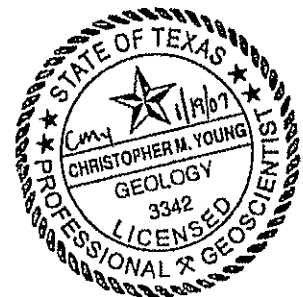
## SB-95B8 DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-95B8 Date Drilled 8/23/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 1.5' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 (\_\_\_\_\_) 2. Ft. 0 (\_\_\_\_\_)  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele



NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Located 80' Northeast of  
 SB-95B parallel to tracks.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				0.0 0.0 10.9	0-1.5	0-0.8 0.8-1.5	<p>SANDY CLAY: greenish gray (2 Gley 5 10G), sandy clay, sand grains are very fine-grained, sorted and rounded, moist, clay plastic, some gravel, reddish yellow (7.5 YR 6/8) and dark gray (1 Gley 4/N) mottles, some plant rootlets</p> <p>CLAYEY SAND: very dark gray (1 Gley 3/N), clayey sand, medium to coarse-grained, poorly sorted, angular to rounded, moist from 0.8' to 1', wet from 1' to 1.5', stained, REFUSAL AT ~1.5'            T.D. = 1.5'</p>
-5	5							
-10	10							
-15	15							





SB-91D  
DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-91D Date Drilled 8/7/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 4' Boring Diam. 2.5"  
 N. Coord. \_\_\_\_\_ E. Coord. \_\_\_\_\_ Surface Elevation 0' Ft. MSL Datum \_\_\_\_\_  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Marcel St. Marie

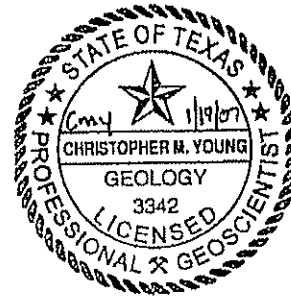
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.  
Located 17' North of SB-91  
perpendicular to tracks.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-4	0-1.5	FILL: brown (7.5 R 4/4), fill, sand, trace clay, some gravel, some cobble, very fine-grained, well sorted, subangular, moist, trace rootlets, clay content increasing from 0.5' to 1.5', 100% recovery
					60.8		1.5-2	GRAVELLY CLAY: light greenish gray (1 GLEY 7/1), gravelly sandy clay, some cobble, fine, poorly sorted, subangular, moist, trace wood pieces, moist, 100% recovery, 100% recovery
					97.2		2-3.3	SANDY CLAY: dark gray (2.5 Y 4/1), gravelly sandy clay, some cobble, fine, poorly sorted, subangular, saturated from 2' to 2.8', wet from 3' to 3.3', trace wood pieces, reduced gravel and much clay, plastic, has odor and fine sand from 2.8' to 3.3', 100% recovery
					NM		3.3-4	CLAY: dark gray (2.5 Y 4/1), clay, moist, plastic, dark discoloration, has odor T.D. = 4'
-5	5							
-10	10							
-15	15							







# ERM Environmental Resources Management

## SB-93B(F) DRILLING LOG

Proj. No. 0014419 Boring/Well ID SB-93B(F) Date Drilled 8/25/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 3.25' Boring Diam. 2.5"  
 N. Coord. 728419.7' E. Coord. 3167477.29' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type \_\_\_\_\_ Diam. 0" Length 0' Slot Size 0"  
 Casing: Type \_\_\_\_\_ Diam. 0" Length 0' Sump Length 0'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( \_\_\_\_\_ ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company \_\_\_\_\_ Driller \_\_\_\_\_  
 Drilling Method Hand Auger Log By Bizuayehu Ayele

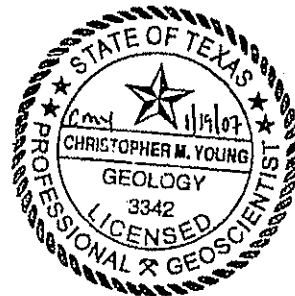
SKETCH MAP

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NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-3.25	0-1	GRAVELLY CLAY: brownish yellow (10 YR 6/8), gravelly sandy clay, moist, slightly plastic, 100% recovery
					2.4		1-1.5	CLAYEY SAND: dark gray (1 for Gley 4/N), clayey sand, medium to coarse-grained, poorly sorted, angular to subrounded, moist, stained, 100% recovery
					22.4		1.5-2	CLAYEY SAND: dark gray (1 for Gley 4/N), clayey sand, fine to medium-grained, fairly sorted, rounded, moist, stained, 100% recovery
					113		2-2.5	CLAYEY SAND: dark gray (1 for Gley 4/N), clayey sand, fine to medium-grained, fairly sorted, rounded, moist, stained, 100% recovery
					248.8		2.5-3	SAND: grayish brown (2.5 Y 5/2) with dark gray (1 for Gley 4/N) mottles, sand, fine, rounded, sorted, moist, slightly cohesive, occasional spots of product, odor, 100% recovery
					191.9		3-3.25	SAND: grayish brown (2.5 Y 5/2), sand, fine, rounded, sorted, moist, slightly cohesive, occasional spots of product, odor, 100% recovery SAND: grayish brown (2.5 Y 5/2), sand, fine, rounded, sorted, moist, slightly cohesive, occasional spots of product, odor, 100% recovery SAND: grayish brown (2.5 Y 5/2), sand, fine, rounded, sorted, wet, slightly cohesive, product, odor, 100% recovery T.D. = 3.25'



**TABLE 1**  
**SUMMARY OF GROUNDWATER MONITORING WELLS**  
**UPRR HOUSTON WOOD PRESERVING WORKS, HOUSTON, TX**

WELL NO.	DATE INSTALLED	NORTHING	EASTING	TOP OF CASING ELEVATION (FT HVD)	TOTAL DEPTH (FT BGS)	Top Screen Interval (FT BGS)	Bottom Screen Interval (FT BGS)	Zone
<b>SWMU No. 1 Monitoring Wells</b>								
MW-01A <sup>1</sup>	1/0/1900	728,006	3,165,936	47.92	19	8.5	18.5	A-TZ
MW-02 <sup>1</sup>	4/17/1984	728,007	3,165,857	47.97	18.5	8.5	18.5	A-TZ
MW-07 <sup>1</sup>	3/27/1991	727,779	3,165,867	48.86	23	14.1	19.1	A-TZ
MW-08 <sup>1</sup>	3/27/1991	727,903	3,165,972	49.33	24	14.2	19.2	A-TZ
MW-10A <sup>1</sup>	9/13/1994	727,921	3,165,866	49.86	23	11	20.5	A-TZ
MW-10B <sup>1</sup>	9/14/1994	727,916	3,165,866	49.94	46	27.1	41.6	B-TZ
MW-11A <sup>1</sup>	9/15/1994	727,849	3,165,869	50.05	22	10	19.3	A-TZ
MW-11B <sup>1</sup>	9/19/1994	727,845	3,165,869	50.18	44	27.5	41.2	B-TZ
P-10 <sup>1</sup>	3/26/1991	727,786	3,165,866	47.69	50	36.2	38.2	B-TZ
P-12 <sup>1</sup>	3/27/1991	727,912	3,166,127	48.78	50	36.3	38.3	B-TZ
<b>Site-Wide Monitoring Wells</b>								
MW-03	4/17/1984	727,985	3,165,857	48.34	18.5	8.5	18.5	A-TZ
MW-04	4/18/1984	727,813	3,165,938	49.85	21	11	21	A-TZ
MW-05	1/0/1900	727,715	3,166,026	49.24	26	10	25	A-TZ
MW-09	3/26/1991	727,908	3,166,130	49.26	24	14.8	19.8	A-TZ
MW-12A	2/27/1997	728,333	3,166,004	49.96	30	17.5	27.5	A-TZ
MW-12B	2/27/1997	728,328	3,166,004	50.02	45	32.5	42.5	B-TZ
MW-12C	4/21/1997	728,345	3,166,005	50.14	75.3	69	73.5	C-TZ
MW-13	2/25/1997	728,777	3,165,977	50.65	25	9	22.5	A-TZ
MW-14	2/27/1997	728,718	3,166,550	50.66	45	28	42.5	B-TZ
MW-15A	2/25/1997	728,755	3,166,931	50.41	30	12	26.1	A-TZ
MW-15C	4/25/1997	728,761	3,166,947	50.01	75	64	73.5	C-TZ
MW-16	2/26/1997	728,305	3,167,235	51.51	30	12.5	27	A-TZ
MW-17	3/25/1997	728,787	3,167,447	50.92	35	18	32.5	A-TZ
MW-17C	12/10/2003	728,779	3,167,446	50.17	70	59.5	69.5	C-TZ
MW-18A	2/26/1997	728,839	3,168,227	51.57	35	18	32.5	A-TZ
MW-18C	4/25/1997	728,849	3,168,219	51.47	80.2	62	76.5	C-TZ
MW-19C	10/15/1998	728,620	3,167,727	53.05	73	63	73	C-TZ
MW-20A	9/28/1998	728,600	3,167,091	50.43	30	15	25	A-TZ
MW-21C	10/26/1998	727,730	3,165,884	49.05	72.5	62.5	72.5	C-TZ
MW-22A	10/1/1998	727,876	3,165,677	46.07	25	10	20	A-TZ
MW-22B	10/27/1998	727,871	3,165,678	45.86	38	27.5	37.5	B-TZ
MW-23C	10/14/1998	728,759	3,167,721	51.91	72.5	62.5	72.5	C-TZ
MW-24AR	1/27/2009	727,531	3,165,207	45.65	21	11	21	A-TZ
MW-24B	3/7/2000	727,534	3,165,208	46.06	50	38.5	48.5	B-TZ
MW-24C	3/8/2000	727,542	3,165,206	46.05	74	63	73	C-TZ
MW-25A	3/7/2000	729,089	3,168,524	44.65	29	18.5	28.5	A-TZ
MW-25C	3/7/2000	729,089	3,168,518	44.49	74	58	68	C-TZ
MW-26A	3/7/2000	729,159	3,167,519	44.62	26	14.5	24.5	A-TZ
MW-27A	3/26/2001	730,002	3,169,610	44.90	30	17	27	A-TZ
MW-27C	4/16/2001	730,009	3,169,610	45.04	73.5	60.5	70.5	C-TZ
MW-28A	3/26/2001	729,462	3,167,926	43.86	28	16	26	A-TZ
MW-28C	4/12/2001	729,461	3,167,920	43.96	88	75	85	C-TZ
MW-29A	4/19/2001	727,310	3,164,239	46.59	23	9	19	A-TZ
MW-29B	4/12/2001	727,303	3,164,239	46.26	57	44	54	B-TZ
MW-29C	4/27/2001	727,293	3,164,240	46.46	75	62.5	72.5	C-TZ
MW-30A	12/8/2003	728,759	3,167,517	50.45	31	19.5	29.5	A-TZ
MW-31A	12/8/2003	728,648	3,167,477	52.08	33	21.5	31.5	A-TZ
MW-32A	12/29/2003	728,914	3,167,401	43.77	32	20.5	30.5	A-TZ
MW-33A	12/30/2003	728,989	3,167,668	44.25	25	13	23	A-TZ
MW-33B	2/23/2007	729,150	3,167,661	44.35	42	32	42	B-CZ
MW-34C	1/13/2004	728,934	3,168,160	45.31	72	60	70	C-TZ
MW-35A	2/21/2007	728,985	3,167,045	44.75	28	13	28	A-TZ
MW-35B	2/26/2007	728,988	3,167,045	44.83	42	32	42	B-CZ
MW-36A	2/22/2007	729,148	3,168,167	44.53	28	18	28	A-TZ
MW-36B	6/24/2010	729,161	3,168,172	44.07	43	38	43	B-CZ
MW-36D	6/23/2010	729,162	3,168,180	44.33	110	100	110	D-TZ
MW-38A	2/21/2007	728,402	3,165,934	46.39	22	12	22	A-TZ
MW-38B	12/31/2003	728,319	3,165,945	45.51	37	25.5	35.5	B-TZ
MW-39B	12/16/2003	728,424	3,166,019	49.58	40	29.5	39.5	B-TZ
MW-40B	12/15/2004	728,341	3,166,122	49.59	40	29.5	39.5	B-TZ
MW-41B	1/7/2003	728,176	3,166,003	49.37	40	29.5	39.5	B-TZ
MW-42B	8/24/2006	728,257	3,166,324	50.52	42	30	40	B-TZ
MW-44A	2/22/2007	729,021	3,168,349	45.11	28	18	28	A-TZ
MW-44C	1/16/2004	729,021	3,168,349	45.03	70	57.5	67.5	C-TZ
MW-45C	1/20/2004	729,155	3,168,512	44.73	70	58	68	C-TZ
MW-46C	1/9/2004	729,121	3,168,576	44.94	72	60	70	C-TZ
MW-47C	3/16/2007	728,725	3,168,535	45.61	71	61	71	C-TZ
MW-48C	2/2/2004	728,417	3,168,241	44.68	72	60	70	C-TZ
MW-49A	2/28/2007	728,345	3,168,191	46.18	30	20	30	A-TZ
MW-49B	1/24/2009	728,375	3,168,184	46.43	35	30	35	B-CZ
MW-50A	3/1/2007	727,501	3,167,958	46.96	25	15	25	A-TZ
MW-51A	2/28/2007	726,925	3,166,885	47.80	25	15	25	A-TZ
MW-52A	2/27/2007	728,699	3,167,814	51.91	30	20	30	A-TZ

**TABLE 1**  
**SUMMARY OF GROUNDWATER MONITORING WELLS**  
**UPRR HOUSTON WOOD PRESERVING WORKS, HOUSTON, TX**

WELL NO.	DATE INSTALLED	NORTHING	EASTING	TOP OF CASING ELEVATION (FT HVD)	TOTAL DEPTH (FT BGS)	Top Screen Interval (FT BGS)	Bottom Screen Interval (FT BGS)	Zone
MW-53C	8/15/2006	729,813	3,168,481	45.49	72	60	70	C-TZ
MW-54C	8/15/2006	729,218	3,168,766	44.99	72	60	70	C-TZ
MW-55A	1/12/2009	728,540	3,167,482	52.01	25	10	25	A-TZ
MW-57A	1/22/2009	728,858	3,167,974	47.72	27	12	27	A-TZ
MW-58A	1/23/2009	728,875	3,168,176	47.76	29	14	29	A-TZ
MW-59A	1/28/2009	728,155	3,168,358	44.18	21	11	21	A-TZ
MW-59B	6/26/2010	728,145	3,168,358	44.36	33	28	33	B-CZ
MW-59D	1/27/2009	728,114	3,168,365	44.22	118	108	118	D-TZ
MW-60A	1/26/2009	728,825	3,168,823	46.79	28.5	18.5	28.5	A-TZ
MW-61A	1/26/2009	728,336	3,168,630	44.67	22	12	22	A-TZ
MW-62B	1/21/2009	728,190	3,165,880	48.16	35	25	35	B-TZ
MW-63B	1/28/2009	729,361	3,167,652	44.48	36	31	36	B-CZ
MW-64A	1/26/2009	727,496	3,165,573	44.55	19.5	14.5	19.5	A-TZ
MW-65D	1/17/2009	729,512	3,168,331	44.55	110	100	110	D-TZ
MW-66D	1/20/2009	729,137	3,169,381	46.51	103	93	103	D-TZ
MW-67B	6/26/2010	729,782	3,167,588	43.93	40	35	40	B-CZ
MW-68C	6/25/2010	729,164	3,167,346	44.8	70	60	70	C-TZ
MW-69A	6/23/2010	728,136	3,168,234	45.71	18.5	8.5	18.5	A-TZ
P-11	3/25/1991	728,049	3,166,025	48.98	50	36.2	38.2	B-TZ
TW-41B	1/22/2009	728,222	3,166,002	49.67	40	30	40	B-TZ
TW-56A	1/23/2009	728,758	3,168,070	51.89	31	21	31	A-TZ

**Notes:**

1 - Point of Compliance Wells for SWMU No. 1

BGS=Below Ground Surface

HVD = Elevations relative to Houston Vertical Datum, Houston Monument System

Northing/Easting = Coordinates based on NAD 1927 Texas State Plane, South Central Zone, US Survey Feet



**TABLE 7.3**  
**SUMMARY OF AQUIFER TEST RESULTS AND SUSTAINABLE WELL YIELD CALCULATIONS**

Groundwater Resource Classification: UPRR Houston Wood Preserving Works  
Houston, Texas

Well Number	Type of Test	Analysis Method	Hydraulic Conductivity, K (cm/sec)	Average K (cm/sec)	Representative K (cm/sec)	Saturated Thickness, b (ft)	Confining Head, h <sub>c</sub> (ft)	Average Yield, Q (GPD)
<b>B-CZ Wells</b>								
MW-33B	Bail Down	Bouwer - Rice	7.E-07	7.E-07	5.E-07	0.5	23	0.3
MW-35B	Bail Down	Bouwer - Rice	1.E-04	1.E-04		0.5	29	31
			1.E-04					31
			9.E-05					25
MW-36B	Bail Down	Bouwer - Rice	1.E-04	1.E-04		0.5	35	31
			2.E-04					45
MW-49B	Bail Down	Bouwer - Rice	6.E-08	6.E-08		2	19	0.04
MW-59B	Bail Down	Bouwer - Rice	1.E-07	1.E-07	4	21	0.15	
MW-63B	Bail Down	Bouwer - Rice	5.E-07	5.E-07	4	6	1.01	
MW-67B	Bail Down	Bouwer - Rice	1.E-07	1.E-07	4	6	0.09	
			2.E-07	2.E-07	5	32	0.78	
<b>D-TZ Wells</b>								
MW-36D	Slug	Bouwer - Rice	3.E-05	3.E-05	3.E-05	1	18	10.44
			4.E-05					13.53
			3.E-05					10.92
			3.E-05					11.04
			3.E-05					11.15
			3.E-05				11.45	

JOB No. 286-45062

# LOG OF BORING No. SP-4/MW-1

MONITOR WELL INSTALLATIONS

SOUTHERN PACIFIC TRANSPORTATION COMPANY

HOUSTON, TEXAS

LOCATION: See Plate 1

TYPE BORING: Wash

DEPTH, FT.	SAMPLE No. SAMPLE	SOIL DESCRIPTION	MONITOR WELL INSTALLATION
		SUR. ELEV.:	
- 0	[Hatched pattern]	Red clay - black below 3'	
- 5	[Hatched pattern]	Light gray and tan sandy clay - tan and light gray below 9'	
- 10	[Hatched pattern]	Light gray and tan sand	
- 15	[Dotted pattern]		<p>Note: For Description Of Material Used, See Plate 3.</p> <p>5</p>
- 20	[Dotted pattern]		
- 25	[Dotted pattern]		
- 30	[Dotted pattern]		
- 35	[Dotted pattern]		
- 40	[Dotted pattern]		
- 45	[Dotted pattern]		
		COMPLETION DEPTH: 18.5' DATE: April 17, 1984	DEPTH TO WATER: DATE:

JOB No. 286-45062

# LOG OF BORING No. SP-2 /MW-2

MONITOR WELL INSTALLATIONS  
SOUTHERN PACIFIC TRANSPORTATION COMPANY  
HOUSTON, TEXAS

TYPE BORING: Auger & Wash

LOCATION: See Plate 1

DEPTH, FT.	SAMPLE No. SAMPLE	SOIL DESCRIPTION	MONITOR WELL INSTALLATION
		SUR. ELEV.:	
0		Dark gray clay - light gray and tan w/calcareous nodules below 7'	4" Stl. Casing w/ Locking Cap Bentonite/Cement Grout
5		- tan and light gray w/silt pockets 10' - 11'	2" Sch. 40 PVC w/ Threaded Coupling Bentonite Pellets
10		Light gray silty clay	Coarse Sand 2" Sch. 40 PVC w/0.020" Slots
15		Tan and light gray sand w/chemical odor - free water at 14'	2" PVC Cap
20		Light gray clay	5"
25			
30			
35			
40			
45			

COMPLETION DEPTH: 18.5'  
DATE: April 17, 1984

DEPTH TO WATER:  
DATE:

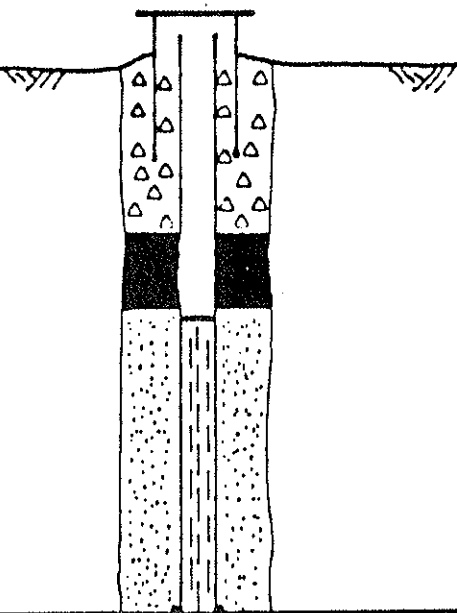
JOB No. 286-45062

# LOG OF BORING No. SP-3/MW-3

MONITOR WELL INSTALLATIONS  
SOUTHERN PACIFIC TRANSPORTATION COMPANY  
HOUSTON, TEXAS

TYPE BORING: Wash

LOCATION: See Plate 1

DEPTH, FT.	SAMPLE No.	SOIL DESCRIPTION	MONITOR WELL INSTALLATION
		SUR. ELEV.:	
0		Black sandy clay	
		- tan and light gray below 3'	
5		- light gray and tan below 7'	
		- tan and light gray w/sand seams below 9'	
10			
15		Tan and light gray sand	
20			
25			
30			
35			
40			
45			

Note:  
For Description Of Material  
Used, See Plate 3.

4

COMPLETION DEPTH: 18.5'  
DATE: April 17, 1984

DEPTH TO WATER:  
DATE:



JOB No. 286-45062

LOG OF BORING No. SP-5 /MW-4  
MONITOR WELL INSTALLATIONS  
SOUTHERN PACIFIC TRANSPORTATION COMPANY  
HOUSTON, TEXAS

TYPE BORING: Wash

LOCATION: See Plate 1

DEPTH, FT.	SAMPLE No.	SAMPLE	SOIL DESCRIPTION	MONITOR WELL INSTALLATION
			SUR. ELEV.:	
0			Tan and dark gray sandy clay - dark gray below 3'	
5			- light gray and tan below 7'	
10			- tan and light gray w/calcareous nodules below 12'	
15			Light gray sand	
20				
25				
30				
35				
40				
45				

Note:  
For Description Of Material  
Used, See Plate 3.

6

COMPLETION DEPTH: 21'  
DATE: April 18, 1984

DEPTH TO WATER:  
DATE:

Client: SP ENVIRONMENTAL SYSTEMS, INC.

GEO ASSOCIATES

Date: MARCH 27, 1991

# LOG OF BORING

Job No. 241

Location: N 727866.10; E 3166206.30

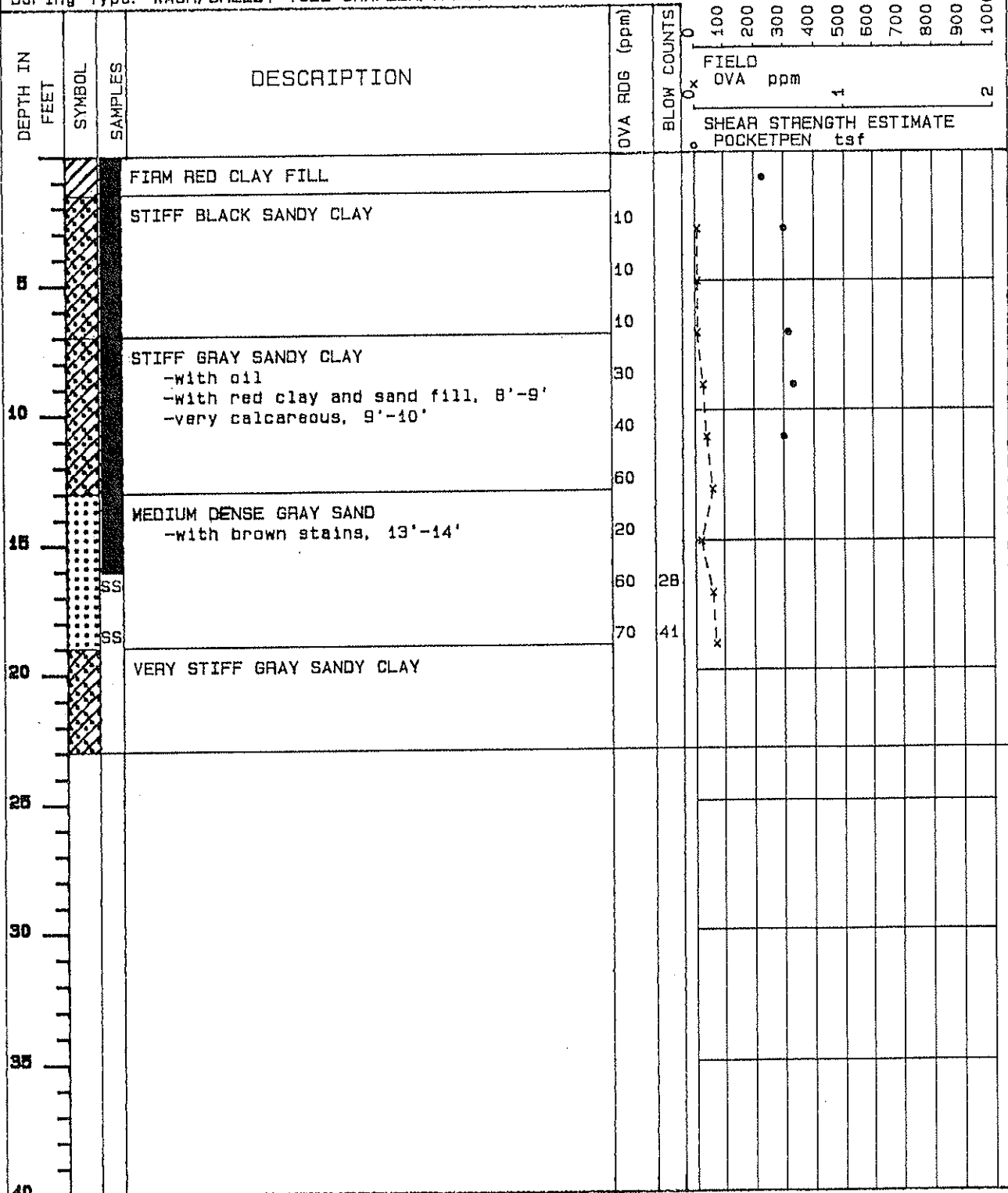
Water Level Depth=

Ground Elev. 46.00

## No. 7/MW-7

Caving Depth=

Boring Type: WASH/SHELBY TUBE SAMPLER/SPLIT SPOON



Total Depth= 23.0

OIL IN PIT, 3'-20'

Logged By: D. BRAGG

Drilled By: GULF COAST CORING

Client: SP ENVIRONMENTAL SYSTEMS, INC.

GEO ASSOCIATES

Date: MARCH 27, 1991

# LOG OF BORING

Job No. 241

Location: N 727983.88; E 3166311.99

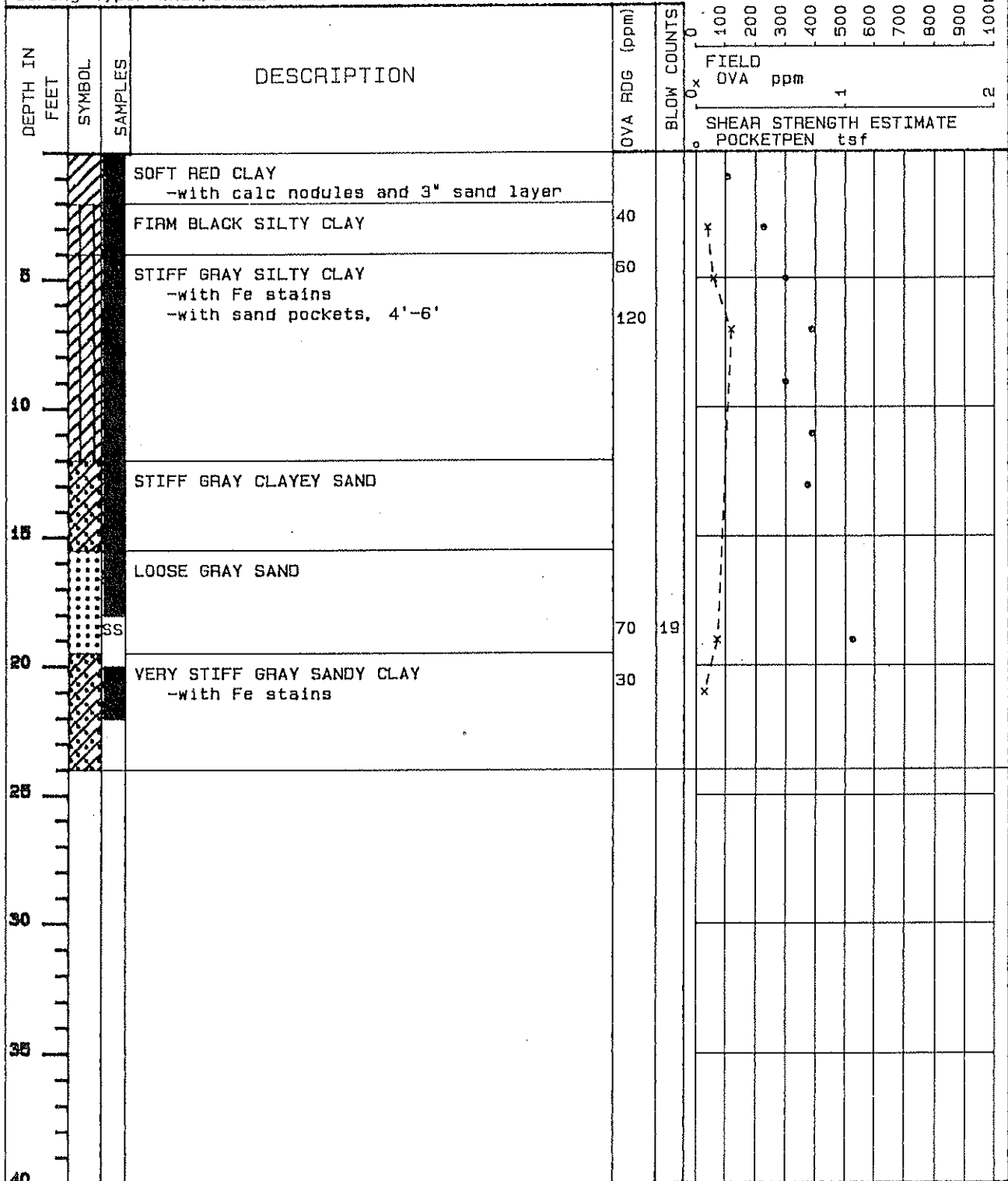
Water Level Depth=

Ground Elev. 46.60

No. 8 /MW-8

Caving Depth=

Boring Type: WASH/SHELBY TUBE SAMPLER/SPLIT SPOON



Total Depth= 24.0

Logged By: D. BRAGG

Drilled By: GULF COAST CORING

Client: SP ENVIRONMENTAL SYSTEMS, INC.

Date: MARCH 26, 1991

Location: N 727992.46; E 3166467.08

Ground Elev. 47.10

Boring Type: WASH/SHELBY TUBE SAMPLER/SPLIT Spoon

# LOG OF BORING

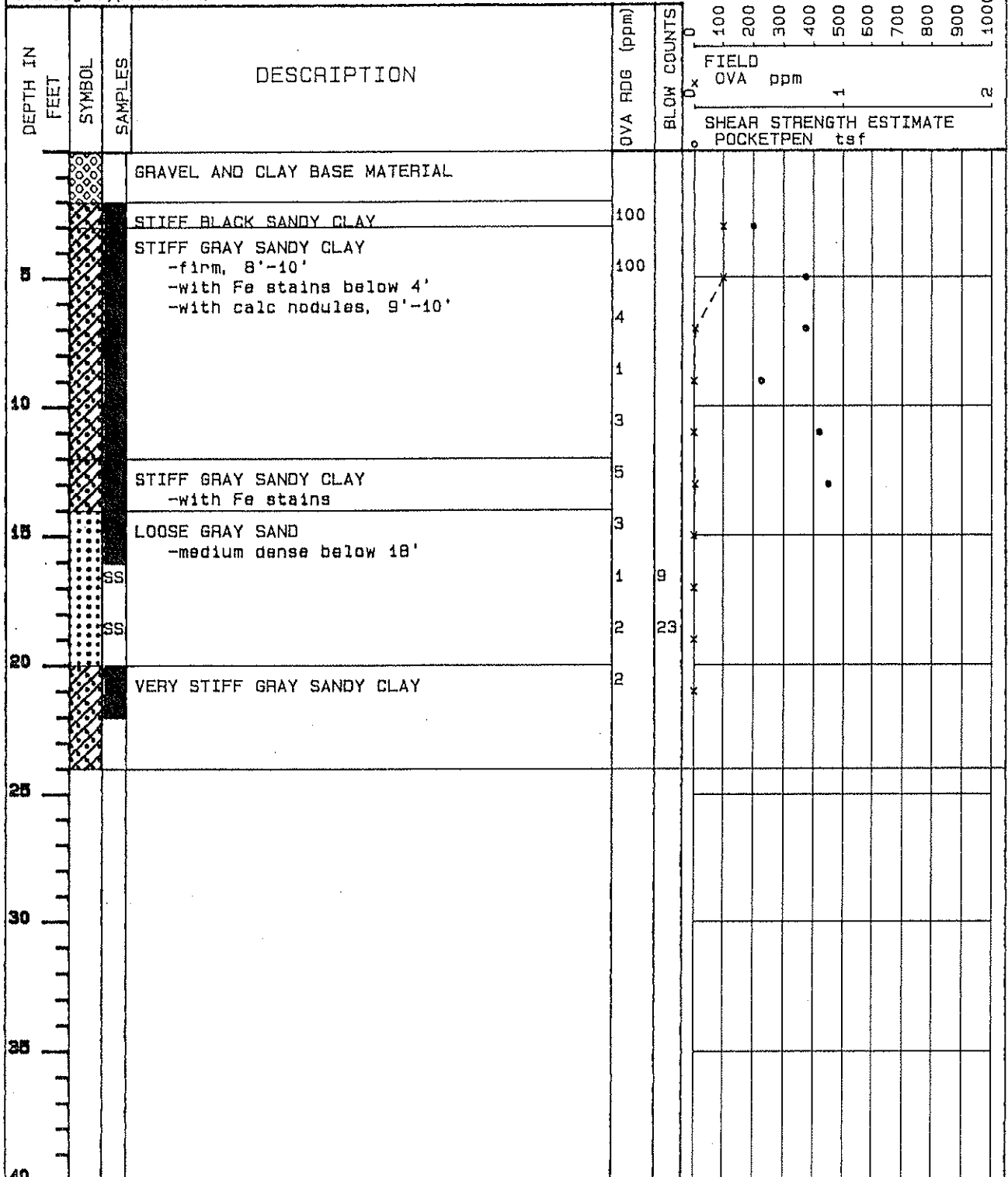
No. 9 / MW-9

GEO ASSOCIATES

Job No. 241

Water Level Depth=

Caving Depth=



Total Depth= 24.0

Logged By: D. BRAGG

Drilled By: GULF COAST CORING

**IC****INDUSTRIAL COMPLIANCE**

LOG OF BORING No.: MW-10A

SHEET NUMBER 1 OF 2

Location Diagram

ENT: SPTCo  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

DRILLING CONTRACTOR: PSI  
 DRILLING METHOD: 6.25" - Hollow Stem Auger

SAMPLING METHOD: Shelby Tube and Split Spoon

BORING LOCATION:  
 START DATE: 09/13/94 FINISH DATE: 09/13/94

SURFACE ELEVATION: 47.2'  
 TOC ELEVATION: 49.90'  
 WATER LEVEL: 7.1'  
 WATER ELEVATION: 42.80'  
 DATE: 09/19/94

START TIME: FINISH TIME:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
				1	F	
ST			0.9	2	I	
ST			0.9	3	L	
				4		
ST			1.2	5	CL	
				6		
ST			1.5	7		
				8		
ST			1.1	9		
				10		
ST			1.6	11		
				12		
ST			1.5	13		
				14		
ST			1.0	15	SM	
				16		
ST			2.0	17		
				18		
ST			1.8	19	CL	
				20		

SOIL DESCRIPTION AND DRILLING CONDITIONS

NOTES:

Fill - crushed concrete 0-0.5'  
 clay dark brown and gray

Silty clay - dark gray, stiff, moist,  
 laminated rootlets

PP 1.75

4-6' medium gray and dark yellow orange  
 calcareous nodules

PP 2.0 - 2.25

PP 3.0

very calcareous with small iron nodules

PP 2.5

very sandy, light gray and dark yellow orange,  
 moist to wet  
 stiff to hard

PP 1.25 - 4.5+

Sand - light greenish gray, some clay, wet

wet, creosote odor

Silty Clay, slight creosote odor  
 light gray / iron stained;

PP 3.0

Geologist: Shiman  
 Checked By:

**LEGEND:**

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing

**IC INDUSTRIAL COMPLIANCE**

LOG OF BORING No.: MW-10A

SHEET NUMBER 2 OF 2

CLIENT: SPTCo  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX  
 BORING LOCATION:  
 START DATE: 09/13/94 FINISH DATE: 09/13/94  
 START TIME: FINISH TIME:

DRILLING CONTRACTOR: PSI  
 DRILLING METHOD: 6.25" - Hollow Stem Auger  
 SAMPLING METHOD: Shelby Tube and Split Spoon  
 SURFACE ELEVATION: 47.2'  
 TOC ELEVATION: 49.90'  
 WATER LEVEL: 7.1'  
 WATER ELEVATION: 42.80'  
 DATE: 09/19/94

Location Diagram

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I
ST			2.0	21	CL	
				22		
				23	///	
				24		
				25		
				26		
				27		
				28		
				29		
				30		
				31		
				32		
				33		
				34		
				35		
				36		
				37		
				38		
				39		
				40		

SOIL DESCRIPTION AND DRILLING CONDITIONS:

very stiff, moist, no creosote odor to very mild creosote odor, some very fine grained sand

Total Depth of Boring: 23 ft  
 Well Screened Interval: 11.0 - 20.5 ft  
 Well Total Depth: 23 ft

NOTES:

Geologist: Shiman  
 Checked By:

**LEGEND:**

- CI - Completion Interval
- OVM - Organic Vapor Meter
- PP - Pocket Penetrometer
- TOC - Top Of Casing

<b>IC</b> INDUSTRIAL COMPLIANCE		LOG OF BORING No.: MW-10B		SHEET NUMBER 1 OF 3				
		DRILLING CONTRACTOR: PSI		Location Diagram				
ENT: SPTCo		DRILLING METHOD: 6.25" Hollow Stem Auger						
PROJECT NAME: Houston Wood Preserving Works		Ream 0-19' with 16" Auger Bit						
PROJECT NUMBER: 44102069		SAMPLING METHOD: Shelby Tube and Split Spoon						
PROJECT LOCATION: 4910 Liberty Road Houston, TX								
BORING LOCATION:		SURFACE ELEVATION: 47.3'						
		TOC ELEVATION: 49.97'						
		WATER LEVEL: 7.0'						
START DATE: 09/12/94 FINISH DATE: 09/14/94		WATER ELEVATION: 42.97'						
START TIME: FINISH TIME:		DATE: 09/19/94						
		SOIL DESCRIPTION AND DRILLING CONDITIONS		NOTES:				
SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH			
				1	F I L L	Fill - crushed concrete 0-0.9'; clay; dark gray with black discoloration, calcareous nodules, dark to medium gray	Borehole diameter 16" from 0 to 19 ft	
ST			0.6	2				
ST			0.7	3				
				4				
ST			1.5	5		With fine-grained gravel, woody fragments, moist to wet	poor sample	
				6				
ST			2.0	7	C L	Silty Clay - medium light gray, soft, wet, with large wood fragments	PP 0.5	
				8				
ST			1.5	9		light olive gray, stiff to very stiff, moist, with dark yellow orange iron staining	PP 1.75 - 2.75	
				10				
ST			0.3	11		soft boggy / woody fragments with sandy clay	very poor recovery	
				12				
ST			1.7	13		Silty Sandy Clay - light greenish gray and dark yellow orange mottled; stiff, moist to wet	PP 1.25 - 2.0	
				14				
ST			0.9	15	S P	Sand - light greenish gray, some clay, wet, with woody fragments		
				16				
SS			1.5	17		light gray, very fine-grained, trace silt, wet, creosote odor		
				18				
SS			1.2	19	C L	Sandy Clay - light gray, moist to wet	PP 1.5	
				20				
						Set 12" surface casing 0-20'		
Geologist: Shiman		Checked By:		LEGEND:		CI - Completion Interval		
						OVM - Organic Vapor Meter		PP - Pocket Penetrometer
						TOC - Top Of Casing		

<b>IC</b> INDUSTRIAL COMPLIANCE		LOG OF BORING No.: MW-10B	SHEET NUMBER 2 OF 3
ENT: SPTCo		DRILLING CONTRACTOR: PSI	Location Diagram
PROJECT NAME: Houston Wood Preserving Works		DRILLING METHOD: 6.25" Hollow Stem Auger	
PROJECT NUMBER: 44102069		Ream 0-19' with 16" Auger Bit	
PROJECT LOCATION: 4910 Liberty Road Houston, TX		SAMPLING METHOD: Shelby Tube and Split Spoon	
BORING LOCATION:		SURFACE ELEVATION: 47.3'	
START DATE: 09/12/94 FINISH DATE: 09/14/94		TOC ELEVATION: 49.97'	
START TIME: FINISH TIME:		WATER LEVEL: 7.0'	
		WATER ELEVATION: 42.97'	
		DATE: 09/19/94	

SAMPLER TYPE	SAMPLE DEPTH	OVN (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:
ST			1.5	21			with dark yellow orange iron staining; very stiff, moist, no creosote odor	PP 3.25 - 3.75
ST			1.8	23			some silt, very mild creosote odor light gray and orange brown mottled clay	PP 3.0 - 3.75
SS			2.0	25			silty, sandy, hard, moist	PP > 4.5
SS			1.7	27				PP 4.0
SS			1.9	29			color is light gray and light brown	
SS			1.0	31	SM		mottled, become silty sand @ 29', wet 6" layer silty clay (30-30.5)	
SS			1.7	33	SP		Silty Sand - brown, wet, very fine-grained; sand, light brown, vfg very dense, saturated, 10-20% silt, mild creosote odor, light brown and gray	PID 2.5 ppm MAX
SS			0.7	35				PID 2.9 ppm MAX
SS			0.5	37				
SS			2.0	39	CH		Clay - moderate reddish-brown with light greenish gray markings, hard, moist, with light brown silty sand (40.5'-41.4').	strata break @ 38.5'

Geologist: Shiman	<b>LEGEND:</b>	CI - Completion Interval
Checked By:		OVM - Organic Vapor Meter
		PP - Pocket Penetrometer
		TOC - Top Of Casing



<b>IC</b> INDUSTRIAL COMPLIANCE				LOG OF BORING No.: MW-10B				SHEET NUMBER 3 OF 3	
				DRILLING CONTRACTOR: PSI				Location Diagram	
ENT: SPTCo				DRILLING METHOD: 6.25" Hollow Stem Auger				NOTES:	
PROJECT NAME: Houston Wood Preserving Works				Ream 0-19' with 16" Auger Bit					
PROJECT NUMBER: 44102069				SAMPLING METHOD: Shelby Tube and Split Spoon					
PROJECT LOCATION: 4910 Liberty Road Houston, TX									
BORING LOCATION:				SURFACE ELEVATION: 47.3'					
				TOC ELEVATION: 49.97'					
				WATER LEVEL: 7.0'					
START DATE: 09/12/94    FINISH DATE: 09/14/94				WATER ELEVATION: 42.97'					
START TIME:    FINISH TIME:				DATE: 09/19/94					
				SOIL DESCRIPTION AND DRILLING CONDITIONS					
SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I			
SS			1.8	41					
				42	SM		wet, with very mild creosote odor		
SS			2.0	43	CH		Clay - moderate reddish brown with light greenish gray marks; hard, moist		
				44					
SS			2.0	45					
				46					
				47	///		Total Depth of boring: 46'		
				48			Well screen (completion) interval: 27.1' - 41.6'		
				49			Total Depth of Well: 44'		
				50					
				51					
				52					
				53					
				54					
				55					
				56					
				57					
				58					
				59					
				60					
							Set 12" surface casing 0-20'		
Geologist: Shiman				<b>LEGEND:</b> CI - Completion Interval OVM - Organic Vapor Meter PP - Pocket Penetrometer TOC - Top Of Casing					
Checked By:									

<b>IC INDUSTRIAL COMPLIANCE</b>							LOG OF BORING No.: MW-11A		SHEET NUMBER 1 OF 2	
							DRILLING CONTRACTOR: PSI		Location Diagram	
CLIENT: SPTCo							DRILLING METHOD: 6.25" Hollow Stem Auger			
PROJECT NAME: Houston Wood Preserving Works							SAMPLING METHOD: Shelby Tube and Split Spoon			
PROJECT NUMBER: 44102069										
PROJECT LOCATION: 4910 Liberty Road Houston, TX										
BORING LOCATION:							SURFACE ELEVATION: 47.5'			
							TOC ELEVATION: 50.00'			
							WATER LEVEL: 7.4'			
START DATE: 09/15/94    FINISH DATE: 09/15/94							WATER ELEVATION: 42.06'			
START TIME:                      FINISH TIME:							DATE: 09/19/94			
SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I	SOIL DESCRIPTION AND DRILLING CONDITIONS			
				1	F I L L		Fill - crushed concrete brown/gray silty clay			
ST			0.9	2	F I L L					
ST			1.3	3	F I L L					
				4			Silty Clay - blackish gray			
ST			1.4	5	C L		medium light gray and dark yellow orange, stiff, moist, rootlets		PP 2.0	
				6						
ST			1.2	7			medium light gray with iron staining, some sand, Fe nodules, creosote odor		PP 1.75 - 2.0	
				8						
ST			1.3	9			calcareous deposit @ 8 ft, creosote odor		PP 2.25	
				10						
ST			1.7	11			grayish yellow green with Fe staining, with dark gray vertical silt pocket, wet, creosote odor		PP 1.0	
				12						
ST			1.6	13			calcareous deposits, iron black staining, very stiff, very mild creosote odor		PP 2.25 - 3.0	
				14						
ST			1.3	15	S C- S M		Clayey to Silty Sand - greenish gray with dark yellow orange markings, wet, no odor			
				16						
SS			2.0	17	S M		Silty Sand - very fine-grained, medium dense, wet, no creosote odor		No creosote odor @ bottom of sand	
				18						
ST			1.8	19	C L		Silty Clay - light gray with light olive brown markings, stiff, moist to wet		PP 1.25 - 1.5	
				20						
Geologist: Shiman							<b>LEGEND:</b> CI - Completion Interval OVM - Organic Vapor Meter PP - Pocket Penetrometer TOC - Top Of Casing			
Checked By:										

<b>IC INDUSTRIAL COMPLIANCE</b>		LOG OF BORING No.: MW-11A		SHEET NUMBER 2 OF 2				
		DRILLING CONTRACTOR: PSI		Location Diagram				
ENT: SPTCo		DRILLING METHOD: 6.25" Hollow Stem Auger						
PROJECT NAME: Houston Wood Preserving Works		SAMPLING METHOD: Shelby Tube and Split Spoon						
PROJECT NUMBER: 44102069								
PROJECT LOCATION: 4910 Liberty Road Houston, TX								
BORING LOCATION:		SURFACE ELEVATION: 47.5'						
		TOC ELEVATION: 50.00'						
		WATER LEVEL: 7.4'						
START DATE: 09/15/94    FINISH DATE: 09/15/94		WATER ELEVATION: 42.06'						
START TIME:                      FINISH TIME:		DATE: 09/19/94						
SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:
ST			1.7	21	CL		light gray, with dark yellow orange markings, very stiff, moist	PP 3.75
				22				
				23	///		Total Depth of boring: 22'	
				24			Well screen (completion) interval: 10.0' - 19.3'	
				25			Total Depth of Well: 21.5'	
				26				
				27				
				28				
				29				
				30				
				31				
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				
				40				

Geologist: Shiman  
Checked By:

**LEGEND:**

- CI - Completion Interval
- OVM - Organic Vapor Meter
- PP - Pocket Penetrometer
- TOC - Top Of Casing

<b>IC INDUSTRIAL COMPLIANCE</b>		LOG OF BORING No.: MW-11B		SHEET NUMBER 1 OF 2				
CLIENT: SPTCo		DRILLING CONTRACTOR: PSI		Location Diagram				
PROJECT NAME: Houston Wood Preserving Works		DRILLING METHOD: Hollow Stem Auger						
PROJECT NUMBER: 44102069		SAMPLING METHOD: Shelby Tube and Split Spoon						
PROJECT LOCATION: 4910 Liberty Road Houston, TX								
BORING LOCATION:		SURFACE ELEVATION: 47.6'						
		TOC ELEVATION: 50.19'						
		WATER LEVEL: 7.55'						
START DATE: 09/16/94 FINISH DATE: 09/19/94		WATER ELEVATION: 42.64'						
START TIME: FINISH TIME:		DATE: 09/20/94						
SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:	
				21	CL	12" isolation casing set 0' to 20'		
				22				
SS			2.0	23			Silty Clay - light gray, very stiff, moist, some vfg sand, tr, Fe stain, no creosote odor	PP 3.25 - 4.25
				24				
SS			2.0	25			light gray and light brown mottled, trace calcareous deposits, trace sand.	PP 4.5+
				26				
SS			2.0	27			light gray and orange-brown mottled, hard, becomes sandier	PP > 4.5
				28			Sandy Clay - with wet sand pockets, green, gray staining, very slight creosote odor.	
SS			2.0	29				
				30				
SS			0.2	31		mild creosote odor	very poor recovery hit calcareous hard zone	
				32	SP			
SS			2.0	33			Sand - moderate yellowish brown, vfg, wet, ~10% silt, with creosote product in calcareous deposits with yellowish gray color, no visible product,	
				34				
SS			1.2	35			slight creosote odor	
				36				
SS			0.5	37		slight creosote odor		
				38				
SS			1.4	39	CL	Silty Sandy Clay - moderate reddish brown and light greenish gray, hard, moist, slight creosote odor. Becomes high plastic clay below 40'	break @ 38.3' PP 4.5+ PP 4.5+	
				40				

Geologist: Shiman  
Checked By:

**LEGEND:**

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing

**IC INDUSTRIAL COMPLIANCE**

LOG OF BORING No.: MW-11B

SHEET NUMBER 2 OF 2

ENT: SPTCo  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX  
 BORING LOCATION:  
 START DATE: 09/16/94 FINISH DATE: 09/19/94  
 START TIME: FINISH TIME:

DRILLING CONTRACTOR: PSI  
 DRILLING METHOD: Hollow Stem Auger  
 SAMPLING METHOD: Shelby Tube and Split Spoon  
 SURFACE ELEVATION: 47.6'  
 TOC ELEVATION: 50.19'  
 WATER LEVEL: 7.55'  
 WATER ELEVATION: 42.64'  
 DATE: 09/20/94

Location Diagram

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:
SS			2.0	41	CN			
				42			slickenside fracture planes	
SS			2.0	43			questionable creosote odor	
				44	///		Total Depth of boring: 44'	
				45			Well screen (completion) Interval: 27.5' - 41.2'	
				46			Total Depth of Well: 43.5'	
				47				
				48				
				49				
				50				
				51				
				52				
				53				
				54				
				55				
				56				
				57				
				58				
				59				
				60				

Geologist: Shiman  
 Checked By:

**LEGEND:**

- CI - Completion Interval
- OVM - Organic Vapor Meter
- PP - Pocket Penetrometer
- TOC - Top Of Casing



LOG OF BORING No.: MW-12A

SHEET NUMBER 1 OF 2

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: Split Spoon

BORING LOCATION: West Side

SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL: 5.52'

START DATE: 02/27/97 FINISH DATE: 02/27/97  
 START TIME: 07:45 FINISH TIME: 09:40

DATE: 03/25/97

				SOIL DESCRIPTION AND DRILLING CONDITIONS:				NOTES:
SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C		
SS	0 - 5	---	3.75	1	FILL		FILL, moist, 10YR3/1, very dark gray, gravel, roots, brick, slight odor	Sample Retained For Chemical Analysis
				2				
				3			Slightly moist	
				4	CL		CLAY, silty, slightly moist, 10YR4/1, dark gray, calcareous nodules	PP = 2.0
				5				
				6			Moist, 10YR5/1, gray, silt seams	
SS	5 - 10	---	5.0	6				
				7				
				8			Silt content decreases, 25% calcareous nodules 10YR7/1	
				9			Light gray with 10YR6/8 brownish yellow and 10YR4/1 dark gray mottling, silt seams	
				10				
				11			silt seams	
				12				
				13				
				14				
				15	ML		SILT, clayey, slightly moist, 10YR5/1, gray, odor, clay seams	
SS	15 - 20	---	3.75	16				
				17	SP		SAND, wet, 10YR7/1, light gray with greenish tint, fine grained, odor, staining with 10YR2/1, black, and 10YR3/3 dark brown	
				18				
				19				
				20				

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-12A

SHEET NUMBER 2 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

DRILLING METHOD: Hollow Stem Auger

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: Split Spoon

BORING LOCATION: West Side

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL: 5.52'

START DATE: 02/27/97 FINISH DATE: 02/27/97

WATER ELEVATION:

START TIME: 07:45 FINISH TIME: 09:40

DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OMV (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
SS	20 - 25	---	5.0	21	SP	
				22		
				23		
				24		
				25		
SS	25 - 30	---	5.0	26	CL	
				27		
				28		
				29		
				30		
				31		
				32		
				33		
				34		
				35		
				36		
				37		
				38		
				39		
				40		

SOIL DESCRIPTION AND DRILLING CONDITIONS

NOTES:

SAND, wet, 10YR7/1, light gray, with greenish tint, fine grained, odor, staining with 10YR2/1 black and 10YR3/3 dark brown

Sample Retained For Chemical Analysis

CLAY, slightly silty, very slightly moist, 10YR7/1, light gray, >25% mottling with 10YR6/8, brownish yellow, green and black staining, odor

PP = 4.0

Sample Retained For Chemical Analysis

Silt content = 50%, strong odor

Boring TD @ 30.0'

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-12B

SHEET NUMBER 1 OF 1

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: Split Spoon

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: West Side

SURFACE ELEVATION:  
TOC ELEVATION:  
WATER LEVEL: 5.60'

START DATE: 02/27/97 FINISH DATE: 02/27/97

WATER ELEVATION:  
DATE: 03/25/97

START TIME: 10:15 FINISH TIME: 13:10

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:	
SS	25 - 30	—	5.0	26	CL	CLAY, slightly silty, very slightly moist, 10YR7/1, light gray, >25% mottling with 10YR6/8 brownish yellow, green and black staining, creosote @ 30', strong odor	0 - 25' not logged because of close proximity to MW-12A	
				27				
				28				
				29				
				30				
ST	30 - 35	—	2.5	31	SP	SAND, saturated, 7.5YR4/6, strong brown with 7.5YR6/1 gray, fine grained, silt nodules, sheen, strong odor	Sample Retained For Chemical and Geotechnical Analysis	
				32				
				33				
				34				
				35				
SS	35 - 40	—	5.0	36				
				37				
				38				
				39				
				40				
SS	40 - 45	—	5.0	41	CH	CLAY, very slightly moist, 10R4/6, red, hard, firm, fat, scattered small calcareous nodules	Sample Retained For Chemical and Geotechnical Analysis	
				42			PP = 4.5	
				43				
				44				
				45		Boring TD @45.0'		

Geologist: B. Goldsby  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing





LOG OF BORING No.: MW-12C

SHEET NUMBER 1 OF 1

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger through 10" PVC casing

Location Diagram

PROJECT NAME: Southern Pacific Lines  
 Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

BORING LOCATION: MW-12C

START DATE: 4/21/97 FINISH DATE: 4/21/97

START TIME: FINISH TIME:

SAMPLING METHOD: CME 5-foot Sampler

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

WATER ELEVATION:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
CB1			4.2	61	ML	Clayey SILT; reddish brown; firm; low plasticity; moist	Boring Advanced with 8 1/4-inch O.D., 4 1/4-inch I.D. HSA
				62			
				63			
				64			
	65.0			65			
CB2			1.5	66	SP	Silty SAND; reddish brown; very fine grained; wet with nodules of cemented sand.	Sand heaves ~ 1.0 foot into auger
				67			
				68			
				69			
	70.0			70			
CB3			2.7	71	CH	CLAY; reddish brown; hard; medium plasticity	Bottom of boring @ 75.0 Install MW-12C
				72			
				73			
				74			
	75.0			75			
				76			
				77			
				78			
				79			
				80			

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-12C

SHEET NUMBER 2 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

Client: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

DRILLING METHOD: Hollow Stem Auger through 10" PVC casing

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: CME 5-foot Sampler

PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SURFACE ELEVATION:

BORING LOCATION: MW-12C

TOC ELEVATION:

WATER LEVEL:

START DATE: FINISH DATE:

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
CB1			4.2	61	ML	
				62		
				63		
				64		
	65.0			65		
CB2			1.5	66	SP	
				67		
				68		
				69		
	70.0			70		
CB3			2.7	71	CH	
				72		
				73		
				74		
	75.0			75		
				76		
				77		
				78		
				79		
				80		

SOIL DESCRIPTION AND DRILLING CONDITIONS:

NOTES:

Clayey SILT; reddish brown; firm; low plasticity; moist

Boring Advanced with 8 1/4-inch O.D., 4 1/4-inch I.D. HSA

grading with trace sand

Silty SAND; reddish brown; very fine grained; wet with nodules of cemented sand.

Sand heaves ~ 1.0 foot into auger

CLAY; reddish brown; hard; medium plasticity

Bottom of boring @ 75.0  
 Install MW-12C

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-13

SHEET NUMBER 1 OF 2

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: Split Spoon

BORING LOCATION: NW Corner of Site

SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL: 9.43'

START DATE: 02/25/97 FINISH DATE: 02/25/97  
 START TIME: 10:00 FINISH TIME: 12:00

WATER ELEVATION:  
 DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
SS	0 - 5	---	5.0	1	ML	
				2		
				3		
				4		
				5	CL	
SS	5 - 10	---	5.0	6		
				7		
				8		
				9		
				10		
SS	10 - 15	---	5.0	11		
				12		
				13		
				14		
				15		
SS	15 - 20	---	5.0	16	SP	
				17		
				18		
				19		
				20		

SOIL DESCRIPTION AND DRILLING CONDITIONS

0 - 4" Fill, asphalt gravel  
 SILT, very slightly moist, odor,  
 10YR3/1 very dark gray

CLAY, silty, very slightly moist,  
 10YR3/1 very dark gray, firm odor

10YR6/1 Gray with dark green staining;  
 1/4" - 1/2" calcium nodules

SAND, wet, loose, fine-grained,  
 10YR7/1 - light gray

NOTES:

Sample Submitted For  
 Chemical Analysis

PP = 2.5

Sample Submitted For  
 Chemical Analysis

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-13

SHEET NUMBER 2 OF 2

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX  
 BORING LOCATION: NW Corner of Site

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger  
 SAMPLING METHOD: Split Spoon  
 SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL: 9.43'

START DATE: 02/25/97 FINISH DATE: 02/25/97  
 START TIME: 10:00 FINISH TIME: 12:00

DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I
SS	20 - 25	---	5.0	21	SP	
				22	CH	
				23		
				24		
				25		
				26		
				27		
				28		
				29		
				30		
				31		
				32		
				33		
				34		
				35		
				36		
				37		
				38		
				39		
				40		

SOIL DESCRIPTION AND DRILLING CONDITIONS:

SAND, wet, loose, fine-grained, 10YR7/1 gray

CLAY, slightly moist, 10YR7/1  
 Light gray, mottling with 10YR6/8  
 brownish yellow, firm

DRY

Boring TD = 25.0 Feet

NOTES:

PP = 4.0  
 Sample Submitted For  
 Chemical Analysis

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-14  
SHEET NUMBER 1 OF 3

CLIENT: Southern Pacific Lines  
PROJECT NAME: Houston Wood Preserving Works  
PROJECT NUMBER: 44102069.07  
PROJECT LOCATION: 4910 Liberty Road Houston, TX

DRILLING CONTRACTOR: Best Drilling Services  
DRILLING METHOD: Hollow Stem Auger

Location Diagram

BORING LOCATION:  
START DATE: 02/27/97 FINISH DATE: 02/27/97  
START TIME: 13:45 FINISH TIME: 15:30

SAMPLING METHOD: Split Spoon  
SURFACE ELEVATION:  
TOC ELEVATION:  
WATER LEVEL: 7.71'  
WATER ELEVATION:  
DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
SS	0 - 5	---	3.75	1	FILL	FILL, moist, 10YR4/6 dark yellowish brown grades to 10YR3/1 very dark gray, wood pieces	
				2	SP	1.5 - 1.75' SAND, slightly moist, 10YR6/4 light yellowish brown, fine-grained	
				3	CL	1.75 - 5 CLAY, silty, very slightly moist, 10YR2/2 very dark brown grades to 10YR4/1 dark gray, odor	PP = 2.75
				4			
				5			
ST	5 - 7	---	2.0	6		CLAY	Sample Collected In A Shelby Tube For Geotechnical Analysis
				7			
SS	7 - 10	---	3.0	8		CLAY, silty, moist, 10YR6/2 light yellowish gray, mottling with 10YR6/8 brownish yellow and 10YR4/1 dark gray, calcareous nodules, Fe nodules, greenish tint, interbedded silt lenses	PP = 2.5
				9			
				10			
SS	10 - 15	---	5.0	11	CL		
				12			
				13			
				14			
				15		ODOR	
ST	15 - 17	---	2.0	16		SAND	Sample Collected In A Shelby Tube For Geotechnical Analysis
				17			
SS	17 - 20	---	3.0	18		SAND, wet, 10YR6/1, gray, odor, sheen, greenish tint	Sample Retained For Chemical Analysis
				19	SP		
				20		2" Clay seam with creosote staining and globules	

Geologist: B. Goldsby  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: MW-14

SHEET NUMBER 2 OF 3

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger  
 CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road, Houston, TX  
 SAMPLING METHOD: Split Spoon  
 SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL: 7.71'  
 WATER ELEVATION:  
 DATE: 03/25/97  
 START DATE: 02/27/97 FINISH DATE: 02/27/97  
 START TIME: 13:45 FINISH TIME: 15:30

Location Diagram

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:
SS	20 - 25	---	5.0	21	SP	SAND, wet, 10YR6/1, gray, slight odor, no staining	
				22			
				23			
				24			
				25			
SS	25 - 30	---	5.0	26	CL	CLAY, silty, slightly moist 10YR7/2, light gray, with 10YR6/8 brownish yellow mottling, firm, hard	PP = 4.0
				27			
				28			
				29		CLAY	Sample Retained For Geotechnical Analysis
				30			
SS	30 - 35	---	5.0	31	CL	CLAY, slightly moist, 10R4/8, red with 10YR7/1; light gray mottling, calcareous seams, 1/2 - 3/4" thick, moist @ 31', 32', 33', and 34'. Very silty 31 - 35'	PP = 2.0
				32			
				33			
				34			
				35			
SS	35 - 40	---	2.5	36	SP	SAND, slightly silty, wet, 2.5 YR5/8, red, fine grained, clay nodules. 2" clay @ bottom, then 2" hard cemented sandstone or claystone, 2.5YR5/8, red, with 10YR7/2, light gray mottling	Sample Retained For Chemical Analysis
				37			
				38			
				39			
				40			

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-14

SHEET NUMBER 3 OF 3

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

Location Diagram

BORING LOCATION:  
 START DATE: 02/27/97 FINISH DATE: 02/27/97  
 START TIME: 13:45 FINISH TIME: 15:30

SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL: 7.71'  
 WATER ELEVATION:  
 DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOL GRAPH	C
ST	40 - 43	---	3.0	41	CH	
				42		
				43		
ST	43 - 45	---	2.0	44		
				45		
				46		
				47		
				48		
				49		
				50		
				51		
				52		
				53		
				54		
				55		
				56		
				57		
				58		
				59		
				60		

SOIL DESCRIPTION AND DRILLING CONDITIONS:

CLAY, dry, 2.5YR5/8, red, mottling with 10YR7/2, light gray, fractures, black staining (probably manganese oxide) scattered throughout.

CLAY

Boring TD @ 45.0'

NOTES:

Sample Collected In A Shelby Tube For Geotechnical Analysis

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-15

SHEET NUMBER 1 OF 2

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon

BORING LOCATION: East of Entrance Gate North Side of Office

SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL: 8.22'

START DATE: 02/25/97 FINISH DATE: 02/25/97  
 START TIME: 13:30 FINISH TIME: 15:00

WATER ELEVATION:  
 DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:
SS	0 - 5	---	3.5	1	CL	Fill, moist, sandy, 10YR5/3 brown	PP = 1.0 Sample Submitted For Chemical Analysis
				2		CLAY, silty, slightly moist, 10YR3/1 very dark gray	
				3			
				4			
				5	CH	CLAY, very slightly moist, 10YR3/1 Very dark gray	PP = 1.0
SS	5 - 10	---	5.0	6			PP = 1.5
				7			
				8	SP	10YR6/1 Gray with 10YR6/8 brownish yellow mottling + 10YR4/1 dark gray Fe nodules; 8.5 - 9.0 calcareous nodule seam	PP = 3.0
				9			
				10			
SS	10 - 15	---	3.5	11	CL		
				12		Very silty	
				13	SP		
				14		SAND, saturated, 10YR7/1 light gray	
				15			
				16			
				17			
				18			
				19			
				20			

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing





LOG OF BORING No.: MW-15

SHEET NUMBER 2 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines

DRILLING METHOD: Hollow Stem Auger

PROJECT NAME: Houston Wood Preserving Works

PROJECT NUMBER: 44102069.07

SAMPLING METHOD: Split Spoon

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: East of Entrance Gate  
North Side of Office

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL: 8.22'

START DATE: 02/25/97 FINISH DATE: 02/25/97

WATER ELEVATION:

START TIME: 13:30 FINISH TIME: 15:00

DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
SS	20 - 25	---	5.0	21	SP		SAND, saturated, 10YR7/1, light gray	Sample Submitted For Chemical Analysis
				22				
				23				
				24				
				25	CH		CLAY, very slightly moist, 10YR 7/1 Light gray with 10YR6/8 Browish yellow mottling, firm	PP = 3.0 Sample Submitted For Chemical Analysis
SS	25 - 27	---	2.0	26				
				27				
				28			Boring TD @ 27'	
				29				
				30				
				31				
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				
				40				

Geologist: B. Goldsby  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



Union Pacific Railroad

# Log of Boring: MW-15B

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	12/19/2011	Drilling Method:	Roto Sonic
Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
Driller:	Tim Beach	Total Depth (ft):	40
Driller's License:	58141	Northing:	728761.26
Field Supervisor:	Tim Jennings	Easting:	3166959.61
Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	47.05

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				PAV	(0 - 0.2) Asphalt Pavement
					(0.2 - 0.7) Gravel Base Material
			DO		(0.7 - 11.9) SANDY CLAY, CL, dark gray, moist, becomes light gray with orange mottling at 6-feet, ~10-20% fine sand, firm, abundant FeOx
5		0.5	6.0/6.0	CH	
		0.2			
		0.4			
10		0.2	7.5/10.0	SC	(11.9 - 14.9) CLAYEY SAND, SC, greenish gray, moist, ~30-40% high plasticity clay, fine sand
		0.6			
15		0.3			
				SM	(14.9 - 20.2) SILTY SAND, SM, light gray and light grayish brown, wet, ~10% fines in very fine to fine sand, soft, no odor to slight odor near base
20		0.6	5.0/5.0	CL/GH	(20.2 - 28.8) SANDY CLAY, CL, light gray with orange and reddish brown mottling, moist, ~10-30% fine sand, decreasing downward in high plasticity clay, becomes medium plasticity clay below 24.5-feet
		0.8			
25		1.7	5.0/5.0		
		0.8			
30		0.9	5.0/5.0	CL	(28.8 - 37.4) SANDY CLAY, CL, reddish brown with gray mottling, moist to locally wet, ~10-20% very fine sand in medium plasticity clay, sand to gravel sized carbonate nodules are common mostly as thin beds ( $\leq 0.1'$ ), sandy zone (~50% fine sand) 32.6-34", wet with very minor oily staining in sandy zone, slight to moderate odor
		1.6			
35		2.4	5.0/5.0	CL	
		1.8			
40					(37.4 - 40) CLAY, CL, reddish brown, moist, medium plasticity clay, hard, thin zone of carbonate nodules at 37.9 feet, slight odor

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 4 feet drilled out (DO) with a hydrovac to clear for utilities.  
8-inch sonic isolation casing advanced to 25' then removed during grouting.

Initial Fluid Level (01/27/12)

Depth to water: 10.13 ft BTOC

**Annular Materials**

(0.0 - 2.0) Concrete  
(2.0 - 22.0) Portland/Bentonite Grout  
(22.0 - 26.0) Bentonite Pellets  
(26.0 - 38.0) 20/40 Silica Sand  
(38.0 - 40.0) Bentonite Pellets

**Well Materials**

(0 - 28.0) Casing, 2" FJT Stainless Steel  
(28.0 - 38.0) Screen, 2" FJT Stainless Steel,  
0.01 slot

**TOC Elevation (ft AMSL)**

50.2



LOG OF BORING No.: MW-15C

SHEET NUMBER 1 OF 2

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX

SAMPLING METHOD: CME 5-foot Sampler

BORING LOCATION: SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL:  
 WATER ELEVATION:

START DATE: FINISH DATE:  
 START TIME: FINISH TIME:

DATE: SOIL DESCRIPTION AND DRILLING CONDITIONS:

NOTES:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	I	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
				50	CH				Boring advanced with 14-inch rotary bit using water as drilling fluid
				51					
				52					
				53				CLAY, reddish brown; hard; medium plasticity	
				54					
				55					
				56					
				57					
				58	ML			SILT, reddish brown; firm; non-plastic; wet with trace clay and sand	Boring advanced with 8 1/4-inch O.D., 4 1/4-inch I.D. HSA
				59					
CB1			4.2	60					
				61					
				62					
				63				2" thick layer at CaCO3 cemented sand @ 63.5'	
				64				grades with some sand	
	65.0			65					
CB2				66	SP			Silty SAND; reddish brown, very fine grained; wet	
				67					
				68				grading very fine to fine grained	
				69					
	70.0			70				~2" thick layer CaCO3 cemented sand @ 70.0'	

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon  
 CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-15C

SHEET NUMBER 2 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

DRILLING METHOD: Hollow Stem Auger

CLIENT: Southern Pacific Lines  
PROJECT NAME: Houston Wood Perserving Works

PROJECT NUMBER: 44102069.07 SAMPLING METHOD: CME 5-foot Sampler

PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

BORING LOCATION: SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 4/25/97 FINISH DATE: 04/25/97 WATER ELEVATION:

START TIME: FINISH TIME: DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C I	SOIL DESCRIPTION AND DRILLING CONDITIONS
--------------	--------------	-----------	---------------	---------------	------------	-----	--

NOTES:

For geolog, to 50 feet, see log of boring MW-15

CB3

4.2

70

71

72

73

74

CL

Silty CLAY; reddish brown; hard low plasticity; moist

75.0

75

Bottom of boring @ 75.0'  
Install MW-15C on 4/28/97

76

77

78

79

80

81

82

83

84

85

86

87

88

89

Geologist: R. Lamb  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: MW-16

SHEET NUMBER 1 OF 2

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX

SAMPLING METHOD: Split Spoon

BORING LOCATION: Adjacent to Main Line

SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL: 7.41'

START DATE: 02/26/97 FINISH DATE: 02/26/97  
 START TIME: 13:50 FINISH TIME: 15:30

DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
SS	0 - 5	---	1.5	1	ML	
				2		
				3		
				4		
				5		
SS	5 - 10	---	5.0	6	CL	
				7		
				8		
				9		
				10		
SS	10 - 15	---	5.0	11	SM	
				12		
				13		
				14		
				15		
SS	15 - 20	---	5.0	16	ML	
				17		
				18		
				19		
				20		

SOIL DESCRIPTION AND DRILLING CONDITIONS

SILT, moist, 10YR3/3, dark brown, gravel

CLAY, silty, moist, 10YR3/3, dark brown, calcareous nodules throughout

SILT, sandy, wet, 10YR7/1 light gray, green tint, odor

SAND, silty, wet, 10YR7/1 light gray, green tint, odor

NOTES:

Sample Retained For Chemical Analysis

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-16

SHEET NUMBER 2 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

DRILLING METHOD: Hollow Stem Auger

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: Split Spoon

BORING LOCATION: Adjacent to Main Line

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL: 7.41'

START DATE: 02/26/97 FINISH DATE: 02/26/97

WATER ELEVATION:

START TIME: 13:50 FINISH TIME: 15:30

DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
				21	SM	
				22		
				23		
				24		
				25	CL	
				26		
				27		
				28		
				29		
				30		
				31		
				32		
				33		
				34		
				35		
				36		
				37		
				38		
				39		
				40		

SOIL DESCRIPTION AND DRILLING CONDITIONS:

SAND, silty, wet, 10YR7/1, light gray, odor

CLAY, silty, slightly moist,  
 10YR4/8 red with 10YR7/1 light gray mottling, firm, odor

Boring TD = 30.0'

NOTES:

Sample Retained For Chemical Analysis

Sample Retained For Chemical Analysis

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-17

SHEET NUMBER 1 OF 2

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works  
 PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road Houston, TX

DRILLING CONTRACTOR: Best Drilling Services  
 DRILLING METHOD: Hollow Stem Auger

SAMPLING METHOD: Split Spoon

BORING LOCATION: East of Entrance Gate  
 START DATE: 02/25/97 FINISH DATE: 02/25/97  
 START TIME: 15:30 FINISH TIME: 17:45

SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL: 9.97'  
 WATER ELEVATION:  
 DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH
SS	0 - 5	---	1.5	1	CL
				2	
				3	
				4	
				5	CH
SS	5 - 10	---	5.0	6	CL
				7	
				8	
				9	
				10	
SS	10 - 15	---	3.5	11	SM
				12	
				13	
				14	
SS	15 - 20	---	5.0	16	SM
				17	
				18	
				19	
				20	

SOIL DESCRIPTION AND DRILLING CONDITIONS:

1-5: Fill, moist, gravel, CLAY, silty, slightly moist, 10YR3/1 very dark gray

5-6: CLAY; very slightly moist

6-10: CLAY; silty; 10YR6/1; gray, very slightly moist; mottling with 10YR6/8 brownish yellow and 10YR3/1 very dark gray; scattered Fe nodules, scattered calcareous nodules (1/4" - 3/4")

11-14: Silt content increases

14-15: SAND, moist, very silty, 10YR6/1 gray, greenish tint, odor

16-20: Saturated, slightly silty

NOTES:

PP = 3.0

PP = 3.0

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-17

SHEET NUMBER 2 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

DRILLING METHOD: Hollow Stem Auger

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: Split Spoon

BORING LOCATION: East of Entrance Gate

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL: 9.97'

START DATE: 02/25/97 FINISH DATE: 02/25/97

WATER ELEVATION:

START TIME: 15:30 FINISH TIME: 17:45

DATE: 03/25/97

						SOIL DESCRIPTION AND DRILLING CONDITIONS.		NOTES:
SAMPLER TYPE	SAMPLE DEPTH	DVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	I	
SS	20 - 25	1.5	2.5	21	SP			SAND, saturated, 10YR6/1 gray, odor, brown staining
				22				
				23				
				24				
				25				
SS	25 - 30	---	2.5	26				10YR7/3 very pale brown
				27				
				28				
				29				
				30				
SS	30 - 35	---	5.0	31	CH			CLAY, moist, 10YR4/8 red with 5YR7/1 light gray mottling, Highly fractured, odor, contaminant staining
				32				
				33				
				34				
				35				
				36				Boring TD @ 35 Feet
				37				
				38				
				39				
				40				

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing





# MW-17C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-17C Date Drilled 12/10/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72' Boring Diam. 7.88"  
 N. Coord. 728778.5050' E. Coord. 3167446.4830' Surface Elevation 47.56' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.0"  
 Casing: Type Stainless Steel Diam. 2" Length 59.5' Sump Length 2.5'  
 Top of Casing Elevation 50.17' Stickup 3'  
 Depth to Water: 1. Ft. 24.45 (12/29/03) 2. Ft. 0 (        )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Hollow stem auger Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
47.56	0					0-3	0-0.4 0.4-3	FILL: Asphalt, cobbles, and some sand. SILTY SAND: Black (5YR 2.5/1), very fine-grained, subrounded, sorted, trace rootlets, trace gravels, strong odor, moist, 100 % recovery.
					9.2	3-5	3-5	SILTY CLAY: Gray (5YR 5/1), mottled, plastic, stiff (pp= 2.0 tsf), poorly developed cleavage, trace fractures, some iron staining, trace gravel, trace sand, trace rootlets, odor, moist, 50 % recovery.
45	5				8.7	5-7	5-7	NO RECOVERY
					NM	7-9	7-8	SILTY CLAY: Gray (5YR 5/1), light brown mottling, plastic, very stiff (pp= 3.25 tsf), poorly developed cleavage, trace fractures, some iron staining, trace gravel, trace rootlets, odor, moist, 100 % recovery.
					3.3	8-10.3	8-10.3	SANDY CLAY: Gray (5YR 5/1), plastic, soft (pp= 0.5 tsf) at 8', very soft (pp = 0.25 tsf) at 10', gravels up to >10 mm in diameter, odor, moist, 100 % recovery.
					3.6	9-11		
40	10				2.6		10.3-13.7	SILTY CLAY: Light brownish gray (2.5YR 6/2) from 10.3'-11', light olive brown (2.5YR 5/3) from 11'-15', very stiff (pp= 3.5 tsf) at 11', very soft (pp= 0.0 tsf) at 13', some gravel (up to 5mm in diameter) from 13'-13.7', some wood fragments from 13'-13.7', trace sand increasing with depth, moist, 100% recovery.
					2.2	11-13		
					NM	13-15		
					1.9		13.7-21	SILTY SAND: Greenish gray (GLEYS 6/10GY) from 13.7'-19', yellowish brown (10YR 5/4) from 19'-21', fine-grained, sorted, subangular, trace of clay, some medium sand (up to 2 mm in diameter), moist from 13.7'-15', saturated from 15'-21', 25% recovery.
	15						17	



# MW-17C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-17C Date Drilled 12/10/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72' Boring Diam. 7.88"  
 N. Coord. 728778.5050' E. Coord. 3167446.4830' Surface Elevation 47.56' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.0"  
 Casing: Type Stainless Steel Diam. 2" Length 59.5' Sump Length 2.5'  
 Top of Casing Elevation 50.17' Stickup 3'  
 Depth to Water: 1. Ft. 24.45 (12/29/03) 2. Ft. 0 (        )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Hollow stem auger Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
35	15	[Pattern]	[Pattern]	[Pattern]	1.5	15-17		
		[Pattern]	[Pattern]	[Pattern]	1.9	17-19		
		[Pattern]	[Pattern]	[Pattern]	1.9	19-21		
30	20	[Pattern]	[Pattern]	[Pattern]	4.7	21-23	21-25	NO RECOVERY
		[Pattern]	[Pattern]	[Pattern]		23-25		
25	25	[Pattern]	[Pattern]	[Pattern]	NM	25-27	25-28	SILTY CLAY: Gray (10YR 6/1), plastic, stiff (pp=1.75 tsf) at 25.5', hard (pp= >4.5 tsf) at 26.8', slightly fractured, black staining from 25'-25.8', some pink discoloration, strong odor, moist, 67% recovery.
		[Pattern]	[Pattern]	[Pattern]	282			
		[Pattern]	[Pattern]	[Pattern]	52.2	27-28		
		[Pattern]	[Pattern]	[Pattern]	NM	28-30	28-44	CLAY: Gray (5Y 6/1) from 28'-34', red (10R 4/6) from 34'-40', red (10R 4/4) from 40'-42', mottled, plastic, hard (pp= 4.5 tsf) at 29', 33', 35', 37', 41', and 43', hard (pp= 4.25 tsf) at 39', fractured, product in some fractures, some iron staining, some black staining, trace silt lenses, trace rootlets, slicken sides, some sand seams at 36.2' and 37.5', trace white nodules (up to 5mm in diameter) from 38'-40', odor, moist, 72% recovery.
30		[Pattern]	[Pattern]	[Pattern]				



# MW-17C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-17C Date Drilled 12/10/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72' Boring Diam. 7.88"  
 N. Coord. 728778.5050' E. Coord. 3167446.4830' Surface Elevation 47.56' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.0"  
 Casing: Type Stainless Steel Diam. 2" Length 59.5' Sump Length 2.5'  
 Top of Casing Elevation 50.17' Stickup 3'  
 Depth to Water: 1. Ft. 24.45 (12/29/03) 2. Ft. 0 (          )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Hollow stem auger Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
20	30				33.5	30-32		
					65.9	32-34		
					113.4	34-36		
15	35				26.4	36-38		
					96.8	38-40		
10	40				59.9	40-42		
					8.9	42-44		
					18.1	44-46	44-45.3	SANDY CLAY: Light gray (5Y 7/1), light brown mottling, plastic, hard (pp= 4.0 tsf), fractured, trace silt lenses, some black staining, odor, moist, 100% recovery.
45							19	



# MW-17C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-17C Date Drilled 12/10/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72' Boring Diam. 7.88"  
 N. Coord. 728778.5050' E. Coord. 3167446.4830' Surface Elevation 47.56' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.0"  
 Casing: Type Stainless Steel Diam. 2" Length 59.5' Sump Length 2.5'  
 Top of Casing Elevation 50.17' Stickup 3'  
 Depth to Water: 1. Ft. 24.45 ( 12/29/03 ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Hollow stem auger Log By Marcel St. Marie

SKETCH MAP

NOTES  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45								
					23.3	46-48	45.3-45.7 45.7-48	SILTY CLAY: Dusky red (10R 3/4), plastic, very soft (pp= 0.25 tsf), odor moist, 100% recovery. SANDY CLAY: Light gray (5Y 7/1), mottled, plastic, hard (pp= >4.5 tsf), fractured, trace silt lenses, some black staining, odor, moist, 100% recovery.
					13.8	48-50	48-48.2 48.2-61	SAND: Light gray (5Y 7/1), cemented, fine-grained, sorted, subangular, moist, 100% recovery. SANDY CLAY: Light gray (5Y 7/1) from 48.2'-60', red (10R 5/6) from 60'-61'. mottled, plastic, hard (pp= >4.0 tsf) at 49', 51', 53', 55', 57', 59', and 61', fractured, trace silt lenses, some black staining, trace silt lenses at 54', trace black nodules from 58'-60', odor, moist, 100% recovery.
50					16.4	50-52		
					9.6	52-54		
					4.0	54-56		
55					4.0	56-58		
					0.0	58-60		
60								

20



# MW-17C DRILLING LOG

O. NO. 422-102 Boring/Well ID MW-17C Date Drilled 12/10/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72' Boring Diam. 7.88"  
 N. Coord. 728778.5050' E. Coord. 3167446.4830' Surface Elevation 47.56' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.0"  
 Casing: Type Stainless Steel Diam. 2" Length 59.5' Sump Length 2.5'  
 Top of Casing Elevation 50.17' Stickup 3'  
 Depth to Water: 1. Ft. 24.45 (12/29/03) 2. Ft. 0 (          )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Hollow stem auger Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-10	60				7.2	60-62	61-64	SILTY CLAY: Red (10R 5/6), plastic, stiff (pp= 2.0 tsf) at 62', very soft (pp= 0.25 tsf) at 63', silt increasing with depth, trace sand, moist, 75 % recovery.
					2.9	62-64		
					1.9	64-66	64-66.3	CLAYEY SILT: Red (10R 5/6), firm (pp= 1.0 tsf), sheen observed throughout interval, trace sand, odor, moist, 100 % recovery.
-15	65				30.3	66-68	66.3-69.7	SANDY SILT: Red (10R 5/6) from 66.3'-68', yellowish red (5YR 5/6) from 68'-69.7', soft (pp= 0.5 tsf) from 68'-69.7', some clay increasing with depth, saturated from 66.3-68', wet from 68'-69.7', 38 % recovery.
					14.9	68-70		
-20	70				3.0	70-72	69.7-70 70-72	SANDY SILTY CLAY: Red (10R 5/6), plastic, stiff (pp=1.25 tsf), some black staining, wet, 50% recovery. CLAY: Red (10R 5/6), plastic, hard (pp=>4.5 tsf), some fractures, some black staining in fractures, some silt lenses, moist, 100 % recovery.
					1.2			T.D. = 72'
75								21



LOG OF BORING NO.: MW-18

SHEET NUMBER 1 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

DRILLING METHOD: Hollow Stem Auger

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: Split Spoon

BORING LOCATION: East End

SURFACE ELEVATION:  
 TOC ELEVATION:  
 WATER LEVEL: 15.41'

START DATE: 02/26/97 FINISH DATE: 02/26/97  
 START TIME: 10:10 FINISH TIME: 12:30

WATER ELEVATION:  
 DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:
SS	0 - 5	---	5.0	1	FILL	Fill, slightly moist, 10YR3/1, very dark gray to 10YR2/1, black, gravel, brick, roots	Sample Retained For Chemical Analysis
				2			
				3			CLAY, silty, very slightly moist, very dark gray 10YR3/1
				4	CL		
				5			
SS	5 - 10	---	5.0	6		Silt decreases, 10YR6/1 gray, odor	PP = 3.0
				7		50% calcareous nodules	
				8		Calcareous nodules decrease, mottling with 10YR6/8 brownish yellow and 10YR4/1 dark gray	PP = 2.5
				9			
SS	10 - 15	---	5.0	11	Scattered calcareous and FE nodules	PP = 2.5	
				12			
				13			
				14			
				15		Very silty	PP = 1.0
SS	15 - 20	---	5.0	16	ML	SILT, clayey, moist, 10YR6/1, gray, mottling with 10YR4/1, dark gray, and 2.5R4/8, red, scattered calcareous and Fe nodules, green staining, no odor.	
				17			
				18			
				19			
				20	SM	SAND, silty, moist, 10YR6/1 gray, green tint, odor	

Geologist: B. Goldsby  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



LOG OF BORING No.: MW-18

SHEET NUMBER 2 OF 2  
Location Diagram

CLIENT: Southern Pacific Lines  
PROJECT NAME: Houston Wood Preserving Works

DRILLING CONTRACTOR: Best Drilling Services  
DRILLING METHOD: Hollow Stem Auger

PROJECT NUMBER: 44102069.07  
PROJECT LOCATION: 4910 Liberty Road  
Houston, TX

SAMPLING METHOD: Split Spoon

BORING LOCATION: East End

SURFACE ELEVATION:  
TOC ELEVATION:  
WATER LEVEL: 15.41'

START DATE: 02/26/97 FINISH DATE: 02/26/97  
START TIME: 10:10 FINISH TIME: 12:30

DATE: 03/25/97

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C
SS	20 - 25	---	5.0	21	SP	
				22		
				23		
				24		
				25		
SS	25 - 30	---	3.75	26	CH	
				27		
				28		
				29		
				30		
SS	30 - 35	---	5.0	31		
				32		
				33		
				34		
				35		
				36		
				37		
				38		
				39		
				40		

SOIL DESCRIPTION AND DRILLING CONDITIONS

SAND, saturated, 10YR6/2, light brownish gray, greenish staining, odor, calcareous material at bottom.

CLAY, slightly moist, 2.5R4/8, red, with mottling 10YR7/1, light gray, firm, hard, fractures, odor.

Very slightly moist, 5YR6/6 reddish yellow with light gray 10YR7/1 mottling, hard, firm, no fractures, no odor, silt content increases, calcareous nodules.

Boring TD = 35'

NOTES:

Sample Retained For Chemical Analysis

PP = 3.0

Sample Retained For Chemical Analysis

PP = 4.0

Geologist: B. Goldsby  
Checked By:

LEGEND:  
SS - Split Spoon

CI - Completion Interval  
OVM - Organic Vapor Meter  
PP - Pocket Penetrometer  
TOC - Top Of Casing



LOG OF BORING No.: MW-18C

SHEET NUMBER 1 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Preserving Works

DRILLING METHOD: Hollow Stem Auger

PROJECT NUMBER: 44102069.07  
 PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

SAMPLING METHOD: CME 5-foot Sampler

BORING LOCATION: East corner of site

SURFACE ELEVATION:

TOC ELEVATION:

WATER LEVEL:

START DATE: 04/24/97 FINISH DATE: 04/25/97

WATER ELEVATION:

START TIME: FINISH TIME:

DATE:

SOIL DESCRIPTION AND DRILLING CONDITIONS:

NOTES:

SAMPLER TYPE	SAMPLE DEPTH	QVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES
				51	CH		Boring Advanced with 8 1/4-inch O.D., 4 1/4-inch I.D. HSA
				52			
				53			
				54			
CB1			4.7'	55			CLAY; reddish brown; hard; medium plasticity; moist
				56			
				57			
				58			
				59			
	60.0			60			
CB 2			3.7	61			
				62			
				63			
				64	ML	SILT; reddish brown; firm; non-plastic; dilatent; moist	
				65	CL	Silty CLAY; reddish brown; very stiff; low plasticity; moist with CaCO3 nodules, pea size	
CB 3			3.4	66	SP	Silty SAND; reddish brown; mild creosote odor very fine grained; wet	





LOG OF BORING No.: MW-18C

SHEET NUMBER 2 OF 2

DRILLING CONTRACTOR: Best Drilling Services

Location: Diagram

DRILLING METHOD: Hollow Stem Auger

CLIENT: Southern Pacific Lines  
 PROJECT NAME: Houston Wood Perserving Works

PROJECT NUMBER: 44102069.07 SAMPLING METHOD: CME 5-foot Sampler

PROJECT LOCATION: 4910 Liberty Road  
 Houston, TX

BORING LOCATION: East corner of site

START DATE: 04/23/97 FINISH DATE: 04/24/97 WATER ELEVATION:

START TIME: FINISH TIME: DATE:

SAMPLER TYPE	SAMPLE DEPTH	OVM (PPM)	RECOVERY (FT)	DEPTH IN FEET	SOIL GRAPH	C	SOIL DESCRIPTION AND DRILLING CONDITIONS	NOTES:
CB 4			3.2	71			grading fine to very fine grained	
				72			3" thick clay lens @ 71.5'	
				73			grading fine to medium grained; creosote odor	
				74			grading with trace gravel and oil sheen and creosote odor	
	75.0			75			grading fine to very fine grained; oil sheen grades out	
CB 5			4.1	76	CH		CLAY; reddish brown; hard; medium plasticity	
				77				
				78				
				79			grading reddish brown; and light gray	
	80.0			80			grading light gray	
				81				Bottom of boring @ 80.0'
				82				Install monitoring well 18C on 4/24/97
				83				
				84				
				85				
				86				
				87				
				88				
				89				
				90				

Geologist: R. Lamb  
 Checked By:

LEGEND:  
 SS - Split Spoon

CI - Completion Interval  
 OVM - Organic Vapor Meter  
 PP - Pocket Penetrometer  
 TOC - Top Of Casing



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**MW-19C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-19C Date Drilled 10/15/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 75.2' Boring Diam. 10"  
 N. Coord. 728619.81' E. Coord. 3167726.90' Surface Elevation 50.08' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 63' Sump Length 0.5'  
 Top of Casing Elevation 53.05' Stickup 3.05'  
 Depth to Water: 1. Ft. 29.34 ( 11/10/98 ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
50.08	0					0-2.5	0-2.5	SILTY SAND: Light yellowish brown 10YR6/4; very dense; fine grained; dry; angular to subangular; abundant gravel, poorly sorted. At 0-1' collect surface soil sample MW19C-00
					35	2.5-5	2.5-3.7	SANDY CLAY: Dark grayish brown 2.5Y4/2; loose; low plasticity; moist; abundant gravel; slight odor.
						5-10	3.7-5	CLAYEY SILT: Black, soft to loose; non-plastic; moist; with some very fine grained sand; somewhat shiny coating; no fluorescence; slight odor.
45	5						5-8.6	SILTY CLAY: Very dark gray 2.5Y3/1; soft to firm; plastic; moist; large blocky ped structure.
						10-15	8.6-11.4	SILTY CLAY: Gray 2.5Y5/1; hard; plastic; moist; many small caliche nodules; no staining; very slight odor.
40	10				3		11.4-15.7	SILTY CLAY: Gray 2.5Y5/1 mottled with olive yellow 2.5Y6/8; soft to firm; very plastic; moist; trace small caliche nodules; no staining; very slight odor.
35	15					15-20	15.7-18	SILTY SANDY CLAY: Greenish gray 5GY6/1 mottled with gray 2.5Y5/1; soft; plastic; moist; no staining; no odor.
							18-20	SANDY CLAY: Gray 2.5Y5/1; soft; plastic; moist; no staining; no odor.
30	20					20-25	20-31	CLAYEY SAND: Gray 2.5Y6/1; loose; fine grained; subrounded; well sorted; wet; no staining; no odor.
25								



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**MW-19C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-19C Date Drilled 10/15/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 75.2' Boring Diam. 10"  
 N. Coord. 728619.81' E. Coord. 3167726.90' Surface Elevation 50.08' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 63' Sump Length 0.5'  
 Top of Casing Elevation 53.05' Stickup 3.05'  
 Depth to Water: 1. Ft. 29.34 ( 11/10/98 ) 2. Ft. ( )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25	25					25-30		At 25.0' grades to olive gray 5Y5/2; strong odor
								At 28.0' NAPL present throughout saturated matrix
20	30				14	30-35	31-34.5	SILTY CLAY: Gray 2.5Y6/1 mottled with yellowish brown 10YR5/8; very hard; plastic; moist; trace to some microfractures; fluorescence in and around microfractures; strong odor.
15	35				36	35-40	34.5-35 35-40	SILTY CLAY: Variegated (brown, white, pink, olive, gray); many caliche nodules; very hard; moist; some microfractures; strong odor. SILTY CLAY: Yellowish red 5Y4/6; hard to very hard; plastic; moist; small, angular, blocky ped structure; no staining; no fluorescence; strong odor.
10	40					40-45	40-50	At 36-40' collect soil sample MW19C-38 & SPLP At 38.4' lens of small caliche nodules At 38.8' lens of small caliche nodules At 39.5' lens of small caliche nodules CLAY: Red 2.5YR4/6 mottled with greenish gray 10GY6/1; very hard; plastic; moist; some microfractures; strong odor. At 41.0' to 42.0' NAPL present; slight light-brown staining inside microfractures; slight fluorescence. At 43.0' no NAPL or staining; strong odor.
5	45					45-50		At 45.0' some macrofractures(horizontal).
	50							



**MW-19C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-19C Date Drilled 10/15/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 75.2' Boring Diam. 10"  
 N. Coord. 728619.81' E. Coord. 3167726.90' Surface Elevation 50.08' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 63' Sump Length 0.5'  
 Top of Casing Elevation 53.05' Stickup 3.05'  
 Depth to Water: 1. Ft. 29.34 ( 11/10/98 ) 2. Ft.            (            )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	50					50-55	50-52	SANDY SILTY CLAY: Yellowish red 5YR4/6; soft to firm; low plasticity; moist to wet; no staining; slight odor.
					7		52-57.5	CLAY: Red 2.5YR5/6, very hard; plastic; moist; no staining; very slight odor.
-5	55				4	55-57.5		At 55-57' collect soil sample MW19C-55 & SPLP
						57.5-58	57.5-58	At 57.5' bottom of 8-inch diameter steel surface casing
						58-62	58-63.7	OTHER: Not sampled CLAY: Red 2.5YR4/6; very hard; plastic; moist; no staining; no odor.
-10	60				0.7			At 60-62' collect soil sample MW19C-60 & SPLP
						62-66		
							63.7-65	SANDY CLAY: Yellowish red 5YR4/6; soft; plastic; wet; no staining; no odor. Sand is very fine grained, well sorted, subrounded.
-15	65						65-66	CLAYEY SILT: Yellowish red 5YR4/6; soft; plastic; moist to wet; no staining; no fluorescence; no odor.
							66-68	CLAYEY SAND: Yellowish red 5YR4/6; loose; very fine grained; subrounded; well sorted; wet; no staining; no odor.
							68-70	NO RECOVERY: Probable clayey sand sheen recovered inside core-barrel. Driller reported very easy to drill through this interval.
-20	70						70-72	
						72-75.2	72-73.2	SANDY SILTY CLAY: Yellowish red 5YR4/6; soft to firm; plastic; moist to wet; very fine grained; no staining; no odor.
					0.7		73.2-75.2	At 73.0' to 75.0' collect soil sample MW19C-73 & SPLP SILTY CLAY: Yellowish red 5YR4/6; trace reddish yellow 7.5YR6/8 mottling; very hard; plastic; moist; no staining; no fluorescence; no odor.
	75							



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**MW-19C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-19C Date Drilled 10/15/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 75.2' Boring Diam. 10"  
 N. Coord. 728619.81' E. Coord. 3167726.90' Surface Elevation 50.08' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 63' Sump Length 0.5'  
 Top of Casing Elevation 53.05' Stickup 3.05'  
 Depth to Water: 1. Ft. 29.34 ( 11/10/98 ) 2. Ft.            (            )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-25	75							T.D. = 75.2'
-30	80							
-35	85							
-40	90							
-45	55							
100								



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**MW-20A  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-20A Date Drilled 09/28/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 30' Boring Diam. 8.25"  
 N. Coord. 728600.42' E. Coord. 31670990.58' Surface Elevation 47.47' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 15' Sump Length 0.5'  
 Top of Casing Elevation 50.43' Stickup 2.96'  
 Depth to Water: 1. Ft. 8.54 (11/16/98) 2. Ft. \_\_\_\_\_  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
47.47	0					0-3	0-1	SANDY GRAVEL: Pink to white to gray; loose; dry; angular to subangular gravel; fine to medium grained sand (Fill).
							1-6	CLAYEY SILT: Dark gray 2.5Y4/1; firm; non-plastic; moist; some gravel; no odor. At 3.0' grades to very dark gray 2.5Y3/1, hard
	45					3-5		
	5					5-10		
	40					6-15		SILTY CLAY: Dark gray 2.5Y4/1 mottled with light olive brown 2.5Y5/6; firm to very stiff; PP = 1.25-2.5; plastic; moist; no odor. At 6.0-6.5' trace caliche, subrounded, 0.1 to 1" diameter At 8.0-9' trace caliche, subrounded, 0.1 to 1" diameter
	10					10-15		At 10.0' grades to light olive gray 5Y6/2 mottled with olive 5Y5/6 and dark gray 5Y4/1; with trace very fine grained sand At 11.3' trace caliche nodules, subrounded, 0.5" diameter
	35				0.5	15-20	15-25	CLAYEY SAND: Greenish gray; 10GY5/1; loose; wet; very fine to fine grained; well sorted; no fluorescence; slight odor.
	15					20-25		
	30				10			
	20							
	25							
	25				18			At 24-26' collect soil samples MW20A-24 and MW20A-24D



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**MW-20A  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-20A Date Drilled 09/28/98  
 Project Phase 2B RF1 Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 30' Boring Diam. 8.25"  
 N. Coord. 728600.42' E. Coord. 31670990.58' Surface Elevation 47.47' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 15' Sump Length 0.5'  
 Top of Casing Elevation 50.43' Stickup 2.96'  
 Depth to Water: 1. Ft. 8.54 ( 11/16/98 ) 2. Ft. ( )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25	25				3	25-30	25-30	SILTY CLAY: Greenish gray 10GY5/1 mottled with yellowish red 5YR4/6; very stiff PP = 0.5-2.75; plastic; moist; with very fine grained sand; no odor.  At 28-30' collect soil sample MW20A-28  T.D. = 30'
20								
30								
15								
35								
10								
40								
5								
45								
0								
50								



**MW-21C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-21C Date Drilled 10/26/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 76' Boring Diam. 16"  
 N. Coord. 727730.42' E. Coord. 3165884.50' Surface Elevation 46.62' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 62.5' Sump Length 0.5'  
 Top of Casing Elevation 49.05' Stickup 2.43'  
 Depth to Water: 1. Ft. 28.38 ( 11/11/98 ) 2. Ft. ( )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
46.62	0					0-4	0-0.4 0.4-0.8 0.8-1.5 1.5-5	SANDY SILTY CLAY: Very dark grayish brown 10YR3/2; soft; plastic; moist; many roots; some small gravel, subrounded. At 0-1' collect surface soil sample MW21C-00 & SPLP SILTY SAND: with some small gravel; very coarse; sub angular; wet; loose (FILL). OTHER: Wood-like fibers: Black, shiny; mulch-like odor.
45					16	4-5	5-12.5	SILTY CLAY: Greenish gray 5G6/1 mottled with light olive brown 2.5Y5/6; firm to hard; plastic; moist; no staining; slight to no odor. SILTY CLAY: Greenish gray 10GY6/1 mottled with light olive brown 2.5Y5/6; firm; plastic; moist; with some sand; many caliche nodules; with some lenses of silty clay, greenish gray 5GY5/1, soft, plastic, moist; no staining; no odor. At 8-10' collect soil sample MW21C-08 & SPLP
40					44	10-14		
35						12.5-14.5		SANDY CLAY: Light greenish gray 10Y7/1; firm; low plasticity; moist; no staining; no odor.
30	15				23	14-18	14.5-18.5	CLAYEY SAND: Light greenish gray 10Y7/1; loose; fine grained; subrounded; well sorted; wet; no staining; no odor.
25					1.2	18-22	18.5-22	SILTY CLAY: Greenish gray 10GY6/1 mottled with strong brown 7.5YR4/6; firm; plastic; moist; no staining; no fluorescence; no odor. At 20-22' collect soil sample MW21C-20 At 20.0' strong brown grades to yellowish brown 10YR5/8
20						22-24	22-24	At 22.0' bottom of 12-inch diameter steel casing. Continue with mud rotary drilling
25						24-28	24-31	Not sampled. SILTY CLAY: Yellowish red 5YR4/6 mottled with light gray 5Y7/1; firm; plastic; moist; no staining; no odor.





**MW-21C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-21C Date Drilled 10/26/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 76' Boring Diam. 16"  
 N. Coord. 727730.42' E. Coord. 3165884.50' Surface Elevation 46.62' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 62.5' Sump Length 0.5'  
 Top of Casing Elevation 49.05' Stickup 2.43'  
 Depth to Water: 1. Ft. 28.38 ( 11/11/98 ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25						28-32		
20							31-32	SANDY CLAY: Light gray 5Y7/2 mottled with red 2.5YR4/6; hard; low plasticity; moist; no staining; no odor.
30						32-34	32-36	CLAYEY SAND: Strong brown 7.5YR5/6; very fine grained; well sorted; subrounded; wet; no staining; no odor.
15						34-36		
35						36-38	36-37.5	SILTY SANDY CLAY: Strong brown 7.5YR5/8; soft; plastic; wet; no staining; no fluorescence; very slight odor.
10						37.5-38	37.5-38	CLAYEY SAND: Strong brown 7.5YR4/6; loose; very fine grained; well sorted; subrounded; no staining; no fluorescence; very slight odor.
5						38-42	38-42	SILTY CLAY: Reddish brown 2.5YR4/4; very hard; very plastic; moist; no staining; no odor.
40						42-46	42-46	CLAY: Red 2.5YR4/6; very hard; very plastic; moist; no staining; no odor.
45								At 44-46' Collect soil sample MW21C-44 and MW21C-44D
0						46-48	46-48	At 46' Bottom of 8-inch diameter steel casing NOT SAMPLED:
50						48-52	48-56	CLAY: Red 2.5YR4/6; very hard; very plastic; moist; trace microfractures; no staining; no odor.



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**MW-21C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-21C Date Drilled 10/26/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 76' Boring Diam. 16"  
 N. Coord. 727730.42' E. Coord. 3165884.50' Surface Elevation 46.62' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 62.5' Sump Length 0.5'  
 Top of Casing Elevation 49.05' Stickup 2.43'  
 Depth to Water: 1. Ft. 28.38 ( 11/11/98 ) 2. Ft. ( )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVN (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
50								
-5						52-56		
55							56-58	CLAY: Yellowish red 5YR4/6; hard; very plastic; moist; some PVC pieces; no staining; no odor.
-10					0		58-60	SILTY CLAY: Yellowish red 5YR4/6; hard; plastic; moist; no staining; no odor.
60						60-64	60-62.5	SANDY CLAY: Yellowish red 5YR4/6; soft to firm; low plasticity; wet; no staining; no odor.
-15					0		62.5-64	SILTY CLAY: Yellowish red 5YR4/6; firm to hard; plastic; moist; trace microfractures; no staining; no odor.
65						64-66	64-66	NO RECOVERY: Driller reports that interval drilled like sand.
-20						66-68	66-68	CLAYEY SAND: Strong brown 7.5YR4/6; loose; fine grained; subangular; well sorted; wet; no staining; no odor.
70						68-72	68-72	NO RECOVERY: Driller reports that interval drilled like sand.
-25					0	72-76	72-76	CLAY: Brown 7.5YR4/3; hard; plastic; moist; iron coloration in macrofracture; no odor. At 72-74' collect MW21C-72 and MW21C-72D
75								



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**MW-21C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-21C Date Drilled 10/26/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 76' Boring Diam. 16"  
 N. Coord. 727730.42' E. Coord. 3165884.50' Surface Elevation 46.62' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 62.5' Sump Length 0.5'  
 Top of Casing Elevation 49.05' Stickup 2.43'  
 Depth to Water: 1. Ft. 28.38 (11/11/98) 2. Ft. ( )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
75								T.D. = 76'
-30								
80								
-35								
85								
-40								
90								
-45								
95								
-50								
100								



**MW-22A  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-22A Date Drilled 10/01/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 25' Boring Diam. 8.25"  
 N. Coord. 727875.63' E. Coord. 3165677.21' Surface Elevation 45.88' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 10' Sump Length 0.5'  
 Top of Casing Elevation 46.07' Stickup 0'  
 Depth to Water: 1. Ft. 4.12 ( 11/10/98 ) 2. Ft. ( )  
 Drilling Company Best Drilling Services Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45.88	0					0-3	0-1	SILTY SAND: Dark grayish brown 10YR4/2; loose; moist; with gravel, 0.2-0.5" diameter, subangular; some small roots; some angular shell fragments; 1 bottle cap. At 0-1' Collect surface soil sample MW22A-00 & SPLP
45						3-5	1-3	SILTY SANDY CLAY: Dark grayish brown 2.5Y4/2; stiff; plastic; moist; trace small roots; no odor.
40	5					5-10	3-13.8	SILTY CLAY: Gray 2.5Y5/1 mottled with olive yellow 2.5Y6/8; stiff; plastic; moist; trace small roots; no odor. At 5.8-6.3' some medium caliche-like gravel (0.5-1" diam.)  At 8.0-9.3' some small to large caliche nodules (<1.5")
35	10					10-15		
30	15					15-20	13.8-15	SANDY CLAY: Light gray 5Y7/2 mottled with olive yellow 5Y6/6; stiff; plastic; moist; no odor.
25	20					20-25	15-18	CLAYEY SAND: Light gray 5Y7/2; very fine to fine grained; well sorted; rounded; wet; no odor.
							18-20	SILTY CLAY: Light gray 5Y7/2 mottled with yellowish red 5YR4/6; hard; plastic; moist; with some very fine grained sand; no odor. At 19.1-19.2' fine grained sand lens, light gray 5Y7/2.
							20-25	SILTY CLAY: Light gray 2.5Y7/2 mottled with olive yellow 2.5Y6/8; very stiff; plastic; moist; no odor.
	25							T.D. = 25'



MW-22B  
DRILLING LOG

W.O. NO. 422-09 Boring/Well ID MW-22B Date Drilled 10/27/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 42' Boring Diam. 10"  
 N. Coord. 727871.34' E. Coord. 3165678.00' Surface Elevation 45.61' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 27.5' Sump Length 0.5'  
 Top of Casing Elevation 45.86' Stickup 0'  
 Depth to Water: 1. Ft. 3.70 (11/10/98) 2. Ft.        (      )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45.61 45	0					0-24	0-1 1-3 3-13.8	MW-22A, located 5' north, was cored continuously from ground surface to 25' and accordingly, MW-22B was not cored through this interval. The MW-22A lithology is presented for informational purposes; refer to the MW-22A log for soil descriptions. SILTY SANDY CLAY SILTY CLAY
40	5							
35	10							
30	15						13.8-15 15-18	SANDY CLAY CLAYEY SAND
25	20						18-20 20-25	SILTY CLAY SILTY CLAY
								At 22-24' collect soil samples MW22B-22 and MW22B-22D
25						24-25		At 24.0' bottom of 8-inch diameter steel casing



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**MW-22B  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-22B Date Drilled 10/27/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 42' Boring Diam. 10"  
 N. Coord. 727871.34' E. Coord. 3165678.00' Surface Elevation 45.61' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 27.5' Sump Length 0.5'  
 Top of Casing Elevation 45.86' Stickup 0'  
 Depth to Water: 1. Ft. 3.70 (11/10/98) 2. Ft. \_\_\_\_\_  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
20	25					25-27	25-27.8	SANDY SILTY CLAY: Light gray 5Y7/2 mottled with strong brown 7.5YR5/6; firm; low plasticity; moist; no staining; no odor.
	27-31					27.8-35	CLAYEY SAND: Strong brown 7.5YR5/8; loose to medium dense; very fine grained; well sorted; wet; no staining; no odor.	
15	30					31-33	At 30.5' grades yellowish red 5YR5/6 mottled with light gray 5Y7/2	
	33-35					33-35		
10	35					35-37	35-38	NO RECOVERY: Driller reports interval drilled like sand.
5	40					38-42	38-42	SILTY CLAY: Yellowish red 5YR5/6; firm; very plastic; moist; no staining; no odor.
							T.D. = 42'	
	45							
	50							



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**MW-23C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-23C Date Drilled 10/14/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 76' Boring Diam. 10"  
 N. Coord. 728759.11' E. Coord. 3167721.35' Surface Elevation 48.85' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 62' Sump Length 0.5'  
 Top of Casing Elevation 51.91' Stickup 3.06'  
 Depth to Water: 1. Ft. 29.34 ( 11/10/98 ) 2. Ft. ( )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
48.85	0					0-2	0-2	SILTY SAND: Grayish brown 2.5Y5/2; very dense; angular to subangular; very fine grained; some to many gravel (0.1" to 1" diameter). At 0.0-1' collect surface soil sample SB23-00 and SPLP
						2-5	2-5	CLAYEY SANDY SILT: Black 2.5Y2.5/1; hard; friable; moist; some small gravel (0.1-0.3" diameter); trace sheen; very faint fluorescence; slight odor.
45	5					5-7	5-7	SANDY CLAY: Light gray 2.5Y7/1 hard; plastic; moist; some small gravel (0.1" diameter); no staining; no fluorescence; no odor.
						7-9	7-11	SILTY CLAY: Light gray 2.5Y7/2; firm to hard; plastic; moist; some small gravel (0.1-0.3" diameter); angular to subangular; no staining; no odor.
40	10				3	9-11		
						11-15	11-15	SANDY CLAY: Light gray 2.5Y7/2; firm to hard; plastic; moist; trace organic matter; no staining; very slight odor.
35	15				11	15-19	15-25	CLAYEY SAND: Light gray 2.5Y7/2; loose; wet; very fine to fine grained; well sorted; no staining; no fluorescence; slight odor.
30	20					19-23		At 19.0' grades light yellowish brown 2.5Y6/3
25	25					23-25		At 23.0' with NAPL, strong odor.



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## MW-23C DRILLING LOG

W.O. NO. 422-09 Boring/Well ID MW-23C Date Drilled 10/14/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 76' Boring Diam. 10"  
 N. Coord. 728759.11' E. Coord. 3167721.35' Surface Elevation 48.85' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 62' Sump Length 0.5'  
 Top of Casing Elevation 51.91' Stickup 3.06'  
 Depth to Water: 1. Ft. 29.34 (11/10/98) 2. Ft. \_\_\_\_\_ (\_\_\_\_\_)  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method Mud Rotary Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)			
25	25				21	25-29	25-26	CLAY: Yellowish red 5YR4/6; very hard; very plastic; moist; angular blocky substructure; no staining; strong odor.			
								26-33	26-33	SILTY CLAY: Light gray 2.5Y7.1 mottled with light yellowish brown 2.5Y6/4; hard to very hard; plastic; moist; trace light to medium brown staining in microfractures; strong odor.	
20								29-33		At 29.0' light yellowish brown grades to yellowish brown 10YR5/6	
30								64		At 31.0-33' collect soil sample SB23-31 and SPLP At 32.0' trace small gravel-size caliche nodules	
15								33-37	33-37	CLAY: Brown 7.5YR5/4 mottled light greenish gray 10GY7/1; hard; very plastic; moist; no staining; odor to strong odor.	
35								28	37-41	37-45	CLAY: Yellowish red 5YR4/6 mottled with light greenish gray 5GY7/1; very hard; very plastic; moist; small angular blocky substructures trace to some microfractures; trace to no fluorescence; odor to strong odor.
40									41-45		At 41.0' grades very slight odor to no odor; no fluorescence.
5								4	45-49	45-47	CLAY: Red 2.5YR4/6; very hard; very plastic; moist; trace to some microfractures; small angular blocky substructure; no staining; no odor; no fluorescence
45									47-53	47-53	SILTY CLAY: Red 2.5YR4/6; very hard; very plastic; trace to some microfractures; moist; no staining; no fluorescence; upon fresh break of the core there is a very faint odor.
0									49-53		At 49.0' no odor upon fresh break
50	50										





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## MW-23C DRILLING LOG

W.O. NO. 422-09 Boring/Well ID MW-23C Date Drilled 10/14/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 76' Boring Diam. 10"  
 N. Coord. 728759.11' E. Coord. 3167721.35' Surface Elevation 48.85' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 62' Sump Length 0.5'  
 Top of Casing Elevation 51.91' Stickup 3.06'  
 Depth to Water: 1. Ft. 29.34 (11/10/98) 2. Ft. \_\_\_\_\_ (\_\_\_\_\_)  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
50								
-5					3	53-57	53-57	CLAY: Red 2.5YR4/6; very hard; very plastic; moist; trace to some microfractures; no staining; no odor; no fluorescence.  At 55-57' collect soil sample SB23-55 and SPLP
							57-58	At 57' bottom of 6-inch diameter steel surface casing
-10						58-62	58-62	OTHER: Not Sampled CLAY: Red 2.5YR4/6, very hard; very plastic; moist; no staining, no odor.
60					0.4			At 60-62' collect soil sample SB23-60
-15						62-66	62-66	CLAYEY SILT: Yellowish red 5YR4/6; soft; plastic; moist to wet; no staining; no fluorescence; no odor; no sheen on the water.
65						66-68	66-68	At 65.5' very slight odor CLAYEY SAND: Yellowish red 5YR4/6; loose; wet; very fine to fine grained; subrounded; well sorted; no staining; very slight odor; one very small (1mm) NAPL globule observed.
-20						68-72	68-72	NO RECOVERY: Driller reported probable sand zone.
70						72-76	72-75	SILTY CLAY: Yellowish red 5YR4/6; very hard; plastic; moist; no staining; no odor. At 73-75' collect soil sample SB23-73 and SPLP At 74.0' trace reddish yellow 7.5YR6/8 mottling
-25					0.4			
75								



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**MW-23C  
DRILLING LOG**

W.O. NO. 422-09 Boring/Well ID MW-23C Date Drilled 10/14/98  
 Project Phase 2B RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 76' Boring Diam. 10"  
 N. Coord. 728759.11' E. Coord. 3167721.35' Surface Elevation 48.85' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 62' Sump Length 0.5'  
 Top of Casing Elevation 51.91' Stickup 3.06'  
 Depth to Water: 1. Ft. 29.34 ( 11/10/98 ) 2. Ft. ( )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method Mud Rotary Log By M. Yagan

SKETCH MAP

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NOTES

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
	75						75-76	SILTY CLAY: Brown 7.5YR4/3; very hard; plastic; moist; no staining; no odor. T.D. = 76'
-30	80							
-35	85							
-40	90							
-45	95							
-50								
100								

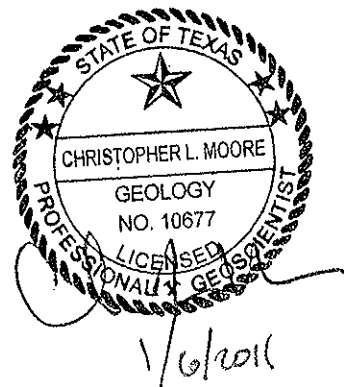


Union Pacific Railroad

# Log of Boring: MW-24AR

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Direct Push Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
PBW Project No. 1358	Driller:	Keith Barge	Total Depth (ft):	30.5
	Driller's License:	4786	Northing:	727530.67
	Field Supervisor:	Tim Jennings	Easting:	3165206.96
	Sampling Method:	2"x6.5' Barrel	Ground Elev. (ft AMSL):	46.28

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	[Patterned]	-	DO	CL	(0 - 6.0) SANDY/GRAVELLY CLAY, CL, gray, moist, moderate creosote odor.
5					(6.0 - 14.3) SANDY CLAY, CL, gray, moist, firm, slight creosote odor, few carbonate nodules at 11.0.
10	[Patterned]	0.9	3.0/3.0	CL	(14.3 - 19.8) SILTY/CLAYEY SAND, light brown, wet, soft, no odor.
15		4	5.0/6.5		
20	[Patterned]	4.7	6.5/6.5	SC/SM	(19.8 - 30.5) SILTY CLAY, CL, gray, moist, firm to hard.
25		5.1		CL	
30	[Patterned]	3.5	6.5/6.5	CL	
		3.2			
		1.6			

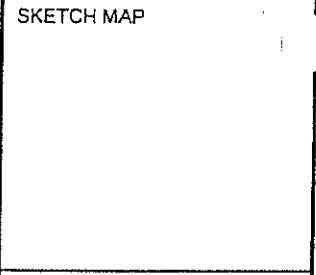


<b>PBW</b> Pastor, Behling & Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446	Notes: Top 8 feet drilled out (DO) with a hydrovac to clear for utilities. Replacement well for MW-24AR.	Initial Fluid Level (2/05/09) ▼ Depth to water: 5.18 ft BTOC
	<b>Annular Materials</b> (0.0 - 9.0) Bentonite Chips (9.0 - 21.0) 16/30 Silica Sand (11.0 - 21.0) Pre Pack Silica Sand (21.0 - 30.5) Cuttings cave-in	<b>Well Materials</b> (0 - 11.0) Casing, 1" Sch 40 FJT PVC (11.0 - 21.0) Screen, 1" Sch 40 FJT PVC, 0.01 slot



**MW-24B  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-24B Date Drilled 03/15/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 50' Boring Diam. 14.5"  
 N. Coord. 727534.32' E. Coord. 3165208.21' Surface Elevation 46.46' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 38.5' Sump Length 0.5'  
 Top of Casing Elevation 46.06' Stickup 0'  
 Depth to Water: 1. Ft. 1.57 ( 03/16/2000 ) 2. Ft. 11.91 ( 3/27/00 )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan



NOTES  
 8" Dia. steel surface casing installed to 25 feet bgs.  
 NAPL = Non-Aqueous Phase Liquid  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
100	0				0	0-25	0-10	SILTY CLAY: MW-24A, located ~9' north, was cored continuously from ground surface to 25' and accordingly, MW-24B was not cored through this interval. The MW-24A lithology is presented for informational purposes; refer to the MW-24A log for soil descriptions.
95	5					10-16	SANDY CLAY	
90	10					16-20	CLAYEY SAND	
85	15					20-25	SILTY CLAY	
80	20					25-26	At 25.0' bottom of 8-inch diameter steel casing	
75	25					26-30	At 33.5-34.0' fractured clay; small to medium, hard, indurated brecciated pieces.	
70	30							



**MW-24B  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-24B Date Drilled 03/15/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 50' Boring Diam. 14.5"  
 N. Coord. 727534.32' E. Coord. 3165208.21' Surface Elevation 46.46' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 38.5' Sump Length 0.5'  
 Top of Casing Elevation 46.06' Stickup 0'  
 Depth to Water: 1. Ft. 1.57 (03/16/2000) 2. Ft. 11.91 (3/27/00)  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSAMud Rotary Log By M. Ylagan

SKETCH MAP

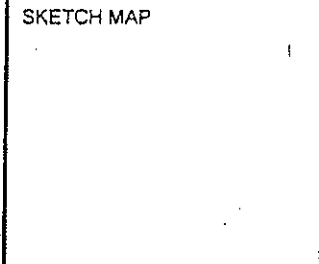
NOTES  
 8" Dia. steel surface casing installed to 25 feet bgs.  
 NAPL = Non-Aqueous Phase Liquid  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
70	30				0 0 0 0 0	30-34	30-45	NOT SAMPLED SILTY CLAY: strong brown 7.5YR5/6 mottled with light gray 2.5Y7/2; very stiff PP=2.0-4.0 tsf; plastic; moist; no odor; no NAPL; no defining structure. CLAY: yellowish red 5YR4/6 mottled with light gray 5Y7/2 stiff to very stiff PP=1.5-2.5 tsf; plastic; moist; no odor; no NAPL.
65	35					34-38	At 34' grades with less mottling of light gray 5Y7/2 At 34-37' some fine grained caliche At 34-38' trace freckly-black coloration	
60	40					38-42	At 38-45' microfractures are filled with light gray clay 5Y7/2; filled microfractures are small and irregular.	
55	45					42-46	SILTY CLAY: yellowish red 5YR5/6 stiff PP=3.0 tsf; plastic; moist; massive; no odor.	
50	50					46-48.5	CLAY: yellowish red 5YR4/6; hard PP=4.5 tsf; plastic; moist; massive; no odor. T.D. = 50'	
45	55					48.5-50	73	



**MW-24C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-24C Date Drilled 03/14/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 74' Boring Diam. 14.5"  
 N. Coord. 727541.75' E. Coord. 3165205.52' Surface Elevation 46.27' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 63' Sump Length 0.5'  
 Top of Casing Elevation 46.05" Stickup 0'  
 Depth to Water: 1. Ft. 22.6 ( 03/16/2000 ) 2. Ft. 25.77 ( 3/27/00 )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan



**NOTES**  
 12" Dia. Steel Surface Casing  
 Installed to 25 feet bgs.  
 8" Dia. Steel Surface Casing  
 Installed to 50 feet bgs.  
 NAPL = Non-Aqueous Phase Liquid  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
100	0					0-26	0-10	SILTY CLAY: MW-24A, located ~9' north, was cored continuously from ground surface to 25' and accordingly, MW-24C was not cored through this interval. The MW-24A lithology is presented for informational purposes; refer to the MW-24A log for soil descriptions.
95	5						10-16	SANDY CLAY
90	10						16-20	CLAYEY SAND
85	15						20-25	SILTY CLAY
80	20						25-26	At 25.0' bottom of 12-inch diameter steel casing
75	25					26-30	26-30	NOT SAMPLED: PVC end cap.
70	30				0		74	SILTY CLAY: strong brown 7.5YR5/6 mottled with light gray 2.5Y7/2; very stiff PP=2.0-4.0 tsf; plastic; moist; no odor; no NAPL; no defining structure.



**MW-24C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-24C Date Drilled 03/14/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 74' Boring Diam. 14.5"  
 N. Coord. 727541.75' E. Coord. 3165205.52' Surface Elevation 46.27' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 63' Sump Length 0.5'  
 Top of Casing Elevation 46.05' Stickup 0'  
 Depth to Water: 1. Ft. 22.6 ( 03/16/2000 ) 2. Ft. 25.77 ( 3/27/00 )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

SKETCH MAP

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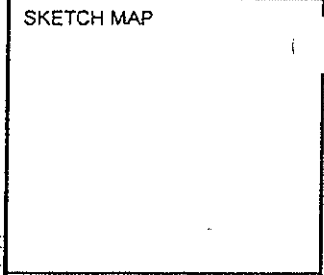
NOTES  
 12" Dia. Steel Surface Casing  
 Installed to 25 feet bgs.  
 8" Dia. Steel Surface Casing  
 Installed to 50 feet bgs.  
 NAPL = Non-Aqueous Phase Liquid  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
70	30				0	30-34	30-45	CLAY: yellowish red 5YR4/6 mottled with light gray 5Y7/2 stiff to very stiff pp=1.5-2.5; plastic; moist; no odor; no NAPL. At 33.5-34.0' fractured clay; small to medium, hard, indurated brecciated pieces
65	35					34-38	At 34' grades with less mottling of light gray 5Y7/2 At 34-37' some fine grained caliche At 34-38' trace freckly-black coloration	
60	40					38-42	At 38-45' microfractures are filled with light gray clay 5Y7/2; filled microfractures are small and irregular	
55	45					42-46		
50	50					45-48.5	SILTY CLAY: yellowish red 5YR5/6 stiff PP=3.0 tsf; plastic; moist; massive; no odor.	
45	55					46-48.5		
40	60					48.5-50	CLAY: yellowish red 5YR4/6; hard PP=4.5 tsf; plastic; moist; massive; no odor.	
						50-55	At 50.0' bottom of 8-inch diameter steel casing	
						55-60	At 54-54.3' laminated zone with light gray clayey silt; laminae are 1/4" thick	
							75	



**MW-24C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-24C Date Drilled 03/14/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 74' Boring Diam. 14.5"  
 N. Coord. 727541.75' E. Coord. 3165205.52' Surface Elevation 46.27' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 63' Sump Length 0.5'  
 Top of Casing Elevation 46.05" Stickup 0'  
 Depth to Water: 1. Ft. 22.6 ( 03/16/2000 ) 2. Ft. 25.77 ( 3/27/00 )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan



**NOTES**  
 12" Dia. Steel Surface Casing installed to 25 feet bgs.  
 8" Dia. Steel Surface Casing installed to 50 feet bgs.  
 NAPL = Non-Aqueous Phase Liquid  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
40	60				0.7	60-62	60-62	CLAYEY SILT; yellowish red 5YR5/6; very loose; wet; with some very fine grained sand; no NAPL; no odor.
						62-64	62-66	CLAYEY SAND; yellowish red 5YR5/6; well sorted; subangular; very loose; wet; almost fluidized; very fine grained; no NAPL; no odor.
35	65				0.3	64-66		
						66-68	66-73	NO RECOVERY; driller reports that it drills like sand.
						68-73		
30	70				0.3	73-74	73-74	CLAY: reddish brown 5YR4/4 laminated with yellowish brown 10YR5/8; stiff PP=2.0 tsf; plastic; moist; thin, horizontal laminae; laminae are approx 2" apart; no NAPL; no odor. T.D. = 74'
25	75							
20	80							
15	85							
10	90							

76



**MW-25A  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-25A Date Drilled 03/07/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 29' Boring Diam. 8"  
 N. Coord. 729088.52' E. Coord. 3168524.46' Surface Elevation 44.94' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 18.5' Sump Length 0.5'  
 Top of Casing Elevation 44.65' Stickup 0.0'  
 Depth to Water: 1. Ft. 9.2 (03/15/2000) 2. Ft. 9.15 (3/27/00)  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method Hollow Stem Auger Log By M. Ylagan

SKETCH MAP

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NOTES  
 No Surface Casing Installed  
 NAPL = Non-Aqueous Phase Liquid  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
100	0					0-2	0-2	FILL: organic.
					0	2-5	2-5	SANDY SILTY CLAY: light gray 10YR7/1 with brownish yellow 10YR6/6 and gray 10YR5/1; stiff PP=1.0 tsf; plastic; moist; some fine grained (1/8 inch dia.) caliche nodules; trace iron staining; no fluorescence; no odor.
95	5				0	5-10	5-10	At 3-5' firm PP=0.5 tsf SILTY CLAY: very dark grey 10YR3/1 mottled with dark gray 10YR4/1 and brownish-yellow 10YR6/8; firm PP=0.5-0.75 tsf; plastic; moist; trace Fe and black (Mn-like) concretions; no NAPL staining; no fluorescence; no odor.
90	10				0	10-15	10-17	At 5-8' many small (1/8-1/2 inch dia.) and one large (2 inch dia.) caliche concretions SANDY CLAY: light gray 10YR7/2 mottled with brownish-yellow 10YR6/8; very fine grained; firm PP=0.5-1.0 tsf; plastic; moist; no odor.
85	15				0	15-20	17-27	At 13.5' trace Fe and Mn-like concretions CLAYEY SAND: light greenish gray G1 7/5GY; very fine grained; well sorted; trace Fe-like concretions, moist, no NAPL staining; no fluorescence, no odor.
80	20				0	20-25	20-25	At 15-17' dense PP=2.5-3.0 tsf At 17-20' medium dense PP=1.5-2.0 tsf
75	25				0	25-29	25-29	At 19-20' Collect soil sample MW25A-19 At 20' grades dark yellowish brown 10YR4/4 mottled with light greenish gray 1G6/5GY; very fine grained; well sorted; loose; wet (fluidized); slight odor; sheen on water
70	30				1.2	27-29	27-29	SILTY CLAY: yellowish-red 5YR5/6; very stiff PP=3.5 tsf; very plastic; massive; moist; no NAPL staining; no fluorescence; slight odor.
							77	T.D. = 29'

**MW-25C  
 DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-25C Date Drilled 03/13/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 74' Boring Diam. 14.5"  
 N. Coord. 729089.28' E. Coord. 3168517.87' Surface Elevation 44.99' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 58.0' Sump Length 0.5'  
 Top of Casing Elevation 44.49' Stickup 0'  
 Depth to Water: 1. Ft. 20.9 ( 03/16/2000 ) 2. Ft. 19.92 ( 3/27/00 )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Yagan

SKETCH MAP

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NOTES  
 8" Dia. Steel Surface Casing Installed to 55 feet bgs  
 NAPL = Non-Aqueous Phase Liquid  
 SPLP = Synthetic Precipitate Leachate Procedure  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVUM READING (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
100	0					0-15	0-2	FILL: MW-25A, located ~9' east, was cored continuously from ground surface to 29' and accordingly, MW-25C was not cored through this interval. The MW-25A lithology is presented for informational purposes. Refer to the MW-25A log for soil descriptions.
	5					2-5	SANDY SILTY CLAY	
95	10					5-10	SILTY CLAY	
90	15					10-15	SANDY CLAY	
85	20					15-20	SILTY CLAY: light greenish gray 7/5G; stiff PP=1.5 tsf; low plasticity; moist; no structure; no NAPL staining; no odor. At 15-16' some Fe nodules and Fe staining; some small caliche nodules	
80	25					20-25	At 19' grades with some very fine grained sand; strong brown 7.5YR5/6 CLAYEY SAND: brown; very fine grained; well sorted; saturated (fluidized); loose; no odor; no sheen.	
75	30					25-35	At 25' moderate odor	
70								



**MW-25C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-25C Date Drilled 03/13/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 74' Boring Diam. 14.5"  
 N. Coord. 729089.28' E. Coord. 3168517.87' Surface Elevation 44.99' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 58.0' Sump Length 0.5'  
 Top of Casing Elevation 44.49' Stickup 0'  
 Depth to Water: 1. Ft. 20.9 ( 03/16/2000 ) 2. Ft. 19.92 ( 3/27/00 )  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

**SKETCH MAP**

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**NOTES**  
 8" Dia. Steel Surface Casing Installed to 55 feet bgs  
 NAPL = Non-Aqueous Phase Liquid  
 SPLP = Synthetic Precipitate Leachate Procedure  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV READING (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
70	30				0		30-32	CLAY: yellowish red 5YR4/6; very stiff PP=2.25 tsf; massive structure; plastic; moist; no NAPL staining; very slight odor.
							32-40	At 31' grades to strong brown 7.5YR5/6; no odor SILTY CLAY: gray 2.5YR7/1 mottled with olive yellow 2.5Y6/6; very stiff PP=2.0 to 2.25 tsf; plastic, moist; slight odor.
65	35					35-40		At 35' moderate odor; Fe staining; no NAPL staining  At 38' trace small to medium caliche
					12.5	40-45	40-57	At 39' grades to yellowish red 5YR4/6 and black freckle-like black specks; soil core breaks along black splotches; odor present CLAY: yellowish red 5YR4/6 slightly mottled with light gray 7.5GY(1G); stiff PP=3.5-4.0 tsf; plastic, moist; strong odor; trace small black coloration; NAPL in microfractures, approximately 1 microfracture every 2" with depth; NAPL sheens in microfractures fluoresce with U.V. light (long wavelength); upon fresh break of the core, NAPL will ooze out of the microfracture, evident as golden sheen.
60	40				12.2	45-50		At 43-45' Collect soil sample MW25C-43 & SPLP At 45-50' grades with less mottling
55	45					50-55		At 47-50' caliche powdery zones (no measurable nodules) At 48.5' no more NAPL sheen present in fractures, moderate odor At 49' grades to red 2.5YR4/6; small black concretions present
50	50					55-60		At 53-55' Collect soil sample MW25C-53 & SPLP
45	55				5.1			At 55.0' Bottom of 8-inch diameter steel surface casing CLAYEY SILT: red 2.5YR4/6; with some very fine grained sand; soft (fluidized); saturated; no NAPL; no sheen; no fluorescence; slight odor.
40	60				0		57-61.5	
								79



**MW-25C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-25C Date Drilled 03/13/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 74' Boring Diam. 14.5"  
 N. Coord. 729089.28' E. Coord. 3168517.87' Surface Elevation 44.99' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 58.0' Sump Length 0.5'  
 Top of Casing Elevation 44.49' Stickup 0'  
 Depth to Water: 1. Fl. 20.9 (03/16/2000) 2. Fl. 19.92 (3/27/00)  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method HSA/Mud Rotary Log By M. Ylagan

SKETCH MAP

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NOTES  
 8" Dia. Steel Surface Casing Installed to 55 feet bgs  
 NAPL = Non-Aqueous Phase Liquid  
 SPLP = Synthetic Precipitate Leachate Procedure  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
40	60				0.3 0.7	60-64	61.5-62 62-64	At 60-61' Collect soil sample MW25C-60  CLAY: red 2.5YR4/6; very stiff PP=3.0 tsf; massive; plastic; moist; no NAPL; no fluorescence; slight odor. CLAYEY SILT: yellowish red 5YR5/6; with some very fine grained sand; soft; wet (saturated); sheen on inside of soil core upon fresh break of the core; no sheen develops on standing water; moderate odor. NO RECOVERY: driller reports drilling like sand.
35	65				0	64-68	64-70	At 68' driller reports drilling like sandstone or siltstone, or possibly a caliche unit.
30	70				0	68-70 70-74	70-74	CLAY: yellowish red 5YR4/6; very stiff PP=3.0 tsf; plastic; moist; with thin (<1/16"), horizontal, yellowish brown 10YR5/8 laminae, 2" apart vertically; soil core breaks along laminae; no NAPL; no odor.  At 70-72' Collect soil sample MW25C-70 and request SPLP prep At 72-74' dark yellowish brown 10YR 4/6; very stiff PP=2.75 tsf; with thin, horizontal, gray 5Y6/1, laminae; core breaks along laminae as above T.D. = 74'
25	75						80	
20	80							
15	85							
10	90							



**MW-26A  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-26A Date Drilled 03/13/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 26' Boring Diam. 8"  
 N. Coord. 729159.27' E. Coord. 3167518.51' Surface Elevation 45.01' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 14.5' Sump Length 0.5'  
 Top of Casing Elevation 44.62' Stickup 0'  
 Depth to Water: 1. Ft. 6.0 (03/15/2000) 2. Ft. 7.40 (3/27/00)  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method Hollow Stem Auger Log By M. Ylagan

SKETCH MAP

NOTES

No Surface Casing Installed  
 NAPL = Non-Aqueous Phase Liquid  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
100	0					0-1	0-1	NOT SAMPLED
					0	1-5	1-8	SILTY CLAY: very dark gray 5Y3/1 very stiff PP=2.5 tsf; plastic; moist; organic-rich; some root hairs; no NAPL; no odor.
					0	5-10		At 3' grades gray 2.5Y5/1 mottled with very dark gray 2.5Y3/1 and olive yellow 2.5Y3/1; stiff PP=1.25 tsf At 4'2" small (1/8") to med. (1/2" diam.) caliche nodules At 4'10" small (1/8") to med. (1/2" diam.) caliche nodules
					0		8-11	At 7-8' interbedded with clayey sand; light gray 2.5Y7/1; very fine grained
					0	10-15	11-25	SANDY CLAY: light gray 2.5Y7/1 mottled with olive yellow 2.5Y6/8; stiff PP=2.0 tsf; very fine grained; well sorted; angular to subangular; low plasticity; moist; no NAPL; no odor. At 9-11' Collect soil sample MW26A-09 and duplicate sample MW26A-09D
					0	15-20		CLAYEY SAND: greenish gray 6/10GY; wet; loose; fluidized; fine grained; well sorted; angular to subangular; no NAPL; no sheen; no odor.
					0	20-26		
					0	25-26	25-26	SILTY CLAY: brown 7.5YR5/4 mottled with gray 5Y6/1; very stiff PP=3.0 tsf; plastic; moist; no NAPL; no odor.
70	30							81

**MW-26A  
 DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-26A Date Drilled 03/13/00  
 Project Phase 2C RFI Owner Southern Pacific Trans. Co.  
 Location Houston Wood Preserving Works Boring T.D. 26' Boring Diam. 8"  
 N. Coord. 729159.27' E. Coord. 3167518.51' Surface Elevation 45.01' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.010"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 14.5' Sump Length 0.5'  
 Top of Casing Elevation 44.62' Stickup 0'  
 Depth to Water: 1. Ft. 6.0 (03/15/2000) 2. Ft. 7.40 (3/27/00)  
 Drilling Company Best Drilling Services Driller Keith Barge  
 Drilling Method Hollow Stem Auger Log By M. Ylagan

SKETCH MAP

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NOTES  
 No Surface Casing Installed  
 NAPL = Non-Aqueous Phase  
 Liquid  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM READING (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
70	30							At 25-26' Collect soil sample MW26A-25 T.D. = 26'
65	35							
60	40							
55	45							
50	50							
45	55							
40	60							

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**MW-27A  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-27A Date Drilled 3/26/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 30' Boring Diam. 8.25"  
 N. Coord. 730002.11' E. Coord. 3169610.22' Surface Elevation 45.3' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 17' Sump Length 0'  
 Top of Casing Elevation 44.9' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shari Bauman

SKETCH MAP

NOTES  
 No Surface Casing Installed.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45.3	0					0-3	0-0.25 0.25-0.8 0.8-24.5	ASPHALT: Road material. FILL: Sandy Silty Clay; strong brown 7.5YR 4/6; damp; shell fragments; gravel; road-base material. SILTY CLAY: Very dark gray 5YR 3/1; damp; plastic.
					0	3-5		At 3.5 ft. - becomes mottled with brown 7.5YR 4/2 and trace mottled with light olive brown 2.5Y 5/4; stiff, PP=2.0 tsf; iron oxide concentrations
40	5				0	5-10		At 8.5 ft. - trace to some calcium carbonate nodules with depth; stiff, PP=2.0 tsf At 10.5 ft. - becomes light brownish gray 10YR 6/2 mottled with brownish yellow 10YR 6/8; stiff, PP=2.0 tsf
					0			At 12.0 ft. - no calcium carbonate nodules present At 18.0- 19.0 ft. - calcium carbonate nodules and concentrations in seams and layers
35	10				0	10-15		At 19.0 ft. - becomes yellowish red 5YR 4/6 mottled with light brownish gray 10YR 5/2; very stiff, PP=3.5 tsf At 21.0 ft. - layer of calcium carbonate nodules
					0			
30	15				0	15-20		
					0			
25	20				0	20-25		
					0			
							24.5-26.5	SAND: Fine grained; strong brown 7.5YR 4/6; saturated; loose; trace gray clay pockets.
25							<b>83</b>	


**MW-27A  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-27A Date Drilled 3/26/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 30' Boring Diam. 8.25"  
 N. Coord. 730002.11' E. Coord. 3169610.22' Surface Elevation 45.3' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 17' Sump Length 0'  
 Top of Casing Elevation 44.9' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shari Bauman

SKETCH MAP

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NOTES  
 No Surface Casing Installed.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
20	25				0	25-30	26.5-30	CLAY: with trace silt; strong brown 7.5YR 4/6; damp; plastic; hard, PP>4.0 tsf.  T.D. = 30'
15	30							
10	35							
5	40							
0	45							
	50							





**MW-27C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-27C Date Drilled 04/16/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 73.5' Boring Diam. 8.25"  
 N. Coord. 730008.65' E. Coord. 3169609.94' Surface Elevation 45.3' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 60.5' Sump Length 2.5'  
 Top of Casing Elevation 45.04' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan

SKETCH MAP

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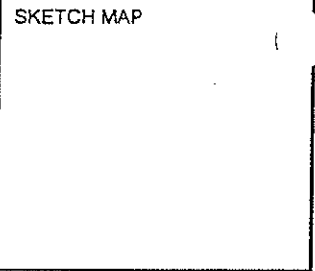
NOTES  
 10" inner diameter new carbon steel surface casing installed to 29 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45.3	0					0-30	0-0.25	ASPHALT; MW-27A, located ~6' south, was cored continuously from the ground surface to 30' and accordingly MW-27C was not cored through this interval. The MW-27A lithology is presented for informational purposes; refer to the MW-27A log for soil descriptions.
	5					0.25-0.8	FILL	
40	10					0.8-24.5	SILTY CLAY	
35	15							
30	20							
25	25						24.5-26.5	SAND
							85	



**MW-27C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-27C Date Drilled 04/16/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 73.5' Boring Diam. 8.25"  
 N. Coord. 730008.65' E. Coord. 3169609.94' Surface Elevation 45.3' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 60.5' Sump Length 2.5'  
 Top of Casing Elevation 45.04' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan



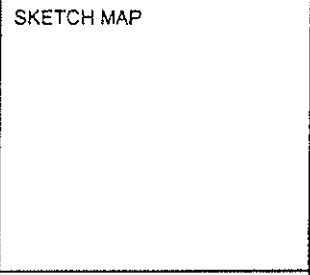
**NOTES**  
 10" inner diameter new carbon steel surface casing installed to 29 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (P.P.M)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
20	25						26.5-30	CLAY
								At 29.0' bottom of 10-inch diameter new carbon steel surface casing
15	30					30-35	30-35	NO RECOVERY.
10	35				0.0	35-40	35-40	SILTY CLAY: Brown 2.5YR 6/6 mottled with trace yellowish-tan 10YR 6/8; moist; plastic; stiff PP=1.5 tsf. At 37.0' less moist
5	40				0.0	40-45	40-50	At 38.5' moist At 39.0' irregular shaped (mm to cm diameter) tan 7.5YR 6/4 and gray 5Y 6/2 gravels; more moist SILTY CLAY: Red 5YR 5/6 with trace gray 5Y 6/2 mottling; moist to damp; plastic. At 42.0' very stiff PP=3.5 tsf At 44.0' stiff PP=2.5 tsf
0	45				0.7	45-50		At 46.0' very stiff PP=3.5 tsf At 47.0' stiff PP=2.5 tsf
	50				0.4		86	At 49.0' very stiff PP=3.5 tsf At 49.5' sandy clay; gray 5Y 7/1 with trace red 10YR 6/6; moist to slightly wet



**MW-27C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-27C Date Drilled 04/16/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 73.5' Boring Diam. 8.25"  
 N. Coord. 730008.65' E. Coord. 3169609.94' Surface Elevation 45.3' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 60.5' Sump Length 2.5'  
 Top of Casing Elevation 45.04' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan



**NOTES**  
 10" inner diameter new carbon steel surface casing installed to 29 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-5	50					50-55	50-64	CLAYEY SAND: Gray 10YR 7/2; wet; slightly plastic; soft PP=0.5 tsf At 50.1' 3-inch sandy and silty clay pocket; red 7.5YR 5/6 with trace gray.
-10	55				0.4	55-60		At 55.0' tan-brown 2.5Y 6/6 with minor gray 2.5Y 7/2; very wet At 56.0' increased clay content; soft PP=0.5 tsf At 57.0' decreased clay content; very soft PP=0.0 tsf At 57.0' increased clay content; soft PP=0.5 tsf At 58.0' decreased clay content; very soft PP=0.0 tsf At 59.0' increased clay content; soft PP=0.5 tsf
-15	60				0.4	60-65		At 60.0' gray 5Y 6/2 with trace red 10YR 5/8; higher plasticity; less wet; stiff PP=1.5 tsf At 63.0' lower clay content; soft PP=1.0 tsf
-20	65				0.4	65-67	64-65.3	CLAY: Fine; red 2.5YR 4/6 with trace gray 5Y 6/2 mottling; damp; plastic; slight silt content.
					0.7	67-72	65.3-70.5	At 65.0' silty clay; red 5YR 4/6 with trace gray 5Y 6/3 mottling in matrix; stiff PP=2.5 tsf CLAYEY SAND: Red 5YR 5/6 and red 5YR 4/6; very wet; plastic; soft PP=0.5 tsf At 67.0' trace gray mottling 5Y 6/3; very soft PP=0.0 tsf
-25	70				0.7	70.5-72		SILTY CLAY: Red 2.5YR 4/6; damp; plastic; hard PP=4.5 tsf; trace black organic-like layering.
					0.4	72-73.5	72-73.5	SILTY CLAY: Red 5YR 4/6 with trace gray 10YR 6/3 and pink 2.5Y 7/2 mottling; damp to dry; plastic; stiff PP=2.5 tsf At 73.25' very stiff PP=3.5 tsf T.D. = 73.5'

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**MW-28A  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-28A Date Drilled 3/26/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 28' Boring Diam. 8.25"  
 N. Coord. 729461.71' E. Coord. 3167925.77' Surface Elevation 44.29' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 16' Sump Length 0'  
 Top of Casing Elevation 43.86' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Sharl Bauman

SKETCH MAP

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NOTES

No Surface Casing Installed  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
44.29	0					0-3	0-0.25 0.25-0.8 0.8-20	ASPHALT: Road material. FILL: Sandy Silty Clay; strong brown 7.5YR 4/6; dry; gravel; road-base material. SILTY CLAY: Gray 10YR 5/1 mottled with yellowish brown 10YR 5/8; damp; plastic; some fine to medium grained sand pockets and calcium carbonate nodule pockets. At 3.5ft. - very stiff, PP=3.5 tsf At 7.5 ft. - becomes yellowish brown 10YR 5/8 mottled with dark gray 10YR 4/1; wet; very plastic; soft, PP<0.5 tsf; no sand or calcium carbonate pockets present At 12.0 ft. - becomes mottled with black organic-like concentrations and orange iron-like concentrations; damp; trace damp fine-grained sand pockets; very stiff, PP=3.0 tsf At 14.0 ft. - becomes trace mottled with red 10YR 4/8; very stiff, PP=2.5 tsf At 18.5 ft. - becomes wet
	5				.2	3-5		
	10				0	5-10		
	15				0	10-15		
	20				0	15-20		
	25				0	20-25	20-25.5	SAND: Fine-grained; brown 7.5YR 5/4; saturated; loose.
	28				0		88	



**MW-28A  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-28A Date Drilled 3/26/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 28' Boring Diam. 8.25"  
 N. Coord. 729461.71' E. Coord. 3167925.77' Surface Elevation 44.29' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 16' Sump Length 0'  
 Top of Casing Elevation 43.86' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shari Bauman

SKETCH MAP

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NOTES

No Surface Casing Installed  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25	25				0	25-28	25.5-28	CLAY: Yellowish red 5YR 4/6; damp; very plastic; very stiff, PP=3.5 tsf; trace silt, trace light gray clay seams with black organic-like mottling in seam.  T.D. = 28'
15	30							
10	35							
5	40							
0	45							
-5	50						89	



**MW-28C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-28C Date Drilled 04/12/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 88' Boring Diam. 8.25"  
 N. Coord. 729461.28' E. Coord. 3167919.72' Surface Elevation 44.3' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 75' Sump Length 2.5'  
 Top of Casing Elevation 43.96' Stickup 0'  
 Depth to Water: 1. Fl. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Fl. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan

SKETCH MAP

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NOTES  
 10" Inner Diameter New Carbon Steel Surface Casing Installed to 32 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-28	0-0.25	ASPHALT: MW-28A, located -6' east, was cored continuously from ground surface to 28' and accordingly, MW-28C was not cored through this interval. The MW-28A lithology is presented for informational purposes; refer to the MW-28A log for soil descriptions.
	0.25-0.8					FILL		
5	0.8-20					SILTY CLAY		
10								
15								
20							20-20.5	SAND
25							90	



**MW-28C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-28C Date Drilled 04/12/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 88' Boring Diam. 8.25"  
 N. Coord. 729461.28' E. Coord. 3167919.72' Surface Elevation 44.3' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 75' Sump Length 2.5'  
 Top of Casing Elevation 43.96' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan

SKETCH MAP

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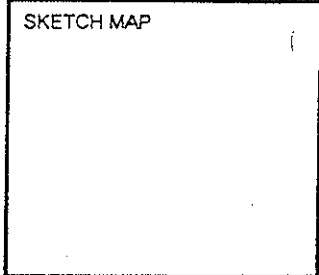
NOTES  
 10" Inner Diameter New Carbon Steel Surface Casing installed to 32 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25							25.5-28	CLAY
							28-35	NOT SAMPLED
								At 32.0' bottom of 10-inch diameter new carbon steel surface casing
35					3.9	35-40	35-40	CLAY: Yellowish orange-red 5YR 5/8 mottled with trace gray 2.5Y 6/1; damp; plastic; layers of small mm diameter orangish nodules. At 35.0' very stiff PP=4.0 tsf At 36.0' hard PP=4.5 tsf
					2.7			At 39.0' possible parting in matrix.
40					0.0	40-45	40-53.8	CLAY: Red 2.5YR 5/8 with trace gray 5Y 6/3 mottles; damp; plastic; hard PP=4.5 tsf; possible soil partings visible. At 40.0' trace white, crumbly, irregular nodules.
					1.2			
45						45-50		At 45.0' red (5YR 5/8) is present also
					1.5			
50							91	At 49.4' pockets of silty clay is dry and crumbles



**MW-28C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-28C Date Drilled 04/12/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 88' Boring Diam. 8.25"  
 N. Coord. 729461.28' E. Coord. 3167919.72' Surface Elevation 44.3' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 75' Sump Length 2.5'  
 Top of Casing Elevation 43.96' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobota  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan



NOTES  
 10" Inner Diameter New Carbon Steel Surface Casing installed to 32 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
50					0.3	50-55		At 50.0' gray 5Y 6/3 mottling becoming silty clay; dry to damp; whitish irregular mm diameter nodular layering that is dry and crumbles
					0.3	53.8-60		SILTY SANDY CLAY: Red 2.5YR 5/8 with trace gray 5Y 6/3; damp to wet; plastic.
55					0.0	55-60		At 54.0' stiff PP=3.0 tsf At 55.0' stiff PP=2.0 tsf At 55.5' reds 2.5YR 4/8 and 5YR 5/8 in matrix; very moist; sandy unit; soft PP=1.0 tsf
					0.3	60-65	60-70	At 56.0' clay unit of (7 inches thick); hard PP=4.5 tsf At 57.0' silty unit; stiff PP=1.5 tsf At 58.0' clay unit (4 inches thick); hard PP=4.5 tsf At 59.0' silty unit; soft PP=0.5 tsf CLAYEY SAND: Fine; orange-red 5YR 5/8; wet; plastic; very soft PP=0.25 tsf
					0.3	65-70		At 62.5' 2-inch thick sandy and silty clay pocket; very moist; stiff PP=1.5 tsf At 65.0' very soft PP=0.0 tsf
					0.0	70-75		At 66.5' 3-inch pocket of sandy clay; wet; soft PP=0.5 tsf At 67.0' very soft PP=0.5 tsf
70								NO RECOVERY
75								92





**MW-28C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-28C Date Drilled 04/12/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 88' Boring Diam. 8.25"  
 N. Coord. 729461.28' E. Coord. 3167919.72' Surface Elevation 44.3' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 75' Sump Length 2.5'  
 Top of Casing Elevation 43.96' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Toboia  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan

SKETCH MAP

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NOTES  
 10" Inner Diameter New Carbon Steel Surface Casing Installed to 32 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
75						75-80		
80						80-85		
85					0.0	85-87	85-85.3 85.3-87	CLAYEY SAND: Red 2.5YR 4/8; wet; plastic; stiff PP=1.0 tsf CLAY: Red 2.5YR 4/8 and trace gray 5Y 6/3 mottling; damp; hard PP=4.5 tsf T.D. = 88'
90								
95								
100								

*Plugged 12/2004*  
**MW-29A**  
**DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-29A Date Drilled 04/19/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 23' Boring Diam. 8.25"  
 N. Coord. 727310.34' E. Coord. 3164239.02' Surface Elevation 46.71' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 9' Sump Length 2.75'  
 Top of Casing Elevation 46.59' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Jose Herrera  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan

SKETCH MAP

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NOTES  
 No Surface Casing Installed  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)			
46.91	0				0	0-5	0-12.5	SILTY CLAY: Dark brown 2.5Y 2.5/1 mottled with trace reddish brown 7.5YR 5/8; damp to moist with depth; plastic.  At 2.0' stiff PP=1.0 tsf  At 3.5' stiff PP=1.25 tsf  At 4.5' stiff PP=2.0 tsf			
45	5					5-10	At 6.25' whitish calcareous-like nodules with a diameter of centimeters to inches  At 8.0' blackish cm sized nodules in dark brown 2.5YR 2.5/1, orange-brown 10YR 6/8, tan 5Y 6/2, beige 2.5Y 5/2, and black mixed matrix; stiff PP=1.5 tsf  At 8.5' dark brown 2.5YR 2.5/1 disappears from matrix; stiff PP=2.25 tsf  At 10.0' grades to calcareous-like cm sized whitish nodules; dry				
40	10					10-15	SANDY CLAY: Dark pinkish gray 5YR 4/1 matrix; very moist; plastic; soft PP=0.5 tsf; trace orange-brown 10YR 6/8 and gray-brown 5Y 7/1 silty clay mottling; stiff PP=1.5 tsf  At 13.0' orange-brown 10YR 6/8 and gray-brown 5Y 7/1 sandy clay only; stiff PP=1.5 tsf  At 13.5' very stiff PP=2.5 tsf  At 14.0' stiff PP=2.0 tsf				
35	15					15-20	CLAYEY SAND: Equally clayey and silty sand; light gray 2.5Y 7/2, orange-brown 10YR 6/8, and pinkish tan 3.5Y 6/4 mottled matrix; wet; malleable; slightly plastic; soft PP=0.5 tsf.				
30	20					20-23	SANDY CLAY: Medium grayish tan 5Y 6/2 matrix with trace orange-brown mottling 10YR 6/8 and trace dark brown 10R 2.5/1 pigment; damp; plastic; hard PP=4.5 tsf.  At 20.0' trace reddish 5YR 5/8 cm and mm diameter nodules				
25	25										T.D. = 23'  94



*Plugged 11/2011*  
**MW-29B  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-29B Date Drilled 04/12/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 57' Boring Diam. 8.25"  
 N. Coord. 727302.91' E. Coord. 3164238.97' Surface Elevation 46.73' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 44' Sump Length 2.5'  
 Top of Casing Elevation 46.26' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan

**SKETCH MAP**

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**NOTES**  
 10" Inner Diameter New Carbon Steel Surface Casing Installed to 23 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-23	0-12.5	SILTY CLAY: MW-29A, located ~6' north, was cored continuously from ground surface to 23' and accordingly, MW-29B was not cored through this interval. The MW-29A lithology is presented for informational purposes; refer to the MW-29A log for soil descriptions.
	5						12.5-15	SANDY CLAY
	15						15-19	CLAYEY SAND
	20						19-23	SANDY CLAY
	25				0.0	23-25	95	At 23.0' bottom of 10-inch diameter new carbon steel surface casing SILTY CLAY: Fine; orangish yellow-brown 5YR 5/6 and light yellowish gray 5Y 6/2 mottled; dry to damp; plastic; very hard PP>4.5 tsf; trace whitish mm diameter nodules.


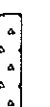

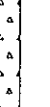
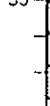
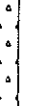



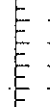
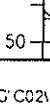
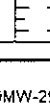


**MW-29B  
 DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-29B Date Drilled 04/12/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 57' Boring Diam. 8.25"  
 N. Coord. 727302.91' E. Coord. 3164238.97' Surface Elevation 46.73' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 44' Sump Length 2.5'  
 Top of Casing Elevation 46.26' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan

SKETCH MAP

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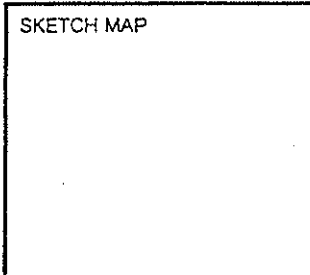
NOTES  
 10" Inner Diameter New Carbon Steel Surface Casing Installed to 23 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25						25-30		At 25.0' light yellowish gray 5Y 6/2 diminishes to ~40 % of the matrix; damp; very stiff PP=3.5 tsf
	30				1.4	30-35	30.75-45	CLAY: Red 2.5YR 4/6 mottled with gray 5Y 6/3; damp; plastic; very hard PP>4.5 tsf
	35				0.0	35-40		
	40				0.0	40-45		
	45				0.2	45-50	45-46	CLAYEY SILTY SAND: Yellow orange-red 2.5YR 5/8; wet; soft PP=0.5 tsf
					0.0		46-50	SILTY CLAY: Yellow orange-red 2.5YR 5/8 with trace gray 5Y 6/2; damp; very stiff PP=3.5 to 4.0 tsf.
	50				0.0			



**MW-29B  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-29B Date Drilled 04/12/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 57' Boring Diam. 8.25"  
 N. Coord. 727302.91' E. Coord. 3164238.97' Surface Elevation 46.73' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 44' Sump Length 2.5'  
 Top of Casing Elevation 46.26' Stickup 0'  
 Depth to Water: 1. Ft. \_\_\_\_\_ (\_\_\_\_\_) 2. Ft. \_\_\_\_\_ (\_\_\_\_\_)  
 Drilling Company Best Drilling Services, Inc. Driller Sonny Tobola  
 Drilling Method Hollow Stem Auger Log By Shannon Greenan



**NOTES**  
 10" Inner Diameter New Carbon Steel Surface Casing Installed to 23 feet bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
50					0.0	50-55	50-53.5	CLAYEY SAND: Reddish orange 2.5YR 5/8; wet; soft PP=0.5 tsf.
					0.0		53.5-57	CLAY: Red 2.5YR 4/6 mottled with gray 5Y 6/3; damp; plastic; hard PP=4.5 tsf.
55					0.0	55-57		At 55.0' Reddish orange 2.5YR 5/8 clay with trace gray-tan mottling; very hard PP>4.5 tsf
								T.D. = 57'
60								
65								
70								
75								



*Plugged w/2011*

**MW-29C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-29C Date Drilled 04/27/01

Project Phase 2C RFI Owner Union Pacific Railroad Company

Location Houston Wood Preserving Works Boring T.D. 75' Boring Diam. 6.0"

N. Coord. 727292.82' E. Coord. 3164239.67' Surface Elevation 46.79' MSL Datum

Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"

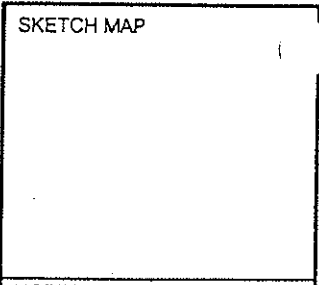
Casing: Type Schedule 40 PVC Diam. 2" Length 62.5' Sump Length 2.5'

Top of Casing Elevation 46.46' Stickup 0'

Depth to Water: 1. Fl. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Fl. \_\_\_\_\_ ( \_\_\_\_\_ )

Drilling Company Best Drilling Services, Inc. Driller Alfredo Palacios

Drilling Method Mud Rotary Log By Shannon Greenan



**NOTES**  
12" Inner Diameter New Carbon Steel Surface Casing Installed to 23 feet bgs.  
8 1/4" Inner Diameter New Carbon Steel Surface Casing Installed to 55 bgs.  
PP = Pocket Penetrometer  
tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-23	0-12.5	SILTY CLAY; MW-29A, located ~12' north, was cored continuously from ground surface to 23' and accordingly, MW-29C was not cored through this interval. The MW-29A lithology is presented for informational purposes; refer to the MW-29A log for soil descriptions.
5							12.5-15	SANDY CLAY
10							15-19	CLAYEY SAND
15							19-23	SANDY CLAY
20								At 23.0' bottom of 12-inch diameter new carbon steel surface casing
25						23-55	23-30.75	SILTY CLAY; MW-29B, located ~6' north, was cored continuously from ground surface to 55' and accordingly, MW-29 C was not cored through this interval. The MW-29B lithology is presented for informational purposes; refer to MW-29B log for descriptions.



**MW-29C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-29C Date Drilled 04/27/01

Project Phase 2C RFI Owner Union Pacific Railroad Company

Location Houston Wood Preserving Works Boring T.D. 75' Boring Diam. 6.0"

N. Coord. 727292.82' E. Coord. 3164239.67' Surface Elevation 46.79' MSL Datum

Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"

Casing: Type Schedule 40 PVC Diam. 2" Length 62.5' Sump Length 2.5'

Top of Casing Elevation 46.46' Stickup 0'

Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )

Drilling Company Best Drilling Services, Inc. Driller Alfredo Palacios

Drilling Method Mud Rotary Log By Shannon Greenan

SKETCH MAP

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NOTES  
12" Inner Diameter New Carbon Steel Surface Casing Installed to 23 feet bgs.  
8 1/4" Inner Diameter New Carbon Steel Surface Casing Installed to 55 bgs.  
PP = Pocket Penetrometer  
tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
25								
	30						30.75-45	CLAY
	35							
	40							
	45						45-46	CLAYEY SILTY SAND
							46-50	SILTY CLAY
	50						50-53.5	CLAYEY SAND



**MW-29C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-29C Date Drilled 04/27/01

Project Phase 2C RFI Owner Union Pacific Railroad Company

Location Houston Wood Preserving Works Boring T.D. 75' Boring Diam. 6.0"

N. Coord. 727292.82' E. Coord. 3164239.67' Surface Elevation 46.79' MSL Datum

Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"

Casing: Type Schedule 40 PVC Diam. 2" Length 62.5' Sump Length 2.5'

Top of Casing Elevation 46.46' Stickup 0'

Depth to Water: 1. Ft. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Ft. \_\_\_\_\_ ( \_\_\_\_\_ )

Drilling Company Best Drilling Services, Inc. Driller Alfredo Palacios

Drilling Method Mud Rotary Log By Shannon Greenan

SKETCH MAP

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NOTES  
12" Inner Diameter New Carbon Steel Surface Casing Installed to 23 feet bgs.  
8 1/4" Inner Diameter New Carbon Steel Surface Casing Installed to 55 bgs.  
PP = Pocket Penetrometer  
tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
50								
55					0.0	55-60	55-60	At 55.0' bottom of 8 1/4-inch diameter new carbon steel surface casing SILTY CLAY: Red 5YR 4/6 mottled with trace gray, 5Y 6/2; damp; plastic; very stiff PP=3.5 tsf.
60						60-65	55-60	NO RECOVERY: Driller reports drills like sand.
65						65-66.8		
					0.0	66.8-69	66.8-67 67-67.3 67.3-68.25 68.25-69	SAND: Red 7.5YR 5/6; saturated; loose. SILTY SAND: Fine; red 7.5YR 5/6; wet; soft PP=0.5 tsf. SANDY CLAY: Red 5YR 5/6; very moist to wet; very soft PP=0.25 tsf. SILTY SAND: Fine; red 7.5YR 5/6; wet; soft PP=0.5 tsf.
						69-70	69-70	NO RECOVERY
					0.0	70-75	70-71	CLAYEY SILTY SAND: Red 5YR 5/6; wet; plastic; soft PP=0.5 tsf; trace reddish tan 7.5YR 5/6 sand.
							71-71.75 71.75-72.5	SILTY CLAY: Red 5YR 5/6 and reddish tan 7.5YR 5/6; damp; plastic; stiff PP=1.0 tsf. CLAYEY SILTY SAND: Red 5YR 5/6; wet; plastic; soft PP=0.5 tsf; trace reddish tan 7.5YR 5/6 sand.
75					0.0		100	





**MW-29C  
DRILLING LOG**

W.O. NO. 422-009 Boring/Well ID MW-29C Date Drilled 04/27/01  
 Project Phase 2C RFI Owner Union Pacific Railroad Company  
 Location Houston Wood Preserving Works Boring T.D. 75' Boring Diam. 6.0"  
 N. Coord. 727292.82' E. Coord. 3164239.67' Surface Elevation 46.79' MSL Datum  
 Screen: Type Schedule 40 PVC Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Schedule 40 PVC Diam. 2" Length 62.5' Sump Length 2.5'  
 Top of Casing Elevation 46.46' Stickup 0'  
 Depth to Water: 1. Fl. \_\_\_\_\_ ( \_\_\_\_\_ ) 2. Fl. \_\_\_\_\_ ( \_\_\_\_\_ )  
 Drilling Company Best Drilling Services, Inc. Driller Alfredo Palacios  
 Drilling Method Mud Rotary Log By Shannon Greenan

SKETCH MAP

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NOTES  
 12" Inner Diameter New Carbon Steel Surface Casing Installed to 23 feet bgs.  
 8 1/4" Inner Diameter New Carbon Steel Surface Casing Installed to 55 bgs.  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (PPM)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
	75						72.5-75	SILTY CLAY: Red 5YR 5/6 and reddish tan 7.5YR 5/6; damp; plastic; very stiff PP=3.5 tsf. T.D. = 75'
	80							
	85							
	90							
	95							
	100							



# MW-30A DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-30A Date Drilled 12/8/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 33' Boring Diam. 8.25"  
 N. Coord. 728759.0600' E. Coord. 3167517.0680' Surface Elevation 47.7' Ft. MSL Datum  
 Screen: Type Stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless steel Diam. 2" Length 20' Sump Length 2.5'  
 Top of Casing Elevation 50.45' Stickup 3'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

NOTES

PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
47.7	0					0-1	0-4	FILL: Dark yellowish brown (10YR 3/4) from 0'-3.5', very dark brown (7YR 2.5/2) from 3.5'-4', cobbles and silty sand, fine-grained, sorted, subrounded, some black staining and wood fragments from 1'-3.5', moist, 82% recovery.
50					0.0	1-3.5		
					1.2 0.6	3.5-8.5	4-12	SANDY CLAY: Dark gray (10YR 4/1) from 4'-7', gray (10YR 6/1) from 7'-8.5', mottled, some iron nodules, some black nodules, sand decreasing with depth, very stiff (pp = 3.0 tsf). At 8.5' sand increasing with depth, moist, 100% recovery.
45	5				0.6	8.5-13.5		
					0.0		12-23.5	CLAYEY SAND: Gray (10YR 6/1) from 12'-13.5', light gray (10YR 7/1) from 13.5'-23.5', very fine-grained, sorted, subrounded to subangular w/ depth, some black staining, some iron staining, product observed from 13.5'-23.5', slight odor, moist from 12'-13.5', saturated from 13.5'-23.5', 50% recovery.
40	10				0.3	13.5-18.5		
15							22	



# MW-30A DRILLING LOG

O. NO. 422-102 Boring/Well ID MW-30A Date Drilled 12/8/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 33' Boring Diam. 8.25"  
 N. Coord. 728759.0600' E. Coord. 3167517.0680' Surface Elevation 47.7' Ft. MSL Datum  
 Screen: Type Stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless steel Diam. 2" Length 20' Sump Length 2.5'  
 Top of Casing Elevation 50.45' Stickup 3'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP  
 NOTES  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
35	15	[Hatched pattern]	[Solid black]					
					4.7	18.5-23.5		
30	20	[Hatched pattern]	[Solid black]					
					1.9	23.5-28.5	23.5-28.5	NO RECOVERY
25	25	[Hatched pattern]	[Solid black]					
					NA	28.5-29.5	28.5-29.5	CLAYEY SAND: Light reddish brown (5YR 6/4), clay increasing with depth, some gravel, odor, saturated to moist with depth, 100 % recovery.
					9.8	29.5-33	29.5-33	SILTY CLAY: Reddish brown (5YR 5/4), mottled, plastic, hard (pp = >4.5 tsf), fractured, black staining in fractures, some sand decreasing with depth, moist, 100% recovery.



# MW-30A DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-30A Date Drilled 12/8/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 33' Boring Diam. 8.25"  
 N. Coord. 728759.0600' E. Coord. 3167517.0680' Surface Elevation 47.7' FL MSL Datum  
 Screen: Type Stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless steel Diam. 2" Length 20' Sump Length 2.5'  
 Top of Casing Elevation 50.45' Stickup 3'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
20	30				70.5			T.D. = 33'
15	35							
10	40							
45							24	



# MW-31A DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-31A Date Drilled 12/8/2003  
 Project Houston Wood Preserving works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 34' Boring Diam. 8.25"  
 N. Coord. 728647.8540' E. Coord. 3167476.9270' Surface Elevation 49.4' Ft. MSL Datum  
 Screen: Type Stainless steel Diam. 2" Length 10' Slot Size 0.1"  
 Casing: Type Stainless steel Diam. 2" Length 21.5' Sump Length 2.5'  
 Top of Casing Elevation 52.08' Stickup 3'  
 Depth to Water: 1. Ft. 15.19 ( 12/9/03 ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Hollow stem auger Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
52.08	0					0-5	0-3	CLAYEY SAND: Brown (5YR 6/3) from 0'-0.2', black (5YR 2.5/1), from 0.2'-3', fine-grained, sorted, subrounded, gravelly, wood from 2.9'-3', 100 % recovery, strong odor, moist, 100 % recovery.
50					9.9		3-6	SANDY CLAY: Black (5YR 2.5/1), plastic, firm (pp = 1.0 tsf), trace rootlets, trace gravels, sand decreasing with depth, oily, strong odor, moist, 100% recovery.
5					51.3	5-10	6-18.4	SILTY CLAY: Dark reddish gray (2.5YR 3/1) from 6'-12.6', greenish gray (2.5YR 5/10) from 12.6'-17', dark greenish gray (2.5YR 4/10) from 17'-18.4', mottled, plastic, firm (pp = 1.25 tsf), trace rootlets, trace silt lenses, some iron nodules, some black staining, sand increasing with depth, strong odor, moist, 100% recovery.
45					58.3			
10					6.6	10-15		
40								
15								
							25	



# MW-31A DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-31A Date Drilled 12/8/2003  
 Project Houston Wood Preserving works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 34' Boring Diam. 8.25"  
 N. Coord. 728647.8540' E. Coord. 3167476.9270' Surface Elevation 49.4' Ft. MSL Datum  
 Screen: Type Stainless steel Diam. 2" Length 10' Slot Size 0.1"  
 Casing: Type Stainless steel Diam. 2" Length 21.5' Sump Length 2.5'  
 Top of Casing Elevation 52.08' Stickup 3'  
 Depth to Water: 1. Ft. 15.19 ( 12/9/03 ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Hollow stem auger Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15					8.9	15-20		
35					15.2		18.4-25	CLAYEY SAND: Dark greenish gray (2.5YR 4/10) from 18.4'-21.8', dark reddish brown (5YR 2.5/2) from 21.8'-25', some pinkish coloring, fine-grained, sorted, subangular, stiff (pp=1.5 tsf) at 16', soft (pp=0.5 tsf) at 18.5', clay is decreasing, wet from 18.4'-21.8', saturated from 21.8'-25', product is observed, strong odor, 100% recovery.
20					24.8	20-25		
30					13.9			
25					113.8	25-30	25-30	NO RECOVERY
25								
30								



# MW-31A DRILLING LOG

V.O. NO. 422-102 Boring/Well ID MW-31A Date Drilled 12/8/2003  
 Project Houston Wood Preserving works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 34' Boring Diam. 8.25"  
 N. Coord. 728647.8540' E. Coord. 3167476.9270' Surface Elevation 49.4' El. MSL Datum  
 Screen: Type Stainless steel Diam. 2" Length 10' Slot Size 0.1"  
 Casing: Type Stainless steel Diam. 2" Length 21.5' Sump Length 2.5'  
 Top of Casing Elevation 52.08' Stickup 3'  
 Depth to Water: 1. Ft. 15.19 ( 12/9/03 ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Hollow stem auger Log By Marcel St. Marie

SKETCH MAP

NOTES  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30					NR	30-33	30-33	SILTY CLAY: Gray (7.5YR 6/1), mottled, plastic, hard (pp=>4.5 tsf), fractured, some pea size black nodules, some gravel from 32.3'-32.5', trace rootlets, moist, 100% recovery.  T.D. = 34'
20				54.0				
15				24.3				
35								
40								
45								



# MW-32A DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-32A Date Drilled 12/29/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 33' Boring Diam. 7.88"  
 N. Coord. 728913.7360' E. Coord. 3167400.8980' Surface Elevation 44.54' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 20.5' Sump Length 2.5'  
 Top of Casing Elevation 43.77' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
44.54	0				0-3	0-0.5	FILL: Asphalt
						0.5-2.8	CLAYEY SAND: Yellowish brown (10YR 5/4), fine-grained, sorted, subangular, moist, some gravels, some wood fragments, strong odor, 100% recovery.
					3-8	2.8-9	SILTY CLAY: Yellowish red (5YR 5/6), mottled, moist, plastic, very soft (pp=0.25 tsf), some gravels, 100% recovery. At 3'-8" pinkish gray (7.5YR 6/2) mottling, very stiff (pp=2.25 tsf), some sand, some iron staining, some black nodules, some silt lenses. Sand layer from 4.2'-4.4'. Sand is very fine-grained, sorted, subangular, yellowish red (5YR 5/6). At 7'-8' some rootlets and trace sand. From 7.7'-8' greenish gray (6/10Y-GLEY). At 8'-9' sand increases.
40	5				8-13		
						8-13	
						9-12	SANDY CLAY: Greenish gray (6/10Y-GLEY), moist, very stiff (pp=2.25 tsf), trace iron staining, sand increasing, 100% recovery.
35	10					12-13	CLAYEY SAND: Greenish gray (6/10Y-GLEY), fine-grained, sorted, subangular, saturated, some black staining, 100% recovery.
					13-18	13-18	SILTY SAND: Greenish gray (6/10Y-GLEY), fine-grained, sorted, subangular, saturated, trace clay, 20% recovery.
30	15					28	





# MW-32A DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-32A Date Drilled 12/29/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 33' Boring Diam. 7.88"  
 N. Coord. 728913.7360' E. Coord. 3167400.8980' Surface Elevation 44.54' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 20.5' Sump Length 2.5'  
 Top of Casing Elevation 43.77' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP  
 NOTES  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15					18-23	18-30	NO RECOVERY: At 23'-30" odor noted from cuttings.
25					23-28		
20					28-30		
25							
20							
15							
30							



# MW-32A DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-32A Date Drilled 12/29/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 33' Boring Diam. 7.88"  
 N. Coord. 728913.7360' E. Coord. 3167400.8980' Surface Elevation 44.54' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 20.5' Sump Length 2.5'  
 Top of Casing Elevation 43.77' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30	30				30-33	30-30.2 30.2-33	SANDY CLAY: Greenish gray (6/10Y-GLEY), moist, plastic, very stiff (pp=2.75 tsf), product observed, odor, 100% recovery. CLAY: Yellowish red (5YR 4/6), mottled, moist, plastic, pp=3.0 tsf, highly fractured, product present in fractures, trace silt lenses, strong odor, 100% recovery.  T.D. = 33'
10	35						
5	40						
0	45					30	



**Union Pacific Railroad**

# Log of Boring: MW-32AR

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	12/15/2011	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	22
	Driller's License:	58141	Northing:	728925.14
	Field Supervisor:	Tim Jennings	Easting:	3167400.14
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	44.74

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0			DO	PAV	(0 - 0.2) Asphalt Pavement
5				FILL	(0.7 - 5) FILL, gravelly clay, caliche-like
1.5/5			1.5/5	CL	(5 - 9.5) SANDY GRAVELLY CLAY, CL, light brown and light gray, moist, ~20-40% fine gravel, and fine to coarse carbonate sand, grade to silty sand
10			12/12	SM	(9.5 - 11.7) SILTY SAND, SM, gray, wet, ~30-40% fines in very fine to fine sand, slight odor
15				SP	(11.7 - 18) POORLY GRADED SAND, SP, brown to gray, wet, very fine to fine sand, slight odor
20				SM/SC	(18 - 19.7) SILTY CLAYEY SAND, SM/SC, gray, wet, ~40-50% medium plasticity fines in very fine to fine sand, firm
				CH	(19.7 - 22) SANDY CLAY, CH, light gray, moist, ~20-30% fine sand in high plasticity clay, soft to firm, slight odor

## PBW

**Pastor, Behling & Wheeler, LLC**  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**  
 Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.

Initial Fluid Level (01/27/12)  
 Depth to water: 3.22 ft BTOC

Annular Materials  
 (0.0 - 2.0) Concrete  
 (2.0 - 4.0) Portland/Bentonite Grout  
 (4.0 - 8.0) Bentonite Pellets  
 (8.0 - 20.0) 20/40 Silica Sand  
 (20.0-22.0) Caved Formation

Well Materials  
 (0 - 10.0) Casing, 2" FJT Sch 40 PVC  
 (10.0 - 20.0) Screen, 2" FJT Sch 40 PVC,  
 0.01 slot

TOC Elevation (ft AMSL)  
 44.56



**Union Pacific Railroad**

# Log of Boring: MW-32B

UPRR Houston Wood Preserving Works  
Houston, TX

PBW Project No. 1358

Completion Date:	12/15/2011	Drilling Method:	Roto Sonic
Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
Driller:	Tim Beach	Total Depth (ft):	40
Driller's License:	58141	Northing:	728918.2
Field Supervisor:	Tim Jennings	Easting:	3167400.46
Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	44.73

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FAV	(0 - 0.2) Asphalt Pavement
				FILL	(0.2 - 0.7) Gravel Base Material
				FILL	(0.7 - 5) FILL, gravelly clay, caliche-like
5		0.7	DO	CL	(5 - 9.5) SANDY GRAVELLY CLAY, CL, light brown and light gray, moist, ~20-40% fine gravel, and fine to coarse carbonate sand, grade to silty sand
		0.8	1.5/5	CL	
10				SM	(9.5 - 11.7) SILTY SAND, SM, gray, wet, ~30-40% fines in very fine to fine sand, slight odor
		1.1		SP	(11.7 - 18) POORLY GRADED SAND, SP, brown to gray, wet, very fine to fine sand, slight odor
15			3/10	SP	
		1.2		SM/SC	(18 - 19.7) SILTY CLAYEY SAND, SM/SC, gray, wet, ~40-50% medium plasticity fines in very fine to fine sand, firm
		5.5		CH	(19.7 - 23.5) SANDY CLAY, CH, light gray, moist, ~20-30% fine sand in high plasticity clay, soft to firm, slight odor
20			5/5	CH	
		20.4		CL	(23.5 - 29.2) SANDY GRAVELLY CLAY, CL, orange and reddish brown with gray mottling, moist, ~5-10% fine sand (increases to ~30% sand 25 to 28.5 feet), <5% fine to coarse gravel, purple and black staining around gravel, thin gravel seams (interbeds) at 26.6, and 29-29.2 feet, small amount of NAPL in gravel bed at 29-29.2 feet (NAPL seeps out of core after laying out for 10-15 minutes), strong odor
25			5/5	CL	
		24		CL/SP	(29.2 - 36.3) SANDY CLAY, CL/SP, reddish brown with gray mottling moist to dry, ~5-20% very fine sand mostly as fracture lining and fill, low to medium plasticity clay is very fractured and very friable, small amount of NAPL seeping out of sand-lined fractures 34-34.8 feet, strong odor
30			5/5	CL/SP	
		43.2		CH	(36.3 - 40) CLAY, CH, reddish brown and gray along fractures, very stiff, high plasticity clay, locally fractured with slickensides, fractures at 25 to 45 degree angle from vertical, slight odor
35			5/5	CH	
		51.3		CH	
		105.2		CH	
40			5/5	CH	
		15.4		CH	
		8.1		CH	

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.  
8-inch sonic isolation casing advanced to 23' then removed during grouting.

Initial Fluid Level (01/27/12)

Depth to water: 3.11 ft BTOC  
Depth to NAPL: 30.52 ft BTOC

Annular Materials

(0.0 - 2.0) Concrete  
(2.0 - 20.0) Portland/Bentonite Grout  
(20.0 - 24.0) Bentonite Pellets  
(24.0 - 36.5) 20/40 Silica Sand  
(36.5 - 40.0) Bentonite Pellets

Well Materials

(0 - 26.0) Casing, 2" FJT Stainless Steel  
(26.0 - 36.0) Screen, 2" FJT Stainless Steel,  
0.01 slot

TOC Elevation (ft AMSL)

44.41



# MW-33A DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-33A Date Drilled 12/30/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 25.5' Boring Diam. 7.88"  
 N. Coord. 728988.5670' E. Coord. 3167667.8710' Surface Elevation 44.76' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 13' Sump Length 2.5'  
 Top of Casing Elevation 44.25' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
44.76	0					0-3	0-0.25 0.25-1	OTHER: Asphalt, removed by driller. CLAYEY SAND: Dark grayish brown (10YR 4/2), clay increasing with depth, some gravels, moist, 100% recovery.
							1-7	SILTY CLAY: Dark grayish brown (10YR 4/2), mottled, plastic, very stiff (pp=2.5 tsf), some sand increasing with depth, trace iron nodules, some iron staining, rootlets, moist, 100% recovery. At 3' becomes light gray (2.5Y 7/2), some sand lenses (up to 1" diameter), grayish brown (2.5Y 5/2), very fine-grained, sorted, subangular.
					0.0	3-8		
	40				1.4			
					1.4		7-9	SANDY CLAY: Light gray (2.5Y 7/2), mottled, very stiff (pp=2.25 tsf), rootlets, some black staining, moist, 100% recovery.
						8-13		
	35				1.4		9-11.8	CLAYEY SAND: Greenish gray (GLEY 6/5GY), fine-grained, sorted, subangular, soft (pp=0.5 tsf), wet, 100% recovery.
							11.8-23	SILTY SAND: Greenish gray (GLEY 6/5GY), fine-grained, sorted, subangular, soft (pp=0.5 tsf), trace of clay, wet, saturated at 14', 50% recovery. At 18' becomes light yellowish brown (2.5Y 6/2).
					1.4	13-18		
	30							
	15							



# MW-33A DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-33A Date Drilled 12/30/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 25.5' Boring Diam. 7.88"  
 N. Coord. 728988.5670' E. Coord. 3167667.8710' Surface Elevation 44.76' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 13' Sump Length 2.5'  
 Top of Casing Elevation 44.25' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15					1.4			
					2.1	18-23		
25					2.4			
20								
						23-25.5	23-25.5	SILTY CLAY: Light gray (2.5Y 7/1), mottled, plastic, hard (pp=4.25 tsf), trace fractures, trace silt lenses, trace white nodules, rootlets, moist, 100 % recovery.
20								
25					7.7			T.D. = 25.5'
15								
30								
							32	



Union Pacific Railroad

# Log of Boring: MW-33B

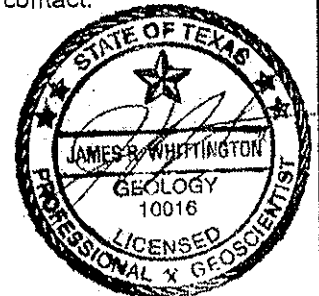
UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date: 2/23/07  
 Drilling Company: Best Drilling, Inc.  
 Driller: Sonny Tobola  
 Driller's License: 3026  
 Field Supervisor: James Whittington, P.G.  
 Sampling Method: 2" x 3' Split Spoon

Drilling Method: HSA  
 Borehole Diameter (in.): 7.5  
 Total Depth (ft): 75  
 Northing: 3167660.91  
 Easting: 729149.63  
 Casing Elevation (ft): 44.35

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0			0	Fill	(0.0 to 0.25) Asphalt.
		0.2	75	CL	(0.25 to 1.0) Gravelly clay FILL, red.
					(1.0 to 3.0) Silty CLAY, very dark gray, gradational basal contact.
		0.1	100	CL/SC	(3.0 to 6.0) Silty CLAY and SAND, mottled gray and reddish-brown, increasing sand content with depth, gradational basal contact.
5		0	100		
		0	100	SP	(6.0 to 12.0) SAND, gray, fine-grained, ~25% clay, decreasing clay content with depth, gradational basal contact.
			0		
10		0.1	75	SP	
		0	75		(12.0 to 21.0) SAND, gray, sand is fine-grained quartz, < 10% clay, Base of Oxidized Zone at 14.0, gradational basal contact.
			0		
15		0.1	75	SP	
		0.3	50		
			0		
20		0.1	50		(21.0 to 27.0) SAND, brown, medium- to fine-grained, ~80% sand, 10% silt, 10% clay, sharp basal contact.
		0	25	SP	
			0		
25		0.1	100		
		8.5	90	CL	(27.0 to 30.0) CLAY, mottled reddish-brown and gray, ~5% small carbonaceous clasts, ~10% sand, creosote odor at ~29.0.
30					(30.0 to 40.0) silty CLAY, mottled reddish-brown and gray, firm moist



## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

- 10" PVC surface casing set from 0 to 28.5 feet bgs.
- Borehole grouted from 48 to 75 feet bgs, bentonite plug from 42 to 48 feet bgs

Annular Materials

(0 to 29.0) Bentonite-Cement Grout  
 (29.0 - 31.0) Bentonite Pellets  
 (31.0 - 42.0) 16-30 Silica Sand

Well Materials

(0 to 32.0) Casing, 2" Stainless Steel  
 (32.0 to 42.0) Screen 2" Wire Wrapped  
 Stainless Steel 0.010 slot



Union Pacific Railroad

# Log of Boring: MW-33B

UPRR Houston Wood Preserving Works  
Houston, Texas

PBW Project No. 1358

Completion Date:	2/23/07	Drilling Method:	HSA
Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	7.5
Driller:	Sonny Tobola	Total Depth (ft):	75
Driller's License:	3026	Northing:	3167660.91
Field Supervisor:	James Whittington, P.G.	Easting:	729149.63
Sampling Method:	2" x 3' Split Spoon	Casing Elevation (ft):	44.35

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
35		132		CL	carbonaceous nodules at 33.0, 35.0, 40.0; strong odor, product visible within matrix of freshly broken surfaces, gradational basal contact.
		38			
		141			
		145			
		21			
40		10			
		6			
45		4.5			
		3.0			
		8.0			
50		1.5		CL	(40.0 to 62.0) CLAY, reddish-brown, moist, silty intervals < 0.5' thick at 48.0 and 56.0, weaker odor than at 30.0 to 40.0, sharp basal contact.
		1			
55		2			
		1.0			
		1.0			
60		0.3			

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

- 10" PVC surface casing set from 0 to 28.5 feet bgs.
- Borehole grouted from 48 to 75 feet bgs, bentonite plug from 42 to 48 feet bgs

Annular Materials

(0 to 29.0) Bentonite-Cement Grout  
(29.0 - 31.0) Bentonite Pellets  
(31.0 - 42.0) 16-30 Silica Sand

Well Materials

(0 to 32.0) Casing, 2" Stainless Steel  
(32.0 to 42.0) Screen 2" Wire Wrapped  
Stainless Steel 0.010 slot





Union Pacific Railroad

# Log of Boring: MW-33B

UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date: 2/23/07

Drilling Method: HSA

Drilling Company: Best Drilling, Inc.

Borehole Diameter (in.): 7.5

Driller: Sonny Tobola

Total Depth (ft): 75

PBW Project No. 1358

Driller's License: 3026

Northing: 3167660.91

Field Supervisor: James Whittington, P.G.

Easting: 729149.63

Sampling Method: 2" x 3' Split Spoon

Casing Elevation (ft): 44.35

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
65		0.5		 SC	(62.0 to 75.0) Silty, clayey SAND; reddish-brown to medium brown, moderate creosote odor, saturated, sand increases with depth.
		41			
70		38			
75					

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

- 10" PVC surface casing set from 0 to 28.5 feet bgs.
- Borehole grouted from 48 to 75 feet bgs, bentonite plug from 42 to 48 feet bgs

Annular Materials

(0 to 29.0) Bentonite-Cement Grout  
(29.0 - 31.0) Bentonite Pellets  
(31.0 - 42.0) 16-30 Silica Sand

Well Materials

(0 to 32.0) Casing, 2" Stainless Steel  
(32.0 to 42.0) Screen 2" Wire Wrapped  
Stainless Steel 0.010 slot



**Union Pacific Railroad**

# Log of Boring: MW-33BR

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	12/19/2011	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	40
	Driller's License:	58141	Northing:	729142.16
	Field Supervisor:	Tim Jennings	Easting:	3167661.63
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	44.86

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				PAV	(0 - 0.2) Asphalt Pavement
				FILL	(0.2 - 0.7) Gravel Base Material
			DO		(0.7 - 3) FILL, gravelly clay, caliche-like
5		0.7		CL	(3 - 6) SANDY CLAY, CL, light brown and gray mottled, ~20% fine sand in medium plasticity clay, firm
			3/5		(6 - 22.4) POORLY GRADED SAND, SP, grayish brown - grading to gray at ~14 feet and brown to locally gray 20-22.4 feet, moist to wet below 12 feet, very fine to fine sand, soft, abundant FeOx 13-14 feet
10		0.6			
		1			
15		0.7	5/10	SP	
20		1.2			
			5/5	CH	(22.4 - 23.5) CLAY, CH, reddish brown with gray mottling, moist, high plasticity clay, hard
25		1.33		CH	(23.5 - 27.5) SANDY CLAY, CH, brown with trace gray mottling, wet, ~20-40% fine sand decreasing downward, grades to silty clay
		0.6			
			5/5		
30		15.2			(27.5 - 38) SILTY CLAY, CL, reddish brown with gray mottling, low to medium plasticity clay is fractured and moderately friable from 30-36.5 feet, fractures are commonly lined or filled with fine sand, <5% coarse sand to medium gravel sized carbonate nodules common 28.2-31.8 feet, thin carbonate seams at 28.2', 31.8', and 32.9', black FeOx and MgOx mineralization is common along fractures, trace NAPL in sand along fractures, moderate odor
		16.1			
			5/5	OL	
35		3.4			
		10.9			
			5/5		
40		2.6		CL	(38 - 40) CLAY, CH, reddish brown with minor gray mottling, medium plasticity clay, hard, fractures with slickensides 38.2 and 39.7, slight odor

## PBW

**Pastor, Behling & Wheeler, LLC**  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.  
 8-inch sonic isolation casing advanced to 25' then removed during grouting.

Initial Fluid Level (01/27/12)

Depth to water: 4.07 ft BTOC

Annular Materials

(0.0 - 2.0) Concrete  
 (2.0 - 22.0) Portland/Bentonite Grout  
 (22.0 - 26.0) Bentonite Pellets  
 (26.0 - 38.0) 20/40 Silica Sand  
 38.0 - 40.0) Bentonite Pellets

Well Materials

(0 - 28.0) Casing, 2" FJT Stainless Steel  
 (28.0 - 38.0) Screen, 2" FJT Stainless Steel,  
 0.01 slot

TOC Elevation (ft AMSL)

44.46



# MW-34C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-34C Date Drilled 1/13/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 728933.9030' E. Coord. 3168159.5200' Surface Elevation 45.63' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 45.31' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud Rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45.31	0					0-0.58	0-0.58	CONCRETE: Road material.
45					NM	0.58-2	0.58-2	CLAY: Dark gray (7.5YR 4/1), plastic, some gravel up to 1/2" diameter, moist, 100% recovery.
					0.0	2-4	2-3	SILTY CLAY: Dark greenish gray (GLE Y 3/10Y), soft (pp=0.5 tsf), some gravel up to 1/2" diameter, moist, 100% recovery.
					0.0	4-6	3-6	SANDY CLAY: Greenish gray (GLE Y 6/10Y), fine-grained, subangular, stiff (pp=1.25 tsf), cobbles up to 1" in diameter, moist. At 5' has olive yellow mottling (2.5Y 6/8), stiff (pp=2.0 tsf), iron nodules, and gravel up to 1/2" diameter, 75% recovery.
40	5				0.0	6-8	6-8	SANDY SILTY CLAY: Greenish gray (GLE Y 5/10Y), orange red mottling, very stiff (pp=2.5), gravels up to 1/2" diameter, moist, 100% recovery.
					0.0	8-10	8-9	NO RECOVERY
					0.0	9-10	9-10	SANDY CLAY: Greenish gray (GLE Y 6/5GY), brownish yellow (10YR 7/8) mottling, stiff (pp=1.5 tsf), fine-grained, subrounded, gravel up to 3/4" diameter, some iron nodules, moist, 100% recovery.
35	10				0.0	10-12	10-12	SILTY SANDY CLAY: Greenish gray (GLE Y 6/10Y), brownish yellow mottling, fine-grained, subangular, black staining, moist, 100% recovery.
					0.0	12-14	12-14	SANDY CLAY: Greenish gray (GLE Y 6/5GY), yellowish brown (10YR 5/6) at 13.5', mottling at 13.5', pinkish tinge, very stiff (pp= 3 tsf at 12' and 2.5 tsf at 13'), fine-grained, subrounded, gravel up to 3/4" diameter, some iron nodules, some white calcareous nodules, moist, 100% recovery.
					0.0	14-16	14-15.5	SILTY SANDY CLAY: Greenish gray (GLE Y 6/5BG) with light greenish gray (GLE Y 4/5BG) and olive yellow (2.5Y 6/8) mottling, fine grained, subangular, gravels up to 1/2" diameter, moist, 100% recovery.
15	15						33	



# MW-34C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-34C Date Drilled 1/13/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 728933.9030' E. Coord. 3168159.5200' Surface Elevation 45.63' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 45.31' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud Rotary Log By Vivian Rohrback

SKETCH MAP

NOTES

PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30	15							
					0.0	16-18	15.5-18	CLAYEY SAND: Dark greenish gray (GLEY 4/10Y), yellowish red (5YR 5/8) at 16.5', fine-grained, subangular, moist, 75 % recovery.
					0.0	18-20	18-18.5	SANDY CLAY: Greenish gray (GLEY 6/10Y), fine-grained, subangular, moist to saturated, 100% recovery.
							18.5-19.5	CLAYEY SAND: Yellowish brown (10YR 5/6), fine-grained, subangular, moist, 100% recovery.
							19.5-21	NO RECOVERY
	20				0.0	20-22	20-22	
					0.0	22-24	21-26	CLAYEY SAND: Bluish gray (GLEY 6/5BG), grades to a pinkish gray, fine-grained, subangular, some iron flecks, some clay lenses, some gravels up to 1/2" diameter, moist to saturated, 75 % recovery. At 22' becomes greenish gray (GLEY 6/10Y), caliche zone at 22.8', wet, 1" of brownish yellow (10YR 6/8) clayey sand at 25.5', odor.
					0.8	24-26		
	25				4.7	26-28	26-28	CLAY: Yellowish red (5YR 4/6), pale yellow (2.5Y 7/3) mottling, stiff (pp=2.0 tsf), laminated, fractured, fractures filled with black staining, moist, 100% recovery.
					0.0	28-30	28-32	SILTY CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/10BG) mottling, very stiff (pp=3.5 tsf), silt lenses, fractured, iron staining, mild odor, moist, 100% recovery. At 30' becomes dark yellowish brown (10YR 4/6), very stiff (pp=3.5 tsf), manganese oxide nodules at 31.5', odor.
	30							34



# MW-34C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-34C Date Drilled 1/13/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 728933.9030' E. Coord. 3168159.5200' Surface Elevation 45.63' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 45.31' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud Rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15	30				0.0	30-32		
					0.0	32-34	32-32.5	NO RECOVERY
							32.5-34	CLAYEY SILT: Light greenish gray (GLEY 7/10BG), pp=3.5 tsf moist, iron nodules, black staining at 32.5', silt lenses.
					71.9	34-36	34-34.5	NO RECOVERY
							34.5-36	SILTY CLAY: Light greenish gray (GLEY 7/10BG) with brownish yellow (10YR 6/8) mottling, hard (pp=>4.5 tsf), fractured, manganese oxide staining, few iron nodules, odor, moist, 100% recovery.
10	35				1.1	36-38	36-36.5	NO RECOVERY
							36.5-38	CLAYEY SILT: Light greenish gray (GLEY 7/5GY) with yellowish red (5YR 5/6) mottling, stiff (pp=2.0), fractured, sheen, odor, moist, 100% recovery.
					82.0	38-40	38-48	SILTY CLAY: Reddish yellow (5YR 6/6) with light olive gray (5Y 6/2) mottling, hard (pp=>4.5 tsf), fractured, manganese oxide staining, few iron nodules, sheen, odor, moist, 75% recovery. Silt increases from 40.8'-44.6', hard (pp=>4.5 tsf). At 44' becomes yellowish red (5YR 5/6) with light greenish gray (GLEY 7/10BG), very stiff (pp=4.0 tsf), fractured, bioturbation. Clay lenses at 47.5', plastic, hard (pp=>4.5 tsf) at 46', stiff (pp=2.25 tsf) at 48', odor.
5	40				8.5	40-42		
					4.8	42-44		
					2.8	44-46		
							35	



# MW-34C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-34C Date Drilled 1/13/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 728933.9030' E. Coord. 3168159.5200' Surface Elevation 45.63' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 45.31' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud Rotary Log By Vivian Rohrback

SKETCH MAP

NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	45				1.8	46-48		
					11.8	48-50	48-50	NO RECOVERY
-5	50				NM	50-52	50-54	SILTY CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLE Y 7/10BG), very stiff (pp=4.0 tsf) at 50' and hard (pp=>4.5 tsf) at 52', manganese oxide staining, limestone gravel at 50'-50.2', odor, moist, 75 % recovery. Silt lenses, very stiff (pp=3.0 tsf), bioturbation, slight odor at 53'.
					3.8	52-54		
					0.8	54-56	54-58	SILTY CLAY: Slightly silty clay, yellowish red (5YR 5/6) with light greenish gray (GLE Y 7/10BG), very stiff (pp=3.5 tsf at 55' and pp=4.0 tsf at 56', pp=2.25 tsf at 57'), fractured, silt lenses, manganese oxide staining, odor, moist, 100% recovery. At 57.5' becomes clayey sand, fine-grained, subrounded, clay partings, slight odor.
-10	55				0.8	56-58		
					0.5	58-60	58-59.5	SILTY SANDY CLAY: Yellowish red (5YR 5/6), plastic, very fine-grained, well sorted, moist, odor, 100% recovery.
						59.5-60	3.5	SILTY CLAY: Yellowish red (5YR 4/6) with light greenish gray (GLE Y 7/10BG) mottling, hard (pp=>4.5 tsf), fractured, laminated, odor, moist, 100% recovery.



# MW-34C DRILLING LOG

V.O. NO. 422-102 Boring/Well ID MW-34C Date Drilled 1/13/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 728933.9030' E. Coord. 3168159.5200' Surface Elevation 45.63' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 45.31' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud Rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	60				0.0	60-62	60-61	SILTY SAND: Yellowish red (5YR 5/6), fine-grained, subrounded, wet, 75% recovery. SILTY SANDY CLAY: Yellowish red (5YR 5/6), fine-grained, slight odor, moist, 100% recovery. SANDY CLAY: Yellowish red (5YR 5/6), fine-grained, clay partings, moist, 100% recovery.
					0.1	62-64	62-64	
					0.0	64-66	64-68	
-20	65				0.0	66-68		SILTY SAND: Yellowish red (5YR 5/6), fine-grained, subrounded, clay partings, sheen from 64.5'-64.7' and 67'-68', odor, wet to moist with depth, 63% recovery. Sampler hammered in approximately 81 blows for 64'-66' interval and approximately 87 blows for 66'-68' interval.
					0.0	68-70	68-70	SILTY SANDY CLAY: Yellowish red (5YR 5/6), fine-grained, subrounded, silt and clay lenses, manganese oxide staining, black staining, odor, moist, 75% recovery.
-25	70				0.0	70-72	70-72	CLAY: Yellowish red (5YR 5/6), fractured, laminated, very stiff (pp=2.75 tsf at 71' and pp=3.25 tsf at 72'), some iron nodules, manganese oxide staining, slight odor, moist, 100% recovery.
					0.0			T.D. = 72.5'
							37	



# Union Pacific Railroad

# Log of Boring: MW-34CR

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date: 5/9/2014  
 Drilling Company: Walker-Hill  
 Driller: Tim Beach  
 Driller's License: 58141  
 Field Supervisor: Patrick Ferrell  
 Sampling Method: 4"x10' Barrel

Drilling Method: Roto Sonic  
 Borehole Diameter (in.): 10  
 Total Depth (ft): 70  
 Northing: 728982.3594  
 Easting: 3168226.8542  
 Ground Elev. (ft AMSL): 46.9

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 10) No Recovery, NR, concrete cored and soils removed to 10' by hydrovac to clear for utilities.
5			0.0/0.0	NR	
10		3.1	10.0/10.0	CL	(10 - 19.9) SILTY CLAY, CL, grey with dark brown and orange mottling between 10.0' to 12.4', orange mottling continues to 16.3', becomes red-brown and grey at 18.0' with few black streaks, carbonate nodules present at 12.5', 16.5', and 19.8', dry, firm to hard with low plasticity, no odors.
15		3.3			
		3			
		4.2			
20		7.8	10.0/10.0	SP	(19.9 - 27.7) SAND, SP, grey and tan becomes brown below 25.6', medium to fine grained, saturated at 20.0', no visible staining, mild creosote odor between 23.0' to 27.7'.
25		15.4			
		21.1			
30		20.4	10.0/10.0	CL	(27.7 - 56.8) SILTY CLAY, CL, red-brown with few black streaks, fractured seams at 29.4' and 29.9', no odor, dry and hard. Fractures seen in dark brown clay at 30.1' with black/dark staining and mild odor, clay becomes grey at 32.8' with orange mottling beginning at 33.7' and increasing with depth to 37.4' where it becomes primarily orange. Some carbonate nodules with black staining at 36.5' to 37.2' and large carbonate nodule clast at 39.2' (8 cm diameter). Orange-red clay with some black streaks continues with mild odor to 46.0' with a visible sheen on carbonate nodules at 43.0'. Slickenside fractures at 41.9', and 46.4', clay is grey along the fractures, but red-orange above and below fractures, dry, very hard with no plasticity. Carbonate nodule lenses noted at 53.3' to 53.4', 55.4' to 55.5', no staining or odors.
35		14.1			
		16.1			
		15.7			
40		15.4			
		16.4			
45		13.2			
		12.4			
50		9.1			
		7.1			
55		3.1	10.0/10.0	CH	(56.8 - 59.4) SANDY CLAY, CH, red-brown and orange, fine grained with no odors or staining, moist, soft with low to medium plasticity.
		3.2			
60		2.3	10.0/10.0	CL	(59.4 - 60.5) SILTY CLAY, CL, red-brown and orange with few black streaks, no odors, dry, very hard with no plasticity.
		17.4			
65		19.3			
		20.1			
		14.7	10.0/10.0	SM	(60.5 - 64.2) SANDY CLAY, CH, red-brown, trace carbonate nodules at 63.2', sheen visible at 62.4' to 62.7', and 63.7' to 64.0', heavy odor, some thin clay lenses at 63.2' and 63.3', moist and soft with low plasticity.
		14.7			
70				CL	(64.2 - 68.4) SILTY SAND, SM, fine grained, orange-brown with slight creosote odor, but no visible staining, few clasts (2-4 cm diameter at 68.4'), moist. (68.4 - 70) SILTY CLAY, CL, orange-brown, some fine grained sand present, no staining, clay lenses present at 69.1' to 69.6', moist, firm with low plasticity.

## PBW

**Pastor, Behling & Wheeler, LLC**  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

### Notes:

Top 10 feet drilled out (DO) with a hydrovac to clear for utilities.  
 8-inch sonic casing advanced to 30' then removed during grouting.  
 6-inch sonic casing advanced to 70', then removed during grouting.

Annular Materials  
 (0.0 - 2.0) Concrete  
 (2.0 - 54.0) Portland/Bentonite Grout  
 (54.0 - 57.0) Bentonite Pellets  
 (57.0 - 70.0) 20/40 Silica Sand

Well Materials  
 (0 - 60.0) Casing, 4" FJT Stainless Steel  
 (60.0 - 70.0) Screen, 4" FJT Stainless Steel,  
 0.01 slot

TOC Elevation (ft AMSL)  
 46.47





Union Pacific Railroad

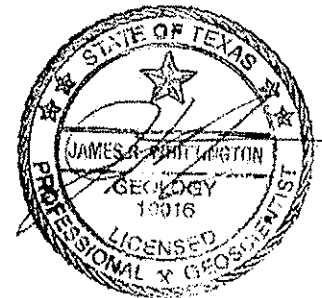
# Log of Boring: MW-35A

UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date:	2/21/07	Drilling Method:	HSA
Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	8.5
Driller:	Sonny Tobola	Total Depth (ft):	30
Driller's License:	3026	Northing:	3167045.40
Field Supervisor:	James Whittington, P.G.	Easting:	728984.92
Sampling Method:	4" x 5" Split Barrel	Casing Elevation (ft):	44.75

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0					(0.0 to 0.5) Asphalt.
				FILL	(0.5 to 1.0) Gravelly clay FILL, red.
		0.4	80		(1.0 to 1.5) Clay FILL, red.
		0.2		CL	(1.5 to 6.0) Silty CLAY, dark gray, lighter color with increasing depth.
5		0.6			
		0.6	100	CL	(6.0 to 10.0) Sandy CLAY, mottled gray and tan, ~30% sand, increasing sand with depth.
10		0.3			
		0.3	70	CL/SC	(10.0 to 14.0) CLAY and SAND, tan and gray, ~50% clay, ~50% sand, increasing moisture with depth.
15		0.2			
		0.2			
		0.5	80	SP	(14.0 to 24.0) SAND, gray, fine-grained, < 20% silt and clay, saturated, coarsens downward.
20		0.5			
		0.3	80		
25		0.8		SP	(24.0 to 27.0) SAND, tan, medium-grained, ~10 % clay.
		0.8	60	CL	(27.0 to 30.0) Sandy CLAY, reddish-brown, dense, calcareous nodules, ~10% sand, less moist than above.
30					



## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Annular Materials

(0 to 10.0) Bentonite-Cement Grout  
 (10.0 - 12.0) Bentonite Pellets  
 (12.0 - 28.0) 16-30 Silica Sand

Well Materials

(0 to 13.0) Casing, 2" Sch 40 FJT PVC  
 (13.0 to 23.0) Screen 2" Sch 40 FJT PVC  
 0.010 slot



Union Pacific Railroad

# Log of Boring: MW-35B

UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date: 2/26/07  
 Drilling Company: Best Drilling, Inc.  
 Driller: Sonny Tobola  
 Driller's License: 3026  
 Field Supervisor: James Whittington, P.G.  
 Sampling Method: 4" x 5' Split Barrel

Drilling Method: HSA  
 Borehole Diameter (in.): 8.5  
 Total Depth (ft): 43  
 Northing: 3167045.19  
 Easting: 728988.18  
 Casing Elevation (ft): 44.83

PBW Project No. 1358

Depth (ft)	Well Materials	PIID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0					(0.0 to 0.5) Asphalt.
		0.4	80	FILL	(0.5 to 1.0) Gravelly clay FILL, red.
		0.2		CL	(1.0 to 1.5) Clay FILL, red.
5		0.6			(1.5 to 6.0) Silty CLAY, dark gray, lighter color with increasing depth.
		0.6	100	CL	(6.0 to 10.0) Sandy CLAY, mottled gray and tan, ~30% sand, increasing sand with depth.
10		0.3			(10.0 to 14.0) CLAY and SAND, tan and gray, ~50% clay, ~50% sand, increasing moisture with depth.
		0.3	70	CL/SC	
		0.2			(14.0 to 24.0) SAND, gray, fine-grained, < 20% silt and clay, saturated, coarsens downward.
15		0.2			
		0.5	80	SP	
20		0.5			
		0.3	80		
25		0.8			(24.0 to 27.0) SAND, tan, medium-grained, ~10 % clay.
		0.8	60	SP	
				CL	(27.0 to 30.0) Sandy CLAY, reddish-brown, dense, calcareous nodules, ~10% sand, less moist than above.
30					(30.0 to 43.0) Silty CLAY, mottled reddish-brown gray and tan.



## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

- 10" PVC surface casing set from 0 to 30.0 feet bgs.

Annular Materials

(0 to 29.0) Bentonite-Cement Grout  
 (29.0 - 31.0) Bentonite Pellets  
 (31.0 - 42.0) 16-30 Silica Sand

Well Materials

(0 to 32.0) Casing, 2" Sch 40 FJT PVC  
 (32.0 - 42.0) Screen 2" Sch 40 FJT PVC  
 0.010 slot



Union Pacific Railroad

# Log of Boring: MW-35B

UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date:	2/26/07	Drilling Method:	HSA
Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	8.5
Driller:	Sonny Tobola	Total Depth (ft):	43
Driller's License:	3026	Northing:	3167045.19
Field Supervisor:	James Whittington, P.G.	Easting:	728988.18
Sampling Method:	4" x 5' Split Barrel	Casing Elevation (ft):	44.83

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description	
35    40		9		CL	(33.0 to 36.0) Gravelly, silty CLAY, carbonate seams, very strong hydrocarbon odor, visible product at 36.0, saturated at 36.0.	
		211		CL		
		50		CL		(36.0 to 43.0) CLAY, mottled reddish-brown and gray, firm, moist, sporadic carbonate nodules < 5 mm in diameter.
		8				
		2				
		3				

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:

- 10" PVC surface casing set from 0 to 30.0 feet bgs.

Annular Materials

(0 to 29.0) Bentonite-Cement Grout  
(29.0 - 31.0) Bentonite Pellets  
(31.0 - 42.0) 16-30 Silica Sand

Well Materials

(0 to 32.0) Casing, 2" Sch 40 FJT PVC  
(32.0 to 42.0) Screen 2" Sch 40 FJT PVC  
0.010 slot



Union Pacific Railroad

# Log of Boring: MW-36A

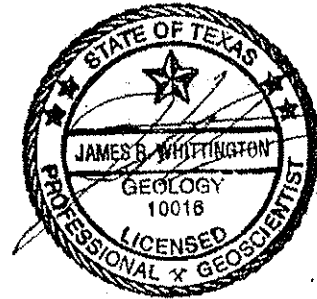
UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date: 2/22/07  
 Drilling Company: Best Drilling, Inc.  
 Driller: Sonny Tobola  
 Driller's License: 3026  
 Field Supervisor: James Whittington, P.G.  
 Sampling Method: 4" x 5' Split Barrel

Drilling Method: HSA  
 Borehole Diameter (in.): 8.5  
 Total Depth (ft): 30  
 Northing: 3168167.43  
 Easting: 729148.20  
 Casing Elevation (ft): 44.53

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0				Fill	(0.0 to 0.3) Asphalt.
				Fill	(0.3 to 0.8) Gravel base.
		0.2		CL	(0.8 to 1.5) Gravelly, clay FILL, red.
		0.2		CL	(1.5 to 3.5) CLAY, dark gray, dense, < 2% clasts, gradational basal contact.
5		0.1		CL	(3.5 to 14.0) Silty CLAY, mottled gray and tan, sporadic carbonaceous clasts, coarsening downward into lighter colored gray and tan mottled sandy clay.
		0.1		CL	
		0.1		CL	
		0.1		CL	
15		0.6	NA	CL	(14.0 to 19.0) CLAY, mottled red and gray to black, chemically weathered carbonaceous gravel.
		0		CL	
		0.1		CL	
20				SP	(19.0 to 27.0) SAND, light brown, medium-grained, quartz sand, < 5% clay, < 5% silt, ~5% dark minerals, no apparent bedding, sharp contact.
		0.2		SP	
25		0.2		SP	
				CL	(27.0 to 30.0) CLAY, mottled red and gray, < 10% sand and fine gravel.
30		0.2		CL	



## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

- Borehole plugged with bentonite chips 28.0 to 30.0 feet bgs.

Annular Materials

(0 to 15.0) Bentonite-Cement Grout  
 (15.0 - 17.0) Bentonite Pellets  
 (17.0 - 28.0) 16-30 Silica Sand

Well Materials

(0 to 18.0) Casing, 2" Sch 40 FJT PVC  
 (18.0 to 28.0) Screen 2" Sch 40 FJT PVC  
 0.010 slot

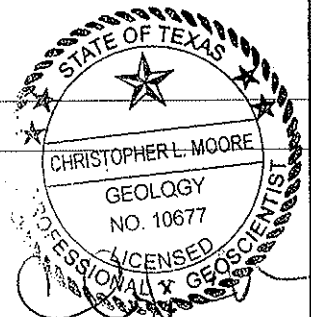


Union Pacific Railroad

# Log of Boring: MW-36B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/24/10	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Blutworth	Total Depth (ft):	43
	Driller's License:	4885	Northing:	729161.08
	Field Supervisor:	Chris Moore	Easting:	3168172.38
	Sampling Method:	4"6"x10' Barrel	Ground Elev. (ft AMSL):	44.58

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	Asphalt Pavement				Asphalt Pavement
	Gravel Base Material				Gravel Base Material
	CLAY, CH, light gray, moist, firm to hard.		DO		CLAY, CH, light gray, moist, firm to hard.
5					CLAY, CH, dark gray, moist, firm, some banded orange staining, 8.2-13: silty/sandy.
				CH	
10			9.0/10.0		
15					SAND, SP, yellowish brown, wet, soft, very fine grained, trace clayey lenses.
20			10.0/10.0	SP	
25					CLAY, CH, reddish brown, moist, firm to hard, some gray mottling,
30			10.0/10.0		
35				CH	CLAY, CH, light brown, moist, firm to hard, some sand to gravel size calcarous nodules, 39.5-39.8: wet sand lens.
40			8.0/8.0		CLAY, CH, mottled reddish brown and gray, moist, hard.



1/6/2011

**PBW**  
**Pastor, Behling & Wheeler, LLC**  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:	Initial Fluid Level (7/12/10)
Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.	▼ Depth to water: 1.32 ft BTOC
<u>Annular Materials</u>	<u>Well Materials</u>
(0.0 - 1.0) Concrete	(0 - 38.0) Casing, 2" Sch 40 FJT PVC
(1.0 - 34.0) Portland/Bentonite Grout	(38.0 - 43.0) Screen, 2" Sch 40 FJT PVC,
(34.0 - 36.0) Bentonite Chips	0.01 slot
(36.0 - 43.0) 16/30 Silica Sand	
	TOC Elevation (ft AMSL) 44.07

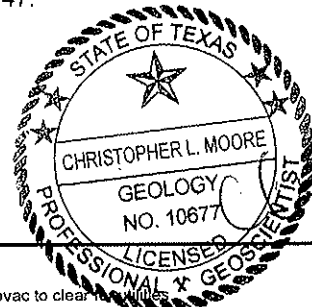


Union Pacific Railroad

# Log of Boring: MW-36D

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/22/10	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
	Driller:	William Blutworth	Total Depth (ft):	110
	Driller's License:	4885	Northing:	729161.54
	Field Supervisor:	Chris Moore	Easting:	3168179.5
PBW Project No. 1358	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	44.53

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					Asphalt Pavement
					Gravel Base Material
			DO		CLAY, CH, light gray, moist, firm to hard.
5		-			CLAY, CH, dark gray, moist, firm, some banded orange staining, 8.5-13: silty/sandy.
		0	10.0/10.0	CH	
10		0			
		0			
15		0			SAND, SP, yellowish brown, wet, soft, very fine grained, trace clayey lenses.
		0	9.5/10.0	SP	
20		0			
		0			
25		0			
		0	10.0/10.0		CLAY, CH, reddish brown, moist, firm to hard, some gray mottling,
30		0			
		0			
35		0			CLAY, CH, light brown, moist, firm to hard, some sand to gravel size calcarous nodules, 39.5-39.6 and 39.8-39.9: wet sand lens.
		0	10.0/10.0		
40		0			CLAY, CH, mottled reddish brown and gray, moist, hard, some slickensided fractures, reddish brown below 47.
		0		CH	
45		0			
		0			
50		0	10.0/10.0		



1/2/2011

**PBW**  
**Pastor, Behling & Wheeler, LLC**  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Top 8 feet drilled out (DO) with a hydrovac to clear the hole.  
 Sonic isolation casing advanced to 75' then removed during grouting.

Initial Fluid Level (7/12/10)  
 ▼ Depth to water: 85.39 ft BTOC

Annular Materials (0.0 - 1.0) Concrete (1.0 - 96.0) Portland/Bentonite Grout (96.0 - 98.0) Bentonite Chips (98.0 - 110.0) 16/30 Silica Sand	Well Materials (0 - 100.0) Casing, 2" Sch 40 FJT PVC (100.0 - 110.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot	TOC Elevation (ft AMSL) 44.33
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Union Pacific Railroad

# Log of Boring: MW-36D

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	6/22/10	Drilling Method:	Roto Sonic
Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
Driller:	William Bludworth	Total Depth (ft):	110
Driller's License:	4885	Northing:	729161.54
Field Supervisor:	Chris Moore	Easting:	3168179.5
Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	44.53

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
55		0	10.0/10.0		SILTY SAND, SM, reddish brown, wet, soft, very fine grained, some clayey lenses.
56		0			
57		0			
58		0			
59		0			
60		0			
61		0			
62		0			
63		0			
64		0			
70		0	10.0/10.0		CLAY, CH, reddish brown, moist, firm to hard, trace gray silty lenses, 78-79: sand size calcareous nodules, 80-83: gray.
71		0			
72		0			
73		0			
74		0			
75		0			
76		0			
77		0			
78		0			
79		0			
80		0	8.0/10.0		
81		0			
82		0			
83		0			
84		0			
85		0			
86		0			
87		0			
88		0			
89		0			
90		0	10.0/10.0		
91		0			
92		0			
93		0			
94		0			
95		0			
96		0			
97		0			
98		0			
99		0			
100		0	10.0/10.0		
101		0			

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.  
Sonic isolation casing advanced to 75' then removed during grouting.

Initial Fluid Level (7/12/10)  
▼ Depth to water: 85.39 ft BTOC

Annular Materials  
(0.0 - 1.0) Concrete  
(1.0 - 96.0) Portland/Bentonite Grout  
(96.0 - 98.0) Bentonite Chips  
(98.0 - 110.0) 16/30 Silica Sand

Well Materials  
(0 - 100.0) Casing, 2" Sch 40 FJT PVC  
(100.0 - 110.0) Screen, 2" Sch 40 FJT PVC,  
0.01 slot

TOC Elevation (ft AMSL)  
44.33



Union Pacific Railroad

# Log of Boring: MW-36D

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	6/22/10	Drilling Method:	Roto Sonic
Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
Driller:	William Bludworth	Total Depth (ft):	110
Driller's License:	4885	Northing:	729161.54
Field Supervisor:	Chris Moore	Easting:	3168179.5
Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	44.53

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm~v)	Recovery (ft/ft)	USCS	Lithologic Description
105		0	5.0/5.0		
		0		SP/SM	SAND/SILTY SAND, SP/SM, reddish brown, wet, soft, very fine grained.
		0		CH	CLAY, CH, reddish brown, moist, firm to hard, trace gray silty lenses, 78-79: sand size calcareous nodules, 80-83: gray.
		0		CL	SILTY CLAY, CL, light gray, moist, firm, with sand.
110					

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.  
 Sonic isolation casing advanced to 75' then removed during grouting.

Initial Fluid Level (7/12/10)

▼ Depth to water: 85.39 ft BTOC

Annular Materials

(0.0 - 1.0) Concrete  
 (1.0 - 96.0) Portland/Bentonite Grout  
 (96.0 - 98.0) Bentonite Chips  
 (98.0 - 110.0) 16/30 Silica Sand

Well Materials

(0 - 100.0) Casing, 2" Sch 40 FJT PVC  
 (100.0 - 110.0) Screen, 2" Sch 40 FJT PVC,  
 0.01 slot

TOC Elevation (ft AMSL)

44.33





Union Pacific Railroad

# Log of Boring: MW-38A

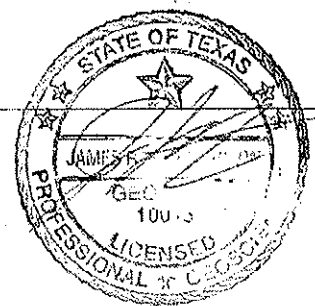
UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date: 2/21/07  
 Drilling Company: Best Drilling, Inc.  
 Driller: Sonny Tobola  
 Driller's License: 3026  
 Field Supervisor: James Whittington, P.G.  
 Sampling Method: 4" x 5' Split Barrel

Drilling Method: HSA  
 Borehole Diameter (in.): 8.5  
 Total Depth (ft): 25  
 Northing: 3165934.27  
 Easting: 728402.21  
 Casing Elevation (ft): 46.39

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0				Fill	(0.0 to 0.4) Asphalt. (0.4 to 2.0) Gravel base.
0.7		0.7	50	CL	(2.0 to 7.0) Silty CLAY, dark gray, fine laminations, no odor.
20		1	20	CL	(7.0 to 15.0) Sandy CLAY, tan to gray, lighter color and more sand with depth.
0.7		0.7	60	CL	
0.5		0.5	60	CL	
15.0		0.5	80	SP	(15.0 to 21.0) SAND, light gray, saturated, > 20% silt and clay, no odor.
1		1	80	SP	
0.5		0.5	100	CL	(21.0 to 25.0) CLAY, mottled light gray and tan.
0.7		0.7	100	CL	
1.2		1.2	100	CL	



## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

- Borehole plugged with bentonite chips 23.0 to 25.0 feet bgs.

Annular Materials

(0 to 9.0) Bentonite-Cement Grout  
 (9.0 - 11.0) Bentonite Pellets  
 (11.0 - 23.0) 16-30 Silica Sand

Well Materials

(0 to 12.0) Casing, 2" Sch 40 FJT PVC  
 (12.0 to 22.0) Screen 2" Sch 40 FJT PVC  
 0.010 slot



# MW-38B DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-38B Date Drilled 12/31/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 38' Boring Diam. 7.88"  
 N. Coord. 728319.1500' E. Coord. 3165944.7150' Surface Elevation 45.92' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 25.5' Sump Length 2.5'  
 Top of Casing Elevation 45.51' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)				
45.51	0					0-6	0-6	CLAYEY SAND: Reddish brown (5YR 4/3), rootlets.				
45												
	5											
40									NM	6-8	6-13.9	SANDY CLAY: Light brownish gray (2.5Y 6/2), mottled, plastic, very stiff (pp=2.5 tsf), trace fractures, trace white silt lenses, trace white nodules up to 10 mm, moist, 100% recovery. At 8' stiff (pp=1.5 tsf), sand decreasing with depth, some iron nodules. At 10' stiff (pp=2.0 tsf), sand increases, some black staining.
	10								0.0	8-10		
35					0.0	10-12						
					8.7	12-14		CLAYEY SAND: Light brownish gray (2.5Y 6/2), firm (pp=0.75 tsf), fine-grained, sorted, subangular, some iron staining, moist, 50% recovery.				
15					6.2	14-16	13.9-14 14-18.5	CLAYEY SILTY SAND: Light brownish gray (2.5Y 6/2), very fine-grained, sorted, subangular, clay decreasing with depth, moist, saturated at 15.9', 100% recovery.				



# MW-38B DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-38B Date Drilled 12/31/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 38' Boring Diam. 7.88"  
 N. Coord. 728319.1500' E. Coord. 3165944.7150' Surface Elevation 45.92' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 25.5' Sump Length 2.5'  
 Top of Casing Elevation 45.51' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30	15				4.8	16-18		
					9.0	18-20	18.5-22	SANDY CLAY: Light brownish gray (2.5Y 6/2), plastic, fractured, very stiff (pp=2.25 tsf) at 20'-22', sand decreasing with depth, trace white silt lenses, some iron staining, saturated from 18'-18.5', moist from 18.5'-22', 100% recovery.
	20				6.2	20-22		
	25				6.1	22-24	22-28	SILTY CLAY: Light gray (5Y 7/2), plastic, hard (pp=4.25 tsf, pp=4.5 tsf) at 22'-24' and 24'-28', some fractures, trace white silt lenses, some iron staining, moist, 100% recovery. At 24' sand decreasing, black staining, iron staining. At 26' sand content increasing with depth.
	25				38.9	24-26		
	20				57.3	26-28		
					9.0	28-30	28-30	CLAYEY SAND: Yellowish red (5YR 4/6), very fine-grained, sorted, subangular, clay content decreasing, moist, 100% recovery.
30								39





# MW-39B DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-39B Date Drilled 12/16/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 40' Boring Diam. 7.88"  
 N. Coord. 728423.6760' E. Coord. 3166019.0000' Surface Elevation 47.20' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 27.5' Sump Length 2.5'  
 Top of Casing Elevation 49.58' Stickup 3'  
 Depth to Water: 1. Ft. 6.23 (12/29/03) 2. Ft. 0 (        )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)				
47.20	0				0.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0-4	0-0.2 0.2-1.5	OTHER: Shells and asphalt. CLAYEY SAND: Dark yellowish brown (10YR 4/4), very fine-grained, sorted, subrounded, moist, 100% recovery.				
										1.5-2.5	SANDY CLAY: Black (5YR 2.5/1), moist, plastic, soft, pp=0.25 tsf, trace gravels, 100% recovery.	
										2.5-12	SILTY CLAY: Black (5YR 2.5/1), moist, pp=0.5 tsf, some sand decreasing with depth. At 4'-6' becomes gray (10YR 5/1), mottled, very stiff (pp=2.25 tsf), trace sand, trace gravel, some concretions, some iron staining, 100% recovery. At 6'-8' very stiff (pp=2.75 tsf) and some black nodules. At 8'-10' very stiff (pp=2.25 tsf). At 10'-12' becomes light gray (2.5Y 7/1), mottled, soft (pp=0.5 tsf), trace sand, increasing with depth.	
45	5									4-6		
										6-8		
										8-10		
40	10									10-12		
										12-14	12-15.9	SANDY CLAY: Black (5YR 2.5/1), fine-grained, sorted, subangular, moist, plastic, some iron staining, 75% recovery.
										14-16		
35	15											



# MW-39B DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-39B Date Drilled 12/16/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 40' Boring Diam. 7.88"  
 N. Coord. 728423.6760' E. Coord. 3166019.0000' Surface Elevation 47.20' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 27.5' Sump Length 2.5'  
 Top of Casing Elevation 49.58' Stickup 3'  
 Depth to Water: 1. Ft. 6.23 (12/29/03) 2. Ft. 0 (          )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15					0.0	16-18	15.9-20.8	CLAYEY SAND: Light olive gray (5Y 6/2), moist, very stiff (pp=3.0 tsf), 100% recovery. At 16' becomes gray (5Y 5/1), soft (pp=0.25 tsf), clay decreases with depth. At 18'-20.8' becomes saturated.
					0.7	18-20		
30	20				0.0	20-22		
					0.0	20.8-21.5	20.8-21.5	SANDY CLAY: Light gray (2.5Y 7/2), moist, plastic, stiff (pp=1.25 tsf).
					0.0	21.5-22	21.5-22	SILTY CLAY: Gray (5Y 5/1), moist, plastic, very stiff (pp=3.0 tsf), trace sand, iron staining from 21.8'-22', 100 % recovery.
					0.0	22-24	22-26	SANDY CLAY: Light gray (10YR 7/2), mottled, moist, plastic, very stiff (pp=2.25 tsf), some iron staining, 100 % recovery. At 24'-26' very stiff (pp=2.75 tsf), sand decreasing with depth, trace rootlets.
25	25				0.0	24-26		
					0.0	26-28	26-28.6	CLAYEY SAND: Yellowish red (5YR 5/6), fine-grained, sorted, subangular, very soft (pp=0.0 tsf), moist, 100 % recovery.
					NM	28-30		
20	30					28.6-30.4	28.6-30.4	SILTY CLAY: Light olive gray (5Y 6/2), mottled, plastic, stiff (pp=2.0 tsf), some sand, trace gravels, moist, 100 % recovery. At 28'-30' some horizontal fractures, very stiff (pp=4.0 tsf), trace silt lenses, sand increasing with depth. At 30'-30.4' very soft (pp=0.5 tsf).



# MW-39B DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-39B Date Drilled 12/16/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 40' Boring Diam. 7.88"  
 N. Coord. 728423.6760' E. Coord. 3166019.0000' Surface Elevation 47.20' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 27.5' Sump Length 2.5'  
 Top of Casing Elevation 49.58' Stickup 3'  
 Depth to Water: 1. Ft. 6.23 ( 12/29/03 ) 2. Ft. 0 (          )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30					0.0	30-32	30.4-38.6	<p>CLAYEY SAND: Yellowish red (5YR 5/6), fine-grained, sorted, subangular, very soft (pp=0.0 tsf), moist, 100% recovery. At 31'-32' becomes silty sand with some clay. At 32'-34' becomes strong brown (7.5YR 5/8), saturated, very soft (pp=0.0 tsf), trace clay. At 34'-36' yellowish red (5YR 4/6), saturated, very soft (pp=0.0 tsf), clay increasing. At 36'-38' becomes strong brown (7.5YR 5/8), saturated. At 38'-38.6' clay increases and trace gravels are present.</p>
	0.0				32-34			
15					0.0	34-36		
	0.0				36-38			
	0.0				38-40			
10	40				0.0		38.6-40	<p>SILTY CLAY: Light gray (5Y 7/2), mottled, moist, plastic, very stiff (pp=3.75 tsf), trace fractures, trace of sand decreasing with depth, trace black staining, 100% recovery.</p> <p>T.D. = 40'</p>
5	45							43



# MW-40B DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-40B Date Drilled 12/15/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 42' Boring Diam. 7.88"  
 N. Coord. 728340.8690' E. Coord. 3166121.9310' Surface Elevation 47.18' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 29.5' Sump Length 2.5'  
 Top of Casing Elevation 49.59' Stickup 3.0'  
 Depth to Water: 1. Ft. 5.81 ( 12/29/2003 ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

NOTES  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
47.18	0					0-4	0-0.3 0.3-0.9 0.9-1.9	FILL: Asphalt, 100% recovery. FILL: Base for asphalt, 100% recovery. SILTY SAND: Dark reddish brown (5YR 3/3), fine-grained, sorted, subrounded, moist, 100% recovery.
					1.8	1.9-6	1.9-6	SILTY CLAY: Black (5YR 2.5/1) from 1.9'-4', dark gray (7.5YR 4/1) from 4'-6', mottled, plastic, soft (pp= 0.5 tsf) at 3', stiff (pp= 1.5 tsf) at 5', some sand decreasing with depth, trace gravel, trace wood fragments, trace fractures, moist, 75% recovery.
45	5				1.8	4-6	4-6	
					1.8	6-8	6-8	GRAVELLY CLAY: Light yellow brown (2.5Y 6/2), plastic, soft (pp= 0.5 tsf), gravels (up to 5mm in diameter), moist, 100 % recovery.
					0.7	8-10	8-12	SILTY CLAY: Light olive gray (5Y 6/2), mottled, plastic, stiff (pp= 1.75 tsf) at 9', very stiff (pp= 3.0 tsf) at 11', some iron staining, trace black nodules, trace sand from 9.2'-10', moist, 100 % recovery.
40	10				0.0	10-12	10-12	
					1.4	12-14	12-16	SANDY CLAY: Light olive gray (5Y 6/2), plastic, pp= 3.25 tsf, iron staining, moist, 100% recovery.
35	15				1.8	14-16	14-16	





# MW-40B DRILLING LOG

'O. NO. 422-102 Boring/Well ID MW-40B Date Drilled 12/15/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 42' Boring Diam. 7.88"  
 N. Coord. 728340.8690' E. Coord. 3166121.9310' Surface Elevation 47.18' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 29.5' Sump Length 2.5'  
 Top of Casing Elevation 49.59' Stickup 3.0'  
 Depth to Water: 1. Ft. 5.81 ( 12/29/2003 ) 2. Ft. 0 ( \_\_\_\_\_ )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15					1.1	16-18	16-20	CLAYEY SAND: Gray (5Y 6/1), very fine-grained, sorted, subangular, wet, 100% recovery.
					2.1	18-20		
30	20				5.0	20-22	20-22	NO RECOVERY
					NA	22-24	22-22.4	SANDY CLAY: Gray (5Y 6/1), plastic, pp= 0.5 tsf, trace gravels, moist, 100% recovery.
					0.0	22.4-28	22.4-28	SILTY CLAY: Gray (5Y 6/1), plastic, hard (pp= 4.25 tsf) at 23', stiff (pp=3.0 tsf) at 27', some iron staining, moist, 100% recovery.
					0.0	24-26		
25	25				0.0	26-28		
					0.0	28-30	28-32.4	SANDY CLAY: Gray (5Y 6/1), plastic, very hard (pp= >4.5 tsf), silt lenses, moist, 100% recovery.
20	30						45	



# MW-40B DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-40B Date Drilled 12/15/2003  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 42' Boring Diam. 7.88"  
 N. Coord. 728340.8690' E. Coord. 3166121.9310' Surface Elevation 47.18' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 29.5' Sump Length 2.5'  
 Top of Casing Elevation 49.59' Stickup 3.0'  
 Depth to Water: 1. Ft. 5.81 (12/29/2003) 2. Ft. 0 (          )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie

SKETCH MAP

NOTES

PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30					0.0	30-32		
					0.0	32-34	32.4-38	CLAYEY SAND: Gray (5Y 6/1), very fine-grained, sorted, subrounded, some sandy clay intervals at 34.3' and 35.1', moist from 32.4'-35.4', wet from 35.4'-38', 100% recovery.
					0.0	34-36		
15	35				0.0	36-38		
					0.0	38-40	38-40	SILTY SAND: Yellowish red (5YR 5/6), fine-grained, subrounded, some clay, saturatrd, 75% recovery.
10	40				0.0	40-42		T.D. = 42'
					0.0			
5	45						46	



# MW-41B DRILLING LOG

O. NO. 422-102 Boring/Well ID MW-41B Date Drilled 1/7/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 42' Boring Diam. 7.88"  
 N. Coord. 728176.0110' E. Coord. 3166002.9040' Surface Elevation 46.7' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 29.5' Sump Length 2.5'  
 Top of Casing Elevation 49.37' Stickup 0'  
 Depth to Water: 1. Ft. 4.47 (01/19/04) 2. Ft. 0 (          )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
46.7	0					0-2	0-0.25 0.25-6	GRAVEL: Fill material. Gravels up to 1.5" diameter. CLAY: Reddish black (2.5YR 2.5/1), plastic, gravels up to 0.5" diameter, some wood fragments, some fine-grained sand, subrounded, moist, 100% recovery. At 2'-4' greenish black (GLEY 3/10Y), grades to black (7.5YR 2.5/1) at 3', plastic, pp=0.5 tsf at 2', pp=1 tsf at 4', some fine-grained sand, rounded, few iron nodules. At 4' plastic, pp=0.5 tsf, some gravel up to 1/4" diameter, some iron nodules, becoming more sandy. At 5.2' becomes light bluish gray (GLEY 7/5B) with brownish yellow (10YR 6/8) mottling. pp=1 tsf at 6'.
					0.0	2-4		
					0.0	4-6		
					0.0	6-8	6-6.9	SILTY CLAY: Greenish gray (GLEY 5/10GY), gravels up to 1/2" diameter, moist, 100% recovery.
					0.0	6.9-8	6.9-8	CLAY: Greenish gray (GLEY 5/10GY) with brownish yellow mottling, plastic, stiff (pp=1 tsf) at 6.5', 1" lenses of white nodules at 7.9', moist, 100% recovery.
					0.0	8-10	8-8.5 8.5-10	SANDY SILTY CLAY: Dark greenish gray (GLEY 4/10Y), gravels up to 1/2" diameter, moist, 100% recovery. CLAY: Light greenish gray (GLEY 7/5G) with brownish yellow (10YR 6/8) mottling, plastic, very stiff (pp=2.5 tsf), iron nodules, moist, 100% recovery.
					0.0	10-12	10-11.2	SILTY CLAY: Greenish gray (GLEY 6/5G) with orange brown mottling, plastic, soft (pp=<0.5 tsf), black staining, moist, 100% recovery.
					0.0	12-14	11.2-12 12-13	SANDY CLAY: Greenish gray with some pink (GLEY 6/5G) with orange brown mottling, fine-grained, subrounded, moist, 100% recovery. SILTY CLAY: Greenish gray (GLEY 6/10GY) with orange brown mottling, gravels up to 1/2" diameter, moist, 100% recovery.
					0.0	14-16	13-14 14-15	SANDY CLAY: Greenish gray with pinkish tinge (GLEY 6/5GY) with orange brown and greenish gray (GLEY 6/5G) mottling, firm (pp=1 tsf) at 12' and very stiff (pp=3.5 tsf) at 13.5', fine-grained, rounded, moist, 100% recovery. SILTY SANDY CLAY: Pale olive (5Y 6/3) with pink tint and orange brown mottling, fine-grained, moist, 100% recovery.



# MW-41B DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-41B Date Drilled 1/7/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 42' Boring Diam. 7.88"  
 N. Coord. 728176.0110' E. Coord. 3166002.9040' Surface Elevation 46.7' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 29.5' Sump Length 2.5'  
 Top of Casing Elevation 49.37' Stickup 0'  
 Depth to Water: 1. Ft. 4.47 (01/19/04) 2. Ft. 0 (          )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15							15-18	SANDY CLAY: Greenish gray (GLEY 7/5GY) with pink tinge, fine-grained, rounded, moist, 100% recovery. At 16' orange brown mottling, gravels up to 1/2" diameter. At 16.8' becomes light greenish gray (GLEY 7/5GY), moist to saturated with depth.
					0.0	16-18		
					0.0	18-20	18-19	NO RECOVERY
30							19-19.5	SILTY CLAY: Dark greenish gray (GLEY 4/10Y) with reddish yellow and blue gray mottling, soft (pp=0.5 tsf), small gravel, saturated, 100% recovery.
	20				0.0	20-22	19.5-24	SANDY CLAY: Light greenish gray (GLEY 7/10Y), fine-grained, subrounded, saturated to moist with depth, 100% recovery. At 20' reddish yellow (7.5YR 1/6) mottling, fractured, hard (pp=>4.5 tsf), gravels up to 1/2" diameter. At 22' light greenish gray (GLEY 7/10GY) with yellowish brown (10YR 5/8) mottling, very stiff (pp=3.5 tsf), few iron nodules.
					0.0	22-24		
25					0.0	24-26	24-24.5	SILTY SANDY CLAY: Very pale brown (10YR 7/4) with light greenish gray mottling, fine-grained, subangular, moist, 100% recovery.
	25				0.0	24.5-26	24.5-26	SANDY CLAY: Light greenish gray (GLEY 7/10GY) with yellowish brown (10YR 5/8) mottling, fractured, very stiff (pp=2.5 tsf), fine-grained, subangular, moist, 100% recovery.
					0.0	26-28	26-27	SILTY SANDY CLAY: Light greenish gray (GLEY 7/5BG) with reddish yellow mottling, fine grained, subrounded, gravels up to 1/2" diameter, sheen, odor, moist, 100% recovery.
					0.1	28-30	27-30	SANDY CLAY: light greenish gray (GLEY 7/10GY) with yellowish brown (5YR 5/8) mottling, very stiff (pp=2.5 tsf), fine-grained, subangular, moi. 100% recovery. At 28' has light greenish gray (GLEY 7/5GY) mottling, stiff (pp=2.0 tsf), some white nodules, some black staining, odor.
20							48	
30								



# MW-41B DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-41B Date Drilled 1/7/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 42' Boring Diam. 7.88"  
 N. Coord. 728176.0110' E. Coord. 3166002.9040' Surface Elevation 46.7' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 29.5' Sump Length 2.5'  
 Top of Casing Elevation 49.37' Stickup 0'  
 Depth to Water: 1. Ft. 4.47 (.01/19/04) 2. Ft. 0 (          )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

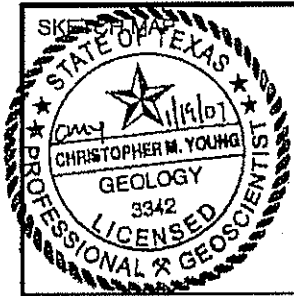
Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30					0.1	30-32	30-31	NO RECOVERY
					0.0	32-34	31-38	CLAYEY SAND: Light greenish gray (GLEY 6/10Y) grading to yellowish red (5YR 5/6), fine grained, subrounded, sheen, odor, saturated, 63 % recovery. At 33'-34' some gravel up to 1/2" diameter. At 36' becomes subangular, light greenish gray (GLEY 7/5GY), mottled, very stiff (pp=3.0 tsf), moist. At 36.4' black staining, sheen, odor.
15					0.0	34-36		
35					0.0	36-38		
					0.0	38-40	38-40	SANDY CLAY: Yellowish red (5YR 5/8) with light greenish gray (GLEY 7/5BG) mottling, stiff (pp=2.0 tsf), fine-grained, subangular, moist, 25 % recovery.
10					0.0	40-42	40-42	CLAY: Yellowish red (5YR 5/8), hard (pp=4.5 tsf) at 41.5', small thin layer of olive (2.5Y 6/8) with black staining, some calcareous nodules, sheen, odor, moist, 75% recovery.
40					NA			T.D. = 42'
5							49	
45								



**ERM** Environmental Resources Management

**MW-42B  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID MW-42B Date Drilled 8/24/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 42' Boring Diam. 14"  
 N. Coord. 728258.42' E. Coord. 3166322.89' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 30' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 3'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe/Mud Rotary Log By Emmanuel Mkandawire



**NOTES**  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 23.5' and monitoring well installed using mud rotary.  
 0'-41' log from geoprobe boring.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0					0-42	0-2	FILL: concrete and fill material approximately 2 ft thick, moist, gravel pieces 2mm-10mm diameter, angular
							2-3	SILTY CLAY: silty clay, very dark gray (5YR 3/1), moist, pp=1, very plastic, traces of brown concretions, less than 1mm
							3-5	NO RECOVERY
-5	5						5-7	SILTY CLAY: silty clay, gray (5 YR 5/1), moist, pp=2.0tsf, very plastic, few strong brown mottling (1.5 YR 5/6)
							7-10	CLAY: clay, gray (5 YR 5/1), moist, pp=3.5tsf, very plastic, few strong brown mottling (1.5 YR 5/6), calcarious nodules white (<2mm diameter), increasing content with depth
-10	10						10-11.5	CLAY: clay, gray (5 YR 5/1), moist, white calcarious nodules increasing with depth <2mm diameter, black specks and stains
							11.5-13.6	CLAYEY SILTY SAND: clayey silty sand, poorly sorted, very fine to medium-grained, gray (5 YR 6/1), moist, pp=2.0tsf, slight plastic
-15	15						13.6-15	NO RECOVERY



# ERM Environmental Resources Management

## MW-42B DRILLING LOG

Proj. No. 0014419 Boring/Well ID MW-42B Date Drilled 8/24/2006

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, TX Boring T.D. 42' Boring Diam. 14"

N. Coord. 728258.42' E. Coord. 3166322.89' Surface Elevation 0' Ft. MSL Datum

Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"

Casing: Type stainless steel Diam. 2" Length 30' Sump Length 2'

Top of Casing Elevation 0' Stickup 3'

Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )

Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt

Drilling Method Geoprobe/Mud Rotary Log By Emmanuel Mkandawire

SKETCH MAP

### NOTES

pp = pocket penetrometer.  
tsf = tons per square foot.  
Isolation casing set at 23.5' and  
monitoring well installed using mud  
rotary.  
0'-41' log from geoprobe boring.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15					15-20	15-20	SILTY SAND: silty sand, gray (5 YR 6/2), saturated, poorly sorted, medium to fine-grained, subangular
-20	20					20-20.6 20.6-24	20-20.6 20.6-24	SILTY SAND: silty sand, gray (5 YR 6/2), saturated, poorly sorted, medium to fine-grained, subangular CLAY: clay, gray (5 YR 6/1) with few strong brown mottled (7.5 YR 5/8), moist, pp=3.0tsf, very plastic
-25	25					24-25	24-25	NO RECOVERY: NOTE: stopped on 8/24/2006, continued on 8/25/2006
						25-27	25-27	CLAY: clay, gray (7.5 YR 5/1), strong brown (7.5 YR 5/6) mottling, moist, pp=>4.5tsf, plastic, traces of slicken sides
						27-29	27-29	CLAY: clay, gray (7.5 YR 5/1), strong brown (7.5 YR 5/6) mottling, moist, pp=>4.5tsf, plastic, traces of slicken sides
-30	30					29-30	29-30	CLAY: clay light gray (2.5 Y 7/1) mottled with strong brown (7.5 YR 5/6), moist, pp=2.5tsf, very plastic



Proj. No. 0014419 Boring/Well ID MW-42B Date Drilled 8/24/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 42' Boring Diam. 14"  
 N. Coord. 728258.42' E. Coord. 3166322.89' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 30' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 3'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe/Mud Rotary Log By Emmanuel Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 23.5' and monitoring well installed using mud rotary.  
 0'-41' log from geoprobe boring.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30						30-31	SILTY CLAY: silty clay, strong brown (7.5 YR 5/6), moist, pp=>4.5tsf, crumbly, black stain, traces of white calcareous nodules (1mm diameter)
							31-32	SILTY CLAY: silty clay, strong brown (7.5 YR 5/6), moist, pp=>4.5tsf, crumbly, black stain, white calcareous nodules (30mm diameter)
							32-33	NO RECOVERY
							33-34.3	SILTY CLAY: silty clay, strong brown (7.5 YR 5/6), moist, pp=>4.5tsf, crumbly, black stain, @33.4ft, white calcareous zone 1-inch thick
							34.3-35	NO RECOVERY
-35	35						35-35.8	SANDY SILT: sandy silt, strong brown (7.5 YR 5/6), with few light gray (7.5 YR 7/1) mottling, moist, pp=2.0tsf, crumbly, traces of white calcareous nodules, <2mm diameter, fine-grained
							35.8-37	NO RECOVERY
							37-38.6	SILTY SAND: silty sand, strong brown (7.5 YR 5/6), wet to saturated, very fine to fine sand, poorly sorted, crumbly, traces of greenish gray (1 Gley 5/10GY)
							38.6-39	NO RECOVERY
							39-41	CLAY: clay, strong brown (7.5 YR 5/6), very few light gray (7.5 YR 7/1) mottles, moist, pp=4.0tsf, white calcareous nodules, 5mm diameter
-40	40				0			
					2		41-42	NOT SAMPLED
					NM			T.D. = 42'
-45	45							





Union Pacific Railroad

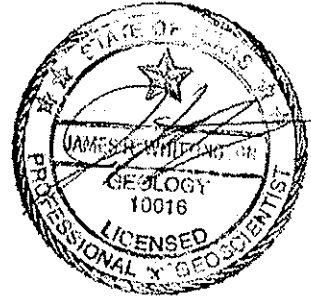
# Log of Boring: MW-44A

UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date:	2/22/07	Drilling Method:	HSA
Drilling Company:	Best Drilling, inc.	Borehole Diameter (in.):	8.5
Driller:	Sonny Tobola	Total Depth (ft):	32
Driller's License:	3026	Northing:	3168348.72
Field Supervisor:	James Whittington, P.G.	Easting:	729020.79
Sampling Method:	4" x 5' Split Barrel	Casing Elevation (ft):	45.11

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0				Topsoil	(0.0 to 1.0) Topsoil.
		0		CL	(1.0 to 2.5) Silty CLAY, dark gray, undecayed plant material.
		0.2		CL	(2.5 to 7.0) Silty CLAY, gray, moist, < 5% carb nodules.
5		0		CL	
				CL	(7.0 to 17.0) Silty CLAY, mottled tan and gray, more gray with depth, more sand with depth.
10		0		CL	
		0		CL	
15		0.1	NA	CL	(17.0 to 18.0) Sandy CLAY, gray, carb nodules.
				SP	(18.0 to 24.0) SAND, brown, medium-grained, 90% sand, 5% silt, and 5% clay.
20		0.3			
		0			
25				SP/ML	(24.0 to 30.0) SAND, brown, medium grained, sandy SILT, gray, fine-grained, < 10% clay interbedded, ~5 - 10 cm, silt layers, dilatent.
		0.2			
30		11.2		CL	(30.0 to 32.0) CLAY, mottled red and gray, moist, stiff, top of sand lense at 32.0, creosote odor.



## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

1. Borehole plugged with bentonite chips 28.0 to 32.0 feet bgs.

Annular Materials

(0 to 15.0) Bentonite-Cement Grout  
 (15.0 - 17.0) Bentonite Pellets  
 (17.0 - 28.0) 16-30 Silica Sand

Well Materials

(0 to 18.0) Casing, 2" Sch 40 FJT PVC  
 (18.0 to 28.0) Screen 2" Sch 40 FJT PVC  
 0.010 slot



Union Pacific Railroad

# Log of Boring: MW-44A

UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date:	2/22/07	Drilling Method:	HSA
Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	8.5
Driller:	Sonny Tobola	Total Depth (ft):	32
Driller's License:	3026	Northing:	3168348.72
Field Supervisor:	James Whittington, P.G.	Easting:	729020.79
Sampling Method:	4" x 5' Split Barrel	Casing Elevation (ft):	45.11

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0				Topsoil	(0.0 to 1.0) Topsoil.
		0		CL	(1.0 to 2.5) Silty CLAY, dark gray, undecayed plant material.
		0.2		CL	(2.5 to 7.0) Silty CLAY, gray, moist, < 5% carb nodules.
5		0		CL	
				CL	(7.0 to 17.0) Silty CLAY, mottled tan and gray, more gray with depth, more sand with depth.
10		0		CL	
		0		CL	
15		0.1	NA	CL	(17.0 to 18.0) Sandy CLAY, gray, carb nodules.
				SP	(18.0 to 24.0) SAND, brown, medium-grained, 90% sand, 5% silt, and 5% clay.
20		0.3		SP	
		0		SP/ML	(24.0 to 30.0) SAND, brown, medium grained, sandy SILT, gray, fine-grained, < 10% clay interbedded, ~5 - 10 cm, silt layers, dilatent.
25				SP/ML	
		0.2		CL	(30.0 to 32.0) CLAY, mottled red and gray, moist, stiff, top of sand lense at 32.0, creosote odor.
30		11.2		CL	

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

- Borehole plugged with bentonite chips 28.0 to 32.0 feet bgs.

Annular Materials

(0 to 15.0) Bentonite-Cement Grout  
 (15.0 - 17.0) Bentonite Pellets  
 (17.0 - 28.0) 16-30 Silica Sand

Well Materials

(0 to 18.0) Casing, 2" Sch 40 FJT PVC  
 (18.0 to 28.0) Screen 2" Sch 40 FJT PVC  
 0.010 slot



# MW-44C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-44C Date Drilled 1/16/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 70' Boring Diam. 7.88"  
 N. Coord. 729020.8930' E. Coord. 3168348.8380' Surface Elevation 45.2' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 57.5' Sump Length 2.5'  
 Top of Casing Elevation 45.03' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP

NOTES

PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45.2	0					0-2	0-4.5	CLAY: Light olive brown (2.5Y 5/3), mottled, stiff (pp=1.5 tsf), some gravel, moist, 50% recovery. At 2' black nodules. At 2.7' becomes sandy, fine-grained, angular, some gravel. At 4' becomes dark yellowish brown (10YR 3/6), plastic, stiff (pp=1.5 tsf).
					0.0	2-4		
					0.0	4-6		
40	5				0.0	6-8	4.5-5 5-8	SILTY CLAY: Bluish black (GLE Y 4/10B), gravels up to 1/4" diameter from 4.5'-5', moist, 75% recovery. CLAY: Light olive brown (2.5Y 5/3), mottled. At 6' becomes (GLE Y 6/5PB) with orange and dark brown mottling, stiff (pp=1.5 tsf), sand lenses, fine grained, angular, moist, 50% recovery.
					0.0	8-10	8-10	SILTY CLAY: Brown (10YR 5/3) with orange mottling, plastic, soft (pp=0.5 tsf) at 8'-9' and stiff (pp=1.25 tsf) at 9'-10', gravels up to 1/2" diameter, iron nodules up to 1/2" diameter from 9'-10', moist, 100% recovery. At 9.5' becomes strong brown (7.5YR 5/6) with less gravel.
35	10				0.0	10-12	10-12	CLAY: Brownish yellow (10YR 6/8) with light bluish gray (GLE Y 7/10B) mottling, stiff (pp=1.5 tsf), iron nodules up to 1/2" diameter, sand lenses, fine-grained, subangular, moist, 100% recovery.
					0.0	12-14	12-12.5	SILTY CLAY: Brownish yellow (10YR 6/6), soft (pp=0.5 tsf), moist.
					0.0	12.5-14	12.5-14	SANDY CLAY: Very pale brown (10YR 7/3) with pink tinge, fine-grained subangular, plastic, stiff (pp=2.0 tsf), iron nodules up to 1/2" diameter, moist, 100% recovery.
					0.0	14-16	14-16.3	SANDY SILTY CLAY: light brown (7.5YR 6/3) with orange mottling, fine-grained, subangular, very soft (pp=0.0 tsf), gravels up to 1/2" diameter, moist, 100% recovery.
15							50	



# MW-44C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-44C Date Drilled 1/16/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 70' Boring Diam. 7.88"  
 N. Coord. 729020.8930 E. Coord. 3168348.8380 Surface Elevation 45.2' FL MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 57.5' Sump Length 2.5'  
 Top of Casing Elevation 45.03' Stickup 0'  
 Depth to Water: 1. Ft. 0 (            ) 2. Ft. 0 (            )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP  
  
  
  
  
  
  
  
 NOTES  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30	15				0.0	16-18	16.3-20.3	SANDY CLAY: Greenish gray (GLEY 6/10GY) with dark brown mottling, stiff (pp=1.5 tsf), fine-grained, subangular, moist, 100 % recovery. At 18' becomes brown (7.5YR 5/4) with greenish gray (GLEY 6/10GY) mottling, gravels up to 1/2" diameter at 19', increasing sand.
					0.0	18-20		
25	20				0.0	20-22	20.3-24	SAND: Light yellowish brown (10YR 6/4), very fine-grained, subangular, moist, 50% recovery. At 22' few gravel pieces up to 3/4" diameter, some iron nodules.
					0.0	22-24		
					0.0	24-26	24-26	NO RECOVERY
20	25				0.0	26-28	26-28	SAND: Light yellowish brown (10YR 6/4), very fine-grained, subangular, moist, 25% recovery.
					0.0	28-30	28-30	CLAY: Strong brown (7.5YR 5/6) with bluish gray (GLEY 6/10B) mottling, plastic, soft (pp=0.25 tsf) at 28'-28.4' and very stiff (pp=3.0 tsf) at 28.4'-30', moist, 100% recovery. At 28.4'-30' becomes brownish yellow (10YR 6/6) with bluish gray (GLEY 6/10B) mottling, sand lenses, fine-grained, subangular, black staining at 28.5'.
30								51



# MW-44C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-44C Date Drilled 1/16/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 70' Boring Diam. 7.88"  
 N. Coord. 729020.8930' E. Coord. 3168348.8380' Surface Elevation 45.2' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 57.5' Sump Length 2.5'  
 Top of Casing Elevation 45.03' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP

NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)	
15	30				0.0	30-32	30-38	<p>CLAY: Olive yellow (2.5Y 6/6) with light bluish gray mottling, black nodules, black staining, stiff (pp=2.0 tsf), moist, 75% recovery. At 32' grades to light yellowish brown (2.5Y 6/4) with bluish gray (GLEY 6/5B) mottling, some calcareous nodules, soft (pp=0.5 tsf) at 32' and stiff (pp=2.0 tsf) at 34'. At 34' becomes reddish yellow (7.5YR 6/6) with light greenish gray (GLEY 7/5GY) mottling, calcareous nodules up to 1/4" diameter, very stiff (pp=3.25 tsf). At 36' some black staining, few fractures, very stiff (pp=2.5 tsf).</p>	
					0.0	32-34			
					0.0	34-36			
10	35				1.7	36-38			
					1.4	38-40	38-39.2		SILTY SANDY CLAY: Reddish yellow (7.5YR 6/6) with light greenish gray (GLEY 8/10Y) mottling, fine-grained, subangular, gravels up to 1/4" diameter, moist, 100% recovery.
							39.2-42		CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, some calcareous nodules, some black staining, hard (pp=>4.5 tsf) moist. At 40'-42' odor.
5	40				0.0	40-42			
					0.0	42-44	42-43		SILTY SANDY CLAY: Reddish yellow (7.5YR 6/6) with light greenish gray (GLEY 8/10Y) mottling, fine-grained, subangular, gravels up to 1/4" diameter, moist, 100% recovery.
							43-46		CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, hard (pp=4.5 tsf), some calcareous nodules, some black staining, moist, odor, 100% recovery.
					0.0	44-46			
45							52		



# MW-44C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-44C Date Drilled 1/16/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 70' Boring Diam. 7.88"  
 N. Coord. 729020.8930 E. Coord. 3168348.8380 Surface Elevation 45.2' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 57.5' Sump Length 2.5'  
 Top of Casing Elevation 45.03' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP  
  
 NOTES  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	45				0.0 0.0 0.0 0.0 0.5 1.7 0.2	46-48	46-47	SILTY CLAY: Yellowish red (5YR 3/8) with light greenish gray (GLEY 7/5GY) mottling, odor, moist, 100% recovery.
						47-50	47-50	CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 8/5GY) mottling, fractured, very stiff (pp=4.0 tsf), odor, moist, 100% recovery. At 48' becomes hard (pp=4.5 tsf).
						48-50	48-50	
-5	50					50-52	50-51	SILTY CLAY: Yellowish red (5YR 5/8) with light greenish gray (GLEY 7/5GY) mottling, some gravels up to 1/2" diameter, odor, moist, 100% recovery.
						51-54	51-54	CLAY: Red (2.5YR 4/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, hard (pp=4.5 tsf), odor, moist, 100% recovery.
						52-54	52-54	
						54-55	54-55	SILTY CLAY: Yellowish red (5YR 5/8) with light greenish gray (GLEY 7/5GY) mottling, some gravels up to 1/2" diameter, odor, moist, 100% recovery.
-10	55					55-57	55-57	CLAY: Red (2.5YR 4/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, hard (pp=>4.5 tsf) at 55' and very stiff (pp=3.75 tsf) at 56', odor, moist, 100% recovery.
						56-58	56-58	
						57-58	57-58	SILTY CLAY: Yellowish red (5YR 5/6), firm (pp=1.0 tsf), slight odor, moist, 100% recovery.
		58-59	58-59	NO RECOVERY				
		59-60	59-60	CLAY: With silt partings, yellowish red (5YR 5/8), laminated, fractured, hard (pp=>4.5 tsf), moist, 100% recovery.				
60								53



### MW-44C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-44C Date Drilled 1/16/2004

Project Houston Wood Preserving Works Owner Union Pacific Railroad Company

Location Houston, Texas Boring T.D. 70' Boring Diam. 7.88"

N. Coord. 729020.8930' E. Coord. 3168348.8380' Surface Elevation 45.2' Ft. MSL Datum

Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"

Casing: Type Stainless Steel Diam. 2" Length 57.5' Sump Length 2.5'

Top of Casing Elevation 45.03' Stickup 0'

Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )

Drilling Company Fugro Geosciences, Inc. Driller Steve Bender

Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP
NOTES
PP = Pocket Penetrometer
tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OMV (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	60				1.4	60-62	60-65.8	SILTY CLAY: Yellowish red (5YR 5/6), fractured, carbonate cemented sand zone at 62.5', odor, moist, 100% recovery. At 62' some small gravel, 63', and 63.5', sheen, wet to moist with depth. At 64' becomes wet.
					0.0	62-64		
					0.0	64-66		
-20	65				0.2	66-68	65.8-66 66-68	SANDY SILT: Yellowish red (5YR 5/6), very fine-grained, rounded, odor, wet, 100% recovery. NO RECOVERY: Hammered sampler ~109 blows. Driller stated it drilled like sandstone.
					NR	68-70	68-70	CLAY: Yellowish red (5YR 5/6), fractured, manganese oxide in fractures, stiff (pp=1.0 tsf) at 68' and very stiff (pp=3.0 tsf) at 70', odor, moist, 100% recovery.
-25	70				0.0			T.D. = 70'



# MW-45C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-45C Date Drilled 1/20/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 70.5' Boring Diam. 7.88"  
 N. Coord. 729155.2550' E. Coord. 3168511.7350' Surface Elevation 44.9' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 58' Sump Length 2.5'  
 Top of Casing Elevation 44.73' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
44.73	0					0-2	0-6	CLAY: Dark olive brown (2.5Y 3/2), soft (pp=0.5 tsf), some gravels up to 1/2" diameter, rootlets, some glass and rusty screws, moist, 50 % recovery. At 3' becomes brownish yellow (10YR 6/1), plastic, stiff (pp=1.5 tsf), trace rootlets, iron nodules, calcareous nodules, moist, 50 % recovery. At 4' becomes olive yellow (5Y 6/1) with brownish yellow (10YR 6/8) mottling, stiff (pp=1.5 tsf), some gravel up to 1/4" in diameter, caliche lenses at 4.4' and 5', moist, 75% recovery.
					0.0	2-4		
					0.0	4-6		
40	5					6-8	6-7	NO RECOVERY
					0.0	6-8		
					0.0	7-8.8	7-8.8	SILTY CLAY: Dark grayish brown (2.5Y 4/2), caliche nodules up to 1/4" diameter, some iron nodules, wet, 100% recovery.
					0.0	8-10		
					0.0	8.8-10	8.8-10	CLAY: Olive yellow (2.5Y 6/8) and greenish gray (GLE Y 5/10Y) mottling, plastic, soft (pp=0.5 tsf), iron nodules, moist, 100 % recovery.
35	10					10-11.5	10-11.5	NO RECOVERY
					0.0	10-12		
					0.0	11.5-12	11.5-12	SILTY CLAY: Light gray (2.5Y 7/2), mottled, soft (pp=0.5 tsf), 100 % recovery.
					0.0	12-14	12-12.5	NO RECOVERY
					0.0	12.5-14	12.5-14	CLAY: Light greenish gray (GLE Y 7/10Y) with brownish yellow (10YR 6/8) mottling, plastic, very stiff (pp=4.0 tsf), iron nodules, black oxide staining, moist, 100% recovery.
30	15					14-16	14-16	SILTY CLAY: Light gray (2.5Y 7/2) with brownish yellow (10YR 6/8) mottling, very stiff (pp=3.0 tsf), black oxide zone at 15'-16', moist, 100 % recovery.
					0.0	14-16		

55





# MW-45C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-45C Date Drilled 1/20/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 70.5' Boring Diam. 7.88"  
 N. Coord. 729155.2550' E. Coord. 3168511.7350' Surface Elevation 44.9' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 58' Sump Length 2.5'  
 Top of Casing Elevation 44.73' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15					0.0	16-18	16-16.5	NO RECOVERY
							16.5-18	CLAY: Light gray (2.5Y 7/2) with brownish yellow (10YR 6/8) mottling, iron staining, some gravel, gravel at beginning of interval ~2.5" diameter, moist, 100% recovery.
					0.0	18-20	18-19	NO RECOVERY
							19-20	CLAYEY SILT: Pale yellow (2.5Y 7/2), pink tinge, some black nodules, moist, 100% recovery.
25	20				0.0	20-22	20-22	CLAYEY SILTY SAND: Brownish gray (2.5Y 6/2) grading to yellowish brown (10YR 5/6), very fine-grained, rounded, light, moist, 100% recovery.
					0.0	22-24	22-22.5	NO RECOVERY
							22.5-26	CLAYEY SAND: Yellowish brown (10YR 5/6), fine-grained, subrounded, some light brownish gray (2.5Y 6/2) clay stringers, saturated to wet with depth, 100% recovery.
20	25				0.0	24-26		
					0.0	26-28	26-28	CLAY: Strong brown (7.5YR 5/6), fat, fractured, laminated, very stiff (pp=3.5 tsf), light greenish gray (GLEY 8/10Y) clay fill in fractures, black oxide staining, odor, moist, 100% recovery.
					0.0	28-32	28-32	SILTY CLAY: Strong brown (7.5YR 5/6) with light greenish gray (GLEY 8/10GY) mottling, fractured, stiff (pp=2.0 tsf), manganese oxide staining, large limestone gravel up to 2" diameter at 29', odor, moist, 100% recovery. At 30'-32' very stiff (pp=2.75 tsf), some calcareous nodules, some iron nodules, slight odor, moist, 100% recovery, .
15	30							56



# MW-45C DRILLING LOG

O. NO. 422-102 Boring/Well ID MW-45C Date Drilled 1/20/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 70.5' Boring Diam. 7.88"  
 N. Coord. 729155.2550' E. Coord. 3168511.7350' Surface Elevation 44.9' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 58' Sump Length 2.5'  
 Top of Casing Elevation 44.73' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer  
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Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppr:n)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30					0.3			
					0.0	32-34	32-34	CLAYEY SILT: Light greenish gray (GLEY 7/5GY), mottled, very stiff (pp=3.25 tsf), rootlets, iron staining, moist, 50% recovery.
					0.0	34-36	34-36	SILTY CLAY: Light greenish gray (GLEY 7/5GY), mottled, very stiff (pp=3.25 tsf), rootlets, iron staining, moist, 100% recovery.
10	35				0.0	36-42	36-42	CLAYEY SILT: Light greenish gray (GLEY 7/5GY) with yellowish brown (10YR 5/8) mottling, very stiff (pp=4.0 tsf at 36'-38', pp=3.0 at 38.5'-40'), hard (pp=>4.5 tsf) at 40.5'-42', odor, moist, 58% recovery. At 37.5'-38' iron nodules. At 40.5' becomes yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, manganese nodules and staining, sheen.
					2.5			
5	40				0.6			
					5.0	42-60	42-60	SILTY CLAY: Light greenish gray (GLEY 7/5GY) with yellowish brown (10YR 5/8) mottling, hard (pp=>4.5 tsf), manganese oxide staining, odor, moist, 72% recovery. At 45' becomes yellowish red (5YR 5/6) with light greenish gray (GLEY 7/10BG) mottling, cohesive, fractured, hard (pp=>4.5 tsf), bioturbation. At 46'-48' hard (pp=>4.5 tsf), manganese oxide staining. At 49'-50' fractured, hard (pp=>4.5 tsf), silt lenses, manganese oxide staining, slight odor. At 51'-54' more fractures, hard (pp=4.0 tsf), manganese oxide staining, slight odor. At 54'-56' very stiff (pp=3.0 tsf), silt lenses. At 56.5'-58' very stiff (pp=3.5 tsf), homogenous, bioturbation, carbonate concretions. At 58'-60' plastic with clay and silt lenses.
0	45				48.9		57	



# MW-45C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-45C Date Drilled 1/20/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 70.5' Boring Diam. 7.88"  
 N. Coord. 729155.2550' E. Coord. 3168511.7350' Surface Elevation 44.9' El. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 58' Sump Length 2.5'  
 Top of Casing Elevation 44.73' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP

NOTES

PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45					2.2			
					0.6			
-5	50				0.0			
					0.0			
-10	55				0.0			
					0.0			
					0.0			
-15	60						58	



# MW-45C DRILLING LOG

O. NO. 422-102 Boring/Well ID MW-45C Date Drilled 1/20/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 70.5' Boring Diam. 7.88"  
 N. Coord. 729155.2550' E. Coord. 3168511.7350' Surface Elevation 44.9' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 58' Sump Length 2.5'  
 Top of Casing Elevation 44.73' Stickup 0'  
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 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Vivian Rohrback

SKETCH MAP  
 NOTES  
 PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
60					0.0		60-62	NO RECOVERY
					NR		62-64	SILTY CLAY: Yellowish red (5YR 5/6), moist to wet with depth, laminated, fractured, very stiff (pp=3.0 tsf), burrows, clay lenses, sheen, odor, moist to wet with depth, 100% recovery.
					5.9		64-68	SILTY CLAYEY SAND: Yellowish red (5YR 5/6), very fine-grained, well-sorted, sheen, odor, wet, 40% recovery. At 67.5'-68' moderately sorted, slight odor. At 64'-66' hammered in ~82 blows. At 66'-68' hammered in ~57 blows.
-20	65				11.9			
					1.2		68-70	CLAY: Yellowish red (5YR 5/6), plastic, very stiff (pp=3.0 tsf), laminated, fractured, manganese oxide and iron staining, slight odor, moist, 100% recovery.
-25	70				0.0			T.D. = 70.5'
							59	
-30	75							



# MW-46C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-46C Date Drilled 1/9/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 729120.9350' E. Coord. 3168576.2680' Surface Elevation 45.0' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 44.94' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud Rotary Log By Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
44.94	0					0-2	0-2	SANDY CLAY: Black (5YR 2.5/1) grading to weak red (2.5YR 4/2), fine-grained, subrounded, gravel up to 3/4" diameter, some iron nodules, wood fragments, rootlets, moist, 50% recovery.
					0.0	2-4	2-4	CLAY: Weak red (2.5YR 4/2), some gravel, some white nodules, sand lense at 2.3', fine-grained, subangular, some rootlets, iron staining, moist, 75% recovery.
					0.0	4-6	4-4.5	SILTY SANDY CLAY: Greenish gray (GLEY 6/10Y), fine-grained, subangular, gravels up to 1/2" diameter, moist, 100% recovery.
40	5				0.0	4.5-6	4.5-6	SANDY CLAY: Greenish gray (GLEY 6/10Y) with reddish yellow (7.5YR 6/8) mottling, stiff (pp=1.5 tsf), fine-grained, subangular, some white nodules, moist, 100% recovery.
					0.0	6-8	6-6.8	SANDY SILTY CLAY: Greenish gray (GLEY 5/8GY), fine-grained, subangular, gravels up to 1/2" diameter, moist, 100% recovery.
					0.0	6.8-8	6.8-8	SANDY CLAY: Light greenish gray (GLEY 7/10Y) with orange yellow mottling, stiff (pp=1.5 tsf), fractured, fine-grained, subangular, some iron nodules, black staining, moist, 100% recovery.
					0.0	8-10	8-8.9	SANDY SILTY CLAY: Greenish gray (GLEY 5/8GY), fine-grained, subangular, gravels up to 1/2" diameter, moist, 100% recovery.
					0.0	8.9-10	8.9-10	SANDY CLAY: Light greenish gray (GLEY 7/10Y) with orange yellow mottling, firm (pp=1.0 tsf), gravel ~1.5" diameter from 8'-8.2', moist, 100% recovery.
35	10				0.0	10-12	10-10.8	SILTY SANDY CLAY: Light greenish gray (GLEY 7/10Y) with yellow brown mottling, very fine-grained, rounded, gravels up to 1/2" diameter, moist, 100% recovery.
					0.0	10.8-12	10.8-12	CLAY: Light greenish gray (GLEY 7/10Y), firm (pp=0.5 tsf), very fine-grained, rounded, some iron nodules, some sand lenses, moist, 100% recovery.
					0.0	12-14	12-12.5	SANDY SILTY CLAY: Greenish gray (GLEY 5/8GY), fine-grained, subangular, gravels up to 1/2" diameter, moist, 100% recovery.
					0.0	12.5-16	12.5-16	SANDY CLAY: Light greenish gray (GLEY 7/10GY) with reddish yellow (7.5YR 6/8) mottling, fine-grained, subangular, very stiff (pp=2.25 tsf) at 12.5'-14' and (pp=2.5tsf) at 14'-16', iron nodules, some shell fragments, moist, 100% recovery.
30	15						60	



# MW-46C DRILLING LOG

V.O. NO. 422-102 Boring/Well ID MW-46C Date Drilled 1/9/2004  
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 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 729120.9350' E. Coord. 3168576.2680' Surface Elevation 45.0' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 44.94' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud Rotary Log By Vivian Rohrback

SKETCH MAP

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 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15								
					0.0	16-18	16-16.8	SANDY SILTY CLAY: Light greenish gray (GLEY 7/10Y) with orange red mottling, fine-grained, subangular, black nodules up to 1/2" diameter, moist, 100% recovery.
					0.0	18-20	16.8-20	
25	20				0.0	20-22	20-28	SAND: Light greenish gray (GLEY 7/10GY) grading to brown (7.5YR 5/4), very fine-grained, subrounded, saturated to moist to saturated, 70% recovery. At 22.5'-24' some gravels up to 1/2" diameter. At 24'-26' light greenish gray (GLEY 7/5BG) mottling, firm (pp=1.0 tsf), clay lenses from 24.3'-24.5', odor.
					0.0	22-24		
					0.0	24-26		
20	25				0.0	26-28		
					0.0	28-30	28-30	CLAY: Strong brown (7.5YR 5/6) with light greenish gray (GLEY 6/10Y) mottling, very stiff (pp=4.0 tsf), some black staining, moist, 100% recovery. At 28-28.2' sandy silt clay, fine-grained, subangular, gravel up to 1/2" diameter. At 29.6' sand lenses, very fine grained, rounded. Sampler had sheen on it when pulled from hole.
15	30							61



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 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 44.94' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud Rotary Log By Vivian Rohrback

SKETCH MAP

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Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30					0.0	30-32	30-34	SILTY CLAY: Reddish yellow (5YR 6/6) grading to yellowish red (5YR 5/6) with light greenish gray (GLEYS 8/5GY) mottling, some iron nodules, moist, 100% recovery, odor. At 32.5 becomes light greenish gray (GLEYS 8/10Y) and olive yellow (2.5Y 6/8), slight odor.
					0.0	32-34		
10	35				0.0	34-36	34-36	CLAYEY SILT: Pale yellow (2.5Y 7/3) with yellow (2.5Y 7/8) mottling, very stiff (pp=3.25 tsf), caliche nodules, moist, 50 % recovery.
					0.0	36-38	36-42	SILTY CLAY: Reddish yellow (7.5YR 6/8) with light greenish gray (GLEYS 8/5GY) mottling, plastic, massive, very stiff (pp=3.25 tsf at 36'-38' and pp=3.5 tsf at 39'-40'), trace gravels, moist, 63 % recovery. At 39' black nodules. At 40' becomes strong brown (7.5YR 5/6) with light greenish gray (GLEYS 7/10Y) mottling, fractured, laminated, very stiff (pp=3.75 tsf), caliche lenses, manganese oxide staining.
					0.0	38-40		
5	40				0.0	40-42	40-42	CLAYEY SILT: Strong brown (7.5YR 5/8) with light greenish gray (GLEYS 7/10Y) mottling, very stiff (pp=4.0 tsf), manganese oxide staining, odor, moist.
					0.0	42-44	42-44	
0	45				17.9	44-46	44-46	CLAY: Strong brown (7.5YR 5/8) with light greenish gray (GLEYS 7/5GY) mottling, hard (pp=>4.5 tsf), calcareous nodules up to 1/4" diameter, manganese oxide staining, odor, moist, 75 % recovery.



# MW-46C DRILLING LOG

O. NO. 422-102 Boring/Well ID MW-46C Date Drilled 1/9/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 729120.9350' E. Coord. 3168576.2680' Surface Elevation 45.0' Et. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 44.94' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
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SKETCH MAP

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 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45								
					0.0	46-48	46-47	NO RECOVERY
							47-48	CLAYEY SILT: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, slicken sides, hard (pp=>4.5 tsf), manganese oxide staining, odor, moist, 50% recovery.
					0.7	48-50	48-54	SILTY CLAY: Yellowish red (5YR 5/6) with pale yellow (5Y 7/3) mottling, very stiff (pp=3.5 tsf), calcareous nodules, manganese oxide staining, moist, 100% recovery, odor. At 50' becomes strong brown (7.5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, slicken sides, very stiff (pp=3.0 tsf). At 52' hard (pp=>4.5 tsf), slight odor.
-5	50				0.1	50-52		
					0.0	52-54		
					0.0	54-56	54-56	CLAYEY SILT: Yellow red (5YR 5/6), plastic, stiff (pp=1.5 tsf), fractured, laminated, clay lenses, moist, 75% recovery.
-10	55				0.0	56-58	56-57	NO RECOVERY
							57-58	SILTY CLAY: Yellow red (5YR 5/6), plastic, stiff (pp=1.5 tsf), moist, 100% recovery.
					0.0	58-60	58-60	CLAYEY SILT: Yellowish red (5YR 5/8), very stiff (pp=4.0 tsf), slight odor, moist, 75% recovery.
-15	60							

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# MW-46C DRILLING LOG

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 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 729120.9350' E. Coord. 3168576.2680' Surface Elevation 45.0' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 44.94' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud Rotary Log By Vivian Rohrback

SKETCH MAP

NOTES

PP = Pocket Penetrometer  
 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
60					0.0	60-62	60-64	SANDY CLAY: Yellowish red (5YR 5/6), very fine-grained, very soft (pp=0.0 tsf), sheen, odor, moist, 75% recovery. <b>At 62.9' some silt lenses, sheen, strong odor.</b> At 62.7'-62.9' clayey silt, at 62.9' limestone lenses.
					1.0	62-64		
					10.9	64-66	64-68	SAND: Yellowish red (5YR 5/6), fine-grained, subrounded, carbonate cemented sand lenses at 65.1', sheen, strong odor, wet, 50% recovery. At 66'-68' hammered sampler ~80 blows, driller indicated increased resistance.
-20	65				1.6	66-68		
					0.0	68-70	68-70	SILTY CLAY: Yellowish red (5YR 5/6), fractured, stiff (pp=1.5 tsf), fractured, manganese oxide staining, moist to wet with depth, odor, 75% recovery. At 68.5'-69.4' becomes silty sand, fine grained, subrounded.
-25	70				0.0	70-72		
					0.0	70-72	70-72	CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, laminated, very stiff (pp=2.5 tsf), manganese oxide staining, moist, 100% recovery.  T.D. = 72.5'
-30	75				0.0			

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Union Pacific Railroad

# Log of Boring: MW-47C

UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date:	2/24/07	Drilling Method:	HSA / Mud Rotary
Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	6
Driller:	Sonny Tobola	Total Depth (ft):	72.5
Driller's License:	3026	Northing:	3168535.04
Field Supervisor:	James Whittington, P.G.	Easting:	728724.52
Sampling Method:	2" x 3' Split Spoon	Casing Elevation (ft):	45.61

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description		
0		0	50	Fill	(0.0 to 1.0) Topsoil and trash.		
				Fill	(1.0 to 1.4) Asphalt.		
				Fill	(1.4 to 2.5) Fill, gravelly clay.		
					(2.5 to 6.0) Silty CLAY, dark gray, gradational basal contact.		
5							
10		0.1	100	CL	(6.0 to 15.0) Silty CLAY with SAND, mottled gray and tan, more sand with depth, more gray with depth, gradational basal contact.		
15		0.2	100	SP	(15.0 to 23.0) SAND, gray, fine sand, trace tan iron mottles, saturated at ~17.0, gradational basal contact.		
20		0.1	50	SP	(23.0 to 28.0) Interbedded gray fine SAND and medium-fine brown SAND		
25		0.4	25	SC	(28.0 to 30.0) Interbedded brown SAND and reddish-brown CLAY, sharp basal contact.		
30		0	0	CL	(30.0 to 32.0) CLAY, mottled reddish-brown and gray, dense, firm, less		



## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 1. 10" PVC surface casing set from 0 to 30.0 feet bgs. 6" PVC casing set from 30.0 to 55.0 feet

Annular Materials  
 (0 to 55.0) Bentonite-Cement Grout  
 (55.0 - 57.0) Bentonite Pellets  
 (57.0 - 74.0) 16-30 Silica Sand

Well Materials  
 (0 to 61.0) Casing, 2" Stainless Steel  
 (61.0 to 71.0) Screen 2" Wire Wrapped  
 Stainless Steel 0.010 slot



Union Pacific Railroad

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Houston, Texas

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Sampling Method:	2" x 3' Split Spoon	Casing Elevation (ft):	45.61

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
		0.3	100	CL	moist.
35		0	80	CL	(32.0 to 40.0) CLAY with SILT, mottled yellowish-brown and gray, carb clasts, firm, moist, transition with Fe.
40		0	100	CL	(40.0 to 50.0) CLAY, reddish-brown with 10% gray mottling, moist, very firm, no odor until 49.0.
45		0	100	CL	
50		3			
		69			
		4.5	100	CL	(50.0 to 51.0) Silty CLAY, reddish-brown, saturated, sheen visible on broken surface, very strong odor.
		1	100	CL	(51.0 to 55.0) CLAY, dark red, very firm, moist, fat, no odor, less moist with depth.
55			0	NR	(55.0 to 57.0) Drilled out, no recovery.
			100	CL	(57.0 to 58.5) CLAY, dark red, very firm, moist, fat, no odor, less moist with depth.
60		1.5		SM	(58.5 to 63.5) Very silty SAND, red (2.5YR 4/6), reddish-brown to orange fine sand, no odor, some silty clayey lenses; hard, blocky, cemented lens at 59.3 to 59.5.

## PBW

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 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

1. 10" PVC surface casing set from 0 to 30.0 feet bgs. 6" PVC casing set from 30.0 to 55.0 feet

Annular Materials

(0 to 55.0) Bentonite-Cement Grout  
 (55.0 - 57.0) Bentonite Pellets  
 (57.0 - 74.0) 16-30 Silica Sand

Well Materials

(0 to 61.0) Casing, 2" Stainless Steel  
 (61.0 to 71.0) Screen 2" Wire Wrapped  
 Stainless Steel 0.010 slot



Union Pacific Railroad

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	Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	Sonny Tobola	Total Depth (ft):	72.5
	Driller's License:	3026	Northing:	3168535.04
	Field Supervisor:	James Whittington, P.G.	Easting:	728724.52
	Sampling Method:	2" x 3' Split Spoon	Casing Elevation (ft):	45.61

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
65		4.1	100	CL	(63.5 to 64.5) Clayey SILT and silty CLAY, red (2.5YR 5/6), stiff to firm, interbedded silt and clay, thin (0.2' each), moist, slight odor with depth.
		1	20	SM	(64.5 to 68.0) Silty SAND, red (2.5YR 5/6); very fine, poorly sorted, quartz sand; wet, firm, odor present, cleaner sand with depth, less silt with depth no recovery from 65.5 to 67.5, very hard/stiff sand, drilled out to 68', drilling very easy, washing out as drill stem being lowered, indication of a decent sand.
70		1.4	75	CL SM	(68.0 to 69.0) Silty CLAY, red (2.5 YR 4/6), hard, medium plasticity, homogenous, thin laminae of silt, dark color, <0.01' thick, sharp basal contact.
			100	CL/CH	(69.0 to 70.0) Silty SAND, red (2.5YR 4/6), firm, wet, very fine-grained, powdery, friable, no odor.
					(70.0 to 72.5) Silty CLAY, light gray (10YR 7/1) to brownish-yellow (10YR 6/8), moist to slightly moist, firm, some very thin laminae of silt, core breaks along silt laminations, medium plasticity, sticky clay, no odor, color grades into a brown (10YR 5/3) with laminated silt at 71.6, little burros filled with silt, basal contact not encountered.

## PBW

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Notes:

- 10" PVC surface casing set from 0 to 30.0 feet bgs. 6" PVC casing set from 30.0 to 55.0 feet

Annular Materials

- (0 to 55.0) Bentonite-Cement Grout
- (55.0 - 57.0) Bentonite Pellets
- (57.0 - 74.0) 16-30 Silica Sand

Well Materials

- (0 to 61.0) Casing, 2" Stainless Steel
- (61.0 to 71.0) Screen 2" Wire Wrapped Stainless Steel 0.010 slot



# MW-48C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-48C Date Drilled 2/2/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 728417.3900' E. Coord. 3168240.9350' Surface Elevation 44.69' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 44.68' Stickup 0'  
 Depth to Water: 1. Ft. 0 (            ) 2. Ft. 0 (            )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie and Vivian Rohrback

SKETCH MAP  
  
 NOTES  
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44.68	0					0-2	0-2	CLAY: Very dark gray (7.5YR 3/1), mottled, plastic, stiff (pp=2.0 tsf), some gravels, trace sand grains, glass fragments, rootlets, moist, 100 % recovery.
					0.0	2-4	2-10	SILTY CLAY: Very dark gray (7.5YR 3/1), mottled, plastic, very stiff (pp=2.25 tsf), some sand, rootlets, moist, 50 % recovery. At 4'-6" becomes gray (7.5YR 6/1), mottled, plastic, very stiff (pp=2.25 tsf), some iron staining, trace white nodules. At 8'-10' firm (pp=0.75 tsf).
					0.0	4-6		
					0.0	6-8		
					0.0	8-10		
40	5				0.0	10-12	10-12	CLAYEY SAND: Gray (2.5Y 6/1), very fine-grained, sorted, subangular, some iron staining, moist, 25% recovery.
					0.0	12-14	12-16.8	SANDY CLAY: Greenish gray (GLE Y 6/5GY), plastic, stiff (pp=1.5 tsf), very fine-grained, sorted, subangular, sand increasing with depth.
					0.0	14-16	65	
35	10							
30	15							



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 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
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 tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
15					0.0	16-18	16.8-18	CLAYEY SAND: Greenish gray GLEY 6/5GY, fine-grained, sorted, subangular, moist, 100% recovery.
					0.0	18-20	18-24	SILTY SAND: Gray (2.5Y 6/1), fine-grained, sorted, subangular, trace clay, layers of greenish gray (GLEY 6/5GY), wet, 60% recovery. At 20'-22' saturated. At 22'-24' very dark gray (7.5YR 3/1), product observed, strong odor, saturated, 58% recovery.
25	20				0.0	20-22		
					NA	22-24		
					NA	24-26	24-26	CLAY: Light gray (2.5Y 6/1), plastic, very stiff (pp=4.0 tsf), moist, 100% recovery.
20	25				NA	26-28	26-30	SILTY CLAY: Pale yellow (2.5Y 7/4) with light greenish gray (GLEY 7/10BG) mottling, very stiff (pp=3.0 tsf), some iron nodules, odor, moist, 90% recovery. At 28' becomes light yellowish brown (2.5Y 6/4) with light greenish gray (GLEY 7/10BG) mottling, grading to a strong brown (7.5YR 5/8) with the same color mottling, very stiff (pp=3.5 tsf) at 29' at hard (pp=4.25 tsf) at 30', fractured, some iron nodules, manganese oxide staining.
					0.8	28-30		
15	30						66	



# MW-48C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-48C Date Drilled 2/2/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 728417.3900' E. Coord. 3168240.9350' Surface Elevation 44.69' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 44.68' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie and Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
30					8.4	30-32	30-34	CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, very stiff (pp=4.0 tsf), 2" limestone at 30.3'-30.5', manganese oxide staining, reacts after acid applied to limestone fragments, odor, moist, 75% recovery. At 32'-34' very stiff (pp=4.0 tsf), silt lenses, slight odor.
					20.5	32-34		
					0.4	34-36	34-36	SILTY CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, very stiff (pp=2.75 tsf), some small calcareous nodules, reacts after acid applied to limestone fragments at 34.2', 34.5', and 34.9', manganese oxide staining, odor, moist, 75 % recovery.
10	35				3.1	36-38	36-42	CLAYEY SILT: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, very stiff (pp=4.0 tsf), some small calcareous nodules, manganese oxide staining, odor, moist, 90 % recovery. At 38'-40' very stiff (pp=3.75 tsf). At 40'-42' fractured, very stiff (pp=3.25 tsf).
					0.8	38-40		
5	40				0.8	40-42		
					0.0	42-44	42-44	SILTY CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 8/5GY) mottling, very stiff (pp=3.75 tsf), few calcareous nodules, some black manganese oxide staining, slight odor, moist, 100 % recovery.
								SILTY SAND: Yellowish red (5YR 5/6), very fine grained, moist, 100 % recovery.
					0.4	44-46	44-44.5 44.5-48 67	SILTY CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 8/5GY) mottling, hard (pp=>4.5 tsf), sand lenses, slight odor, moist, 100% recovery. At 46'-48' stiff (pp=2.0 tsf) at 47' and very stiff (pp=3.5 tsf) at 48', sand lenses at 46.2', sheen, odor.
0	45							



# MW-48C DRILLING LOG

W.O. NO. 422-102 Boring/Well ID MW-48C Date Drilled 2/2/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 728417.3900' E. Coord. 3168240.9350' Surface Elevation 44.69' FL MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 44.68' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie and Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
45					0.0	46-48		
					5.3	48-50	48-50	CLAYEY SILT: Yellowish red (5YR 5/6) with light greenish gray (GLEY 8/5GY) mottling, hard (pp=>4.5 tsf), bioturbation, sheen, odor, moist, 75 % recovery.
-5	50				0.8	50-52	50-52	SILTY CLAY: Yellowish red (5YR 5/6), mottled, hard (pp=4.25 tsf), some manganese oxide staining, odor, moist, 100 % recovery.
					0.0	52-54	52-54	CLAYEY SILT: Yellowish red (5YR 5/6) with light greenish gray (GLEY 8/5GY) mottling, very stiff (pp=3.75 tsf) at 54', hard (pp=>4.5 tsf) at 53', burrows, manganese oxide staining, odor, moist, 75 % recovery.
-10	55				0.0	54-56	54-56	SILTY CLAY: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, hard (pp=>4.5 tsf), some calcareous nodules, burrows, 100% recovery, slight odor, moist, 100 % recovery.
					0.8	56-58	56-60	CLAYEY SILT: Yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, hard (pp=>4.5 tsf) at 56'-58', very stiff (pp=2.5' tsf) at 58.5', firm (pp=1.0 tsf) at 60', fractured, silt lenses, some manganese oxide staining, bioturbation, slight odor, moist, 75 % recovery. At 59.7' very fine-grained, sandy silt lenses.
-15	60				0.4	58-60		
							68	





# MW-48C DRILLING LOG

I.O. NO. 422-102 Boring/Well ID MW-48C Date Drilled 2/2/2004  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, Texas Boring T.D. 72.5' Boring Diam. 7.88"  
 N. Coord. 728417.3900' E. Coord. 3168240.9350' Surface Elevation 44.69' Ft. MSL Datum  
 Screen: Type Stainless Steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type Stainless Steel Diam. 2" Length 60' Sump Length 2.5'  
 Top of Casing Elevation 44.68' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Steve Bender  
 Drilling Method Mud rotary Log By Marcel St. Marie and Vivian Rohrback

SKETCH MAP

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NOTES

PP = Pocket Penetrometer

tsf = Tons per square foot

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
60					0.4	60-62	60-70	SILTY SAND: Yellowish red (5YR 5/6), soft (pp=0.5 tsf), fine-grained, medium-grained from 62.5-64', subrounded, moist, clay lenses, moist, 75% recovery. hammered in ~35 blows. At 65'-66' clay lenses, hammered in ~108 blows, slight odor. At 67.5' clay, yellowish red (5YR 5/6), hammered in ~69 blows. At 69.2'-70' clay lenses, black staining between clay lenses and silty sand, slight odor.
					0.4	62-64		
					0.4	64-66		
-20	65				0.0	66-68		
					0.0	68-70		
-25	70				0.0	70-72	70-72	CLAY: Yellowish red (5YR 5/6) grading to brown (7.5YR 5/4), laminated, fractured, very stiff (pp=2.5 tsf), black staining, light greenish gray (GLEY 7/5GY) and yellow (2.5Y 7/8) in fractures with black staining, odor, moist, 100% recovery.
					0.0			T.D. = 72'
-30	75						69	



Union Pacific Railroad

# Log of Boring: MW-49A

UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date:	2/28/07	Drilling Method:	HSA
Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	8.5
Driller:	Bruce Milton	Total Depth (ft):	30
Driller's License:	4926	Northing:	3168190.82
Field Supervisor:	Tim Jennings, P.G.	Easting:	728345.08
Sampling Method:	4" x 5' Split Barrel	Casing Elevation (ft):	46.18

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0				Base	(0.0 to 0.5) Concrete base.
		0.7	80	CH	(0.5 to 3.5) Sandy CLAY, dark brown to black, moist, ~20 to 30% fine sand and silt, ~70 to 80% high plasticity clay, firm, bedded.
		0.5			
5			100	CH	(3.5 to 8.9) Sandy gravelly CLAY, grayish-brown with black mottling, moist, ~20 to 40% fine to coarse carbonate sand, ~10% carbonate gravel and cobbles, ~70% high plasticity clay, firm.
		0.6			
10			80	CL	(8.9 to 13.0) Sandy CLAY, orange with gray mottling, moist, ~30 to 40% fine sand, ~60 to 70% high plasticity clay, soft.
		0.8			
15			1	SP	(13.0 to 16.6) Clayey SAND, grayish-brown, moist, ~40% medium to high plasticity clay interbedded with ~60% fine sand, soft.
		0.8	90	CL	(16.6 to 20.5) CLAY with SAND, gray, moist to wet below 20.0, ~30% fine sand interbeds, ~70% medium plasticity clay interbeds, very firm, slight chemical odor.
20			70	SP	(20.5 to 25.3) SAND, gray, poorly graded, wet, very fine to fine sand, trace small gray clay clasts or interbeds below 23.0, moderate chemical odor.
		2.7			
25			100	CL	(25.3 to 30.0) CLAY with SAND, orange with gray mottling, moist to locally wet, ~10% fine sand interbedded and in lenses, ~90% medium plasticity clay, abundant nodular below 29.5, moderate chemical odor.
30		15.5			

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

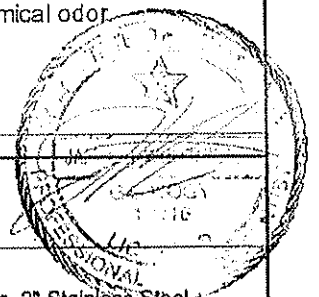
Notes:

Annular Materials

(0 to 16.0) Bentonite-Cement Grout  
 (16.0 - 18.0) Bentonite Pellets  
 (18.0 - 30.0) 20-40 Silica Sand

Well Materials

(0 to 20.0) Casing, 2" Stainless Steel  
 (20.0 to 30.0) Screen 2" Wire Wrapped  
 Stainless Steel 0.010 slot





Union Pacific Railroad

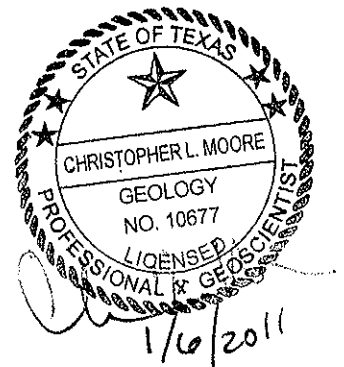
# Log of Boring: MW-49B

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	1/24/09	Drilling Method:	Roto Sonic
Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
Driller:	William Blutworth	Total Depth (ft):	35.0
Driller's License:	4885	Northing:	728374.64
Field Supervisor:	Chris Moore	Easting:	3168183.77
Sampling Method:	4" / 6" x 10' Barrel	Ground Elev. (ft AMSL):	46.43

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				GC	(0 - 1.2) CONCRETE
5		-	DO	GC	(1.2 - 8.5) CLAYEY GRAVEL, GC, very dark gray, with sand, moist, firm, no odor.
10		4.5	5.0/6.0	CL	(8.5 - 15.7) SANDY CLAY, CL, light gray, moist, firm to hard, some yellow/orange staining.
		4.5			
		4			
15		5.8	10.0/10.0	SM	(15.7 - 19.6) SILTY SAND, SM, light grayish brown, wet, soft, odor.
		4.8			
20		4.4	10.0/10.0	SP	(19.6 - 25.5) SAND, SP, light greenish gray, wet, soft, strong odor.
		12.7			
		10.2			
25		10.1	5.0/5.0	CH	(25.5 - 31.6) CLAY, CH, light greenish gray, moist, hard, with sand, strong odor, oily sheen/NAPL in seams at 27.5, silt lens with NAPL at 30.6-31.0, carbonate gravel with NAPL at 32.3-32.4.
		13.6			
30		78	5.0/5.0	CH	(31.6 - 35.0) CLAY, CH, red, moist, firm, slight odor.
		141			
		13			
35		9.3			



Notes:

Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.  
Sonic isolation casing advanced to 30' then removed during grouting.

Initial Fluid Level (2/04/09)

▼ Depth to water: 11.65 ft BTOC

# PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Annular Materials  
(0.0 - 27.0) Portland/Bentonite Grout  
(27.0 - 29.0) Bentonite Chips  
(29.0 - 35.0) 16/30 Silica Sand

Well Materials  
(0 - 30.0) Casing, 2" Sch 40 FJT PVC  
(30.0 - 35.0) Screen, 2" Sch 40 FJT PVC,  
0.01 slot

TOC Elevation (ft AMSL)  
44.18

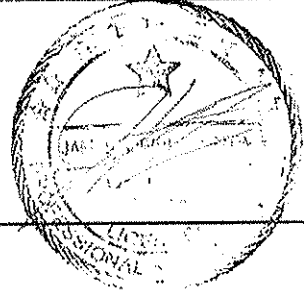


Union Pacific Railroad

# Log of Boring: MW-50A

UPRR Houston Wood Preserving Works Houston, Texas	Completion Date:	3/1/07	Drilling Method:	HSA
	Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	8.5
PBW Project No. 1358	Driller:	Bruce Milton	Total Depth (ft):	25
	Driller's License:	4926	Northing:	3167958.38
	Field Supervisor:	Tim Jennings, P.G.	Easting:	727501.00
	Sampling Method:	4" x 5' Split Barrel	Casing Elevation (ft):	46.96

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0		0		Base	(0.0 to 0.5) Concrete base.
				FILL	(0.5 to 1.5) Gel and FILL from previous sample.
		0	100	CH/SP	(1.5 to 5.0) Sandy CLAY and clayey SAND, dark brown, moist, ~30 to 60% fine sand, ~40 to 70% high plasticity clay, soft.
5		0			
		0	100	CL	(5.0 to 10.5) Sandy gravelly CLAY, light brownish-gray with orange mottling, moist, ~10% fine sand, ~5 to 10% fine to coarse carbonate gravel, ~80% to 85% medium plasticity clay, very firm, abundant root traces filled with carbonaceous material.
10		0			
		0	100	CL	(10.5 to 14.5) Sandy CLAY with SAND, orange with gray mottling, moist, ~10% fine sand in clay, ~20 to 30% sand interbeds and lenses increasing downward, ~70 to 80% high plasticity clay, firm, few carb nodules.
15		0			
		0	60	SC	(14.5 to 16.5) Clayey SAND, gray, wet, ~30% high plasticity clay, ~70% fine sand, very soft.
		0			
		0	60	SP	(16.5 to 21.6) SAND, gray, poorly graded, wet, very fine to fine sand, unconsolidated.
20		0			
		0	100	SP/CL	(21.6 to 23.5) Interbedded SAND and CLAY, orange and gray, moist to wet, ~50% poorly graded sand interbeds, ~50% medium plasticity clay interbeds, firm.
		0			
		0	100	CL	(23.5 to 25.0) CLAY, gray with orange mottling, moist, medium plasticity clay, stiff.



**PBW**  
 Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

<u>Annular Materials</u>	<u>Well Materials</u>
(0 to 10.0) Bentonite-Cement Grout	(0 to 14.0) Casing, 2" Sch 40 FJT PVC
(10.0 - 12.0) Bentonite Pellets	(14.0 to 24.0) Screen 2" Sch 40 FJT PVC
(12.0 - 25.0) 20-40 Silica Sand	0.010 slot



Union Pacific Railroad

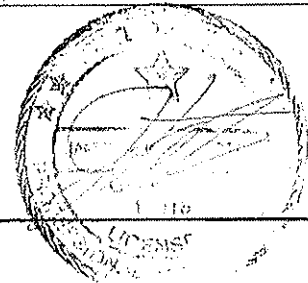
# Log of Boring: MW-51A

UPRR Houston Wood Preserving Works  
Houston, Texas

Completion Date:	2/28/07	Drilling Method:	HSA
Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	8.5
Driller:	Bruce Milton	Total Depth (ft):	25
Driller's License:	4926	Northing:	3166884.68
Field Supervisor:	Tim Jennings, P.G.	Easting:	726926.05
Sampling Method:	4" x 5' Split Barrel	Casing Elevation (ft):	47.8

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0		0	20	CL	(0.0 to 1.0) Sandy gravelly CLAY, dark brown, dry, ~20 to 30% fine sand, ~10 to 20% fine to coarse gravel, ~60 to 70% low plasticity clay, gravel blocked sampler. (1.0 to 5.0) No Recovery.
				NR	
5		0	100	CH	(5.0 to 8.5) Sandy CLAY, gry with black mottling, moist, ~10 to 20% fine sand (few lenses), ~80 to 90% high plasticity clay, firm.
10		0	100	SP/CL	(8.5 to 14.8) SAND and sandy CLAY, mottled orange and gray, ~20 to 40% fine sand including small sand lenses, ~60 to 80% high plasticity clay, firm, increasing sand below ~13.5, few carb nodules, abundant Fe staining, few root holes with black carbonaceous material.
15		0	100	CL	(14.8 to 18.4) CLAY with SAND, red with gray mottling, moist, ~10% fine sand as small lenses, ~90% medium plasticity clay, very firm.
20		0	100	CL	(18.4 to 23.2) Sandy CLAY with SAND, gray with orange mottling, wet to moist, ~30 to 40% fine sand including seams and lenses, soft to firm, decreasing sand below 21.5.
25		0	100	CL	(23.2 to 25.0) CLAY, reddish-brown with gray mottling, moist to wet, medium plasticity clay with ~5% carbonate sand and nodules, abundant carb nodules in zone at 24.6 to 24.8.



## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Annular Materials

(0 to 11.0) Bentonite-Cement Grout  
 (11.0 - 13.0) Bentonite Pellets  
 (13.0 - 25.0) 20-40 Silica Sand

Well Materials

(0 to 15.0) Casing, 2" Sch 40 FJT PVC  
 (15.0 to 25.0) Screen 2" Sch 40 FJT PVC  
 0.010 slot



# Union Pacific Railroad

# Log of Boring: MW-51C

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	5/10/2014	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	10
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	80
	Driller's License:	58141	Northing:	726934.5814
	Field Supervisor:	Patrick Ferrell	Easting:	3166894.3552
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	47.7

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 10) No Recovery, NR, soils removed to 10' by hydrovac to clear for utilities.
5			0.0/0.0	NR	
10		3.1	10.0/10.0	CL	(10 - 17.1) SILTY CLAY, CL, grey with trace orange mottling that increases with depth, trace black streaks (no odor), carbonate nodule seam at 14.8' to 15.1', 15.6' to 15.8', dry, firm with low plasticity.
15		3			
20		2.4	10.0/10.0	SM	(17.1 - 18.3) SILTY SAND, SM, grey with orange and few black streaks, very fine grained, no odor, dry.
25		2.7			
30		1.9	10.0/10.0	CL	(18.3 - 36.7) SILTY CLAY, CL, red-brown with grey mottling, carbonate nodules at 18.8'. Becomes grey with orange mottling at 19.3' to 25.9', with carbonate seams at 25.0' to 25.4', 26.1' to 28.0', carbonate gravel is black between 27.4' to 27.8' with no odor. Orange mottling increases beyond 28.0' with trace small carbonate nodules below 30.0' (no lenses or seams), dry, very hard with no plasticity.
35		1.9			
40		1.7	10.0/10.0	CL	(36.7 - 42.4) SILTY CLAY, CL, red-brown with some grey mottling and carbonate seams at 37.9', 38.5', 38.95' and 39.5', dry, very hard with no plasticity.
45		1.8			
50		2.1	10.0/10.0	CL	(42.4 - 45.8) SANDY SILTY CLAY, CL, red-brown, very fine grained, dry to moist, soft with no plasticity.
55		1.8			
60		1.7	10.0/10.0	CL	(45.8 - 54.2) SILTY CLAY, CL, red-brown with trace grey mottling, dry, very hard (driller noted that it required >1000 psi to remove sample from core barrel), no plasticity, staining or odors.
65		2			
70		1.3	10.0/10.0	SM	(54.2 - 57.9) SILTY SAND, SM, red-brown, fine grained, homogeneous with no odors or staining, wet, very soft, no plasticity.
75		1.5			
75		1.4	10.0/10.0	CL	(57.9 - 59.7) SILTY CLAY, CL, red-brown, moist, very hard with no to low plasticity, no staining or odors.
80		1.9			
80		1.7	10.0/10.0	SP	(59.7 - 63.7) CLAYEY SAND, SP, red-brown, very fine grained with some cohesives, moist to wet, very soft with low plasticity, no staining or odors.
80		1.7			
80		1.7	10.0/10.0	CL	(63.7 - 72.2) SAND, SP, red-brown, medium grained, wet, very soft with no plasticity, thin clayey zones at 69.4' to 69.7', becomes red-brown and tan at 69.8'.
80		1.7			
80		1.4	10.0/10.0	CL	(72.2 - 80) SILTY CLAY, CL, red-brown, becomes red-brown and grey at 74.1', becomes grey with black streaks at 76.2' (no odor), and brown below 77.0', dry, firm to hard with no plasticity.
80		1.6			
80		1.7	10.0/10.0	CL	

## PBW

**Pastor, Behling & Wheeler, LLC**  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

### Notes:

Top 10 feet drilled out (DO) with a hydrovac to clear for utilities.  
 8-inch sonic isolation casing advanced to 20' then removed during grouting.  
 6-inch sonic casing advanced to 72', then removed during grouting.

Annular Materials  
 (0.0 - 2.0) Concrete  
 (2.0 - 57.0) Portland/Bentonite Grout  
 (57.0 - 60.0) Bentonite Pellets  
 (60.0 - 72.0) 20/40 Silica Sand  
 (72.0 - 80.0) Bentonite Pellets

Well Materials  
 (0 - 62.0) Casing, 2" FJT Sch 40 PVC  
 (62.0 - 72.0) Screen, 2" FJT Sch 40 PVC,  
 0.01 slot

TOC Elevation (ft AMSL)  
 47.48

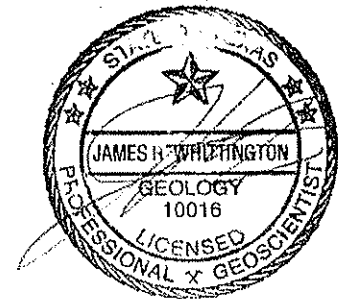


Union Pacific Railroad

# Log of Boring: MW-52A

UPRR Houston Wood Preserving Works Houston, Texas	Completion Date:	2/27/07	Drilling Method:	HSA
	Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	8.5
PBW Project No. 1358	Driller:	Bruce Milton	Total Depth (ft):	35
	Driller's License:	4926	Northing:	3167814.27
	Field Supervisor:	James Whittington, P.G.	Easting:	728698.97
	Sampling Method:	2" x 3' Split Spoon	Casing Elevation (ft):	51.91

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0				Fill	(0.0 to 1.5) FILL, gravel, oily.
			20	Fill	(1.5 to 4.0) FILL, clay with gravel; dark gray, oily.
		3			
5				CL	(4.0 to 14.5) Silty, sandy CLAY, dark gray, moist, firm, lighter gray with depth, ~1% carb clasts, slightly more sand with depth, dense layer of carb nodules with 50% CLAY matrix from 14-14.5.
		0.6	< 20		
		8			
10				CL	
		0	60		
		0			
15				CL	(14.5 to 18.0) CLAY, mottled gray and brown, ~5% carb clasts.
		0	< 20		
20				SP	(18.0 to 30.0) SAND and silty CLAY, gray, fine sand, becoming cleaner fine sand with depth, saturated with free product.
		0.6	20		
25					
		216			
		32	75		
30					
		87			
					(30.0 to 35.0) Sandy CLAY, mottled gray and tan, strong odor.



<p><b>PBW</b></p> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:							
	<table border="0"> <tr> <td><u>Annular Materials</u></td> <td><u>Well Materials</u></td> </tr> <tr> <td>(0 to 16.0) Bentonite-Cement Grout</td> <td>(0 to 20.0) Casing, 2" Stainless Steel</td> </tr> <tr> <td>(16.0 - 18.0) Bentonite Pellets</td> <td>(20.0 to 30.0) Screen 2" Wire Wrapped</td> </tr> <tr> <td>(18.0 - 35.0) 20-40 Silica Sand</td> <td>Stainless Steel 0.010 slot</td> </tr> </table>	<u>Annular Materials</u>	<u>Well Materials</u>	(0 to 16.0) Bentonite-Cement Grout	(0 to 20.0) Casing, 2" Stainless Steel	(16.0 - 18.0) Bentonite Pellets	(20.0 to 30.0) Screen 2" Wire Wrapped	(18.0 - 35.0) 20-40 Silica Sand
<u>Annular Materials</u>	<u>Well Materials</u>							
(0 to 16.0) Bentonite-Cement Grout	(0 to 20.0) Casing, 2" Stainless Steel							
(16.0 - 18.0) Bentonite Pellets	(20.0 to 30.0) Screen 2" Wire Wrapped							
(18.0 - 35.0) 20-40 Silica Sand	Stainless Steel 0.010 slot							



Union Pacific Railroad

# Log of Boring: MW-52A

UPRR Houston Wood Preserving Works Houston, Texas	Completion Date:	2/27/07	Drilling Method:	HSA
	Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	8.5
PBW Project No. 1358	Driller:	Bruce Milton	Total Depth (ft):	35
	Driller's License:	4926	Northing:	3167814.27
	Field Supervisor:	James Whittington, P.G.	Easting:	728698.97
	Sampling Method:	2" x 3' Split Spoon	Casing Elevation (ft):	51.91

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
35			100	CL	

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Annular Materials

(0 to 16.0) Bentonite-Cement Grout  
 (16.0 - 18.0) Bentonite Pellets  
 (18.0 - 35.0) 20-40 Silica Sand

Well Materials

(0 to 20.0) Casing, 2" Stainless Steel  
 (20.0 to 30.0) Screen 2" Wire Wrapped  
 Stainless Steel 0.010 slot

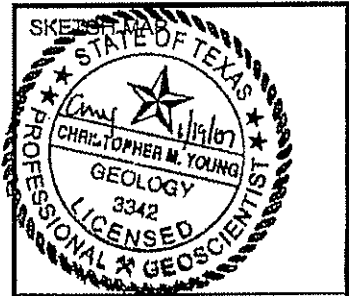




**ERM** Environmental Resources Management

**MW-53C (SB-69)  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID MW-53C (SB-69) Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 72' Boring Diam. 14"  
 N. Coord. 729610.93' E. Coord. 3168505.34' Surface Elevation 0' FL MSL Datum  
 Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe/Mud Rotary Log By J. Rose and M. St. Marie and E. Mkandawire



**NOTES**  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 38' and monitoring well installed using mud rotary.  
 0'-45' log from geoprobe boring, 53'-70' log from mud rotary boring.  
 Lithological description of 45'-55' taken from nearby well MW-45C.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				1.6 NM	0-72	0-0.5 0.5-1 1-5	<p>CLAYEY SAND: brown (10 YR 5/3) clayey sand, moist, well sorted, fine-grained, loose, grass, rootlets last inch, tar-like gravel</p> <p>FILL: pale brown (10 YR 6/3) shell/sand fill material, moist, poorly sorted, loose</p> <p>SANDY CLAY: dark gray (10 YR 4/1) mottled sandy clay, moist, rootlets, iron staining, increasing sand at 2', (pp=1.0tsf) above 2' pp=2.25tsf, firm, plastic below 2'</p>
-5	5				0.3		5-10	<p>SANDY CLAY: light brownish gray (2.5 Y 6/2) sandy clay, moist, firm, plastic pp=7.0tsf at 1' pp=1.0tsf at 3', pp=2.0 at 5' carbonate layer at 2' and 4.5'</p>
-10	10						10-15	<p>SANDY CLAY: light greenish gray (Gley 1 7/1 10Y), moist, pp=1.25tsf at 1', pp=1.0tsf at 2.5', pp=2.0tsf at 5', mottled sandy clay, plastic</p>
-15	15							



# ERM Environmental Resources Management

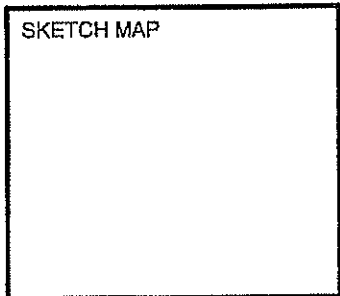
## MW-53C (SB-69) DRILLING LOG

Proj. No. 0014419 Boring/Well ID MW-53C (SB-69) Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 72' Boring Diam. 14"  
 N. Coord. 729610.93' E. Coord. 3168505.34' Surface Elevation 0' FL MSL Datum

Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 0'

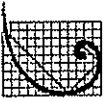
Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )

Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhardt  
 Drilling Method Geoprobe/Mud Rotary Log By J. Rose and M. St. Marie and E. Mkandawire



NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 38' and monitoring well installed using mud rotary.  
 0'-45' log from geoprobe boring, 55'-70' log from mud rotary boring.  
 Lithological description of 45'-55' taken from nearby well MW-45C.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15						15-20	SANDY CLAY: light greenish gray (Gley 1 7/1 10Y) mottled sandy clay, moist, plastic, carbonate lenses pp=1.25tsf at 1', pp=1.0 at 3', pp=0.75tsf at 4', black nodules, iron staining
-20	20						20-20.2 20.2-23.5	CLAYEY SAND: light olive gray (5 Y 6/2) clayey sand, moist, fine-grained, plastic pp=0.25tsf, mottled CLAYEY SAND: strong brown (7.5 YR 5/6) well sorted clayey sand, wet, soft, fine-grained sand, non plastic
-25	25						23.5-24 24-24.8 24.8-25 25-28	CLAYEY SAND: light olive gray (5 Y 6/2) clayey sand, moist, fine-grained, plastic pp=0.25tsf, mottled SILTY CLAY: yellowish brown (10 YR 5/6) silty sand, moist, very fine-grained, soft (pp=0.75tsf) SILTY SAND: yellowish brown (10 YR 5/6) silty sand, moist, very fine-grained, loose, non plastic, well sorted SILTY SAND: yellowish brown (10 YR 5/6) silty sand, moist, very fine-grained, loose, non plastic, well sorted
-30	30						28-30	CLAYEY SAND: light olive gray (5 Y 6/2), mottled clay, moist, cleavage, black staining



ERM Environmental Resources Management

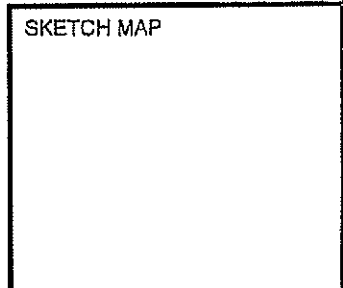
MW-53C (SB-69) DRILLING LOG

Proj. No. 0014419 Boring/Well ID MW-53C (SB-69) Date Drilled 8/15/2006
Project Houston Wood Preserving Works Owner Union Pacific Railroad Company
Location Houston, TX Boring T.D. 72' Boring Diam. 14"
N. Coord. 729610.93' E. Coord. 3168505.34' Surface Elevation 0' Ft. MSL Datum

Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"
Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'
Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )

Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart
Drilling Method Geoprobe/Mud Rotary Log By J. Rose and M. St. Marie and E. Mkandawire



NOTES
pp = pocket penetrometer.
tsf = tons per square foot.
Isolation casing set at 38' and monitoring well installed using mud rotary.
0'-45' log from geoprobe boring, 55'-70' log from mud rotary boring.
Lithological description of 45'-55' taken from nearby well MW-45C.

Table with 9 columns: Elevation (Feet), Depth (Feet), Graphic Log, Well Construction, Sample Type, OVM (ppm), Sample Interval (Feet), Description Interval (Feet), Description/Soil Classification (Color, Texture, Structure). Rows include soil descriptions for intervals 30-33.5, 33.5-35, 35-40, and 40-45.



**MW-53C (SB-69)  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID MW-53C (SB-69) Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 72' Boring Diam. 14"  
 N. Coord. 729610.93' E. Coord. 3168505.34' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'  
 Top of Casing Elevation 0' Slickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe/Mud Rotary Log By J. Rose and M. St. Marie and E. Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 isolation casing set at 38' and monitoring well installed using mud rotary.  
 0'-45' log from geoprobe boring, 55'-70' log from mud rotary boring.  
 Lithological description of 45'-55' taken from nearby well MW-45C.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-45	45				0.0	45-55	45-55	SILTY CLAY: yellowish red (5YR 5/6) with light greenish gray (GLEY 7/10BG) mottling, cohesive, fractured, hard, pp=>4.5 tsf, bloturbation. At 46'-48' hard, pp=> 4.5 tsf, manganese oxide staining. At 49'-50' fractured, hard pp=>4.5 tsf, silt lenses, manganese oxide staining, slight odor. At 51'-54' more fractures, hard, pp=4.0 tsf, manganese oxide staining, slight odor. At 54'-56' very stiff, pp=3.0 tsf, silt lenses.
-55	55				NM	55-57	55-57	CLAY: clay, red (2.5 YR 4/6) mottled with gray (7.5 YR 5/1) moist, pp=4.0tsf, plastic, slicken slides present
					0.2	57-60	57-60	NO RECOVERY
-60	60							



**ERM** Environmental Resources Management

**MW-53C (SB-69)  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID MW-53C (SB-69) Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 72' Boring Diam. 14"  
 N. Coord. 729810.93' E. Coord. 3168505.34' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe/Mud Rotary Log By J. Rose and M. St. Marie and E. Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 38' and monitoring well installed using mud rotary.  
 0'-45' log from geoprobe boring, 55'-70' log from mud rotary boring.  
 Lithological description of 45'-55' taken from nearby well MW-45C.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OVM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-60	60				NM		60-60.7	CLAY: clay, red (2.5 YR 4/6) mottled with gray (7.5 YR 5/1) moist, pp=4.0tsf, plastic, slicken sides present
					0.8		60.7-64	SILTY CLAY: silty clay, red (2.5 YR) mottled with gray (7.5 YR 5/1), moist, pp=3.0tsf, slightly plastic, slicken sides present, traces of white calcareous nodules <1mm
							64-65	NO RECOVERY
-65	65				2.9		65-69.5	SAND: sand, red (2.5 YR 4/6) mottled with yellowish brown (5 YR 5/6) saturated, loose, very fine to medium-grained, subrounded
					6			
-70	70				4		69.5-70 70-72	CLAY: clay, red (2.5 YR 4/6), moist, pp=3.0tsf, very plastic, black specks NOT SAMPLED
					NM			T.D. = 72'
-75	75							



**ERM Environmental Resources Management**

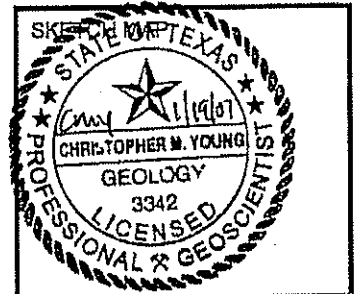
**MW-54C (SB-68)  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID MW-54C (SB-68) Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 72' Boring Diam. 14"  
 N. Coord. 729217.62' E. Coord. 3168760.34' Surface Elevation 0' Ft. MSL Datum

Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 0'

Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )

Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe/Mud Rotary Log By Marcel St. Marie and Emmanuel Mkandawire



**NOTES**  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 37' and monitoring well installed using mud rotary.  
 0'-49' log from geoprobe boring, 55'-72' log from mud rotary boring.  
 Lithological description of 40'-55' taken from nearby well MW-46C.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OWM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
0	0				NM	0-72	0-0.8 0.8-2 2-5	CLAYEY SAND: very dark grayish brown (10 YR 3/2), moist, clayey sand, very fine-grained, well sorted, subangular, some rootlets, trace gravel GRAVEL: gravel, sandy SILTY CLAY: silty clay, very dark grayish brown (10 YR 3/2), moist, plastic, trace gravel, pp=2.0tsf, mottled, trace rootlets
-5	5						5-10	SILTY CLAY: greenish gray (Gley 1 5/10Y), moist, mottled, trace iron staining, trace rootlets, pp=0.5tsf, small black staining, black sand layer from 9.6-9.8', trace sand, silty clay
-10	10						10-13.5	SILTY CLAY: greenish gray (Gley 1 5/10Y), moist, mottled, trace iron staining, trace rootlets, pp=0.5tsf, small black staining, trace sand, silty clay
-15	15				0		13.5-14 14-14.2 14.2-15	CLAYEY SAND: clayey sand, dark gray (10 YR 3/1), wet, very fine-grained, well sorted, subangular, sheen SANDY CLAY: sandy clay, wet, calcarius lenses from 14.0-14.2, odor SILTY CLAY: greenish gray (Gley 1 5/10Y), moist, mottled, trace iron staining, trace rootlets, pp=0.5tsf, small black staining, trace sand, silty clay



**ERM Environmental Resources Management**

**MW-54C (SB-68)  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID MW-54C (SB-68) Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 72' Boring Diam. 14"  
 N. Coord. 729217.62' E. Coord. 3168760.34' Surface Elevation 0' FL MSL Datum

Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 0'

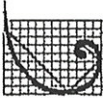
Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )

Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe/Mud Rotary Log By Marcel St. Marie and Emmanuel Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 37' and monitoring well installed using mud rotary.  
 0'-40' log from geoprobe boring, 55'-72' log from mud rotary boring.  
 Lithological description of 40'-55' taken from nearby well MW-46C.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OWM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-15	15						15-15.3 15.3-16.3	CALICHE: caliche layer, moist
					NM		16.3-19	SILTY CLAY: silty clay, greenish gray (Gley 1 5/10GY), moist, mottled, plastic, trace calcium carbonate lenses, pp=3.0tsf CLAYEY SAND: very dark gray (2.5 Y 3/1), wet, clayey sand, very fine-grained, well sorted, subangular
					0		19-20	SILTY CLAY: silty clay, greenish gray (Gley 1 6/10GY), moist, abundant calcium carbonate lenses, pp=0.0tsf, plastic, trace iron staining
-20	20				10.5		20-23.5	SANDY CLAY: sandy clay, interlayered clayey sand, greenish gray (Gley 1 7/10GY), wet, trace iron staining, sand is very fine-grained, well sorted, subangular, soft, cohesive
							23.5-25	SILTY CLAY: silty clay, pp=4.35tsf, light gray (2.5 Y 7/2), wet, mottled, trace black nodules, trace calcium carbonate nodules and lenses
-25	25						25-28.5	SANDY CLAY: sandy clay, interlayered clayey sand, greenish gray (Gley 1 7/10GY), wet, trace iron staining, sand is very fine-grained, well sorted, subangular, soft, cohesive
							28.5-30	SILTY CLAY: silty clay, yellowish red (5 YR 4/6), wet, plastic, pp=3.75 tsf, mottled, trace black nodules
-30	30							



**ERM** Environmental Resources Management

**MW-54C (SB-68)  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID MW-54C (SB-68) Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 72' Boring Diam. 14"  
 N. Coord. 729217.62' E. Coord. 3168760.34' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe/Mud Rotary Log By Marcel St. Marie and Emmanuel Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 37' and monitoring well installed using mud rotary.  
 0'-40' log from geoprobe boring, 55'-72' log from mud rotary boring.  
 Lithological description of 40'-55' taken from nearby well MW-48C.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OWM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-30	30					30-33	30-33	SILTY CLAY: silty clay, yellowish red (5 YR 4/6), moist, plastic, pp=3.75 tsf, mottled, trace black nodules
						33-33.5	33-33.5	SAND: sand, brown (7.5 YR 5/4), moist, very fine-grained, well sorted, subangular
						33.5-35	33.5-35	SILTY CLAY: silty clay, dark grayish brown (2.5 Y 4/2), moist, trace black staining, plastic, pp=4.25tsf, mottled
-35	35					35-40	35-40	SILTY CLAY: silty clay, dark grayish brown (2.5 Y 4/2), moist, some black staining, plastic, pp=4.5tsf, mottled, BORING STOPPED ON 8/15/2006, CONTINUED ON 8/28/2006
					0	40-42	40-42	SILTY CLAY: strong brown (7.5YR 5/6) with light greenish gray (GLEY 7/10Y) mottling, fractured, laminated, very stiff, pp=3.75 tsf, caliche lenses, manganese oxide staining
						42-44	42-44	CLAYEY SILT: strong brown (7.5YR 5/8) with light greenish gray (GLEY 7/10Y) mottling, very stiff, pp=4.0 tsf, manganese oxide staining, odor, moist
						44-46	44-46	CLAY: strong brown (7.5YR 5/8) with light greenish gray (GLEY 7/5GY) mottling, hard, pp=>4.5 tsf, calcareous nodules up to 1/4" diameter, manganese oxide staining, odor, moist, 75% recovery
-45	45							





**ERM Environmental Resources Management**

**MW-54C (SB-68)  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID MW-54C (SB-68) Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 72' Boring Diam. 14"  
 N. Coord. 729217.62' E. Coord. 3168760.34' Surface Elevation 0' Fl. MSL Datum  
 Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe/Mud Rotary Log By Marcel St. Marie and Emmanuel Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 37' and monitoring well installed using mud rotary.  
 0'-10' log from geoprobe boring, 65'-72' log from mud rotary boring.  
 Lithological description of 40'-55' taken from nearby well MW-45C.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OWM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-45	45						46-47	NO RECOVERY
							47-48	CLAYEY SILT: yellowish red (5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, slicken sides, hard, pp=>4.5 tsf, manganese oxide staining, odor, moist, 50% recovery
							48-54	SILTY CLAY: yellowish red (5YR 5/6) with pale yellow (5Y 7/3) mottling, very stiff, pp=3.5 tsf, calcareous nodules, manganese oxide staining, moist, 100% recovery, odor. At 50' becomes strong brown (7.5YR 5/6) with light greenish gray (GLEY 7/5GY) mottling, fractured, slicken sides, very stiff, pp=3.0 tsf. At 52' hard, pp=>4.5tsf, slight odor
-50	50						54-55	CLAYEY SILT: yellow red (5YR 5/6), plastic, stiff, pp=1.5 tsf, fractured, laminated, clay lenses, moist, 75% recovery .
-55	55				NA		55-57	SILTY CLAY: silty clay, red (2.5 YR 4/6), moist, pp=1.0tsf, slightly plastic, traces of light gray (7.5 YR 7/1) vein like structures
					0.5		57-60	NO RECOVERY
-60	60							



**ERM** Environmental Resources Management

**MW-54C (SB-68)  
DRILLING LOG**

Proj. No. 0014419 Boring/Well ID MW-54C (SB-68) Date Drilled 8/15/2006  
 Project Houston Wood Preserving Works Owner Union Pacific Railroad Company  
 Location Houston, TX Boring T.D. 72' Boring Diam. 14"  
 N. Coord. 729217.62' E. Coord. 3168760.34' Surface Elevation 0' Ft. MSL Datum  
 Screen: Type stainless steel Diam. 2" Length 10' Slot Size 0.01"  
 Casing: Type stainless steel Diam. 2" Length 60' Sump Length 2'  
 Top of Casing Elevation 0' Stickup 0'  
 Depth to Water: 1. Ft. 0 ( ) 2. Ft. 0 ( )  
 Drilling Company Fugro Geosciences, Inc. Driller Doug Isenhart  
 Drilling Method Geoprobe/Mud Rotary Log By Marcel St. Marie and Emmanuel Mkandawire

SKETCH MAP

NOTES  
 pp = pocket penetrometer.  
 tsf = tons per square foot.  
 Isolation casing set at 37' and monitoring well installed using mud rotary.  
 0'-40' log from geoprobe boring, 55'-72' log from mud rotary boring.  
 Lithological description of 40'-55' taken from nearby well MW-46C.

Elevation (Feet)	Depth (Feet)	Graphic Log	Well Construction	Sample Type	OWM (ppm)	Sample Interval (Feet)	Description Interval (Feet)	Description/Soil Classification (Color, Texture, Structure)
-60	60				NM	60-62	60-62	SILTY CLAY: silty clay, red (2.5 YR 4/6), traces of slicken sides, pp=1.5tsf, at 60.2ft traces of sandy silt, very fine to medlum-grained, poorly sorted, subrounded (2 inches thick), moist to saturated
					1.0			
					0.5	62-65	62-65	NO RECOVERY
-65	65				NM	65-66	65-66	SILTY SAND: silty sand, red (2.5 YR 4/6), saturated, pp=<0tsf, loose, very fine to medium-grained, poorly sorted, subrounded
					1.0	66-70	66-70	NO RECOVERY
-70	70				NM	70-72	70-72	CLAY: clay, red (2.5 YR 4/6), moist, pp=3.0tsf, very plastic, slicken sided, traces of light gray mottling (7.5 YR 7/1), black specks
					0.5			T.D. = 72'
-75	75							



Union Pacific Railroad

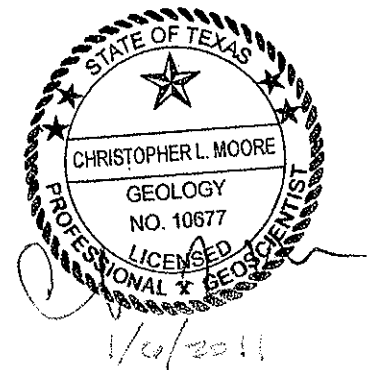
# Log of Boring: MW-55A

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	1/12/09	Drilling Method:	Roto Sonic
Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
Driller:	William Bludworth	Total Depth (ft):	25.0
Driller's License:	4885	Northing:	728540.33
Field Supervisor:	Chris Moore	Easting:	3167481.93
Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	49.2

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 7.0) SILTY CLAY, brown, fill, moist, firm, with brick and wood fragments, odor.
5			DO	FILL	
10		71.5 198 484	8.0/8.0	CL	(7.0 - 16.5) SILTY CLAY, CL, dark gray, with sand, moist, firm, strong odor.
15		785 648			
20		543 1531	10.0/10.0	SM	(16.5 - 22.0) SILTY SAND, SM, light grayish brown, wet, soft, strong odor, oily sheen/NAPL pockets at 18.0-20.0.
25		1934 434		CH	(22.0 - 25.0) CLAY, CH, mottled reddish brown and grayish brown, moist, hard, strong odor, stained sand lens at 22.5.



## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Top 7 feet drilled out (DO) with a hydrovac to clear for utilities.

Initial Fluid Level (2/04/09)  
 ▼ Depth to water: 13.79 ft BTOC

Annular Materials  
 (0.0 - 7.0) Bentonite Chips  
 (7.0 - 25.0) 16/30 Silica Sand

Well Materials  
 (+3.0 - 10.0) Casing, 2" Sch 40 FJT PVC  
 (10.0 - 25.0) Screen, 2" Sch 40 FJT PVC,  
 0.01 slot

TOC Elevation (ft AMSL)  
 44.22



Union Pacific Railroad

# Log of Boring: MW-55B

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	12/14/2011	Drilling Method:	Roto Sonic
Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
Driller:	Tim Beach	Total Depth (ft):	40
Driller's License:	58141	Northing:	728537.62
Field Supervisor:	Tim Jennings	Easting:	3167473.94
Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	49.15

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 3) FILL, Sand, Clay and Gravel
			DO	FI LL	
5		7.1			(3 - 9.5) SANDY CLAY, CH, dark gray, moist, ~20-40% fine sand, soft, wood fragments soaked in creosote 4-5 feet, moderate odor
		8.3	5/5	CH	
		7.2			
10		13.5			(9.5 - 16.4) SANDY CLAY, CL, light gray and orange, moist, ~20-30% fine sand, firm, slight to moderate odor
		12.5	10/10	CL	
15		5.9			
		35			(16.4 - 23.8) SILTY SAND, SM, brown, wet, ~30-40% silt in very fine to fine sand, laminated, abundant black staining below 20 feet with NAPL locally, very strong odor
20		68.2		SM	
		12	10/10		
25		12.5			(23.8 - 33.7) SANDY CLAY, CL, red 23.8-24.7 and light brown and gray mottled below 24.7, moist, ~10-20% fine sand, thin sand interbed at 24.7 feet, fine to coarse carbonate gravel seam 32.4-32.7 feet, trace NAPL in gravel after core laid out for ~1/2 hour, moderate odor, strong odor in sandier zone 32-33.7 feet
		30		CL	
30		32	5/5		
		22.4			
35		10.7	5/5	CL	(33.7 - 40) CLAY, CL, reddish brown with gray mottling, moist, very hard, medium plasticity clay, abundant carbonate nodules, thin (<0.1' thick) carbonate gravel seams at 34.1, 34.5, and 36.7 feet, thin sand partings at 38.8, 39.1, and 39.4 feet, slight to moderate odor
		9.8			
40					

## PBW

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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.  
 8-inch sonic isolation casing advanced to 25' then removed during grouting.

Initial Fluid Level (01/27/12)

Depth to water: 13.28 ft BTOC

Annular Materials

(0.0 - 2.0) Concrete  
 (2.0 - 25.7) Portland/Bentonite Grout  
 (25.7 - 29.7) Bentonite Pellets  
 (29.7 - 38.0) 20/40 Silica Sand  
 (38.0 - 40.0) Bentonite Pellets

Well Materials

(0 - 32.0) Casing, 2" FJT Stainless Steel  
 (32.0 - 37.0) Screen, 2" FJT Stainless Steel,  
 0.01 slot

TOC Elevation (ft AMSL)

52.04

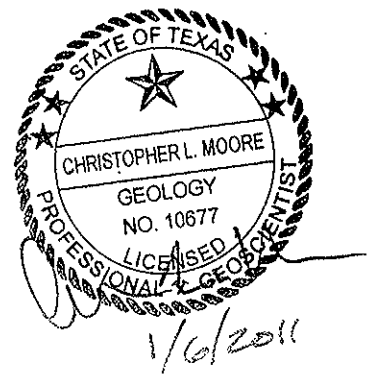


Union Pacific Railroad

# Log of Boring: MW-57A

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/22/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Bludworth	Total Depth (ft):	30.0
	Driller's License:	4885	Northing:	728858.37
	Field Supervisor:	Chris Moore	Easting:	3167973.58
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	47.8

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL	(0 - 4.0) CLAYEY GRAVEL, GC, very dark gray, moist, firm, fill, no odor.
5			DO		
		874			
10		715	8.0/8.0	CL	(4.0 - 15.4) SANDY CLAY, CL, greenish gray, moist, firm to hard, some calcareous nodules, some orange staining, odor.
		457			
15		653			
		10.7			
20		8.2	10.0/10.0	SP	(15.4 - 25.5) SAND, SP, light greenish gray, wet, soft, fine sand, odor, some NAPL stained seams from 18.0-23.0, saturated with NAPL from 23.0-25.5.
		10.3			
		239			
		31.9			
25		63.7			
		46.8	5.0/5.0	CH	(25.5 - 30.0) CLAY, CH, reddish brown, moist, hard, odor, NAPL stained sand lens at 26.2.
30		23.4			



<h2>PBW</h2> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:	Initial Fluid Level (2/5/09)
	Top 7 feet drilled out (DO) with a hydrovac to clear for utilities.	▼ Depth to water: 12.73 ft BTOC
	<b>Annular Materials</b> (0.0 - 10.0) Bentonite Chips (10.0 - 27.0) 16/30 Silica Sand (27.0 - 30.0) Hole cave-in	<b>Well Materials</b> (0 - 12.0) Casing, 2" Sch 40 FJT PVC (12.0 - 27.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot
	TOC Elevation (ft AMSL) 46.22	



Union Pacific Railroad

# Log of Boring: MW-57B

UPRR Houston Wood Preserving Works  
Houston, TX

PBW Project No. 1358

Completion Date:	12/21/2011	Drilling Method:	Roto Sonic
Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
Driller:	Tim Beach	Total Depth (ft):	40
Driller's License:	58141	Northing:	728857.15
Field Supervisor:	Tim Jennings	Easting:	3167964.88
Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	47.93

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL	(0 - 4) FILL, Sand, Gravel and Clay
5		88.6	DO	CL	(4 - 15.4) SANDY CLAY, CL, greenish gray with heavy orange mottling 9-15.4 feet, ~20% fine sand in medium plasticity clay, carbonate nodules common below 9.8 feet, moderate to strong odor
		307	5/5	CL	
10		510		CL	
		497		CL	
15		91.6	6/10	SP	(15.4 - 24.3) POORLY GRADED SAND, SP, greenish gray and grayish brown, wet, very fine to fine sand, saturated with NAPL 23.6-24.3 feet, Strong odor
20		93		SP	(24.3 - 25.5) SANDY CLAY, CL, greenish gray with red mottling, moist, firm, NAPL is visible in small fractures on broken surfaces (25.5 - 26.2) POORLY GRADED SAND, SP, dark brown, wet, saturated with NAPL 25.9-26.2, strong odor (26.2 - 28.1) CLAY, CL, reddish brown, moist, medium plasticity clay, firm to hard, moderate odor (28.1 - 35) SANDY CLAY, CH, light gray and light brown mottled, ~10-20% fine sand in high plasticity clay, firm, small amount of NAPL staining on broken surfaces from 34-35 feet, strong odor, grades to clay at ~ 35.0 feet
		149		CL	
25		131	10/10	SP	
		43.9		CL	
30		51	5/5	CH	(35 - 40) CLAY, CL, reddish brown with gray mottling, few carbonate nodules throughout, clay is very fractured with few carbonate nodules 37.5-38.4 feet, small amount of NAPL staining in fractured zone, strong odor 35-38.4 feet, slight odor 38.4-40 feet
		65.5		CH	
35		14.8	5/5	CL	
		87.4		CL	
40		8.6		CL	

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 5 feet drilled out (DO) with a hydrovac to clear for utilities,  
 8-Inch sonic isolation casing advanced to 27' then removed during grouting.

**Initial Fluid Level (01/27/12)**

Depth to water: 28.83 ft BTOC  
 Depth to NAPL: 42.51 ft BTOC

**Annular Materials**

(0.0 - 2.0) Concrete  
 (2.0 - 28.0) Portland/Bentonite Grout  
 (28.0 - 32.0) Bentonite Pellets  
 (32.0 - 40.0) 20/40 Silica Sand

**Well Materials**

(0 - 34.0) Casing, 2" FJT Stainless Steel  
 (34.0 - 39.0) Screen, 2" FJT Stainless Steel,  
 0.01 slot

**TOC Elevation (ft AMSL)**

50.91

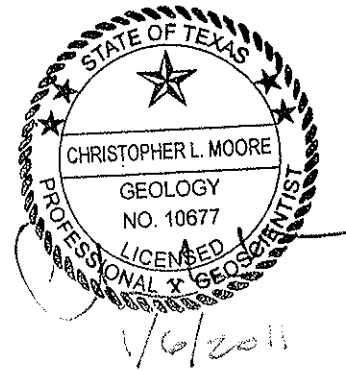


Union Pacific Railroad

# Log of Boring: MW-58A

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/23/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Blutworth	Total Depth (ft):	30.0
	Driller's License:	4885	Northing:	728874.59
	Field Supervisor:	Chris Moore	Easting:	3168176
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	47.9

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL	(0 - 4.0) CLAYEY GRAVEL, GC, very dark gray, moist, firm, fill, no odor.
5			DO		(4.0 - 17.2) SANDY CLAY, CL, greenish gray, moist, firm to hard, some calcareous nodules, some orange staining, odor.
10		35.3	8.0/8.0	CL	
		155			
		271			
		231			
15		20.4	10.0/10.0	SP	(17.2 - 28.1) SAND, SP, light greenish gray, wet, soft, fine sand, odor, trace NAPL staining from 24.0-28.1.
		7.1			
		7.6			
		10.1			
25		8.7	5.0/5.0	CH	(28.1 - 30.0) CLAY, CH, reddish brown, moist, hard, odor.
		11.1			
		15.4			
30		8.9			



<h2>PBW</h2> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:	Initial Fluid Level (2/05/09)
	Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.	▼ Depth to water: 14.55 ft BTOC
Annular Materials	Well Materials	TOC Elevation (ft AMSL)
(0.0 - 12.0) Bentonite Chips (12.0 - 29.0) 16/30 Silica Sand (29.0 - 30.0) Hole cave-in	(0 - 14.0) Casing, 2" Sch 40 FJT PVC (14.0 - 29.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot	52.01

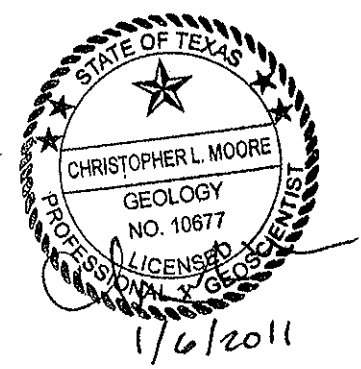


Union Pacific Railroad

# Log of Boring: MW-59A

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/28/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Blutworth	Total Depth (ft):	21.0
	Driller's License:	4885	Northing:	728155.16
	Field Supervisor:	Chris Moore	Easting:	3168358.06
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	44.48

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 14.1) SANDY CLAY, CL, dark gray, moist, firm, laminated, no odor.
5		-	DO	CL	
10		0	6.0/7.0	CL	
		0			
		0			
15		0	6.0/6.0	SM	(14.1 - 16.7) SILTY SAND, SM, light gray, moist, firm, very fine to fine sand,
		0		SP	(16.7 - 20.3) SAND, SP, light gray, wet, soft, very fine to fine sand, no odor.
20		0		CH	(20.3 - 21.0) SILTY CLAY, CL, light gray, moist, hard, no odor.



<h2>PBW</h2> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:	Initial Fluid Level (2/05/09)
	Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.	▼ Depth to water: 10.71 ft BTOC
<u>Annular Materials</u> (0.0 - 9.0) Bentonite Chips (9.0 - 21.0) 16/30 Silica Sand	<u>Well Materials</u> (0 - 11.0) Casing, 2" Sch 40 FJT PVC (11.0 - 21.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot	<u>TOC Elevation (ft AMSL)</u> 47.72





Union Pacific Railroad

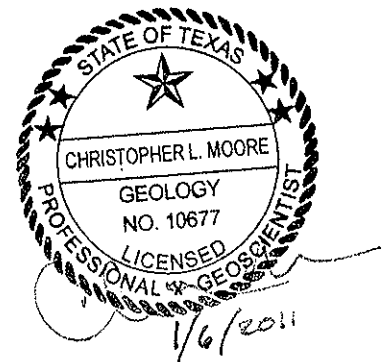
# Log of Boring: MW-59B

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	6/26/10	Drilling Method:	Roto Sonic
Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
Driller:	William Bludworth	Total Depth (ft):	33
Driller's License:	4885	Northing:	728144.74
Field Supervisor:	Chris Moore	Easting:	3168357.83
Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	44.67

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					SANDY CLAY, very dark gray, moist, firm.
5			DO	CL	SANDY CLAY, CL, gray, moist, firm, laminated.
10		0	10.0/10.0	SM	SILTY SAND, SM, gray wet, soft.
15		0		SP	SAND, SP, gray, wet, soft.
20		0	10.0/10.0		
25		0		CL	SILTY CLAY, CL, mottled reddish brown and gray, moist, firm to hard, 29.4, 30.9, 31.7, 32.2, 32.7: sand and gravel size calcareous nodules/seams
30		0	8.0/8.0		



## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.

Initial Fluid Level (7/12/10)  
▼ Depth to water: 7.43 ft BTOC

Annular Materials  
(0.0 - 1.0) Concrete  
(1.0 - 24.0) Portland/Bentonite Grout  
(24.0 - 27.0) Bentonite Chips  
(27.0 - 33.0) 16/30 Silica Sand

Well Materials  
(0 - 28.0) Casing, 2" Sch 40 FJT PVC  
(28.0 - 33.0) Screen, 2" Sch 40 FJT PVC,  
0.01 slot

TOC Elevation (ft AMSL)  
44.36

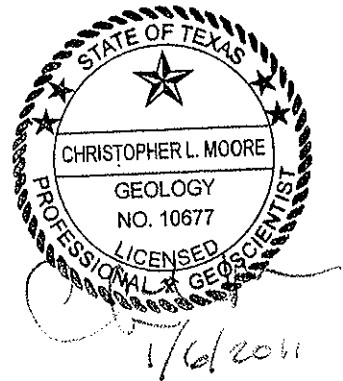


Union Pacific Railroad

# Log of Boring: MW-59D

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/27/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
PBW Project No. 1358	Driller:	William Blutworth	Total Depth (ft):	125.0
	Driller's License:	4885	Northing:	728114.05
	Field Supervisor:	Chris Moore	Easting:	3168365.41
	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	44.52

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description					
0		-	DO	CL	(0 - 14.0) SANDY CLAY, CL, dark gray, moist, firm, no odor.					
5					6.0/7.0	CL				
10								10.0/10.0	CL	
15										
15					0.5	10.0/10.0	SP		(16.5 - 19.8) SAND, SP, light gray, wet, soft, very fine to fine sand, no odor.	
20					0.6					
20					0	10.0/10.0	CL		(19.8 - 26.0) SILTY CLAY, CL, light gray, moist, hard, no odor.	
25					0					
30					0					
30					2.5	10.0/10.0	SM/SC		(26.0 - 29.8) SILTY/CLAYEY SAND, SM/SC, greenish gray, moist to wet, soft, slight odor.	
35					1.4					
40					1.5					
40					0	10.0/10.0	CH		(29.8 - 55.5) CLAY, CH, red, moist, hard, no odor, 31.5 - 44.5: calcareous nodules and carbonaceous seams.	
45					0					
50					0					
50					0					



<p><b>PBW</b> Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	<p>Notes:</p> <p>Top 8 feet drilled out (DO) with a hydrovac to clear for utilities. Sonic isolation casings advanced to 46' and 75' then removed during grouting.</p>	<p>Initial Fluid Level (2/05/09) ▼ Depth to water: 84.17 ft BTOC</p>
	<p>Annular Materials</p> <p>(0.0 - 95.0) Portland/Bentonite Grout (95.0 - 100.0) Bentonite Chips (100.0 - 118.0) 16/30 Silica Sand (118.0 - 125.0) Bentonite Chips</p>	<p>Well Materials</p> <p>(0 - 108.0) Casing, 2" Sch 40 FJT PVC (108.0 - 118.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot</p>



Union Pacific Railroad

# Log of Boring: MW-59D

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	1/27/09	Drilling Method:	Roto Sonic
Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
Driller:	William Bludworth	Total Depth (ft):	125.0
Driller's License:	4885	Northing:	728114.05
Field Supervisor:	Chris Moore	Easting:	3168365.41
Sampling Method:	4"6"x10' Barrel	Ground Elev. (ft AMSL):	44.52

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
55		0	10.0/10.0		(55.5 - 67.0) SILTY SAND, SM, yellowish red, wet, soft, with laminated clay lenses, no odor.
56		0			
57		0			
58		0			
59		0			
60		0			
61		0			
62		0			
63		0			
64		0			
65		0			
66		0			
70		0	10.0/10.0		(67.0 - 74.5) CLAY, CH, reddish brown, moist, hard, no odor.
71		0			
72		0			
73		0			
74		0			
75		0			
76		0			
77		0			
78		0			
79		0			
80		0			
81		0			
85		0	10.0/10.0		(74.5 - 84.2) SANDY CLAY, CL, greenish gray, moist, firm, trace calcareous nodules, no odor.
86		0			
87		0			
88		0			
89		0			
90		0			
91		0			
92		0			
93		0			
94		0			
95		0			
96		0			
100		0	10.0/10.0		(84.2 - 95.8) SILTY SAND, SM, light yellowish brown, wet, very fine to fine sand, no odor.
101		0			
102		0			
103		0			
104		0			
105		0			
106		0			
107		0			
108		0			
109		0			
110		0			
111		0			
116.8		0	10.0/10.0		(95.8 - 116.8) SAND, SP, light brown, very fine to fine sand, trace clay lenses, no odor.
117		0			
118		0			
119		0			
120		0			
121		0			
122		0			
123		0			
124		0			
125		0			
126		0			
127		0			
128	0				
129	0				
130	0				

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.  
Sonic isolation casings advanced to 46' and 75' then removed during grouting.

Initial Fluid Level (2/05/09)

▼ Depth to water: 84.17 ft BTOC

Annular Materials

(0.0 - 95.0) Portland/Bentonite Grout  
(95.0 - 100.0) Bentonite Chips  
(100.0 - 118.0) 16/30 Silica Sand  
(118.0 - 125.0) Bentonite Chips

Well Materials

(0 - 108.0) Casing, 2" Sch 40 FJT PVC  
(108.0 - 118.0) Screen, 2" Sch 40 FJT PVC,  
0.01 slot

TOC Elevation (ft AMSL)

47.76



Union Pacific Railroad

# Log of Boring: MW-59D

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	1/27/09	Drilling Method:	Roto Sonic
Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
Driller:	William Bludworth	Total Depth (ft):	125.0
Driller's License:	4885	Northing:	728114.05
Field Supervisor:	Chris Moore	Easting:	3168365.41
Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	44.52

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
105		0		SP	
		0			
		0			
		0			
110		0	10.0/10.0		
		0			
		0		CL	(116.8 - 125.0) SILTY CLAY, CL, greenish gray, moist, hard, no odor.
		0			
		0			
120		0	10.0/10.0		
		0			
125		0			

## PBW

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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.  
 Sonic isolation casings advanced to 46' and 75' then removed during grouting.

Initial Fluid Level (2/05/09)

▼ Depth to water: 84.17 ft BTOC

Annular Materials

(0.0 - 95.0) Portland/Bentonite Grout  
 (95.0 - 100.0) Bentonite Chips  
 (100.0 - 118.0) 16/30 Silica Sand  
 (118.0 - 125.0) Bentonite Chips

Well Materials

(0 - 108.0) Casing, 2" Sch 40 FJT PVC  
 (108.0 - 118.0) Screen, 2" Sch 40 FJT PVC,  
 0.01 slot

TOC Elevation (ft AMSL)

47.76



Union Pacific Railroad

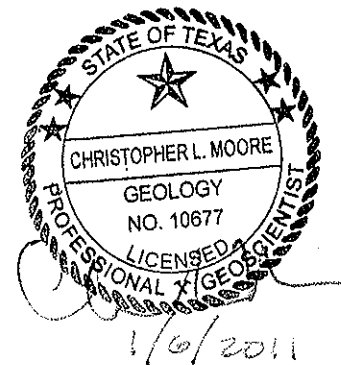
# Log of Boring: MW-60A

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	1/26/09	Drilling Method:	Direct Push Sonic
Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
Driller:	Keith Barge	Total Depth (ft):	30.5
Driller's License:	4786	Northing:	728825.06
Field Supervisor:	Tim Jennings	Easting:	3168822.57
Sampling Method:	2"x6.5' Barrel	Ground Elev. (ft AMSL):	47.17

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	[Hatched pattern]	-	DO	CL	(0 - 8.2) SANDY/GRAVELLY CLAY, CL, brown to yellowish brown, moist, soft, no odor.
5					
8.2	[Hatched pattern]	2.5	3.5/3.5	SP	(8.2 - 9.5) SAND, brown, moist, soft, medium sand, no odor.
9.5					
9.5	[Hatched pattern]	2.3	5.5/6.5	CL	(9.5 - 19.1) SILTY/SANDY CLAY, yellowish gray, moist, firm, no odor.
15					
19.1					
19.1	[Dotted pattern]	1.1	6.5/6.5	SM	(19.1 - 28.5) SILTY SAND, SM, reddish brown, wet, soft, fine sand, no odor.
25					
28.5					
28.5	[Cross-hatched pattern]	1.2	6.0/6.5	CL	(28.5 - 30.5) SILTY CLAY, CL, dark reddish brown, moist, firm, no odor.
30					



## PBW

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Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
Top 7 feet drilled out (DO) with a hydrovac to clear for utilities.

Initial Fluid Level (2/05/09)  
▼ Depth to water: 9.56 ft BTOC

Annular Materials  
(0.0 - 16.0) Bentonite Chips  
(16.0 - 28.5) 16/30 Silica Sand  
(18.5 - 28.5) Pre Pack Silica Sand  
(28.5 - 30.5) Cuttings cave-in

Well Materials  
(0 - 18.5) Casing, 1" Sch 40 FJT PVC  
(18.5 - 28.5) Screen, 1" Sch 40 FJT PVC,  
0.01 slot

TOC Elevation (ft AMSL)  
46.79

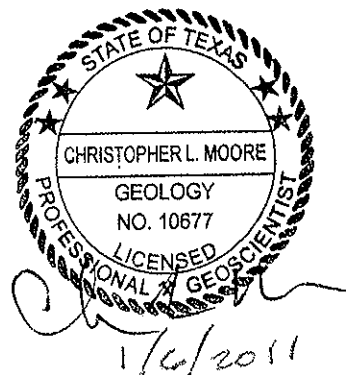


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# Log of Boring: MW-61A

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/26/09	Drilling Method:	Direct Push Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
PBW Project No. 1358	Driller:	Keith Barge	Total Depth (ft):	24.0
	Driller's License:	4786	Northing:	728336.29
	Field Supervisor:	Tim Jennings	Easting:	3168629.69
	Sampling Method:	2"x6.5' Barrel	Ground Elev. (ft AMSL):	45.15

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 11.5) SANDY/GRAVELLY CLAY, CL, light brown to light gray, moist, firm, no odor.
5		-	DO	CL	
10		0.8	3.0/3.0		
15		0.6	6.5/6.5	SC	(11.5 - 14.1) CLAYEY SAND, SC, grayish brown, wet, soft, no odor.
20		1.7		SP	(14.1 - 21.7) SAND, SP, greenish gray, wet, soft, no odor, grades to reddish brown and brown at 16.1.
		1.7	6.5/6.5		
		1.4		CH	(21.7 - 24.0) SILTY CLAY, CH, reddish brown, moist, firm, no odor.



<b>PBW</b> Pastor, Behling & Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446	Notes:	Initial Fluid Level (2/03/08)
	Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.	▼ Depth to water: 8.35 ft BTOC
<u>Annular Materials</u> (0.0 - 9.7) Bentonite Chips (9.7 - 21.9) 16/30 Silica Sand (11.9 - 21.9) Pre Pack Silica Sand (21.9 - 24.0) Cuttings cave-in	<u>Well Materials</u> (0 - 11.9) Casing, 1" Sch 40 FJT PVC (11.9 - 21.9) Screen, 1" Sch 40 FJT PVC, 0.01 slot	<u>TOC Elevation (ft AMSL)</u> 44.67

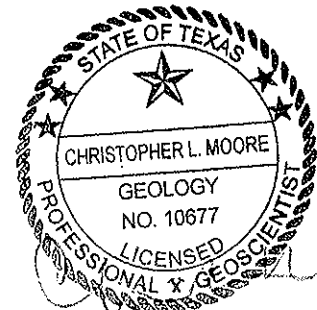


Union Pacific Railroad

# Log of Boring: MW-62B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/21/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Bludworth	Total Depth (ft):	35.0
	Driller's License:	4885	Northing:	728189.57
	Field Supervisor:	Chris Moore	Easting:	3165880.32
	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	45.4

Depth (ft)	Well Materials	PID (ppm-V)	Recovery (ft/ft)	USCS	Lithologic Description
0		0	4.5/5.0	CL	(0 - 14.2) SILTY CLAY, CL, dark gray, with sand, moist, soft to firm, laminated, no odor.
1					
2					
3					
4					
5		0	10.0/10.0	CL	(14.2 - 15.8) SAND, SP, light gray, wet, soft, laminated, very fine to fine sand, no odor.
6					
7					
8					
9					
10	0	10.0/10.0	CL	(15.8 - 25.8) SILTY CLAY, CL, light gray, moist, hard, some orange staining, slight odor to 17.0.	
11					
12					
13					
14					
15	0	10.0/10.0	SP	(25.8 - 34.5) SAND, SP, yellowish red, wet, soft, fine sand, laminated, slight odor.	
16					
17					
18					
19					
20	0	10.0/10.0	CH	(34.5 - 35.0) CLAY, CH, red, moist, hard, trace calcareous nodules, slight odor.	
21					
22					
23					
24					
25	0	10.0/10.0	SP	(34.5 - 35.0) CLAY, CH, red, moist, hard, trace calcareous nodules, slight odor.	
26					
27					
28					
29					
30	0.4	10.0/10.0	CH	(34.5 - 35.0) CLAY, CH, red, moist, hard, trace calcareous nodules, slight odor.	
31					
32					
33					
34					
35	0.2	10.0/10.0	CH	(34.5 - 35.0) CLAY, CH, red, moist, hard, trace calcareous nodules, slight odor.	
36					
37					
38					
39					
	1	10.0/10.0	CH	(34.5 - 35.0) CLAY, CH, red, moist, hard, trace calcareous nodules, slight odor.	
	0.8	10.0/10.0	CH	(34.5 - 35.0) CLAY, CH, red, moist, hard, trace calcareous nodules, slight odor.	



1/20/11

<h2>PBW</h2> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:	Initial Fluid Levels (2/04/09)
	Sonic isolation casing advanced to 20' then removed during grouting.	▼ Depth to water: 6.99 ft BTOC
Annular Materials	Well Materials	TOC Elevation (ft AMSL)
(0.0 - 20.0) Portland/Bentonite Grout	(0 - 25.0) Casing, 2" Sch 40 FJT PVC	48.16
(20.0 - 23.0) Bentonite Chips	(25.0 - 35.0) Screen, 2" Sch 40 FJT PVC,	
(23.0 - 35.0) 16/30 Silica Sand	0.01 slot	

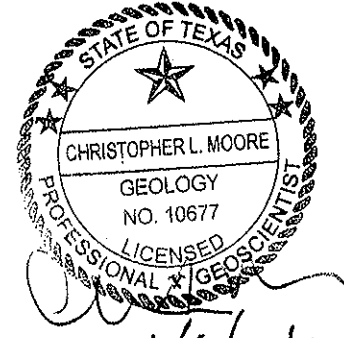


Union Pacific Railroad

# Log of Boring: MW-63B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/28/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Bludworth	Total Depth (ft):	36.0
	Driller's License:	4885	Northing:	729361.26
	Field Supervisor:	Chris Moore	Easting:	3167652.03
	Sampling Method:	4" / 6" x 10' Barrel	Ground Elev. (ft AMSL):	44.8

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				PAV	(0 - 0.8) PAVEMENT and base material.
5		0	DO	CL	(0.8 - 14.3) SILTY/SANDY CLAY, CL, light gray, moist, firm, no odor.
10		0	3.0/8.0	CL	
15		0		SP	(14.3 - 23.5) SAND, SP, light yellowish brown, wet, soft, very fine to fine sand, no odor.
20		0	10.0/10.0	SP	
25		0		CH	(23.5 - 36.0) CLAY, CH, reddish brown, moist, hard, odor, some coarse sand size nodules with NAPL 26.0-31.0, wet carbonate gravel seams from 31.6-35.0.
30		10.1	11.0/11.0	CH	
35		2.8			
		2.3			
		0			



1/6/2011

Initial Fluid Level (2/05/08)  
▼ Depth to water: 31.54 ft BTOC

Notes:  
Top 7 feet drilled out (DO) with a hydrovac to clear for utilities.  
Sonic isolation casing advanced to 25' then removed during grouting.

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<u>Annular Materials</u> (0.0 - 27.0) Portland/Bentonite Grout (27.0 - 29.0) Bentonite Chips (29.0 - 36.0) 16/30 Silica Sand	<u>Well Materials</u> (0 - 31.0) Casing, 2" Sch 40 FJT PVC (31.0 - 36.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot	<u>TOC Elevation (ft AMSL)</u> 44.48
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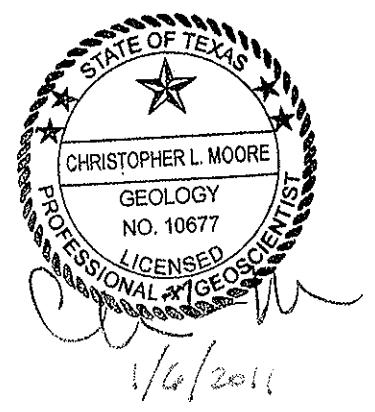


Union Pacific Railroad

# Log of Boring: MW-64A

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/26/09	Drilling Method:	Direct Push Sonic
	Drilling Company:	Universal Drilling	Borehole Diameter (in.):	2
	Driller:	Keith Barge	Total Depth (ft):	24.0
	Driller's License:	4786	Northing:	727495.89
PBW Project No. 1358	Field Supervisor:	Tim Jennings	Easting:	3165572.82
	Sampling Method:	2"x6.5' Barrel	Ground Elev. (ft AMSL):	44.81

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0		0.2	4.5/4.5	CL	(0 - 7.1) SANDY CLAY, CL, brown, moist, firm, no odor, fine sand, black staining at 2.3-2.5.
5		0.4			
10		1.4	4.3/6.5	CL	(7.1 - 17.7) SANDY CLAY, CL, gray, moist, firm to hard, no odor, trace carbonate gravel.
15		1.5			
20		3.1	4.0/6.5	SM	(17.7 - 19.4) SILTY SAND, SM, brown, wet, soft, fine sand, no odor.
		3.3			
		1.6			
		2.5	6.5/6.5	CL	(19.4 - 24.0) SILTY CLAY, CL, gray, moist, firm to hard.



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Notes: Initial Fluid Level (2/04/09)  
 ▼ Depth to water: 9.02 ft BTOC

<u>Annular Materials</u>	<u>Well Materials</u>	<u>TOC Elevation (ft AMSL)</u>
(0.0 - 12.5) Bentonite Chips	(0 - 14.5) Casing, 1" Sch 40 FJT PVC	44.55
(12.5 - 19.5) 16/30 Silica Sand	(14.5 - 19.5) Screen, 1" Sch 40 FJT PVC,	
(14.5 - 19.5) Pre Pack Silica Sand	0.01 slot	
(19.5 - 24.0) Cuttings cave-in		

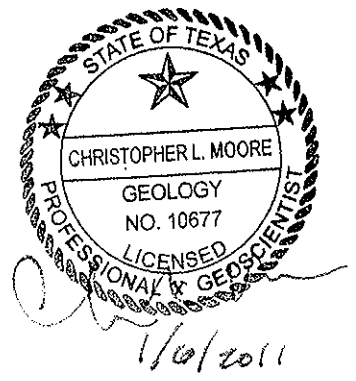


Union Pacific Railroad

# Log of Boring: MW-65D

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/17/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
PBW Project No. 1358	Driller:	William Bludworth	Total Depth (ft):	110.0
	Driller's License:	4885	Northing:	729512.29
	Field Supervisor:	Chris Moore	Easting:	3168331.33
	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	46.83

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	[Cross-hatched pattern]	-	DO	CL	(0 - 13.7) SILTY CLAY, CL, light gray, moist, firm to hard, laminated, no odor.
5					
10					
15					
20					
25					
30					
35					
40					
45					
50					
			10.0/10.0	SP	
			8.5/10.0		(28.5 - 54.4) CLAY, CH, red, moist, hard, trace carbonaceous lenses, no odor.
			10.0/10.0	CH	
			10.0/10.0		



<p><b>PBW</b> Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	<p>Notes:</p> <p>Top 8 feet drilled out (DO) with a hydrovac to clear for utilities. Sonic isolation casings advanced to 46' and 75' then removed during grouting.</p>	<p>Initial Fluid Level (2/05/09) ▼ Depth to water: 86.72 ft BTOC</p>
	<p><u>Annular Materials</u></p> <p>(0.0 - 92.0) Portland/Bentonite Grout (92.0 - 97.0) Bentonite Chips (97.0 - 110.0) 16/30 Silica Sand</p>	<p><u>Well Materials</u></p> <p>(0 - 100.0) Casing, 2" Sch 40 FJT PVC (100.0 - 110.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot</p>



Union Pacific Railroad

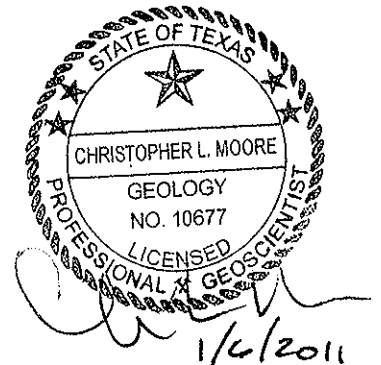
# Log of Boring: MW-65D

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	1/17/09	Drilling Method:	Roto Sonic
Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
Driller:	William Bludworth	Total Depth (ft):	110.0
Driller's License:	4885	Northing:	729512.29
Field Supervisor:	Chris Moore	Easting:	3168331.33
Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	46.83

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
55		0			
		0			
		0		SM	(54.4 - 57.7) SILTY SAND, SM, wet, soft, fine sand, no odor.
		0			
60		0	10.0/10.0	CH	(57.7 - 61.8) CLAY, CH, red, no odor, moist, hard, no odor.
		0			
		0		SM	(61.8 - 68.2) SILTY SAND, SM, red, wet, soft, very fine to fine sand, no odor.
65		0			
		0			
		0	10.0/10.0		(68.2 - 103.7) CLAY, CH, red, moist, hard, some thinly laminated silt lenses, no odor.
70		0			
		0			
		0			
		0	8.0/10.0		
80		0			
		0			
		0		CH	
85		0			
		0			
		0	10.0/10.0		
90		0			
		0			
		0			
95		0			
		0			
100		0	10.0/10.0		



## PBW

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 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.  
 Sonic isolation casings advanced to 46' and 75' then removed during grouting.

Initial Fluid Level (2/05/09)

▼ Depth to water: 86.72 ft BTOC

**Annular Materials**

(0.0 - 92.0) Portland/Bentonite Grout  
 (92.0 - 97.0) Bentonite Chips  
 (97.0 - 110.0) 16/30 Silica Sand

**Well Materials**

(0 - 100.0) Casing, 2" Sch 40 FJT PVC  
 (100.0 - 110.0) Screen, 2" Sch 40 FJT PVC,  
 0.01 slot

**TOC Elevation (ft AMSL)**

46.51



Union Pacific Railroad

# Log of Boring: MW-65D

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/17/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
	Driller:	William Blutworth	Total Depth (ft):	110.0
	Driller's License:	4885	Northing:	729512.29
	Field Supervisor:	Chris Moore	Easting:	3168331.33
PBW Project No. 1358	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	46.83

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
105    110		0	5.0/5.0		(103.7 - 105.5) SAND, SP, yellowish red, wet, soft, very fine to fine sand, no odor.
		0			(105.5 - 107.0) CLAY, CH, reddish brown to gray, moist, hard, no odor.
		0			(107.0 - 110.0) SILTY CLAY, CL, gray, with sand, moist, firm, some thinly laminated sand lenses.
		0			
		0			

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**Notes:**

Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.  
 Sonic isolation casings advanced to 46' and 75' then removed during grouting.

Initial Fluid Level (2/05/09)

▼ Depth to water: 86.72 ft BTOC

Annular Materials

(0.0 - 92.0) Portland/Bentonite Grout  
 (92.0 - 97.0) Bentonite Chips  
 (97.0 - 110.0) 16/30 Silica Sand

Well Materials

(0 - 100.0) Casing, 2" Sch 40 FJT PVC  
 (100.0 - 110.0) Screen, 2" Sch 40 FJT PVC,  
 0.01 slot

TOC Elevation (ft AMSL)

46.51

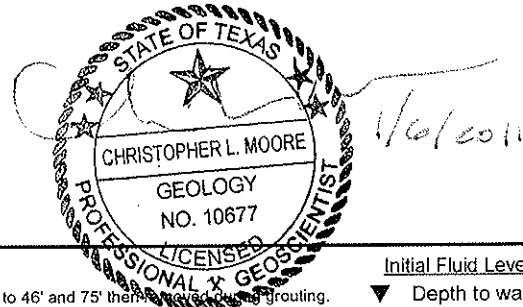


Union Pacific Railroad

# Log of Boring: MW-66D

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/20/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
PBW Project No. 1358	Driller:	William Bludworth	Total Depth (ft):	105.0
	Driller's License:	4885	Northing:	729136.87
	Field Supervisor:	Chris Moore	Easting:	3169381.04
	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	45.3

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	[Cross-hatched pattern]	0	5.0/5.0	GC	(0 - 6.0) CLAYEY GRAVEL, GC, very dark gray, fill, trace wood fragments, no odor.
5		0			
6	[Cross-hatched pattern]	0	9.0/10.0	CH	(6.0 - 8.0) CLAY, CH, very dark gray, moist, firm, no odor, trace carbonate gravel.
8		0			
10	[Cross-hatched pattern]	0	10.0/10.0	CL	(8.0 - 14.4) SILTY CLAY, CL, light brownish gray, with sand, moist, firm, no odor.
14		0			
15	[Cross-hatched pattern]	0	10.0/10.0	CL/ML	(14.4 - 21.5) SANDY CLAY/SILT, CL/ML, light brownish gray, moist, soft to firm, no odor.
20		0			
21	[Cross-hatched pattern]	2.8	10.0/10.0	SP	(21.5 - 30.5) SAND, SP, light brownish gray, wet, soft, laminated, slight creosote odor grades to reddish brown at 25'.
22		2.7			
24	[Cross-hatched pattern]	2.4	10.0/10.0	CH	(30.5 - 36.0) CLAY, CH, reddish brown, moist, hard, slight odor 30.5-32.5.
25		3			
27	[Cross-hatched pattern]	2.7	10.0/10.0	SP	(36.0 - 40.5) SAND, SP, reddish brown, wet, soft, slight odor.
30		2.2			
31	[Cross-hatched pattern]	2.1	10.0/10.0	CH	(40.5 - 55.5) CLAY, CH, yellowish brown, moist, hard, some sand size calcareous nodules, no odor.
32		1			
33	[Cross-hatched pattern]	2.3	10.0/10.0	SP	(36.0 - 40.5) SAND, SP, reddish brown, wet, soft, slight odor.
34		2.2			
36	[Cross-hatched pattern]	2.7	10.0/10.0	CH	(40.5 - 55.5) CLAY, CH, yellowish brown, moist, hard, some sand size calcareous nodules, no odor.
39		0			
40	[Cross-hatched pattern]	0	10.0/10.0	CH	(40.5 - 55.5) CLAY, CH, yellowish brown, moist, hard, some sand size calcareous nodules, no odor.
41		0			
42	[Cross-hatched pattern]	0	10.0/10.0	CH	(40.5 - 55.5) CLAY, CH, yellowish brown, moist, hard, some sand size calcareous nodules, no odor.
43		0			
44	[Cross-hatched pattern]	0	10.0/10.0	CH	(40.5 - 55.5) CLAY, CH, yellowish brown, moist, hard, some sand size calcareous nodules, no odor.
45		0			
46	[Cross-hatched pattern]	0	10.0/10.0	CH	(40.5 - 55.5) CLAY, CH, yellowish brown, moist, hard, some sand size calcareous nodules, no odor.
47		0			
48	[Cross-hatched pattern]	0	10.0/10.0	CH	(40.5 - 55.5) CLAY, CH, yellowish brown, moist, hard, some sand size calcareous nodules, no odor.
49		0			
50	[Cross-hatched pattern]	0	10.0/10.0	CH	(40.5 - 55.5) CLAY, CH, yellowish brown, moist, hard, some sand size calcareous nodules, no odor.



<p><b>PBW</b> Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes: Sonic isolation casings advanced to 46' and 75' then removed using grouting.	Initial Fluid Level (2/05/09) ▼ Depth to water: 86.18 ft BTOC
	<u>Annular Materials</u> (0.0 - 86.0) Portland/Bentonite Grout (86.0 - 91.0) Bentonite Chips (91.0 - 105.0) 16/30 Silica Sand	<u>Well Materials</u> (0 - 93.0) Casing, 2" Sch 40 FJT PVC (93.0 - 103.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot



Union Pacific Railroad

# Log of Boring: MW-66D

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/20/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
PBW Project No. 1358	Driller:	William Blutworth	Total Depth (ft):	105.0
	Driller's License:	4885	Northing:	729136.87
	Field Supervisor:	Chris Moore	Easting:	3169381.04
	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	45.3

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
55		0			
		0			
		0			(55.5 - 59.0) SILTY SAND, SM, red, wet, soft, no odor, very fine to fine sand.
		0		SM	
60		0	10.0/10.0	SP	(59.0 - 61.4) SAND, SP, red, wet, soft, no odor.
		0		CH	(61.4 - 63.0) CLAY, CH, red, moist, hard, no odor.
		0		SM	(63.0 - 65.5) SILTY SAND, SM, red, wet, soft to firm, no odor.
65		0		CL	(65.5 - 66.8) SILTY CLAY, CL, red, moist, hard, some sand lenses, no odor.
		0		SP	(66.8 - 69.3) SAND, SP, red, wet, soft, fine sand, no odor.
70		0	10.0/10.0	CH	(69.9 - 70.3) CLAY, CH, red, moist, hard, no odor.
		0		SP	(70.3 - 72.0) SAND, SP, red, wet, soft, fine sand, no odor.
		0			(72.0 - 87.0) CLAY, CH, red, moist, hard, trace silt lenses and sand size calcareous nodules, no odor.
75		0			
		0			
80		0	10.0/10.0	CH	
		0			
85		0			
		0			(87.0 - 94.6) SILTY CLAY, CL, yellowish red, moist, firm, no odor.
90		0	10.0/10.0	CL	
		0			
95		0			(94.6 - 100.8) SILTY SAND, SM, yellowish red, wet, soft, very fine to fine sand, no odor.
		0		SM	
100		0	8.0/10.0		

<p><b>PBW</b> Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:	Initial Fluid Level (2/05/09)
	Sonic isolation casings advanced to 46' and 75' then removed during grouting.	▼ Depth to water: 86.18 ft BTOC
Annular Materials	Well Materials	TOC Elevation (ft AMSL)
(0.0 - 86.0) Portland/Bentonite Grout (86.0 - 91.0) Bentonite Chips (91.0 - 105.0) 16/30 Silica Sand	(0 - 93.0) Casing, 2" Sch 40 FJT PVC (93.0 - 103.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot	48.31



Union Pacific Railroad

# Log of Boring: MW-66D

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/20/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
PBW Project No. 1358	Driller:	William Blutworth	Total Depth (ft):	105.0
	Driller's License:	4885	Northing:	729136.87
	Field Supervisor:	Chris Moore	Easting:	3169381.04
	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	45.3

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
105		0		CH	(100.8 - 105.0) CLAY, CH, reddish brown, moist, hard, no odor.

<h2>PBW</h2> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:	Initial Fluid Level (2/05/09)
	Sonic isolation casings advanced to 46' and 75' then removed during grouting.	▼ Depth to water: 86.18 ft BTOC
	<u>Annular Materials</u> (0.0 - 86.0) Portland/Bentonite Grout (86.0 - 91.0) Bentonite Chips (91.0 - 105.0) 16/30 Silica Sand	<u>Well Materials</u> (0 - 93.0) Casing, 2" Sch 40 FJT PVC (93.0 - 103.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot
		TOC Elevation (ft AMSL) 48.31

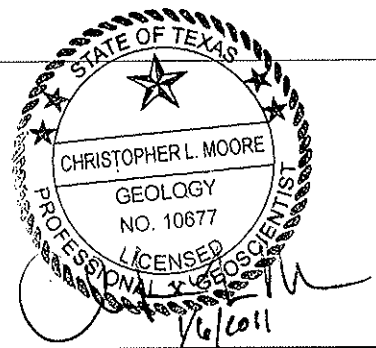


Union Pacific Railroad

# Log of Boring: MW-67B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/26/10	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Blutworth	Total Depth (ft):	40
	Driller's License:	4885	Northing:	729781.52
	Field Supervisor:	Chris Moore	Easting:	3167587.88
	Sampling Method:	4"6"x10' Barrel	Ground Elev. (ft AMSL):	44.53

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					Asphalt Pavement
					Gravel Base Material
			DO		SILTY CLAY, CL, gray, moist, firm, laminated.
5				CL	
10			10.0/10.0		
15					SILTY SAND, SM, gray wet, soft, very fine grained.
20			2.0/10.0	SP	
25					
30			5.0/10.0		
35				CH	CLAY, CH, reddish brown, moist, firm to hard, 34.3-34.5 and 37.2-37.4: wet sand lens, 38.0-38.1 and 38.7-38.8: sand to gravel size calcarous nodules.
40			5.0/5.0		



<h2>PBW</h2> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:	Initial Fluid Level (7/12/10)
	Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.	▼ Depth to water: 5.76 ft BTOC
<b>Annular Materials</b> (0.0 - 1.0) Concrete (1.0 - 32.0) Portland/Bentonite Grout (32.0 - 34.0) Bentonite Chips (34.0 - 40.0) 16/30 Silica Sand	<b>Well Materials</b> (0 - 35.0) Casing, 2" Sch 40 FJT PVC (35.0 - 40.0) Screen, 2" Sch 40 FJT PVC, 0.01 slot	<b>TOC Elevation (ft AMSL)</b> 43.93





**Union Pacific Railroad**

# Log of Boring: MW-68B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	12/15/2011	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	40
	Driller's License:	58141	Northing:	729161.75
	Field Supervisor:	Tim Jennings	Easting:	3167327.53
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	44.93

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				PAV	(0 - 0.2) Asphalt Pavement
				FILL	(0.2 - 0.7) Gravel Base Material
			DO		(0.7 - 5) FILL, Sand, Gravel and Clay
5		0.2		CL	(5 - 6) SANDY CALY, CL, light brown, moist, ~20% fine sand in medium plasticity clay, firm
			1/5		(6 - 18.8) SILTY SAND, SM, greenish gray, moist to wet below ~10 feet, ~30-40% fines, very soft, no odor
10		0.3		SM	
		0.4			
15		0.2	7.5/10		
		0.4			
20				CL	(18.8 - 19.5) SANDY CLAY, CL, reddish brown with gray mottling, ~20% fine sand in medium plasticity clay, slight odor
		0.2		SP	(19.5 - 22.5) POORLY GRADED SAND, SP, brown, wet, very fine to fine sand, soft, slight odor
25		0.5	5/5		(22.5 - 38) SANDY CLAY, CL, orange and reddish brown mottled 22.5-26 feet and becomes reddish brown with gray mottling below 26 feet, moist to wet, ~20-40% fine sand in high plasticity clay, firm to soft, sand to gravel sized carbonate nodules in thin seams at 22.5, 24.0, 24.6, 32.4, and 33.1 feet, slight NAPL staining at 22.5 feet, sand lined fractures common from 33.5-35 feet, sand is stained with NAPL from 34.5-35 feet, fractures with slickensides and sand to gravel sized carbonate nodules in fractures 36.3, 37.1, and 37.7 feet, slight odor in clay and moderate to strong odor near fractures
30		6.7	5/5		
		13.4		GH	
35		52.1	5/5		
		58.3			
		8.7	3/3		
		5.4			

<h2>PBW</h2> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:	Initial Fluid Level (01/27/12)
	Top 5 feet drilled out (DO) with a hydrovac to clear for utilities. 8-inch sonic isolation casing advanced to 25' then removed during grouting.	Depth to water: 1.16 ft BTOC
	<b>Annular Materials</b> (0.0 - 2.0) Concrete (2.0 - 22.0) Portland/Bentonite Grout (22.0 - 26.0) Bentonite Pellets (26.0 - 38.0) 20/40 Silica Sand	<b>Well Materials</b> (0 - 28.0) Casing, 2" FJT Stainless Steel (28.0 - 38.0) Screen, 2" FJT Stainless Steel, 0.01 slot



Union Pacific Railroad

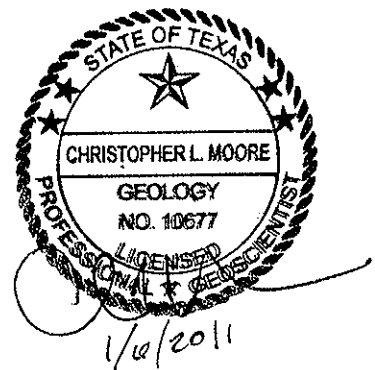
# Log of Boring: MW-68C

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	6/25/10	Drilling Method:	Roto Sonic
Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
Driller:	William Bludworth	Total Depth (ft):	73
Driller's License:	4885	Northing:	729164.26
Field Supervisor:	Chris Moore	Easting:	3167345.75
Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	44.98

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				LAVC	Asphalt Pavement
			DO		Gravel Base Material
					CLAY, CH, gray, moist, soft to firm, with gravel.
5		-		CH	
10		0	1.0/10.0		
		0			
15		0		CL	SILTY CLAY, CL, gray, moist, firm, laminated, with sand, 19.2-20.2: clay lens.
		0			
20		0.1	10.0/10.0	SP	SAND, SP, gray, wet, soft, very fine grained, slight odor.
		0.3			
		0			
25		1			CLAY, CH, reddish brown, moist, firm to hard, some gray mottling, strong odor, 28.4, 31.2, and 33.4: sand to gravel size calcareous nodules with sheen/NAPL, 35.9-36.7: sand layer, odor, 37.0-44.0: slickensided fractures.
30		54.4	10.0/10.0		
		82.1			
		46.7			
35		100.3		CH	
		0			
40		1.5	10.0/10.0		
		2.6			
45		0.7		CL	SILTY CLAY, CL, reddish brown, moist, soft to firm, slight odor.
		3.4			CLAY, CH, reddish brown, moist, firm to hard.
50			10.0/10.0		



## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.  
Sonic isolation casing advanced to 55' then removed during grouting.

Initial Fluid Level (7/12/10)

▼ Depth to water: 16.52 ft BTOC

**Annular Materials**

(0.0 - 1.0) Concrete  
(1.0 - 58.0) Portland/Bentonite Grout  
(58.0 - 58.0) Bentonite Chips  
(58.0 - 70.0) 16/30 Silica Sand  
(70.0 - 73.0) Hole cave-in

**Well Materials**

(0 - 60.0) Casing, 2" Sch 40 FJT PVC  
(60.0 - 70.0) Screen, 2" Sch 40 FJT PVC,  
0.01 slot

**TOC Elevation (ft AMSL)**

44.8



Union Pacific Railroad

# Log of Boring: MW-68C

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/25/10	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Bludworth	Total Depth (ft):	73
	Driller's License:	4885	Northing:	729164.26
	Field Supervisor:	Chris Moore	Easting:	3167345.75
	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	44.98

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
55		0.3		CH	
		0			
		0			
60		0.1	10.0/10.0	SM	SILTY SAND, reddish brown, moist, soft, slight odor, very fine grained.
		0			
65		0		SP	SAND, SP, reddish brown, wet, soft, very fine grained, slight odor.
		0			
70		0	8.0/8.0	CH	CLAY, CH, reddish brown, moist, firm to hard, 68.3-69.4: silty.
		0		CL	SILTY CLAY, CL, brown, moist, firm, laminated.

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.  
 Sonic isolation casing advanced to 55' then removed during grouting.

Initial Fluid Level (7/12/10)

▼ Depth to water: 16.52 ft BTOC

Annular Materials

(0.0 - 1.0) Concrete  
 (1.0 - 58.0) Portland/Bentonite Grout  
 (58.0 - 58.0) Bentonite Chips  
 (58.0 - 70.0) 18/30 Silica Sand  
 (70.0 - 73.0) Hole cave-in

Well Materials

(0 - 60.0) Casing, 2" Sch 40 FJT PVC  
 (60.0 - 70.0) Screen, 2" Sch 40 FJT PVC,  
 0.01 slot

TOC Elevation (ft AMSL)

44.8

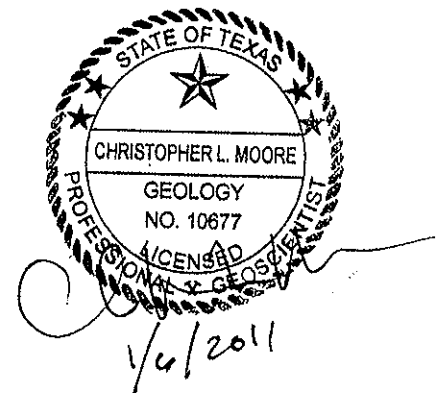


Union Pacific Railroad

# Log of Boring: MW-69A

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	6/26/10	Drilling Method:	Geoprobe
	Drilling Company:	Alpine Field Services	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Clay Neal	Total Depth (ft):	23
	Driller's License:	56591	Northing:	728135.7
	Field Supervisor:	Tim Jennings	Easting:	3168234.02
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	45.7

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0	Asphalt Pavement	0	3.1/4.0	PAV	Asphalt Pavement
	Gravel Base Material	0			Gravel Base Material
	SANDY CLAY, CL, dark brown, moist, firm.	0		CL	SANDY CLAY, CL, dark brown, moist, firm.
5		0	4.0/4.0	CL	SILTY CLAY, CL, mottled gray and orange, moist, soft to firm, trace calcarous nodules, becomes sandy with depth.
		0		CL	SANDY CLAY, CL, mottled light gray and orange, moist, soft.
10		0	4.0/4.0	CL	SANDY CLAY, CL, mottled light gray and orange, moist, soft.
		1.2			SAND, light gray, wet, soft, fine grained, some sandy clay interbeds.
15		1.5		SP	SAND, light gray, wet, soft, fine grained, some sandy clay interbeds.
		1.3		SP	
		3.7/4.0		CL	CLAY, CL, mottled gray and orange, moist, hard.
20		0.6		CL	CLAY, CL, mottled gray and orange, moist, hard.
		0	3.0/3.0	SP	SAND, light brown, wet, soft, fine grained.



<h2>PBW</h2> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:	Initial Fluid Level (7/12/10)
	Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.	▼ Depth to water: 11.81 ft BTOC
<b>Annular Materials</b> (0.0 - 1.0) Concrete (1.0 - 3.5) Bentonite Chips (3.5 - 18.5) 16/30 Silica Sand	<b>Well Materials</b> (0 - 8.5) Casing, 1" Sch 40 FJT PVC (8.5 - 18.5) Screen, 1" Sch 40 FJT PVC, 0.01 slot	<b>TOC Elevation (ft AMSL)</b> 45.71



**Union Pacific Railroad**

# Log of Boring: MW-70B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	12/14/2011	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	40
	Driller's License:	58141	Northing:	728944.39
	Field Supervisor:	Tim Jennings	Easting:	3167671.2
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	45.02

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 0.2) Asphalt Pavement
					(0.2 - 0.7) Gravel Base Material
					(0.7 - 5) FILL, Sand, Gravel and Clay
5				DO	
					(5 - 11.4) SILTY SAND, SM, gray, moist, ~10-20% fines in very fine to fine sand, soft, slight odor
10		1.2		SM	
					(11.4 - 18) SANDY CLAY, CL, reddish brown with gray mottling, ~10-20% fine sand in medium plasticity clay, firm, slight odor
15		1		CL	
			5/10		(18 - 21.8) POORLY GRADED SAND, SP, greenish gray, wet, very fine to fine sand, soft
20		4.6		SP	
			5/5		(21.8 - 29.4) SANDY CLAY, CL, reddish brown to orange with gray mottling, moist, ~20-30% fine sand medium plasticity clay, firm, abundant small carbonate nodules, strong odor, abundant carbonate nodules below 25.4 feet, thin seams of carbonate nodules 26.8 to 27.2 feet
25		72.7		CL	
		20.6			(29.4 - 33.4) SILTY CLAY, CL, reddish brown with gray mottling, moist, hard, medium plasticity clay, thin carbonate gravel seams at 30.5, 32.2, and 33.2, strong odor, no visible NAPL
30		42.8		CL	
		24.4			(33.4 - 40) CLAY, CL, red with gray mottling, moist, very hard medium plasticity clay, locally fractured with slickensides common, all fractures in the same direction at approximately 45-degree angle, large carbonate nodules at 38.2 feet, no visible NAPL, moderate to slight odor
35		16.7		CL	
		6.8			
40		3.1		CL	

## PBW

**Pastor, Behling & Wheeler, LLC**  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.  
 8-inch sonic isolation casing advanced to 25' then removed during grouting.

Initial Fluid Level (01/27/12)

Depth to water: 6.51 ft BTOC  
 Depth to NAPL: 34.26 ft BTOC

Annular Materials

(0.0 - 2.0) Concrete  
 (2.0 - 22.5.0) Portland/Bentonite Grout  
 (22.5 - 24.5) Bentonite Pellets  
 (24.5 - 36.0) 20/40 Silica Sand  
 (36.0-40.0) Caved Formation

Well Materials

(0 - 25.0) Casing, 2" FJT Stainless Steel  
 (25.0 - 35.0) Screen, 2" FJT Stainless Steel,  
 0.01 slot

TOC Elevation (ft AMSL)

44.86



# Union Pacific Railroad

# Log of Boring: MW-71B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	12/13/2011	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	40
	Driller's License:	58141	Northing:	728956.44
	Field Supervisor:	Tim Jennings	Easting:	3167950.69
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	45.06

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				PAV	(0 - 0.2) Asphalt Pavement
				FILL	(0.2 - 0.7) Gravel Base Material
					(0.7 - 5) FILL, Sand, Gravel and Clay
5			DO		
				CL	(5 - 10) No recovery in sandy clay
10		0.1		CL	(10 - 10.7) SANDY CLAY, CL, greenish gray, moist, ~20-30% fine sand in medium plasticity clay, soft
		0.3		ML	(10.7 - 11.9) SILT, ML, gray, moist, soft low plasticity fines
					(11.9 - 23.5) POORLY GRADED SAND, SP, gray to dark gray below 21.5, wet, very fine to fine sand, soft, slight odor below 21.5
15			4/10		
				SP	
20		2.4			
			5/5		
		2.6		CL	(23.5 - 24.2) SANDY CLAY, CL, blueish gray and brown, moist, ~10% fine sand in medium plasticity clay, hard
25				SP	(24.2 - 25) POORLY GRADED SAND, SP, light brown, wet, fine sand, soft, moderate odor
		183			(25 - 31.1) SANDY GRAVELLY CLAY, CL, reddish brown with gray mottling, moist, <5% fine sand and <5% fine gravel in medium plasticity clay, thin (<0.1' thick) sand and gravel seams at 26.8 and 28.4 feet with trace NAPL on sand and gravel seams, strong odor
		46.1		CL	
30		6.6			
		8.9			(31.1 - 36.8) INTERBEBBED SAND AND CLAY, SP/CL, ~20% Poorly Graded Sand seams (<~0.4' thick), brown, wet, fine sand, soft; ~80% Clay, reddish brown, moist, hard medium plasticity clay, trace carbonate nodules, trace NAPL staining at 34.4 feet, moderate odor
		24.6		CL	
35		43.7			
		58.3		CL	(36.8 - 40) SANDY CLAY, CL, reddish brown with gray mottling, <5% sand and fine carbonate nodules in medium plasticity clay, firm, becomes very hard below 38.5 feet
40					

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

### Notes:

Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.  
8-inch sonic isolation casing advanced to 26' then removed during grouting.

### Initial Fluid Level (01/27/12)

Depth to water: 7.08 ft BTOC

### Annular Materials

(0.0 - 2.0) Concrete  
(2.0 - 26.0) Portland/Bentonite Grout  
(26.0 - 30.0) Bentonite Pellets  
(30.0 - 37.0) 20/40 Silica Sand  
(37.0-40.0) Caved Formation

### Well Materials

(0 - 32.0) Casing, 2" FJT Stainless Steel  
(32.0 - 37.0) Screen, 2" FJT Stainless Steel,  
0.01 slot

### TOC Elevation (ft AMSL)

44.59



Union Pacific Railroad

# Log of Boring: MW-72B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	12/21/2011	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	41
	Driller's License:	58141	Northing:	728790.47
	Field Supervisor:	Tim Jennings	Easting:	3167792.48
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	48.69

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				PAV	(0 - 3) FILL, Gravel Base
5		14.5	DO	SC	(3 - 9) CLAYEY SAND, SC, black, moist, ~40-50% high plasticity clay in fine sand, soft, locally oily, strong odor, grades to sandy clay at ~ 9 feet
10		3.1	5/5	CH	(9 - 15.2) SANDY CLAY, CH, gray to light gray with brown mottling, moist, ~20-30% fine sand in high plasticity clay, abundant (~30%) carbonate nodules 12.5-13.3 feet, strong odor throughout
15		15.3	8/10	SM	(15.2 - 17.3) SILTY SAND, SM, greenish gray, wet, ~20-40% fines in very fine to fine sand, soft, well bedded with brown viscous NAPL (staining) locally along bedding planes
20		4.1		SP/SM	(17.3 - 28.7) POORLY GRADED SAND AND SILTY SAND, SP/SM, brown, wet, very fine to fine sand with silt, well bedded, NAPL sheen and/or staining, with very heavy staining and brown NAPL 26.8-28.7
25		10.6		CL	(28.7 - 29) CLAY, CL, reddish brown with gray mottling, moist, hard medium plasticity clay, NAPL staining on sharp lower contact
30		6.2	10/10	CH	(29 - 31.8) SANDY CLAY, CH, light brown with gray mottling, moist, ~10-20% fine sand in high plasticity clay, firm
35		6.8		CL	(31.8 - 39) SANDY CLAY, CL, reddish brown with gray mottling, moist, ~10% fine sand in medium plasticity clay, firm to hard, fine gravel sized chalky carbonate nodules throughout, seams of sand to gravel sized carbonate fragments at 31.8, 33.1, and 34.8-35 feet, small amount of NAPL in seams at 33.1 and 34.8-35 feet, clay is very fractured 36.5-36.9 feet, small amount of staining in fractures, horizontal sand lined fracture at 38.4 - small amount of NAPL in sand, strong odor throughout, grades to clay at ~ 39 feet
40		39.7	5/5	CL	(39 - 41) CLAY, CL, reddish brown with gray mottling, moist, very hard medium plasticity clay, fractures with slicken sides at ~45 degrees from 39-40 feet, moderate odor decreases to slight odor at 41 feet
		217.5		CL	
		96.1	6/6	CL	
		70.2		CL	
		170	14		
		101.8			

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 Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:	Initial Fluid Level (01/27/12)
Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.	Depth to water: 38.76 ft BTOC
8-Inch sonic isolation casing advanced to 31' then removed during grouting.	
Annular Materials	Well Materials
(0.0 - 2.0) Concrete	(0 - 32.0) Casing, 2" FJT Stainless Steel
(2.0 - 27.0) Portland/Bentonite Grout	(32.0 - 37.0) Screen, 2" FJT Stainless Steel,
(27.0 - 31.0) Bentonite Pellets	0.01 slot
(31.0 - 37.5) 20/40 Silica Sand	
(37.5-40.0) Bentonite Pellets	
	TOC Elevation (ft AMSL)
	51.97



# Union Pacific Railroad

# Log of Boring: MW-73B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	12/13/2011	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	55
	Driller's License:	58141	Northing:	728419.47
	Field Supervisor:	Tim Jennings	Easting:	3167122.74
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	48.66

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL	(0 - 5) FILL, Sand Clay and Gravel
5		0.5	1/5	GH	(5 - 13.3) SANDY CLAY, CH, dark brown, moist, ~20-30% fine sand in high plasticity clay, soft, moderate odor below 10 feet
10		1.3		GH	
15		5.7		SW	
15		1.5	8/10	CL	(13.3 - 14) GRADED SAND, SW, dark brown, moist, fine to coarse sand, moderate odor
15		6.7		CL	(14 - 16.2) SILTY CLAY, CL, light brown with orange mottling, moist, medium plasticity clay, soft, locally fractured with NAPL along fractures
20		13.8		SM	(16.2 - 23.3) SILTY SAND, SM, light brown, moist to wet below 17.5 feet, ~20-30% fines in very fine sand, NAPL visible locally on fresh beak, grades to sandy clay at ~23.3 feet
20		2.1	5/5	SM	
25		1.5		CL	(23.3 - 31.5) SANDY CLAY, CL, light gray with orange mottling, moist, ~20-30% fine sand in medium plasticity clay, firm, slight odor
25		2.1	5/5	CL	
30		2.5		CL	
30		1.8	5/5	CL	(31.5 - 33.5) SANDY CLAY, CL, gray with orange mottling, moist, ~10% fine sand in medium plasticity clay
35		3.4		CL	(33.5 - 38) CLAY, CL, reddish brown with gray mottling, moist, very hard medium plasticity clay, carbonate gravel seams at 34.2, 35.5, and 37.3, no visible NAPL, moderate odor
35		5	5/5	CL	
40		178.2		CL	(38 - 40) CLAY, CL, as above with thin (<0.2 feet thick) very fine sand interbeds at 38.0, 38.9, and 39.9 feet, sand is saturated with NAPL, NAPL in fracture at 40 feet, strong odor
40		9.7	5/5	CL	(40 - 48.3) CLAY, CL, reddish brown with gray mottling, moist, locally silty, locally fractured with slickensides common, no NAPL, moderate odor, grades to silty clay sand below 48.3 feet
45		3.6		CL	
45		2.4	5/5	CL	
50		5.3		SM	(48.3 - 51.3) SILTY SAND, SM, reddish brown, wet, ~30-40% fines in very fine sand, NAPL locally - increasing downward and saturated with NAPL 50-51.3 feet, strong odor
50		9.6	5/5	SM	
55		1.7		CL	(51.3 - 55) CLAY, CL, reddish brown, moist, medium plasticity clay, few carbonate nodules, very hard, fractures at 53.5 and 54.8, moderate odor

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

### Notes:

Top 5 feet drilled out (DO) with a hydrovac to clear for utilities.  
8-inch sonic casing advanced to 29' then removed during grouting.

### Initial Fluid Level (01/27/12)

Depth to water: 25.48 ft BTOC

### Annular Materials

(0.0 - 2.0) Concrete  
(2.0 - 40.0) Portland/Bentonite Grout  
(40.0 - 44.0) Bentonite Pellets  
(44.0 - 52.5) 20/40 Silica Sand  
(52.5-55.0) Bentonite Pellets

### Well Materials

(0 - 47.0) Casing, 2" FJT Stainless Steel  
(47.0 - 52.0) Screen, 2" FJT Stainless Steel,  
0.01 slot

### TOC Elevation (ft AMSL)

51.42





Union Pacific Railroad

# Log of Boring: MW-74B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	12/20/2011	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	40
	Driller's License:	58141	Northing:	728372.95
	Field Supervisor:	Tim Jennings	Easting:	3167717.81
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	47.83

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 4.5) FILL, Sand, Clay and Gravel, heavy black staining at 2.5 feet
5		11.7	DO	FILL	
		2.7	5/5		(4.5 - 14.2) SANDY CLAY, CH, greenish gray and light gray with light brown mottling, moist, ~20-40% fine sand in high plasticity clay, sand increasing downward, soft, strong odor
10		4.1		GH	
		9.3			
15		24.5	8/10		(14.2 - 16.5) SILTY SAND, SM, greenish gray, wet, ~40-50% silt, soft, strong odor
		10		SM	
		6.9			(16.5 - 23.1) POORLY GRADED SAND, SP, light gray to brown, wet, very fine to fine sand, soft, saturated with NAPL, 22.1-23.1, very strong odor
20		146.2	5/5	SP	
		47			(23.1 - 26.1) SANDY CLAY, CH, reddish brown with gray mottling, moist, ~10-30% fine sand in medium plasticity clay with very sandy zone 23.5-24.3 with NAPL in sandy zone, firm to soft and locally friable, fracture lined with chalky carbonate 25.8-26.1 with small amount of NAPL, strong odor
25		24.7	5/5	CL	
		70.8			(26.1 - 35) SANDY CLAY, CL, light brown with gray mottling, moist, ~10-20% fine sand in medium plasticity clay, clay is moderately fractured 29-35 feet, fractures are commonly lined with fine sand, with NAPL present along most fractures, strong odor, grades to hard sandy clay
30		140.8	5/5	CL	
		148.5			
35		17.2	5/5	CL	(35 - 39.1) SANDY CLAY, CL, reddish brown with gray mottling, ~10-20% fine sand in hard, medium plasticity clay, sand to gravel sized carbonate nodules in thin seams at 36.3, 37.6, 38, and 38.7 feet, small amount of NAPL in carbonate seam at 38.7 feet, strong odor
40		5.8		CL	(39.1 - 40) CLAY, CL, reddish brown with gray mottling, hard, dense medium plasticity clay, slight odor

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

### Notes:

Top 5 feet drilled out (DO) with a hydrovac to clear for utilities,  
 8-inch sonic casing advanced to 27' then removed during grouting.

### Initial Fluid Level (01/27/12)

Depth to water: 7.63 ft BTOC

### Annular Materials

(0.0 - 2.0) Concrete  
 (2.0 - 21.5) Portland/Bentonite Grout  
 (21.5 - 25.5) Bentonite Pellets  
 (25.5 - 37.5) 20/40 Silica Sand  
 (37.5 - 40.0) Bentonite Pellets

### Well Materials

(0 - 26.5) Casing, 2" FJT Stainless Steel  
 (26.5 - 36.5) Screen, 2" FJT Stainless Steel,  
 0.01 slot

### TOC Elevation (ft AMSL)

47.58



**Union Pacific Railroad**

# Log of Boring: MW-75B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	12/20/2011	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	5
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	40
	Driller's License:	58141	Northing:	728066.11
	Field Supervisor:	Tim Jennings	Easting:	3168022.07
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	47.18

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				PAV FILL	(0 - 0.5) Concrete (0.5 - 3) FILL, Gravel Base
5		0.3	4/5	CL	(3 - 10) SANDY, GRAVELLY, CLAY, CL, gray with brown mottling, moist, ~30-40% fine to coarse carbonate sand and fine to coarse carbonate gravel in medium plasticity clay, firm
10		0.2			
10		0.3		CH	(10 - 14.2) SANDY CLAY, CH, light gray and light brown mottled, moist, ~20-40% fine sand increasing downward in high plasticity clay, firm to soft, very slight odor
15		0.4			
15		0.4	7.5/10	SM	(14.2 - 15.9) SILTY SAND, SM, greenish gray, wet, ~30-40% silt in fine sand, soft, slight odor
15		0.8		SP	(15.9 - 20.7) POORLY GRADED SAND, SP, gray and grayish brown, wet, fine sand, soft, moderate odor
20					
20		1.7		CL	(20.7 - 22.6) SANDY CLAY, CL, reddish brown and gray, moist to locally wet, ~20-30% fine sand in medium plasticity clay, with fine sand interbeds at 21.1 and 21.6-21.8, firm to hard
25				SP	(22.6 - 23) POORLY GRADED SAND, SP, grayish brown, wet, soft
25		2.2	5/5	CL	(23 - 32.5) SANDY CLAY, CL, gray with brown mottling, moist, ~20-30% fine sand (decreasing near base) in medium plasticity clay, firm, moderate to strong odor
30					
30		19	5/5	CL	(32.5 - 37.3) SANDY CLAY, CL, reddish brown with gray mottling, moist, ~10-20% fine sand in medium plasticity clay, clay is very fractured and friable 35-37 feet, sand to gravel sized carbonate fragments in thin zones at 33.4, 34.4, and 37.1 feet, carbonate fragments are coated with Fe/Mn mineralization, clay is v. sandy (~50% fn snd), 36.4 to 36.8 heavy NAPL present, mod. strong odor
35		2.7			
35		31.3	5/5	CL	
40		2.9		CL	(37.3 - 40) CLAY, CL, reddish brown, moist, very hard, medium plasticity clay, with slickenside fractures at 37.6 and 38.8 feet, slight odor near top

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 5 feet drilled out (DO) with a hydrovac to clear for utilities,  
8-inch sonic isolation casing advanced to 25' then removed during grouting.

**Initial Fluid Level (01/27/12)**

Depth to water: 9.07 ft BTOC  
Depth to NAPL: 35.26 ft BTOC

**Annular Materials**

(0.0 - 2.0) Concrete  
(2.0 - 26.0) Portland/Bentonite Grout  
(26.0 - 30.0) Bentonite Pellets  
(30.0 - 37.5) 20/40 Silica Sand  
(37.5 - 40.0) Bentonite Pellets

**Well Materials**

(0 - 32.2) Casing, 2" FJT Stainless Steel  
(32.2 - 37.2) Screen, 2" FJT Stainless Steel,  
0.01 slot

**TOC Elevation (ft AMSL)**

46.78



# Union Pacific Railroad

# Log of Boring: MW-76C

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	5/7/2014
Drilling Company:	Walker-Hill
Driller:	Tim Beach
Driller's License:	58141
Field Supervisor:	Patrick Ferrell
Sampling Method:	4"x10' Barrel

Drilling Method:	Roto Sonic
Borehole Diameter (in.):	10
Total Depth (ft):	70
Northing:	727485.1524
Easting:	3166628.2572
Ground Elev. (ft AMSL):	48.17

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 10) No Recovery, NR, concrete cored and soils removed to 10' by hydrovac to clear for utilities.
5			0.0/0.0	NR	
10		3			(10 - 19.4) SILTY CLAY, CL, grey with trace orange mottling, few iron nodules and large (2 to 5 cm diameter) calcareous nodules to 14.6', orange mottling increases after 14.6' and continues to 18.2' where it becomes tan-grey and red with abundant iron nodules between 18.4' to 18.6'.
15		2.8	10.0/10.0	CL	
		2.9			
		3.4			
20		1.2		SP	(19.4 - 21.1) SAND, SP, tan and red-brown with abundant calcareous nodules between 20.2 and 21.1, wet.
25		1.4	10.0/10.0		(21.1 - 47.2) SILTY CLAY, CL, tan with some orange mottling which increases with depth, becomes red-orange with black streaks at 33.5', carbonate gravel seams between 35.4' to 35.7', moist carbonate gravel seams between 37.3' to 37.7', 38.1' to 38.3', 39.2' to 39'6, and 40.4' to 40.7', dry, very hard with no plasticity.
		1.7			
30		1.1			
		3.4			
35		3.2	10.0/10.0	CL	
		2.1			
40		3			
		2.2			
45		1.9	10.0/10.0		
		1			
50		1.2		SP	(47.2 - 48) SAND, SP, medium grained with large cobbles (3 to 6 cm in diameter) at the bottom of interval, dry to moist.
		1.7			(48 - 54.4) SILTY CLAY, CL, red-brown, with carbonate seam between 49.4' to 49.5', and trace carbonate nodules throughout, dry, very very hard with no plasticity.
55		1.4	10.0/10.0	CL	(54.4 - 60.8) SANDY CLAY, CL, red-brown, approximately 35% sand and 65% clay, carbonate seam between 58.2' to 58.4', clay content decreases with depth, moist, soft with low to medium plasticity.
		2.1			
60		2.1			
		1.4	10.0/10.0		(60.8 - 68) CLAYEY SAND, SP, orange-brown, very fine grained, saturated, trace calcareous nodules between 65.8' to 65.9'.
65		0.9		SP	
		0.8			
70		0.8		CL SP	(68 - 68.2) SILTY CLAY, CL, orange-brown, dry, very hard with no plasticity. (68.2 - 70) SAND, SP, brown-orange, medium grained, very homogeneous, moist.

## PBW

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 Round Rock, TX 78664  
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### Notes:

Top 10 feet drilled out (DO) with a hydrovac to clear for utilities, approximately 8 to 12 inches of concrete.  
 8-inch sonic isolation casing advanced to 25' then removed during grouting.  
 6-inch sonic casing advanced to 70', then removed during grouting.

Annular Materials  
 (0.0 - 2.0) Concrete  
 (2.0 - 55.0) Portland/Bentonite Grout  
 (55.0 - 58.0) Bentonite Pellets  
 (58.0 - 70.0) 20/40 Silica Sand

Well Materials  
 (0 - 60.0) Casing, 2" FJT Sch 40 PVC  
 (60.0 - 70.0) Screen, 2" FJT Sch 40 PVC,  
 0.01 slot

TOC Elevation (ft AMSL)  
 47.84



# Union Pacific Railroad

# Log of Boring: MW-77A

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	5/7/2014
Drilling Company:	Walker-Hill
Driller:	Tim Beach
Driller's License:	58141
Field Supervisor:	Patrick Ferrell
Sampling Method:	4"x10' Barrel

Drilling Method:	Roto Sonic
Borehole Diameter (in.):	10
Total Depth (ft):	25
Northing:	727671.8914
Easting:	3166981.4842
Ground Elev. (ft AMSL):	49.41

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 10) No Recovery, NR, concrete cored and soils removed to 10' by hydrovac to clear for utilities.
5			0.0/0.0	NR	
10		3.2		CL	(10 - 16.4) SILTY CLAY, CL, grey with orange mottling, becomes grey-green at 13.3' with abundant black and some calcareous nodules between 10.5' and 13.3', calcareous nodules are abundant between 10.5' to 10.7' and 11.5' to 12.4', no odor, dry, firm with medium plasticity.
15		2.9	10.0/10.0	CL	
		2.6		SW	(16.4 - 22.1) SAND, SW, grey with trace black staining and mild odor, grades from a finer grained to a medium grained sand with depth, becomes wet at 18.6'.
20		13.2		SW	
		6.8	5.0/5.0	SW	
25		3.7		CL	(22.1 - 25) SILTY CLAY, CL, grey with orange-brown mottling, no visible staining or odors present, dry, very hard with no plasticity.

## PBW

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 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

### Notes:

Top 10 feet drilled out (DO) with a hydrovac to clear for utilities, approximately 8 to 12 inches of concrete. 6-inch sonic casing advanced to 25', then removed during grouting.

Annular Materials  
 (0.0 - 2.0) Concrete  
 (2.0 - 9.0) Portland/Bentonite Grout  
 (9.0 - 11.0) Bentonite Pellets  
 (11.0 - 23.0) 20/40 Silica Sand  
 (23.0 - 25.0) Bentonite Pellets

Well Materials  
 (0 - 13.0) Casing, 4" FJT Sch 40 PVC  
 (13.0 - 23.0) Screen, 4" FJT Sch 40 PVC,  
 0.01 slot

TOC Elevation (ft AMSL)  
 49.05



Union Pacific Railroad

# Log of Boring: MW-78A

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	5/6/2014	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	10
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	30
	Driller's License:	58141	Northing:	727952.5744
	Field Supervisor:	Patrick Ferrell	Easting:	3167512.1962
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	48.89

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 8) No Recovery, NR, concrete cored and soils removed to 8' by hydrovac to clear for utilities.
5			2.0/10.0	NR	
10				CL	(8 - 14.8) SILTY CLAY, CL, grey with some orange mottling, creosote mixed with water around the core, no staining in the sample, strong odor, dry, firm with low plasticity.
15			10.0/10.0	SP	(14.8 - 24.9) SAND, SP, grey, medium grained becomes wet at 16.3', with light staining and strong odor beyond 17', saturated with creosote between 22.8' and 23.8', small clayey zone between 23.8' to 24.2'.
20					
25			9.0/10.0	CL	(24.9 - 25.9) SILTY CLAY, CL, grey and red-brown, dry, very hard with no plasticity.
30				CL	(25.9 - 30) SILTY CLAY, CL, grey to brown, creosote staining within fractures and seeping out of pores/matrix, dry, very hard with no plasticity.

## PBW

**Pastor, Behling & Wheeler, LLC**  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

**Notes:**

Top 10 feet drilled out (DO) with a hydrovac to clear for utilities, approximately 8 to 12 inches of concrete.  
 6-inch sonic casing advanced to 25', then removed during grouting.

Annular Materials  
 (0.0 - 2.0) Concrete  
 (2.0 - 10.0) Portland/Bentonite Grout  
 (10.0 - 13.0) Bentonite Pellets  
 (13.0 - 25.0) 20/40 Silica Sand  
 (25.0 - 30.0) Bentonite Pellets

Well Materials  
 (0 - 15.0) Casing, 4" FJT Sch 40 PVC  
 (15.0 - 25.0) Screen, 4" FJT Sch 40 PVC,  
 0.01 slot

TOC Elevation (ft AMSL)  
 48.677



Union Pacific Railroad

# Log of Boring: MW-79A

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date:	5/7/2014
Drilling Company:	Walker-Hill
Driller:	Tim Beach
Driller's License:	58141
Field Supervisor:	Patrick Ferrell
Sampling Method:	4"x10' Barrel

Drilling Method:	Roto Sonic
Borehole Diameter (in.):	10
Total Depth (ft):	30
Northing:	728237.1364
Easting:	3167665.8862
Ground Elev. (ft AMSL):	49.34

PBW Project No. 1358

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 9.8) No Recovery, NR, concrete cored and soils removed to 9.8' by hydrovac to clear for utilities.
5			0.0/0.0	NR	
10		501		CL	(9.8 - 15.6) SILTY CLAY, CL, grey with orange mottling, dry, hard with no plasticity, calcareous nodules between 10.7' to 11.0' with creosote staining in fracture seams and strong odor.
15		803	10.0/10.0		
20		758		SP	(15.6 - 27.3) SAND, SP, medium grained, grey with creosote staining throughout, heavy staining begins at 19.0' and becomes saturated with creosote at 22.0' to 27.0', very strong odor, wet.
25		346			
27.3		287		SP	
27.9		146			
28.2		58	10.0/10.0		
28.2				CL	(27.3 - 30) SILTY CLAY, CL, red-brown between 27.3' to 27.9', then becomes grey to 28.2' and grey with tan-brown below 28.2', some staining in fractures with a strong creosote odor, dry.
30		51		CL	

## PBW

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 Round Rock, TX 78664  
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**Notes:**

Top 10 feet drilled out (DO) with a hydrovac to clear for utilities, approximately 8 to 12 inches of concrete.  
 6-inch sonic casing advanced to 27', then removed during grouting.

**Annular Materials**  
 (0.0 - 2.0) Concrete  
 (2.0 - 12.0) Portland/Bentonite Grout  
 (12.0 - 14.0) Bentonite Pellets  
 (14.0 - 27.0) 20/40 Silica Sand  
 (27.0-30.0) Bentonite Pellets

**Well Materials**  
 (0 - 17.0) Casing, 4" FJT Sch 40 PVC  
 (17.0 - 27.0) Screen, 4" FJT Sch 40 PVC,  
 0.01 slot

**TOC Elevation (ft AMSL)**  
 48.946



# Union Pacific Railroad

# Log of Boring: MW-80B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	5/8/2014	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	10
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	35
	Driller's License:	58141	Northing:	727906.7414
	Field Supervisor:	Patrick Ferrell	Easting:	3168200.8792
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	47.24

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 10) No Recovery, NR, concrete cored and soils removed to 10' by hydrovac to clear for utilities.
5			0.0/0.0	NR	
10		8.6			(10 - 18.5) SILTY CLAY, CL, grey with trace, small calcareous nodules, trace orange and dark grey mottling between 16.4' to 18.2', dry and firm.
15		6.4			
		5.8	9.0/10.0	CL	
20		3.1			(18.5 - 23.7) SAND, SP, grey, medium grained, with some orange and brown streaks between 18.5' and 19.1', clay content increases near 22.2' with few calcareous nodules, moist to wet, firm to soft.
		3.2		SP	
25		4.1	9.0/10.0		(23.7 - 30.2) SILTY CLAY, CL, grey, becomes red-brown and grey at 24.3' with a wet small sand lense between 25.6' to 25.9', dry and firm.
		2.9			
30		2.3			
		2.3		CL	
35		2.1	5.0/5.0		(30.2 - 35) SILTY CLAY, CL, red-brown with black and grey streaks, carbonate gravel seams between 30.6' to 30.9', 31.1' to 31.3', 31.4' to 31.8', 33.0' to 33.4', and 33.8' to 34.4'.

## PBW

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### Notes:

Top 10 feet drilled out (DO) with a hydrovac to clear for utilities, approximately 8 to 12 inches of concrete.  
 8-inch sonic isolation casing advanced to 25' then removed during grouting.  
 6-inch sonic casing advanced to 34', then removed during grouting.

**Annular Materials**  
 (0.0 - 2.0) Concrete  
 (2.0 - 24.0) Portland/Bentonite Grout  
 (24.0 - 27.0) Bentonite Pellets  
 (27.0 - 34.0) 20/40 Silica Sand  
 (34.0 - 35.0) Bentonite Pellets

**Well Materials**  
 (0 - 29.0) Casing, 2" FJT Stainless Steel  
 (29.0 - 34.0) Screen, 2" FJT Stainless Steel,  
 0.01 slot

**TOC Elevation (ft AMSL)**  
 47.107



# Union Pacific Railroad

# Log of Boring: MW-81B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	5/11/2014	Drilling Method:	Roto Sonic
	Drilling Company:	Walker-Hill	Borehole Diameter (in.):	10
PBW Project No. 1358	Driller:	Tim Beach	Total Depth (ft):	40
	Driller's License:	58141	Northing:	727291.7534
	Field Supervisor:	Patrick Ferrell	Easting:	3167925.9062
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	47.05

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0					(0 - 10) No Recovery, NR, soils removed to 10' by hydrovac to clear for utilities.
5			0.0/0.0	NR	
10		2	8.5/10.0	CL	(10 - 16.1) SILTY CLAY, CL, grey with some orange mottling which increases with depth, some black streaks, calcareous gravel at 12.2' to 12.4', and 14.6' to 14.9', dry, firm with no plasticity.
15		1.8			
20		2.3			
25		2.1			
20				NR	(17.5 - 18.5) SAND, SP, grey, medium grained, with some black and dark grey streaks, no odor, moist. (18.5 - 21) No Recovery, NR, likely sand.
25		1.4	9.0/10.0	SP	(21 - 23.2) SAND, SP, grey, medium grained, with some black and dark grey streaks, no odor, moist.
30		1.7			
35		2.4			
40		2.1			
25				CL	(23.2 - 29.8) SILTY CLAY, CL, grey with orange mottling, becomes red-brown at 28.8' with grey calcareous seams at 29.6', dry, very very hard with no plasticity.
30		1.2	8.5/10.0	CL	(29.8 - 33.6) SANDY SILTY CLAY, CL, grey-brown with some orange mottled zones, carbonate gravel zones at 31.2' and 32.6', moist, soft with low plasticity.
35		1.3			
40		1.6			
40		1.2			
35					(33.6 - 40) SILTY CLAY, CL, grey and red-brown, very tight, carbonate seams at 36.6', 36.9', 37.8' and 39.4', dry, very very hard with no plasticity.

## PBW

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 Round Rock, TX 78664  
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### Notes:

Top 10 feet drilled out (DO) with a hydrovac to clear for utilities.  
 8-inch sonic isolation casing advanced to 25' then removed during grouting.  
 6-inch sonic casing advanced to 40', then removed during grouting.

Annular Materials  
 (0.0 - 2.0) Concrete  
 (2.0 - 24.0) Portland/Bentonite Grout  
 (24.0 - 27.0) Bentonite Pellets  
 (27.0 - 34.0) 20/40 Silica Sand  
 (34.0-40.0) Bentonite Pellets

Well Materials  
 (0 - 29.0) Casing, 2" FJT Stainless Steel  
 (29.0 - 34.0) Screen, 2" FJT Stainless Steel,  
 0.01 slot

TOC Elevation (ft AMSL)  
 46.766





Union Pacific Railroad

# Log of Boring: TW-03

UPRR Houston Wood Preserving Works Houston, Texas	Completion Date:	3/12/07	Drilling Method:	Direct Push
	Drilling Company:	Best Drilling, Inc.	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Alfredo Palicos	Total Depth (ft):	25
	Driller's License:	5036	Northing:	3167007.08
	Field Supervisor:	John Brayton	Easting:	727733.70
	Sampling Method:	2" x 5' Split Spoon	Casing Elevation (ft):	--

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (%)	USCS	Lithologic Description
0		0.5	NA	FILL	(0.0 to 2.0) FILL, asphalt and gravel road base.
5		0.6		CH	(2.0 to 6.0) CLAY, dark gray, firm
		3.6		CL	(6.0 to 11.0) Silty/sandy CLAY, gray, firm
10		19.6		CL	(11.0 to 15.0) Silty CLAY, tan with gray mottling, firm, black staining throughout, strong odor.
15		4.1		CL	(15.0 to 19.0) Silty CLAY, gray with tan mottling, firm, slight odor.
20		43.5		SC	(19.0 to 24.0) Clayey SAND, gray, wet, strong odor.
25				CL	(24.0 to 25.0) Silty CLAY, gray with tan mottling, firm, dry.



<p><b>PBW</b></p> <p>Pastor, Behling &amp; Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes: 1. Temporary monitoring well plugged 3/13/2007
	<p><u>Annular Materials</u></p> <p>(0 to 12.0) Bentonite Pellets (12.0 to 24.0) 20-40 Silica Sand</p>

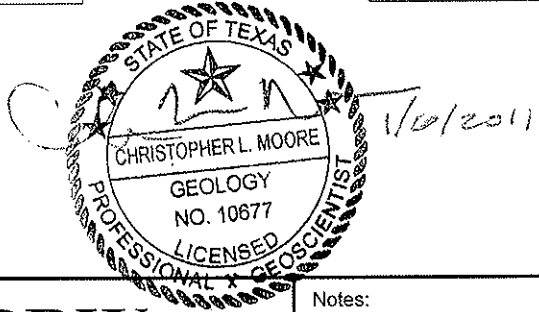


Union Pacific Railroad

# Log of Boring: TW-41B

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/22/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Bludworth	Total Depth (ft):	40.0
	Driller's License:	4885	Northing:	728221.84
	Field Supervisor:	Chris Moore	Easting:	3166002.28
	Sampling Method:	4" / 6" x 10' Barrel	Ground Elev. (ft AMSL):	46.9

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0		0	5.0/5.0	FILL	(0 - 2.4) CLAYEY SAND, SC, dark grayish brown, with gravel, moist, soft, no odor.
1.9		1.9			
5		0.5	10.0/10.0	CL	(2.4 - 16.5) SILTY CLAY, CL, very dark gray, with sand, moist, firm, laminated, odor from 2.5-5.0.
0		0			
0		0			
0		0			
0		0			
15		0.2	10.0/10.0	SP	(16.5 - 22.0) SAND, SP, light gray, wet, soft, laminated, odor.
0.4		0.4			
0.2		0.2			
20		0	10.0/10.0	CL	(22.0 - 29.3) SILTY CLAY, CL, light gray, with sand, moist, hard.
0		0			
0		0			
0		0			
0		0			
30		0.3	10.0/10.0	SP	(29.3 - 38.5) SAND, SP, yellowish red, wet, soft, laminated, odor.
1.9		1.9			
2.9		2.9			
35		1	5.0/5.0	CH	(38.5 - 40.0) CLAY, CH, red, moist, hard, with sand size calcareous nodules, slight odor.
0.4		0.4			
0.1		0.1			



<b>PBW</b> Pastor, Behling & Wheeler, LLC 2201 Double Creek Dr., Suite 4004 Round Rock, TX 78664 Tel (512) 671-3434 Fax (512) 671-3446	Notes:	Initial Fluid Levels (2/04/09)
	Sonic isolation casing advanced to 25' then removed during grouting.	▼ Depth to water: 8.44 ft BTOC
Annular Materials	Well Materials	TOC Elevation (ft AMSL)
(0.0 - 25.0) Portland/Bentonite Grout	(+3 - 29.5) Casing, 4" FJT Stainless Steel	49.67
(25.0 - 27.5) Bentonite Chips	(29.5 - 39.5) Screen, 4" FJT Stainless Steel,	
(27.5 - 39.5) 16/30 Silica Sand	0.01 wire wrap	
(39.5 - 40.0) Hole cave-in		

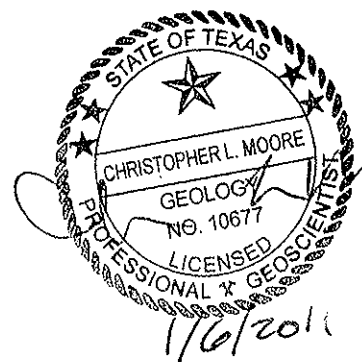


Union Pacific Railroad

# Log of Boring: TW-56A

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/23/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	6
PBW Project No. 1358	Driller:	William Blutworth	Total Depth (ft):	32.0
	Driller's License:	4885	Northing:	728757.67
	Field Supervisor:	Chris Moore	Easting:	3168069.59
	Sampling Method:	4"x10' Barrel	Ground Elev. (ft AMSL):	49.1

Depth (ft)	Well Materials	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL	(0 - 1.5) GRAVEL, fill.
1.5				GC	(1.5 - 4.0) CLAYEY GRAVEL, GC, very dark gray, moist, hard, odor.
5		--	DO		
10		27.3	6.0/7.0	CL	(4.0 - 18.2) SANDY CLAY, CL, light greenish gray, moist, firm to hard, some orange staining, odor.
12		82.9			
14		92.9			
15		124	10.0/10.0	SP	(18.2 - 30.6) SAND, SP, light greenish gray, wet, soft, fine sand, odor, some NAPL staining from 27.5-28.7, clay lens from 28.7-29.5, saturated with NAPL from 29.5-30.6
18		18.1			
20		18			
25		276	7.0/7.0	GH	(30.6 - 32.0) CLAY, CH, red, moist, hard, odor.
26		18.6			
28		10.6			
30		68.4			
31		232			
32		20.6			



Notes:  
Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.

Initial Fluid Level (2/05/08)  
▼ Depth to water: 17.48 ft BTOC

**PBW**  
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 Round Rock, TX 78664  
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Annular Materials  
 (0.0 - 17.0) Portland/Bentonite Grout  
 (17.0 - 19.0) Bentonite Chips  
 (19.0 - 31.0) 16/30 Silica Sand  
 (31.0 - 32.0) Hole cave-in

Well Materials  
 (+3 - 21.0) Casing, 4" FJT Stainless Steel  
 (31.0 - 31.0) Screen, 4" FJT Stainless Steel,  
 0.01 wire wrap

TOC Elevation (ft AMSL)  
51.89

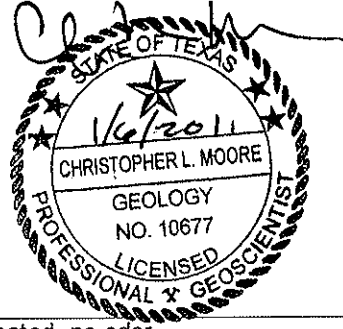


# Union Pacific Railroad

# Log of Boring: GB-1

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/14/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
PBW Project No. 1358	Driller:	William Blutworth	Total Depth (ft):	135.0
	Driller's License:	4885	Northing:	729145.94
	Field Supervisor:	Chris Moore	Easting:	3169447.46
	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	46.1

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0			Fill	(0 - 1.0) CLAYEY GRAVEL, GC, very dark gray, fill, trace wood fragments, no odor.
5	-	DO		(1.0 - 13.7) SILTY CLAY, CL, light brownish gray, with sand, moist, firm, no odor.
10	0	8.0/8.0	CL	
15	0			(13.7 - 25.0) SILTY SAND, SM, light brownish gray, wet, soft, laminated, no odor.
20	0		SM	
25	0	8.0/20.0		(25.0 - 33.5) SILTY CLAY, CL, light brownish gray, moist, firm, no odor.
30	0		CL	
35	15.7		SP	(33.5 - 36.0) SAND, SP, reddish brown, wet, soft, odor.
40	0	9.0/10.0		(36.0 - 44.0) CLAY, CH, brown, moist, hard, some sand size calcareous nodules, no odor.
45	0		CH	(44.0 - 54.5) CLAY, CH, red, moist, hard, some silt lenses, no odor.
50	0	8.5/10.0		



## PBW

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Notes:  
 Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.



Union Pacific Railroad

# Log of Boring: GB-1

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/14/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
PBW Project No. 1358	Driller:	William Bludworth	Total Depth (ft):	135.0
	Driller's License:	4885	Northing:	729145.94
	Field Supervisor:	Chris Moore	Easting:	3169447.46
	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	46.1

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
55	0			
	0			
	0			
60	0	10.0/10.0	SM	(53.5 - 63.3) SILTY SAND, SM, red, wet, soft, no odor, very fine to fine sand.
	0			
65	0		CL	(63.3 - 66.7) SILTY CLAY, CL, red, moist, soft to firm, laminated, no odor.
	0			
	0		SP	(66.7 - 68.5) SAND, SP, red, wet, soft, medium to fine sand, no odor.
	0		CL	(68.5 - 69.7) SILTY CLAY, CL, red, moist, soft to firm, laminated, no odor.
70	0	10.0/10.0	SP	(69.7 - 71.0) SAND, SP, red, wet, soft, medium to fine sand, no odor.
	0			
	0			
75	0			
	0			
80	0	10.0/10.0	CH	(71.0 - 88.3) CLAY, CH, red, moist, hard, some silt lenses, no odor, color grades to brown at 76.0 and light gray at 82.0.
	0			
85	0			
	0			
90	0	9.5/10.0	CL	(88.3 - 93.8) SILTY CLAY, CL, yellowish red, moist, soft to firm, trace sand size calcareous nodules no odor.
	0			
95	0			
	0			
	0		SM	(93.8 - 100.8) SILTY SAND, SM, yellowish red, wet, soft, fine to very fine sand, no odor.
100	0	8.5/10.0		

## PBW

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Notes:  
 Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.



Union Pacific Railroad

# Log of Boring: GB-1

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	1/14/09	Drilling Method:	Roto Sonic
	Drilling Company:	WDC Exploration	Borehole Diameter (in.):	9/8/6
	Driller:	William Blutworth	Total Depth (ft):	135.0
	Driller's License:	4885	Northing:	729145.94
	Field Supervisor:	Chris Moore	Easting:	3169447.46
PBW Project No. 1358	Sampling Method:	4"/6"x10' Barrel	Ground Elev. (ft AMSL):	46.1

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
105	0	10.0/10.0	CH	(100.8 - 106.6) CLAY, CH, reddish brown, moist, firm, no odor.
	0			(106.6 - 108.7) SILTY SAND, SM, yellowish red, wet, soft, fine to very fine sand, no odor.
	0			(108.7 - 112.4) CLAY, CH, reddish brown, moist, firm, no odor.
110	0	10.0/10.0	CH	(112.4 - 115.0) SAND, SP, grayish brown, wet, soft, fine to very fine sand, no odor.
	0			(115.0 - 118.1) SILT, ML, dark gray, with sand, moist to wet, soft, no odor.
	0			(118.1 - 119.3) SAND, SP, grayish brown, wet, soft, fine to very fine sand, no odor.
120	0	10.0/10.0	CL	(119.3 - 129.0) SILTY CLAY, CL, greenish gray, moist, hard, laminated, trace thin sand lenses, no odor.
	0			(129.0 - 130.6) SILTY/CLAYEY SAND, SM/SC, greenish gray, wet, soft, medium to fine sand, some calcareous nodules, no odor.
	0			(130.6 - 132.9) SILTY CLAY, CL, greenish gray, moist, hard, laminated, trace thin sand lenses, no odor.
135	0	10.0/10.0	CL	(132.9 - 135.0) SANDY CLAY, CL, greenish gray mottled reddish brown, moist, soft, no odor.

## PBW

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Notes:  
 Top 8 feet drilled out (DO) with a hydrovac to clear for utilities.

Client: SP ENVIRONMENTAL SYSTEMS, INC.

Date: MARCH 26, 1991

Location: N 727859.71; E 3166207.41

Ground Elev. 45.90

Boring Type: WASH/SHELBY TUBE SAMPLER/SPLIT SPOON

# LOG OF BORING

No. P10

GEO ASSOCIATES

Job No. 241

Water Level Depth=

Caving Depth=

DEPTH IN FEET	SYMBOL	SAMPLES	DESCRIPTION	OVA RBG (ppm)	BLOW COUNTS		FIELD OVA ppm		SHEAR STRENGTH ESTIMATE POCKETPEN tsf	
					0x	1	1	2	1	2
0			NOTE: UPPER 23' FEET ASSUMED TO BE THE SAME STRATA AS IN ADJACENT BORING FOR WELL # 7							
8										
10										
15										
20										
25			VERY STIFF GRAY SANDY CLAY -with Fe stains	100						
30			FIRM RED AND GRAY SANDY CLAY	50						
35		SS	VERY DENSE RUST COLORED SAND	50						
40		SS	VERY STIFF RED CLAY	45						

Total Depth= 50.0

Logged By: D. BRAGG

Drilled By: GULF COAST CORING

Client: SP ENVIRONMENTAL SYSTEMS, INC.

Date: MARCH 26, 1991

Location: N 727859.71; E 3166207.41

Ground Elev. 45.90

Boring Type: WASH/SHELBY TUBE SAMPLER/SPLIT SPOON

# LOG OF BORING

## No. P10

GEO ASSOCIATES

Job No. 241

Water Level Depth=

Caving Depth=

DEPTH IN FEET	SYMBOL	SAMPLES	DESCRIPTION	OVA Rtg (ppm)	BLOW COUNTS	FIELD OVA ppm		SHEAR STRENGTH ESTIMATE POCKETPEN tsf	
						0x	1	0	2
40			VERY STIFF RED CLAY -with slickensides below 43'	0	x				
45									
50				0	x				
55									
60									
65									
70									
75									
80									

Total Depth= 50.0  
 Logged By: D. BRAGG  
 Drilled By: GULF COAST CORING



Client: SP ENVIRONMENTAL SYSTEMS, INC.

Date: MARCH 25, 1991

Location: N 728129.26; E 3166365.03

Ground Elev. 47.20

Boring Type: WASH/SHELBY TUBE SAMPLER/SPLIT SPOON

# LOG OF BORING

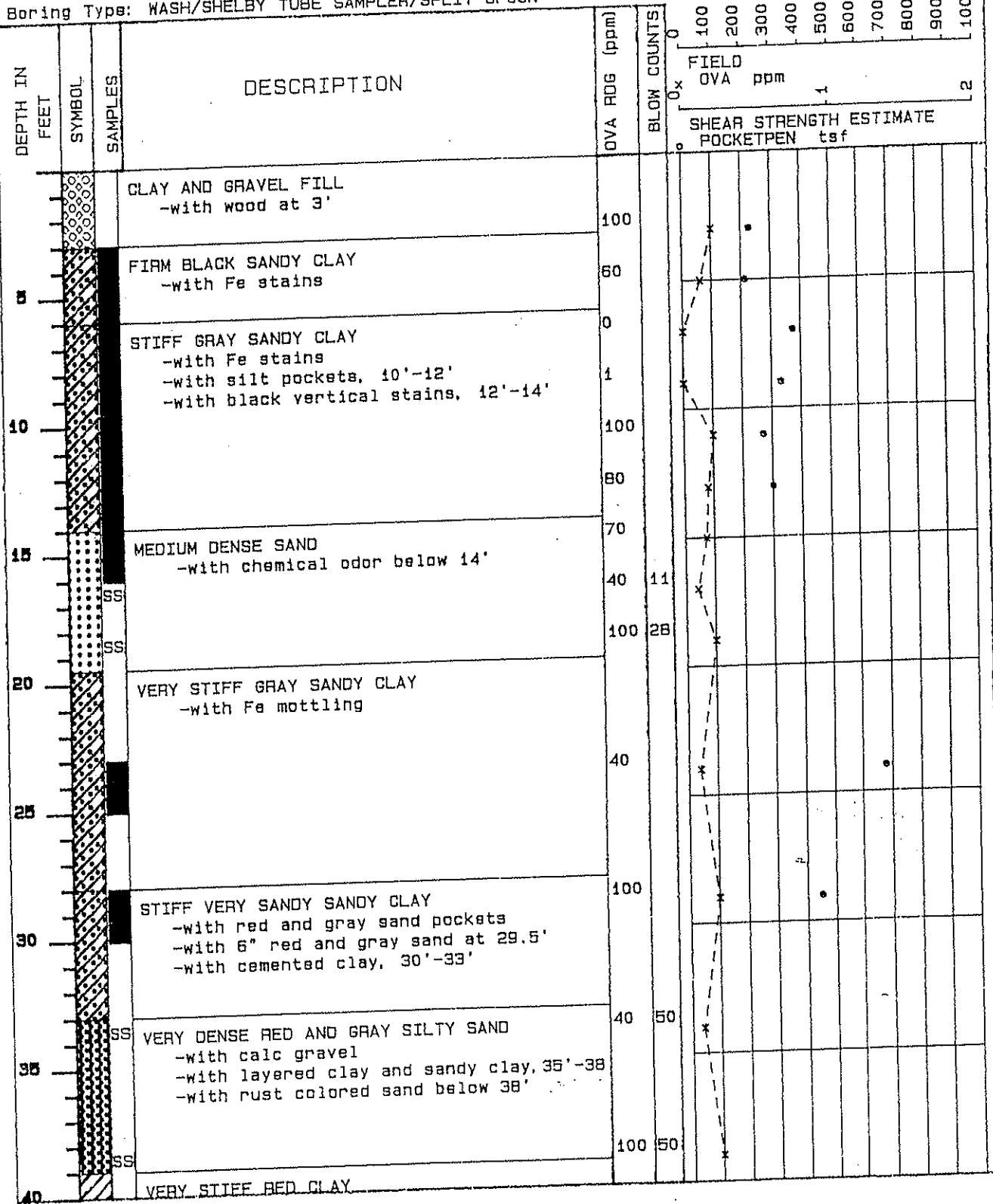
No. P11

GEO ASSOCIATES

Job No. 241

Water Level Depth=

Caving Depth=



Total Depth= 50.0  
 Logged By: D. BRAGG  
 Drilled By: GULF COAST CORING

Client: SP ENVIRONMENTAL SYSTEMS, INC.

Date: MARCH 25, 1991

Location: N 728129.26; E 3166365.03

Ground Elev. 47.20

Boring Type: WASH/SHELBY TUBE SAMPLER/SPLIT SPOON

# LOG OF BORING

## No. P11

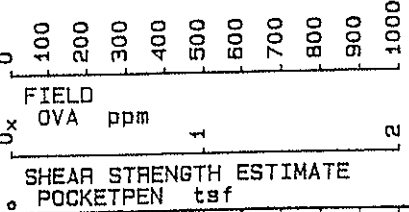
GEO ASSOCIATES

Job No. 241

Water Level Depth=

Caving Depth=

DEPTH IN FEET	SYMBOL	SAMPLES	DESCRIPTION	OVA RDG (ppm)	BLOW COUNTS	
					0x	1
40	[Hatched]	[Black]	VERY STIFF RED CLAY -with slickensides -with calc nodules, 43'-45'	0	0	0
45					0	0
50	[Hatched]	[Black]		0	0	0
55						
60						
65						
70						
75						
80						



Total Depth= 50.0

Logged By: D. BRAGG

Drilled By: GULF COAST CORING

Client: SP ENVIRONMENTAL SYSTEMS, INC.

GEO ASSOCIATES

Date: MARCH 27, 1991

# LOG OF BORING

Job No. 241

Location: N 727988.51; E 3166470.48

Water Level Depth=

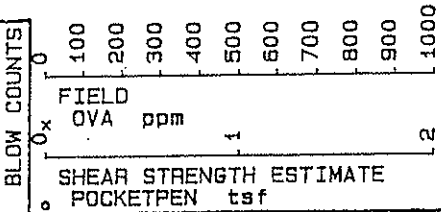
Ground Elev. 47.10

## No. P12

Caving Depth=

Boring Type: WASH/SHELBY TUBE SAMPLER/SPLIT SPOON

DEPTH IN FEET	SYMBOL	SAMPLES	DESCRIPTION	OVA RDG (ppm)	BLOW COUNTS	
					0x	1
			NOTE: UPPER 23' ASSUMED TO BE THE SAME STRATA AS IN ADJACENT BORING FOR WELL #9			
25			VERY STIFF GRAY AND RED SANDY CLAY -stiff below 28' -w/ red and gray silt pockets below 28'	40	x	
30			DENSE RED AND GRAY SILT -with calc nodules -with cemented clay	90		
35	SS					
40	SS		MEDIUM DENSE RED SAND -with layered red silt	25	x	



Total Depth= 50.0

Logged By: D. BRAGG

Drilled By: GULF COAST CORING

Client: SP ENVIRONMENTAL SYSTEMS, INC.

GEO ASSOCIATES

Date: MARCH 27, 1991

# LOG OF BORING

Job No. 241

Location: N 727988.51; E 3166470.48

Water Level Depth=

Ground Elev. 47.10

## No. P12

Caving Depth=

Boring Type: WASH/SHELBY TUBE SAMPLER/SPLIT SPOON

DEPTH IN FEET	SYMBOL	SAMPLES	DESCRIPTION	OVA RDB (ppm)	BLOW COUNTS	FIELD OVA ppm		SHEAR STRENGTH ESTIMATE	
						0x	1	POCKETPEN tsf	2
40	[Hatched Box]	[Black Box]	VERY STIFF RED CLAY -with calc nodules -with slickensides	20	x				
45									
50	[Hatched Box]	[Black Box]		0	x				
55									
60									
65									
70									
75									
80									

Total Depth= 50.0

Logged By: D. BRAGG

Drilled By: GULF COAST CORING



Union Pacific Railroad

# Log of Boring: CPT-01-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/11/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727093
	Field Supervisor:	Carolyn Sexton	Easting:	3165988
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravel and silt, unconsolidated.
1	0.5		FILL	
2		4.3/5		
3				SILTY CLAY, CL, dark gray brown, slightly moist, slightly firm.
4	0.5			
5				SILTY CLAY, CL, with SAND, gray, dark gray/orange mottling, carbonate gravels 7.1 to 16.2', increasing sand with depth, slightly moist, firm.
6	0.9			
7		5/5		
8				
9	1.8			
10				
11	2.5		CL	
12		3.7/5		
13				
14	0.9			
15				
16	1.2			CLAY, CL, gray, some oxidation staining, moist, slightly firm. (No recovery from 18.8 to 20'.)
17		3.8/5		
18				
19	1.5			
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Samples collected at 2-5', 10-12.5', and 17.5-20'.

Location is adjacent to CPT location.  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-02-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/11/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727176
	Field Supervisor:	Carolyn Sexton	Easting:	3166585
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, gravel and silt, unconsolidated.
1	1.3		FILL	
2		5.1/5		
3				SILTY CLAY, CL, dark gray brown, slightly moist, firm.
4	1.4			
5				SILTY CLAY, CL, with SAND, light gray, wet, soft.
6	1.4			
7		4.8/5		
8				
9	1.6		CL	
10				
11	3.5			
12		5/5		
13				CLAY, CL, gray, red mottling, silt filled root casts.
14	11.3			
15				
16	2.8		SP	SAND, SP, gray, wet, soft.
17				SILTY CLAY, CL, light tan, some orange mottling, slightly moist, firm. (No recovery from 19.3 to 20'.)
18		4.3/5		
19	2.9		CL	
20				

## PBW

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 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Samples collected at 2-5' and 12.5-15'.

Location is adjacent to CPT location.  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-03-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/11/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727268
	Field Supervisor:	Carolyn Sexton	Easting:	3167047
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PIID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				(0 - 3.2) FILL, dark gray brown, gravel, silt, clay, dry, unconsolidated.
1	2.9		FILL	
2		5.1/5		
3				(3.2 - 5.9) CLAYEY SILT, SM, dark gray brown, slightly moist, firm, low plasticity.
4	6.3		ML	
5				
6	3.9			(5.9 - 6.9) SANDY CLAY, CL, reddish tan, fine grained, moist, soft.
7		4.8/5		(6.9 - 13.5) SANDY/SILTY CLAY, CL, light gray, abundant carbonate nodules, orange modeling, slightly moist, firm.
8				
9	3.1		CL	
10				
11	2.5			
12		4.7/5		
13				(13.5 - 20.0) CLAYEY SAND, SC, gray, fine grained, wet, soft.
14	5.2			
15				
16	5.3		SC	
17		5/5		
18				
19	6.2			
20				

<p><b>PBW</b></p> <p>Pastor, Behling &amp; Wheeler, LLC          2201 Double Creek Dr., Suite 4004          Round Rock, TX 78664          Tel (512) 671-3434 Fax (512) 671-3446</p>	<p>Notes:          Samples collected at 2-5' and 12.5-13.5'.</p>
	<p>Location is adjacent to CPT location.          Borehole plugged with bentonite chips upon completion.</p>



Union Pacific Railroad

# Log of Boring: CPT-04-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/11/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727554
	Field Supervisor:	Carolyn Sexton	Easting:	3167957
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				(0 - 2) CONCRETE.
1	-		CON	
2		2.8/5	FILL	(2 - 2.5) FILL, gravel base material, unconsolidated.
3	2.6			(2.5 - 5.3) SILTY CLAY, CL, dark green gray, moist, slightly firm, low plasticity, mottled dark gray brown and orange.
4				
5				
6		1.5		(5.3 - 10.3) SILTY CLAY, CL, with GRAVEL, dark gray brown, moist, soft, low plasticity, mottled green gray.
7				
8		3/5		
9	-		CL	
10				
11	1.8			(10.3 - 12.2) SILTY CLAY, CL with SAND, light gray, moist, slightly moist, firm, low plasticity, orange mottling.
12		3.4/5		
13				(12.2 - 15.3) SANDY CLAY, CL, light green gray, very fine grained, moist, slightly firm, medium plasticity clay.
14	1.4			
15				
16	1.6			(15.3 - 20.0) CLAYEY SAND, SC, light gray to green, fine grained, moderately sorted, unconsolidated, wet, soft. (No recovery from 18.6 to 20'.)
17		3.6/5	SC	
18	1.8			
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Samples collected at 2-5' and 10-12.5'.

Location is adjacent to CPT location.  
 Borehole plugged with bentonite chips upon completion.





Union Pacific Railroad

# Log of Boring: CPT-05-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/11/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727674
	Field Supervisor:	Carolyn Sexton	Easting:	3168198
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PIID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				(0 - 4.0) CONCRETE.
1				
2		1/5	CON	
3				
4	1.4			(4.0 - 5.0) SILTY CLAY, CL, dark gray, slightly moist, firm.
5				(5.0 - 10.4) SILTY CLAY, CL, light gray, abundant carbonate clasts, slightly moist, firm.
6	2.1			
7		5/5		
8			CL	
9	2.7			
10				(10.4 - 12.2) SILTY/SANDY CLAY, CL, gray, very fine grained, orange mottling, moist, slightly firm.
11	1.2			
12		3.2/5		(12.2 - 15.0) SILTY SAND, SP, with CLAY, tan, fine grained, orange staining, moist, firm. (No recovery from 13.2 to 15'.)
13			SP	
14				
15				

## PBW

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 Round Rock, TX 78664  
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Notes:

Samples collected at 4-5' and 7.5-10'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-06-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/12/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	728014
	Field Supervisor:	Carolyn Sexton	Easting:	3168174
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				CONCRETE.
1				
2		1.5/5	CON	
3				
4	6.6		FILL	FILL, gray to dark brown, gravel, silt, clay, glass.
5				SILTY CLAY, CL, dark brown to light gray, abundant carbonate clasts, gray green and orange mottling, slightly moist, firm to hard, becomes sandy with depth.
6	0			
7		4.8/5		
8				
9	0		CL	
10				
11	0			
12		4.6/5		
13				
14	0		SC	CLAYEY SAND, SC, with SILT, green tan, very fine grained, moist, firm.
15				
16	0			SAND, SP, green gray, fine grained, wet, unconsolidated. (No recovery from 19 to 20'.)
17		4/5		
18	0		CL	← SP
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Samples collected at 3-5', and 13-15'.

Location is adjacent to CPT location.  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-07-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/12/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	728043
	Field Supervisor:	Carolyn Sexton	Easting:	3168045
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				(0 - 2.4) CONCRETE.
1			CON	
2		2.6/5		
3			FILL	(2.4 - 3.2) FILL, black, gravel base, silt, glass fragements, unconsolidated.
4	33.8		SM	(3.2 - 5) SANDY SILT, SM, with CLAY, dark gray, very fine grained, moist, firm, low plasticity.
5				(5 - 12.2) SANDY CLAY, CL, light gray, fine grained, abundant carbonate gravels and clasts, slightly moist, firm, increasing sand and orange mottling with depth.
6	11.6			
7		4.7/5		
8				
9	18.6			
10			CL	
11	12.9			
12		3/5		(12.2 - 15.3) SILTY/SANDY CLAY, gray, some pink and green staining, fine grained, moist, slightly firm, low plasticity, no mottling, slight odor.
13				
14	17.4			
15				
16				(15.3 - 20.0) SAND, SP, light greenish gray, fine to medium grained, subrounded, moderately sorted, wet, unconsolidated, slight odor. (No recovery from 18.6 to 20'.)
17	15.3			
18		3.6/5	SP	
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
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 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 2-5', and 7.5-10'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-08-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/12/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727834
	Field Supervisor:	Carolyn Sexton	Easting:	3167778
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				CONCRETE.
1			CON	
2		2.7/5		
3			FILL	FILL, black, pebbles, sand, silt, wood.
4	143		SP	SAND, SP, brown, fine to medium grained, wet, unconsolidated.
5				SILTY CLAY, CL, with SAND, dark gray brown to light green gray, tan sand, orange mottling, increasing sand with depth, moist, firm.
6	98			
7		5/5		
8				
9	48		CL	
10				
11	13.2			
12		4.9/5		
13				
14	62			SANDY, SILTY CLAY, SC, green gray, orange mottling.
15			SC	
16	0			
17				SAND, SP, green gray, fine to medium grained, wet, unconsolidated. (No recovery from 18.5 to 20'.)
18	114	3.5/5	SP	
19				
20				

## PBW

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 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Samples collected at 2.3-5', 5-7.5', and 15-16'.

Location is adjacent to CPT location.  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-09-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/12/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727640
	Field Supervisor:	Carolyn Sexton	Easting:	3167397
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0			CON	(0 - 0.6) CONCRETE.
1	101	4.4/5	FILL	(0.6 - 5.3) FILL, whitish gray, dark gray brown, and black, gravel, silt, clay, glass and trash.
2				
3				
4	88			
5		4.8/5	CL	(5.3 - 13.3) SANDY/SILTY CLAY, CL, dark gray, carbonate clasts, increasing orange mottling and sand with depth, lighter gray with depth, moist, firm.
6	6			
7				
8				
9	23			
10		4.2/5	SC	(13.3 - 15.7) CLAYEY SAND, SC, green gray, fine grained, mottled orange, moist, firm.
11	38			
12				
13				
14	25	3.3/5	SP	(15.7 - 20.0) SILTY SAND, SP, light brown, wet, very soft no odor. (No recovery from 18.3 to 20'.)
15				
16				
17	23			
18				
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Samples collected at 2-5', 5-7.5', and 15-15.7'.

Location is adjacent to CPT location.  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-10-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/15/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
	Driller:	Doug Isenhart	Total Depth (ft):	20
PBW Project No. 1358	Driller's License:		Northing:	728116
	Field Supervisor:	Carolyn Sexton	Easting:	3167847
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				(0 - 2) CONCRETE.
1	-		CON	
2		3/5	FILL	(2 - 3.3) FILL, black, gravel, sand, glass.
3				
4	133		SP	(3.3 - 4.1) SAND, SP, tan, coarse grained, moderately sorted, slightly moist, hydrocarbon staining and odor.
5			SM	(4.1 - 5.7) CLAYEY SILT, SM, with SAND, dark gray brown, moist, soft.
6	1474			
7		4.7/5		
8				
9	1468			
10			CL	
11	1449			
12		4.6/5		
13				(12.4 - 14.4) SANDY CLAY, CL, green gray, medium to fine grained, some orange mottling, hydrocarbon staining, moist slightly soft to firm.
14	824			
15			SP	(14.4 - 15.0) SAND, SP, green gray, fine to medium grained, moist, soft. (No recovery from 14.6 to 15')

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 2-5' and 5-7.5'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-11-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/12/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727835
	Field Supervisor:	Carolyn Sexton	Easting:	3167467
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0			CON	CONCRETE
1	166			
2		3.6/5	FILL	FILL, black, gravel, white sand, sheen at base.
3				
4	68			SANDY CLAY, CL, dark brown black, fine grained, slightly moist, firm.
5				
6	13.6			SANDY CLAY, CL, with SILT, green gray, abundant carbonate clasts, orange mottling, slightly moist, firm.
7		5.1/5		
8				
9	5.1		CL	
10				
11	14.4			
12		2.8/5		
13				
14	-			
15				SAND, SP, green gray, fine to medium grained, wet, slightly soft. (No recovery from 18.6 to 20'.)
16				
17	1.6			
18		3.6/5	SP	
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Samples collected at 1.4-2.5' and 10-12.5'.  
  
 Location is adjacent to CPT location.  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-12-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/13/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
	Driller:	Doug Isenhart	Total Depth (ft):	20
PBW Project No. 1358	Driller's License:		Northing:	727698
	Field Supervisor:	Carolyn Sexton	Easting:	3167220
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0			CON	(0 - 1.4) CONCRETE.
1	0			
2		3.6/5	FILL	(1.4 - 3.9) FILL, white sand and gravel, black gravel and silt, glass, wet 3.2-3.9, unconsolidated.
3				
4	2		SM	(3.9 - 5) SANDY SILT, SM, with CLAY, hydrocarbon staining and odor to 4.2, moist, soft.
5				
6	0			(5 - 15.9) SILTY CLAY, CL, with SAND, dark gray brown to gray tan, carbonate nodule at 4.3, orange mottling, some fine sand at base, moist, firm to hard.
7		4.7/5		
8				
9	0			
10				
11			CL	
12		0/5		
13				
14				
15				
16	0			(15.9 - 17) SILTY SAND, SP, green gray, some mottling, moist, slightly firm.
17				
18		2.6/5	SP	(17 - 20.0) SAND, green gray, no mottling, moist, soft. (No recovery from 17.6 to 20')
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 2-5', 5-7.5', and 15-15.9'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.





Union Pacific Railroad

# Log of Boring: CPT-13-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/13/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727591
	Field Supervisor:	Carolyn Sexton	Easting:	3167015
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				CONCRETE.
1	MAX		CON	
2		2.4/5	FILL	FILL, black, gravel, sand, silt, glass, moist, no odor.
3				
4	1023		ML	CLAYEY, SANDY SILT, ML, dark gray brown, slightly moist, slightly firm to hard.
5				SANDY CLAY, CL, green gray, carbonate clasts, orange mottling with depth, slightly moist, firm.
6	68			
7		5.1/5		
8	0			
9				
10				
11	12.4		CL	
12		4.1/5		
13				
14	0			
15				
16	10.8			
17				
18	9.5	3.3/5		SAND, SP, green gray, wet, soft. (No recovery from 18.3 to 20')
19			SP	
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 1.5-2.5', 5-7.5', and 15-17.2'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-14-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/14/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	728000
	Field Supervisor:	Carolyn Sexton	Easting:	3167439
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0			CON	(0 - 1.4) CONCRETE.
1	390			
2		3.6/5	FILL	(1.4 - 5.3) FILL, white gravel and silt to 1.6, black gravel; silt and glass, tarry, strong hydrocarbon odor to 3', wet; whitish gray silt and caly to 4.8, slightly moist, firm; wood debris and strong odor to 5.3, wet, soft.
3				
4	407			
5				
6	423		SC	(5.3 - 10.8) CLAYEY SAND, SC, with SILT, dark gray, some mottling, slightly moist, firm.
7		5.2/5		
8				
9	210			
10				
11	336		CL	(10.8 - 16.4) SILTY, SANDY CLAY, CL, light gray, increasing sand with depth, mottled orange, red mottling at base.
12		4.5/5		
13				
14	763			
15				
16	601			
17	3905		SP	(16.4 - 20.0) SAND, SP, green gray, strong hydrocarbon staining/mottling of brown and tan stains, wet. (No recovery from 17.5 to 20')
18		2.5/5		
19				
20				

<p><b>PBW</b></p> <p>Pastor, Behling &amp; Wheeler, LLC          2201 Double Creek Dr., Suite 4004          Round Rock, TX 78664          Tel (512) 671-3434 Fax (512) 671-3446</p>	Notes:
	<p>Samples collected at 1.4-2.5', 12.5-15', and 15-16.4'.</p> <p>Location is adjacent to CPT location.</p> <p>Borehole plugged with bentonite chips upon completion.</p>



Union Pacific Railroad

# Log of Boring: CPT-15-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/14/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
	Driller:	Doug Isenhart	Total Depth (ft):	20
PBW Project No. 1358	Driller's License:		Northing:	727886
	Field Supervisor:	Carolyn Sexton	Easting:	3167290
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				CONCRETE.
1	-		CON	
2		3/5	FILL	FILL, black, gravel, silt, glass, sheen at base, wet, unconsolidated.
3	2009			
4			SM	SILT, whitish gray, wet, slightly firm.
5				SANDY, CLAYEY SILT, SM, black brown, hydrocarbon staining, very moist, soft to slightly firm.
6	MAX			SILTY, SANDY CLAY, CL, dark gray to light gray, medium to fine grained sand, carbonate clasts, red and orange mottling, slightly moist, firm.
7		5.1/5		
8				
9	1345			
10			CL	
11	92.8			
12		3.4/5		
13				
14	333			
15			SC	CLAYEY SAND, SC, with SILT, green gray, fine grained, some tan mottling, moist, slightly firm.
16	88			
17		3.2/5	SP	SAND, SP, gray, fine to medium grained, hydrocarbon staining and strong odor, wet, soft. (No recovery from 18.2 to 20'.)
18	58			
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 2-5', 5-7.5', and 15-16.2'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-16-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/13/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727721
	Field Supervisor:	Carolyn Sexton	Easting:	3166906
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				(0 - 1.9) CONCRETE.
1			CON	
2		2.1/5		(1.9 - 5) FILL, gravel, sand, silt, glass, brick, unconsolidated.
3			FILL	
4	5.8			
5			SM	(5 - 5.6) SANDY SILT, SM, with CLAY, dark gray brown, fine grained, very moist, soft.
6	2.6			(5.6 - 15.7) SANDY/SILTY CLAY, CL, dark brown gray to light gray, fine grained, carbonate clasts, mottling and sand increasing with depth and lighter gray, slightly moist, firm, low plasticity.
7		5.1/5		
8				
9	4.8			
10				
11	38.2			
12		4.8/5	CL	
13				
14	21			
15				
16	84			(15.7 - 17.8) SANDY CLAY, CL, green gray, some orange staining, increasing sand with depth
17		3/5		
18	19.4			(17.8 - 20.0) SAND, green gray, wet, unconsolidated. (No recovery from 18 to 20')
19			SP	
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 1.9-5', 10-12.5', and 15-17.5'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-17-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/15/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	728210
	Field Supervisor:	Carolyn Sexton	Easting:	3167657
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (fr/ft)	USCS	Lithologic Description
0				(0 - 2.3) ASPHALT.
1			PAV	
2		2.7/5		
3	MAX		FILL	(2.3 - 4.9) FILL, black, gravel, sand, silt, glass, hydrocarbon odor and staining throughout, moist, unconsolidated.
4				
5				(4.9 - 5.6) WOOD, hydrocarbon odor and staining, wet, soft.
6	MAX		SM	(5.6 - 7.6) CLAYEY SILT, dark gray brown, moist to wet, soft.
7		3.7/5		
8	MAX			(7.6 - 14.2) SILTY CLAY, CL, with SAND, green gray, orange mottling, hydrocarbon odor and staining throughout, slightly moist, firm.
9				
10				
11	MAX		CL	
12		5.1/5		
13	MAX			
14				
15	38.6		SC	(14.2 - 15.8) CLAYEY SAND, SC, green gray, light orange mottling, hydrocarbon odor and staining, slightly moist, firm.
16				(15.8 - 20.0) SAND, SP, green gray, fine to medium grained, very strong hydrocarbon odor and abundant staining, wet, soft. (No recovery from 19 to 20')
17		4.5/5		
18	489		SP	
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:  
 Samples collected at 2.3-5' and 13-15'.

Location is adjacent to CPT location.  
 Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-18-13

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date: 2/14/2013

Drilling Method: Geoprobe

Drilling Company: Fugro

Borehole Diameter (in.): 3

Driller: Doug Isenhardt

Total Depth (ft): 20

PBW Project No. 1358

Driller's License:

Northing: 728275

Field Supervisor: Carolyn Sexton

Easting: 3168143

Sampling Method: 2"x 5' Barrel

Ground Elev. (ft AMSL):

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				CONCRETE.
1	-		CON	
2		3.3/5	FILL	FILL, gravel, sand, silt, glass, unconsolidated.
3	158			
4			SM	SANDY/SILT, SM, with CLAY, black brown, very fine grained, moist, soft, some odor.
5				
6	0	4.7/5	CL	SILTY CLAY, CL, with SAND, green gray, very fine grained, abundant carbonate clasts, to 8.4', mottled gray and orange, slightly moist, firm.
7				
8				
9	11			
10				
11	0	4.6/5	CL	
12				
13				
14	8.7			SANDY CLAY, CL, gray tan, fine to medium grained, moist, soft, medium plasticity.
15				
16				
17	0	3.6/5	SP	SAND, SP, green gray, fine grained, moderately sorted, wet, soft. (No recovery from 18.6 to 20'.)
18				
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 1.7-5' and 12.5-14.3'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-19-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/14/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
	Driller:	Doug Isenhart	Total Depth (ft):	20
PBW Project No. 1358	Driller's License:		Northing:	728442
	Field Supervisor:	Carolyn Sexton	Easting:	3168004
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				(0 - 1.9) CONCRETE.
1	-		CON	
2		3.1/5		(1.9 - 4.1) FILL, black, gravel, sand, silt, glass, moist to wet, unconsolidated, hydrocarbon odor and appearance below 3.4'.
3	138		FILL	
4				(4.1 - 5.9) CLAYEY SILT, SM, with SAND, dark gray, moist, hard.
5			SM	
6	0			(5.9 - 15.6) SILTY, SANDY CLAY, CL, gray, orange and dark gray mottling, increasing sand with depth, moist, slightly firm.
7		5/5		
8				
9	43			
10				
11	9.3		CL	
12		4.8/5		
13				
14	37			
15				
16				(15.6 - 20.0) SAND, green gray, fine to medium grained, wet, soft. (No recovery from 18.6 to 20'.)
17	30.2			
18		3.6/5	SP	
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 1.9-5' and 7.5-10'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: CPT-20-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/14/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	727301
	Field Supervisor:	Carolyn Sexton	Easting:	3167511
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, dark gray, gravel, silt, glass, wet, unconsolidated.
1	MAX			
2		3.8/5	FILL	
3				
4	208			
5				SANDY, CLAYEY SILT, SM, dark brown gray, moist, soft.
6	108			
7		5.1/5	SM	
8				
9	156			SILTY CLAY, CL, with SAND, gray to tan, carbonate clasts at 10.2 - 10.5, orange and red mottling, moist, firm.
10				
11	3.4			
12		4.2/5	CL	
13				
14	24.1			
15				SAND, with CLAY, gray, fine to medium grained, wet, soft.
16	-			
17		4/5	SC	
18	-			SANDY CLAY, white. (No recovery from 19 to 20'.)
19			CL	
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 0-2.5' and 5-7.5'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.





Union Pacific Railroad

# Log of Boring: CPT-21-13

UPRR Houston Wood Preserving Works  
Houston, TX

Completion Date: 2/15/2013

Drilling Method: Geoprobe

Drilling Company: Fugro

Borehole Diameter (in.): 3

Driller: Doug Isenhart

Total Depth (ft): 20

PBW Project No. 1358

Driller's License:

Northing: 728379

Field Supervisor: Carolyn Sexton

Easting: 3167773

Sampling Method: 2"x 5' Barrel

Ground Elev. (ft AMSL):

Depth (ft)	PID (ppm-v)	Recovery (ft/5)	USCS	Lithologic Description
0				(0 - 3.6) FILL, gravel, sand, clay, hydrocarbon odor and staining, unconsolidated.
1	170		FILL	
2		4.2/5		
3				
4	1666		CL	(3.6 - 5.4) CLAYEY SILT, SM, with SAND, dark brown gray, moist, soft, hydrocarbon odor and staining.
5				
6	333		CL	(5.4 - 15.4) SANDY/SILTY CLAY, CL, green gray, mottled gray and orange increasing with depth, slightly moist, firm, carbonate nodules locally, 7.6 - 9.6, hydrocarbon staining and odor in fractures at top.
7		5.1/5		
8	473			
9				
10	231		SP	
11		4.5/5		
12				
13	169		SP	
14				
15				
16				
17		3.4/5		(15.4 - 20.0) SAND, SP, green gray, wet, soft, hydrocarbon odor and staining. (No recovery from 18.4 to 20')
18				
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
2201 Double Creek Dr., Suite 4004  
Round Rock, TX 78664  
Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 2-5' and 7.6-10'.

Location is adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.



Union Pacific Railroad

# Log of Boring: SB-22-13

UPRR Houston Wood Preserving Works Houston, TX	Completion Date:	2/15/2013	Drilling Method:	Geoprobe
	Drilling Company:	Fugro	Borehole Diameter (in.):	3
PBW Project No. 1358	Driller:	Doug Isenhart	Total Depth (ft):	20
	Driller's License:		Northing:	728501
	Field Supervisor:	Carolyn Sexton	Easting:	3167891
	Sampling Method:	2"x 5' Barrel	Ground Elev. (ft AMSL):	

Depth (ft)	PID (ppm-v)	Recovery (ft/ft)	USCS	Lithologic Description
0				FILL, black brown, gravel, sand, silt, hydrocarbon odor and staining
1	1003			
2		3.9/5	FILL	
3				
4	2103			
5				
6	988			SILTY CLAY, CL, dark gray, carbonate clasts at base, black and orange mottling, hydrocarbon odor and staining throughout, moist, slightly firm.
7		4.7/5		
8				
9	3838			SANDY/SILTY CLAY, CL, light green gray, increasing sand with depth, orange and green mottling, hydrocarbon odor and staining, moist, firm.
10			CL	
11	1786			
12		2.6/5		
13				
14				
15	387			SANDY CLAY, moist, firm.
16				SAND, green white, fine to medium grained, wet, soft. (No recovery from 18.2 to 20')
17	168			
18		3.2/5	SP	
19				
20				

## PBW

Pastor, Behling & Wheeler, LLC  
 2201 Double Creek Dr., Suite 4004  
 Round Rock, TX 78664  
 Tel (512) 671-3434 Fax (512) 671-3446

Notes:

Samples collected at 2-5' and 7.5-10'.

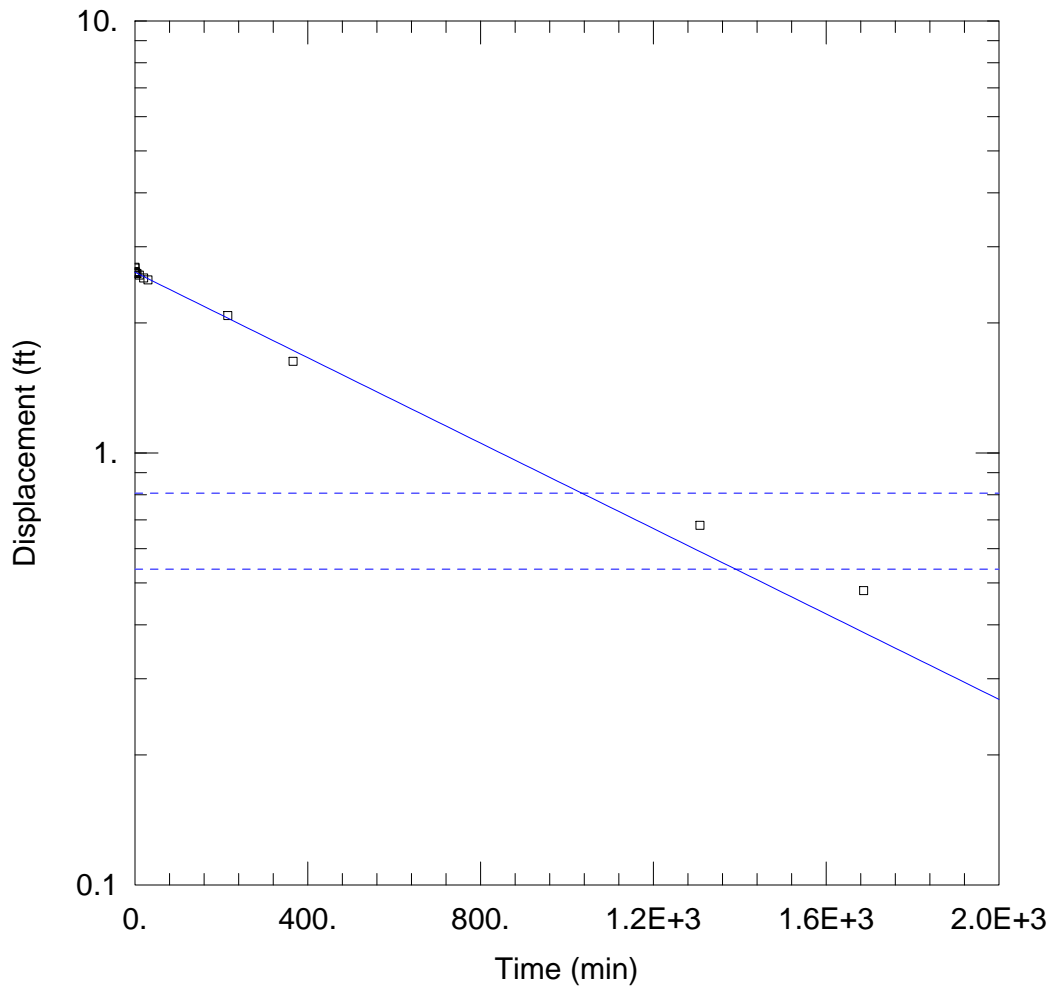
Location is NOT adjacent to CPT location.

Borehole plugged with bentonite chips upon completion.

**Appendix VI.C**

**SLUG TEST RESULTS**

Houston Wood Preserving Works  
Houston, Texas



SLUG IN TEST - MW-32B

Data Set: J:\...\MW32B\_Slugin\_Mar12\_full\_thickness.aqt

Date: 08/28/14

Time: 16:13:47

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW

Test Well: MW-32B

Test Date: 03/06/12

AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-32B)

Initial Displacement: 2.69 ft

Static Water Column Height: 32.07 ft

Total Well Penetration Depth: 16.3 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.208 ft

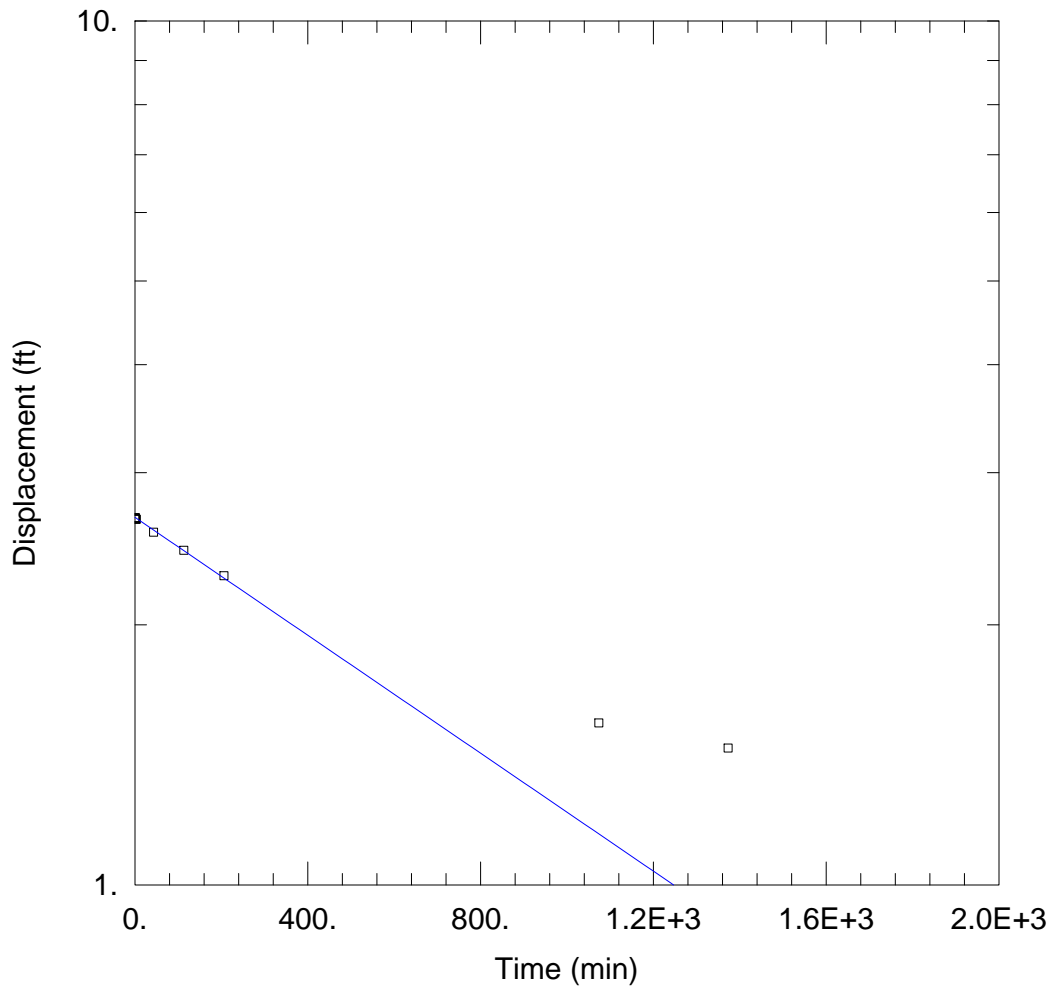
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 7.321E-7 cm/sec

y0 = 2.619 ft



### SLUG OUT TEST - MW-32B

Data Set: J:\...\MW32B\_Slugout\_Mar12\_full\_thickness.aqt

Date: 08/28/14

Time: 16:12:31

### PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW

Test Well: MW-35B

Test Date: 01/22/10

### AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 0.1

### WELL DATA (MW-32B)

Initial Displacement: 2.66 ft

Static Water Column Height: 32.07 ft

Total Well Penetration Depth: 16.3 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.208 ft

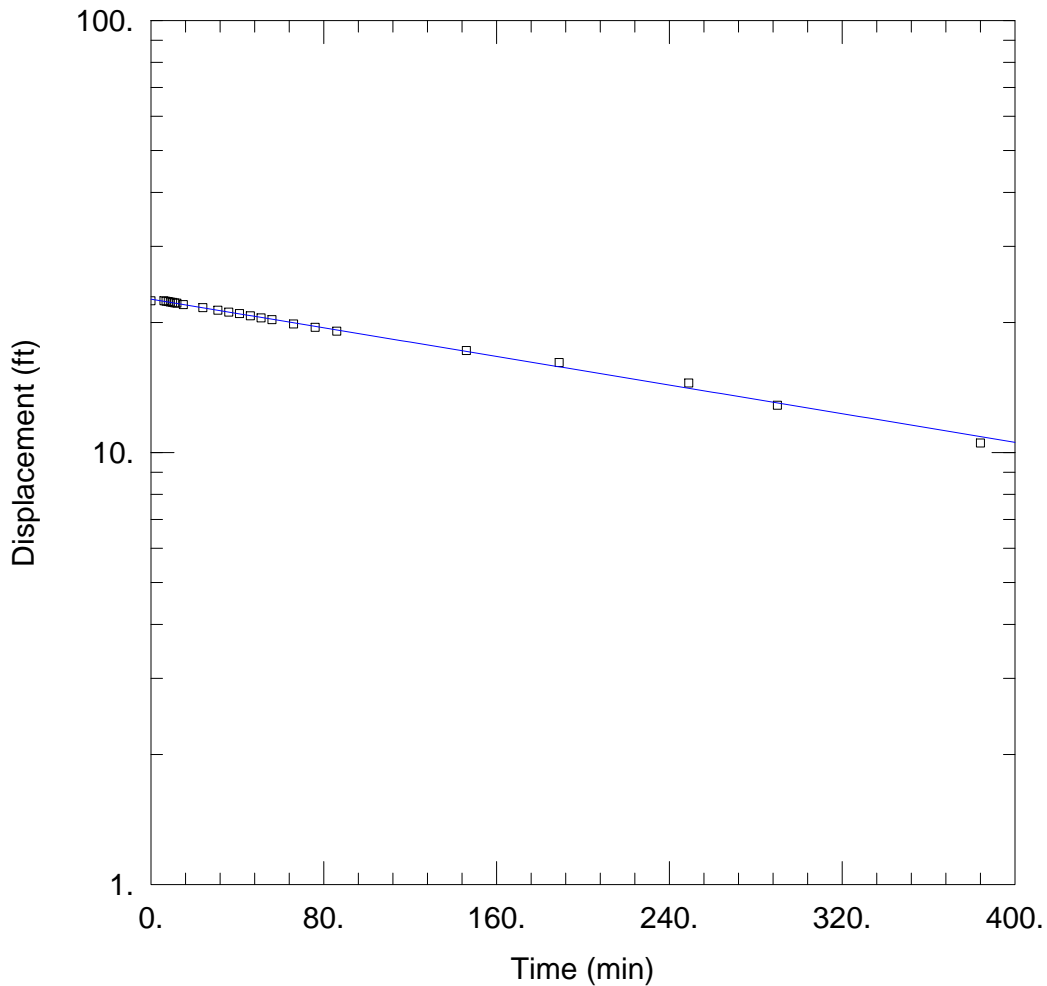
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 5.054E-7 cm/sec

y0 = 2.663 ft



BAILDOWN TEST - MW-33B

Data Set: J:\...\MW33B\_baildown\_full\_thickness.aqt

Date: 08/29/14

Time: 13:46:34

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-33B

Test Date: 02/25/09

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-33B)

Initial Displacement: 22.46 ft

Static Water Column Height: 32.31 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3125 ft

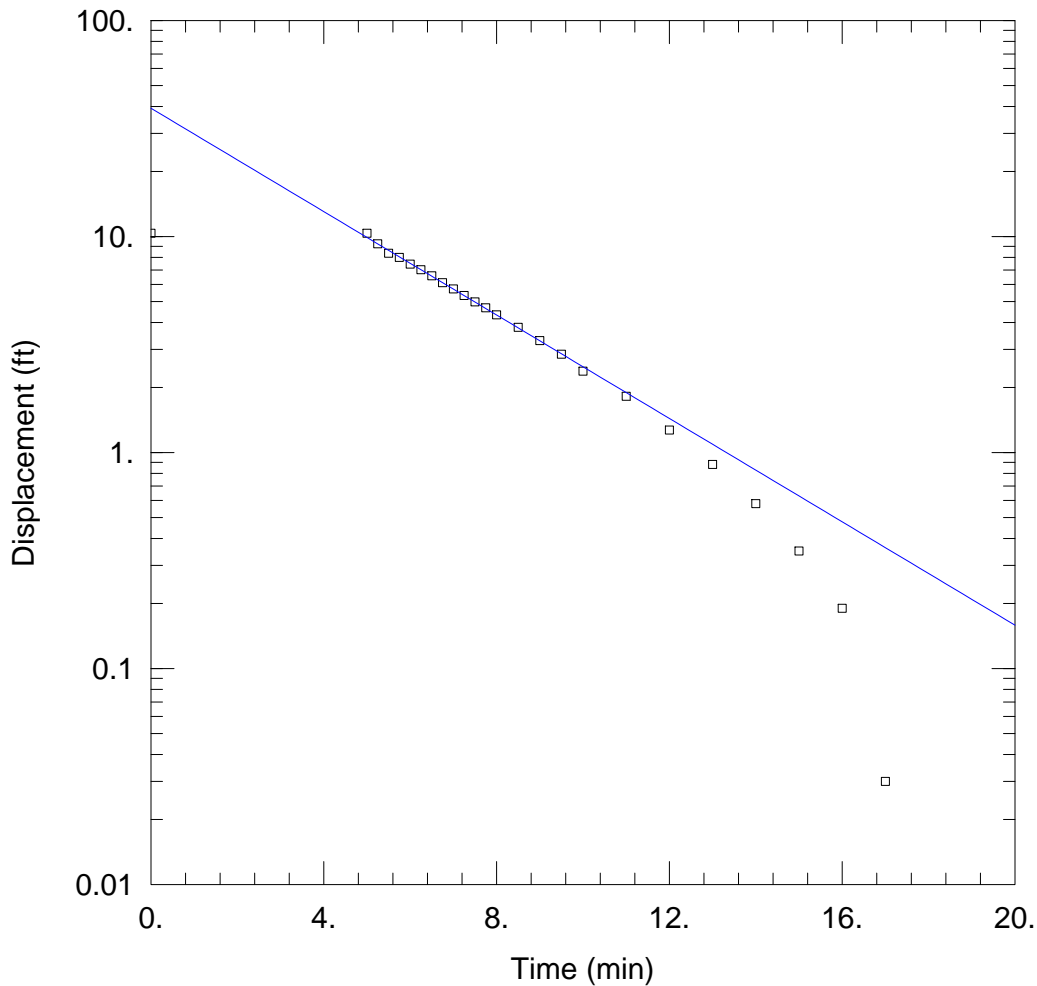
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 1.117E-6 cm/sec

y0 = 22.64 ft



BAILDOWN TEST - MW-35B BAIL DOWN TEST 1

Data Set: J:\...\MW35B\_baildown\_full\_thickness.aqt

Date: 08/29/14

Time: 11:57:41

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-35B

Test Date: 02/25/09

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-35B)

Initial Displacement: 10.36 ft

Static Water Column Height: 36.21 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.354 ft

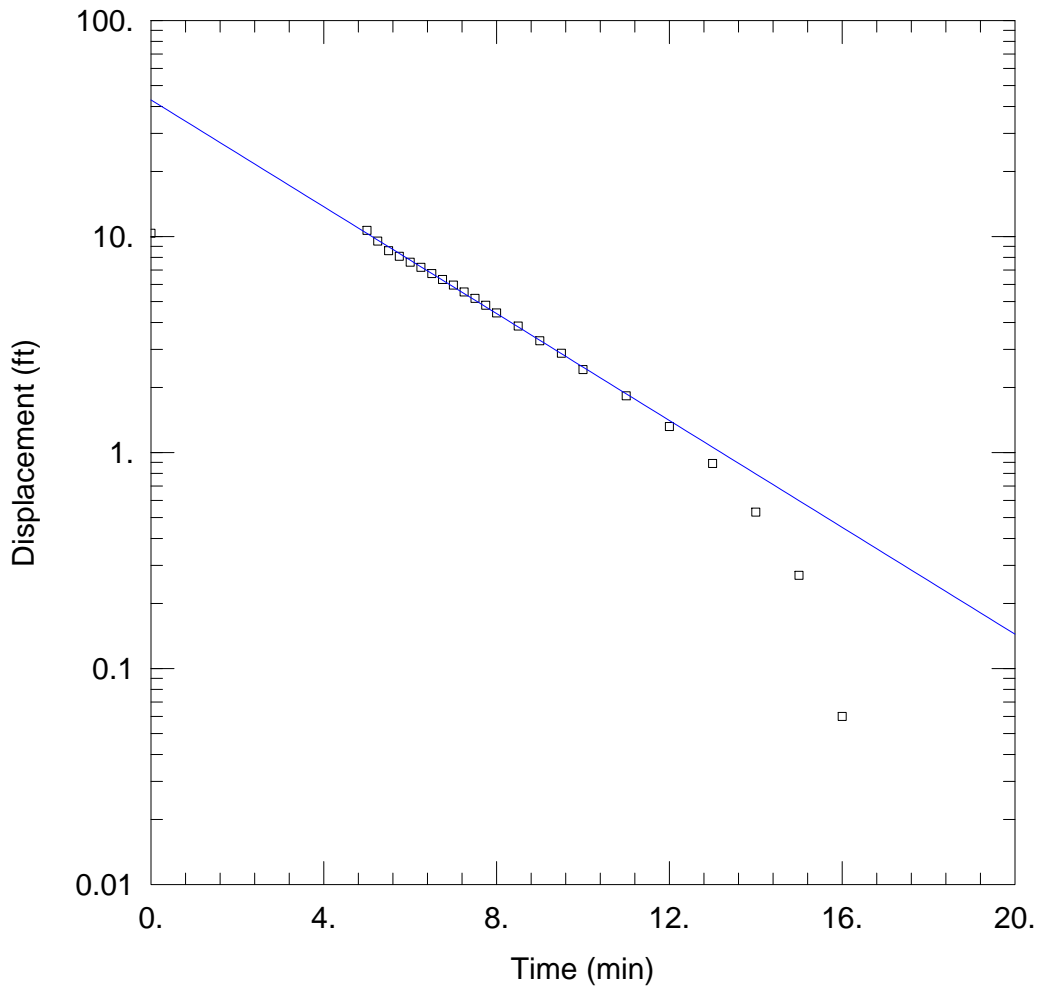
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0001565 cm/sec

y0 = 39.26 ft



BAILDOWN TEST - MW-35B BAIL DOWN TEST 2

Data Set: J:\...\MW35B\_baildown2\_full\_thickness.aqt

Date: 08/29/14

Time: 13:18:18

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-35B

Test Date: 02/25/09

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-35B)

Initial Displacement: 10.36 ft

Static Water Column Height: 36.21 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.354 ft

SOLUTION

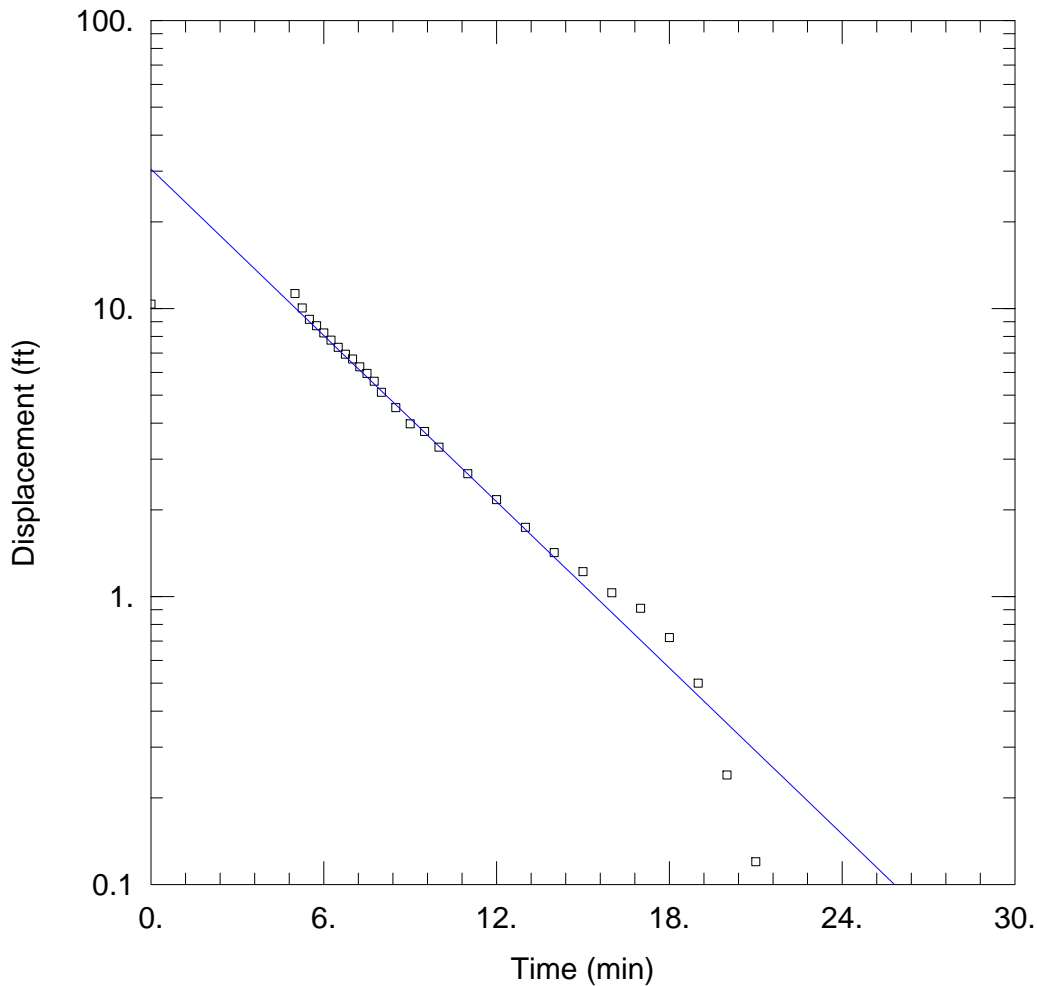
Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0001618 cm/sec

y0 = 42.91 ft





BAILDOWN TEST - MW-35B BAIL DOWN TEST 3

Data Set: J:\...\MW35B\_baildown3\_full\_thickness.aqt

Date: 08/29/14

Time: 13:20:34

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-35B

Test Date: 02/25/09

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-35B)

Initial Displacement: 10.36 ft

Static Water Column Height: 36.21 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.354 ft

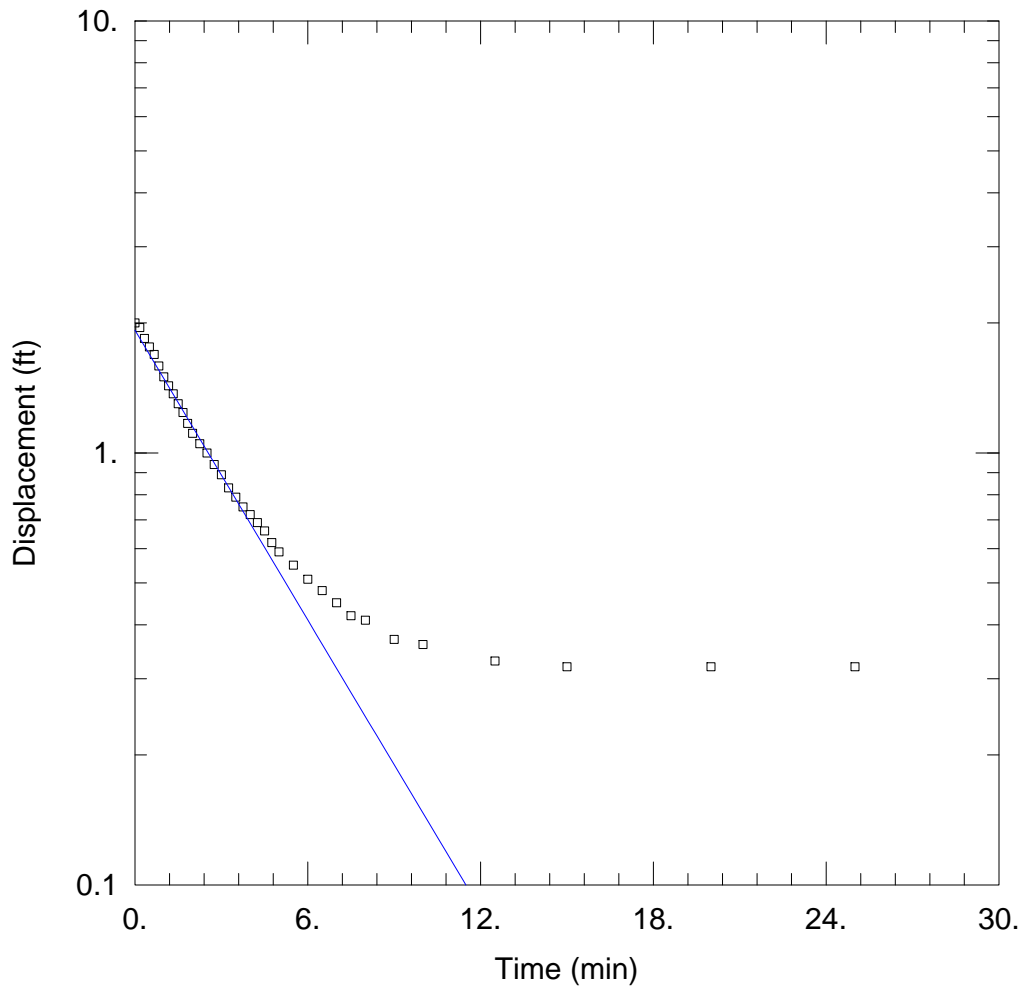
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0001259 cm/sec

y0 = 30.47 ft



WELL TEST ANALYSIS

Data Set: J:\...\MW35B\_Slugin\_full\_thickness.aqt

Date: 08/29/14

Time: 13:27:28

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW

Test Well: MW-35B

Test Date: 01/22/10

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-35B)

Initial Displacement: 2. ft

Static Water Column Height: 38.48 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.354 ft

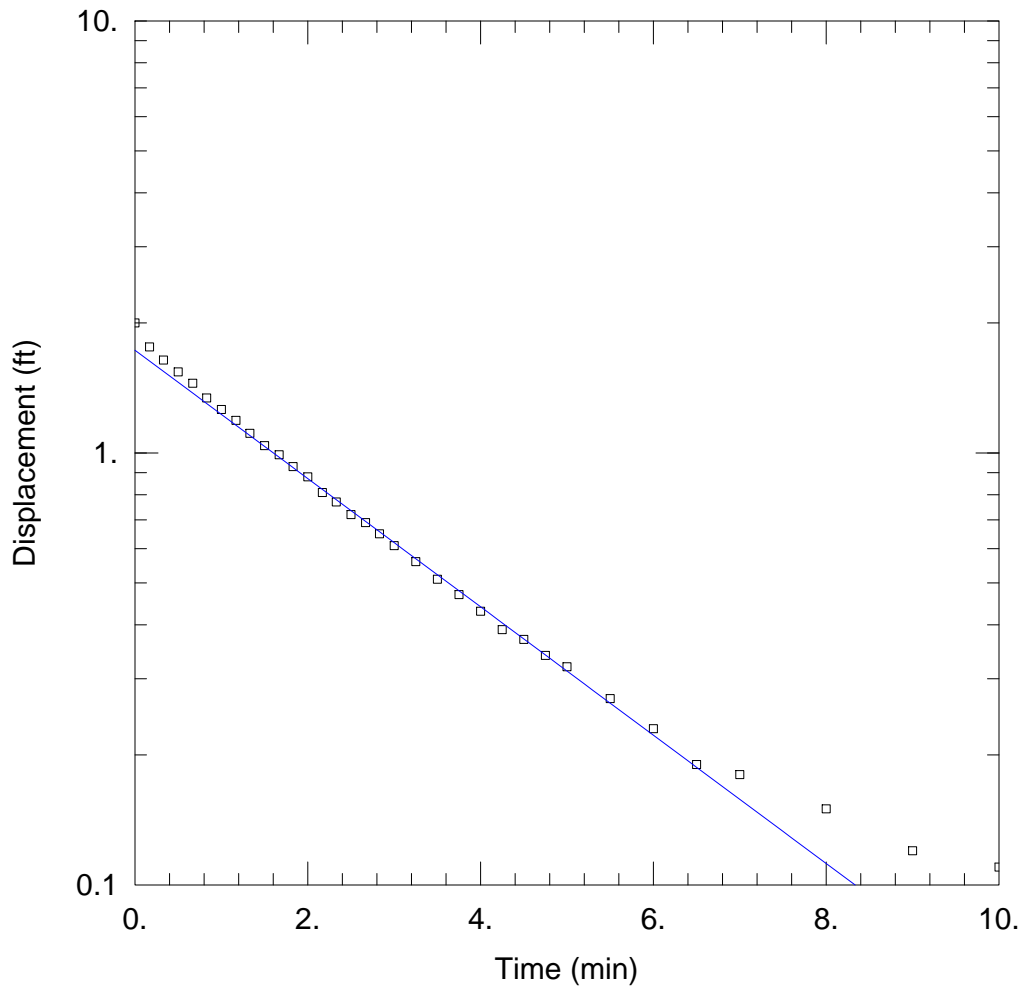
SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

K = 0.0001452 cm/sec

y0 = 1.923 ft



WELL TEST ANALYSIS

Data Set: J:\...\MW35B\_Slugout\_full\_thickness.aqt

Date: 08/29/14

Time: 13:34:10

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW

Test Well: MW-35B

Test Date: 01/22/10

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-35B)

Initial Displacement: 2. ft

Static Water Column Height: 38.48 ft

Total Well Penetration Depth: 15. ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.354 ft

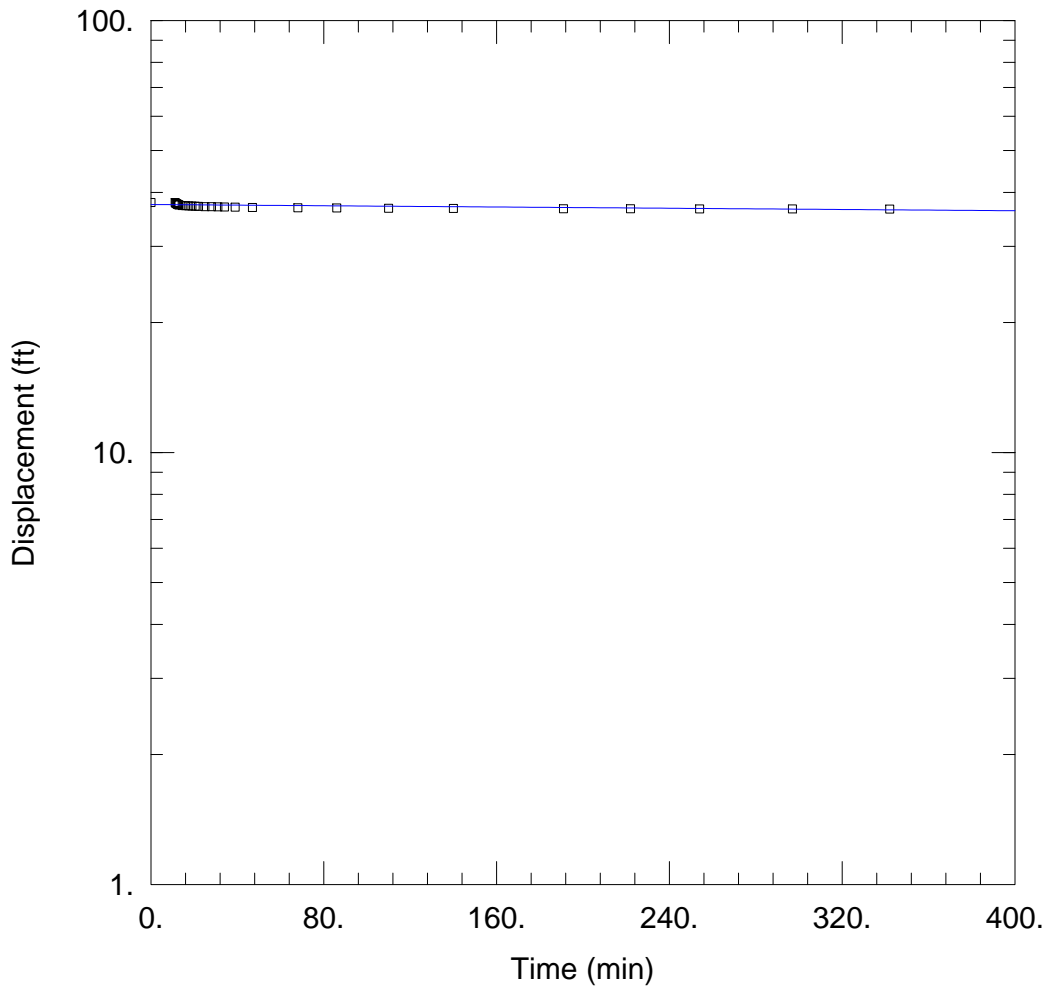
SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

K = 0.0001929 cm/sec

y0 = 1.728 ft



MW-36B BAIL DOWN TEST

Data Set: J:\...\MW36B\_baildown\_full\_thickness.aqt

Date: 08/29/14

Time: 10:38:12

PROJECT INFORMATION

Company: PBW, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-36B

Test Date: 7/22/10

AQUIFER DATA

Saturated Thickness: 31.5 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-36B)

Initial Displacement: 37.92 ft

Static Water Column Height: 38.62 ft

Total Well Penetration Depth: 15.5 ft

Screen Length: 5. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

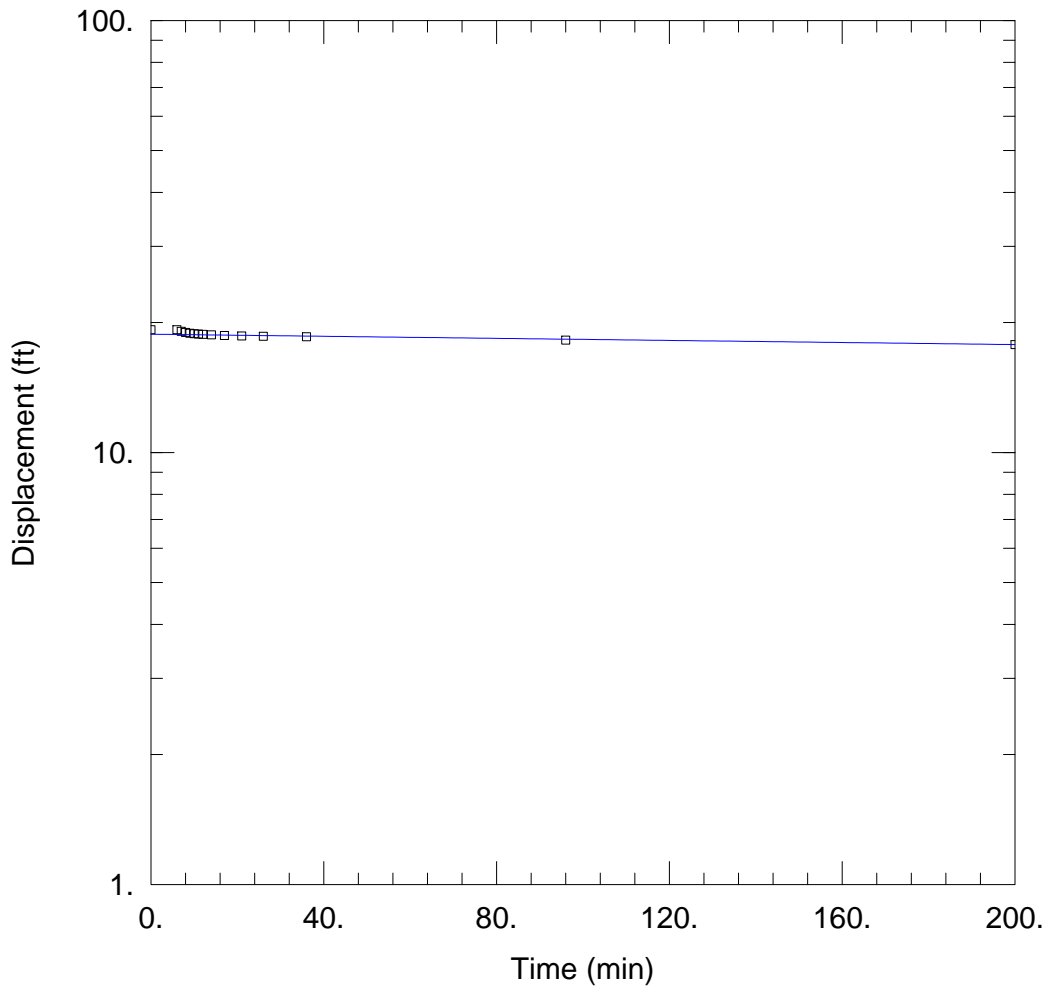
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 9.426E-8 cm/sec

y0 = 37.5 ft



MW-49B BAIL DOWN TEST

Data Set: J:\...\MW49B\_baildown\_full\_thickness.aqt

Date: 08/29/14

Time: 14:26:41

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-49B

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-49B)

Initial Displacement: 19.25 ft

Static Water Column Height: 21.1 ft

Total Well Penetration Depth: 9.5 ft

Screen Length: 5. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

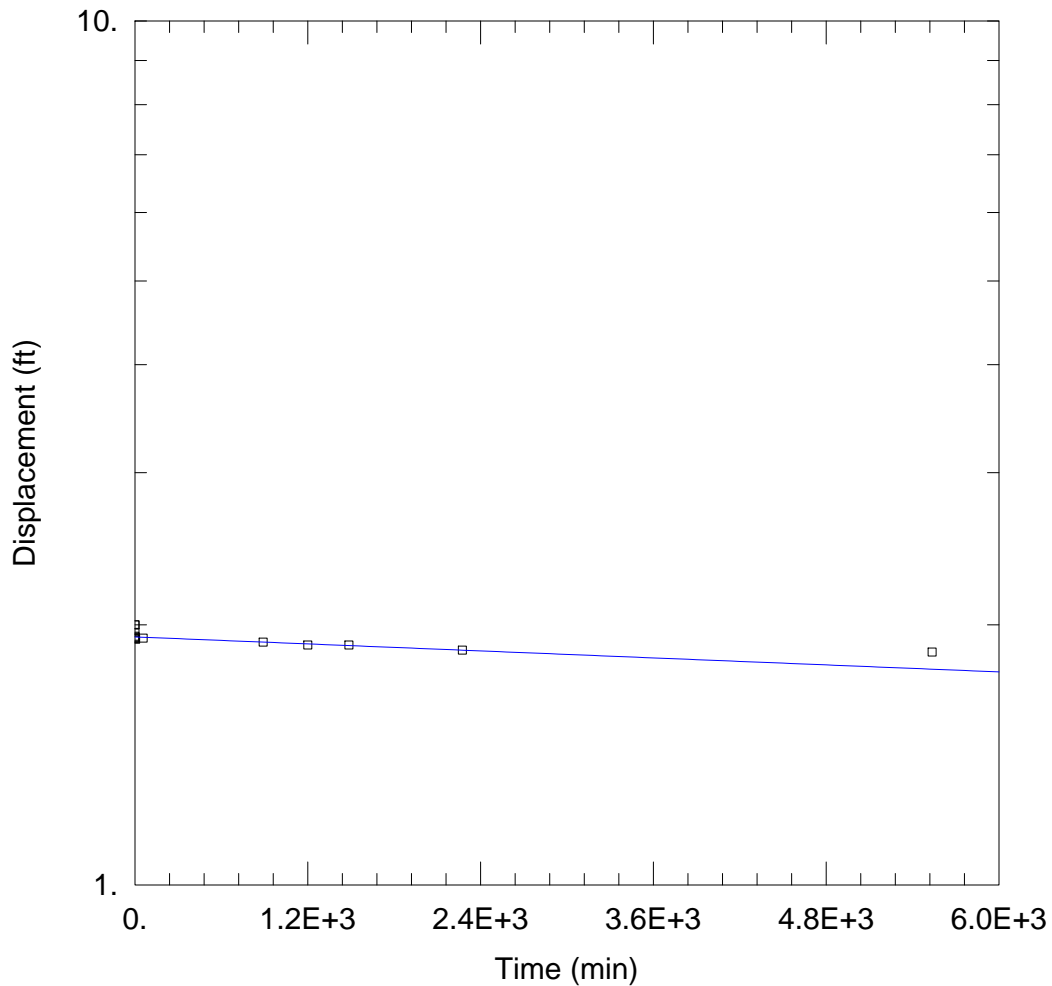
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 2.901E-7 cm/sec

y0 = 18.79 ft



### SLUG IN TEST - MW-55B

Data Set: J:\...\MW55B\_slug\_in\_full\_thickness.aqt

Date: 09/17/14

Time: 16:14:40

### PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW

Test Well: MW-55B

Test Date: 07/25/12

### AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 0.1

### WELL DATA (MW-55B)

Initial Displacement: 2. ft

Static Water Column Height: 23.62 ft

Total Well Penetration Depth: 13.2 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Well Radius: 0.208 ft

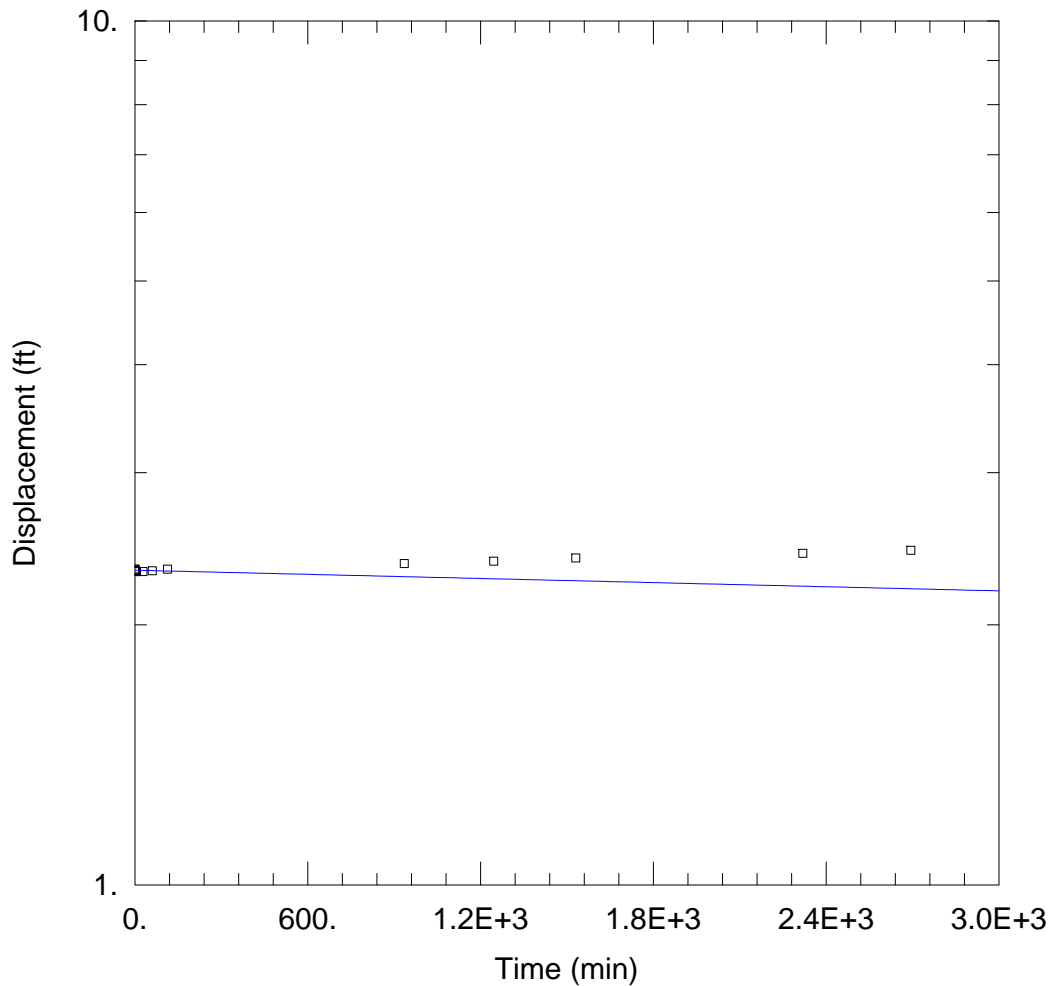
### SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 1.777E-8 cm/sec

y0 = 1.937 ft



SLUG IN TEST - MW-57B

Data Set: J:\...\MW57B\_slug\_in\_full\_thickness.aqt

Date: 09/17/14

Time: 16:12:59

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW

Test Well: MW-57B

Test Date: 07/25/12

AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-57B)

Initial Displacement: 2.32 ft

Static Water Column Height: 18.77 ft

Total Well Penetration Depth: 12.8 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Well Radius: 0.208 ft

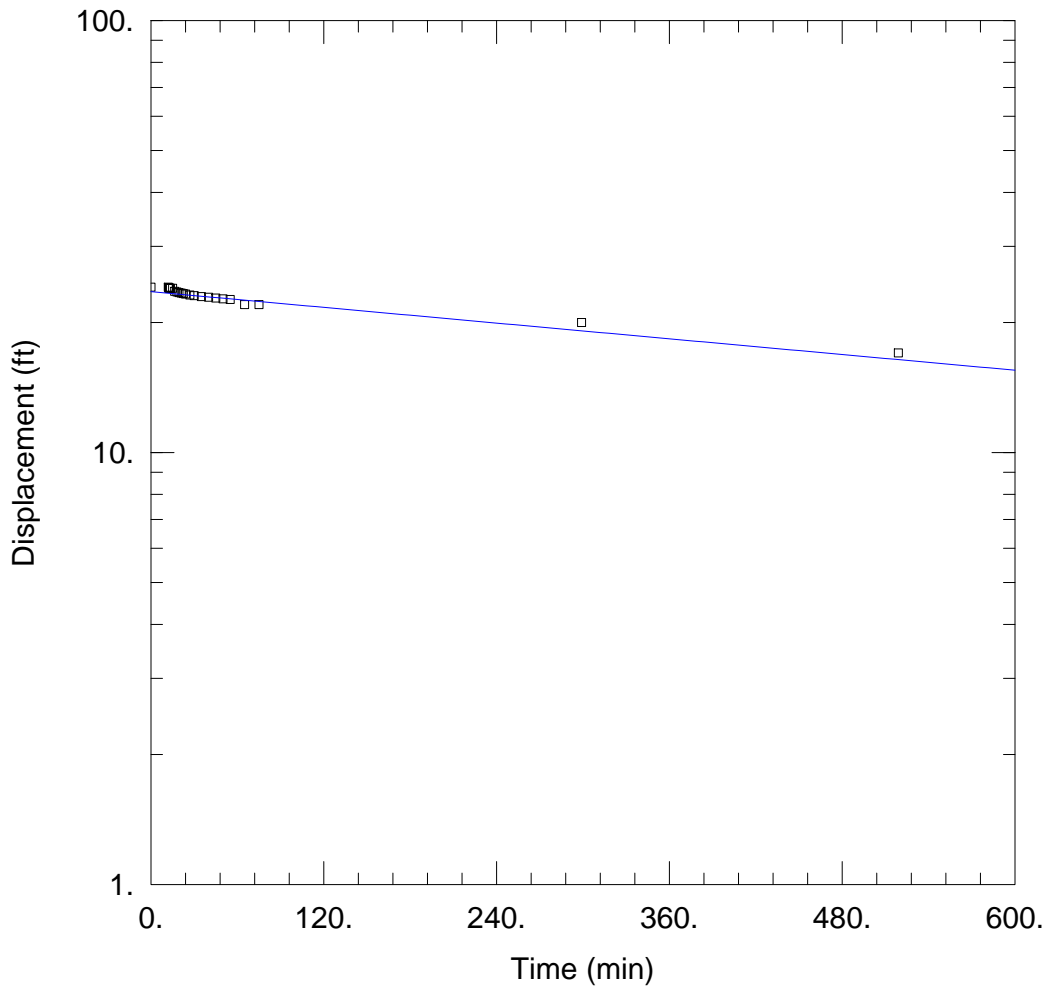
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 2.089E-8 cm/sec

y0 = 2.313 ft



MW-59B BAIL DOWN TEST

Data Set: J:\...\MW59B\_baildown\_full\_thickness.aqt

Date: 08/29/14

Time: 10:56:00

PROJECT INFORMATION

Company: PBW, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-59B

Test Date: 7/22/10

AQUIFER DATA

Saturated Thickness: 34.5 ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-59B)

Initial Displacement: 24.15 ft

Static Water Column Height: 24.69 ft

Total Well Penetration Depth: 12. ft

Screen Length: 5. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

SOLUTION

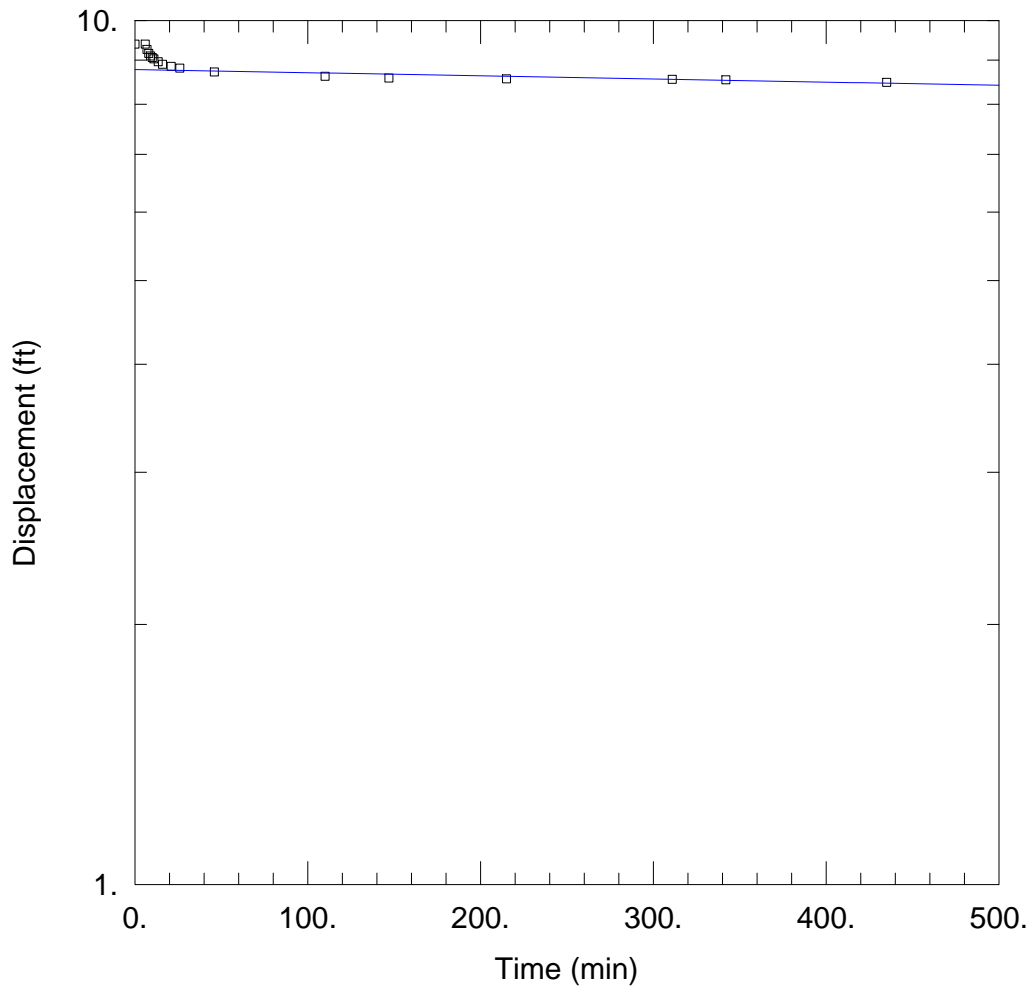
Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 7.607E-7 cm/sec

y0 = 23.57 ft





MW-63B BAIL DOWN TEST

Data Set: J:\...\MW-63B\_full\_thickness.aqt  
 Date: 08/29/14

Time: 11:35:28

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC  
 Client: UPRR  
 Project: 1358  
 Location: HWPW, Houston, TX  
 Test Well: MW-63B  
 Test Date: 2/25/2009

AQUIFER DATA

Saturated Thickness: 37. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-63B)

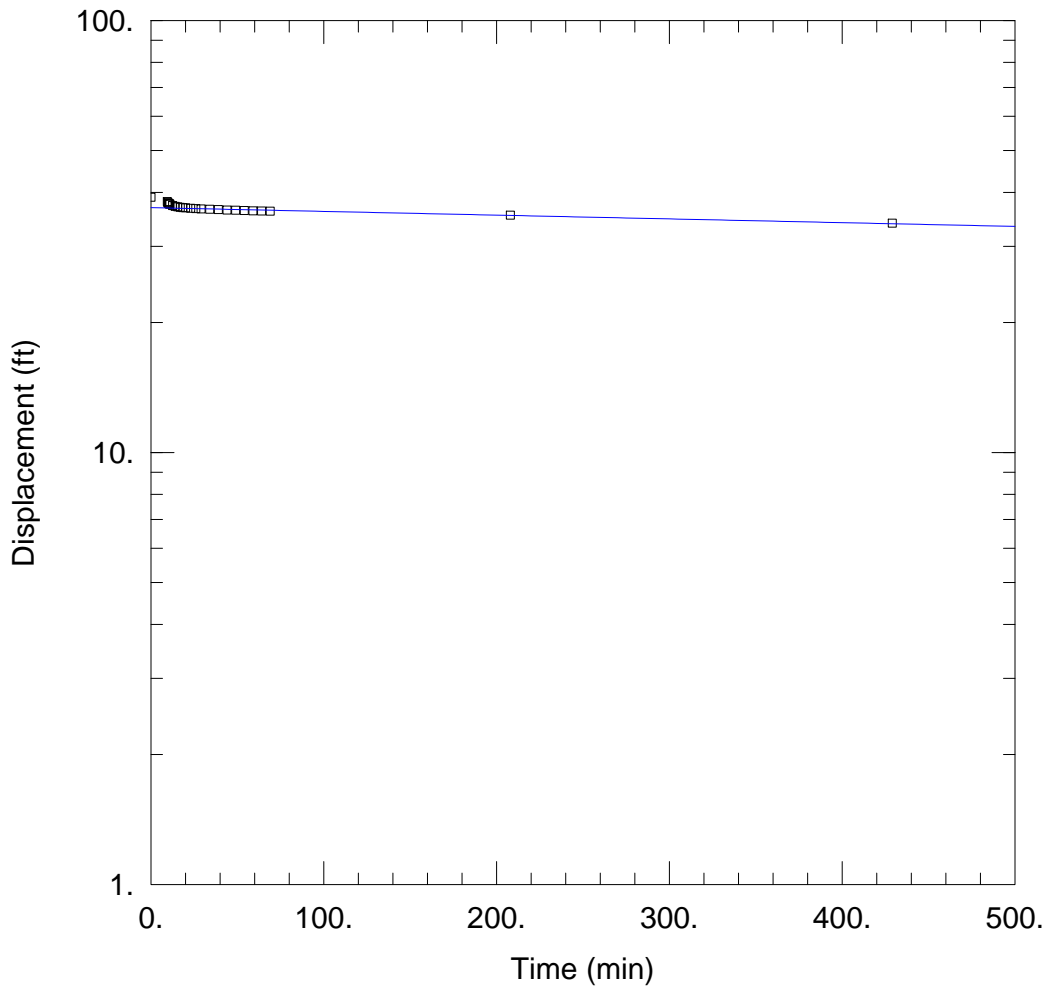
Initial Displacement: 9.39 ft  
 Total Well Penetration Depth: 12.5 ft  
 Casing Radius: 0.0833 ft

Static Water Column Height: 10.42 ft  
 Screen Length: 5. ft  
 Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined  
 K = 9.174E-8 cm/sec

Solution Method: Bouwer-Rice  
 y0 = 8.775 ft



MW-67B BAIL DOWN TEST

Data Set: J:\...\MW-67B\_baildown\_full\_thickness.aqt

Date: 08/29/14

Time: 11:15:24

PROJECT INFORMATION

Company: PBW, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-67B

Test Date: 7/22/10

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-67B)

Initial Displacement: 39. ft

Static Water Column Height: 37.37 ft

Total Well Penetration Depth: 8.5 ft

Screen Length: 5. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

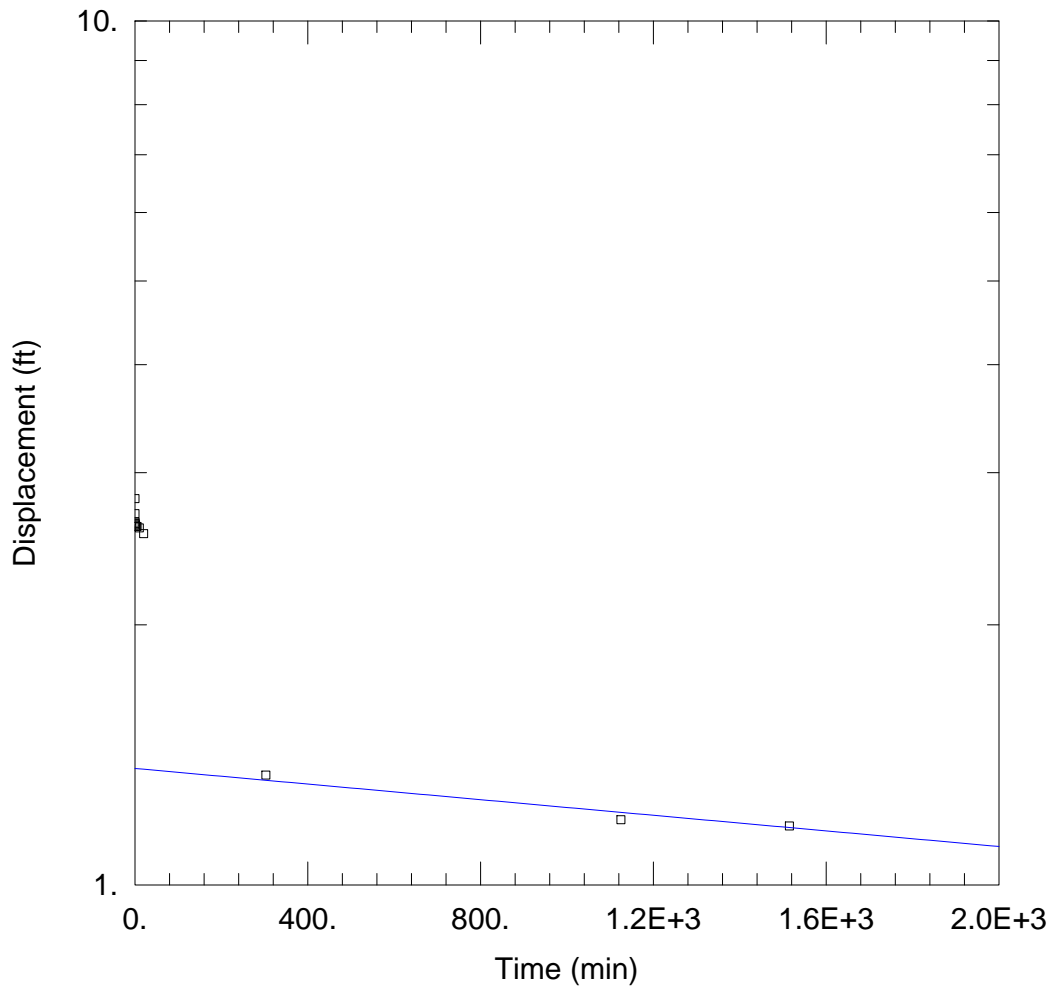
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 2.067E-7 cm/sec

y0 = 36.88 ft



SLUG IN TEST - MW-70B

Data Set: J:\...\MW70B\_Slugin\_Mar12\_full\_thickness.aqt

Date: 08/29/14

Time: 14:09:01

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW

Test Well: MW-70B

Test Date: 03/06/12

AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-70B)

Initial Displacement: 2.8 ft

Static Water Column Height: 29.51 ft

Total Well Penetration Depth: 13.2 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.208 ft

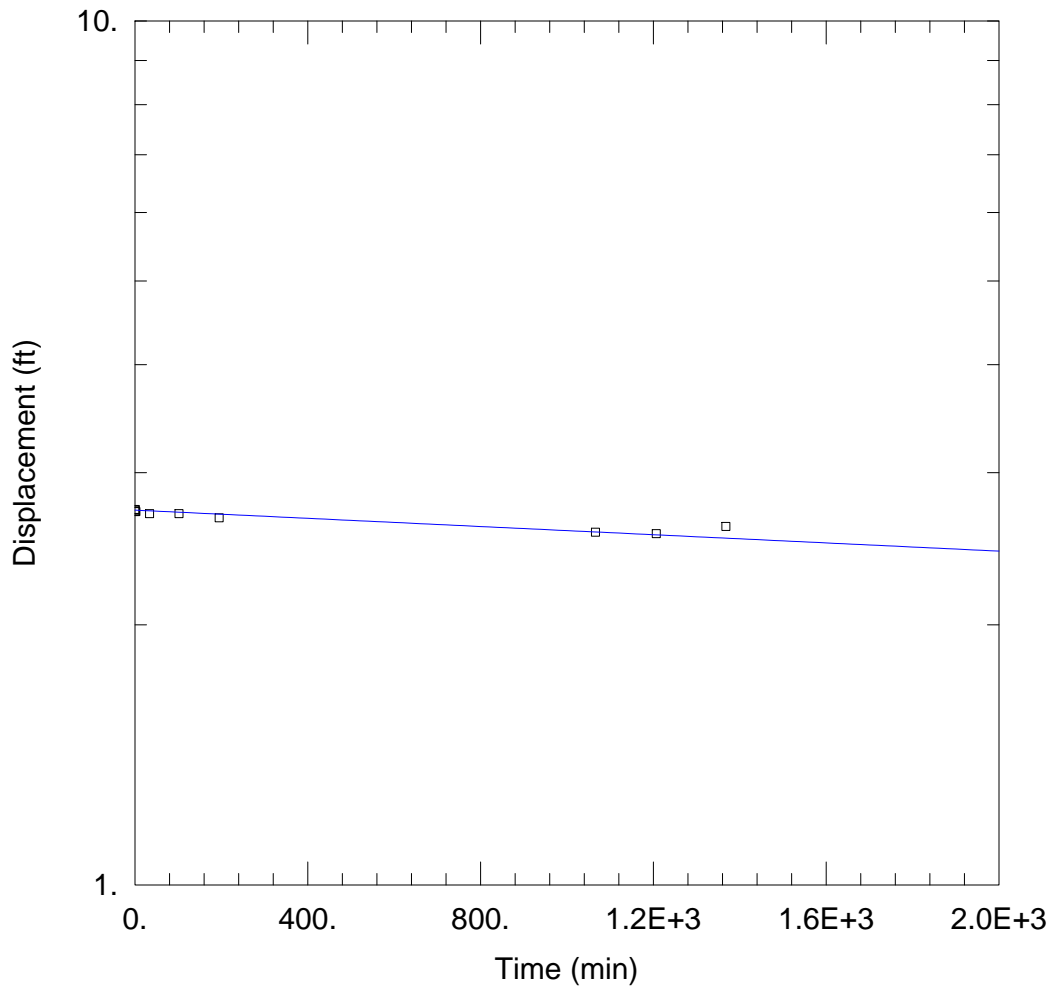
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 6.483E-8 cm/sec

y0 = 1.364 ft



### SLUG OUT TEST - MW-70B

Data Set: J:\...\MW70B\_Slugout\_Mar12\_full\_thickness.aqt

Date: 08/29/14

Time: 13:52:42

### PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW

Test Well: MW-70B

Test Date: 03/06/12

### AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 0.1

### WELL DATA (MW-70B)

Initial Displacement: 2.72 ft

Static Water Column Height: 29.51 ft

Total Well Penetration Depth: 13.2 ft

Screen Length: 10. ft

Casing Radius: 0.083 ft

Well Radius: 0.208 ft

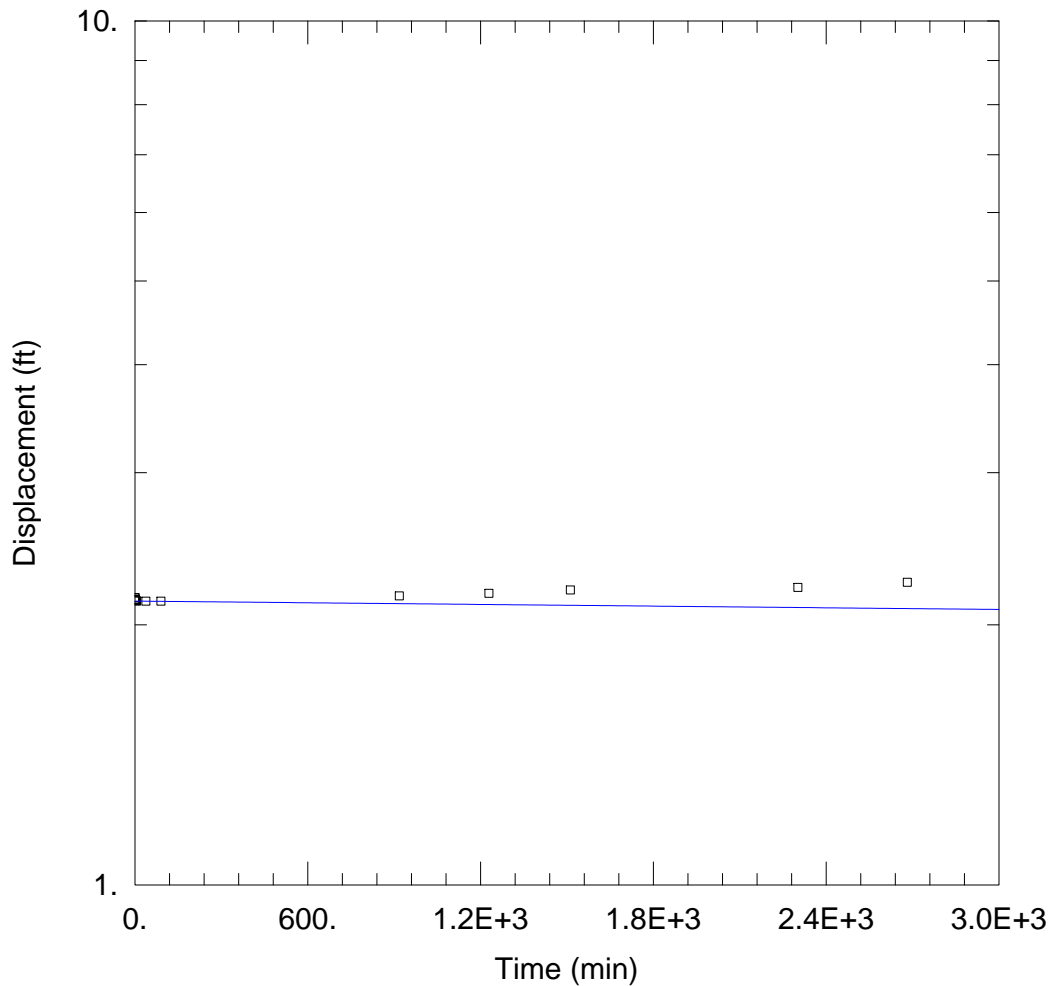
### SOLUTION

Aquifer Model: Confined

Solution Method: Bower-Rice

K = 3.405E-8 cm/sec

y0 = 2.715 ft



SLUG IN TEST - MW-72B

Data Set: J:\...\MW72B\_slug\_in\_full\_thickness.aqt

Date: 09/17/14

Time: 16:10:48

PROJECT INFORMATION

Company: Pastor, Behling & Wheeler, LLC

Client: UPRR

Project: 1358

Location: HWPW

Test Well: MW-72B

Test Date: 07/25/12

AQUIFER DATA

Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-72B)

Initial Displacement: 2.15 ft

Static Water Column Height: 7.76 ft

Total Well Penetration Depth: 8.3 ft

Screen Length: 5. ft

Casing Radius: 0.083 ft

Well Radius: 0.208 ft

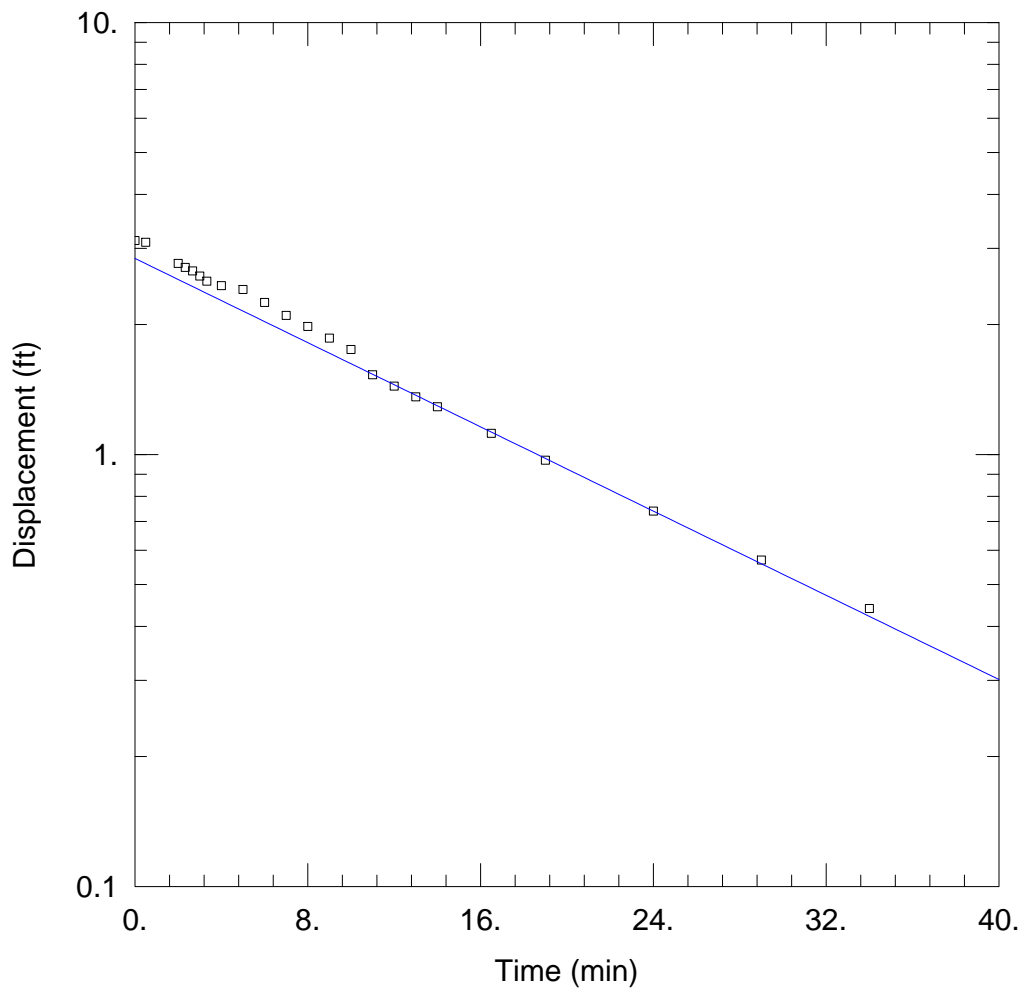
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 8.002E-9 cm/sec

y0 = 2.131 ft



MW-36D SLUG IN 1

Data Set: J:\...\MW-36D\_In\_1\_full\_thickness.aqt

Date: 09/15/14

Time: 10:28:42

PROJECT INFORMATION

Company: PBW, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-36D

Test Date: 7/22/10

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-36D)

Initial Displacement: 3.13 ft

Static Water Column Height: 24.53 ft

Total Well Penetration Depth: 24.53 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

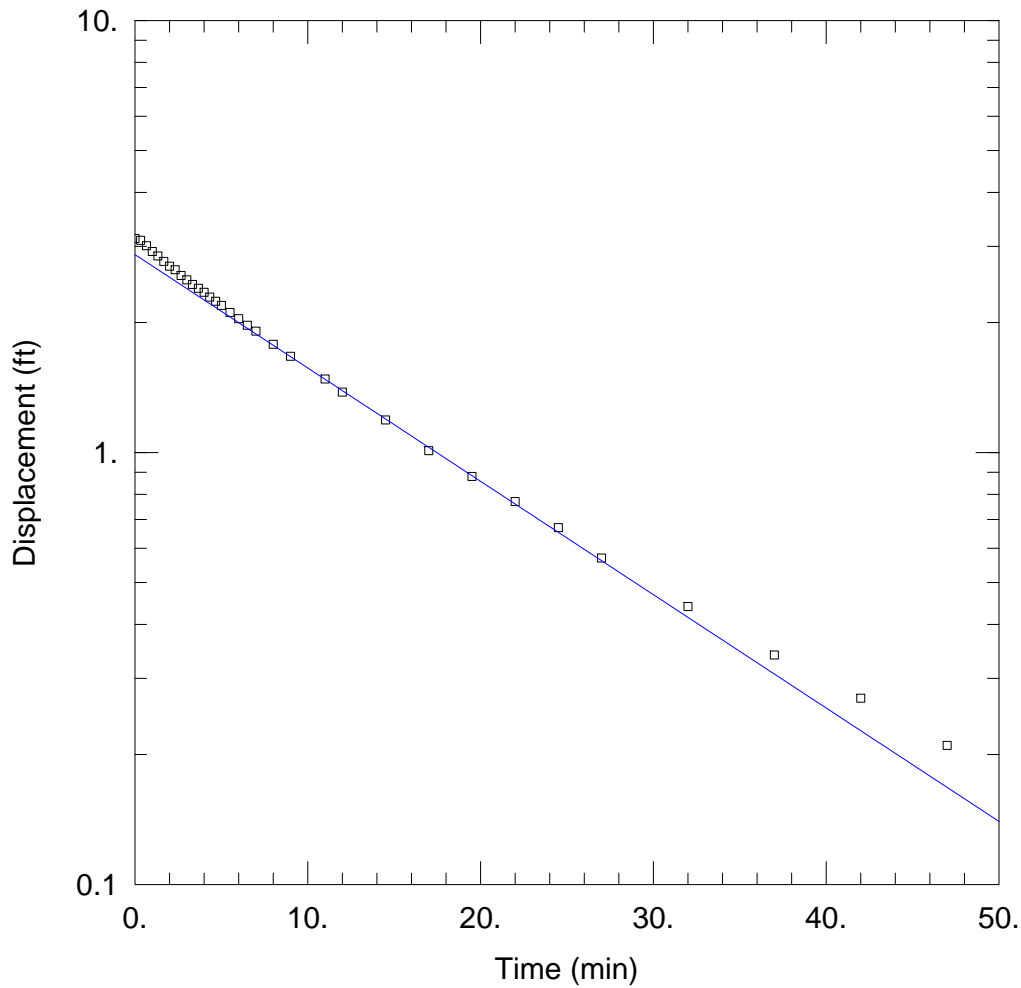
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 3.753E-5 cm/sec

y0 = 2.844 ft



MW-36D SLUG IN 2

Data Set: J:\...\MW-36D\_In\_2\_full\_thickness.aqt

Date: 09/15/14

Time: 10:30:12

PROJECT INFORMATION

Company: PBW, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-36D

Test Date: 7/22/10

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-36D)

Initial Displacement: 3.13 ft

Static Water Column Height: 24.53 ft

Total Well Penetration Depth: 24.53 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

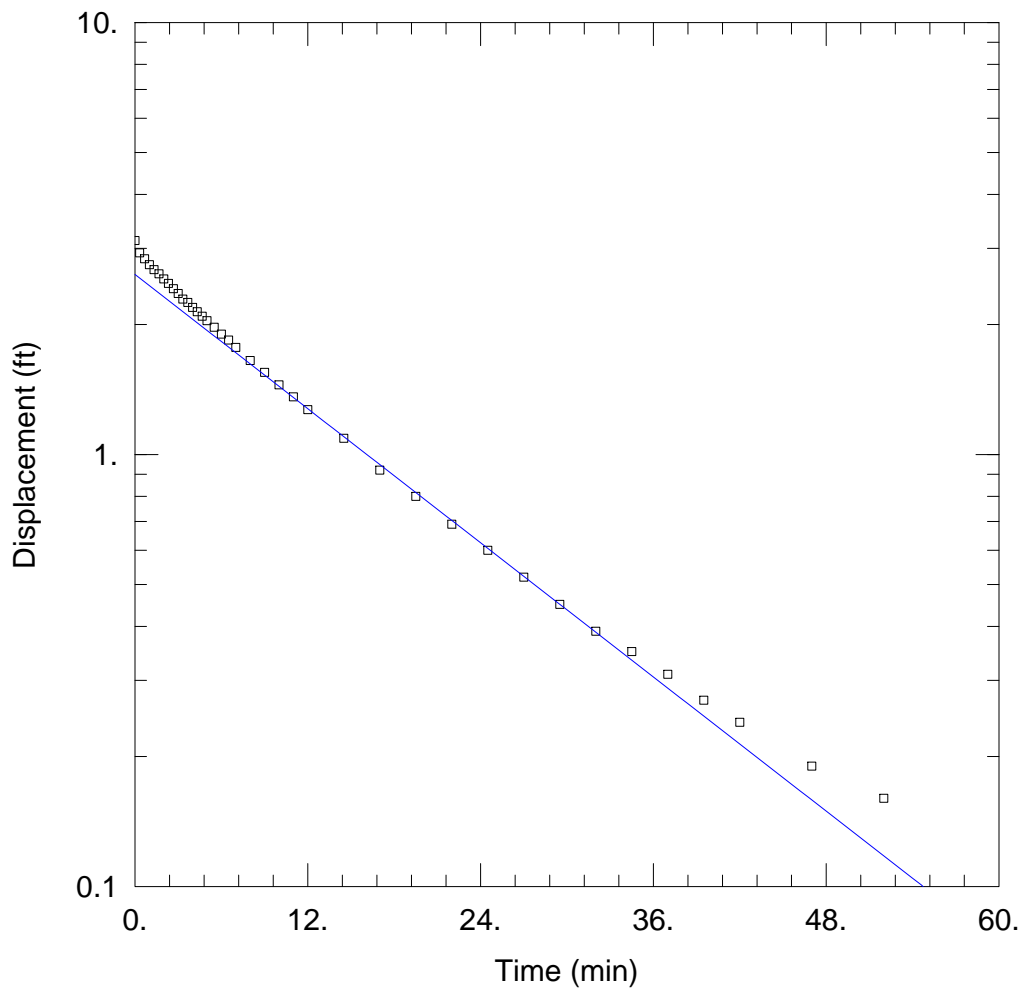
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 4.043E-5 cm/sec

y0 = 2.871 ft



MW-36D SLUG IN 3

Data Set: J:\...\MW-36D\_In\_3\_full\_thickness.aqt

Date: 09/15/14

Time: 10:30:25

PROJECT INFORMATION

Company: PBW, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-36D

Test Date: 7/22/10

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-36D)

Initial Displacement: 3.13 ft

Static Water Column Height: 24.53 ft

Total Well Penetration Depth: 24.53 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

SOLUTION

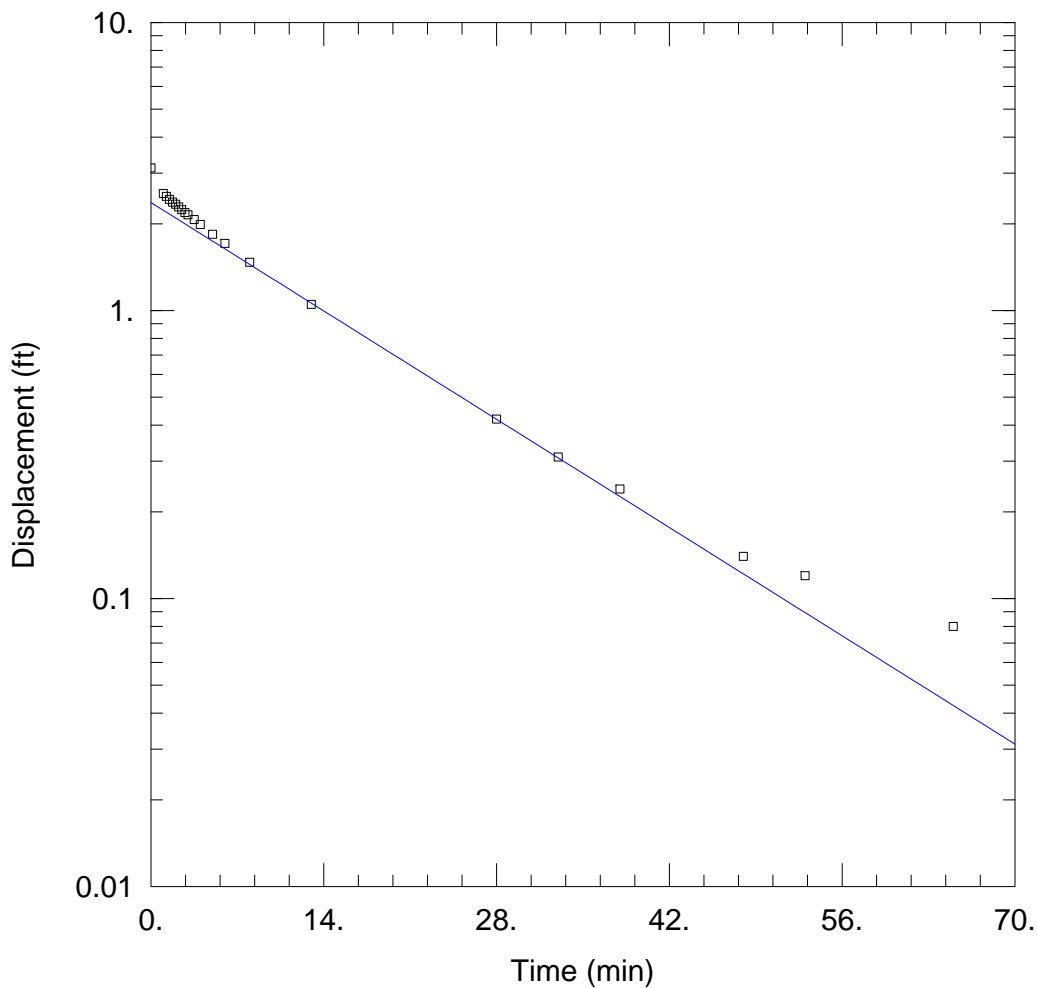
Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 3.987E-5 cm/sec

y0 = 2.611 ft





MW-36D SLUG OUT 1

Data Set: J:\...\MW-36D\_Out\_1\_full\_thickness.aqt

Date: 09/15/14

Time: 10:29:49

PROJECT INFORMATION

Company: PBW, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-36D

Test Date: 7/22/10

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-36D)

Initial Displacement: 3.13 ft

Static Water Column Height: 24.53 ft

Total Well Penetration Depth: 24.53 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

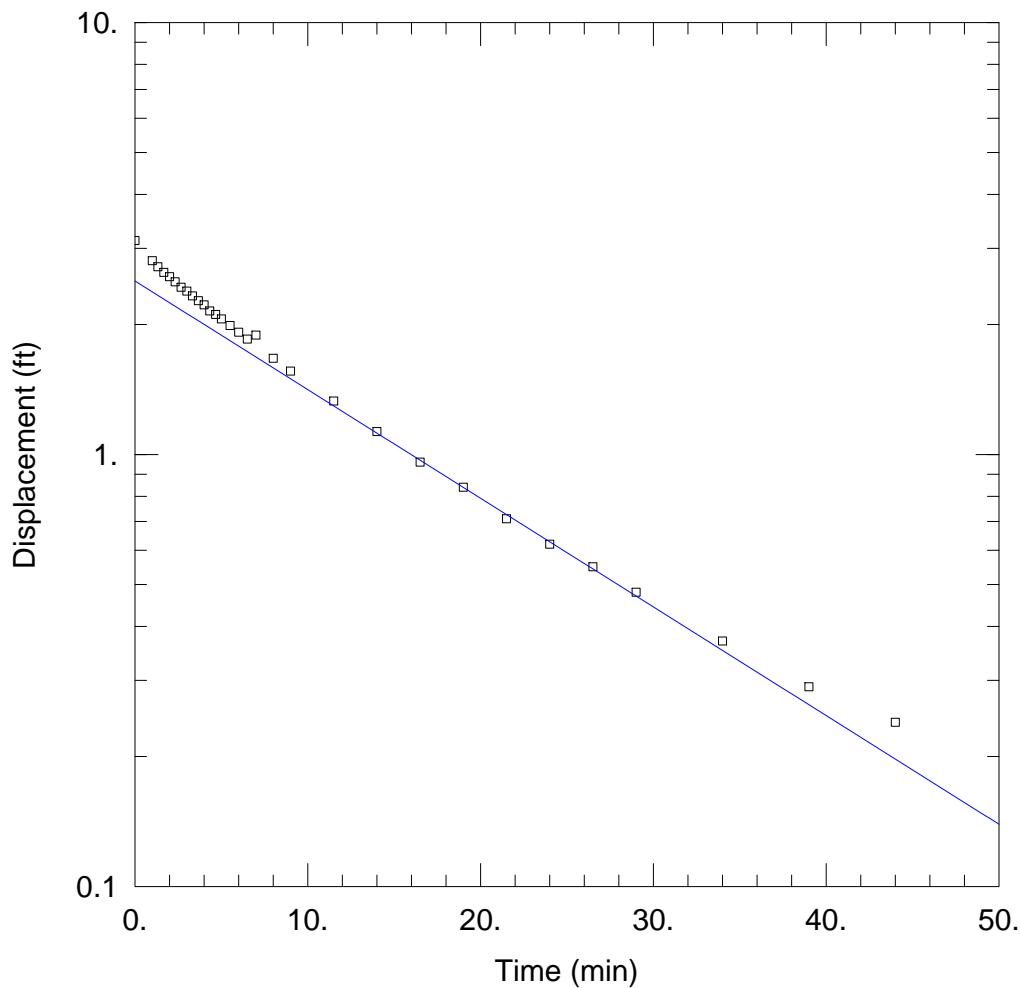
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 4.139E-5 cm/sec

y0 = 2.371 ft



MW-36D SLUG OUT 2

Data Set: J:\...\MW-36D\_Out\_2\_full\_thickness.aqt

Date: 09/15/14

Time: 10:29:20

PROJECT INFORMATION

Company: PBW, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-36D

Test Date: 7/22/10

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-36D)

Initial Displacement: 3.13 ft

Static Water Column Height: 24.53 ft

Total Well Penetration Depth: 24.53 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

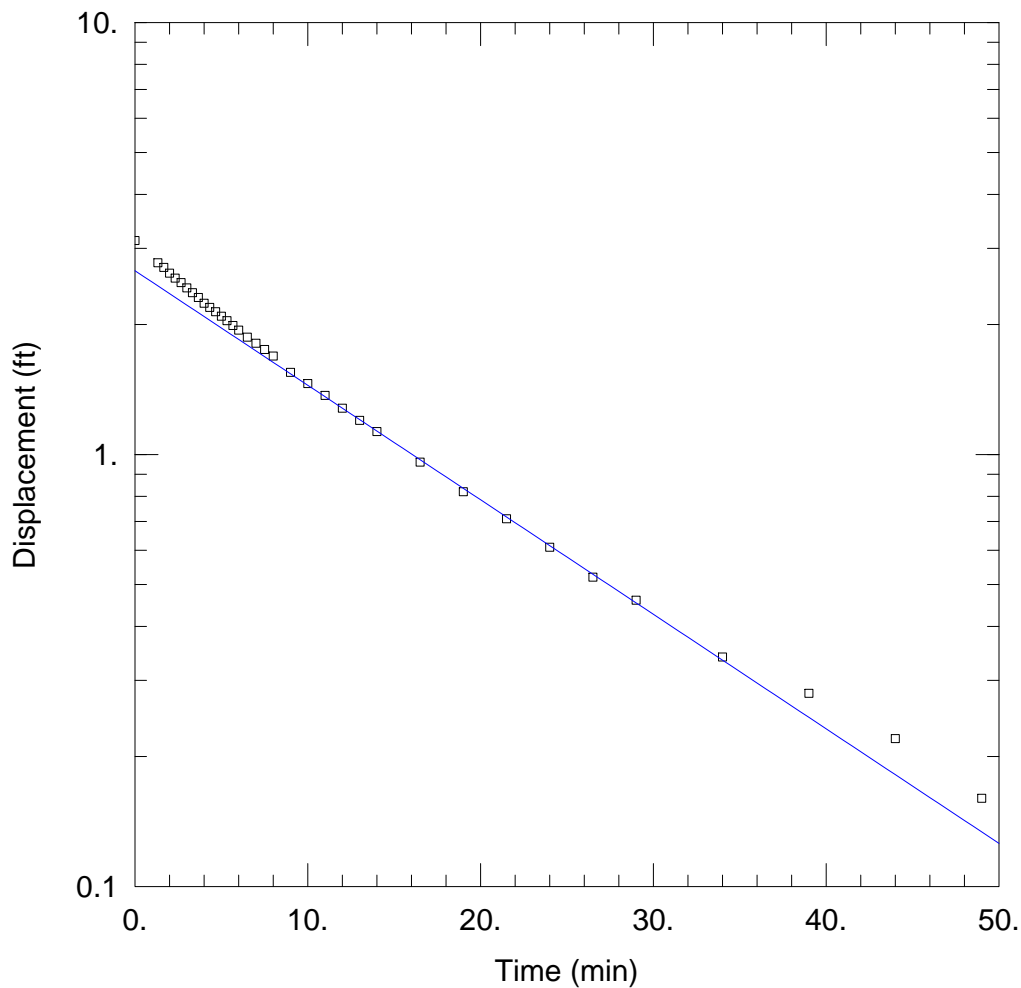
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 3.875E-5 cm/sec

y0 = 2.522 ft



MW-36D SLUG OUT 3

Data Set: J:\...\MW-36D\_Out\_3\_full\_thickness.aqt

Date: 09/15/14

Time: 10:32:40

PROJECT INFORMATION

Company: PBW, LLC

Client: UPRR

Project: 1358

Location: HWPW, Houston, TX

Test Well: MW-36D

Test Date: 7/22/10

AQUIFER DATA

Saturated Thickness: 35. ft

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-36D)

Initial Displacement: 3.13 ft

Static Water Column Height: 24.53 ft

Total Well Penetration Depth: 24.53 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 4.084E-5 cm/sec

y0 = 2.663 ft

## VII. Closure and Post-Closure Plans

Submit a full closure plan and post-closure plan, if applicable, which contains all the information required by 30 TAC 335.8, 335.169, 335.172, 335.174, 335.177-335.178, 335.551-335.569, 30 TAC Chapter 350, 40 CFR 264.112, 264.118, 264.178, 264.197, 264.228, 264.258, 264.280, 264.310, 264.351, 264.575, 264.601, 264.603, 264.1102, 270.14(b)(13), 270.17(f), 270.18(h), 270.20(f), 270.21(e), 270.23(a)(2) & (3), and 270.26(c)(16) where applicable. The owner of property on which an existing disposal facility is located must also submit documentation that a notation has been placed in the deed to the facility that will in perpetuity notify any potential purchasers of the property that the land has been used to manage hazardous wastes and its use is restricted (see 30 TAC 335.5). For hazardous waste disposal units that were closed before submission of the application, the applicant should submit documentation to show that plats and notices required under 40 CFR 264.116 and 264.119 have been filed.

### A. Closure

This section applies to the owners and operators of all hazardous waste management facilities to be permitted. The applicant must close the facility in a manner that minimizes need for further maintenance and controls, or eliminates, to the extent necessary to protect human health and the environment, the post-closure release of hazardous waste, hazardous constituents, leachate, contaminated rainfall, or waste decomposition products to the groundwater, surface waters, or to the atmosphere.

The facility type and type of unit to be closed can determine the level of detail sufficient for a closure plan.

For each unit to be permitted, complete Table VII.A. - Unit Closure and list the facility components to be decontaminated, possible methods of decontamination, and possible methods of disposal of wastes and waste residues generated during unit closure.

Additionally, if the applicant plans to close a surface impoundment in accordance with 30 TAC 335.169(a)(1) and the impoundment does not comply with the liner requirements of 30 TAC Section 335.168(a) then the closure plan for the impoundment must include both a plan for complying with 30 TAC 335.169(a)(1) and a contingent plan for complying with 30 TAC 335.169(a)(2).

Guidance on design of a closure cap and final cover for landfills is given in TCEQ Technical Guideline No. 3, and EPA publication 530-SW-85-014 presents guidance on construction quality assurance of liner construction.

If a waste pile does not comply with the liner requirements of 30 TAC Section 335.170(a)(1) then the closure plan for the waste pile must include both a plan for complying with 40 CFR 264.258(a) and a contingent plan for complying with 40 CFR 264.258(b).

The final certification of closure of a land treatment unit may be prepared by an independent qualified soil scientist in lieu of an independent licensed Professional Engineer.

### B. Closure Cost Estimate (including contingent closure) [30 TAC 335.178, 40 CFR 264.142]

This section applies to owners or operators of all hazardous waste facilities, except state and federal agencies. A detailed estimate, in current dollars, of the cost of closing the facility should be included in the report. The cost estimate must include the cost of closure at the point in the facilities operating life when the extent and manner of its operation would make closure the most expensive. The TCEQ has published Technical Guideline No. 10, Closure and Post-Closure Cost Estimates, for calculating closure costs which should be consulted. Closure costs should be developed on the basis of abandonment of the site at full capacity and closure activities to be conducted by a third party with no operable on-site equipment. The costs for closing each unit must be detailed.

1. If closure costs are based on contractor bids, the applicant should submit a copy of the bid specification and each contractor's response.

2. If closure costs are based on a detailed analysis, the applicant should submit details of item costs and number of each item, and details of costs for equipment rental, third party labor and supervision, transportation, analytical costs, etc. Provide an itemized cost on Table VII.B. - Unit Closure Cost Estimate for a complete, third party permitted facility closure.  
  
As units are added or deleted from these tables through future permit amendments or modifications, the remaining itemized unit costs should be updated for inflation when recalculating the revised total cost in current dollars.
3. The closure plan may propose on-site disposal of wastes, residues, etc. during closure of a unit, and this may be executed if on-site capacity exists in other units during closure of a unit. However, the cost estimate for closure must be based on off-site shipment and disposal during closure of all wastes, waste residues, wastes generated by decontamination, contaminated stormwater, and leachate.
4. For each surface impoundment, waste pile, or tank system required to have a contingent closure plan, the cost for closure under the contingent closure plan should be detailed, as well as the cost of proposed closure. The more expensive of the cost of the proposed closure of a unit versus the cost of the contingent closure of the unit should be used in the total facility closure cost estimate.

### C. Post-closure

This section applies to owners or operators of all hazardous waste disposal facilities. This section also applies to certain waste piles, tanks and surface impoundments from which the owner or operator intends to remove wastes at closure but which are required to have contingent post-closure plans.

Post-closure care of each hazardous waste management unit must continue for 30 years after the date of completing closure of the unit and must consist of monitoring and reporting of the groundwater monitoring systems in addition to the maintenance and monitoring of waste containment systems. Continuation of certain security requirements may be necessary after the date of closure. Post-closure use of property on or in which hazardous waste remains after closure must never be allowed to disrupt the integrity of the containment system. In addition, submit the following information.

1. The post-closure care plan for a landfill or of a surface impoundment, waste pile, miscellaneous unit, or tank system closed with wastes or waste constituents left in place, or closed under a contingent closure plan, must demonstrate compliance with 30 TAC 335.174(b).
2. The name, address, and phone number of the person or office to contact about the disposal facility during the post-closure period; and
3. A discussion of the future use of the land associated with each unit.
4. For landfills, surface impoundments, waste piles, and land treatment areas closed under interim status, submit the required documentation of 40 CFR 270.14(b)(14).
5. Landfills, surface impoundments, waste piles and land treatment areas that received hazardous wastes after July 26, 1982 or for which closure was certified after January 26, 1983 must be included in post-closure care plans unless they have been determined to have closed by removal equivalent to the closure standards in 40 CFR 264 Subpart G. If such a demonstration has been made pursuant to 40 CFR 270.1(c)(5), but an equivalency determination has not been made, please submit a copy of the demonstration documentation. If an equivalency determination has been made pursuant to 40 CFR 270.1(c)(6), applicant

should submit a copy of the determination. Complete Table VII.C.5. - Land-Based Units Closed Under Interim Status for all land based units closed under interim status.

D. Post-closure Cost Estimate [40 CFR 264.144]

This section regarding post-closure cost estimate applies to owners or operators of all hazardous waste disposal facilities, except state and federal agencies, and certain waste piles, tank systems, and surface impoundments from which the owner or operator intends to remove wastes at closure, but which are required to have contingent closure and post-closure plans. A detailed estimate, in current dollars, of the annual cost of monitoring and maintenance of the facility in accordance with the applicable post-closure regulations must be included in the report. The TCEQ has published Technical Guideline No. 10 for calculating post-closure costs, which should be consulted. Costs should be developed in detail for 30 years of post-closure care activities to be conducted by a third party, for each applicable unit.

1. The applicant should submit details of item costs and number of each item for off-site disposal of leachate and bailed monitor well water, labor and supervision, monitor well sampling and analyses, inspection and repair of the cap(s), mowing and re-seeding of the vegetative cover, maintaining site security, etc. Provide an itemized cost estimate on Table VII.D. - Unit Post-Closure Cost Estimate for complete, third party permitted facility post-closure care.  
As units are added or deleted from these tables through future permit amendments or modifications, the remaining itemized unit costs should be updated for inflation when re-calculating the revised total cost in current dollars.
2. Total annual cost of post-closure care for the facility including costs of contingent post-closure care should be multiplied by 30 years.<sup>3</sup>

E. Closure and Post-Closure Cost Summary

Please complete Table VII.E.1 - Permitted Unit Closure Cost Summary.

Please complete Table VII.E.2 - Permitted Unit Post-Closure Cost Summary.

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<sup>3</sup> or the remainder of 30 years from the date of closure certification for each unit if the unit has been previously certified closed.



**VII. CLOSURE AND  
POST-CLOSURE CARE PLANS**



**TABLE VII.D. - UNIT POST-CLOSURE COST ESTIMATE**

Task	Cost
<b>SWMU No. 1</b>	
<u>Monitoring Well Plugging and Abandonment</u>	
P&A (10 wells at \$750 each) - one time cost	\$7,500
<b>Subtotal</b>	<b>\$7,500</b>
subtotal	\$7,500
Contingency (10% minimum)	\$750
<b>TOTAL COST</b>	<b>\$8,250 (2014)</b>
<b>TOTAL POST-CLOSURE COST</b>	
<b>\$8,250 (2014)</b>	

**TABLE VII.E.2. - PERMITTED UNIT POST-CLOSURE COST SUMMARY**

Existing Unit Post-Closure Cost Estimate	
Unit	Cost
SWMU No. 1	\$8,250 (2014)
<b>TOTAL EXISTING UNIT POST-CLOSURE COST ESTIMATE</b>	\$8,250 (2014)

**Table VII.G. - Post-Closure Period**

Unit Name	Date Certified Closed	Permitted Post Closure Period (Yrs)	Earliest Date Post Closure Ends (See Note 1)
Closed Surface Impoundment	6/20/1994	20 years	6/20/2024

Note 1 – Post-Closure Care shall continue beyond the specified date until the Executive Director has approved the permittee's request to reduce or terminate the post-closure period, consistent with 40 CFR Section 264.117 and 30 TAC Section 335.152(a)(5). However, since the unit was clean closed in 1984 and groundwater at the unit has achieved Remedy Standard A response objectives, UPRR requests NFA for post-closure care for the unit (See Section VII and Section XI (Response Action Plan)).

**CLOSURE AND POST-CLOSURE CARE PLANS  
PART B PERMIT APPLICATION  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

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VII.D.	Unit Post-Closure Cost Estimate
VII.E.2	Permitted Unit Post-Closure Cost Summary
VII.G	Post-Closure Period

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### Table

VII.A.1	SWMU No. 1 A-TZ Unit Groundwater Monitoring Data
VII.A.2	SWMU No. 1 B-TZ Unit Groundwater Monitoring Data

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### Figure

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## VII.C. POST-CLOSURE

### VII.C.1. Background

This Post-Closure Care Plan was prepared to describe maintenance, monitoring, and response activities for the Houston Wood Preserving Works facility at 4910 Liberty Road, Houston, Texas. Currently, post-closure care includes the semi-annual monitoring of the two uppermost groundwater bearing units, the A-Transmissive Zone (A-TZ) and the B-Transmissive Zone (B-TZ).

Solid Waste Management Unit (SWMU) No. 1 is an inactive surface impoundment and is a grass-covered section of land located at the southwest corner of the facility property (Figure VI.A). SWMU No. 1 was built in 1979 for the disposal of contaminated surface soils remediated from an adjacent low-lying ponding area (AOC 6). Surface soils from the ponding area were remediated in response to a fire in 1979 and the discovery of contaminated soils. Installation of SWMU No. 1 was based on an agreement with the Texas Department of Water Resources (TDWR) for disposal of the soils.

SWMU No. 1 is bordered on the southern side by an earthen berm, which is about 2 feet by 3 feet by about 80 to 100 feet long. The berm extends about 100 feet south of the southwest corner of the SWMU No. 1. A chain-link security fence is located along the northern and western margins of SWMU No. 1. The original dimensions of the unit were about 180 feet by 106 feet at the surface, extending to a depth of about 7 feet bgs (SPTCo, 1991). Based on these dimensions, SWMU No. 1 would have a capacity of 133,560 cubic feet (about 4,950 cubic yards). According to Southern Pacific Transportation Company (SPTCo) facility representatives, a clay liner was installed during the original construction of SWMU No. 1. No information was available concerning the thickness and engineering properties of the liner.

In 1984, SPTCo clean closed SWMU No. 1 by excavating the soils and materials contained within the unit. The visual hazardous material was removed along with apparent contaminated soil. An additional 3-inches of soil was then removed. The area was then divided into 50-foot grids which were randomly selected for sampling. Between 10 and 15 grab samples not more than 6-inches deep were homogenized and analyzed for K001 listed waste parameters and polycyclic aromatic hydrocarbons (PAHs). When soil confirmation sample concentrations were lower than those of background samples, the excavated area was backfilled with compacted clay and a groundwater monitoring system was installed (Rollins, 1984).

In 1991, a series of six soil borings were drilled within the same six grid areas that were sampled during the 1984 closure operations (Geo Associates, 1991). Four samples were collected from each of the borings

from the following zones: the surficial clay fill, between the clay fill and the uppermost sand, the uppermost sand, and below the uppermost sand unit. These samples were analyzed for benzene, toluene, ethylbenzene and xylene (BTEX), total petroleum hydrocarbons (TPH) and semi-volatiles.

Bis (2-ethylhexyl) phthalate was detected in two samples at concentrations well below the TCEQ Texas Risk Reduction Program (TRRP) Protective Concentration Limits (PCL). Xylene, ethylbenzene and toluene were also detected, but at concentrations well below the PCL. The 1991 soil sampling results indicated that the source of contamination had been removed by the 1984 closure activities (SPTCo, 1991).

In 1984, the facility then began investigating and monitoring the shallow ground water in the vicinity of SWMU No. 1. Between 1984 and 1991, nine groundwater monitoring wells were installed in the upper zone, and three piezometers were installed in the lower permeable zone. Hydrogeological data collected from these wells and piezometers indicate hydraulic conductivity between the zones. Analytical data compiled from 1984 until 1991 indicated that benzene, toluene, naphthalene, 2,4-dimethylphenol, and phenol were the most frequently detected parameters and that naphthalene was the parameter detected at the highest concentrations. Even though the SWMU was clean closed in 1984, a groundwater release was identified and the facility entered into post-closure care in 1994, updated in 2005, and groundwater monitoring has taken place on a semi-annual basis since that time.

With the 2014 first semi-annual analytical data, the SWMU No. 1 monitoring wells have been compliant for sixteen consecutive semi-annual monitoring events (8 years). Tables VII.A.1 and VII.A.2 show groundwater monitoring data for the past 15 years (since 2000) for the A-TZ and B-TX, respectively. Concentration versus time graphs for COCs in the A-TZ (2-methylnaphthalene (Figure VII.B), dibenzofuran (Figure VII.C), and naphthalene (Figure VII.D)) and the B-TZ (dibenzofuran (Figure VII.E) and naphthalene (Figure VII.F)) demonstrate that COC concentrations in the A-TZ and B-TZ POC wells have shown a steady decrease over time. Groundwater at the SWMU No. 1 has achieved TCEQ Remedy Standard A response action objectives and no further action is necessary to protect human health and the environment.

It is recommended at this time that all post-closure care activities, including groundwater monitoring of SWMU No. 1, be terminated and the monitoring wells associated with the unit be plugged and abandoned. While it is proposed that groundwater monitoring of the regulated unit be terminated, facility wide groundwater monitoring activities will be on-going. These activities are discussed in detail in Section XI – Compliance Plan of this Permit application and the Response Action Plan.

**VII.C.1.a. Primary Components for Post-closure Care**

The primary components for post-closure care include properly plugging and abandoning the groundwater monitoring wells associated with SWMU No. 1.

**VII.C.1b. Monitoring Wells**

Upon TCEQ approval for NFA for the unit, the monitoring wells associated with SWMU No. 1 will be plugged and abandoned by a licensed driller in accordance with the procedures specified in Texas Department of Licensing and Regulations (TDLR) Section 76.1004. During abandonment activities, an attempt will be made to remove the well casing material from the borehole. The borehole will then be backfilled with a cement/bentonite mixture. Surface completions will be removed and a patch will be placed at the former well location to match surrounding grade.

**VII.C.2. Administration**

**VII.C.2.a. Facility Records**

All plans, reports, financial assurance information, correspondence, and related records will be maintained at the following location:

Union Pacific Railroad Company  
1400 Douglas St., STOP 1030  
Omaha, NE 68179  
Phone: 402-544-5000

In accordance with 40 CFR 264.15(b)(2) and (d), copies of all inspection records will be maintained for at least three years from the date of inspection.

**VII.C.2.b. Amendment of Plan**

In accordance with 40 CFR 264.118(d), a written notification of or a request for a permit modification will be submitted to authorize a change in the post-closure plan. The request will be submitted at least 60 days prior to the proposed change in design or operation, or no later than 60 days after an unexpected event has occurred which has affected the post-closure plan. A copy of the amended post-closure plan will be included in the notification or request.



**VII.C.2.c. Cost Estimate for Post-closure Care**

A detailed written estimate, in current dollars, of the annual cost of post-closure monitoring and maintenance is attached. The cost estimate is based on third party costs, and it was calculated by multiplying the annual post-closure cost estimate by the number of years of post-closure care. The following will be maintained in the facility operating records during the operational life of the facility: The latest post-closure cost estimate prepared in accordance with 40 CFR 246.144(a) and, when the estimate has been adjusted in accordance with 40 CFR 246.144(b), the latest post-closure cost estimate.

**VII.C.2.d. Certification of Completion of Post-closure Care**

The Site is currently in year 20 (2014) of the 30 years required for post-closure care. However, UPRR is requesting concurrence on a No Further Action for the clean closed unit. In accordance with 40 CFR 264.120, no later than 60 days after approval of the No Further Action for the clean closed hazardous waste disposal unit, UPRR will submit, by registered mail, a certification that the post-closure care period was performed in accordance with the post-closure care plan. The certification will be signed by UPRR and an independent registered professional engineer.

**VII.C.2.e. Proposed Post-Closure Use of Property**

UPRR intends to maintain the Site as an open vegetated area with restricted access. The regulated unit will be part of the on-site Plume Management Zone (PMZ) discussed in detail in Section XI – Compliance Plan Attachment D of this Permit application. Any future use of the site would be contingent upon approval of the TCEQ.

**VII.C.2.f. Facility Contact**

The facility contact is:

Mr. Geoffrey B. Reeder, P.G.  
Manager, Environmental Site Remediation  
Union Pacific Railroad Company  
24125 Aldine Westfield Rd.  
Spring, TX 77373  
Phone: 281-350-7197  
Fax: 402-233-2351  
gbreeder@up.com

#### **VII.D. POST-CLOSURE COST ESTIMATE**

A detailed cost estimate for post-closure care is summarized in Table VII.D of the Part B renewal application form included with the post-closure care plan. These costs cover the plugging and abandonment of the unit's monitoring wells as outlined in the post-closure care plan. Multiple year costs are not included since additional post-closure care will not be necessary following the approval of the NFA and termination of groundwater monitoring and post-closure care.

## **TABLES**

**TABLE VII.A.1**  
**SWMU NO. 1 A-TZ UNIT GROUNDWATER MONITORING DATA**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

Well ID	Constituent	2-Methyl naphthalene	Acenaphthene	Acenaphthylene	Anthracene	bis(2-Ethylhexyl) phthalate	Dibenzofuran	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
		PCL (mg/L)	0.098	1.5	1.5	7.3	0.006	0.098	0.98	0.98	0.49	0.73
MW-01A	3/27/2000	0.022	0.24	0.005	0.009	0.0007 JB	<b>0.12</b>	0.01	0.14	0.13	0.068	0.005
MW-01A	9/25/2000	<b>0.36</b>	0.46	0.005	0.024	0.002 J	<b>0.33</b>	0.022	0.32	0.068	0.23	0.011
MW-01A	4/27/2001	0.012	0.17	0.004	0.005	0.0005 U	0.091	0.007	0.092	0.24	0.042	0.003
MW-01A	9/28/2001	0.0003 U	0.36	0.005	0.007	0.0005 U	<b>0.18</b>	0.01	0.17	0.065	0.1	0.006
MW-01A	3/19/2002	0.033	0.12	0.003	0.004	0.0006 J	0.065	0.006	0.07	0.11	0.028	0.003
MW-01A	9/25/2002	0.002	0.26	0.002	0.008	0.0004 U	<b>0.17</b>	0.01	0.17	0.005	0.033	0.005
MW-01A	3/17/2004	0.005221	0.04226	0.000785	0.001854	0.000973	0.0194	0.003337	0.02334	0.000919	0.002194	0.00117
MW-01A	3/4/2005	0.0882	0.224	0.00326	0.00754	0.00035 U	<b>0.101</b>	0.00935	0.124	0.12	0.0182	0.00362
MW-01A	7/19/2005	<b>0.1036</b>	0.245	0.00221	0.0101	0.000356 U	<b>0.11</b>	0.0139	0.137	0.0216	0.0233	0.00593
MW-01A	9/8/2005						<b>0.133</b>					
MW-01A	1/6/2006	0.00169	0.0937	0.00387	0.0021	0.000356 U	0.0143	0.00557	0.0221	0.000519	0.00065	0.0025
MW-01A	7/28/2006	0.0205	0.163	0.00182	0.00613	0.00009 U	0.0639	0.0079	0.0792	0.00292	0.00698	0.00376
MW-01A	1/23/2007	0.000262	0.0509	0.00137	0.00226	0.00009 U	0.00839	0.00251	0.0155	0.000302	0.000229	0.00105
MW-01A	7/18/2007	0.00133 U	0.11	0.00114 U	0.000952 U	0.00352 U	0.00849 J	0.00696 J	0.0514	0.00124 U	0.00336 J	0.00304 J
MW-01A	1/28/2008	0.00044 U	0.0415	0.00099	0.00129	0.00022 U	0.00129	0.00234	0.0162	0.00044 U	0.00022 U	0.00107
MW-01A	7/16/2008	0.0109	0.126	0.00143	0.00267	0.00137 J	0.00774	0.00923	0.0659	0.0168	0.00177	0.00417
MW-01A	1/22/2009	0.0069	0.054	0.0007 U	0.0012 J	0.0012 U	0.0058	0.0024 J	0.028	0.0008 U	0.001 J	0.001 J
MW-01A	7/22/2009	0.0017 J	0.085	0.0005 U	0.0011 J	0.0033 U	0.0037 J	0.0037 J	0.04	0.0029 J	0.0005 U	0.0019 J
MW-01A	1/22/2010	0.0019 J	0.04	0.0005 U	0.0006 U	0.0033 U	0.0016 J	0.0017 J	0.022	0.0043 J	0.0005 U	0.0005 U
MW-01A	7/14/2010	0.0009 U	0.068	0.0005 U	0.0017 J	0.0033 U	0.0044 J	0.004 J	0.04	0.0006 U	0.0011 J	0.0021 J
MW-01A	1/11/2011	0.0009 U	0.07	0.0011 J	0.0021 J	0.0033 U	0.0007 U	0.0025 J	0.039	0.0006 U	0.0005 U	0.0011 J
MW-01A	7/13/2011	0.0068	0.1	0.0011 J	0.0029 J	0.003 J	0.0054	0.0062	0.056	0.0005 U	0.002 J	0.0028 J
MW-01A	1/31/2012	0.0005 U	0.029	0.0005 U	0.0005 U	0.0005 U	0.0045 J	0.0012 J	0.0013 J	0.0005 U	0.0005 U	0.0005 U
MW-01A	7/11/2012	0.012	0.084	0.0017 J	0.003 J	0.0005 U	0.025	0.0047 J	0.041	0.0005 U	0.0033 J	0.0021 J
MW-01A	1/9/2013	0.00125	0.117	0.00222	0.000285 J	0.00163	0.0141	0.00602	0.0564	0.00219	0.00388	0.00261
MW-01A	7/11/2013	0.00193	0.098	0.00122	0.0022	0.000356 U	0.00264	0.00399	0.0323	0.0169	0.00109	0.00165
MW-01A	1/8/2014	0.00222	0.0895	0.00093	0.003	0.000838 J	0.00951	0.00257	0.0369	0.0000741 U	0.00175	0.0013
MW-01A	7/2/2014	0.00865	0.0848	0.00138	0.00326	0.000349 U	0.0132	0.0043	0.0369	0.074	0.00537	0.00204
MW-02	3/27/2000	0.0004 J	0.022	0.0006 J	0.002	0.0006 JB	0.017	0.002 J	0.016	0.011	0.001 J	0.0007 J
MW-02	9/25/2000	0.005	0.033	0.001 J	0.002	0.0005 U	0.033	0.003	0.031	0.24	0.002	0.001 J
MW-02	4/26/2001	0.0009 J	0.01	0.0003 J	0.002 J	0.0005 U	0.008	0.003	0.009	0.028	0.002	0.002 J
MW-02	9/28/2001	0.001 J	0.012	0.0005 J	0.002 J	0.0005 U	0.01	0.002 J	0.01	0.034	0.003	0.001 J
MW-02	3/13/2002	0.0006 J	0.015	0.0004 J	0.001 J	0.0005 U	0.012	0.001 J	0.013	0.006	0.001 J	0.0007 J
MW-02	9/24/2002	0.0004 J	0.02	0.0004 J	0.001 J	0.0004 U	0.014	0.001 J	0.014	0.013	0.001 J	0.0007 J
MW-02	3/17/2004	0.001694	0.03018	0.000418 J	0.001494	0.000172 U	0.01945	0.001861	0.02035	0.000604	0.002468	0.00088
MW-02	3/4/2005	0.00008 J	0.0394	0.0004 J	0.00114	0.00035 U	0.0152	0.00421	0.0268	0.00161	0.00024 J	0.00183
MW-02	7/19/2005	0.00007 U	0.0031	0.00006 U	0.00032 J	0.000352 U	0.00245	0.000796	0.00268	0.00006 U	0.00036 J	0.00042 J
MW-02	1/5/2006	0.00046 J	0.0142	0.00128	0.000857	0.00037 U	0.0152	0.00113	0.0148	0.0053	0.00024 J	0.00041 J
MW-02	7/28/2006	0.000622	0.0098	0.0002	0.000783	0.00018 J	0.00767	0.00123	0.00604	0.0106	0.00103	0.00063
MW-02	1/23/2007	0.00008 U	0.00675	0.00015 J	0.000542	0.00009 U	0.00488	0.000625	0.00479	0.000406	0.00005 J	0.0003
MW-02	7/18/2007	0.0024 J	0.0256	0.00114 U	0.00138 J	0.00352 U	0.0174	0.00165 J	0.0157	0.0188	0.00167 J	0.00095 U
MW-02	1/28/2008	0.00038 U	0.017	0.00028 U	0.000922	0.00049 J	0.0106	0.0015	0.0119	0.000827	0.000532	0.00082
MW-02	7/16/2008	0.00039 U	0.0218	0.0003 J	0.00042 J	0.00019 U	0.00673	0.000961	0.0103	0.00118	0.00019 U	0.00045 J

**TABLE VII.A.1**  
**SWMU NO. 1 A-TZ UNIT GROUNDWATER MONITORING DATA**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

Well ID	Constituent	2-Methyl naphthalene	Acenaphthene	Acenaphthylene	Anthracene	bis(2-Ethylhexyl) phthalate	Dibenzofuran	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
		PCL (mg/L)	0.098	1.5	1.5	7.3	0.006	0.098	0.98	0.98	0.49	0.73
MW-02	1/22/2009	0.0008 U	0.014	0.0007 U	0.0007 U	0.0012 U	0.0007 U	0.0006 U	0.0039 J	0.0008 U	0.0007 U	0.0009 U
MW-02	7/22/2009	0.0025 J	0.032	0.0005 U	0.0006 U	0.0033 U	0.0042 J	0.0011 J	0.015	0.012	0.0005 U	0.0005 U
MW-02	1/22/2010	0.0009 U	0.0073	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0037 J	0.0006 U	0.0005 U	0.0005 U
MW-02	7/14/2010	0.0009 U	0.018	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.011	0.0006 U	0.0005 U	0.0005 U
MW-02	1/11/2011	0.0009 U	0.0078	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0049 J	0.0006 U	0.0005 U	0.0005 U
MW-02	7/13/2011	0.0021 J	0.026	0.0005 U	0.0005 U	0.0021 J	0.0038 J	0.0012 J	0.015	0.0037 J	0.0005 U	0.0005 U
MW-02	1/30/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-02	7/10/2012	0.0005 U	0.0088	0.0005 U	0.0005 U	0.0005 U	0.0043 J	0.0005 U	0.0043 J	0.0033 J	0.0005 U	0.0005 U
MW-02	1/9/2013	0.00318	0.0384	0.00057	0.00129	0.000874	0.0178	0.00147	0.0201	0.0211	0.00241	0.00087
MW-02	7/11/2013	0.000897	0.0179	0.000335 J	0.0013	0.000356 U	0.00734	0.00069	0.00986	0.00754	0.000776	0.00034 J
MW-02	1/8/2014	6.48E-05 U	0.000445 J	0.000101 J	0.00131	0.000343 U	0.000147 J	0.000307 J	0.00026 J	0.0000741 U	0.000122 J	0.00018 J
MW-02	7/2/2014	0.000509	0.00452	0.0000979 J	0.000596	0.000349 U	0.00301	0.000368 J	0.00357	0.00653	0.000594	0.0002 J
MW-07	3/29/2000	0.0004 U	0.0002 J	0.0009 U	0.0006 J	0.0007 JB	0.0006 U	0.0004 U	0.0005 U	0.0001 J	0.00007 J	0.0003 U
MW-07	9/26/2000	0.0003 U	0.017	0.0002 J	0.0005 J	0.001 J	0.001 J	0.0008 J	0.0004 J	0.0003 J	0.0003 U	0.001 J
MW-07	4/25/2001	0.0003 U	0.0003 U	0.0002 U	0.001 J	0.0005 U	0.0003 U	0.0004 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U
MW-07	9/27/2001	0.0003 U	0.006	0.0002 U	0.002 J	0.0006 J	0.0003 U	0.001 J	0.0003 U	0.0003 U	0.0004 J	0.0009 J
MW-07	3/11/2002	0.0003 U	0.0005 J	0.0002 U	0.0008 J	0.001 J	0.0003 U	0.0004 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U
MW-07	9/25/2002	0.00007 U	0.0009 J	0.00006 U	0.0007 J	0.0004 U	0.00008 J	0.0004 J	0.0001 J	0.0005 J	0.00009 U	0.0006 J
MW-07	3/16/2004	0.000067 U	0.000285 J	0.000076 U	0.000219 J	0.000172 U	0.000076 U	0.000093 U	6.8E-05 U	0.000067 U	0.000077 U	8.4E-05 U
MW-07	3/1/2005	0.00007 U	0.0001 J	0.00006 U	0.0004 J	0.000791	0.00008 U	0.00008 U	0.00007 U	0.00006 U	0.00009 U	0.00009 U
MW-07	7/19/2005	0.00007 U	0.0015	0.00006 U	0.000653	0.000352 U	0.00015 J	0.00017 J	0.00007 U	0.00006 U	0.00009 U	0.00026 J
MW-07	1/5/2006	0.00007 U	0.00286	0.00008 J	0.000537	0.000422 J	0.00009 J	0.00008 U	0.00038 J	0.00019 J	0.00009 U	0.00009 U
MW-07	7/28/2006	0.00008 U	0.00362	0.00008 U	0.000417	0.00009 U	0.00006 U	0.000275	0.00018 J	0.00007 U	0.00004 U	0.00053
MW-07	1/23/2007	0.00008 U	0.00004 U	0.00008 U	0.000353	0.00009 U	0.00006 U	0.00004 U	0.00004 U	0.000637	0.00004 U	0.00004 U
MW-07	7/17/2007	0.00133 U	0.00114 U	0.00114 U	0.000952 U	0.00352 U	0.0041 U	0.000952 U	0.00095 U	0.00124 U	0.000952 U	0.00095 U
MW-07	1/28/2008	0.00038 U	0.00028 U	0.00028 U	0.000516	0.00019 U	0.00028 U	0.00019 U	0.00019 U	0.00038 U	0.00019 U	0.00019 U
MW-07	7/16/2008	0.00039 U	0.00029 U	0.00044 J	0.000982	0.00019 U	0.00029 U	0.00019 U	0.00019 U	0.000675	0.00036 J	0.00019 U
MW-07	1/22/2009	0.0008 U	0.0008 U	0.0007 U	0.0007 U	0.0012 U	0.0007 U	0.0006 U	0.0008 U	0.0008 U	0.0007 U	0.0009 U
MW-07	7/22/2009	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-07	1/22/2010	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-07	7/14/2010	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0049 J	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-07	1/12/2011	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-07	7/12/2011	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-07	1/31/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-07	7/11/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-07	1/10/2013	0.000066 U	0.00181	0.00011 J	0.000833	0.000349 U	0.0000755 U	0.000066 U	0.00014 J	0.0000755 U	0.0000566 U	0.0001 U
MW-07	7/11/2013	7.04E-05 U	0.0000804 U	0.0000603 U	0.000749	0.000372 U	0.0000804 U	0.0000704 U	7E-05 U	0.000111 J	0.0000603 U	0.00011 U
MW-07	1/9/2014	6.48E-05 U	0.0000741 U	0.0000556 U	4.63E-05 U	0.000343 U	0.0000741 U	0.0000648 U	6.5E-05 U	0.0000741 U	0.0000556 U	0.0001 U
MW-07	7/3/2014	0.000066 U	0.0000755 U	0.0000566 U	0.000696	0.000349 U	0.0000755 U	0.000066 U	6.6E-05 U	0.0000755 U	0.0000566 U	0.0001 U
MW-08	3/27/2000	0.0004 U	0.0007 U	0.0009 U	0.0003 J	0.0006 JB	0.0006 U	0.00005 J	0.0005 U	0.0002 J	0.0001 J	0.00004 J
MW-08	9/25/2000	0.0003 U	0.0003 U	0.0002 U	0.0004 U	0.001 J	0.0003 U	0.0004 U	0.0003 U	0.0003 U	0.0003 U	0.0003 J
MW-08	4/25/2001	0.0003 U	0.002	0.0002 U	0.0006 J	0.0005 U	0.001 J	0.0004 U	0.001 J	0.013	0.0003 U	0.0003 U
MW-08	9/27/2001	0.0003 U	0.0003 U	0.0002 U	0.0008 J	0.0007 J	0.0003 U	0.0005 J	0.0003 U	0.0003 U	0.0003 U	0.0004 J

**TABLE VII.A.1**  
**SWMU NO. 1 A-TZ UNIT GROUNDWATER MONITORING DATA**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

Well ID	Constituent	2-Methyl naphthalene	Acenaphthene	Acenaphthylene	Anthracene	bis(2-Ethylhexyl) phthalate	Dibenzofuran	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
		PCL (mg/L)	0.098	1.5	1.5	7.3	0.006	0.098	0.98	0.98	0.49	0.73
MW-08	3/12/2002	0.0002 U	0.0003 J	0.0002 U	0.0005 J	0.0005 U	0.0003 U	0.0004 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U
MW-08	9/25/2002	0.00007 U	0.00007 U	0.00006 U	0.0002 J	0.0004 U	0.00007 U	0.00009 U	0.00007 U	0.0001 U	0.00009 U	0.0002 J
MW-08	3/16/2004	0.000067 U	0.000074 U	0.000076 U	0.000124 U	0.000172 U	0.000076 U	0.000093 U	6.8E-05 U	0.000067 U	0.000077 U	8.4E-05 U
MW-08	3/1/2005	0.00007 U	0.00012 J	0.00006 U	0.00015 J	0.00035 U	0.00008 U	0.00008 U	0.00007 U	0.00006 U	0.00009 U	0.00009 U
MW-08	7/18/2005	0.00007 U	0.00007 U	0.00006 U	0.00026 J	0.000356 J	0.00008 U	0.00008 U	0.00007 U	0.00006 U	0.00009 U	0.00012 J
MW-08	1/6/2006	0.00007 U	0.00007 U	0.00006 U	0.00011 J	0.000363 U	0.00008 U	0.00008 U	0.00007 U	0.00006 U	0.00009 U	0.00009 U
MW-08	7/28/2006	0.00008 U	0.00004 U	0.00008 U	0.00018 J	0.00012 J	0.00006 U	0.00004 U	0.00004 U	0.00007 U	0.00004 U	0.00004 U
MW-08	1/22/2007	0.00008 U	0.00004 U	0.00008 U	0.00004 U	0.00009 U	0.00006 U	0.00004 U	0.00004 U	0.00007 U	0.00004 U	0.00004 U
MW-08	7/17/2007	0.00133 U	0.00114 U	0.00114 U	0.00135 J	0.00352 U	0.0041 U	0.000952 U	0.00095 U	0.00124 U	0.000952 U	0.00095 U
MW-08	1/29/2008	0.00044 U	0.00033 U	0.00033 U	0.00031 J	0.00022 U	0.00033 U	0.00022 U	0.00022 U	0.00044 U	0.00022 U	0.00022 U
MW-08	7/16/2008	0.0004 U	0.0003 U	0.00044 J	0.000669	0.0002 U	0.0003 U	0.0002 U	0.0002 U	0.000654	0.00036 J	0.0002 U
MW-08	1/22/2009	0.0008 U	0.0008 U	0.0007 U	0.0007 U	0.0012 U	0.0007 U	0.0006 U	0.0008 U	0.0008 U	0.0007 U	0.0009 U
MW-08	7/22/2009	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-08	1/22/2010	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-08	7/14/2010	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-08	1/12/2011	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-08	7/12/2011	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-08	1/31/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-08	7/11/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-08	1/10/2013	0.000066 U	0.0000755 U	0.0000566 U	0.000439 J	0.000349 U	0.0000755 U	0.000066 U	6.6E-05 U	0.0000755 U	0.0000566 U	0.0001 U
MW-08	7/11/2013	6.86E-05 U	0.0000784 U	0.0000588 U	0.000101 J	0.000363 U	0.0000784 U	0.0000686 U	6.9E-05 U	0.0000784 U	0.0000588 U	0.00011 U
MW-08	1/9/2014	6.48E-05 U	0.0000741 U	0.0000556 U	0.000494	0.000343 U	0.0000741 U	0.0000648 U	6.5E-05 U	0.0000741 U	0.0000637 J	0.0001 U
MW-08	7/3/2014	0.000066 U	0.0000755 U	0.0000566 U	4.72E-05 U	0.000349 U	0.0000755 U	0.000066 U	6.6E-05 U	0.0000755 U	0.0000566 U	0.0001 U
MW-10A	3/28/2000	0.0002 J	0.0869	0 U	0.003	0.0006 JB	0.0019	0.008	0.0353	0.0929	0.0025	0.0053
MW-10A	9/25/2000	0.0003 U	0.004	0.0002 U	0.0004 J	0.001 J	0.0006 J	0.0004 U	0.0006 J	0.0005 J	0.0004 J	0.0003 J
MW-10A	4/27/2001	0.0003 U	0.003	0.0002 U	0.0006 J	0.0007 J	0.0003 U	0.0004 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U
MW-10A	9/28/2001	0.0003 U	0.0006 J	0.0002 U	0.0005 J	0.0005 U	0.0004 J	0.0004 U	0.0004 J	0.0003 U	0.0003 J	0.0003 U
MW-10A	3/12/2002	0.0003 U	0.001 J	0.0002 U	0.0005 J	0.0005 U	0.0003 U	0.0004 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U
MW-10A	9/24/2002	0.00007 U	0.00007 U	0.00006 U	0.00009 U	0.0004 U	0.00007 U	0.00009 U	0.00007 U	0.0001 U	0.00009 U	0.00009 U
MW-10A	3/16/2004	0.000067 U	0.000074 U	0.000076 U	0.000124 U	0.000916	0.000076 U	0.000093 U	6.8E-05 U	0.000067 U	0.000077 U	8.4E-05 U
MW-10A	3/1/2005	0.00007 U	0.00007 U	0.00006 U	0.00013 J	0.00035 U	0.00008 U	0.00008 U	0.00007 U	0.00006 U	0.00009 U	0.00009 U
MW-10A	7/19/2005	0.00007 U	0.00011 J	0.00006 U	0.00007 U	0.000352 U	0.00008 U	0.00008 U	0.00007 U	0.00006 U	0.00009 U	0.00009 U
MW-10A	1/5/2006	0.00007 U	0.00007 U	0.00006 U	0.00011 J	0.000359 U	0.00008 U	0.00008 U	0.00007 U	0.00006 U	0.00009 U	0.00009 U
MW-10A	7/28/2006	0.00008 U	0.000327	0.00008 U	0.00004 U	0.00009 U	0.00017 J	0.00004 U	0.00004 U	0.00007 U	0.00004 U	0.00004 U
MW-10A	1/23/2007	0.00008 U	0.000714	0.00008 U	0.000273	0.00009 U	0.00009 J	0.00004 U	0.00015 J	0.00007 U	0.00004 U	0.00004 U
MW-10A	7/17/2007	0.00133 U	0.00114 U	0.00114 U	0.000952 U	0.00352 U	0.0041 U	0.000952 U	0.00095 U	0.00124 U	0.000952 U	0.00095 U
MW-10A	1/28/2008	0.0004 U	0.0003 U	0.0003 U	0.0002 U	0.0002 U	0.0003 U	0.0002 U	0.0002 U	0.0004 U	0.0002 U	0.0002 U
MW-10A	7/16/2008	0.00038 U	0.00029 U	0.00029 U	0.00019 U	0.0002 J	0.00029 U	0.00019 U	0.00019 U	0.00038 U	0.00019 U	0.00019 U
MW-10A	1/22/2009	0.0008 U	0.0008 U	0.0007 U	0.0007 U	0.0012 U	0.0007 U	0.0006 U	0.0008 U	0.0008 U	0.0007 U	0.0009 U
MW-10A	7/22/2009	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-10A	1/21/2010	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-10A	7/13/2010	0.0018 J	0.0018 J	0.001 J	0.0012 J	0.0033 U	0.0014 J	0.001 J	0.0012 J	0.0012 J	0.001 J	0.001 J
MW-10A	1/11/2011	0.0009 U	0.0017 J	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U

**TABLE VII.A.1**  
**SWMU NO. 1 A-TZ UNIT GROUNDWATER MONITORING DATA**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

Well ID	Constituent	2-Methyl naphthalene	Acenaphthene	Acenaphthylene	Anthracene	bis(2-Ethylhexyl) phthalate	Dibenzofuran	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene
		PCL (mg/L) 0.098	1.5	1.5	7.3	0.006	0.098	0.98	0.98	0.49	0.73	0.73
MW-10A	7/13/2011	0.0005 U	0.0545 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-10A	1/30/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-10A	7/10/2012	0.0005 U	0.0016 J	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-10A	1/9/2013	6.67E-05 U	0.0000762 U	0.0000571 U	0.000468 J	0.00171	0.0000762 U	0.0000667 U	6.7E-05 U	0.0000762 U	0.0000571 U	0.00011 U
MW-10A	7/11/2013	0.00178	0.0306	0.000385 J	0.00036 J	0.000356 U	0.00866	0.000186 J	0.00631	0.199	0.00221	0.00011 U
MW-10A	1/8/2014	6.48E-05 U	0.0000741 U	0.0000556 U	4.63E-05 U	0.000343 U	0.0000741 U	0.0000648 U	6.5E-05 U	0.0000741 U	0.0000556 U	0.0001 U
MW-10A	7/15/2014	0.00262 J	0.0306	0.000566 U	0.000472 U	0.00349 U	0.00862	0.00066 U	0.0111	0.199	0.00442 J	0.00104 U
MW-11A	3/28/2000	0.0021	0.232	0.00383	0.011	0.001 JB	<b>0.103</b>	0.016	0.179	0.0637	0.0694	0.0067
MW-11A	9/22/2000	0.001 J	0.31	0.003	0.01	0.0005 U	<b>0.12</b>	0.015	0.2	0.01	0.084	0.007
MW-11A	4/26/2001	0.014	0.28	0.004	0.014	0.0005 U	<b>0.14</b>	0.015	0.16	0.47	0.074	0.006
MW-11A	9/27/2001	<b>0.14</b>	0.31	0.004	0.008	0.0008 J	<b>0.13</b>	0.012	0.18	<b>2.4</b>	0.075	0.008
MW-11A	3/11/2002	0.027	0.4	0.005	0.013	0.0005 U	<b>0.19</b>	0.015	0.23	<b>0.68</b>	0.11	0.007
MW-11A	9/23/2002	0.073	0.27	0.003	0.009	0.0004 U	<b>0.099</b>	0.012	0.15	0.49	0.07	0.007
MW-11A	3/16/2004	0.00007 U	0.002777	0.00008 U	0.000321 J	0.001042	0.000463 J	0.000394 J	0.00035 J	0.002776	0.000081 U	8.8E-05 U
MW-11A	3/3/2005	0.00016 J	0.0139	0.00006 U	0.000833	0.000806	0.00451	0.000786	0.00663	0.011	0.00023 J	0.00016 J
MW-11A	7/19/2005	0.00019 J	0.0732	0.00074	0.00201	0.000352 U	0.00957	0.0064	0.0229	0.00482	0.00196	0.00308
MW-11A	1/5/2006	0.00007 U	0.00007 U	0.00006 U	0.00007 U	0.000363 U	0.00008 U	0.000516	0.00008 J	0.00006 U	0.00009 U	0.00011 J
MW-11A	7/28/2006	0.00008 U	0.0306	0.000263	0.000543	0.00014 J	0.000566	0.00362	0.00066	0.00012 J	0.00018 J	0.00186
MW-11A	1/23/2007	0.00008 U	0.00685	0.00008 U	0.000287	0.00009 U	0.0019	0.000292	0.00326	0.00481	0.000829	0.00016 J
MW-11A	7/17/2007	0.00133 U	0.0404	0.00114 U	0.000952 U	0.00352 U	0.0041 U	0.00297 J	0.00095 U	0.00124 U	0.0011 J	0.00148 J
MW-11A	1/28/2008	0.00038 U	0.0346	0.00029 U	0.000798	0.00028 J	0.00276	0.00338	0.0069	0.00038 U	0.00036 J	0.00191
MW-11A	7/16/2008	0.0004 U	0.02	0.0003 U	0.00054	0.0002 U	0.0003 U	0.00387	0.00089	0.0004 U	0.0002 U	0.00184
MW-11A	1/22/2009	0.0008 U	0.0076	0.0007 U	0.0007 U	0.0012 U	0.0007 U	0.0012 J	0.0008 U	0.0008 U	0.0007 U	0.0009 U
MW-11A	7/22/2009	0.0009 U	0.014	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0011 J	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-11A	1/21/2010	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-11A	7/13/2010	0.0018 J	0.0056 UJ	0.001 J	0.0012 J	0.0033 U	0.0014 J	0.001 J	0.0012 J	0.0012 J	0.001 J	0.001 J
MW-11A	1/11/2011	0.0009 U	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
MW-11A	7/12/2011	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-11A	1/30/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-11A	7/10/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-11A	1/9/2013	0.000066 U	0.00175	0.0000566 U	0.000499	0.000349 U	0.0000755 U	0.000066 U	6.6E-05 U	0.0000755 U	0.0000566 U	0.0001 U
MW-11A	7/11/2013	6.73E-05 U	0.000878	0.0000577 U	0.00044 J	0.000356 U	0.0000769 U	0.000221 J	6.7E-05 U	0.0000769 U	0.0000577 U	0.00012 J
MW-11A	1/8/2014	6.48E-05 U	0.0000741 U	0.0001 J	0.00125	0.00046 J	0.0000741 U	0.0000795 J	6.5E-05 U	0.0000741 U	0.0000556 U	0.0001 U
MW-11A	7/2/2014	0.000066 U	0.00427	0.000185 J	0.00126	0.00516	0.000618	0.00215	0.00149	0.000343 J	0.000384 J	0.00194

Notes:  
PCL = Protective Concentration Level  
J = Estimated value between the SDL and the MQL  
U = Value not detected greater than the MQL  
**Bolded** concentrations exceed PCL.

TABLE VILA.2  
 SWMU NO. 1 B-TZ UNIT GROUNDWATER MONITORING DATA  
 UNION PACIFIC RAILROAD COMPANY  
 HOUSTON WOOD PRESERVING WORKS  
 HOUSTON, TX

Well ID	Constituent	Acenaphthene	Acenaphthylene	Anthracene	bis(2-Ethylhexyl) phthalate	Dibenzofuran	Di-n-butyl phthalate	Fluoranthene	Fluorene	Naphthalene	Phenol	Pyrene
	PCL (mg/L)	1.5	1.5	7.3	0.006	0.098	2.4	0.98	0.98	0.49	7.3	0.73
MW-10B	3/28/2000	0.0072	0.0003 J	0.002 J	0.0007 JB	0.0149	0.0006 JB	0.001 J	0.0142	0.0231	0.0002 J	0.0005 J
MW-10B	9/25/2000	0.32	0.004	0.014	0.0005 U	<b>0.2</b>	0.0009 J	0.01	0.19	<b>1.2</b>	0.0003 J	0.005
MW-10B	4/26/2001	0.087	0.002	0.004	0.0005 U	0.036	0.0004 U	0.003	0.047	0.18	0.002	0.001 J
MW-10B	9/28/2001	0.072	0.001 J	0.002	0.0005 U	0.029	0.0004 U	0.002 J	0.036	0.001 J	0.0002 U	0.001 J
MW-10B	3/13/2002	0.073	0.001 J	0.004	0.0006 J	0.032	0.0004 U	0.003	0.044	0.075	0.0002 U	0.002 J
MW-10B	9/24/2002	0.15	0.002	0.006	0.0004 J	0.076	0.001 J	0.005	0.086	0.33	0.00006 U	0.003
MW-10B	3/16/2004	0.04421	0.000833	0.002478	0.000982	0.0171	0.000303 J	0.001567	0.02079	0.001853	9.53E-05 U	0.000718
MW-10B	3/1/2005	0.0164	0.00035 J	0.000995	0.00035 U	0.00482	0.00022 J	0.000941	0.00601	0.00171	0.00004 U	0.00041 J
MW-10B	7/19/2005	0.0739	0.000953	0.00413	0.000352 U	0.0286	0.000648	0.00288	0.0377	0.0789	0.00004 U	0.00125
MW-10B	1/5/2006	0.0113	0.000711	0.000556	0.000356 U	0.0002 J	0.000106 U	0.000649	0.00007 U	0.00006 U	0.00004 U	0.00038 J
MW-10B	7/28/2006	0.0802	0.00107	0.00491	0.00022	0.0323	0.000196	0.00273	0.0434	0.0904	0.00007 U	0.00128
MW-10B	1/23/2007	0.0279	0.00103	0.00126	0.00016 J	0.00312	0.0001 U	0.000745	0.00344	0.000242	0.00007 U	0.000283
MW-10B	7/17/2007	0.0961	0.00114 U	0.00437 J	0.0019 U	0.0325	0.00362 U	0.0028 J	0.0399	0.0252	0.00267 U	0.000952 U
MW-10B	1/28/2008	0.0743	0.00122	0.00432	0.00019 U	0.0255	0.00019 U	0.00371	0.0374	0.0185	0.00019 U	0.00146
MW-10B	7/16/2008	0.0975	0.00113	0.00484	0.0002 J	0.0392	0.0002 U	0.00397	0.0457	0.014	0.0002 U	0.00174
MW-10B	1/22/2009	0.096	0.0007 U	0.0043 J	0.0012 U	0.035	0.0007 U	0.0039 J	0.051	0.0028 J	0.0015 U	0.002 J
MW-10B	7/22/2009	0.067	0.0005 U	0.0029 J	0.0033 U	0.023	0.0005 U	0.0022 J	0.033	0.0082	0.0005 U	0.0013 J
MW-10B	1/21/2010	0.052	0.0005 U	0.0025 J	0.0033 U	0.018	0.0005 U	0.0017 J	0.031	0.0037 J	0.0005 U	0.0005 U
MW-10B	7/13/2010	0.138	0.001 J	0.0076 UJ	0.0033 U	0.05	0.001 J	0.0052 UJ	0.082	0.112	0.001 J	0.002 UJ
MW-10B	1/11/2011	0.096	0.0005 U	0.0068	0.0033 U	0.037	0.0005 U	0.0054	0.059	0.075	0.0005 U	0.0023 J
MW-10B	7/13/2011		0.0005 U	0.0033 J	0.0013 J	0.019	0.0005 U	0.0023 J	0.032	0.0018 J	0.0005 U	0.0011 J
MW-10B	1/30/2012	0.1	0.0011 J	0.0057	0.0005 U	0.038	0.0005 U	0.0046 J	0.06	0.084	0.0005 U	0.002 J
MW-10B	7/10/2012	0.054	0.0005 U	0.0032 J	0.0005 U	0.02	0.0005 U	0.0028 J	0.031	0.004 J	0.0005 U	0.0011 J
MW-10B	1/9/2013	0.12	0.00108	0.00546	0.000349 U	0.0401	0.000104 U	0.00427	0.0652	0.00399	3.77E-05 U	0.00146
MW-10B	7/11/2013	0.977	0.00986	0.0391	0.0037 U	<b>0.302</b>	0.011 U	0.0274	0.468	0.207	0.0004 U	0.0101
MW-10B	1/8/2014	0.021	0.000536	0.00107	0.000408 J	0.00493	0.000275 J	0.000117 J	0.00429	0.0646	0.000037 U	0.000102 U
MW-10B	7/15/2014	0.0777	0.000566 U	0.00352 J	0.00349 U	0.0258	0.00104 U	0.00211 J	0.0424	0.125	0.000377 U	0.00104 U
MW-11B	3/29/2000	0.043	0.002	0.002 J	0.0006 JB	0.016	0.0008 JB	0.003	0.014	0.079	0.0007 U	0.001 J
MW-11B	9/22/2000	0.3	0.003	0.013	0.0005 U	<b>0.18</b>	0.001 J	0.011	0.16	<b>1.5</b>	0.0002 U	0.005
MW-11B	4/25/2001	0.2	0.003	0.011	0.0005 U	<b>0.1</b>	0.0004 U	0.011	0.11	0.47	0.0002 U	0.005
MW-11B	9/27/2001	0.14	0.003	0.005	0.0005 U	0.068	0.0004 U	0.004	0.072	<b>0.5</b>	0.0002 U	0.003
MW-11B	3/14/2002	0.15	0.004	0.007	0.0005 U	0.078	0.0005 J	0.007	0.087	0.22	0.0002 U	0.003
MW-11B	9/24/2002	0.21	0.003	0.009	0.0004 U	<b>0.12</b>	0.0008 J	0.008	0.12	<b>0.7</b>	0.00006 U	0.004
MW-11B	3/16/2004	0.0486	0.001163	0.000854	0.00018 U	0.01581	0.000348 J	0.001971	0.0112	0.01168	0.0001 U	0.000991
MW-11B	3/1/2005	0.0131	0.00031 J	0.00025 J	0.00037 U	0.00027 J	0.0003 J	0.000589	0.0001 J	0.00006 U	0.00004 U	0.00025 J
MW-11B	7/19/2005	0.0577	0.000799	0.0024	0.000352 U	0.0289	0.000357 J	0.00159	0.0261	0.186	0.00004 U	0.000745
MW-11B	1/5/2006	0.0537	0.000617	0.00269	0.000352 U	0.0261	0.00013 J	0.00189	0.0259	0.0025	0.00004 U	0.000873
MW-11B	7/31/2006	0.0707	0.00119	0.00345	0.00026	0.0359	0.00042	0.00245	0.0336	0.1	0.00007 U	0.00122
MW-11B	1/23/2007	0.0125	0.000315	0.000523	0.00009 U	0.00295	0.0001 U	0.000549	0.00231	0.00013 J	0.00007 U	0.000319
MW-11B	7/17/2007	0.088	0.00114 U	0.00396 J	0.0019 U	0.0411	0.00362 U	0.0029 J	0.0353	0.0901	0.00267 U	0.00146 J
MW-11B	1/28/2008	0.0649	0.00028 U	0.00236	0.00021 J	0.0273	0.00019 U	0.00175	0.0297	0.0354	0.00019 U	0.000848
MW-11B	7/16/2008	0.12	0.00126	0.00472	0.00021 U	0.0649	0.00021 U	0.00383	0.0578	0.0772	0.00021 U	0.00163



TABLE VILA.2  
 SWMU NO. 1 B-TZ UNIT GROUNDWATER MONITORING DATA  
 UNION PACIFIC RAILROAD COMPANY  
 HOUSTON WOOD PRESERVING WORKS  
 HOUSTON, TX

Well ID	Constituent	Acenaphthene	Acenaphthylene	Anthracene	bis(2-Ethylhexyl) phthalate	Dibenzofuran	Di-n-butyl phthalate	Fluoranthene	Fluorene	Naphthalene	Phenol	Pyrene
		PCL (mg/L)	1.5	1.5	7.3	0.006	0.098	2.4	0.98	0.98	0.49	7.3
MW-11B	1/22/2009	0.072	0.0007 U	0.0022 J	0.0012 U	0.031	0.0007 U	0.0018 J	0.032	0.0008 U	0.0015 U	0.0009 U
MW-11B	7/22/2009	0.12	0.0015 J	0.0043 J	0.0033 U	0.054	0.0005 U	0.0036 J	0.053	0.048	0.0005 U	0.002 J
MW-11B	1/21/2010	0.048	0.0013 J	0.0011 J	0.0033 U	0.012	0.0005 U	0.0014 J	0.013	0.0006 U	0.0005 U	0.0005 U
MW-11B	7/13/2010	0.22	0.001 J	0.011	0.0033 U	0.096	0.001 J	0.0092 UJ	0.112	0.0136	0.001 J	0.0044 UJ
MW-11B	1/11/2011	0.039	0.0012 J	0.0006 U	0.0033 U	0.006	0.0005 U	0.0015 J	0.0038 J	0.0006 U	0.0005 U	0.0005 U
MW-11B	7/12/2011	0.084	0.0012 J	0.0054	0.0005 U	0.038	0.0005 U	0.0046 J	0.046	0.06	0.0005 U	0.0024 J
MW-11B	1/30/2012	0.025	0.0011 J	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0013 J	0.0005 U	0.0005 U	0.0005 U	0.0005 U
MW-11B	7/10/2012	0.1	0.0013 J	0.0055	0.0005 U	0.04	0.0005 U	0.0053	0.054	0.004 J	0.0005 U	0.0024 J
MW-11B	1/9/2013	0.0631	0.00136	0.000168 J	0.00195	0.00352	0.000104 U	0.00307	0.00205	0.0000755 U	3.77E-05 U	0.00154
MW-11B	7/11/2013	0.108	0.00119	0.00321	0.000356 U	0.0231	0.000106 U	0.00383	0.0388	0.00535	3.85E-05 U	0.00196
MW-11B	1/8/2014	0.0603	0.00102	0.00242	0.000493 J	0.0111	0.000317 J	0.00267	0.0195	0.000382 J	0.000037 U	0.00126
MW-11B	7/2/2014	0.0953	0.00166	0.00375	0.000349 U	0.0199	0.000109 J	0.00417	0.0339	0.0135	3.77E-05 U	0.00213
P-10	3/28/2000	0.51	0.00176	0.022	0.0008 JB	<b>0.16</b>	0.0006 JB	0.014	0.28	<b>4.32</b>	0 U	0.006
P-10	9/26/2000	0.39	0.0002 U	0.024	0.0005 U	<b>0.16</b>	0.0007 J	0.017	0.23	<b>4.4</b>	0.0002 U	0.008
P-10	4/25/2001	0.32	0.0002 U	0.021	0.0005 U	<b>0.11</b>	0.0004 U	0.015	0.19	<b>3.8</b>	0.0002 U	0.006
P-10	9/27/2001	0.3	0.0002 U	0.013	0.0005 J	<b>0.13</b>	0.0004 U	0.01	0.17	<b>3.2</b>	0.0002 U	0.006
P-10	3/13/2002	0.36	0.002	0.012	0.001 J	<b>0.14</b>	0.0004 U	0.008	0.17	<b>2.3</b>	0.0002 U	0.003
P-10	9/25/2002	0.042	0.0004 J	0.001 J	0.0009 J	0.011	0.003	0.001 J	0.013	0.2	0.0006 U	0.0005 J
P-10	3/16/2004	0.000074 U	0.000076 U	0.000124 U	0.000172 U	0.000076 U	0.000379 J	0.000093 U	0.000068 U	0.000067 U	9.53E-05 U	0.000084 U
P-10	3/3/2005	0.00453	0.00008 J	0.00015 J	0.000836	0.000892	0.00028 J	0.00015 J	0.000723	0.0142	0.00004 U	0.00009 U
P-10	7/19/2005	0.0737	0.000476	0.00346	0.000352 U	0.0314	0.000481	0.0024	0.0364	0.464	0.00004 U	0.00102
P-10	1/5/2006	0.102	0.00006 U	0.0057	0.000359 U	0.0325	0.000107 U	0.00273	0.048	0.433	0.00004 U	0.00108
P-10	7/31/2006	0.0346	0.00016 J	0.000981	0.00016 J	0.00945	0.00032	0.000924	0.0115	0.062	0.00007 U	0.00046
P-10	1/23/2007	0.0165	0.00008 U	0.000437	0.00009 U	0.0044	0.0001 U	0.00004 U	0.00541	0.0204	0.00007 U	0.000215
P-10	7/17/2007	0.0688	0.00114 U	0.00319 J	0.0019 U	0.0272	0.00362 U	0.0021 J	0.0291	0.297	0.00267 U	0.001 J
P-10	1/28/2008	0.00373	0.00028 U	0.000703	0.00023 J	0.000713	0.00019 U	0.000506	0.000668	0.00038 U	0.00019 U	0.00039 J
P-10	7/16/2008	0.0106	0.00053	0.000747	0.00022 J	0.00176	0.00092 J	0.00022 J	0.00245	0.00079	0.00021 U	0.00021 U
P-10	1/22/2009	0.0008 U	0.0007 U	0.0007 U	0.0012 U	0.0007 U	0.0007 U	0.0006 U	0.0008 U	0.0008 U	0.0015 U	0.0009 U
P-10	7/22/2009	0.0044 J	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
P-10	1/22/2010	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
P-10	7/14/2010	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
P-10	1/12/2011	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
P-10	7/12/2011	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
P-10	1/31/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
P-10	7/11/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
P-10	1/10/2013	0.0000755 U	0.0000566 U	0.0000472 U	0.000906	0.0000755 U	0.000104 U	0.000066 U	0.000066 U	0.0000755 U	3.77E-05 U	0.000104 U
P-10	7/11/2013	0.0000808 U	0.0000606 U	0.000133 J	0.000492 J	0.0000808 U	0.000111 U	0.0000707 U	0.0000707 U	0.0000808 U	4.04E-05 U	0.000111 U
P-10	1/9/2014	0.000102 J	0.0000556 U	0.000323 J	0.000343 U	0.0000741 U	0.000262 J	0.0000648 U	0.0000648 U	0.0000741 U	0.000037 U	0.000102 U
P-10	7/2/2014	0.01	0.0000588 U	0.000375 J	0.00127	0.00205	0.000108 U	0.00042 J	0.00393	0.0000784 U	3.92E-05 U	0.000318 J
P-12	3/28/2000	0 U	0 U	0 U	0.001 JB	0 U	0.0008 JB	0 U	0 U	0.0001 J	0.0001 J	0.01
P-12	9/25/2000	0.0003 U	0.0002 U	0.0004 U	0.001 J	0.0003 U	0.0006 J	0.0004 U	0.0003 U	0.0003 U	0.0002 U	0.013
P-12	4/24/2001	0.0003 U	0.0002 U	0.0004 U	0.0005 U	0.0003 U	0.0004 U	0.0004 U	0.0003 U	0.0003 U	0.0002 U	0.009

**TABLE VILA.2**  
**SWMU NO. 1 B-TZ UNIT GROUNDWATER MONITORING DATA**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TX**

Well ID	Constituent	Acenaphthene	Acenaphthylene	Anthracene	bis(2-Ethylhexyl) phthalate	Dibenzofuran	Di-n-butyl phthalate	Fluoranthene	Fluorene	Naphthalene	Phenol	Pyrene
	PCL (mg/L)	1.5	1.5	7.3	0.006	0.098	2.4	0.98	0.98	0.49	7.3	0.73
P-12	9/27/2001	0.0003 U	0.0002 U	0.0004 U	0.0007 J	0.0003 U	0.0006 J	0.0004 U	0.0003 U	0.0005 J	0.0002 U	0.01
P-12	3/14/2002	0.0003 U	0.0002 U	0.0004 U	0.0005 U	0.0003 U	0.0004 U	0.0004 U	0.0003 U	0.0003 U	0.0002 U	0.0003 U
P-12	9/25/2002	0.00007 U	0.00006 U	0.00009 U	0.0004 U	0.00007 U	0.001 J	0.00009 U	0.00007 U	0.0001 U	0.00006 U	0.006
P-12	3/17/2004	0.000074 U	0.000076 U	0.000124 U	0.001748	0.000076 U	0.000922	0.000093 U	0.000068 U	0.000067 U	9.53E-05 U	0.007348
P-12	3/3/2005	0.00007 U	0.00006 U	0.00007 U	0.00035 U	0.00008 U	0.00013 J	0.00008 U	0.00007 U	0.00006 U	0.00004 U	0.00592
P-12	7/18/2005	0.00007 U	0.00006 U	0.00007 U	0.000431 J	0.00008 U	0.000533	0.00008 U	0.00007 U	0.00006 U	0.00004 U	0.00767
P-12	1/6/2006	0.00007 U	0.00006 U	0.00007 U	0.000352 U	0.00008 U	0.000105 U	0.00008 U	0.00007 U	0.00006 U	0.00004 U	0.00615
P-12	7/28/2006	0.00004 U	0.00008 U	0.00004 U	0.00011 J	0.00006 U	0.00017 J	0.00004 U	0.00004 U	0.00007 U	0.00007 U	0.00545
P-12	1/22/2007	0.00004 U	0.00008 U	0.00004 U	0.00009 U	0.00006 U	0.0001 U	0.00004 U	0.00004 U	0.00007 U	0.00007 U	0.00312
P-12	7/17/2007	0.00114 U	0.00114 U	0.000952 U	0.0019 U	0.0041 U	0.00362 U	0.000952 U	0.000952 U	0.00124 U	0.00267 U	0.0075 J
P-12	1/29/2008	0.00029 U	0.00029 U	0.000645	0.00019 U	0.00029 U	0.00019 U	0.00019 U	0.00019 U	0.00038 U	0.00019 U	0.00932
P-12	7/16/2008	0.0003 U	0.0003 U	0.000552	0.00034 J	0.0003 U	0.00085 J	0.0002 U	0.0002 U	0.000626	0.0002 U	0.00211
P-12	1/22/2009	0.0008 U	0.0007 U	0.0007 U	0.0012 U	0.0007 U	0.0007 U	0.0006 U	0.0008 U	0.0008 U	0.0015 U	0.0026 J
P-12	7/22/2009	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
P-12	1/22/2010	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
P-12	7/14/2010	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
P-12	1/12/2011	0.0009 U	0.0005 U	0.0006 U	0.0033 U	0.0007 U	0.0005 U	0.0005 U	0.0006 U	0.0006 U	0.0005 U	0.0005 U
P-12	7/12/2011	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
P-12	1/31/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
P-12	7/11/2012	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
P-12	1/9/2013	0.0000755 U	0.0000566 U	0.0000472 U	0.00142	0.0000755 U	0.000104 U	0.000066 U	0.000066 U	0.0000755 U	3.77E-05 U	0.000104 U
P-12	7/11/2013	0.00008 U	0.00006 U	0.00005 U	0.00039 J	0.00008 U	0.00011 U	0.00007 U	0.00007 U	0.00008 U	0.00004 U	0.00011 U
P-12	1/9/2014	0.0000741 U	0.0000556 U	0.0002 J	0.000515 J	0.0000741 U	0.000416 J	0.0000648 U	0.0000648 U	0.0000741 U	0.000037 U	0.000102 U
P-12	7/2/2014	0.0000755 U	0.0000566 U	0.000189 J	0.000439 J	0.0000755 U	0.000144 J	0.000066 U	0.000066 U	0.0000755 U	3.77E-05 U	0.00189

Notes:

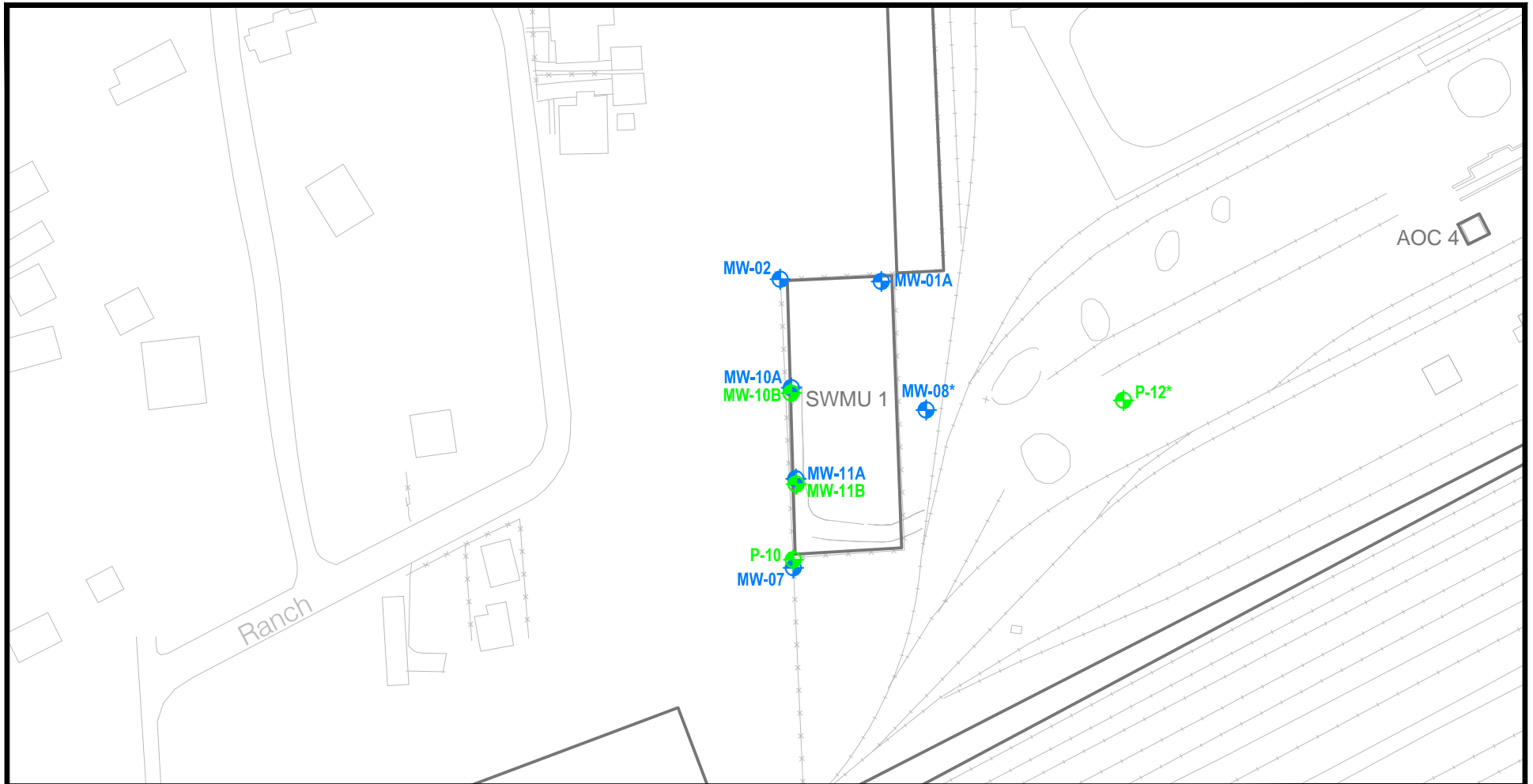
PCL = Protective Concentration Level

J = Estimated value between the SDL and the MQL

U = Value not detected greater than the MQL

**Bolded** concentrations exceed PCL.

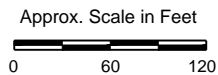
## **FIGURES**



**EXPLANATION**

- Road, Parking Lot, Sidewalk
- x - x - x - Fence
- - - - - Railroad
- ⊕ A-TZ Monitoring Well Location
- ⊕ B-TZ Monitoring Well Location

Note:  
\* Background well.



Source:  
Base map from ERM-Southwest, Inc 0014419a310.dwg, 6/19/2006.



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure VII.A

**SITE MAP  
SWMU No. 1**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

Figure VII.B  
2-Methylnaphthalene Concentrations vs Time - A-TZ Unit  
UPRR HWPW Facility - RCRA SWMU No. 1

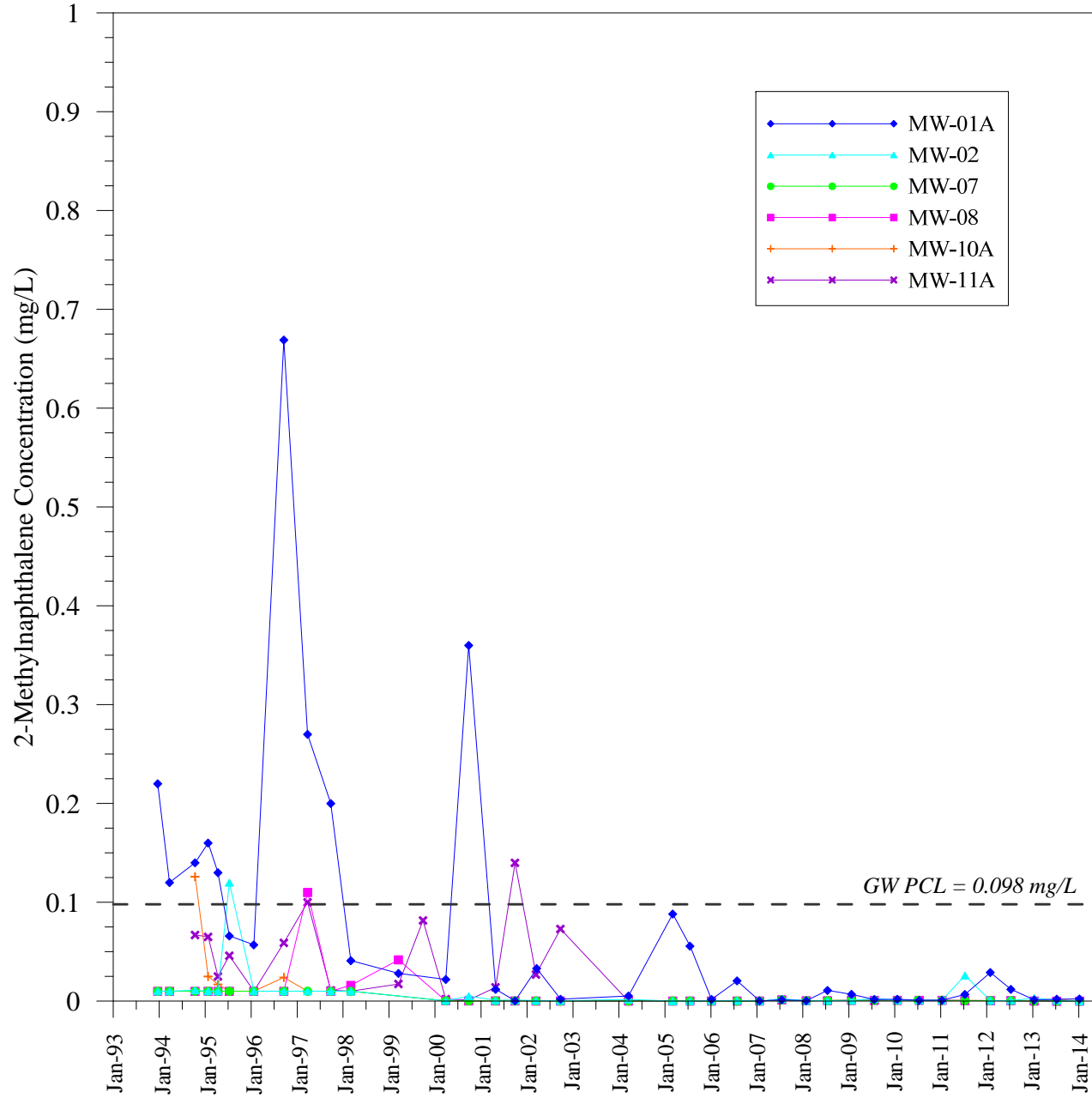


Figure VII.C  
Dibenzofuran Concentrations vs Time - A-TZ Unit  
UPRR HWPW Facility - RCRA SWMU No. 1

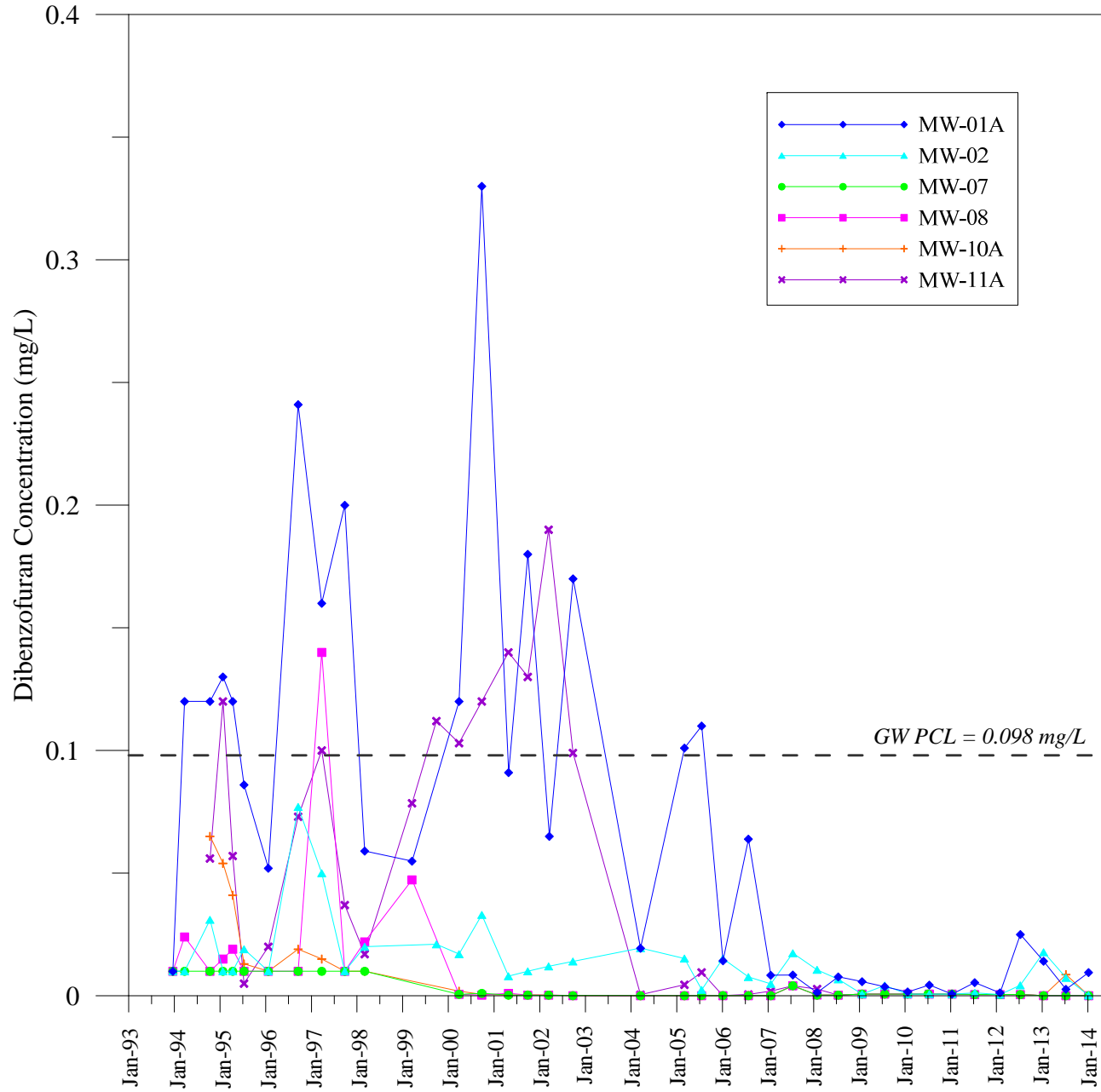


Figure VII.D  
Naphthalene Concentrations vs Time - A-TZ Unit  
UPRR HWPW Facility - RCRA SWMU No. 1

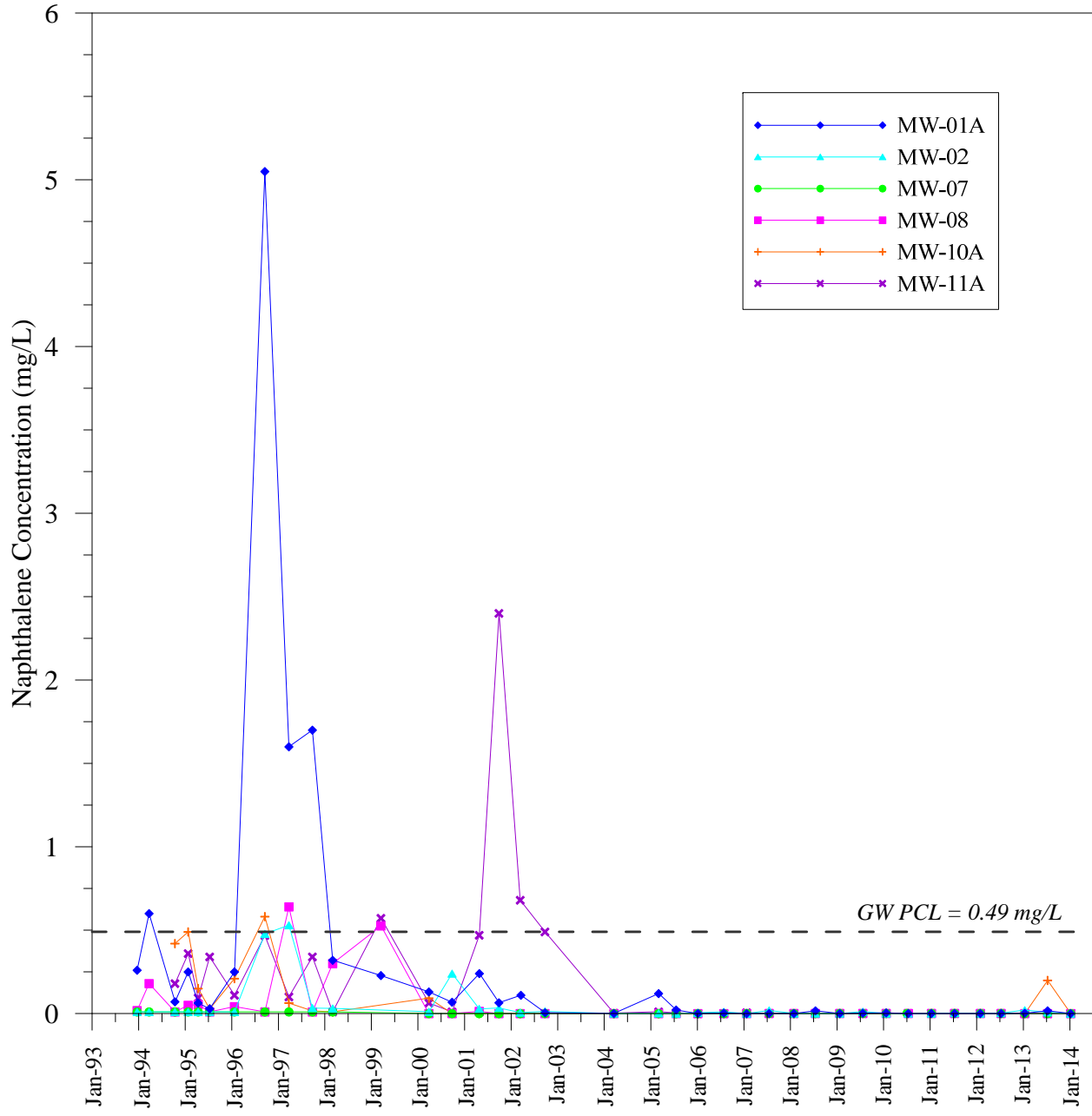


Figure VII.E  
Dibenzofuran Concentrations vs Time - B-TZ Unit  
UPRR HWPW Facility - RCRA SWMU No. 1

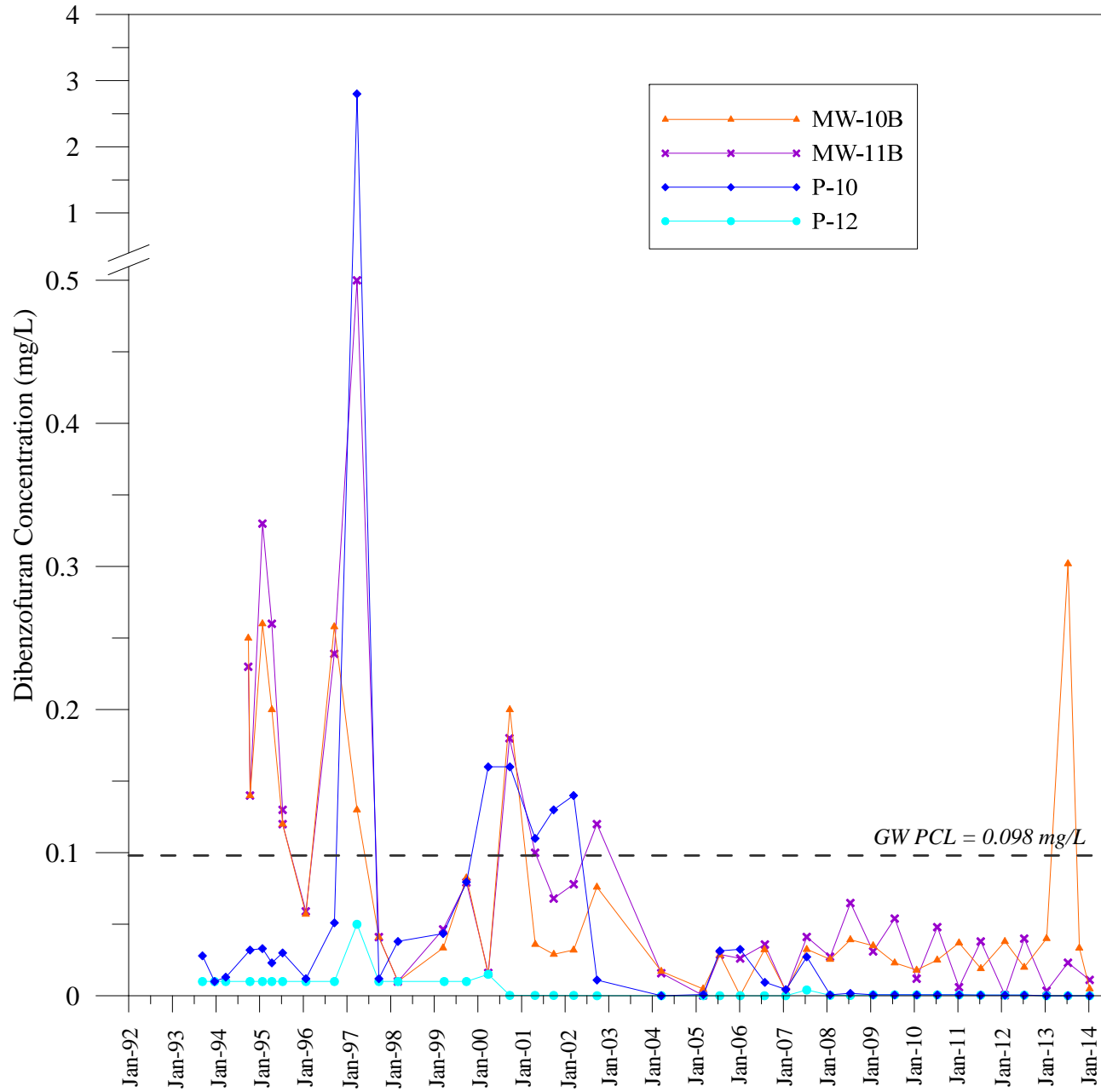
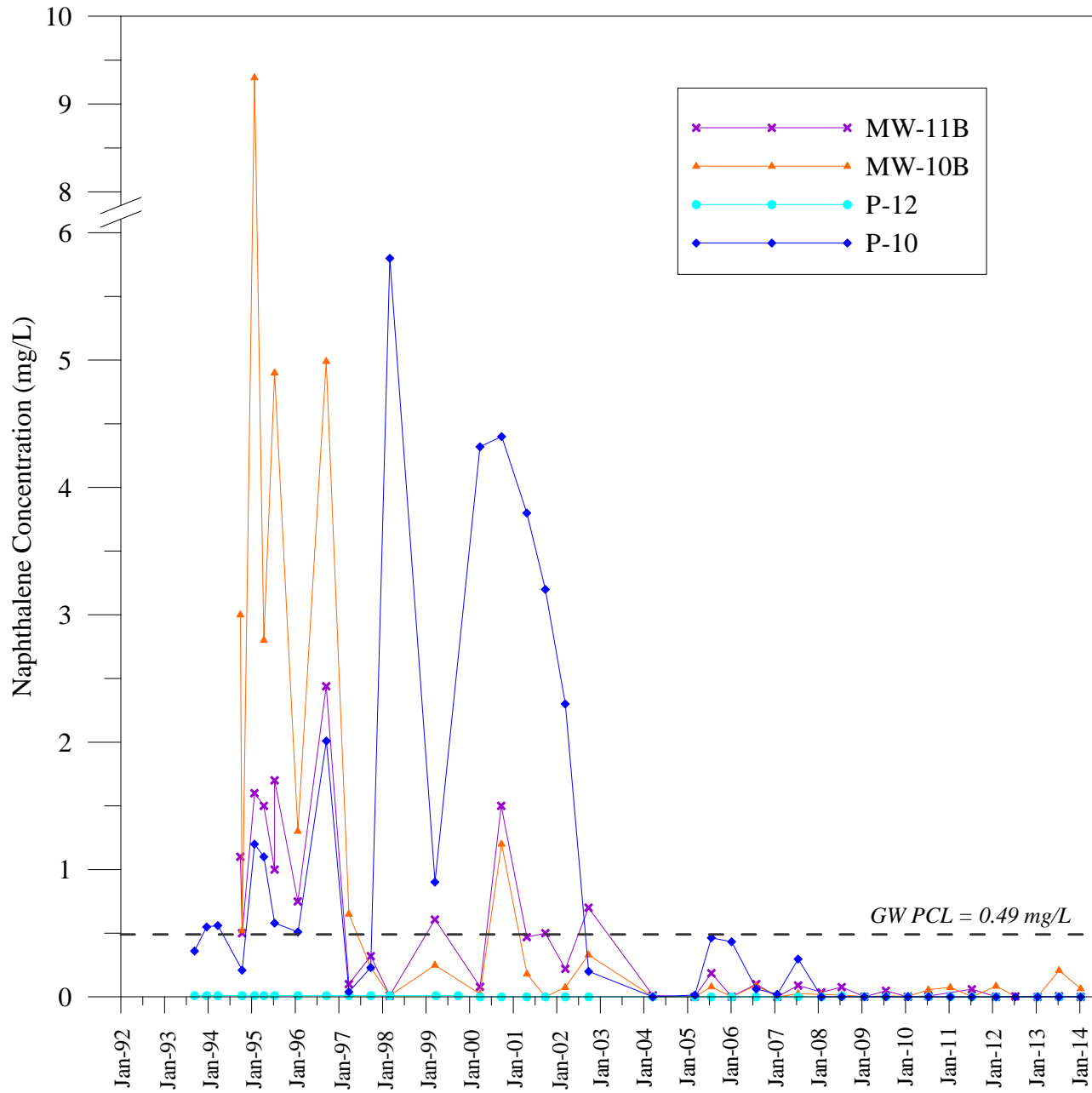




Figure VII.F  
Naphthalene Concentrations vs Time - B-TZ Unit  
UPRR HWPW Facility - RCRA SWMU No. 1



## VIII. Financial Assurance Not Applicable

### A. Financial Assurance Information Requirements for all Applicants (30 TAC Chapter 37, Subchapter P, 305.50(a)(4)(A-E), 335.152(a)(6) and 335.179)

#### 1. Financial Assurance for Closure

An owner or operator must establish financial assurance for the closure of the facility no later than 60 days prior to the first receipt of hazardous waste. Please refer to 30 TAC Chapter 37, Subchapter P, for the financial assurance requirements for closure and provide a signed statement from an authorized signatory per 30 TAC 305.44 regarding how the owner or operator will comply with this provision.

If the financial mechanism(s) has been obtained, provide a copy of the mechanism(s)

#### 2. Financial Assurance for Post-Closure Care (applicable to disposal facilities and contingent post-closure care facilities only)

An owner or operator subject to post-closure monitoring or maintenance requirements must establish financial assurance for the post-closure care of the facility no later than 60 days prior to the first receipt of hazardous waste. Please refer to 30 TAC Chapter 37, Subchapter P for the financial assurance requirements for post-closure and provide a signed statement from an authorized signatory per 30 TAC 305.44 regarding how the owner or operator will comply with this provision.

If the financial mechanism(s) has been obtained, provide a copy of the mechanism(s)

#### 3. Liability Requirements (not required for post-closure care)

All owners or operators must establish financial assurance for third party sudden liability coverage of the facility no later than 60 days prior to the first receipt of hazardous waste. Owners or operators of disposal facilities must establish financial assurance for third party sudden and nonsudden liability coverage of the facility no later than 60 days prior to the first receipt of hazardous waste. Please refer to 30 TAC Chapter 37, Subchapter P, for the financial assurance requirements for liability coverage, and provide a signed statement from an authorized signatory per 30 TAC 305.44 regarding how the owner or operator will comply with this provision.

If the financial mechanism(s) has been obtained, provide a copy of the mechanism(s).

#### 4. State's Assumption of Responsibility

If the State of Texas assumption of responsibility is found to be acceptable, the owner or operator may satisfy the financial assurance requirements by use of both the State's assurance and additional financial mechanisms specified in 30 TAC Chapter 37. The amount of funds available through the State and owner or operator's mechanisms must at least equal the required amount. (30 TAC 37.6041)

### B. Applicant Financial Disclosure Statements for a permit, permit amendment, or permit modification (30 TAC 305.50(a)(4))

1. A statement signed by an authorized signatory per 30 TAC 305.44 explaining in detail how the applicant demonstrates sufficient financial resources to construct, safely operate, properly close, and provide adequate liability coverage for the facility.

2. Audited financial statements for the last two years and the most current quarterly financial statement prepared according to generally accepted accounting principles. If audited statements have not been prepared for the applicant, copies of the applicant's last two years of financial statements and tax returns shall be submitted. The copies of the tax returns shall be certified by original signature of an authorized officer or owner as being a "true and correct copy of the return filed with the Internal Revenue Service." Additionally, an audited financial statement shall be prepared and submitted for the most recent fiscal year. All financial statements shall include a balance sheet, income statement, cash flow statement, notes to the financial statements, and the accountant's opinion letter.
3. For publicly traded companies, copies of Securities and Exchange Commission Form 10-K for the last two years and the most current Form 10-Q.
4. For privately-held companies, written disclosure of the information that would normally be found in Form 10-K including, but not limited to, the following:
  - a. descriptions of the business and its operations;
  - b. identification of any affiliated relationships;
  - c. credit agreements and terms;
  - d. any legal proceedings involving the applicant;
  - e. contingent liabilities; and
  - f. significant accounting policies.

#### C. Applicants Requesting Facility Expansion, Capacity Expansion, or New Construction

Provide the following information as applicable to the particular financial circumstances:

1. Estimate of capital costs for expansion and/or construction. Complete Table VIII.C. - Estimated Capital Costs.
2. Evidence of financial resources to construct, operate safely, close, and provide liability coverage for the facility.
  - a. Applicants demonstrating through financial statements or existing credit arrangements sufficient financial resources to construct, operate, and close the facility may address this requirement with the signed statement submitted to satisfy Section VIII.B.1.
  - b. Applicants that must obtain additional financing through a new stock offering or new debt issuance for construction or expansion as requested in this application shall submit the following information:
    - (1) financial plan sufficiently detailed to clearly demonstrate that the applicant will be in a position to readily secure financing for construction, operation, and closure if the permit is issued. The submitted financial plan must be accompanied by original letters of opinion from two financial experts, not otherwise employed by the applicant, who have the demonstrated ability to either finance the facility or place the required financing. The opinion letters must certify that the financial plan is reasonable, certify that financing is obtainable within 180 days of issuance of the permit, and include the time schedule contingent upon permit issuance for securing the financing. Only one opinion letter from a financial expert, not otherwise employed by the applicant, is required if the letter renders a firm commitment to provide all the necessary financing; and
    - (2) a written detail of the annual operating costs of the facility and a projected cash flow statement including the period of construction and first two years of operation. The

cash flow statement must demonstrate the financial resources to meet operating costs, debt service, and financial assurance for closure, post closure, and liability coverage requirements. A list of the assumptions made to forecast cash flow shall also be provided.

3. For new commercial hazardous waste management facility applications, a written statement signed by an authorized signatory per 30 TAC 305.44 explaining how the applicant intends to provide emergency response financial assurance per 30 TAC 305.50(a)(12)(C) or (D).

**Table VIII.C - Estimated Capital Costs**

	Estimated Capital Costs
Site preparation, fencing, paving, curbing, lighting, roadways .....	\$ _____
Foundations, buildings, other structures, utilities and connections, drainage system, HVAC system, Electrical system, wastewater system .....	\$ _____
Process and control equipment .....	\$ _____
Auxiliary equipment, including but not limited to exhaust hoods, fans, ducting, pumps, piping, conveyors, stacks, storage tanks, process tanks, waste disposal facilities, pollution control equipment, and fire protection system.....	\$ _____
Process integration and instrumentation .....	\$ _____
Emergency response equipment .....	\$ _____
Transportation equipment .....	\$ _____
Office equipment .....	\$ _____
Engineering design, supervision, overhead .....	\$ _____
Construction expenses including permits, insurance, temporary facilities, and clean-up.....	\$ _____
Contractor’s fees and overhead.....	\$ _____
Contingency .....	\$ _____
Total	\$ _____

The estimates listed above were derived from the following sources:

## IX. Releases From Solid Waste Units And Corrective Action

The Texas Solid Waste Disposal Act, 30 TAC 335.167, 40 CFR 270.14(d) and Section 3004(u) of the Hazardous and Solid Waste Amendments of 1984 (HSWA) require that each hazardous waste management permit application review shall address corrective action for all releases of hazardous waste and hazardous constituents listed in 40 CFR 261, Appendix VIII, 40 CFR Part 264, Appendix IX, and/or other constituents of concern from any solid waste management unit (SWMU) and/ or Areas of Concern (AOCs) at a facility, regardless of the time at which waste was placed in such unit.<sup>5</sup> Current EPA interpretation of this requirement has resulted in a Corrective Action process that begins with a RCRA Facility Assessment (RFA) to determine if corrective action is necessary.

The first step in the RFA is the development of a Preliminary Review (PR) from all available documentation for a facility (including but not limited to all facility documents, Part A, and Part B of the permit application, TCEQ correspondence files and inspection reports, etc.). The PR compiles available information on every SWMU and/or AOC that has ever existed at the facility. A unit checklist is completed for each SWMU and/ or AOC. On a unit-by-unit basis, the PR may recommend no further action for:

- well-designed and well-managed units;
- units that have not managed hazardous wastes or wastes containing hazardous constituents;
- units already under corrective action by enforcement order; or
- units scheduled to be addressed in a compliance plan.

In addition, the unit checklists are summarized in a Facility Checklist. If there is a known release or potential for a release of hazardous waste or hazardous constituents from a unit/area, the PR may recommend a RCRA Facility Investigation (RFI), or an Affected Property Assessment (APA), if 30 TAC Chapter 350, Texas Risk Reduction Program (TRRP) applies, to determine the extent of the release for future corrective action, or stabilization as an appropriate and immediate corrective action.

The second step is a Visual Site Inspection (VSI) of the entire facility. The RFA is the combination of the PR and VSI documentation and any sample results. The RFA process should be scheduled so as to be completed during the latter stages of the Technical Review process or no later than one month in advance of the preparation of an initial draft permit for the facility. The RFA includes recommendations for whether further investigation or corrective action is warranted.

The requirements for an RFI or any other corrective action will be included in the permit, in the associated compliance plan which is mandatory for facilities with known groundwater contamination, or pursuant to 40 CFR 270.14(d)(3), the applicant may be required to start the RFI or other corrective action before the permit is issued. The RFI shall comply with all the applicable items contained in the U.S. EPA publication EPA/520-R-94-004, OSWER Directive 9902.3-2A, RCRA Corrective Action Plan (Final), May 1994, unless an alternate investigation approach is approved by the Executive Director. An RFI workplan may typically include a soil boring program, installation of monitoring wells, and sampling and analysis for 40 CFR 261 Appendix VIII and 40 CFR 264 Appendix IX hazardous constituents for surface soils, subsurface strata, surface water, groundwater, and/or air.

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<sup>5</sup>For the purposes of HSWA Corrective Action, a SWMU may include, but is not limited to, any landfill, surface impoundment, land treatment unit, waste pile, underground injection well, incinerator, boiler, industrial furnace, tank, container storage area, drip pad, containment building, miscellaneous unit; any units exempt from hazardous waste permitting requirements, such as wastewater treatment units, elementary neutralization units, totally enclosed treatment units, waste recycle/reuse units, and 90-day accumulation time units; or process units or areas which may have routine and/or systematic releases to the environment (e.g., process drainage ditches or product storage tanks).

The permittee shall perform the RFI or APA and report the results. Corrective Action under 30 TAC Chapter 350 consists of an APA, determination of protective concentration levels, selection of a remedy standard (if necessary), development and implementation of a response action (if necessary), and submittal of required report according to 30 TAC Chapter 350.

If the RFI report indicates releases of hazardous waste or hazardous constituents for SWMUs and/or AOCs that have been grandfathered under 30 TAC Chapter 335 Subchapters A and S, Corrective Action shall consist of, if necessary, Interim Corrective Measures, Baseline Risk Assessment (BLRA)/Corrective Measures Study (CMS) Report, and Corrective Measures Implementation (CMI).

For grandfathered SWMUs and/or AOCs, the permittee may continue to complete the Corrective Action requirements under 30 TAC Chapter 335, Subchapter A and S, provided the permittee complies with the notification and schedule requirements pursuant to 30 TAC 335.8 and 350.(2)(m).

This report shall evaluate the risk, identify and evaluate corrective measure alternatives, and recommend appropriate corrective measure(s) to protect human health and the environment. The BLRA/CMS Report shall address all of the applicable items in 30 TAC 350, 30 TAC 335 Subchapter S, and the U.S. EPA publication EPA/520-R-94-004, OSWER Directive 9902.3-2A, RCRA Corrective Action Plan (Final), May 1994.

Upon approval of the BLRA/CMS Report by the TCEQ, the permittee shall submit a CMI Workplan to address all of the items for CMI Workplan contained in the U.S. EPA publication EPA/520-R-94-004, OSWER Directive 9902.3-2A, RCRA Corrective Action Plan (Final), May 1994. For projects conducted under TRRP, the risk assessment process shall be addressed in the Affected Property Assessment Report (APAR), and the evaluation of corrective measures shall be conducted as part of the remedy standard selection process provided in the Response Action Plan (RAP). If the CMI or RAP does not propose a permanent remedy, then a CMI Workplan or RAP shall be submitted as part of a new compliance plan application or as a modification/amendment application to an existing compliance plan. The workplan or RAP shall contain detailed final engineering design, monitoring plans, and schedules necessary to implement the selected remedy. Implementation of the corrective measures shall be addressed through a new and/or a modified/amended compliance plan. Upon installation of a corrective action system based upon the approved CMI Workplan or RAP, the permittee shall submit a CMI Report or RAP which includes as-built drawings of the corrective action system. To report the progress of the corrective measures, the permittee shall submit periodic CMI Progress Reports or Response Action Effectiveness Reports to the TCEQ in accordance with the schedule specified in the compliance plan. Upon completion of the corrective action requirements, the permittee shall submit CMI Report or Response Action Completion Reports for review and approval.

Please note that the applicant/permittee may perform voluntary corrective action, stabilization, or “interim measures” at any time prior to or during the RFA/RFI/CMS/CMI or the APAR/RAP process without prior TCEQ approval. The TCEQ strongly supports these actions when undertaken to mitigate releases or reduce or minimize exposure and releases to human health and the environment.

#### A. Preliminary Review Checklists

For all facility SWMUs (as defined previously) and/or AOCs, complete the accompanying forms entitled “Preliminary Review Facility Checklist” and “Preliminary Review Unit Checklist”. Make additional copies as necessary. The following instructions are provided in same format as these forms:

### Preliminary Review Facility Checklist Instructions

Facility Checklist - On the form provided, supply the following information:

Fill out the information block at the top of the page (the reviewer space should remain blank for the TCEQ authorized agent).

Facility: \_\_\_\_\_ City: \_\_\_\_\_

ISW Reg. No: \_\_\_\_\_ Date: \_\_\_\_\_

Permit No: \_\_\_\_\_ Reviewer: \_\_\_\_\_

EPA ID No: \_\_\_\_\_

#### Waste Management Units:

1. RCRA Regulated Units: List all units that received hazardous wastes after July 26, 1982 or for which closure was certified after January 26, 1983 with the appropriate information under the three provided column headings as explained in the Unit Checklist instructions. [40 CFR 264.90(a)(2)]
2. Solid Waste Management Units, and/or Areas of Concern (AOC): List all remaining SWMUs and/or AOCs.

#### Reviewed Documents:

1. Enter the appropriate information for sub-items 1-6, including document dates (item 6 should include company files).

#### Summary:

1. Provide an overall summary of the results of this Preliminary Review noting units and areas of concern.

#### Recommended Actions:

1. Summarize the Unit Checklist Recommended Actions and list those units recommended for further investigation including appropriate Unit No.



**Preliminary Review Unit Checklist Instructions (Continued)**

Unit Checklist - On the form provided, supply the following information for EACH unit or area of concern:

- A. Waste Management Unit: Enter SWMU and/or AOC name and facility designated number (e.g., Tank 101)
- B. N.O.R. No.: enter TCEQ Notice of Registration (N.O.R.) Number or, if unassigned, a letter designation (i.e., A-Z)
- C. Description: enter type of unit (e.g., above-grade processing tank) and Process Code as listed below:

**Process Types Table**

Process Code	Unit Type	Process Code	Unit Type
	Disposal	T82	Lime Kiln
D79	Injection Well	T83	Aggregate Kiln
D80	Landfill	T84	Phosphate Kiln
D81	Land Application	T85	Coke Oven
D83	Surface Impoundment - Disposal	T86	Blast Furnace
D99	Other Disposal	T87	Smelting, Melting, or Refining Furnace
	Storage	T88	Titanium Dioxide Chloride Process Oxidation Reactor
S01	Container	T89	Methane Reforming Furnace
S02	Tank - Storage	T90	Pulping Liquor Recovery Furnace
S03	Waste Pile	T91	Combustion Device Used in Recovery of Sulfur Values from Spent Sulfuric Acid
S04	Surface Impoundment - Storage	T92	Halogen Acid Furnace
S05	Drip Pad	T93	Other Industrial Furnaces Listed in 40 CFR 260.10
S06	Containment Building - Storage	T94	Containment Building - Treatment
S99	Other Storage		Miscellaneous (Subpart X)
	Treatment	X01	Open Burning/Open Detonation
T01	Tank - Treatment	X02	Mechanical Processing
T02	Surface Impoundment - Treatment	X03	Thermal Unit
T03	Incinerator	X04	Geologic Repository
T04	Other Treatment	X99	Other Subpart X
T80	Boiler		
T81	Cement Kiln		

- D. Dates of Operation: enter the date the unit was placed into service and any other dates the unit changed status (active, inactive, closed, post-closure) with the appropriate status designation.
- E. Wastes Managed:  
List all solid wastes ever managed in the unit and include the TCEQ NoR waste #, EPA Hazard Codes, and EPA waste codes. For each waste, list any hazardous constituent listed in 40 CFR 261 Appendix VIII and 264 Appendix IX, as appropriate.
- F. Evidence of Release:  
Completely describe the release, including time frame, waste amount, to what media, and any corrective measures taken.
- G. Pollutant Dispersal Pathways:  
Completely describe the possible and actual run-off pathways (i.e., to which tributary, creek, river, and bay or through subsoil to which aquifer with groundwater flow gradient, speed, and direction and any discharge point).
- H. Summary:  
Provide complete unit description including unit type, elements of construction, location, age, condition, dimensions, size, capacity (i.e., gallons, square feet, cubic yards, etc.), and potential for release.
- I. Recommended Action:  
Recommend No Further Action, Stabilization (interim measures), or Further Investigation and justify. Note, corrective action under another authority is justification for No Further Action.

**Preliminary Review Facility Checklist**

Facility: \_\_\_\_\_ City: \_\_\_\_\_

ISW Reg No: \_\_\_\_\_ Date: \_\_\_\_\_

Permit No: \_\_\_\_\_ Reviewer: \_\_\_\_\_

EPA ID No: \_\_\_\_\_

A. Waste Management Units:

1. RCRA Regulated Units:

NoR No.	Description	Status
---------	-------------	--------

2. Solid Waste Management Units:

NoR No.	Description	Status
---------	-------------	--------

B. Reviewed Documents:

3. RCRA: Part A \_\_\_\_\_  
Part B \_\_\_\_\_  
Permit \_\_\_\_\_

- 4. CERCLA:
- 5. Inspection Reports:
- 6. Enforcement Actions:
- 7. Exposure Information:
- 8. Other Information:

C. Summary:

D. Recommended Action:

**Preliminary Review Unit Checklist**

Facility: \_\_\_\_\_ City: \_\_\_\_\_

ISW Reg No: \_\_\_\_\_ Date: \_\_\_\_\_

Permit No: \_\_\_\_\_ Reviewer: \_\_\_\_\_

EPA ID No: \_\_\_\_\_

- A. Waste Management Unit:
- B. NoR No:
- C. Description:
- D. Dates of Operation:
- E. Wastes Managed:
- F. Evidence of Release:
- G. Pollutant Dispersal Pathways:
- H. Summary:
- I. Recommended Action:

## B. Appendices to Preliminary Review (PR)

The PR should also include Appendices I-IV to correspond to the Roman numerals in the Unit Checklist:

### Appendix I. FACILITY and SWMU LOCATION MAPS

- Regional Location Map
- Site Location Map
- Facility SWMU Map - Use the Notice of Registration (NoR) number to show the location of each unit on a replicate of the topographic map required in Section V.A.1 of this application. Also, please note that the term “facility” includes the entire contiguous property under the control of the owner or operator, which in most cases is the area shown as the legal description of the site in the facility’s Part A permit application.

### Appendix II. WASTES MANAGED

- List all wastes managed and 40 CFR 261 Appendix VIII and 40 CFR 264 Appendix IX hazardous constituents. Provide pertinent health, safety, and risk data on each.

### Appendix III. EVIDENCE of RELEASE

- Provide any applicable documentation on a release. Provide a map of release locations, SWMU identification, and paths traveled.

### Appendix IV. POLLUTANT DISPERSAL PATHWAYS

- Provide a facility, local, and regional map identifying all possible and eventual pathways in which a release from any unit could or did travel. Provide a facility general cross-section to illustrate vertical pathways and lateral movements in groundwater, including discharges (i.e., seeps, creeks, etc.).

## C. Preliminary Review Submittal Format

The PR should be bound with a cover page and contain a Table of Contents with the Facility Checklist entered first followed by all the Unit Checklists in unit NoR numerical order and alphabetical order.



**IX. RELEASES FROM SOLID WASTE UNITS AND CORRECTIVE ACTION**

**RELEASES FROM SOLID WASTE UNITS AND CORRECTIVE ACTION  
PART B PERMIT APPLICATION  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

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### Appendix

IX.I	Facility and SWMU Location Maps
IX.II	Wastes Managed
IX.III	Evidence of Release
IX.IV	Pollutant Dispersal Pathways

**IX.A PRELIMINARY REVIEW FACILITY CHECKLIST**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

**I. Waste Management Units:**

1. RCRA Regulated Units:

<u>NOR No.</u>	<u>Description</u>	<u>Status</u>
001/SWMU 1	Closed Surface Impoundment	Post Closure Care
002/SWMU 7	Tank Car	Inactive
003	Sub-surface Tank	Inactive
004	Container Storage Area	Active (<90 day unit)
005	Waste Pile	Inactive
006	Miscellaneous Storage Containers	Closure Request

2. Solid Waste Management Units (SWMU)/Areas of Concern (AOC):

***The information for the Solid Waste Management Units (SWMU) and Areas of Concern (AOC) included in Section IX were provided in the “RCRA Facility Assessment Report, Southern Pacific Transportation Company” (PRC, 1993) prepared for the U.S. Environmental Protection Agency dated October 1993.***

<u>Unit No.</u>	<u>Description</u>	<u>Status</u>
SWMU 1/NOR 001	Surface Impoundment Area which is a closed RCRA-regulated surface impoundment	Post Closure Care
SWMU 2	Northern and Southern Drainage Ditches	Inactive
SWMU 3	Oil Drum Storage (ODS) Building	Inactive
SWMU 4	Recent Process Area	Inactive
SWMU 5	Original Process Area	Inactive
SWMU 6	Water Treatment and Boiler System	Inactive
SWMU 7/NOR 002	Tank Car Storage Area	Inactive
SWMU 8	Aboveground Storage Tank Area	Inactive
SWMU 9	Location of Former UST No. 44-023-05	Inactive
SWMU 10	Location of Former Sap Water Treatment Tank	Inactive
SWMU 11	Oil Water Separators	Inactive
SWMU 12	Railroad Tie Storage Area	Inactive
AOC 1	Diesel Storage Tank	Inactive
AOC 2	Hose House	Inactive
AOC 3	Contaminated Portion of City Water Line	Inactive
AOC 4	Location of Former Incinerator	Inactive
AOC 5	City Storm Sewer	Inactive

<u>Unit No.</u>	<u>Description</u>	<u>Status</u>
AOC 6	Inactive Wastewater Lagoon	Inactive
AOC 7	Location of Former UST No. 44-023-21	Closed

II. Reviewed Documents:

1. RCRA: Part A  X   
 Part B  X   
 Permit  X

2. Other Information:

Environmental Resources Management (ERM), 2000. *Affected Property Assessment Report (APAR), Union Pacific Railroad Houston Wood Preserving Works.* June 10.

ERM, 2003a. *RCRA Part A and Part B Permit Application, Renewal and Amendments, Union Pacific Railroad Houston Wood Preserving Works.* Prepared for Union Pacific Railroad Company, December 22.

ERM, 2003b. *Compliance Plan Application and Amendments, Union Pacific Railroad Houston Wood Preserving Works.* Prepared for Union Pacific Railroad Company, December 22.

ERM, 2004. *Revised Affected Property Assessment Report (APAR), Union Pacific Railroad Company, Houston Wood Preserving Works.* June 10.

Geo Associates, 1991. *Report of Soil Sampling, Closed Surface Impoundment, Southern Pacific Transportation Company.*

Pastor, Behling & Wheeler, LLC (PBW), 2009. *Affected Property Assessment Report Addendum, Union Pacific Railroad Company Houston Wood Preserving Works.* March 29.

Pastor, Behling & Wheeler, LLC (PBW), 2011. *Affected Property Assessment Report Addendum, Union Pacific Railroad Company Houston Wood Preserving Works.* March 25.

PRC Environmental Management, Inc. (PRC), 1993. *RCRA Facility Assessment Report, Southern Pacific Transportation Company, Houston, Texas, TXD 000820266.* October.

Rollins Environmental Services (FS) Inc., 1984. *Final Report on Closure Plan of RCRA Facility #31547.* April.

Southern Pacific Transportation Company (SPTCo), 1991. *Part B Permit Application – Post Closure Care and Compliance Plan for the Closed Surface Impoundment.* Volumes I-III. May 13.

SPTCo, 1993. *Response to PREC and the Environmental Protection Agency (EPA) Request for Information on SPTCo Liberty Road Facility, Houston, Texas.* September 9.

TCEQ, 2005. *Compliance Plan No. 50343.* June 10.

TCEQ, 2005. *Permit For Industrial Solid Waste Management Site, Permit No. 50343, Union Pacific Railroad Company.* June 10.

### III. Summary:

Based on the conclusions of a RCRA Facility Assessment (RFA) completed on behalf of the U.S. EPA (PRC Environmental Management, Inc., 1993), 11 solid waste management units (SWMUs) and six areas of concern (AOCs) were identified as subject to further investigation. On June 20, 1994, a RCRA Permit (Permit No. HW-50343-000) was issued to Southern Pacific Transportation Company (SPTCo), requiring completion of a RCRA Facility Investigation (RFI) for 10 of the SWMUs and the six AOCs to determine whether constituents of interest (referred to as constituents of potential concern in this report) have been released into the environment. The Compliance Plan (Compliance Plan No. CP-50343-000) was also issued to SPTCo in 1994 requiring completion of an Extent of Contamination (EOC) investigation in the area of SWMU No. 1, the closed surface impoundment. SWMU No. 1 is the only regulated unit at the facility.

Groundwater monitoring has taken place on a semi-annual basis since 1994. The site is currently in year 20 of the 30 years required for post-closure care.

### IV. Recommended Action:

No further corrective action is recommended for the individual SWMUs and AOCs since the entire facility is entering into corrective action post-closure monitoring and will be regulated under the Compliance Plan. In order to accelerate the corrective action process at the UPRR HWPW Facility, a comprehensive site-wide approach to corrective action is proposed. The Site has been used for creosoting operations since 1899 with numerous operations at the Site over that time period. Historical material and waste handling practices have resulted in releases to soil and groundwater in many areas across the Site. These releases have resulted in commingled creosote dissolved-phase COC PCLE zones and creosote non-aqueous phase liquid (NAPL) that are not attributable to specific waste management units or areas of concern.

### IX.A.1 PRELIMINARY REVIEW UNIT CHECKLIST – NOR 001/SWMU 1

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: 001/SWMU No. 1

B. Description: Landfill, D80

C. Dates of Operation: 1979-1982

II. Wastes Managed: Creosote-contaminated soil, sawdust, and tank bottoms.

III. Evidence of Release: No evidence of a release

IV. Pollutant Dispersal Pathways: NA

V. Summary: Solid Waste Management Unit (SWMU) 1 is an inactive surface impoundment (SI) and is a grass-covered section of land located at the southwest corner of the facility property. The SI is bordered on the southern side by an earthen berm, which is about 2 feet by 3 feet by about 80 to 100 feet long. The berm extends about 100 feet south of the southwest corner of the SI. A chain-link security fence is located along the northern and western margins of the SI. The original dimensions of the unit were about 180 feet by 106 feet at the surface, extending to a depth of about 7 feet bgs (SPTCo, 1991). Based on these dimensions, the SI would have a capacity of 133,560 cubic feet (about 4,950 cubic yards). According to SPTCo facility representatives, a clay liner was installed during the original construction of the SI. No information was available concerning the thickness and engineering properties of the liner. According to SPTCo representatives, the SI was built in 1979 for the disposal of contaminated surface soils remediated from an adjacent low-lying ponding area (AOC 6). Surface soils from the ponding area were remediated in response to a fire in 1979 and the discovery of contaminated soils. Installation of the SI was based on an agreement with the Texas Department of Water Resources (TDWR) for disposal of the soils.

In 1984, SPTCo closed the SI by excavating the soils and materials contained within. The visual hazardous material was removed along with apparent contaminated soil. An additional 3-inches of soil was then removed. The area was then divided into 50-foot grids which were randomly selected for sampling. Between 10 and 15 grab samples not more than 6-inches deep were homogenized and analyzed for K001 listed waste parameters and polynuclear aromatic hydrocarbons (PAHs). When soil confirmation sample concentrations were lower than those of background samples, the excavated area was backfilled with compacted clay and a groundwater monitoring system was installed (Rollins, 1984).

In 1991, a series of six soil borings were drilled within the same six grid areas that were sampled during the 1984 closure operations (Geo Associates, 1991). Four samples were collected from each of the borings from the following zones: the surficial clay fill, between the clay fill and the uppermost sand, the uppermost sand, and below the uppermost sand unit. These samples were analyzed for BTEX, TPH and semi-volatiles.

Bis (2-ethylhexyl) phthalate was detected in two samples at concentrations well below the TCEQ Texas Risk Reduction Program (TRRP) Protective Concentration Limits (PCL). Xylene, ethylbenzene and toluene were also detected, but at concentrations well below the PCL. The 1991 soil sampling results indicated that the source of contamination had been removed by the 1984 closure activities (SPTCo, 1991).

In 1984, the facility then began investigating and monitoring the shallow ground water in the vicinity of the SI. Between 1984 and 1991, nine groundwater monitoring wells were installed in the upper zone, and three piezometers were installed in the lower permeable zone. Hydrogeological data collected from these wells and piezometers indicate hydraulic conductivity between the zones. Analytical data compiled from 1984 until 1991 indicated that benzene, toluene, naphthalene, 2,4-dimethylphenol, and phenol were the most frequently detected parameters and that naphthalene was the parameter detected at the highest concentrations.

The facility entered into post-closure care in 1994, updated in 2005, and groundwater monitoring has taken place on a semi-annual basis since that time. Analytical results are compared to the TRRP PCLs. Since 2006, constituent concentrations have been below their respective PCLs.

- VI. Recommended Action: No further action recommended. The surface impoundment was clean closed in 1984 and is in post-closure care and has been regulated under a post-closure care permit. Additionally, concentrations in groundwater have been below PCLs for sixteen consecutive semi-annual monitoring events (8 years). Therefore, it is recommended to cease all post-closure care activities including inspection and groundwater monitoring. Upon TCEQ approval, the existing monitoring wells for SWMU No. 1 will be plugged and abandoned.

**IX.A.2 PRELIMINARY REVIEW UNIT CHECKLIST – NOR 002/SWMU 7**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: 002/SWMU 7

B. Description: Tank Car Storage Area, S02

C. Dates of Operation: Unknown

II. Wastes Managed: Sap wastewater and tank bottoms

III. Evidence of Release: Surface spillage documented

IV. Pollutant Dispersal Pathways: Soil

V. Summary: The tank car storage area was located in the northeast corner of the facility in the vicinity of the AST (SWMU 8). Two tank cars, each having a capacity of 12,500 gallons, were located on the tracks near Liberty Road. The cars were removed from the facility.

VI. Recommended Action: No further action recommended. The unit is addressed in the facility-wide corrective action detailed in the Compliance Plan.

**IX.A.3 PRELIMINARY REVIEW UNIT CHECKLIST – NOR 003**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: 003

B. Description: Tank (sub-surface), S02

C. Dates of Operation: Unknown

II. Wastes Managed: Unknown

III. Evidence of Release: See NOR 002/SWMU 7

IV. Pollutant Dispersal Pathways: NA

V. Summary: No information regarding the sub-surface tank is available. The tank was reported to be the vicinity of SWMU 7.

VI. Recommended Action: No further action recommended. The unit is addressed in the facility-wide corrective action detailed in the Compliance Plan.



**IX.A.4 PRELIMINARY REVIEW UNIT CHECKLIST – NOR 004**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

**I. Waste Management Unit:**

A. NOR No: 004

B. Description: Container storage area, S01

C. Dates of Operation: 1995-Present

**II. Wastes Managed:**

<b>TCEQ Waste Code</b>	<b>EPA Waste Code</b>	<b>Waste Description</b>
00029032	Non-haz	General refuse from office & site operations
04003011	Non-haz	Petroleum contaminated solids generated as part of corrective action work performed on-site.
14773012	Non-haz	Petroleum contaminated soils generated as part of site investigation and corrective action
14781011	Non-haz	Petroleum contaminated purge water generated as part of groundwater monitoring and investigation
14791012	Non-haz	Petroleum-affected purge water generated as part of groundwater monitoring and investigation
14804062	Non-haz	Plastic and used personal protective equipment generated as a result of monitoring well and/or soil sampling
14841012	Non-haz	Petroleum contaminated purge water generated as part of groundwater monitoring and investigation
0001301H	F034, K001	Soil generated primarily by the boring of monitor wells around the clean-closed wood preserving operation surface impoundment.
0909101H	K001, F034	Aqueous Waste with low surfactants. Groundwater generated from drilling activities for investigative purposes.
0912489H	F034, K001	Creosote sludge, soil mixture generated as part of corrective action performed on-site.
0914101H	F034, K001	Groundwater generated from purging of various monitor wells for investigative purposes.
0915301H	F034, K001	Soil derived from the boring of monitor wells for investigative purposes.
09163081	Non-haz	Empty drums previously used to contain monitor well purge water
0917406H	K001	Plastic and used personal protective equipment generated as a result of monitor well and/or soil sampling.
09133192	Non-haz	Contaminated clothing & personal protective equipment generated from corrective action work performed on-site
0918219H	F034, K001, U051	Recovered creosote NAPL from groundwater monitoring wells

<b>TCEQ Waste Code</b>	<b>EPA Waste Code</b>	<b>Waste Description</b>
1481514H	D002	Drilling mud from boring monitor wells for investigative purposes
1482110H	D002	Purge water generated as part of groundwater monitoring and investigation
14835142	Non-haz	Drilling mud from boring monitor wells for investigative purposes

III. Evidence of Release: No evidence of a release

IV. Pollutant Dispersal Pathways: NA

V. Summary: The container storage area is an approximately 25 by 18 foot concrete pad surrounded by chain-link fencing and is used as a temporary drum storage.

VI. Recommended Action: No further action recommended. No evidence of a release has been identified at the unit. However, the unit is within the larger SWMU 5 – Original Process Area where evidence of historical releases have occurred.

**IX.A.5 PRELIMINARY REVIEW UNIT CHECKLIST – NOR 005**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: 005

B. Description: Waste Pile, S03

C. Dates of Operation:

II. Wastes Managed:

<b>TCEQ Waste Code</b>	<b>EPA Waste Code</b>	<b>Waste Description</b>
09024882	Non-haz	Waste rail ties generated from operation & maintenance of the railroad & are generated intermittently
09103072	Non-haz	Ferrous scrap metal generated from operation & maintenance of the railroad & is generated on an intermittent basis
09113072	Non-haz	Non-Ferrous scrap metal generated from operation & maintenance of the railroad & is generated on an intermittent basis

III. Evidence of Release: No evidence of a release.

IV. Pollutant Dispersal Pathways: NA

V. Summary: Ferrous and non-ferrous scrap metal and waste rail ties generated from operation and maintenance of the railroad was generated on an intermittent basis. The location of NOR 005 is in the vicinity of SWMU 12. UPRR will no longer store these wastes at this unit.

VI. Recommended Action: No further action. This unit has not managed hazardous wastes or wastes containing hazardous substances and no evidence of a release was reported.

**IX.A.6 PRELIMINARY REVIEW UNIT CHECKLIST – NOR 006**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: 006

B. Description: Miscellaneous Storage Containers, S99 (location unknown)

C. Dates of Operation:

II. Wastes Managed:

TCEQ Waste Code	EPA Waste Code	Waste Description
2012061	Non-haz	Waste oil generated from 4 fork lifts operating on-site

III. Evidence of Release: No evidence of a release

IV. Pollutant Dispersal Pathways: NA

V. Summary: Waste oil generated at this unit was derived from fork lifts on the property which, at maintenance intervals, had oil pumped directly out of their crankcases by a commercial recycler. In a letter to the Texas Natural Resource Conservation Commission dated August 8, 1995, Edward Hurst, the Director of Environmental Compliance for Southern Pacific Lines explained that the commercial recycler pumped the oil directly into a recycling truck and it was immediately removed from the property. None of these activities are performed at the Site and this waste code will be removed from the NOR.

VI. Recommended Action: No further action. This unit has not managed hazardous wastes or wastes containing hazardous substances and no evidence of a release was reported.

## IX.A.7 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 2

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

### I. Waste Management Unit:

A. NOR No: SWMU 2

B. Description: Northern and Southern Drainage Ditches, D99

C. Dates of Operation: Unknown

### II. Wastes Managed: Creosote-contaminated wastewater and residual naphtha

III. Evidence of Release: The ditches released creosote contaminants to the soil and the inactive wastewater lagoon.

IV. Pollutant Dispersal Pathways: Soil and surface water (historically, when in operation)

V. Summary: The Northern Drainage Ditch (NDD) is located at the northwest corner of the SI and runs northward toward Ranch and Kashmere Streets. The Southern Drainage Ditch (SDD) was a wood-lined trench which was formerly located along the south side of the process area. The SDD paralleled railroad tracks from the eastern to western side of the facility and began near the AST area (SWMU 8). Near the southwest corner of the facility, the ditch was routed below railroad tracks via PVC piping. The piping led to a natural drainage ditch and low-lying area near the southwest corner of the SI, known as the inactive wastewater lagoon (AOC 6). The natural drainage ditch flowed off site to the west eventually into Buffalo Bayou (>8,500 feet from the Site). For the purpose of worker safety, the facility filled in the wood-lined portion of the ditch along the southern facility boundary. The PVC piping was plugged below the tracks at the southwestern end of the facility.

VI. Recommended Action: No further action recommended. The unit is addressed in the facility-wide corrective action.

**IX.A.8 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 3**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: SWMU 3

B. Description: Oil Drum Storage (ODS) Building, S06

C. Dates of Operation: Unknown

II. Wastes Managed: Lubricating oil

III. Evidence of Release: No known release

IV. Pollutant Dispersal Pathways: NA

V. Summary: SPTCo representatives were uncertain of the exact location of the oil drum storage (ODS) building. It may have been at the location of the former power house building or at the repair and sign shop. The ODS building was used to store unused oil and lubricant products for the process machinery (SPTCo, 1993). No maintenance work was conducted in the ODS building.

No evidence of the former power house was observed during the Visual Site Inspection (VSI), and the area has been re-graded with gravel. The repair and sign shop consisted of a metal and wood building, about 125 by 50 feet, with concrete flooring. It housed spare parts, field equipment, and reflective signs used by the SPTCo railroad. No subgrade structures were observed inside or surrounding the building (PRC, 1993).

VI. Recommended Action: No further action. This unit reportedly did not manage hazardous wastes or wastes containing hazardous substances. The location of SWMU 3 is within the Original Process Area (SWMU 5), where historical releases likely occurred.

#### IX.A.9 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 4

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: SWMU 4

B. Description: Recent Process Area, T04

C. Dates of Operation: Started sometime between 1955 and 1962 until mid-1980s

II. Wastes Managed: Naphtha, creosote and extenders (bunker C, diesel fuel, styrene tar and used vehicle oil)

III. Evidence of Release: Visible staining of area soils and surface water were documented by TWC. Elevated levels of phenols, pH and oil and grease were released to the sanitary sewer. Air quality violations related to the retort cylinders were cited from 1978 to 1980.

IV. Pollutant Dispersal Pathways: Soils, surface water and air

V. Summary: The recent process area was used by the facility from the early 1960s until the early to mid-1980s. The area occupied about 3 acres in the northeast section of the facility. It consisted of (1) a process building that measured 150 by 50 feet, (2) four retort cylinders that measured about 125 by 12 feet, (3) one retort cylinder that measured about 60 by 12 feet, located next to the process building that is on the west side, and (4) a drip area next to the western side of the retorts. According to facility representatives, the retort cylinders were housed in a slightly depressed area that was covered with gravel. The retort cylinders were braced and kept above ground by concrete brackets. Crossties were brought in and out of the process area via railroad tracks. No structures currently exist in the process area. The area was regraded with limestone or caliche gravel and used as a laydown yard for steel and PVC piping and treated crossties until the early 1990s. A concrete foundation was observed in the vicinity of the former process building during the RCRA Facility Assessment (PRC, 1993). The west side of the foundation appeared to have contained a subsurface sump or work area. The remains of a concrete retaining wall (part of SWMU 8), about 3 feet tall by 1 foot wide, were observed around the southern and eastern ends of the process area.

VI. Recommended Action: No further action recommended. The unit is addressed in the facility-wide corrective action detailed in the Compliance Plan.

### IX.A.10 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 5

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: SWMU 5

B. Description: Original Process Area, T04

C. Dates of Operation: 1911 through sometime between 1955 and 1962

II. Wastes Managed: Specific waste listing was not available but wastes would likely have been similar to those generated at the recent process area (SWMU 4) which include naphtha, creosote and extenders (bunker C, diesel fuel, styrene tar and used vehicle oil)

III. Evidence of Release: Subsurface soil contamination discovered during excavation of UST No. 44-023-05 (SWMU 9) was determined to have originated from this area. Staining observed below diesel storage tank (AOC 1) indicated historical releases within this area.

IV. Pollutant Dispersal Pathways: Soil

V. Summary: The original process area was located in the south-central portion of the facility west of the recent process area. The original process area consisted of (1) one retort cylinder, about 150 by 12 feet, located in a covered shed at the north side of the area, and (2) three retort cylinders, each about 125 by 12 feet, located in a covered shed at the south side of the area. Located between the two retort sheds were, from east to west, (1) the former power house building, (2) a 5 by 41 foot cylinder, three underground brick tanks (42, 43, and 46 feet in diameter), and two 20-foot diameter steel ASTs used for product storage and mixing operations. A 15-foot-diameter AST and a 10-by-20-foot sump were located north of the large retort shed. A 9 by 150 foot concrete catch basin was located on the east side of the large retort shed. According to SPTCo representatives, the original process area was in operation from about 1911 until 1955 or 1962. The original process area is now a gravel-covered area containing a train track, and former diesel storage tank (AOC 1), former location of UST No. 44-023-05 (SWMU 9), Oil Drum Storage Building (SWMU 3), and current Container Storage Area (NOR 004).

VI. Recommended Action: No further action recommended. The unit is addressed in a facility-wide corrective action detailed in the Compliance Plan.



**IX.A.11 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 6**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: SWMU 6

B. Description: Water Treatment and Boiler System, T80

C. Dates of Operation: Unknown

II. Wastes Managed: Boiler and cooling tower blow-down

III. Evidence of Release: The following releases were documented from this unit: (1) Boiler condensate (ran off-site via surface runoff), (2) oily storm sewer discharge, and (3) discharges of boiler and cooling tower blowdown into the storm sewer.

IV. Pollutant Dispersal Pathways: Soil and surface water (historically when in operation)

V. Summary (PRC, 1993): SPTCo used the water treatment and boiler system to (1) treat and distill municipal water, and (2) generate steam used in heating the wood-treatment retort cylinders. Steam and heated water from the retort cylinders were cooled in a cooling tower prior to discharge. SPTCo representatives did not have specific information concerning the design or processes of the system, and the system is now inactive. According to SPTCo representatives, some of the buildings and equipment associated with the system have been removed and the area has been re-graded with gravel. During the VSI, PRC observed the treatment building, the former location of a water storage AST, and the former location of the boiler equipment. No other structures pertaining to the system were observed during the VSI. The treatment building is located north of the retort area (SWMU 4). It consisted of a metal building, about 40 by 20 feet with concrete flooring. The building was open along the south side and wooden pallet debris was observed covering the floor. According to SPTCo representatives, the building may have been used to house pump equipment.

Next to and east of the treatment building was a concrete tank enclosed in a metal building. The tank was rectangular, measuring about 30 by 15 feet. The tank was above ground. It had cinder block walls, about 3 feet tall by 1 foot wide. The tank opening was covered with wooden planking; rolls of chain-link fencing were stored on top. The view inside the tank was obscured, but standing water and wood debris were observed inside the tank. PRC could not determine whether the tank extended below grade. A 2- to 4-inch diameter pipe was observed extending from the south wall of the tank. A hard, white, granular accumulation of an unknown substance was observed around the open end of the pipe. SPTCo

representatives did not know the nature or cause of the accumulation and did not have any information concerning the function of the tank in the water treatment system.

A circular concrete foundation, about 25 feet in diameter, was observed next to and west of the treatment building. SPTCo representatives assumed that this was the location of a former water storage AST used in the treatment system. A rectangular concrete foundation, partially covered with gravel, was observed about 20 feet east of the treatment building. According to SPTCo representatives, this was the former location of the boiler equipment and building. The cooling tower was formerly located in the AST area east of the wood-treatment facility. SPTCo representatives had no specific information concerning the construction or operation of the cooling tower. The cooling tower was removed and the area re-graded with gravel (PRC, 1993).

- VI. Recommended Action: No further action recommended. The unit is addressed in a facility-wide corrective action detailed in the Compliance Plan.

**IX.A.12 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 8**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: SWMU 8

B. Description: Aboveground Storage Tank Area, S02

C. Dates of Operation: Unknown

II. Wastes Managed: Tank bottoms (K001), creosote, extender mix and naphtha

III. Evidence of Release: A naphtha spill and a working tank explosion were documented

IV. Pollutant Dispersal Pathways: Soil

V. Summary: The AST area was formerly located east of the recent process area (SWMU 4) in the northeast corner of the facility. The area housed 14 ASTs and a below-grade product drop tank used to store creosote and extenders. In addition, a series of aboveground pipes and manifolds was used to transfer product and wastes between tanks and the process area retort cylinders. A 1981 site diagram of the wood-preserving works indicated that six of the tanks were classified as working tanks containing creosote and extenders pumped to and from the retort cylinders. The tanks, which were about 20 feet in diameter, were located next to the wood-treatment building. Three tanks classified as storage tanks were located along the south side of the recent process area. These tanks, which were about 30 feet in diameter, were used to store creosote pumped into the working tanks.

An AST, about 30 feet in diameter, and four naphtha storage tanks, about 10 feet in diameter, were located north of the working tanks. The naphtha tanks were used in the process of removing sap and moisture from untreated ties.

The product drop tank was a concrete tank, about 35 by 20 feet, located at the northeast corner of the AST area. SPTCo representatives stated that the tank was constructed of concrete and was about 12 feet deep. SPTCo representatives stated that the product drop tank was used for the off-loading of creosote and extenders from the railway prior to storage in the ASTs. The cooling tower was also located in the AST area.

Secondary containment consisted of a concrete retaining wall about 4 feet high by 1 foot wide. The facility

installed the wall to prevent surface water runoff into the storm sewers. Three circular concrete foundations were observed in the vicinity of the three creosote storage tanks. Remnants of the concrete retaining wall were also observed at the southeast and southwest corners of the AST area. The ASTs have been removed from the area and the area has been re-graded with gravel. Piping and commercially treated wood ties were observed being stored in the area.

- VI. Recommended Action: No further action recommended. The unit is addressed in a site wide Compliance Plan.

**IX.A.13 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 9**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: SWMU 9

B. Description: Location of Former UST No. 44-023-05, S02

C. Dates of Operation: Unknown – removed June 1992

II. Wastes Managed: Gasoline

III. Evidence of Release: Visible contamination was observed in the tank pit during removal. Samples collected below the tank indicated TPH levels above TWC action levels.

IV. Pollutant Dispersal Pathways: Soil

V. Summary: UST 44-023-05 was a 2000-gallon capacity steel tank located at the south side of the facility, in the vicinity of the original process area (SWMU 5). The tank was 5.5 feet in diameter and 12 feet long. The UST has been removed and the area has been re-graded with gravel. The tank was reported to be empty and contain no holes when it was removed (SPTCo, 1993b).

VI. Recommended Action: No further action recommended. The unit is addressed in a site wide Compliance Plan.

**IX.A.14 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 10**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: SWMU 10

B. Description: Location of Former Sap Water Treatment Tank, T01

C. Dates of Operation: Unknown

II. Wastes Managed: Wastewater containing naphtha, creosote residue and extender

III. Evidence of Release: No evidence of a release was discovered.

IV. Pollutant Dispersal Pathways: NA

V. Summary: The sap water treatment tank was formerly located next to the AST area (SWMU 8) in the northeast corner of the facility property. SPTCo representatives had no information regarding the construction or capacity of the tank. A 1981 site diagram of the wood-treatment facility indicated that the tank was about 25 by 10 feet. Several concrete corner pads were observed in the vicinity of the tank location. The pads were identified as the tank foundation.

VI. Recommended Action: No further action recommended. The unit is addressed in a site wide Compliance Plan.

**IX.A.15 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 11**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: SWMU 11

B. Description: Oil Water Separators, T04

C. Dates of Operation: 1979-1984

II. Wastes Managed: Wastewater containing naphtha, creosote residue and extender

III. Evidence of Release: Discharge of wastewater into the sanitary sewer was reported to exceed allowable levels of phenols, pH, temperature and oil and grease. Permit was not renewed.

IV. Pollutant Dispersal Pathways: Surface water

V. Summary: Two oil/water separators were located in the northeast portion of the facility site. The southern separator was located next to the location of the former sap wastewater treatment tank (SWMU 10). The northern separator was located north of the AST area (SWMU 8) in the vicinity of the northern fence boundary. Both separators were subsurface structures, measuring about 6 by 4 by 3 to 4 feet deep. Both were constructed of concrete with a three-compartment design.

VI. Recommended Action: No further action recommended. The unit is addressed in a site wide Compliance Plan.

**IX.A.16 PRELIMINARY REVIEW UNIT CHECKLIST – SWMU 12**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: SWMU 12

B. Description: Railroad Tie Storage Area, S99

C. Dates of Operation: 1911 through mid-1980s

II. Wastes Managed: Creosote and extender

III. Evidence of Release: No known release

IV. Pollutant Dispersal Pathways: Soil

V. Summary: Throughout the history of the site, most of the property not used for specific process areas was used to store treated railroad ties. Much of the previous storage area has been re-graded with gravel. NOR 005 is located in the same vicinity.

VI. Recommended Action: No further action recommended. The unit is addressed in a site wide Compliance Plan.



**IX.A.17 PRELIMINARY REVIEW UNIT CHECKLIST – AOC 1**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: AOC 1

B. Description: Diesel Storage Tank, S02

C. Dates of Operation: Unknown

II. Wastes Managed: Diesel fuel

III. Evidence of Release: Stains and discoloration on underlying gravel observed during the VSI.

IV. Pollutant Dispersal Pathways: Soil

V. Summary: The diesel storage tank (DST) was an AST located in the south-central portion of the facility, in the vicinity of the original process area (SWMU 5). The DST was used by the facility to store diesel fuel for equipment use. It was of steel construction and supported above ground by steel bracing. SPTCo representatives did not know the age or capacity of the DST. The DST was surrounded by a concrete retaining wall, about 3 feet high and 1 foot thick. The bottom of the retaining area was covered with gravel. According to SPTCo representatives native soils were located below the gravel cover.

VI. Recommended Action: No further action recommended. The unit is addressed in a site wide Compliance Plan.

**IX.A.18 PRELIMINARY REVIEW UNIT CHECKLIST – AOC 2**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: AOC 2

B. Description: Hose House, S99

C. Dates of Operation: Unknown

II. Wastes Managed: NA

III. Evidence of Release: Signs of recent oil staining were visible inside hose house and minor staining was observed on the ground in the vicinity of a sewer drain.

IV. Pollutant Dispersal Pathways: Soil and surface water

V. Summary: The hose house was a metal building, measuring about 15 by 12 feet, with concrete flooring located southwest of the water treatment building. A 6 by 2 foot concrete slab was observed in the middle of the floor. An unidentified metal structure was observed on top of the concrete slab, and fresh oil staining was observed around the metal structure. The remains of a shower stall were observed at the eastern end of the building. An open sewer pipe, about 6 inches in diameter, was observed next to the building on the east side. A concrete ramp was located next to the sewer pipe, apparently to direct drainage from exposed piping observed extending from the eastern wall of the building.

VI. Recommended Action: No further action. This unit has not managed hazardous wastes or wastes containing hazardous substances.

**IX.A.19 PRELIMINARY REVIEW UNIT CHECKLIST – AOC 3**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: AOC 3

B. Description: Contaminated Portion of City Water Line, D99

C. Dates of Operation: Unknown

II. Wastes Managed: Phenol

III. Evidence of Release: Analytical results from samples collected from the drinking water system indicated elevated levels of phenols.

IV. Pollutant Dispersal Pathways: Soil

V. Summary: In 1980, SPTCo discovered contamination in its drinking water system. Analytical results from samples collected from the drinking water system indicated elevated levels of phenols. SPTCo stated that “it was determined that the presence of contaminants was caused by a leak around a pump seal” (SPTCo, 1993b). SPTCo repaired the leak and flushed the system. According to SPTCo representatives, a new pipeline may have been installed next to the contaminated portion, which was probably left in place. SPTCo representatives did not know location of the leak or the new line.

VI. Recommended Action: No further action recommended. The unit is addressed in a site wide Compliance Plan.

**IX.A.20 PRELIMINARY REVIEW UNIT CHECKLIST – AOC 4**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: AOC 4

B. Description: Location of Former Incinerator, T03

C. Dates of Operation: between 1955 and 1976

II. Wastes Managed: Untreated lumber remnants

III. Evidence of Release: No known release

IV. Pollutant Dispersal Pathways: NA

V. Summary: An incinerator was formerly located on the facility about 75 feet west of the adzing plant. According to SPTCo representatives the incinerator was used to dispose of untreated lumber remnants generated by the framing mill and adzing plant. The facility had no information concerning the construction or operation of the incinerator.

VI. Recommended Action: This unit has not managed hazardous wastes or wastes containing hazardous substances and no evidence of a release was reported.

**IX.A.21 PRELIMINARY REVIEW UNIT CHECKLIST – AOC 5**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: AOC 5

B. Description: City Storm Sewer, D99

C. Dates of Operation: NA

II. Wastes Managed: Boiler and cooling tower blowdown, potential runoff of creosote contaminated surface water from facility SWMU 1

III. Evidence of Release: Discharges were documented in 1980 and 1982.

IV. Pollutant Dispersal Pathways: Surface water and soil

V. Summary: The city storm sewer used to receive surface water runoff from the facility, including boiler and cooling tower blowdown and sap wastewater. A concrete retaining wall was built around the AST area (SWMU 8) to prevent potentially contaminated runoff from entering the sewer. Runoff features included several subsurface concrete boxes with steel grate tops located throughout the facility. Discharges to the storm sewer were reported in 1980 and 1982 resulting in the issuance of NOVs to the facility (SPTCo, 1993b). Details of the locations of the sewer lines were unavailable.

VI. Recommended Action: No further action recommended. The unit is addressed in a site wide Compliance Plan.

**IX.A.22 PRELIMINARY REVIEW UNIT CHECKLIST – AOC 6**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: AOC 6

B. Description: Inactive Wastewater Lagoon, S99

C. Dates of Operation: NA

II. Wastes Managed: Sap wastewater and surface water runoff containing creosote residue

III. Evidence of Release: In 1979, a fire exposed the presence of creosote-contaminated soils. The contamination was determined to have resulted from pooling of facility wastewater in this area.

IV. Pollutant Dispersal Pathways: Soil and surface water

V. Summary: The inactive wastewater lagoon is a low-lying area off site, next to the inactive SI (SWMU 1). This area was periodically flooded and received discharges of sap wastewater and surface water runoff via the SDD (SWMU 2). In 1979, a fire in the area may have resulted from soil contamination within the area. The uppermost layer of soils in the lagoon area were scraped off and disposed of in the SI. The SDD was plugged to prevent further discharge into the area. The inactive wastewater lagoon was considered to be inactive following these actions. The area is located outside of the facility boundary.

VI. Recommended Action: No further action recommended. The unit is addressed in a site wide Compliance Plan.

**IX.A.23 PRELIMINARY REVIEW UNIT CHECKLIST – AOC 7**

Facility: Houston Wood Preserving Works

City: Houston, Texas

ISW Reg No: 31547

Date: August 27, 2014

Permit No: 50343

Reviewer:

EPA ID No: TXD000820266

I. Waste Management Unit:

A. NOR No: AOC 7

B. Description: Location of Former UST 44-023-21, S02

C. Dates of Operation: NA

II. Wastes Managed: Gasoline

III. Evidence of Release: Total benzene, toluene, ethyl benzene, and xylene (BTEX) levels below the TWC action limit of 30 ppm were detected in soils sampled during tank removal.

IV. Pollutant Dispersal Pathways: Soil

V. Summary: UST 44-023-21 was formerly located next to the access road northeast of the existing diesel storage tank (DST) (AOC 1). The capacity of the tank was 200 gallons. It was used to store gasoline used by the facility. Details concerning the construction activities and installation date are unknown. According to SPTCo, TWC certified clean closure in 1990. Information on waste management practices was unavailable. However, analytical results of samples taken during the UST closure indicate that a release may have occurred from this UST. PRC has not received the closure report requested from SPTCo.

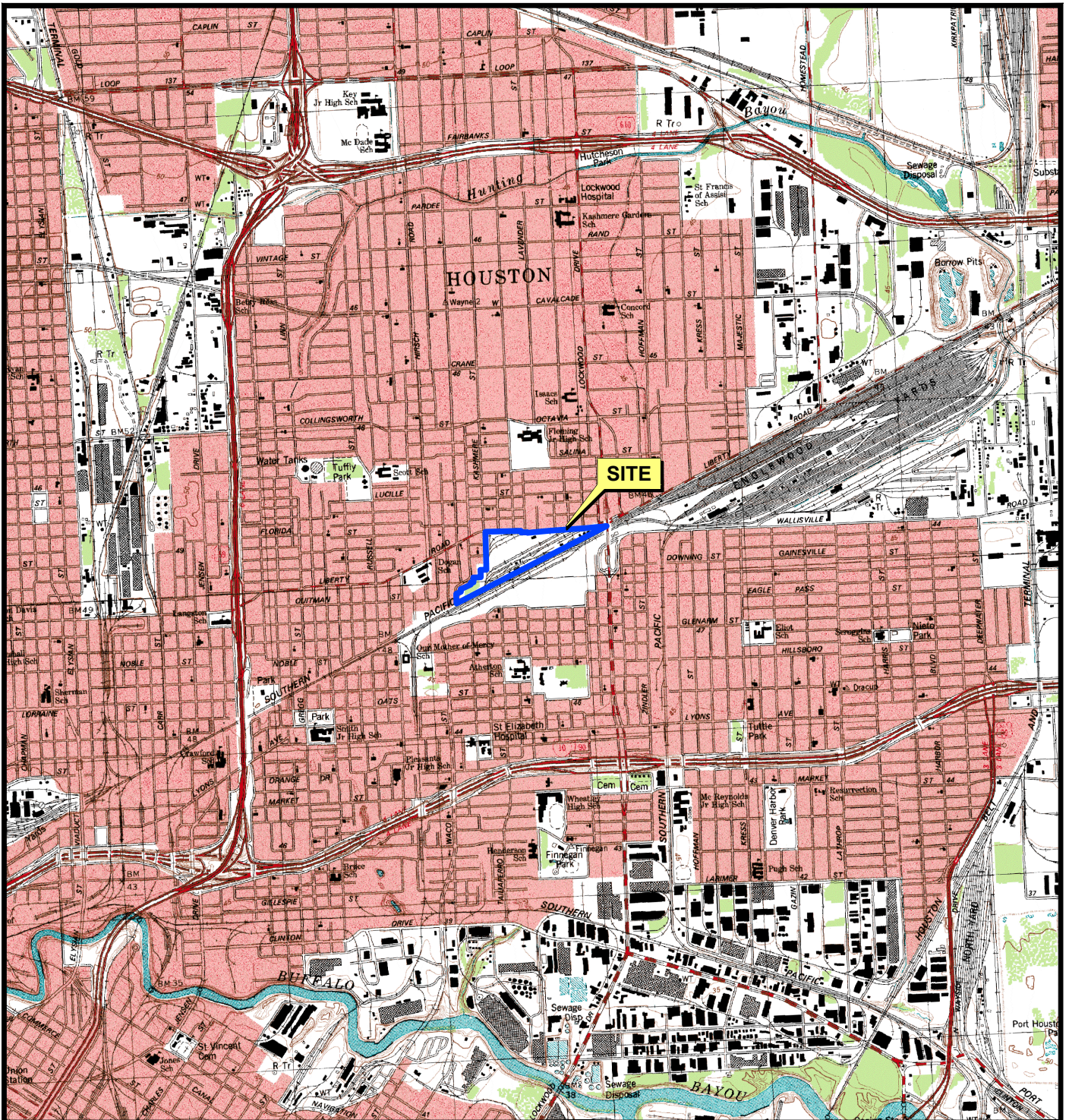
VI. Recommended Action: No further action. This unit has not managed hazardous wastes or wastes containing hazardous substances.

**Appendix IX.I**

**FACILITY AND SWMU LOCATION MAPS**

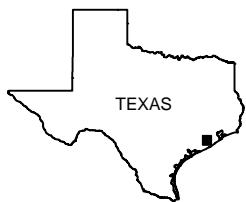
Union Pacific Railroad Company  
Houston Wood Preserving Works  
Houston, Texas





**EXPLANATION**

 UPRR Facility Boundary



QUADRANGLE LOCATION



Scale in Feet



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Appendix IX.I Figure IX.1

**REGIONAL LOCATION MAP**

PROJECT: 1358

BY: AJD

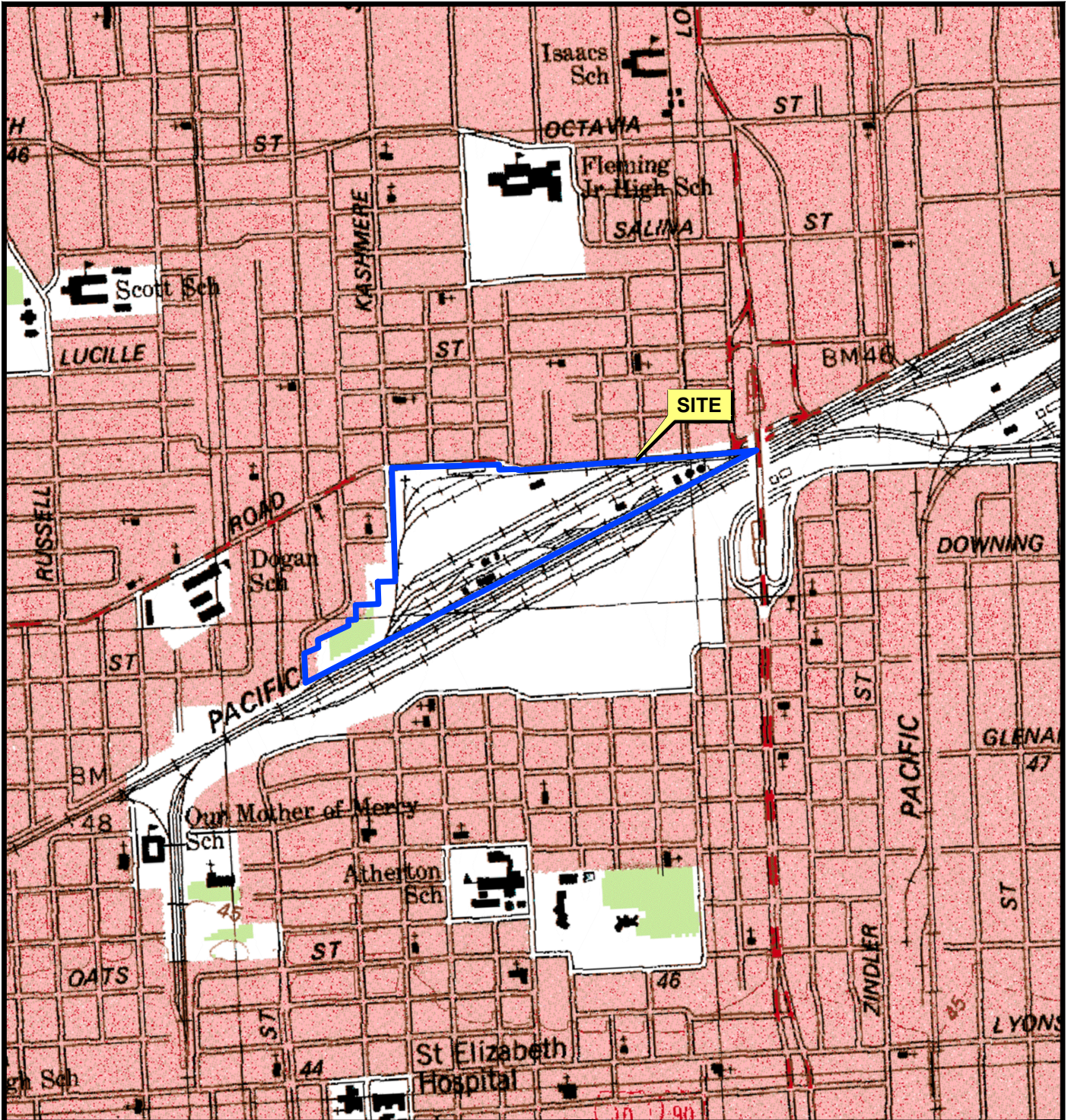
REVISIONS

DATE: NOV., 2014


CHECKED: ECM

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

SOURCE:  
Base map from www.tnris.gov, Settegast, TX 7.5 min. USGS quadrangle dated 1982.

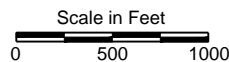


**EXPLANATION**

 UPRR Facility Boundary



QUADRANGLE LOCATION



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Appendix IX.I Figure IX.2

**SITE LOCATION MAP**

PROJECT: 1358

BY: AJD

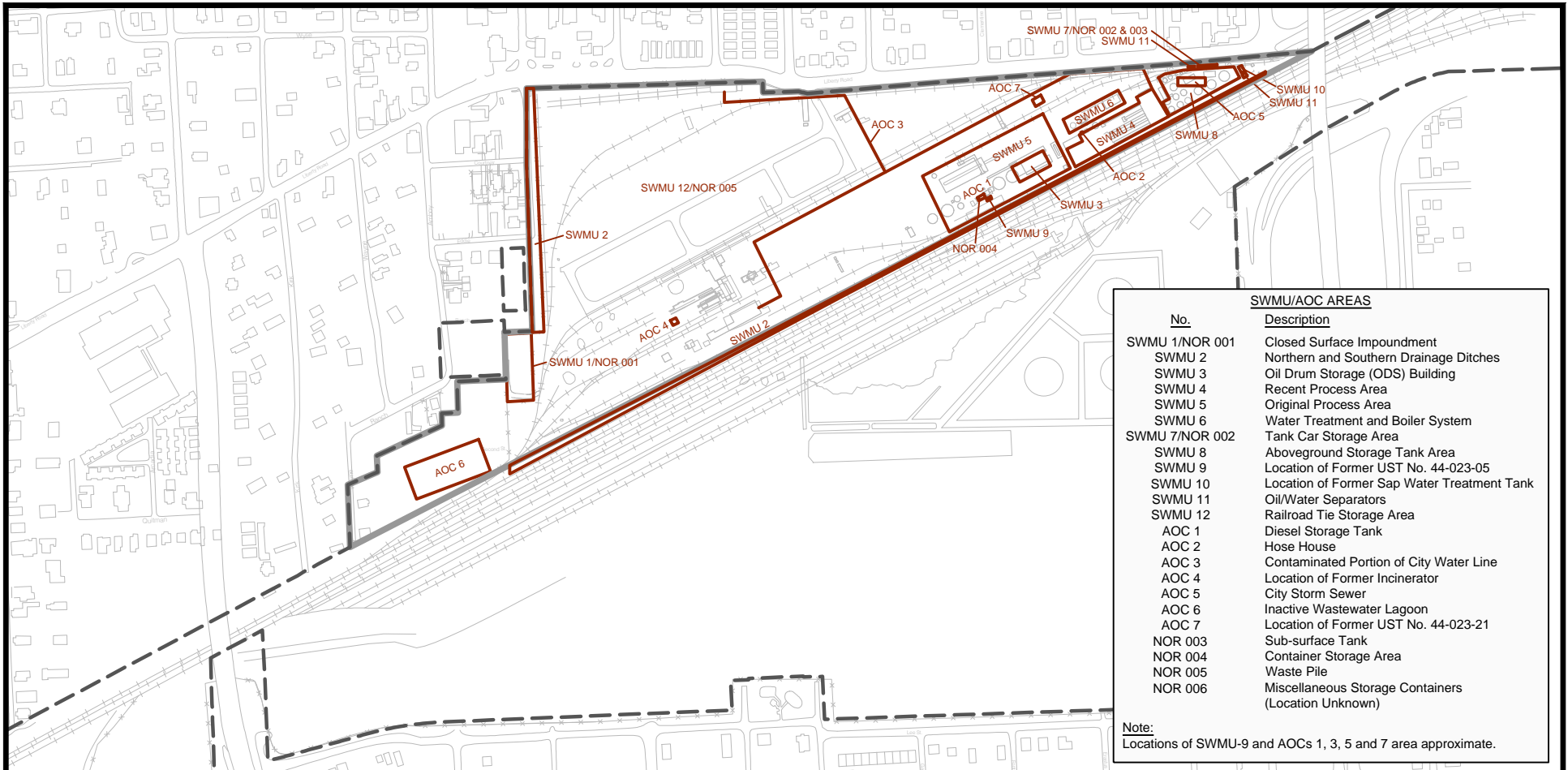
REVISIONS

DATE: NOV., 2014

CHECKED: ECM

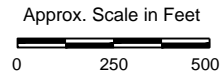
**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

SOURCE:  
Base map from www.tnris.gov, Settegast, TX 7.5 min. USGS quadrangle dated 1982.



**EXPLANATION**

- UPRR Property Boundary
- UPRR Facility Boundary
- Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- \*\*\* Fence
- +— Railroad



**SOURCE:**  
Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.

**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Appendix IX.1 Figure IX.3

**LOCATIONS OF FORMER WASTE MANAGEMENT UNITS**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

**Appendix IX.II**

**WASTES MANAGED**

Union Pacific Railroad Company  
Houston Wood Preserving Works  
Houston, Texas

**APPENDIX II**  
**SUMMARY OF WASTES MANAGED**  
**UNION PACIFIC RAILROAD COMPANY**  
**HOUSTON WOOD PRESERVING WORKS**  
**HOUSTON, TEXAS**

NOR	Waste Description	Class	TCEQ Waste Code	EPA Waste Code	Disposition
001/SWMU 1	Surface Impoundment Area	NA	219, 301, 488, 609	K001, F034, U051, U188	Removed from site
002/SWMU 7	Tank car	Unknown	Unknown	Unknown	No longer generated
003	Sub-surface Tank	Unknown	Unknown	Unknown	No longer generated
004	Container Storage Area (Corrective Action Remediation Wastes)	1	00029032	Non-haz	Inactive
		1	04003011	Non-haz	Active
		2	14773012	Non-haz	Active
		1	14781011	Non-haz	Active
		2	14791012	Non-haz	Active
		2	14804062	Non-haz	Active
		2	14841012	Non-haz	Inactive
		H	0001301H	F034, K001	Active
		H	0909101H	K001, F034	Active
		H	0912489H	F034, K001	Active
		H	0914101H	F034, K001	Active
		H	0915301H	F034, K001	Active
		1	09163081	Non-haz	Inactive
		H	0917406H	K001	Active
		H	0918219H	F034, K001, U051	Active
		H	1481514H	D002	Active
H	1482110H	D002	Active		
005	Waste Pile	2	09024882	Non-haz	No longer generated
		2	09103072	Non-haz	No longer generated
		2	09113072	Non-haz	No longer generated
006	Miscellaneous Storage Containers	1	2012061	Non-haz	No longer generated
SWMU 2	Northern and Southern Drainage Ditches	Unknown	Unknown	Unknown	No longer generated
SWMU 3	Oil Drum Storage (ODS) Building	Unknown	Unknown	Unknown	No longer generated
SWMU 4	Recent Process Area	Unknown	Unknown	Unknown	No longer generated

**APPENDIX II  
SUMMARY OF WASTES MANAGED  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

<b>NOR</b>	<b>Waste Description</b>	<b>Class</b>	<b>TCEQ Waste Code</b>	<b>EPA Waste Code</b>	<b>Disposition</b>
SWMU 5	Original Process Area	Unknown	Unknown	Unknown	No longer generated
SWMU 6	Water Treatment and Boiler System	Unknown	Unknown	Unknown	No longer generated
SWMU 8	Aboveground Storage Tank Area	Unknown	Unknown	Unknown	No longer generated
SWMU 9	Location of Former UST No. 44-023-05	Unknown	Unknown	Unknown	No longer generated
SWMU 10	Location of Former Sap Water Treatment Tank	Unknown	Unknown	Unknown	No longer generated
SWMU 11	Oil Water Separators	Unknown	Unknown	Unknown	No longer generated
SWMU 12	Railroad Tie Storage Area	Unknown	Unknown	Unknown	No longer generated
AOC 1	Diesel Storage Tank	Unknown	Unknown	Unknown	No longer generated
AOC 2	Hose House	Unknown	Unknown	Unknown	No longer generated
AOC 3	Contaminated Portion of City Water Line	Unknown	Unknown	Unknown	No longer generated
AOC 4	Location of Former Incinerator	Unknown	Unknown	Unknown	No longer generated
AOC 5	City Storm Sewer	Unknown	Unknown	Unknown	No longer generated
AOC 6	Inactive Wastewater Lagoon	Unknown	Unknown	Unknown	No longer generated
AOC 7	Location of Former UST No. 44-023-21	Unknown	Unknown	Unknown	No longer generated

**Appendix IX.III**

**EVIDENCE OF RELEASE**

Union Pacific Railroad Company  
Houston Wood Preserving Works  
Houston, Texas

### **APPENDIX III – EVIDENCE OF RELEASE**

#### **SWMU No. 1**

SWMU No. 1 is currently in the 20<sup>th</sup> year of the 30 years required for post-closure care monitoring. In 1984 the surface impoundment was clean closed by excavating the soils and materials contained within the unit. Attachment 1 contains correspondence from the State regarding closure of the surface impoundment. The facility then began investigating and monitoring the shallow groundwater in the vicinity of the surface impoundment. Between 1984 and 1991, nine groundwater monitoring wells were installed in the upper zone and three piezometers were installed in the lower permeable zone. Hydrogeological data collected from these wells and piezometers indicate hydraulic conductivity between the zones. Analytical data compiled from 1984 until 1991 indicated that benzene, toluene, naphthalene, 2,4-dimethylphenol, and phenol were the most frequently detected parameters and that naphthalene was the parameter detected at the highest concentrations.

The facility entered into post-closure care in 1994, updated in 2005, and groundwater monitoring of SWMU No. 1 has taken place on a semi-annual basis since that time. Analytical results are compared to the TCEQ Texas Risk Reduction Program Protective Concentration Levels (TRRP PCLs). Since 2006, constituent concentrations have been below their respective PCLs. SWMU 1 is currently under Corrective Action Monitoring; however, as detailed in Section VII and the Section XI (Attachment D), a request for No Further Action is included in this permit renewal for SWMU 1.

#### **HWPW Facility**

The initial APAR prepared for the facility was submitted to the TCEQ dated June 10, 2000 (ERM, 2000). A revised APAR was submitted to the TCEQ dated June 10, 2004. Pastor, Behling & Wheeler, LLC (PBW) prepared the APAR Addendum dated July 2009 (PBW, 2009). Following comments from the TCEQ, PBW submitted the Updated APAR Addendum dated October 2010, with response to comments dated March 29, 2011 (PBW, 2011). The TCEQ approved the APAR in a letter dated April 13, 2011.

As detailed in the APARs and subsequent submittal, the Affected Property consists of surface soils, subsurface soils, and groundwater affected by chemical of concern (COC) at the Site: The soil and groundwater exposure pathways were evaluated as part of the Site assessments and are considered to be complete and/or anticipated to be complete.



Site stratigraphy from the ground surface to a depth of approximately 135 feet is separated into the following units: Fill Material (0 to 5 feet thick), A-Cohesive Zone (A-CZ) (8 to 15 feet thick); A-Transmissive Zone (A-TZ) (4 to 21 feet thick); B-Cohesive Zone (B-CZ) (6 to 19 feet thick); B-Transmissive Zone (B-TZ) (discontinuous, where present, 3 to 10 feet thick); C-Cohesive Zone (C-CZ) (8 to 20 feet thick); C-Transmissive Zone (C-TZ) (10 to 13 feet thick); D-Cohesive Zone (D-CZ) (17 to 36 feet thick); and D-Transmissive Zone (D-TZ).

As detailed in the Updated APAR Addendum (PBW, 2011), target COCs in soil and groundwater media were evaluated using the March 2010 TCEQ TRRP Residential PCLs, or Residential Assessment Levels (RALs) to establish the Affected Property. Surface and subsurface soil data collected from 1997 through June 2010, with subsequent sampling in 2013 and 2014 were evaluated to assess the Affected Property and PCL Exceedance (PCLE) Zone in surface and subsurface soils. Groundwater data from the most recent sampling events (July/August 2014) were evaluated to assess COC exceedances in groundwater. Details of the most recent groundwater sampling results are provided in the Response Action Plan (see Section XI - Compliance Plan, Attachment B).

**ATTACHEMENT 1**

**AGENCY CORRESPONDENCE REGARDING  
CLOSURE OF SURFACE IMPOUNDMENT**

Union Pacific Railroad Company  
Houston Wood Preserving Works  
Houston, Texas

TEXAS DEPARTMENT OF WATER RESOURCES

1700 N. Congress Avenue  
Austin, Texas



Charles E. Nemir  
Executive Director

TEXAS WATER DEVELOPMENT BOARD

Louis A. Beecher, Jr., Chairman  
George W. McCleskey, Vice Chairman  
Glen E. Roney  
W. O. Bankston  
Lonnie A. "Bo" Pilgrim  
Louie Welch

TEXAS WATER COMMISSION

Paul Hopkins, Chairman  
Lee B. M. Biggart  
Ralph Roming

February 28, 1984

Mr. H. B. Berkshire  
Southern Pacific Transportation Company  
Southern Pacific Building  
One Market Plaza  
San Francisco, CA 94105

Dear Mr. Berkshire:

Re: Industrial Solid Waste Registration No. 31547  
Closure of On-Site Hazardous Waste Landfill  
Harris County, Texas

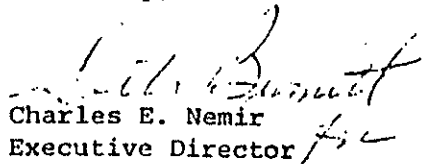
We have completed a review of the closure plan, submitted by your letter of November 29, 1983 and as amended by your letter of December 23, 1983. This closure represents full facility closure and was accordingly reviewed under 31 Texas Administrative Code (TAC) Sections 335.212-.216 and 31 TAC Section 335.286(b).

This letter constitutes approval by the Executive Director of the closure plan contained in the referenced letters, provided that all analytical results shall be submitted to the Central Office and the District 7 Office of the Department within 15 days of receipt by the company.

Upon completion of the closure, certification shall be submitted by the owner or operator of the subject facility and by an independent Registered Professional Engineer that the facility has been closed in accordance with the approved closure plan. Also, an Affidavit of Exclusion (see enclosed form) indicating that this facility meets the "Accumulation Time" requirements of 31 TAC Section 335.69 should be submitted along with the closure certification, if applicable.

If you have any questions, please contact our Solid Waste Section at AC512/475-2041.

Sincerely,

  
Charles E. Nemir  
Executive Director

Enclosure

cc: TDWR District 7 Office - Deer Park  
✓ Frank Bozeman, Southern Pacific Transportation Company  
Dr. Daniel W. Bridge, Rollins Environmental Services (TX) Inc.



AFFIDAVIT OF EXCLUSION FROM HAZARDOUS WASTE PERMITTING REQUIREMENT

Registration No. \_\_\_\_\_

Application No. \_\_\_\_\_

Facility Name \_\_\_\_\_  
(Dept. Use Only)

County of \_\_\_\_\_

\_\_\_\_\_ being duly sworn, deposes and says:

I am \_\_\_\_\_ of \_\_\_\_\_  
Title (Owner or Principal Officer) Facility Owner  
\_\_\_\_\_ and Address \_\_\_\_\_

This affidavit is being executed for the purpose of notifying the Executive Director of the Texas Department of Water Resources that the named facility does not require a hazardous waste permit because:

Check appropriate box(es):

- No hazardous waste is stored, processed or disposed on-site
- The facility qualifies for the "Accumulation Time" storage exclusion of Texas Administrative Code, Section 335.69
- The facility qualifies for the "Small Quantity Generator" exclusion of Texas Administrative Code, Section 335.2(e)
- The facility qualifies for the "Elementary Neutralization Unit" exclusion of Texas Administrative Code, Section 335.2(f)
- The facility qualifies for the "Wastewater Treatment Unit" exclusion of Texas Administrative Code, Section 335.2(f)
- Other (Explain with an attachment and reference TDWR rule)

\_\_\_\_\_  
Signature

Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 198\_\_\_\_\_

\_\_\_\_\_  
Notary Public in and for

\_\_\_\_\_ County, \_\_\_\_\_

My commission expires \_\_\_\_\_

# TEXAS WATER COMMISSION

B. J. Wynne, III, Chairman  
John E. Birdwell, Commissioner  
Cliff Johnson, Commissioner



John J. Vay, General Counsel  
Michael E. Field, Chief Hearings Examiner  
Brenda W. Foster, Chief Clerk

Allen Beinke, Executive Director

July 11, 1990

Certified Mail  
Return Receipt Requested

Mr. R.R. Mahon  
Southern Pacific Transportation Company  
Southern Pacific Building  
One Market Plaza  
San Francisco, Ca. 94105

Re: Southern Pacific Transportation Company - SWR 31547  
Post Closure Care Permit Application

Dear Mr. Mahon:

The Texas Water Commission (TWC) Hazardous and Solid Waste Permits Section has reviewed a referral from the TWC Hazardous and Solid Waste Enforcement Section indicating that the facility will require a post-closure care permit and compliance plan.

Southern Pacific Transportation Company (SPTC) certified closure of a surface impoundment on June 4, 1984 (originally approved in a letter from the TWC dated February 28, 1984). By letter dated June 4, 1984, the TWC required SPTC to sample ground-water monitoring wells quarterly and submit the results to the TWC. Sample results submitted from 1985 to 1990 indicate the presence of hazardous constituents (2,4, dimethylphenol, benzene, toluene, naphthalene and phenol) in the ground-water. Therefore, it appears that the closure does not meet the permitting standards of 40 Code of Federal Regulations (CFR) 264.228 and a post-closure care permit will be required in accordance with 40 CFR 270.1.c.

In accordance with Title 31 Texas Administrative Code (TAC) Section 305.42, the Texas Water Commission (TWC) hereby requests submittal of Part B of your hazardous waste permit application. 40 CFR 270.14 establishes the information requirements for a RCRA permit application. Because of the inherent differences between an operating permit and a permit covering only post-closure care activities, some of the information requirements for an operating permit will not be applicable to a permit for the post-closure care period. Relevant information will be determined on a case-by-case basis. At a minimum, your response should include the information requirements set out in Attachment I.

The submittal should also include any necessary modifications or additions to the Part A application already on file. In revising your Part A application, ensure that each waste and facility unit is identified by the same waste classification code and facility sequence number that are listed in your TWC Notice of Registration (NOR). If the NOR does not accurately reflect current waste management activities at the facility, please make the necessary corrections and submit a revised copy to the Hazardous and Solid Waste Compliance Assistance Unit within 60 days of the receipt of this letter. In addition, please submit an updated list of affected landowners.

Your Part B application, including the new requirements mandated by the Hazardous and Solid Waste Amendments of 1984 (HSWA), must be received no later than six (6) months from the date of this letter. Since releases to ground water from hazardous waste disposal activities have occurred at your facility, you are also required to file an application for a Compliance Plan in conjunction with your Part B application. The submittal of a completed Compliance Plan application is required even if ground-water contamination is being addressed under an enforcement order.

If you determine that your facility is not subject to post-closure permitting requirements, please respond in writing to the Hazardous and Solid Waste Permits Section within 30 days from the receipt of this letter. Your response should include all available documentation that no hazardous waste disposal activity subject to any permitting requirements has been conducted at your facility.

Please note that HSWA established new requirements for which the state has not yet received full authorization. As a result, permits issued solely by the TWC cannot completely satisfy federal permit requirements and a separate permit issued by the EPA could be necessary. To minimize duplication of effort, the State and EPA have executed a joint permitting agreement. Pursuant to this arrangement, the TWC will take the lead in processing permit applications, thus serving as the primary contact for applicants. The TWC will also develop permits under State authorities which can be issued by both agencies. Since we will transmit one copy of the permit application to EPA Region VI and coordinate all subsequent permit processing steps with their office, all copies of the permit application should be submitted to the TWC.

Please submit the following materials with your response: (1) the original and four copies of your Part B and Compliance Plan application, (2) the original and four copies of all related reports, (3) six additional copies of Section I of the Part B application form, and (4) the appropriate application fee and notice fee established by 31 TAC 305.53 and described in Section X of the Part B permit application. Please note that your application will not be considered complete unless all material listed above is submitted. Additional information may be requested at a later date to supplement your application.

Mr. Mahon  
page 3

Communications related to Parts A and B of the permit application should be directed to Nancy E. Frank, Head, Permitting Unit One at (512) 463-8018. Communications relating to the Compliance Plan application should be directed to Paul S. Lewis, Head, RCRA Ground-Water Enforcement Unit at (512) 463-8425.

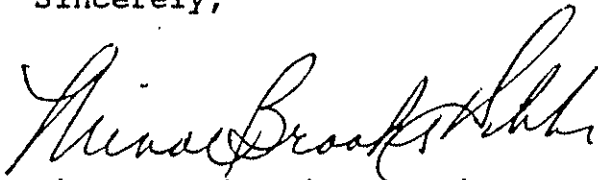
Mailing Address

Texas Water Commission  
Hazardous & Solid Waste Permits Section  
P.O. Box 13087  
Capitol Station  
Austin, TX 78711-3087

Delivery Address

Texas Water Commission  
Stephen F. Austin Bldg.  
Room 1157  
1700 N. Congress Avenue  
Austin, TX 78711-3087

Sincerely,



Minor Brooks Hibbs, Chief  
Hazardous and Solid Waste Permits Section

NEF

Enclosures

cc: TWC District 7 - Houston  
Paul Lewis, TWC Enforcement Section  
Mark Stine, TWC Enforcement Section  
Cheryl Wilson, TWC Reports and Information Management Unit

ATTACHMENT I

CHECKLIST - POST CLOSURE CARE PERMIT APPLICATION PART B  
REQUIREMENTS\*

	<u>Form</u>	<u>PART B PAGE NO.</u> <u>Instructions</u>
I. General Information		
A. Applicant	1	4
B. Representative	1	4
C. Facility Name and Location	2	4
D. Facility Description	2	4
E. Deed Recordation	3	4
F. Waste Disposition	3	4
G. Updated Part A Information	4	4
H. Summary	4	4
I. Signature	5	4
II. Facility Management		
A. Security	6	5
B. Inspection Schedule	7	5
D. Waste Analysis Plan	25	12
E. Personnel Training Plan	27	14
III. Engineering Reports		
A. General	28	15
1a. Overall plan view of entire facility	28	15
2a.-k. Topographic maps	28	16
3a.-e. Flooding	28	18
G. Landfills**		
1. Description	44	47
2. Site Development	44	47
6.i.-l. Containment System (as applicable)	46	49
IV. Geology Report	52	58
V. Ground-Water and Unsaturated Zone Monitoring	56	62
VI. Closure and Post-Closure Plans	59	69
VII. Financial Assurance		
B. Post-Closure	62	76
VIII. Releases from Solid Waste Units and Corrective Action	63	77
X. Hazardous Waste Permit Application Fee	67	82

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\* Because of the inherent differences between an operating permit and a permit covering only post-closure care activities, some of the information requirements for an operating permit will not be applicable to a permit for the post-closure care period. Relevant information will be determined on a case-by case basis, however, at a minimum, it should include the information listed above.

\*\* As required by Title 40 Code of Federal Regulations (CFR) 270.10.j.1. and 2., the owner or operator of any hazardous waste facility that stored, treated or disposed of hazardous waste in a surface impoundment or landfill must submit exposure information, in the form of an exposure assessment report, which addresses the requirements of 40 CFR 270.10.j.(1)i.-iii.

**Appendix IX.IV**

**POLLUTANT DISPERSAL PATHWAYS**

Union Pacific Railroad Company  
Houston Wood Preserving Works  
Houston, Texas

#### APPENDIX IV – POLLUTANT DISPERSAL PATHWAYS

SWMU No. 1 is currently in the 20<sup>th</sup> year of the 30 years required for post-closure care monitoring. In 1984 the surface impoundment was clean closed by excavating the soils and materials contained within. Therefore, there is little potential for migration of constituents from the unit via air dispersion, surface water runoff, or surface water runoff. Horizontal and vertical migration of constituents in groundwater are the most likely dispersal pathways for the unit. The facility entered into post-closure care in 1994 because there had been a release to groundwater prior to the clean closure. The post-closure permit was updated in 2005 and groundwater monitoring has taken place on a semi-annual basis since that time. Analytical results are compared to the TCEQ Texas Risk Reduction Program Protective Concentration Limits (TRRP PCLs). Since 2006, constituent concentrations have been below their respective PCLs. SWMU 1 is currently under Corrective Action Monitoring; however, as detailed in Section VII and Section XI (Attachment D), a request for No Further Action is included in this permit renewal for SWMU 1.

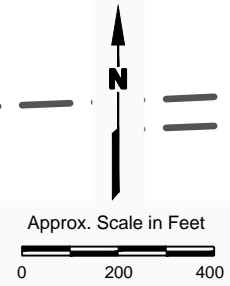
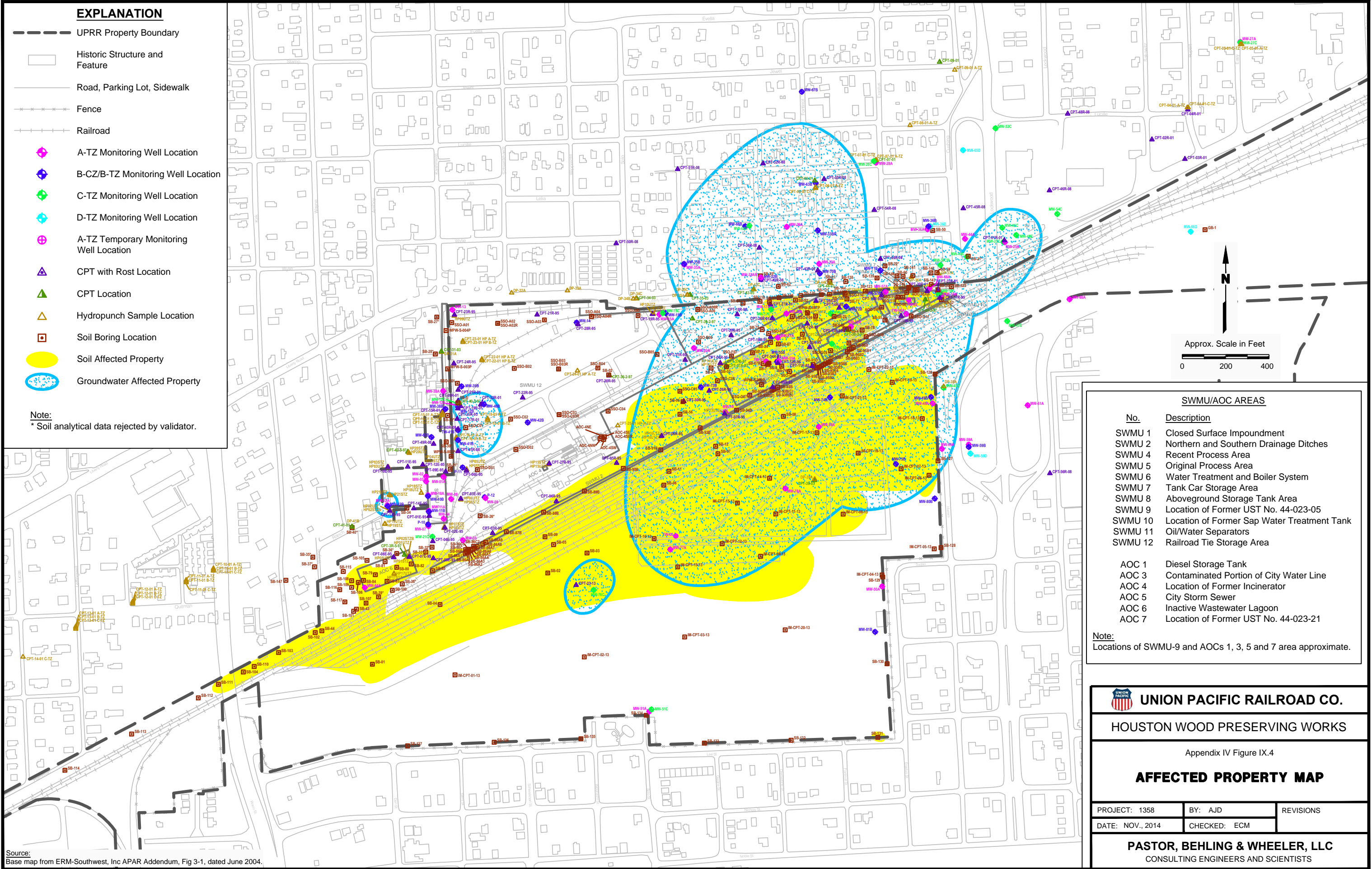
Figures IX.1 and IX.2 in Appendix IX.I of this section provide local and regional maps for the facility. A map of the facility wide locations of former waste management units is included as Figure IX.3.

A facility wide investigation of the former waste management units has been on-going and the entire facility will be regulated under a Compliance Plan in the post-closure care permit. Soil and groundwater have been determined to be the exposure pathways for the facility. Figure IX.4 in Appendix IX.IV illustrates the extent of soil and groundwater exceeding PCLs identified at the facility. Figures IX.5a and IX.5b provide a conceptual site model, illustrating the relationship between hydrogeology, surface and subsurface features, and the generalized extent of contamination.

**EXPLANATION**

- UPRR Property Boundary
- ▭ Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- Fence
- Railroad
- ◆ A-TZ Monitoring Well Location
- ◆ B-CZ/B-TZ Monitoring Well Location
- ◆ C-TZ Monitoring Well Location
- ◆ D-TZ Monitoring Well Location
- ⊕ A-TZ Temporary Monitoring Well Location
- ▲ CPT with Rost Location
- ▲ CPT Location
- ▲ Hydropunch Sample Location
- ▣ Soil Boring Location
- Soil Affected Property
- Groundwater Affected Property

Note:  
\* Soil analytical data rejected by validator.



**SWMU/AOC AREAS**

No.	Description
SWMU 1	Closed Surface Impoundment
SWMU 2	Northern and Southern Drainage Ditches
SWMU 4	Recent Process Area
SWMU 5	Original Process Area
SWMU 6	Water Treatment and Boiler System
SWMU 7	Tank Car Storage Area
SWMU 8	Aboveground Storage Tank Area
SWMU 9	Location of Former UST No. 44-023-05
SWMU 10	Location of Former Sap Water Treatment Tank
SWMU 11	Oil/Water Separators
SWMU 12	Railroad Tie Storage Area
AOC 1	Diesel Storage Tank
AOC 3	Contaminated Portion of City Water Line
AOC 4	Location of Former Incinerator
AOC 5	City Storm Sewer
AOC 6	Inactive Wastewater Lagoon
AOC 7	Location of Former UST No. 44-023-21

Note:  
Locations of SWMU-9 and AOCs 1, 3, 5 and 7 area approximate.

**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

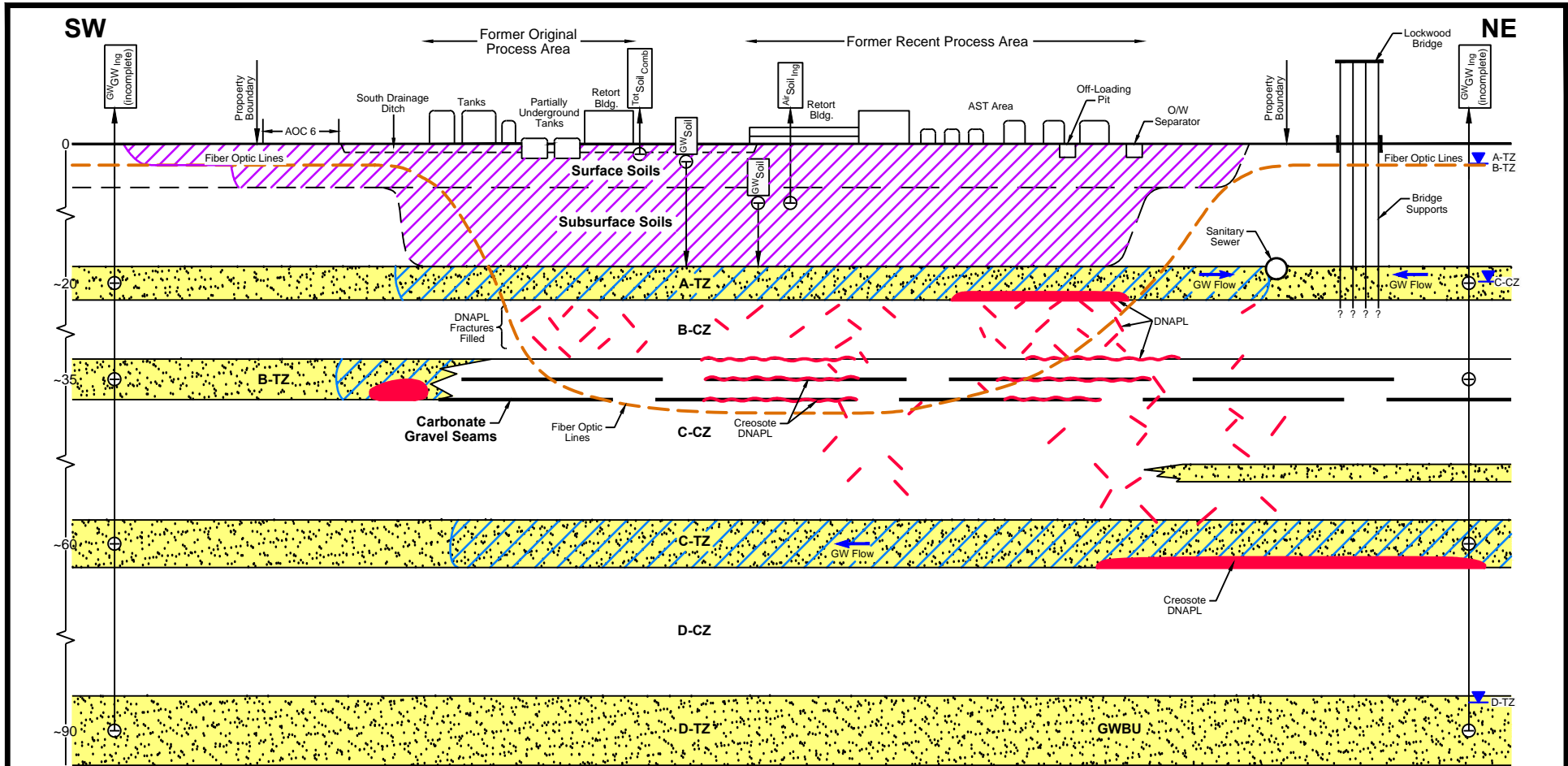
Appendix IV Figure IX.4

**AFFECTED PROPERTY MAP**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

Source:  
Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.



- Soil Affected Property
- Groundwater Affected Property



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Appendix IV Figure IX.5.a

**CONCEPTUAL SITE MODEL  
SW - NE**

PROJECT: 1358

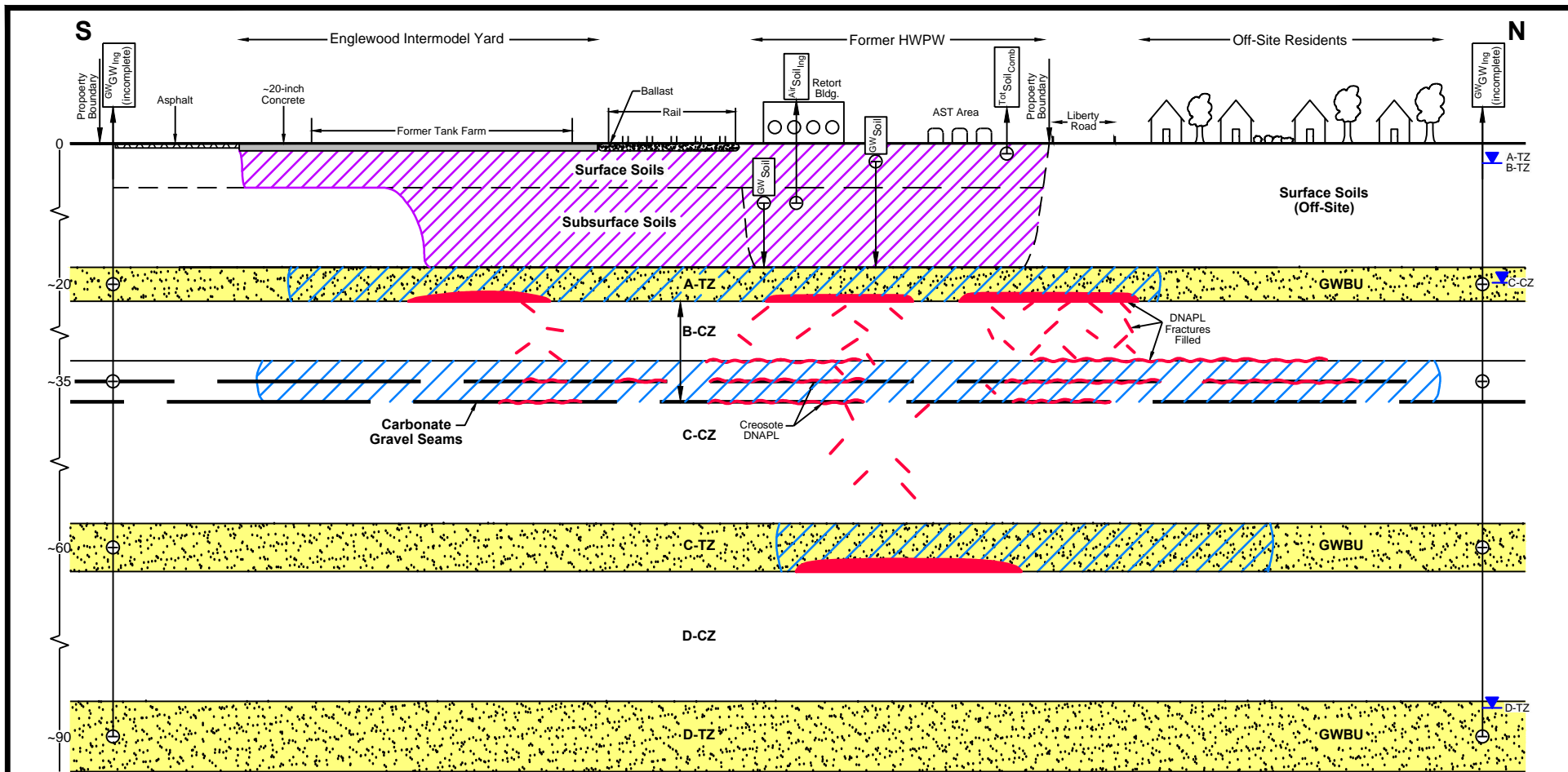
BY: AJD



REVISIONS


DATE: NOV., 2014

CHECKED: ECM

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS



-  Soil Affected Property
-  Groundwater Affected Property

 **UNION PACIFIC RAILROAD CO.**

HOUSTON WOOD PRESERVING WORKS

Appendix IX Figure IX.5.b

**CONCEPTUAL SITE MODEL**  
**S - N**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

## X. Air Emission Standards **Not Applicable**

Sections X.A, X.B, and X.C apply to all permit applications, except post-closure permit applications. Permittees with “one stop” permits applying for an amendment, modification, or renewal should clearly state whether they wish to amend, modify, or renew the Air Permits Division portions of their combined one-stop permit, whether they intend to seek separate authorizations, as appropriate, from the Air Permits Division and subsequently delete these requirements from their hazardous waste permit, or whether they want consolidated permit processing as allowed by 30 TAC Chapter 33 - Consolidated Permit Processing.

### A. Process Vents

For process vents and equipment subject to the requirements of 40 CFR Part 264 Subpart AA , please provide a report that includes all of the information required by 40 CFR 270.24. Indicate on a facility plot plan the approximate location of process vents.

1. For inclusion into a permit, complete Table X.A - Process Vents for all vents on waste management units that manage hazardous waste with an annual average total organics concentration of 10 ppmw or greater (“process vents”). Specifically include:
  - a. process vents on distillation, fractionation, thin-film evaporation, solvent extraction, air or steam stripping operations, and vents on condensers serving these operations; and
  - b. process vents on tanks (e.g., distillate receivers, bottom receivers, surge control tanks, separator tanks, and hot wells) associated with distillation, fractionation, thin-film evaporation, solvent extraction, and air or steam stripping processes if emissions from these process operations are vented through the tanks.

Emissions caused by natural means such as daily temperature changes or by tank loading and unloading are not subject to control.

2. For process vents, include the following certification as part of the air emissions report:

■I, *owner or operator* , certify that the operating parameters used in the design analysis reasonably represent the conditions that exist when the hazardous waste management unit is or would be operating at the highest load or capacity level reasonably expected to occur.

I further certify that the control device is designed to operate at an efficiency of 95 weight percent or greater.

*OR*

I further certify that the total organic emission limits of 40 CFR 264.1032(a) for affected process vents at the facility can be attained by a control device involving vapor recovery at an efficiency less than 95 weight percent.

*(Signature)*

*(Date)* .

### B. Equipment Leaks

For equipment subject to the requirements of 40 CFR Part 264 Subpart BB , please provide a report that includes all of the information required by 40 CFR 270.25.

1. For inclusion into a permit, complete Table X.B. – Equipment Leaks for all valves, pumps, compressors, pressure relief devices, sampling connection systems, and open-ended valves or lines that contains or contacts hazardous waste streams with organic concentrations of 10% by

weight or greater. Equipment in vacuum service is not subject to control if identified in the facility operating record.

2. For equipment, include the following statement as part of the air emissions report:

■I, *owner or operator*, certify that the operating parameters used in the design analysis reasonably represent the conditions that exist when the hazardous waste management unit is operating at the highest load or capacity level reasonably expected to occur.

I further certify that the control device is designed to operate at an efficiency of 95 weight percent or greater.

(*signature*) (date) .

### C. Tanks, Surface Impoundments, and Containers

For tanks, surface impoundment, and containers subject to the requirements of 40 CFR Part 264 Subpart CC, please provide a report that includes all of the information required by 40 CFR 270.27.

Include the following certification as part of the air emissions report:

■I, (*owner or operator*), certify that the control device is designed to operate at the performance level documented by a design analysis as specified in 40 CFR 264.1089 (e)(1)(ii) or by performance tests as specified in 40 CFR 264.1089(e)(1)(iii) when the tank, surface impoundment, or container is or would be operating at capacity or the highest level reasonably expected to occur.

(*signature*) (date) .

### D. Optional TCEQ Office of Air Quality Information

In addition to the information requested in Section X.A, X.B, and X.C above, permittees having “one-stop” permits may elect to combine the air and waste management amendment, modification, or renewal of permitted waste management units. The combined amendment, modification, or renewal application will follow the application processing procedures for an industrial solid waste permit.

1. Area map (to scale) showing the location of the plant and land use in the vicinity of the facility including buildings, schools, residences, etc. within 3000 feet.
2. Plot plan (to scale) with latitude and longitude showing the plant layout, property boundary and location of all emission points of air contaminants. Emission points are to be numbered.
3. Specific chemical name of each air contaminant and emission rate in maximum pounds per hour, maximum tons per year and calculations used to determine emission rates. Fugitive emissions are to be included. Complete Table 1(a) entitled “Emission Sources.”
4. Process description, operating schedule, and flow chart in sufficient detail that will explain the process and operation and a material balance for processes where applicable. The description should include a discussion of disposal methods for any generated residues and associated air emissions.
5. Design specifications about each emission control device using the appropriate OAQ table.
6. Volatile organic compound (VOC) concentrations in water or sludges or soil and volumes or weights of water, sludges or soils to be processed.



7. Exhaust stack or emission point parameters for each emission point including height, diameter, temperature, velocity and flow rate, except ground level fugitive emissions.
8. Best available control technology (BACT) documentation for all new and modified facilities.
9. Documentation of compliance with any applicable Federal New Source Performance Standard (NSPS) and Federal National Emission Standard for Hazardous Air Pollutants (NESHAPS).
10. Documentation as to whether a permit is required under new source review requirements of part C or D or Title I of the Federal Clean Air Act, 42 U.S.C. 7401 et seq., for a major source or major modification.
11. Information that demonstrates reliability of emission control systems including process instrumentation, equipment redundancy and operating procedures.
12. Results of atmospheric dispersion modeling certified to have been conducted in accordance with applicable TCEQ Office of Air Quality (OAQ) procedures. Model results must show maximum off-property 30-minute and annual ground level concentrations of each air contaminant. Dispersion modeling results must indicate compliance with all OAQ Rules and Regulations. Dimensions of buildings/structures that may influence dispersion modeling are to be furnished. Please consult with OAQ before beginning any modeling study.
13. Storage tank data including capacity in gallons, diameter, height, paint color, composition, density, vapor pressure and molecular weight of liquid stored, maximum hourly and annual throughput and number of turnovers per year. Complete Table 7 entitled “Storage Tank Summary” for each tank.
14. A statement addressing the applicability of each OAQ regulation.
15. All methods of calculating emissions must be properly referenced with justification for selecting the values used in any equation.

## XI. Compliance Plan

### Groundwater Monitoring and Corrective Action Requirements for Regulated Units

Owners or operators of facilities that process, store, or dispose of hazardous waste may be required to establish groundwater monitoring and response programs in accordance with the provisions of 30 TAC 335.157. There are three types of groundwater monitoring programs which may be addressed in a Compliance Plan Application for Regulated Units: i) detection monitoring, ii) compliance monitoring, and iii) corrective action monitoring. The applicability of these various monitoring programs and the associated application requirements are illustrated in Figure 2 of the Compliance Plan Application instructions and further outlined below. A Compliance Plan Application will be required to be submitted when establishing a new compliance plan or incorporating changes in an existing compliance plan.

- **Detection Monitoring:** An owner/operator required to conduct detection monitoring per the requirements of 30 TAC 335.164 must monitor for indicator parameters, such as specific conductance, total organic carbon, and total organic halogen, as well as chemical parameters and hazardous constituents specified in the facility permit. If a statistically significant increase in any parameter or hazardous constituent specified in the facility permit is detected in any monitoring well down-gradient of the compliance point, the owner/operator must sample the groundwater in all monitoring wells and analyze the samples for the presence of 40 CFR Part 264 Appendix IX hazardous constituents. As shown in the accompanying Flow Diagram (see Figure 2), if the analytical results confirm the presence of Appendix IX constituents down-gradient of the compliance point, the owner/operator must submit a Compliance Plan Application to establish a compliance monitoring program or corrective action program.
- **Compliance Monitoring:** The requirements for compliance monitoring programs are detailed in 30 TAC 335.165. Owners/operators required to establish a compliance monitoring program must monitor the groundwater to determine whether Regulated Units are in compliance with the Groundwater Protection Standard (GWPS) specified in the compliance plan (see 30 TAC 335.158 - .160). If a statistically significant increase above the GWPS in any chemical parameter or hazardous constituent specified in the compliance plan is confirmed, the owner/operator must submit an application to modify the compliance plan to establish a corrective action program in accordance with 30 TAC 335.166 (see Figure 2). If no such exceedence of the GWPS is detected for three consecutive years and the applicable compliance period has expired, the owner/operator must apply for modification of the compliance plan to re-establish a detection monitoring program for the unit. No further monitoring will be needed if the applicable post-closure care period for the unit is complete.
- **Regulated Unit Corrective Action Program:** Owners/operators required to implement a corrective action program in accordance with the provisions of 30 TAC 335.166 must remove the hazardous waste constituents found in the groundwater or treat the groundwater in-place to levels equal to or less than the GWPS down-gradient of the compliance point. The owner/operator must also establish and implement a groundwater monitoring program to demonstrate the effectiveness of the corrective action program. Corrective action measures may be terminated once the concentrations of hazardous constituents are reduced to levels equal to or below their respective concentration limits. After termination of the corrective action measures, the owner/operator must submit an application for modification of the compliance plan to re-establish a compliance monitoring program for the duration of the compliance period (see Figure 2).

### Groundwater Corrective Action Requirements for Solid Waste Management Units (SWMUs)

- **HSWA Solid Waste Management Unit (SWMU) Corrective Action Program:** An owner/operator of a Permitted facility or an applicant applying for a hazardous waste permit is required to submit a Compliance Plan Application if hazardous constituents have been released from a SWMU and/or Area

of Concern (AOC) to the groundwater and exceeds background or Practical Quantitation Limit (PQL) values, if under Risk Reduction Rules 30 TAC 335 and/or appropriate Protective Concentration Limits (PCLs), if under Texas Risk Reduction Program Rules 30 TAC 350. The Permitted facility must implement a corrective action program for SWMUs and/or AOCs in accordance with provisions 30 TAC 335.167 (see Figure 3, page 122 of the instructions for example of process-alternate, but equivalent process may be authorized by the Executive Director).

Compliance Plan Application Form Structure:

The Compliance Plan Application consists of Sections XI.A. through E:

- **Application Information Form:**  
This section contains detailed information necessary for the application and regulatory requirements needed to put in the final compliance plan.

The application form contains the following subsections:

- A. Site Specific Information
- B. Groundwater Protection Standard (GWPS)
- C. Compliance Monitoring Program
- D. Corrective Action Program
- E. Cost Estimates for Financial Assurance

CP Attachments:

- A. Alternate Concentration Limits
- B. Well Design and Construction Specifications
- C. Sampling and Analysis Plan

- **Compliance Plan Site Specific Tables:**  
This section includes the following tables which are to be completed by the applicant, as applicable, and shall be incorporated as part of the final draft Compliance Plan. [Note: include a CD disk with the application providing an electronic copy of the files supporting the compliance plan tables, as applicable, in MS Word format]:
  - CP Table I – Waste Management Units and/or Areas Subject to Groundwater Corrective Action and Compliance Monitoring
  - CP Table II – Solid Waste Management Units and/or Areas of Concern for which Corrective Action applies pursuant to 30 TAC 335.167.
  - CP Table III – CORRECTIVE ACTION PROGRAM Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard
  - CP Table IIIA – CORRECTIVE ACTION PROGRAM Table of Indicator Parameters and the Groundwater Protection Standard
  - CP Table IV – COMPLIANCE MONITORING PROGRAM Table of Hazardous and Solid Waste Constituents and Practical Quantitation Limits or Method Quantitation Limits for Compliance Monitoring
  - CP Table IVA – COMPLIANCE MONITORING PROGRAM Table of Detected Hazardous Constituents and the Groundwater Protection Standard for Compliance Monitoring
  - CP Table V – Designation of Wells by Function
  - CP Table VI – Compliance Period for RCRA-Regulated Units

**Note to the Permittee:** All responses to each item in Section XI of the application form should be entered immediately below the original text associated with the form. Do not delete any areas of the application form that are not applicable, retain these areas with a response of either 'Reserved' or 'Not Applicable' below the original text of the form. In addition, if material supporting a response is located elsewhere in the application, the response should provide details as to the specific location within the referenced material.

One of the primary goals of the performance based Compliance Plan is the wells listed in, CP Table V – Designation of Wells by Function (to be included in the final Compliance Plan) are the wells in which the GWPS must be met to verify compliance with Compliance Monitoring program or corrective action objectives, and to change the table would require a modification. On the other hand, the following types of wells Corrective Action Observation Wells, Corrective Action System well, etc., that are included in “Attachment A” maps of the final draft Compliance Plan, should be flexible. The purpose is to provide the permittee with the authority to alter the groundwater monitoring system and Corrective Action System designs, as necessary, to proactively address changing environmental conditions without modifying or amending the Compliance Plan. An application to modify/amend the compliance plan is only required if wells listed in CP Table V are changed; consequently, Corrective Action Observation and Corrective Action System Wells are not listed in CP Table V of the compliance plan so they may be added or removed without modifying/amending the compliance plan. Notification of proposed changes to the groundwater monitoring system and Corrective Action System designs can be included in the semiannual or annual report required by CP Table VIII – Compliance Schedule (to be included in the final Compliance Plan).

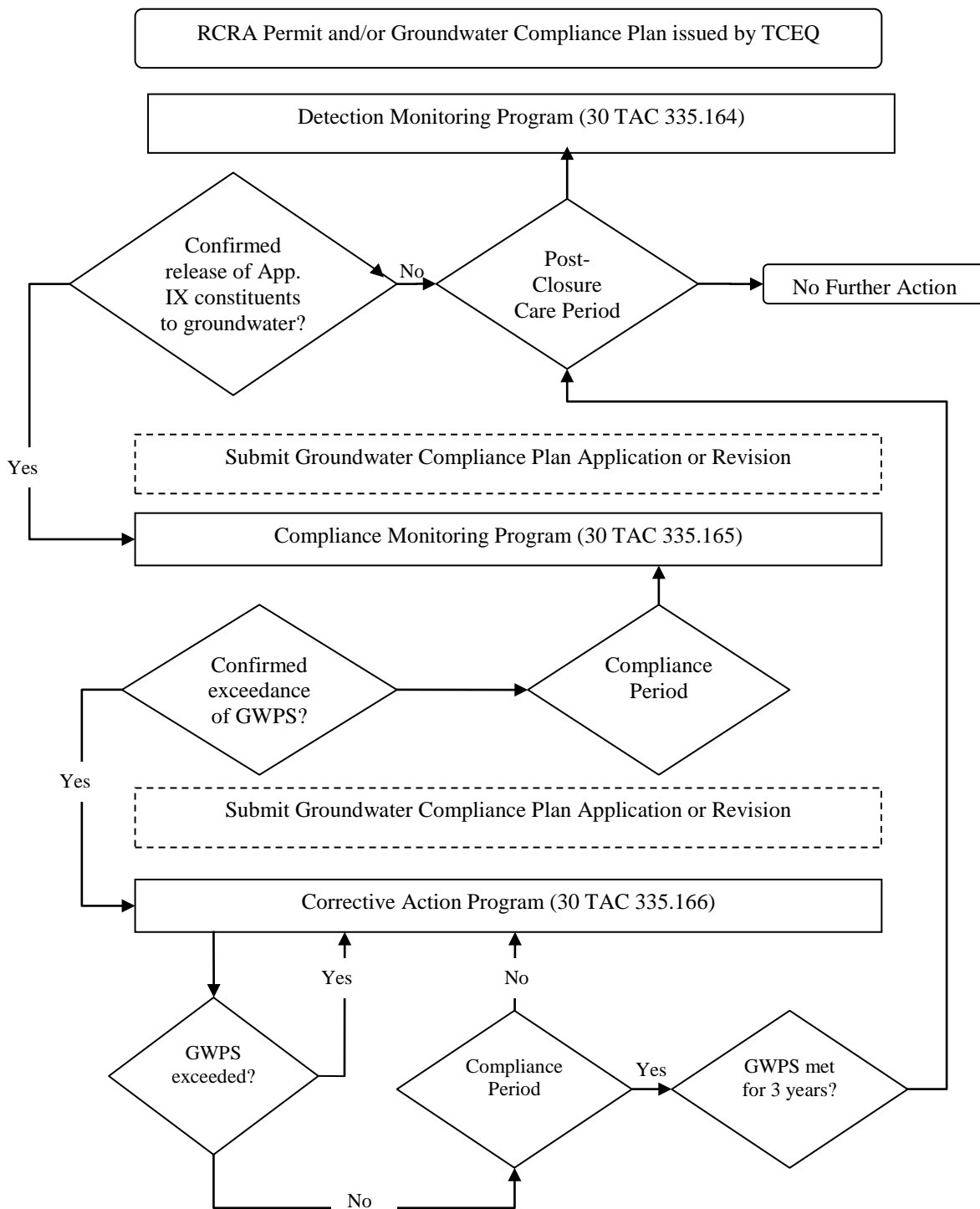
**Figure 1  
 Overview of Required Submittals And Revisions Associated with TCEQ Groundwater Compliance Plan Application**

Type of Compliance Plan Application or Revision	Minimum Required Submittals				Additional Application Submittals Or Revisions					
	Description of Modification	Public Notification Evidence	Fee Payment Evidence	Part B, Section I	Section XI.A.	Section XI.B.	Section XI.C.	Section XI.D.	Section XI.E.	Attachment A
				General Information	Site-Specific Information	Groundwater Protection Standard	Compliance Monitoring Program	Corrective Action Program	Financial Assurance Cost Estimates	Alternate Concentration Limits
RCRA Permitted Units										
Compliance Monitoring Program, commencement or modification per 30 TAC 335.165.	•	•	•	•	•	•	•	○	•	◐
Corrective Action Program, commencement or modification per 30 TAC 335.166.	•	•	•	•	•	•	○	•	•	◐
Compliance Period, termination or extension per 30 TAC 335.162.	•	•	•	•	◐	○	•	○	◐	○
Solid Waste Management Units										
Corrective Measure Implementation (CMI), per 30 TAC 335.167.	•	•	•	•	•	•	◐	•	•	○
Corrective Action Program termination.	•	•	•	•	◐	○	•	○	○	○

**Note:**

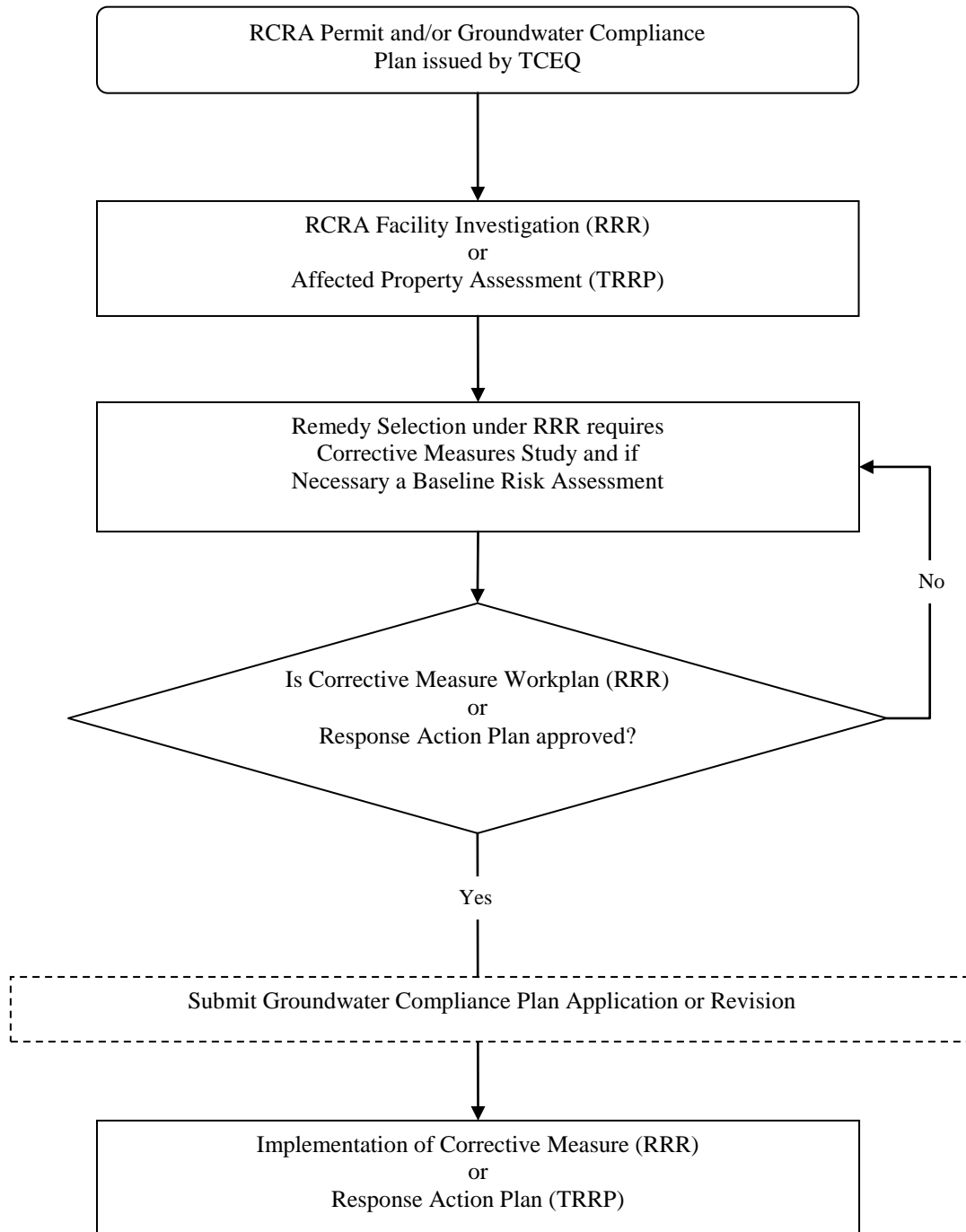
- =Submittal of additional or revised information required.
- =No submittal of additional or revised information required.
- ◐ =Possible submittal of additional or revised information required.

**Figure 2**  
**Summary of Groundwater Monitoring and Compliance Plan**  
**Application Requirements for Regulated Waste Management Units (30 TAC 335 Subchapter F)**



- Note:
- GWPS = Groundwater Protection Standard (See Section XI.B. of this document, and 30 TAC 335.158 – 160)
  - App. IX = Groundwater Monitoring List, 40 CFR 264 Appendix IX.

**Figure 3**  
**Summary of Compliance Plan Application Requirements**  
**for Solid Waste Management Units (SWMUS) (30 TAC 335.167)**



Note:

(RRR) – Risk Reduction Rules, 30 TAC 335

A. SITE SPECIFIC INFORMATION

1. General Site Information (provide the following information):

- a. An overall plan view map of the entire facility delineating the facility’s property boundary, Facility Operations Area (FOA) boundaries, as applicable, and the plume management zone (PMZ) boundaries as applicable;

***See Compliance Plan Figure XI.A.1.a***

- b. A 7.5 minute U.S.G.S. quadrangle topographic map showing the entire facility;

***See Compliance Plan Figure XI.A.1.b***

- c. All oversized (larger than 8.5” by 11”) drawings submitted in accordance with a and b, above, should be accompanied with legible photocopies of the reduced drawing on 8.5” by 11” sheet(s) of paper which shall be used as “CP Attachment A” maps in the final draft Permit/Compliance Plan. The applicant should title the map(s) accordingly as “CP Attachment A, Sheet 1 of xx – Facility Site Map”; “CP Attachment A, Sheet xx of xx, FOA Lateral Boundary Map”; “CP Attachment A, Sheet xx of xx, PMZ Boundary Location Map”; and

**Not Applicable**

- d. Aerial photographs through time depicting changes in the land use, if available.

***See Compliance Plan Figure XI.A.1.d (three years presented)***

2. Waste Management

Provide a complete list and a plan view drawing(s) locating and identifying the following waste management units at the scale of 2.5 centimeters (1 inch) equal to not more than 61.0 meters (200 feet). All oversized (larger than 8.5” by 11”) drawings should be accompanied with legible photocopies of the reduced drawing on 8.5” by 11” sheet(s) of paper. Please provide information for each waste management unit listed below on Table XI.A.1. – Facility History for Waste Management Units.

- a. All hazardous waste management units regulated under the Industrial Solid Waste and Municipal Hazardous Waste Rules (Chapter 335) required to be monitored in accordance with 30 TAC 335.164 (Detection Monitoring), 335.165 (Compliance Monitoring Program) and 335.166 (Corrective Action Program);

***See Table XI.A.1 – Unit 001, SWMU 1 – Closed Surface Impoundment – clean closed and requesting No Further Action for post-closure care (See Section VII and Response Action Plan (CP Attachment XI.D). Location of SWMU 1 shown on Compliance Plan Figure XI.A.2.***

- b. All solid waste management units (SWMUs) and Areas of Concern (AOCs) regulated under 335.167 which are recommended for further investigation and/or corrective action in the RCRA Facility Assessment (RFA) shall include those identified in accordance with the permit requirements subsequent to the initial RFA.

***See Table XI.A.1 for list, SWMUs and AOCs shown on Compliance Plan Figure XI.A.2.***

- c. All on-site wastewater treatment units.

**Not Applicable**



3. Facility History

Based on the information provided in Table XI.A.1., complete CP Table I – Waste Management Units and Areas Subject to Groundwater Corrective Action and Compliance Monitoring accordingly in the format provided.

***See Compliance Plan Table I (Waste Management Units and Areas Subject to Groundwater Corrective Action and Compliance Monitoring).***

For the SWMUs or AOCs listed in Table XI.A.1. regulated under 30 TAC 335.167 which are recommended for further investigation and/or corrective action in the RCRA Facility Assessment (RFA), including those identified in accordance with permit requirements subsequent to the initial RFA, complete CP Table II – Solid Waste Management Units and Areas of Concern for which Corrective Action applies pursuant to 30 TAC 335.167. CP Table II will become part of the Compliance Plan.

***See Compliance Plan Table II (Solid Waste Management Units and Areas of Concern for which Corrective Action Applies Pursuant to 30 TAC 335.167).***

4. Site Geology, Hydrogeologic Conditions, and Relationship to Surface Water

For New, modified/amended Compliance Plan, please provide a Geology Report as required by Section VI.B of this application containing updated site geologic information including the following descriptions, maps and tables with appropriate supporting documentation [All maps should be at the scale of 1 inch equal to not more than 200 feet and legible when reduced to 8.5” by 11” letter size paper]:

- a. A description of the site geology for the facility. The geologic description should include a site geology map and sufficient cross sections (see Item h. below) to describe the uppermost aquifer and any confining stratigraphic unit(s) beneath the site.

***See Permit Section VI. Geology Report***

- b. A description of the site soils and subsurface lithologies using the Unified Soil Classification System. For those soil units which do not extend beneath the entire site area, the soil description should include a plan view map designating the soil’s areal extent;

***See Permit Section VI. Geology Report***

- c. Where a soil remedy is required in a corrective action program of Section XI.D.1. of this application for a Regulated Unit, SWMU and/or AOC, the applicant shall submit a description of contamination in soils of the vadose zone (unsaturated zone above the uppermost aquifer). The soil description should include maps indicating lateral and vertical extent of contamination;

***See CP Attachment XI.D – Response Action Plan – Attachment IA***

- d. A description and designation of the uppermost saturated zone or uppermost aquifer including the name, the type of unit (e.g. perched, confined, etc.), and groundwater characteristics (flow rates, directions, hydraulic conductivity, etc.). As defined in 40 CFR 260.10, an aquifer is a geologic formation, group of formation, or part of a formation, capable of yielding significant amount of groundwater to wells or springs. Persons using Texas Risk Reduction Program (TRRP) should also consider the definition of a groundwater bearing unit as a saturated geologic formation, group of formations, or part of

a formation with a hydraulic conductivity of equal to or greater than  $1 \times 10^{-5}$  centimeters/second (30 TAC 350.4(a)40).

**See Permit Section VI. Geology Report and CP Attachment XI.D – Response Action Plan – Attachment IA**

- e. Present the geologic, stratigraphic and hydrogeological information; and

**See Permit Section VI. Geology Report**

- f. Maps indicating the lateral and vertical extent of the contamination for each stratigraphic unit affected, with supporting documentation.

**See CP Attachment XI.D - Response Action Plan - Attachment IA**

- g. Current Contaminant Plume Map(s) - Locating and identifying the extent of contamination as determined from previous monitoring on a separate facility base map(s). Locate and identify all monitor wells and waste management units/areas.

**See CP Attachment XI.D - Response Action Plan - Attachment IA**

- h. Cross section - Cross section transect lines should be indicated on the Contaminant Plume Map. The applicant, at a minimum, must submit two (2) stratigraphic cross sections for each waste management unit/area. One cross section should be drawn through all the point of compliance wells and the second cross section should be drawn along the direction of the movement of the contaminant plume released from the unit/area. Cross sections should follow the requirements outlined in the Geologic and Hydrogeologic Report of Parts IV and V of this application. At a minimum, the cross sections should include the following information:
  - i. the stratigraphic interpretation (e.g., surface grade, uppermost aquifer, aquiclude);
  - ii. lithology/geologic description of the uppermost aquifer and aquiclude;
  - iii. the potentiometric surface;
  - iv. detected non-aqueous phase liquids (NAPLs) and hazardous constituents; and
  - v. screen length and screen depth for each well in the cross section.

**See CP Attachment XI.D – Response Action Plan – Attachment IA**

- i. Well Construction diagram - The report should include a well construction diagram for all wells used in the cross section. The well construction diagram should include the information in “Attachment B” of this (Compliance Plan) application. The well construction diagram information may be included on the geologic cross-section(s).

**See Permit Section VI, Appendix VI.B for Well Completion Records**

- j. Describe the potential for any surface water bodies to be hydraulically connected to groundwater containing hazardous constituents. Apply the guidance provided in Determining PCLs for Surface Water and Sediment, RG-366/TRRP-24 Revised, December 2002, in order to determine the water body type and applicable surface water criteria for human health, aquatic life and wildlife, as applicable.

**See CP Attachment XI.D – Response Action Plan. The nearest surface water body is Buffalo Bayou, located approximately 1.6 miles southwest of the Site. The potential for lateral migration of groundwater from the Site to the southwest approximately 8,500 feet to Buffalo Bayou is not likely.**

## B. HAZARDOUS CONSTITUENTS IN GROUNDWATER AND GROUNDWATER PROTECTION STANDARDS (GWSS)

### **Hazardous Constituents in Groundwater**

For each contaminated hydrogeologic unit beneath a waste management unit/area (40 CFR 264.95), provide a list of all 40 CFR Part 264 Appendix IX hazardous constituents that have been detected in groundwater samples above background values, Practical Quantitation Limits (PQLs), or Method Quantitation Limits (MQLs). Please submit for each unit/area the most recent Appendix IX laboratory analysis results showing the constituents, constituent concentrations, methods used for analysis and associated laboratory QA/QC.

The groundwater samples (collected for the purpose of determining whether constituents listed in Appendix IX are present) shall be from each waste management unit/area monitoring well system as required by 30 Texas Administrative Code (TAC) 335.164 (detection monitoring program).

***The only RCRA Permitted Unit is the Closed Surface Impoundment (SWMU 1), which is currently under Corrective Action Monitoring. However, as detailed in Section VII and the RAP (CP Attachment XI.D), a request for No Further Action is included in this permit renewal for SWMU 1. The remainder of the units will be handled using a facility-wide corrective action approach subject to the requirements of Section XI (Compliance Monitoring) are proposed to go under Corrective Action Monitoring with specified analyte lists (See Compliance Plan Table III and IIIA).***

If the waste management unit/area is subject to Corrective Action Program required by 30 TAC 335.166 or 335.167 and/or Compliance Monitoring required by 30 TAC 335.165, then list the unit/area and include the list of hazardous constituents and their principal degradation constituents in:

- CP Table III – Corrective Action Program Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard; and

***See Compliance Plan Table III (Corrective Action Program Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard) for the facility-wide corrective action subject to the Corrective Action Program.***

- CP Table IV – Compliance Monitoring Program Table of Hazardous and Solid Waste Constituents and Practical Quantitation Limits or Method Quantitation Limits for Compliance Monitoring.

### ***Not Applicable***

#### 1. Groundwater Protection Standards (GWSSs)

The GWPS (30 TAC 335.158) is designed to ensure that hazardous constituents (30 TAC 335.159) identified in groundwater and their principal degradational constituents do not exceed concentrations that pose a present or potential hazard to human health and the environment. Compliance monitoring and corrective action programs for a Regulated Unit (30 TAC 335.165 and 335.166) and a corrective action program for a solid waste management unit (SWMU) (30 TAC 335.167) require human health and the environment to be protected from all releases of hazardous wastes and constituents. These corrective action and monitoring programs are evaluated using the GWPS. The GWPS is based on the following criteria.

- a. Background Levels - Background levels authorized under 30 TAC 335.160(a)(1) are defined as constituent concentration values that are naturally occurring or are not influenced by contamination coming from the waste management unit. These values are established by statistical analysis of upgradient well sampling data. Analytical results from a sufficient number of independent samples are required to be utilized with an approved

and appropriate statistical method. For guidance on the statistical methods consult, Statistical Analysis of Groundwater Data at RCRA Facilities-Unified Guidance, U.S. EPA, March 2009, and any subsequent updates to this document.

***Not applicable – Facility-wide corrective action.***

Practical Quantitation Limits (PQLs) or Method Quantitation Limits (MQLs) are utilized in lieu of background values unless a background demonstration establishes concentrations for naturally occurring constituents. The PQL or MQL is defined in the footnote of CP Tables III and IV.

***Not applicable – Facility-wide corrective action.***

- b. Primary and Secondary Maximum Contaminant Levels (MCLs) - Maximum permissible level of a contaminant in water which is delivered to any user of a public water system (40 CFR Part 141 and 143, Federal Safe Drinking Water Act).

***See Compliance Plan Table III (Corrective Action Program Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard) and associated footnotes.***

- c. Alternate Concentration Limits (ACLs) determined in accordance with 30 TAC 335.160(b) and are defined in footnote of CP Tables III and IV.

***As discussed in the RAP (Attachment XLD), TCEQ Protective Concentration Levels (PCLs) are the regulatory standards that apply at groundwater alternate points of exposure (POEs) for a particular groundwater exposure pathway, as set in the Title 30 Texas Administrative Code Chapter 350 Texas Risk Reduction Program (TRRP). Therefore, for this compliance plan, the proposed ACLs shall be based on TRRP PCLs. ACLs apply at Attenuation Monitoring Points (AMPs) and protect groundwater POEs. Where the groundwater POE is located at a distance from the plume management zone (PMZ), the ACL considers COC attenuation along the groundwater flow path between the AMPs and POE locations. These attenuation-based ACLs are referred to as attenuation action levels under TRRP. In the cases of PMZs, PCLs will be used to also verify compliance at POEs. Since groundwater impacts are both on-site and off-site, PMZs have been established for on-site (and City of Houston right of way (ROW) using the commercial/industrial PCL for groundwater ingestion, and for off-site using the residential PCL for groundwater ingestion. However, for evaluating the PMZ at the POE wells, residential PCLs were used for the off-site GWPS while commercial/industrial PCLs were used for on-site GWPS.***

***See Compliance Plan Table III (Corrective Action Program Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard) and associated footnotes.***

2. Establishing the Groundwater Protection Standard (GWPS)
  - a. If background, PQL or MQLs are proposed for the GWPS, the applicant must list all constituents (i.e., detected and degradational constituents) for which a GWPS is being applied for and the appropriate concentration limits. This information shall be submitted in the format of CP Tables III, and IV.

***The GWPS are the regulatory groundwater standard(s) for a COC that establish compliance and apply at POE wells as part of the PMZ. In the cases of PMZs and POEs, PCLs will be used to verify compliance.***

***See Compliance Plan Table III (Corrective Action Program Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard).***

- b. Alternate Concentration Limits (ACLs) - ACLs are established at the point of compliance (POC) for a regulated or solid waste management unit (SWMU). All concentration values or limits listed in Section XI.B.1.c. are considered ACLs. ACLs are evaluated in accordance with the provisions of 30 TAC 335.160(b) and other regulations acceptable to the executive director. If an ACL is requested on the basis of Section XI.B.1.c. (MCLs), then no ACL demonstration is necessary. The ACL demonstration must establish constituent concentrations in groundwater in accordance with regulations acceptable to the executive director. This information shall be submitted in the format of CP Tables III and IV. Note that depending upon the rule employed [i.e., 30 TAC 335 Subchapter S – Risk Reduction Rules (RRR) or 30 TAC 350 – Texas Risk Reduction Program (TRRP)], the applicant should determine the GWPS for the point of compliance and point of exposure, as applicable, in accordance with the remedy standard being utilized.

If the contaminant plume discharges or has a potential to discharge into surface water, then the facility must also comply with 30 TAC Chapter 307 (Texas Surface Water Quality Standards) unless other regulatory requirements acceptable to the executive director are requested.

***Not Applicable – NFA being requested for SWMU 1. Corrective Action for other SWMUs will be handled under the facility-wide PMZ.***

“Attachment A” of this Compliance Plan Application provides a summary of regulatory requirements for an ACL demonstration in accordance with 30 TAC 335.160(b).

***Proposed ACLs are based on the TRRP PCLs as described above in XI.B.1.c. Where the POE is at a distance from the POC (i.e., edge of the groundwater PCLE Zone), TRRP PCLs directly apply at the POE. See CP Attachment XI.A (Alternate Concentration Levels) for additional discussion.***

## C. COMPLIANCE MONITORING PROGRAM

As required by 30 TAC 335.165, an owner or operator must monitor the groundwater to determine whether Regulated Units are in compliance with the Groundwater Protection Standard (GWPS) under 30 TAC 335.158. The applicant must provide the following information when proposing a compliance monitoring program.

***Not Applicable. See RAP (CP Attachment XI.D and Permit Section VII). The one Regulated Unit, Closed Surface Impoundment (SWMU 1), is currently under Corrective Action Monitoring. With SWMU 1 achieving the response action objectives for Remedy Standard A requirements under 30 Texas Administrative Code (TAC) §350.32, UPRR recommends ceasing all post-closure response actions (i.e, groundwater monitoring, inspections, reporting) associated with requirements for SWMU No. 1 detailed in the current RCRA Permit and CP. It is also recommended to plug and abandon POC and background monitoring wells that will not be incorporated into the corrective action for the overall response action for the facility, as detailed in the RAP. The other SWMUs and AOCs will be addressed through the facility-wide Corrective Action Monitoring Program (see Section XI.D).***

### 1. Groundwater Monitoring Program Description – Not applicable

- a. Describe the proposed groundwater monitoring system to be used to monitor compliance with the GWPS which includes the following information.

- (1) Changes, if applicable, from the current detection monitoring system or compliance monitoring system groundwater monitoring program at the waste management unit that will be required to comply with the compliance monitoring program described in 30 TAC 335.165. This description should address changes concerning:
  - (a) Geological and/or hydrogeological information differences since the submittal of the previous application [must submit an updated Geologic and Hydrogeologic Report required by Section XI.A.4];
  - (b) Waste management areas/units;
  - (c) Construction details for monitor wells to evaluate compliance with “Attachment B” well specification requirements;
  - (d) The number and locations of additional monitor wells [also see Section XI.C.1.b.(2)];
  - (e) Sample handling, chain of custody, and analytical procedures (also see “Attachment C”);
  - (f) Frequency of monitoring;
  - (g) Monitoring parameters;
  - (h) Evaluation of compliance with GWPS (Statistical Methods);
  - (i) Other Sampling and Analysis Plan information to be compliant with “Attachment C”;
  - (j) Compliance period as defined in Section XI.E.1.c. of the application;
  - (k) Financial assurance (see Section XI.E.); and
  - (l) An ACL variance under 30 TAC 335.160(b), if applicable (also see “Attachment A”).
- (2) The number, depth and location of all monitor wells (Background Wells, Point of Compliance Wells, Observation Wells, Piezometers, etc.). Complete CP Table V – Designation of Wells by Function and make changes as applicable to plans referenced in Section XI.C.1.b.
- (3) The proposed hazardous constituent monitoring list which is based on constituents that were monitored during detection monitoring (if applicable), constituents detected in accordance with 30 TAC 335.164, and degradational constituents identified in Table CP IV accordingly to develop the constituent list for the Compliance Monitoring Program. Also, list the PQL, MQL, or background concentration for each constituent in CP Table IV. CP Table IV shall become part of the final Compliance Plan to be analyzed at least annually as required by 30 TAC 335.165(7).
- (4) The proposed indicator parameter monitoring list. From the list of constituents and GWPS identified in CP Table IV., complete CP Table IVA – Compliance Monitoring Program, Table of Detected Hazardous Constituents and the Groundwater Protection Standard for Compliance Monitoring, accordingly. CP Table IVA shall become part of the final Compliance Plan to be analyzed at least semiannually as required by 30 TAC 335.165(6).
- (5) Monitoring frequency.
- (6) Provisions for reporting of groundwater data at least on an annual basis.
- (7) Annual determination of contamination plume rate and direction of migration.
- (8) Compliance period. Calculate the compliance period as required by 30 TAC 335.162 and 335.165(1)(d). Include calculations and complete CP Table VI – Compliance Period for RCRA-Regulated Units which shall become part of the final Compliance Plan.

- b. Submit the following plans and reports.
- (1) Current Sampling and Analysis Plan - The Sampling and Analysis Plan must include information required by 30 TAC 335.163(4) and 335.163(5) and 40 CFR Subpart 270.30(j). For guidance, please see “Attachment C” to the application.
  - (2) Monitoring System Plan - If the applicant is proposing a monitoring well or a monitoring system in the application, the applicable well installation specifications outlined in “Attachment B” of this application should be followed. All new monitoring wells must be installed in accordance with the specifications outlined in “Attachment B”, unless an alternative design is approved by the agency prior to installation. If the applicant proposes as part of the monitoring system, any well (existing or proposed) that does not meet or exceed the requirements outlined in “Attachment B”, then the proposed alternative design must be described in detail in the Monitoring System Plan and must be submitted with this application. The Monitoring System Plan must include:
    - (a) Monitoring System Design and Specifications - Certified by a qualified engineer and/or geologist which provides detailed plans and specifications on the monitoring system design; and
    - (b) Well Drilling and Well Casing Specifications - Certified by a qualified engineer and/or geologist which provides details on well casing specification, drilling logs and reports.
  - (3) Current Geologic and Hydrogeologic Report - Provide a report per Section X.I.A.4 of this application discussing the geologic and hydrogeologic conditions of the facility and the specific area affected by the waste management areas. This report should include the most up-to-date information from which the design of the groundwater monitoring system was based.

***Not applicable***

2. Waste Management Units Monitored – ***Not applicable***
- a. Delineate and identify the following for each waste management unit in the proposed groundwater monitoring program.
    - (1) Boundary of the waste management unit and, if applicable, the proposed waste management area which includes more than one waste management unit (identify all waste management units which are included in the waste management area). These waste management units subject to compliance monitoring should be listed in CP Table I – Waste Management Units and Areas Subject to Groundwater Corrective Action and Compliance Monitoring which shall become part of the final Compliance Plan.
    - (2) The proposed point of compliance (30 TAC 335.161) and point of exposure wells.
    - (3) Any other proposed monitor wells such as supplemental wells, observation wells, background wells, etc. If appropriate the groundwater monitoring system should have a sufficient number of wells be designated to monitor the downgradient extent of the plume.
    - (4) Features which may serve as conduits for subsurface contamination.
  - b. For each waste management unit/area in the proposed groundwater monitoring system, submit the locations of individual waste management unit/area monitor wells (existing or proposed) and any soil borings (plugged and unplugged) specifically drilled for assessment of

contamination. These individual monitor wells shall be identified by respective well number on a plan view drawing and only the background, point of compliance and/or point of exposure wells should be indicated in CP Table V – Designation of Wells by Function. The plan view map depicting the location of individual monitoring wells for compliance monitoring should be labeled as “CP Attachment A, sheet xx of xx” in the text box. The title box should also include reference to the facility name, Permit/Compliance Plan Number, Solid Waste Registration Number, Unit Description or name with Notice of Registration (NOR) Unit No. 0000. The “CP Attachment A” map(s) and CP Table V shall also become part of the final Compliance Plan.

### 3. Implementation Schedule

Itemize and discuss, in detail, the estimated time schedule necessary for any testing and assessments, system design, construction and installation, and final implementation of the groundwater monitoring program for each Regulated Unit and solid waste management unit. If the schedule of implementation for items are not completed at the time of the application, or are not completed at the time of issuance of the final draft Permit/Compliance Plan, then the items should be added to the CP Table VIII - Compliance Schedule of the application.

*Not applicable*

## D. CORRECTIVE ACTION PROGRAM

As required by 30 TAC 335.166, the owner or operator must take corrective action to ensure that Regulated Units are in compliance with the Groundwater Protection Standards (GWPS) under 30 TAC 335.158. As required under 30 TAC 335.167, all releases of hazardous constituents from any solid waste management unit at the facility must also be addressed. For existing corrective action programs which have been approved by the TCEQ, the applicant shall provide a copy of the TCEQ corrective action system approval letter, design system specifications and any updates as requested in Section XI.D.3.a.(1) of this section. The applicant must provide the information requested below when proposing a corrective action program which has not been previously approved by the TCEQ including a detailed description of a corrective action or a combination of corrective actions that will remedy the groundwater contamination at the waste management unit and a proposed plan for a monitoring program that will demonstrate the effectiveness of the corrective action.

The owner or operator may also apply for a the Facility Operations Area (FOA) pursuant to the requirements of 30 TAC 350.131 - 350.135 of the Texas Risk Reduction Program (TRRP) rules, provided the applicant meets the FOA pre-approval process steps 1 through 3 approved by the Commission.

Also, the owner or operator may apply for alternative groundwater Corrective Action Program pursuant 30 TAC 335.151, 335.156 and 30 TAC 350, where there are commingled releases from RCRA-regulated unit from one or more SWMUs, PCO, and/or AOC.

***As detailed in the RAP (CP Attachment XI.D,) the goal of the corrective action program is to comply with TRRP-based GWPS at the alternate point of exposure (POE) wells at the plume management zone (PMZ) boundary using the facility-wide corrective action approach. A modified Remedy Standard B groundwater response action objective (RAO) will be conducted at the Site through control using a PMZ and Technical Impracticability (TI) Zone. Monitored natural attenuation (MNA) is proposed as a control response to address the PCLE Zones within the PMZs. Within the PMZ and TI Zone, the NAPL response endpoint for the creosote DNAPL will be through the control (via TI) endpoint. The response objective will be to control the creosote DNAPL by physical (recovery from monitoring wells with DNAPL present) or natural means at the NAPL source zone so that the dissolved-phase groundwater PCLE zone is stable (or shrinking) and the PCLE performance objectives for the TI-based “no growth” PMZ can be met.***



***As part of the MNA monitoring, GWPS are tabulated in Compliance Plan Table III (Table of Detected and Solid Waste Constituents and the Groundwater Protection Standard) for POE wells, and Compliance Plan Table IIIA (Corrective Action Program Table of Indicator Parameters and Groundwater Protection Standard).***

1. Type of Corrective Action Proposed

From the list below, indicate the type of groundwater corrective action proposed for each hazardous waste unit/area. Discuss in detail if more than one corrective action is to be used in a waste management area. Submit the discussion and descriptions as an attachment to the application.

- a. Groundwater well recovery with surface treatment
- b. Groundwater well recovery/surface treatment/re-injection
- c. Groundwater well recovery and disposal
- d. Vapor extraction system
- e. Interceptor trench recovery and disposal
- f. Interceptor trench recovery and surface treatment
- g. In-situ treatment – bioreclamation
- h. In-situ treatment – chemical reaction
- i. Barrier walls/encapsulation
- j. Permeable treatment beds
- k. Other, please describe

***As discussed in the RAP (CP Attachment XI.D), UPRR initiated a 24-month pilot study in February 2013 to evaluate DNAPL recovery at the Site by conducting tests on selected monitoring wells where DNAPL had been observed. Details of the scope of work for the pilot test were submitted to the TCEQ in a letter dated February 5, 2013 (PBW, 2013). A copy of the scope of work is provided in Appendix 3 of the RAP. The pilot test procedures consist of measuring the depth to groundwater surface, the depth to the groundwater/DNAPL interface, and the total depth of the well relative to the top of well casing prior to DNAPL recovery. Using a peristaltic pump, DNAPL is pumped from the bottom of the monitoring well until groundwater is returned in the pump discharge. The volume of recovered DNAPL is estimated from each well, and the well is gauged to measure the total depth of the well and depth to residual DNAPL following pumping. Recovered DNAPL is temporarily stored at the Containment Storage Area. UPRR submitted to the TCEQ in a letter dated September 25, 2014 an update after the first 18 months of the pilot test. A copy of the letter is also provided in Appendix 3 of the RAP. After the monthly DNAPL recovery pilot test is concluded following the January 2015 recovery event, UPRR will submit to the TCEQ the results of the 24-month pilot test. This submittal will also include an evaluation of other recovery alternatives, including continuing DNAPL recovery activities.***

2. Program Description

Attach a technical report providing a detailed description of a complete corrective action system including above and below ground equipment/facilities. Include discussions on the following concerns for each type of corrective action as applicable.

***See RAP (CP Attachment XI.D).***

- a. Recovery Wells

***Not Applicable***

- (1) Indicate on a plan view of the waste management area the anticipated location of Recovery Well(s) which would optimize the extraction of the groundwater contaminants.
- (2) Indicate on a plan view the estimated radius of influence of each Recovery Well.
- (3) Indicate the optimum pumping rate of each Recovery Well determined from the aquifer pump test.
- (4) Describe the design of the Recovery Wells and pump system including diameter, construction material, gravel packing, screen slot sizes and patterns, type of pumps and maintenance requirements.
- (5) Describe the collection and storage of the contaminated groundwater which is classified hazardous waste (on-site storage of hazardous waste shall require compliance with the applicable regulations):
  - (a) Less than 90-day tanks (see 40 CFR 262.34/40 CFR 265 Subpart J);
  - (b) Permitted Tanks (see 40 CFR 264 Subpart J);
  - (c) Less than 90-day Container Storage Area (see 40 CFR 262.34/40 CFR 265 Subpart I);
  - (d) Permitted Container Storage Area (see 40 CFR 264 Subpart I); and
  - (e) Temporary Units (see CFR 264.553).
- (6) Describe the treatment and/or final disposition of the hazardous and nonhazardous contaminated groundwater.

b. Vapor Extraction System

***Not Applicable***

- (1) Indicate on a plan view of the waste management area the anticipated location of the vapor extraction system which would optimize the extraction of hazardous constituents from the vadose zone.
- (2) Describe the construction design of the vapor extraction system in detail, including all diagrams and drawings.
- (3) Describe the emission control equipment used to comply with air quality regulations.
- (4) Provide the anticipated volatile contaminants to be remediated along with information on the expected effectiveness of the vapor extraction system at the waste management unit.
- (5) Provide established treatability data for the proposed design.
- (6) Specify the hazardous constituents affected by this type of treatment.

c. Interceptor Trenches

***Not Applicable***

- (1) Indicate on a plan view of the waste management area the anticipated location of the interceptor trench.
- (2) Provide the construction design.
- (3) Describe the procedure for construction.
- (4) Describe the liquid removal and collection system.
- (5) Describe the surface storage and/or treatment of the contaminated groundwater.
- (6) Describe the final disposition of the contaminated groundwater.

d. In-situ Treatment – Chemical Reaction

***Not Applicable***

- (1) Characterize the chemical agents to treat the contaminated groundwater and/or soils in the vadose zone.
- (2) Provide laboratory treatability data.
- (3) Specify the hazardous constituents affected by this type of treatment.
- (4) Specify the reaction by-products produced during the chemical reactions.
- (5) Indicate degradation time for each treated hazardous constituent and any resulting chemical reaction by-products.
- (6) Describe the potential health risks caused by human exposure to the reaction by-products.
- (7) Describe potential damage to wildlife, crops, vegetation and physical structures caused by exposure to reaction by-products.
- (8) Describe the persistence and permanence of the potential effects of the reaction by-products.
- (9) Describe the method of chemical reactant injection and other important aspects of the system design.

e. In-situ Treatment – Bioreclamation

***Not Applicable***

- (1) Describe the type of bacteria most appropriate for the degradation of the hazardous constituents present in the groundwater and/or soil in the vadose zone.
- (2) Describe the nutrients necessary and application frequency to encourage effective bioreclamation.
- (3) Provide laboratory data from treatability studies utilizing the contaminated groundwater and describe any potential hazardous by-products.
- (4) Indicate the degradation time for each hazardous constituent affected by this treatment.
- (5) Describe the method of injecting the bacteria and nutrients and describe the delivery system design.

f. Barrier Walls

***Not Applicable***

- (1) Provide laboratory permeability data using the actual contaminated groundwater.
- (2) Describe the barrier wall materials.
- (3) Summarize construction design and installation procedures.

g. Permeable Treatment Beds

***Not Applicable***

- (1) Provide laboratory data of treatability simulations using actual contaminated groundwater in combination with the material proposed to be used in treatment beds.
- (2) Discuss the properties of the treatment material which would make it effective for use at this site.
- (3) Indicate which hazardous constituents will be affected by this treatment. Indicate the

reactions which will take place and the resulting reactant by-products. Discuss the anticipated lifetime of the permeable treatment beds.

(4) Provide the construction design and installation procedures.

h. Other

Discuss in detail, any other corrective action (soils and groundwater) not included above which is proposed for use at the affected waste management area(s).

### Soils

*As detailed in the RAP (CP Attachment XI.D – Worksheet 1.0), the RAOs for surface and subsurface soil PCLE Zones is to control exposure through Remedy Standard B using physical barriers such that commercial/industrial workers will not be exposed to concentrations of COCs in excess of the critical human health PCLs (§350.33(a)(1)). In addition, COC concentrations in the surface and subsurface soils will not create a leachate that will lead to cPCL exceedances at the point of exposure wells within the proposed PMZ. For surface soils, the Remedy Standard B RAOs will include two approaches:*

- ***Former HWPW area:*** *Using the Area of Contamination (AOC) policy, surface soils with cPCL exceedances in the SDD (SWMU 2), Inactive Wastewater Lagoon (AOC 6), and areas north of the AST Area (SWMU 8) will be consolidated in the area of SWMUs 4, 5, and 8. As allowed under the EPA AOC policy, soils may be consolidated within the AOC (defined at the Site as the “Affected Property”) and not be considered to be removed from the land or generated. Soils removed from the proposed areas will be conducted under Remedy Standard A. The removal action has been designed to remove surface soils containing COCs at concentrations exceeding the critical PCLs as shown on Attachment 2A-1a and 2A-1b of the RAP (CP Attachment XI.D). The soils will be excavated to the vertical extent of the PCLE zone, estimated to be a maximum of approximately 3 feet deep (no greater than 5 feet deep). Soils will be placed within the AOC near SWMU 4, 5 and 8 and covered with an engineered soil cap (Attachment 2A-1a of the RAP (CP Attachment XI.D)).*

*To protect on-site commercial/industrial receptors, a vapor barrier with geotextile fabric, and an engineered soil cap (12-in clay soil, 6-in topsoil) will be constructed to cover the consolidated soil and remaining surface soil PCLE Zone on the former HWPW area (Attachment 2A-1a of the RAP (CP Attachment XI.D)). This will prevent exposure to surface soils within this area of the Site. The soil cap will be vegetated and sloped to minimize infiltration over the surface/subsurface soil PCLE Zone. The vegetated cap will be maintained under the post-response action care. In the areas where surface soils will be removed, subsurface soils do not appear to be impacted above cPCLs. The subsurface soil PCLE Zone within the HWPW area appears to be only in the areas where the proposed engineered soil cap will be constructed. The proposed vapor barrier in the soil cap area will also address the <sup>Air</sup>Soil<sub>Inh-v</sub> PCLE Zone for naphthalene detected in the subsurface soils within and near SWMU 5.*

*Based on the current areas delineated, the estimated volume of soil to be consolidated is approximately 23,000 cubic yards. However, prior to consolidation of the soils and construction of the cap, additional soil samples will be collected to refine the surface soil PCLE Zone to ensure the proper area to be excavated and for the construction of the cap area (Attachment 2A-1a and 2A-1b of the RAP (CP Attachment XI.D)). The additional soil sampling will be conducted to also evaluate the representative concentrations of COCs in surface soil using statistics assuming a 1/2-acre default area for the current surface soil PCLE Zone near the Inactive Waste Water Lagoon (AOC 6) and the southern end of the*

*SDD (SWMU 2) in accordance with 30 TAC §350.51(l). The proposed additional sampling was developed based on at least eight surface soil samples collected within a 1/2-acre exposure area. The 95 percent upper confidence limit (UCL) of the arithmetic mean for each 1/2-acre study area will be calculated using PRO UCL and the Student's t-statistic. Soil data sets will be evaluated for outliers to identify hot spots for excavation. The primary COC in this area defining the PCLE Zone is benzo(a)pyrene, which has a critical PCL for the <sup>Tot</sup>Soil<sub>Comb</sub> pathway.*

*In addition, underground tanks listed as SWMU 11 (Oil/Water Separators) will be removed, properly disposed of, and the excavation backfilled with clean soil.*

- ***Englewood Intermodal Yard area:** The surface and subsurface soil PCLE zone in the Intermodal Yard area is currently covered with a physical barrier (concrete pavement), preventing contact with impacted soils for on-site workers. As part of the post-response action care, the concrete pavement in the area of the surface soil PCLE Zone will be routinely inspected to ensure on-site worker protection. Attachment 2A-1a shows the Surface Soil Affected Property and its location beneath the concrete parking lot on the Site. In addition, storm drains within the proposed response action area will be inspected and sediment in the drains if present will be sampled to evaluate if COCs from surface soils have migrated into the storm water drainage system.*
- ***UPRR Main Lines Ballast Area:** The area between the former HWPW area and the Englewood Intermodal Yard (approximately 100 feet width) is covered with railroad ballast, ties, and rail. UPRR proposes to use the existing railroad ballast as an engineering control for preventing on-site worker exposure to impacted surface soils in this area. The railroad ballast area will be maintained as part of normal railroad operations. The track is owned and controlled by UPRR. In the event construction activities are necessary within the railroad ballast area, a health and safety plan will be implemented to ensure worker protection from COCs in the surface soils and a soil management plan will be developed if soils are excavated as part of the construction activities.*

*The Affected Property (including the entire HWPW and Englewood Intermodal Yard Area) will also be deed restricted for commercial-industrial land use and for the use of a physical controls on surface and subsurface soil in accordance with §350.31(g). Institutional controls will also be used to prevent exposure to the COCs in the surface and subsurface soils. Deed restriction of the Site to commercial-industrial use will limit future use and document the use of the physical barrier for surface soils. The PCLE zones for surface and subsurface soils are in an area with restricted property access.*

### Groundwater

*The response action design for the groundwater PCLE Zones will be to implement the modified Remedy Standard B groundwater response action through use of two approaches:*

1. *A PMZ for the groundwater PCLE Zones in the A-TZ, B-CZ, B-TZ, and C-TZ (discussed in Worksheet 2.1 of the RAP (CP Attachment XI.D));*
2. *Where creosote DNAPL has been observed in soil boring logs and/or monitoring wells, a TI Zone is proposed for those GWBUs A-TZ, B-CZ, B-TZ, and C-TZ (discussed in Worksheet 2.3 of the RAP (CP Attachment XI.D))*

*For the PMZ, MNA will be used for the physical control mechanism, which has shown to be a control for migration of the COC groundwater plumes. An evaluation of historical groundwater monitoring data and data trends for the Site indicates that natural attenuation of COCs in*

groundwater is occurring (Attachments IA (evaluation of recent groundwater data) and 1B (concentration versus time graphs) of the RAP (CP Attachment XI.D)). Site-specific COCs will be monitored to ensure the levels of these constituents remain stable and below cPCLs at the point of exposure (POE) wells as well as below the attenuation action levels (AAL) at the attenuation monitoring points (AMP) (Attachment 2A-2 of the RAP (CP Attachment XI.D)). MNA will be used to confirm the continued attenuation of COCs to concentrations below cPCLs throughout the PCLE zone; however, this will not likely be achieved in a reasonable timeframe given the nature of the creosote DNAPL. Groundwater monitoring will be performed on a semi-annual basis. For the purposes of this RAP submittal, there will be two overall PMZ areas:

1. **On-Site PMZ** – The on-site PMZ will include the cumulative groundwater PCLE Zone (A-TZ, B-CZ/B-TZ, and C-TZ PCLE Zones) within the UPRR-owned property and adjacent City of Houston ROW.
2. **Off-Site PMZ** – The off-site PMZ includes the cumulative groundwater PCLE Zone that extends off-site to the north of the Site. The proposed off-site PMZ will require institutional controls for up to 101 individual properties. Given the large number of off-site properties, and issues with property ownership in the area, the proposed timeframe to acquire the necessary landowner consent for the PMZ will be two years following approval of the RAP.

The on-site PMZ (including the former HWPW, Englewood Intermodal Yard areas, and adjacent City of Houston ROW) will be deed restricted to commercial-industrial land use and to restrict future use of groundwater on-site, as well as restrictions on soil excavation activities within the surface soil PCLE Zone on the UPRR-owned property. For the off-site PMZ, UPRR is currently acquiring the necessary landowner consent to establish the PMZ on properties not owned by UPRR. UPRR has proposed to file restrictive covenants with the Harris County Clerk for the off-site properties (101 off-site properties) within the proposed cumulative PMZ area (includes the three individual PMZs for the A-TZ, B-CZ/B-TZ, and C-TZ PCLE Zones) (Attachment 2A-2 of the RAP (CP Attachment XI.D)).

To address the NAPL, the NAPL response action objectives and endpoints using TCEQ Guidance TRRP-32 (Risk-Based NAPL Management) will be addressed through control via TI. For areas where either creosote NAPL was noted in the soil boring log in the saturated zone or is detected in monitoring wells, the TI demonstration details the difficulty of achieving groundwater PCLs within a reasonable timeframe in these areas because of complex hydrogeology and physical nature of creosote (discussed in Worksheet 2.3 of the RAP (CP Attachment XI.D)). The control endpoint will be to control the soluble NAPL fraction sufficient to create stable or shrinking PCLE zones. Methods to control the creosote DNAPL will include physical (recover readily recoverable creosote DNAPL from monitoring wells with DNAPL present) or natural means at the NAPL source zone so that the dissolved-phase groundwater PCLE zone is stable (or shrinking) and the PCLE performance objectives for the TI-based “no growth” PMZ can be met. UPRR is currently conducting a DNAPL Recovery Pilot Test to evaluate the recoverability of the DNAPL at the Site. The pilot test consists of monthly pumping events from wells with DNAPL. The pilot test will conclude following the January 2015 recovery event. At that time, a DNAPL recoverability evaluation will be completed and submitted to the TCEQ.

Institutional controls as detailed in §350.31(g) through deed recordation (UPRR-owned property) and restrictive covenants (off-site properties) within the PMZ and TI Zone and restricting the use of groundwater will be used at the Site to prevent future exposure risk until groundwater concentrations achieve critical PCLs.

3. Groundwater Monitoring and Corrective Action Program Description

- a. Describe the proposed groundwater monitoring system to be used to monitor corrective action and compliance with the GWPS which includes the following information.

- (1) Changes, if applicable, from the current groundwater monitoring program at the waste management unit that will be required to comply with the corrective action monitoring program described in 30 TAC 335.166. This description should address changes concerning:

- (a) Geological and/or hydrogeological information differences since the submittal of the previous application [must submit a Geologic and Hydrogeologic Report in accordance with Section XI.A.4;

***See Permit Section VI. Geology Report and CP Attachment XI.D – Response Action Plan – Attachment IA for additional geologic and hydrogeologic information since previous permit application.***

- (b) Waste management areas/units;

***Groundwater monitoring and corrective action program was designed for the facility-wide corrective action as detailed in the RAP (CP Attachment XI.D).***

- (c) Construction details for monitor wells to evaluate compliance with “Attachment B” well specification requirements;

***See CP Attachment XI.C (Sampling and Analysis Plan).***

- (d) The number and locations of additional monitor wells [must submit the Monitoring System Plan/Report required by Section XI.D.3.c.(2);

***See RAP, Worksheet 3.1 (CP Attachment XI.D) and Compliance Plan Table V (Designation of Wells by Function) and associated sheets.***

- (e) Sample handling, chain of custody, and analytical procedures (also see “Attachment C”);

***See CP Attachment XI.C (Sampling and Analysis Plan).***

- (f) Frequency of monitoring;

***The parameters listed in Compliance Plan Table IIIA (Table of Indicator Parameters and the Groundwater Protection Standard) will be monitored semiannually.***

- (g) Monitoring parameters;

***See RAP, Worksheet 3.1 and CP Attachment XI.C (Sampling and Analysis Plan). The parameters listed in Compliance Plan Tables IIIA (Table of Indicator Parameters and the Groundwater Protection Standard) will be monitored semiannually.***

- (h) Evaluation of compliance with GWPS (statistical methods);

***See RAP, Appendix 7 Statistical Methodology (CP Attachment XI.D).***

- (i) Other Sampling and Analysis Plan information to be in compliant with “Attachment C”;

***See CP Attachment XI.C (Sampling and Analysis Plan).***

- (j) Compliance period as defined in Section XI.E.1.c. of the application;
- (k) Financial assurance; and

***See Section XI.E (Cost Estimates for Financial Assurance).***

- (l) An ACL variance under 30 TAC 335.160(b), if applicable (also see “Attachment A”).

***See Section XI Attachment A (Alternate Concentration Levels).***

- (2) The number, depth and location of all monitor wells (Background Wells, Point of Compliance Wells, Corrective Action Observation Wells, Supplemental Wells, piezometers, etc.) and all Recovery Wells and complete CP Table V – Designation of Wells by Function. Also, make revisions as applicable to plans referenced in Section XI.D.3.c.

***See Compliance Plan Table V (Designation of Wells by Function) and associated sheets.***

- (3) The proposed hazardous constituent monitoring list which is based on constituents that were monitored during detection monitoring (if applicable), constituents detected in accordance with 30 TAC 335.164, and degradational constituents identified in CP Table III accordingly to develop the constituent list for the Corrective Action Monitoring Program. CP Table III shall become part of the final Compliance Plan.

***See Compliance Plan Table III (Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard).***

- (4) The proposed indicator parameter monitoring list. From the list of constituents and GWPS identified in CP Table III complete CP Table IIIA – Corrective Action Program Table of Indicator Parameters and the Groundwater Protection Standard, accordingly. CP Table IIIA shall become part of the Compliance Plan to be analyzed at least semiannually as required by 30 TAC 335.166(7).

***See Compliance Plan Table IIIA (Table of Indicator Parameters and the Groundwater Protection Standard).***

- (5) Monitoring frequency.

***The parameters listed in Compliance Plan Table IIIA (Table of Indicator Parameters and the Groundwater Protection Standard) will be monitored semiannually.***

- (6) Provisions for semiannual reporting of groundwater data.

***As detailed in the RAP (CP Attachment XI.D), the parameters listed in Compliance Plan Tables III (Table of Detected Hazardous and Solid Waste Constituents and the Groundwater***



**Protection Standard) or Table IIIA (Table of Indicator Parameters and the Groundwater Protection Standard) will be reported annually in Response Action Effectiveness Report (RAER) .**

- (7) Annual determination of contamination plume rate and direction of migration.

**As will be presented in the annual RAER, contaminant plume rate and direction of migration will be determined at a minimum annually and will be discussed in the annual reports for groundwater data.**

- (8) Compliance period. Calculate the compliance period as required by 30 TAC 335.162 and 335.165(1)(d). Include calculations and complete CP Table VI – Compliance Period for RCRA-Regulated Units which shall become part of the final Compliance Plan.

**The only Regulated Unit, SWMU 1, has achieved Remedy Standard A RAOs; therefore, as detailed in Section VII and the RAP, UPRR is requesting No Further Action and ceasing the post-closure care for the clean closed unit in accordance with 40 CFR 264.117.**

- b. Proposed methods of evaluating the effectiveness of the corrective action in the saturated and vadose zone.

**The effectiveness of the corrective action in the saturated zone will ultimately be evaluated by compliance with the TRRP-based GWPS at the alternate POE wells as part of the “no growth” PMZ and TI Zone. The GWPS and PCLs are listed in Compliance Plan Tables III (Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard) or Table IIIA (Table of Indicator Parameters and the Groundwater Protection Standard).**

- c. Submit the following plans and reports.

- (1) Current Sampling and Analysis Plan - The Sampling and Analysis Plan must include information required by 30 TAC 335.163(4) and 335.163(5) and 40 CFR Subpart 270.30(j). For guidance, please see “Attachment C” to the application.

**See CP Attachment XI.C (Sampling and Analysis Plan).**

- (2) Groundwater Recovery and Monitoring System Plan - At a minimum, the plan must include:

- (a) Recovery System Plan - The applicant should propose a recovery system design that will achieve the performance requirement to protect human health and the environment. The plan should provide detailed plans, information and specifications on the recovery system’s design and well installation specifications. All new recovery wells must be installed in accordance with applicable specifications outlined in “Attachment B”, unless an alternative well design is approved by the agency prior to installation of the well. The Recovery System Plan must include Recovery System Design and Specifications - Certified by a Texas Registered Professional Engineer. The certification must be sealed by a licensed Professional Engineer, with current license, along with the Registered Engineering Firm’s name and Registration Number as required by the Texas Engineering Practice Act.;

***Not Applicable***

(b) Monitoring System Plan - If the applicant is proposing a monitoring well or a monitoring system in the application, the applicable well installation specifications outlined in “Attachment B” of this application should be followed. All new monitoring wells must be installed in accordance with the specifications outlined in “Attachment B”, unless an alternative design is approved by the agency prior to installation. If the applicant proposes as part of the monitoring system, any well (existing or proposed) that does not meet or exceed the requirements outlined in “Attachment B”, then the proposed alternative design must be described in detail in the Monitoring System Plan and must be submitted with this application. The Monitoring System Plan must include:

- i. Monitoring System Design and Specifications - Certified by a qualified engineer and/or geologist which provides detailed plans and specifications on the monitoring system design; and
- ii. Well Drilling and Well Casing Specifications - Certified by a qualified engineer and/or geologist which provides details on well casing specification, drilling logs and reports.

***See CP Attachment XI.C (Sampling and Analysis Plan).***

(3) Current Geologic and Hydrogeologic Report - Provide a report per Section XI.A.4 of this application discussing the geologic and hydrogeologic conditions of the facility and the specific area affected by the waste management areas. This report should include the most up-to-date information from which the design of the groundwater monitoring system was based.

***See CP Attachment XI.D – Response Action Plan – Attachment IA for up-to-date geologic and hydrogeologic information used to develop the groundwater monitoring system.***

4. Waste Management Units/Areas Monitored Under Corrective Action Programs

a. Delineate and identify the following for each waste management unit/area in the proposed groundwater monitoring and corrective action programs.

(1) Boundary of the waste management unit and, if applicable, the proposed waste management area which includes more than one waste management unit (identify all waste management units which are included in the waste management area). These waste management units/areas subject to corrective action pursuant to 30 TAC 335.166 and 335.167 should be listed in CP Table I – Waste Management Units and Areas Subject to Groundwater Corrective Action and Compliance Monitoring. CP Table I shall become part of the final Compliance Plan.

***The corrective action program covers a facility-wide approach with the soil Affected Property or the PCLE zone defining the Area of Contamination and the PCLE Zones defining the areas subject to corrective actions.***

(2) The proposed point of compliance (30 TAC 335.161), point of exposure wells, or alternate point of exposure wells.

***See Compliance Plan Table V (Designation of Wells by Function) and associated sheets and***

**RAP, Worksheet 3.1 (CP Attachment XI.D).**

- (3) Any proposed monitor wells such as supplemental wells, observation wells, background wells, etc. If appropriate the groundwater monitoring system should have a sufficient number of wells to monitor the downgradient extent of the plume.

***Depending on the GWBU, additional POE wells are proposed. See Compliance Plan Table V (Designation of Wells by Function) and associated sheets and RAP (CP Attachment XI.D).***

- (4) Features which may serve as conduits for subsurface contamination.

***As discussed in the RAP, Worksheet 2.1 (A-TZ) (see CP Attachment XI.D), an on-site field survey and water-well data search was conducted, indicating no potential artificial penetrations that would act as a conduit for migration of shallow groundwater into the underlying groundwater formation. However, as discussed in the APAR Addendum (PBW, 2009), two sets of fiber optic lines, Level 3 Communications and Qwest, run along the north side of the rail main lines across the entire length of the Site (Attachment 1A, Figure 5A-1). Based on conversations with both Level 3 Communications and Qwest representatives, the fiber lines run underneath SWMUs 2, 5, 4, 8, and 10/11. The fiber lines run directly underneath the drainage ditch southwest of the Site and under the southern drainage ditch (SDD) about 3 to 5 feet bgs. The Level 3 Communications line reportedly was directionally bored to a depth of 40 to 45 feet bgs underneath the Original and Recent Process Areas (SWMU Nos. 5 and 4, respectively) and under the aboveground storage tank (AST) Area (SWMU No. 8). The Qwest fiber line reportedly runs 10 to 15 feet northwest and parallel of the main rail line, and is about 5 to 10 feet bgs through the Site. Just east of SWMU No. 8, the both fiber lines return to approximately 4 to 6 feet below grade and continue running northeast parallel to the rail main line. The Level 3 Communications line may act as an artificial penetration since the reported depths of the line go through both the A-TZ and into the B-CZ immediately below the primary source areas.***

***In addition to the fiber lines, three City of Houston utilities were identified in the previous APAR (PBW, 2009) that cut across the Site oriented north-south just west of the Lockwood Street Bridge: 1) 60-in wastewater line, 2) 84-in water line, and 3) a 42-in storm sewer line (PBW, 2009). Through a review of the utility drawing files obtained from the City of Houston Public Works Survey Department, two of the underground utility lines (the 60-in sanitary sewer line and the 84-in water line) appear to be at depths that potentially intersect the uppermost GWBU A-TZ. The estimated depths of the utilities based on the city drawings are shown on the Geologic Cross Sections A-A', B-B', and C-C' (CP Attachment XI.D, RAP, Attachment 1A, Figure 4C-1). The estimated base depth of the 60-in wastewater line and the 84-in water line where Cross Section B-B' crosses the utility lines is approximately 23 feet bgs (approximate elevation of 26 feet HVD). It is highly unlikely that A-TZ groundwater is seeping into the 84-in water line, given the line is under pressure (flow is south to north), constructed with welded steel pipe, and is relatively new (constructed in 2000). Sampling of the 60-in sanitary sewer line was conducted in 2010. Of the three samples collected in 2010, the only sample with concentrations greater than PCLs was the upgradient sample SSW1 that had a detection of bis(2-ethylhexyl)phthalate (0.0092 mg/L) above the <sup>GW</sup>GW<sub>ing</sub> PCL of 0.006 mg/L; however, bis(2-ethylhexyl)phthalate is a common laboratory contaminant (as cited in 30 TAC§350.71(k)(2)(B)). The sanitary sewer sample analytical results suggest that there is not a significant mass loading of COCs from groundwater into the sanitary sewer.***

- (5) Corrective action system.

**See RAP, Worksheet 2.0 (CP Attachment XI.D).**

- b. For each waste management unit/area in the proposed groundwater monitoring system, submit the locations of individual waste management unit/area monitor wells (existing or proposed) and any soil borings (plugged and unplugged) specifically drilled for assessment of contamination. These individual monitor wells shall be identified by respective well number on a plan view drawing and only the background, point of compliance, point of exposure wells and/or alternate point of exposure wells should be indicated in CP Table V – Designation of Wells by Function. The plan view map depicting the location of individual monitoring wells for corrective action monitoring should be labeled as “CP Attachment A, sheet xx of xx” in the text box. The title box should also include reference to the facility name, Permit/Compliance Plan Number, Solid Waste Registration Number, Unit Description or name with Notice of Registration (NoR) Unit No. 0000. The “CP Attachment A” map(s) and CP Table V shall also become part of the final Permit/Compliance Plan.

**See Compliance Plan Table V (Designation of Wells by Function) and associated sheets.**

5. Waste Management Units/Areas Addressed Under Other Corrective Action Programs -Facility Operations Area (FOA), specific to the requirements of 30 TAC 350.131 - 350.135. The Permittee should also complete Sections XI.D.4. for other units not addressed by the FOA that may require corrective action outside the FOA boundary. For other units not addressed by the FOA, either within the FOA or outside the FOA which may require compliance monitoring, the Permittee should complete Section XI.C. of this application accordingly.

**Not Applicable**

- a. Provide an approved version of the FOA Qualifying Criteria Checklist and evidence that Steps 1 through 3 of the FOA pre-approval process has been approved by the Commission.
- b. Provide a discussion on exceptions to the TRRP rule requested.
- c. Provide a summary of the SWMUs/AOCs that will be addressed within the FOA boundary and a discussion of the multiple sources of COCs present and how FOA will better address these sources.
- d. Provide maps of appropriate scale depicting the following (maps may be combined where appropriate):
- (1) The number, location and type of monitoring points in each stratigraphic unit to be monitored individual monitoring wells should be identified by respective well number on a plan view drawing, to include the background, Point of Compliance (POC), Point of Exposure (POE), FOA Boundary of Compliance wells, FOA piezometers or supplemental wells, Corrective Action Observation ((CAO), Corrective Action System (CAS) wells that are applicable for FOA monitoring program should be labeled as “CP Attachment A, sheet no xx of xx” in the title box. The title box should also include reference to the facility name, Permit/Compliance Plan Number (00000), TCEQ Solid Waste Registration Number and Unit Description or Name. The “CP Attachment A” map(s) shall become part of the final Permit/Compliance Plan.
  - (2) HWMUs/SWMUs/AOCs addressed
  - (3) Surrounding land use
  - (4) FOA lateral boundaries
  - (5) Potential source areas

- (6) Potentiometric surface of all relevant transmissive units
  - (7) Surrounding water wells
  - (8) Extent of known contamination in each transmissive unit
  - (9) Areas of potential ecological impact
  - (10) Known occurrences of NAPL or DNAPL in each transmissive units
  - (11) FOA access control components
- e. Provide cross-sections in accordance with Section XI.A.4. depicting the following (maps may be combined where appropriate);
- (1) The vertical boundaries of the FOA;
  - (2) The vertical extent of contamination;
  - (3) Groundwater level elevations for each transmissive unit.
- f. Provide tabulated information for;
- (1) Results of Appendix IX GW sampling.
  - (2) Proposed PCLs for each hazardous constituent and principal degradational constituent for each monitoring point with supporting documentation (including a discussion of exposure pathways) should be listed in CP Table III – CORRECTIVE ACTION PROGRAM Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard. CP Table III shall become part of the final Compliance Plan.
  - (3) The proposed indicator parameter monitoring list. From the list of constituents and GWPS identified in CP Table IIIA. CP Table IIIA shall become part of the Compliance Plan to be analyzed at least semiannually as required by 30 TAC 335.166(7).
  - (4) Only the background, POC, POE, FOA Boundary of Compliance wells should be listed in CP Table V which shall become part of the final Permit/Compliance Plan.
- g. Provide a discussion of the types of corrective action that will be employed to address contaminated media.
- h. Provide detailed descriptions of GW recovery and other remedial technologies such as vapor extraction, interceptor trenches, hydraulic containment, barrier walls, etc., including radius of influence, estimated optimum recovery rates, location of collection, storage or disposal facilities.
- i. Provide a detailed description of the ground water monitoring system including placement of monitoring wells, hydrogeologic characteristics of monitored units and well completion details.
- j. Provide a Sampling and Analysis plan for the proposed FOA that includes development of COCs to be monitored, sampling methodology, sample handling procedures, sampling frequency and statistical procedures for evaluating analytical results (Appendix C).
- k. Propose a methodology for evaluating the effectiveness of remedial measures and potential remedial system enhancements.
- l. Propose a reporting schedule to provide updated information on the installation and operation of remedial and monitoring systems.
- m. Provide Financial Assurance in accordance with Section XI.E.
- n. Provide draft language intended to comply with the deed notification requirements of 30 TAC 350.111 and 350.135(a)(11).
- o. Provide a summary of the approved workers protection plan.
- p. Provide a discussion of areas of ecological impact, if any, and development of associated Protective Concentration Limits (PCLs).
- q. Provide a discussion of how NAPL occurrences, if any, will be addressed inside and outside the FOA.

- r. Provide a schedule of implementation for items not completed at the time of application See also Section XI.D.8.
6. Waste Management Units/Areas Monitored Under Corrective Action Programs - Plume Management Zone (PMZ)
- a. Please provide a summary of the HWMUs and SWMUs/AOCs that will be addressed within the PMZ boundary.

*See RAP in CP Attachment XI.D, and see response to XI.6.b below.*

- b. Please provide a discussion of the multiple sources of COCs present and how PMZ will better address these sources.

*See RAP in CP Attachment XI.D. The Site has been used for creosoting operations since 1899 with numerous operations at the Site over that time period. Historical material and waste handling practices have resulted in releases to soil and groundwater. These releases have resulted in commingled creosote-derived COC PCLE zones and creosote non-aqueous phase liquid (NAPL) that are not attributable to specific waste management units or areas of concern. In order to effectively manage the corrective action process at the UPRR HWPW Facility, a comprehensive site-wide approach to corrective action is proposed. The cumulative PMZ will encompass all of the SWMUs and AOCs, except for AOC 6. AOC 6 will be closed and No Further Action requested following soil excavation (under the Area of Contamination approach).*

- c. Please provide maps of appropriate scale depicting the following (maps may be combined where appropriate);
- (1) HWMUs/SWMUs/AOCs addressed

*See Figure XI.A.2 – Locations of Former Waste Management Units.*

- (2) surrounding land use

*See Figure XI.A.1a - Facility Site Map.*

- (3) PMZ lateral boundaries

*See CP Table V Sheets 1 through 3.*

- (4) potential source areas

*See RAP in CP Attachment XI.D, Attachment 1A (Figure 1A) and Figure XI.A.2.*

- (5) Potentiometric surface of all relevant transmissive units

*See RAP in CP Attachment XI.D, Attachment 1A (Figures 5A-1 through 5A-4)), and Permit Section VI. Geology Report – Figures VI.J.1 through VI.J.4.*

- (6) Surrounding water wells

*See Permit Section VI. Geology Report – Figure VI.H*

(7) extent of known contamination in each transmissive unit

**See RAP in CP Attachment XI.D, Attachment 1A (Figures 5B-1 through 5B-22))**

(8) number, location and type of monitoring points in each stratigraphic unit to be monitored

**See RAP in CP Attachment XI.D, Worksheet 3.0 and Attachment 3A**

(9) Areas of potential ecological impact

**None, no potential ecological impacts as discussed in the APAR (PBW, 2009).**

(10) known occurrences of LNAPL or DNAPL in each transmissive unit

**See RAP in CP Attachment XI.D, Attachment 1A (Figures 5A-5 through 5A-7))**

d. Please provide sufficient cross-sections depicting the following (maps may be combined where appropriate);

- (1) The vertical boundaries of the PMZ;
- (2) The vertical extent of contamination;
- (3) potentiometric surfaces for each transmissive unit.

**See RAP in CP Attachment XI.D, Attachment 1A (Figures 4C-1 through 4C-5)), and Permit Section VI. Geology Report – Figures VI.E.1 through VI.E.5.**

e. Please provide tabulated information for;

- (1) history of all relevant units or AOCs;

**See CP Table XI.A.1. – Facility History for Waste Management Units.**

- (2) summary of hydrogeologic data for each affected transmissive unit;

**See RAP in CP Attachment XI.D, Attachment 1A and Permit Section VI. Geology Report**

- (3) results of Appendix IX GW sampling;

**Appendix IX Groundwater sampling results are not available. The list of potential contaminants of concern was established in the RCRA Facility Investigation (RFI) Work Plan dated October 1994. The list of chemicals of concern (COCs) for the Site were developed by reviewing current and historical process operations, a list of standard chemicals associated with creosote operations, and groundwater monitoring results.**

- (4) proposed PCLs for each constituent for each monitoring point (Point of Exposure wells, alternate point of exposure wells, etc) with supporting documentation (including a discussion of exposure pathways). This should also include the designation/establishment of sufficient number of Attenuation Monitoring Points (AMPs) beginning at an appropriate hydraulically upgradient location within the groundwater protective concentration level exceedence (PLCE) zone and continuing down the approximate central flow path of the constituent of concern (COC) in the downgradient extent of the Plume Management Zone(s) in accordance with 30 TAC 350.33(f)(4)(D).

***Details of the proposed PCLs and attenuation action levels (AALs) for the AMPs are provided in the RAP (CP Attachment XI.D). Also see Compliance Plan Table III (Table of Detection Hazardous and Solid Waste Constituents and the Groundwater Protection Standard) for list of PCLs for the alternate POE wells. See Compliance Plan Table IIIA (Corrective Action Program Table of Indicator Parameters and Groundwater Protection Standard) and associated footnotes.***

- (5) Establish/Calculate Attenuation Action Levels (AALs) (critical PCLs) for each attenuation monitoring point in accordance with 30 TAC 350.33(f)(4)(D)(ii). The established AALs (critical PCLs) for each AMP well should be graphically presented in table format on the plan view map depicting the location of individual monitoring wells (including AMP wells) for corrective action monitoring labeled “CP Attachment A, Sheet xx of xx”, referenced in XI.D.4.b.

***Details of the proposed AALs for the AMPs are provided in the RAP (CP Attachment XI.D).***

- f. Please provide a discussion of the types of corrective action that will be employed to address contaminated media.

***See RAP in CP Attachment XI.D, Executive Summary :***

***The objective of the RAP is to develop responses to protect current and future pathways from exposure to the PCLE Zones in surface soil, subsurface soil, and groundwater. The following response actions are proposed at the Site to achieve this objective:***

- ***Surface/subsurface soil – The surface/subsurface soil PCLE Zones at the Site will be addressed as follows:***
  1. ***Former HWPW Area: Remedy Standard B closure through consolidating impacted soils within the Area of Contamination (AOC) and implementing Physical Control through an engineered soil cap. Periodic inspections and maintenance of the cap will be implemented;***
  2. ***Englewood Intermodal Yard: Remedy Standard B closure by implementing Physical Control using the existing concrete pavement as a cap. Periodic inspections and maintenance of the cap will be implemented; and***
  3. ***Railroad mainlines and siding tracks: The response action for the operational area between the Former HWPW area and the Englewood Intermodal Yard will be Remedy Standard B closure using the existing railroad ballast as a protective barrier.***
- ***Groundwater – Remedy Standard B closure using a Plume Management Zone (PMZ) with monitored natural attenuation (MNA) for control as the response action for the groundwater PCLE Zones within the Affected Property. For the purposes of this RAP submittal, there will be two PMZ areas:***
  1. ***On-Site PMZ – The on-site PMZ will include the cumulative groundwater PCLE Zone within the UPRR-owned property and adjacent City of Houston ROWs.***
  2. ***Off-Site PMZ – The off-site PMZ includes the cumulative groundwater PCLE Zone that extends off-site to the north of the Site. The proposed off-site PMZ will require institutional controls for up to 101 individual properties. The timeframe to acquire the necessary landowner consent for the PMZ will be two years.***



***In addition, areas where DNAPL was noted will be proposed for control under a Technical Impracticability (TI) Demonstration per 30 TAC §350.33(f). Groundwater monitoring is proposed to be performed as part of the PMZ to confirm that the lateral extent of COC concentrations greater than their respective cPCLs continue to remain within the boundaries of the PMZ. Groundwater monitoring will be initiated for both the on-site PMZ and off-site PMZ following approval of the RAP. During the acquisition of landowner consent for the off-site PMZ, groundwater monitoring will be conducted concurrently with the on-site PMZ monitoring requirements. DNAPL will be recovered from monitoring wells on a periodic basis through pumping to recover the readily recoverable NAPL for the GWBUs to satisfy requirements of the “no growth” PMZ and TI Zone.***

- g. Please provide detailed descriptions of GW recovery and other remedial technologies such as vapor extraction, interceptor trenches, hydraulic containment, barrier walls, etc., including radius of influence, estimated optimum recovery rates, location of collection, storage or disposal facilities.

***As discussed in the RAP, Worksheet 2.0 (CP Attachment XI.D), UPRR initiated a 24-month pilot study in February 2013 to evaluate DNAPL recovery at the Site by conducting tests on selected wells where DNAPL had been observed. Details of the scope of work for the pilot test were submitted to the TCEQ in a letter dated February 5, 2013 (PBW, 2013). The pilot test procedures consists of measuring the depth to groundwater surface, the depth to the groundwater/DNAPL interface, and the total depth of the well relative to the top of well casing prior to DNAPL recovery. Using a peristaltic pump, DNAPL is pumped from the bottom of the monitoring well until groundwater is returned in the pump discharge. The volume of recovered DNAPL is estimated from each well, and the well is gauged to measure the total depth of the well and depth to residual DNAPL following pumping. Recovered DNAPL is temporarily stored at the Containment Storage Area. UPRR submitted to the TCEQ in a letter dated September 25, 2014 an update after the first 18 months of the pilot test. A copy of the letter is also provided in Appendix 3 of the RAP (CP Attachment XI.D). After the monthly DNAPL recovery pilot test has concluded following the January 2015 recovery event, UPRR will submit to the TCEQ the results of the 24-month pilot test. This submittal will also include an evaluation of other recovery alternatives, including continuing DNAPL recovery activities.***

- h. Please provide a detailed description of the groundwater monitoring system including placement of monitoring wells, hydrogeologic characteristics of monitored units and well completion details.

***See RAP in CP Attachment XI.D, Worksheet 3.1 and Attachment 3A***

- i. Please provide a Sampling and Analysis plan for the proposed PMZ that includes development of COCs to be monitored, sampling methodology, sample handling procedures, sampling frequency and statistical procedures for evaluating analytical results.

***See the Sampling and Analysis Plan (SAP) in CP Attachment XI.C, RAP in CP Attachment XI.D, Worksheet 3.1 and Attachment 3A, and Appendix 7 (Statistical Methodology).***

- j. Please propose a methodology for evaluating the effectiveness of remedial measures and

potential remedial system enhancements.

*See RAP in CP Attachment XI.D, Worksheet 3.0:*

#### Surface/Subsurface Soils

*The effectiveness of the response action for the impacted soils within the PCLE Zone to be excavated and relocated within the Area of Contamination will be demonstrated by confirmation sampling from the excavation that indicates COC concentrations in remaining soils are below critical PCLs (commercial/industrial <sup>Tot</sup>Soil<sub>Comb</sub>). During excavation activities, measures will be conducted to ensure migration of impacted soils do not leave the Area of Contamination (Soil Affected Property). These measures will include silt fencing, dust monitoring and control, and adequate storm water protection and management during the construction activities.*

*Performance measures for the capped area will include routine cap inspections to ensure that the cap has not been eroded and thereby exposing soils with COC concentrations greater than cPCLs. Vegetation on the cap will be maintained through a mowing program. Performance measures for the Englewood Intermodal Yard will include routine inspections of the concrete pavement to ensure cracks have not developed in the pavement. Cracks will be repaired in the pavement. The railroad ballast area will be maintained as part of normal railroad operations in the area. These operations will include track and tie maintenance, as well as maintenance of the ballast material for the functions of the rail lines. Inspections of the ballast will assess if areas of exposed soil are present within the soil PCLE Zone.*

*A cap inspection and maintenance program for both areas will be conducted to maintain the integrity of the cap and to ensure that it continues to meet its performance objectives. See RAP Worksheet 3.2. (CP Attachment XI.D).*

#### Groundwater

*Groundwater monitoring will be performed in conjunction with the PMZ (Standard B) response action proposed for the groundwater PCLE zone. Confirmation that the downgradient extent of the PCLE Zone does not expand outside the boundaries of the on-site and off-site PMZs will be provided by comparing concentrations of these COCs to the AALs or exceedance of a cPCL at a alternate POE well as specified in RAP Worksheet 2.1 (CP Attachment XI.D). In the event that a GWPS concentration in an alternate POE well is exceeded in an initial monitoring sample, a second confirmation sample will be collected within 60 days from the monitoring well where the initial unverified exceedance was observed and analyzed for the specific COC that exceeded its GWPS. If the COC concentration in the second sample is greater than the GWPS, a confirmed exceedance will be concluded and further action will be required, unless an alternate source demonstration can explain the detection. Possible further actions for the Site following a confirmed GWPS exceedance may include modifications to the monitoring frequency or monitoring locations (e.g., installation of additional monitoring locations), re-evaluation of concentration trends in existing monitoring wells, or evaluation of the COC data trends (see CP Attachment XI.D, Appendix 7 for Statistical Methodology). The TCEQ will be promptly notified of any verified exceedances at alternate POE wells.*

#### NAPL Recovery

*UPRR will be concluding the 24-month DNAPL Recovery Pilot Study in January 2015. At that time, a long-term recovery program may be initiated pending the results of the pilot test. The*

***preliminary results from the DNAPL recovery pilot test after the first 18 months (PBW, 2014) indicated the following:***

- ***Once per month DNAPL recovery activities are resulting in an overall stable DNAPL thickness trend in the wells tested. However, wells showing increasing trends will continue to be evaluated over the next six months of the pilot test program.***
- ***The current monthly recovery frequency appears to be effective with total DNAPL volume recovered becoming stable in the wells over time.***

***Performance measures for DNAPL recovery will be no significant DNAPL thickness increase in the monitoring wells pumped (compared to pre-test levels), and no migration of DNAPL to wells that had no previous indication of DNAPL present (in-well observations as well as NAPL noted in the boring log in the GWBU).***

- k. Please propose a reporting schedule to provide updated information on the installation and operation of remedial and monitoring systems.

***See RAP in CP Attachment XI.D, Worksheet 6.0.***

- l. Please provide a thorough detailed description of an estimate of all costs that will be incurred by implementing, operating, and maintaining the corrective action and monitoring systems addressed by the compliance plan.

***See Section XI.E (Cost Estimates for Financial Assurance).***

- m. Please provide draft language intended to comply with the deed notification requirements of 350.111, and schedule to verify compliance with institutional control requirements in accordance with 30 TAC 350.31(g) which provides notice of the existence and location of the PMZ and which prevents exposure to groundwater from this zone until such a time as constituents of concern may be reduced to below the GWPS.

***See RAP in CP Attachment XI.D Appendix 4.***

- n. Schedule for notification requirements if an unexpected event occurs, or a condition is detected, during post-response action care period which indicates that additional response actions will be required at an affected property pursuant to 30 TAC 350.33(k).
- o. Please provide a summary of the approved soil response action plan.

***The proposed soil response action plan has not been approved. Details of the soil response are provided in the RAP (CP Attachment XI.D).***

- p. Please provide a discussion of areas of ecological impact, if any, and development of associated PCLs.

***As discussed in the APAR Addendum (dated July 2009 (PBW, 2009)), no areas of ecological***

*impact were identified, except at AOC 6. To address the human health PCLE zone for surface soils in the area of AOC 6, the proposed response action will be soil removal, which is detailed in the RAP (CP Attachment XI.D). Through this action, the proposed remediation to address human health risk will coincidentally address ecological risk by eliminating the ecological exposure pathways. Therefore, to address the PCLE zone for surface soils in the drainage ditch and AOC 6, no additional ecological risk evaluation will be necessary under the reasoned justification clause (30 TAC §350.77).*

- q. Please provide a discussion of how NAPL occurrences, if any, will be addressed inside the PMZ.

*See RAP in CP Attachment XI.D, Worksheet 2.1:*

*To address the NAPL in the PMZs and TI Zone for the three GWBUs (A-TZ, B-CZ/B-TZ, and C-TZ), the NAPL response action objectives and endpoints using TCEQ Guidance TRRP-32 (Risk-Based NAPL Management) will be achieved through control via TI based on the occurrence of DNAPL in monitoring wells. For areas where either creosote NAPL was noted in the soil boring log in the saturated zone or is detected in monitoring wells, the TI demonstration (RAP Worksheet 2.3, CP Attachment XI.D) details the difficulty of achieving groundwater PCLs in these areas because of complex hydrogeology and physical nature of creosote. The control endpoint will be to control the soluble NAPL fraction sufficient to create stable or shrinking PCLE zones. Methods to control the creosote DNAPL will include physical (recover readily recoverable creosote DNAPL from monitoring wells with DNAPL present) or natural means at the NAPL source zone so that the dissolved-phase groundwater PCLE zone is stable (or shrinking) and the PCLE performance objectives for the TI-based “no growth” PMZ can be met, including no GWPS exceedances at the alternate POE wells.*

*Therefore, the current response objective per the TCEQ Guidance is to ensure compliance of NAPL zone in both the TI Zone through control and within the PMZ through recovery. Since both proposed boundaries are the same, readily recoverable NAPL will be recovered from wells in order to control potential migration from the TI Zone. Once the PMZs have been established, the response objectives will include compliance with PMZ performance criteria at the NAPL zone and control through institutional controls on groundwater use to protect exposure to residual NAPL in the GWBUs. As part of the evaluation for compliance with PMZ performance criteria, the on-going DNAPL Recovery Pilot Test will be used to assess if the DNAPL in the GWBUs is considered readily recoverable using the NAPL Management Tool A detailed in Appendix A of the TCEQ TRRP-32 Risk-Based NAPL Management guidance document (TCEQ, 2010). Following the pilot test that is scheduled to end after January 2015, the NAPL Management Tool A will be updated and submitted to the TCEQ.*

- r. Please provide a schedule of implementation for items not completed at the time of application {See also Section XI.D.8.}

*See RAP in CP Attachment XI.D, Worksheet 6.0 and Section XI.D.8.*

7. Waste Management Units/Areas Monitored Under Alternative Corrective Action Program for Commingled plumes Alternative groundwater Corrective Action Program apply, pursuant 30 TAC 335.151, 335.156 and 350, for commingled release from RCRA-regulated unit and from one or more SWMUs and/or AOC.

**Not Applicable**

- a. Complete Sections XI.D.1. through 4.;
  - b. In addition to the CP Attachment A maps in Section XI.D.4.b., CP Attachment A maps should clearly depict those waste management unit or areas of the facility which have commingled plumes and the alternative corrective action applies.
  - c. Please provide a schedule of implementation for items not completed at the time of application {See also Section XI.D.8.}
8. Implementation Schedule

Itemize and discuss, in detail, the estimated time schedule necessary for any testing and assessments, system design, construction and installation, and final implementation of the groundwater monitoring program for each Regulated Unit and solid waste management unit. If the schedule of implementation for items are not completed at the time of the application, or are not completed at the time of issuance of the final draft Compliance Plan, then the items should be added to the CP Table VIII - (Compliance Schedule) of the application.

*See Compliance Plan Table VIII (Compliance Schedule).*

**E. COST ESTIMATES FOR FINANCIAL ASSURANCE**

As required by 30 TAC 335.156 and 335.167, the applicant must provide cost estimates for groundwater monitoring and corrective action to determine the amount of financial assurance. Please complete the applicable parts of this form. Cost estimates should be filled out for each proposed corrective action/monitoring system at the site; or any additional corrective action system not covered in this Part. Please note, the Executive Director may request from the applicant documentary evidence for cost estimates.

If an item is not applicable, please mark it NA.

**General Information**

- 1. For each Waste Management Area (WMA) list the following:
  - a. A description of the waste management unit(s) in the WMA (e.g., landfill, surface impoundment, land treatment);  
  
*See Compliance Plan Table I Waste Management Units Subject to Groundwater Corrective Action and Compliance Monitoring. However, the Corrective Action will be conducted on a facility-wide approach, not WMA by WMA.*
  - b. The NoR unit number(s) in the WMA; and  
  
*See Compliance Plan Table I Waste Management Units Subject to Groundwater Corrective Action and Compliance Monitoring*
  - c. The compliance period for the WMA listed above: Year(s) = 30  
(The compliance period is the number of years equal to the active life of the waste management area as defined in 30 TAC 335.162).
  - d. In instances where the compliance period is equal to or exceeds 30 years, the maximum amount of financial assurance required will be based on 30 years because the required post-

closure care period to perform corrective action and groundwater monitoring is 30 years. In instances where the compliance period is less than 30 years, the financial assurance for corrective action or compliance monitoring will be based on the longest time frame established by one of the following criteria:

- (1) the duration of your compliance plan;
- (2) the time frame for clean-up based on model projections and historical data as approved by the Executive Director; or
- (3) the compliance period for the unit/area.

**TOTAL YEARS USED TO CALCULATE THE FINANCIAL ASSURANCE FOR THE  
CORRECTIVE ACTION AND/OR COMPLIANCE MONITORING PROGRAM**

**YEAR(S) = 30**

2. Please complete Table XI.E.1. – Corrective Action Program Cost Estimate.
3. Please complete Table XI.E.2. – Groundwater Monitoring Cost Estimate.
4. Please complete Table XI.E.3. – Financial Assurance Summary



**XI. COMPLIANCE PLAN**



**COMPLIANCE PLAN  
PART B PERMIT APPLICATION  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

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## LIST OF ATTACHMENTS

### Attachments

Attachment A	Alternate Concentration Levels
Attachment B	Well Design and Construction Specifications
Attachment C	Groundwater Sampling and Analysis Plan
Attachment D	Response Action Plan (Submitted in separate binders)

## **XI. COMPLIANCE PLAN**

As required under 30 TAC 335.167, all releases of hazardous constituents from any solid waste management unit at the facility must be addressed. The Response Action Plan (RAP), included as Attachment D, was developed in accordance with 30 TAC §350.94 to protect current and future pathways from exposure to the PCLE Zones in surface soil, subsurface soil, and groundwater.

## **TABLES**

**Table XI.A.1. - Facility History for Waste Management Units**

(Page 1 of 2)

Name of Waste Management Unit <sup>(1)</sup>	Type of Waste Management Unit	Notice of Registration Unit Number	Date Waste Was <i>First</i> Placed in Unit	EPA Waste Code	Estimated Capacity of Unit	Quantity of Waste Left in Place	Date Waste Was <i>Last</i> Placed in Unit <sup>(2)</sup>	Date of Unit Closure Or Projected Closure	Date Unit Certified Closed <sup>(3)</sup>	Is There Evidence of a Release of Hazardous Constituent(s) <sup>(4)</sup> to Groundwater? (Yes, No, or Unknown)
1. Surface Impoundment*	Surface Impoundment	001	1979	U051 U188	5065 yd <sup>3</sup>	0	8/31/1982	4/18/1984	4/18/1984	Yes
2. Tank Car	Storage Tank	002	Unknown	Unknown	12,500 gal	NA	Unknown	2004	Unknown	Unknown
3. Sub-surface tank	Storage Tank	003	Unknown	Unknown	12,500 gal	NA	Unknown	2004	Unknown	Unknown
4. Container Storage Area*	Container	004	8/8/1995	F034 K001	450 ft <sup>2</sup>	NA	Current	Unknown	Unknown	Unknown
5. Waste Pile	Waste pile	005	8/8/1995	Unknown	Unknown	NA	Current	Unknown	Unknown	Unknown
6. Misc Storage Container	Container	006	8/8/1995	Unknown	Unknown	NA	Current	2004	Unknown	Unknown
7. Northern and Southern Drainage Ditches		NA	Unknown	Unknown	Unknown	NA	Unknown	2004	Unknown	Unknown
8. Recent Process Area		NA	Between 1955-1962	Unknown	Unknown	NA	Mid- 1980s	2004	Unknown	Unknown
9. Original Process Area		NA	1911	Unknown	Unknown	NA	Between 1955-1962	2004	Unknown	Unknown
10. Water Treatment and Boiler System		NA	Unknown	Unknown	Unknown	NA	Unknown	2004	Unknown	Unknown
11. Aboveground Storage Tank	Storage Tank	NA	Unknown	Unknown	Unknown	NA	Unknown	2004	Unknown	Unknown
12. Location of Former UST no 44-023-05	Storage Tank	NA	Unknown	Unknown	2000 gal	NA	Unknown	June 1990	Unknown	Unknown

**Table XI.A.1. - Facility History for Waste Management Units**

(Page 2 of 2)

Name of Waste Management Unit <sup>(1)</sup>	Type of Waste Management Unit	Notice of Registration Unit Number	Date Waste Was <i>First</i> Placed in Unit	EPA Waste Code	Estimated Capacity of Unit	Quantity of Waste Left in Place	Date Waste Was <i>Last</i> Placed in Unit <sup>(2)</sup>	Date of Unit Closure Or Projected Closure	Date Unit Certified Closed <sup>(3)</sup>	Is There Evidence of a Release of Hazardous Constituent(s) <sup>(4)</sup> to Groundwater? (Yes, No, or Unknown)
13. Location of Former SAP Water Treatment Tank	Storage Tank	NA	Unknown	Unknown	Unknown	NA	Unknown	2004	Unknown	Unknown
14. Oil Water Separators		NA	Unknown	Unknown	Unknown	NA	Unknown	2004	Unknown	Unknown
15. Railroad Tie Storage Area		NA	1911	Unknown	Unknown	NA	Mid 1980s	2004	Unknown	Unknown
16. Diesel Storage Tank		NA	Unknown	Unknown	Unknown	NA	Unknown	Unknown	Unknown	Unknown
17. Contaminated Portion of City Water Line		NA	Mid 1980s	Unknown	Unknown	NA	Unknown	December 1980	Unknown	No
18. Location of Former Incinerator		NA	Unknown	Unknown	Unknown	NA	Dismantled Between 1955 and 1960	Between 1955 and 1960	Unknown	Unknown
19. City Storm Sewer		NA	1979	Unknown	Unknown	NA	1982	NA	Unknown	Unknown
20. Inactive Wastewater Lagoon		NA	Unknown	Unknown	Unknown	NA	Unknown	Unknown	Unknown	Unknown
21. Location of Former UST No. 44-023-21		NA	Unknown	Unknown	Unknown	NA	Unknown	1990	1990	No

1. Indicate by asterisk (\*) those waste management units that have received any hazardous waste constituent listed in Appendix VIII of 40 CFR Part 261.
2. For the purposes of this Compliance Plan Application, a waste management unit receiving hazardous waste after July 26, 1982 shall be considered a Regulated Unit. A waste management unit that ceased receiving hazardous waste on or before that date shall be considered a Solid Waste Management Unit (SWMU).
3. Date the applicant submitted certification of closure to the Commission.
4. Hazardous constituents are those hazardous constituents listed in Appendix IX of 40 CFR Part 264.

**TABLE XI.E.1 - CORRECTIVE ACTION PROGRAM COST ESTIMATE  
 HWPW - MONTHLY DNAPL RECOVERY AND CAP INSPECTIONS**

**1. Pumping Capacity Per Year:**

A. Daily average system pumping rate	_____ gal/day
B. Annual groundwater volume recovered ( <b>purge water plus recovered creosote DNAPL</b> )	_____ 300 gal/yr

**2. Off-Site Liquid Treatment / Disposal Cost:**

A. Volume of treated contaminated water to be disposed of off-site yearly	_____ 300 gal/yr
B. Transportation of liquid waste disposed of off-site yearly	
(1) Transportation cost per gallon	_____ \$/gal
(2) Gallons of contaminated water shipped per year	_____ gal/yr
(3) Annual cost of transportation (1 x 2)	_____ \$/yr
C. On-site yearly storage cost prior to off-site disposal	_____ \$/yr
D. Off-site yearly treatment cost of liquid waste	
(1) Treatment charge per gallon	_____ \$/gal
(2) Total volume to be treated per year	_____ gal/yr
(3) Annual treatment cost (1 x 2)	_____ \$/yr
E. Off-site disposal cost of liquid waste per year	
(1) Disposal charge per gallon	\$ 15.00 \$/gal
(2) Total volume to be disposed per year	_____ 300 gal/yr
(3) Annual disposal cost (1 x 2)	\$ 4,500 \$/yr

**\*Annual Off-Site Liquid Treatment / Disposal Cost (2B3 + 2C + 2D3 + 2E3)**

\$ 4,500 \$

**3. On-site Waste Water Treatment System Cost and On-site Treatment / Disposal Cost:**

Submit a cost estimate for a treatment system specifically designed and used exclusively for the groundwater corrective action program and operational after some start up maintenance. Estimates to clean out the system should also be included in the following cost.

A. Initial capital expenditure for treatment system including start up maintenance	_____ \$
--	----------

**\*On-Site Waste Water Treatment System Capital Cost (3A)**

\$ - \$

B. Gallons of contaminated water to be treated on-site per year	_____ gal/yr
C. Cost of on-site treatment per gallon	_____ \$/gal
D. Cost of sludge, or solids disposal per year	_____ \$/yr
E. Cost per year of maintenance on treatment system and recovery system, along with any additional equipment and repairs needed for the systems	_____ \$/yr
F. Cost of on-site disposal per year	_____ \$/yr

**\*Annual On-Site Treatment / Disposal Cost [(3B x 3C) + 3D + 3E + 3F]**

\$ - \$

**4. Inspections, Maintenance and Operation Cost for the Corrective Action Program: (Soil Cap, Concrete Cap, and Railroad Ballast Inspections)**

A. Operator's time on-site for inspections and maintenance per year	_____ 40 hour/yr
B. Charge of salary per hour	\$ 100.00 \$/hr
C. Annual cost of labor (4A x 4B)	\$ 4,000 \$/yr
D. Replacement of parts and equipment per year (includes mowing and fence repairs)	\$ 38,000 \$/yr
E. Electricity cost per year	_____ \$/yr

**\*Annual Inspections / Maintenance / Operation Cost for the Corrective Action Program (4C + 4D + 4E)**

\$ 42,000 \$

**TABLE XI.E.2. – GROUNDWATER MONITORING COST ESTIMATE**

1. Annual Sampling and Analysis Cost:

A. Background Wells

(1) Number of wells	_____	
(2) Sample analysis cost per well	_____	\$/well
(3) Number of sampling events per year	_____	/yr
(4) Sampling cost (1 x 2 x 3)	<u>      \$      -</u>	<u>      \$      </u>

B. Point of Compliance Wells

(1) Number of wells	_____	
(2) Sample analysis cost per well	_____	\$/well
(3) Number of sampling events per year	_____	/yr
(4) Sampling cost (1 x 2 x 3)	<u>      \$      -</u>	<u>      \$      </u>

C. Recovery Wells

(1) Number of wells	_____	
(2) Sample analysis cost per well	_____	\$/well
(3) Number of sampling events per year	_____	/yr
(4) Sampling cost (1 x 2 x 3)	<u>      \$      -</u>	<u>      \$      </u>

D. Corrective Action Observation Wells

(1) Number of wells	_____	11
(2) Sample analysis cost per well	<u>      \$ 250.00</u>	\$/well
(3) Number of sampling events per year	_____	2 /yr
(4) Sampling cost (1 x 2 x 3)	<u>      \$ 5,500</u>	<u>      \$      </u>

E. Point of Exposure Wells

(1) Number of wells	_____	44
(2) Sample analysis cost per well	<u>      \$ 250.00</u>	\$/well
(3) Number of sampling events per year	_____	2 /yr
(4) Sampling cost (1 x 2 x 3)	<u>      \$ 22,000</u>	<u>      \$      </u>

F. Supplemental Wells

(1) Number of wells	_____	6
(2) Sample analysis cost per well	<u>      \$ 250.00</u>	\$/well
(3) Number of sampling events per year	_____	2 /yr
(4) Sampling cost (1 x 2 x 3)	<u>      \$ 3,000</u>	<u>      \$      </u>



**TABLE XI.E.2. – GROUNDWATER MONITORING COST ESTIMATE**

G. Field Quality Control Sampling	
(1) Number of wells	_____
(2) Sample analysis cost per well	_____ \$/well
(3) Number of sampling events per year	_____ /yr
(4) Sampling cost (1 x 2 x 3)	<u>\$ - \$</u>
2. Sampling Labor Cost:	
A. Hours of sampling per well	_____ 2 hrs/well
B. Number of sampling technicians per well	_____ 1
C. Charge per hour	<u>\$ 95.00 \$/hr</u>
D. Total number of wells to be sampled annually	_____ Wells
E. Total number of wells sampled semi-annually	_____ 61 Wells
F. Total number of wells sampled quarterly	_____ Wells
G. Total number of wells sampled monthly	_____ Wells
H. Total number of wells sampled per year (2D) + (2E x 2) + (2F x 4) + (2G x 12)	_____ 122 r total wells sampled/y
I. Sampling Labor Cost (2A x 2B x 2C x 2H)	<u>\$ 23,180 \$</u>
<b>*Annual Groundwater Monitoring Cost</b>	<u>\$ 53,680 \$</u>
3. Well Installation (typical cost):	
A. Monitor well installation cost per well	<u>\$ 15,000 \$/well</u>
B. Number of monitor wells to be installed	_____ 5 Wells
C. Cost of monitor well system (A x B)	<u>\$ 75,000 \$</u>
D. Recovery well installation cost per well	_____ \$/well
E. Number of Recovery Wells to be installed	_____ Wells
F. Cost of Recovery well system (D x E)	<u>\$ - \$</u>
<b>*Total Well Installation Cost (3C + 3F)</b>	<u>\$ 75,000 \$</u>
4. Administrative Cost:	
A. Annual cost for record-keeping and report preparation	<u>\$ 10,000 \$</u>
<b>*Annual Administrative Cost (4A)</b>	<u>\$ 10,000 \$</u>
5. Inspection and Maintenance Cost for the Monitoring Program:	
A. Operator’s time (hours) on-site for inspections and maintenance per year	_____ 16 hour/yr
B. Charge or salary per hour	<u>\$ 95.00 \$/hr</u>
C. Annual cost of labor (5A x 4B)	<u>\$ 1,520 \$/yr</u>
D. Replacement of parts and equipment per year	_____ \$/yr
<b>*Annual Inspections / Maintenance Cost for the Groundwater Monitoring Program (5C + 5D)</b>	<u>\$ 1,520 \$</u>

**TABLE XI.E.3. – FINANCIAL ASSURANCE SUMMARY**

Annual Off-Site Liquid Treatment / Disposal Cost	<u>\$ 4,500</u>
Annual On-Site Treatment / Disposal Cost	
Annual Inspection / Maintenance / Operation Cost For The Corrective Action Program	<u>\$ 42,000</u>
Annual Groundwater Monitoring Cost	<u>\$ 53,680</u>
Annual Administrative Cost	<u>\$ 10,000</u>
Annual Inspection And Maintenance Cost For The Groundwater Monitoring Program	<u>\$ 5,000</u>
Annual DNAPL Recovery Costs (Manual Pumping)	<u>\$ 40,000</u>
<b>Annual Sub Total</b>	<u>\$ 155,180</u>
 Total Years Used For Calculating Financial Assurance	 <u>\$ 30</u> Yrs
 Remediation Cost (Annual Sub Total x Total Years Used)	 <u>\$ 4,655,400</u>
 Well Installation	 <u>\$ 75,000</u>
Soil Delineation	<u>\$ 39,500</u>
 <u>Soil Cap (HWPW)</u>	
1. Pre-Design Work	\$ 40,000
2. Engineering	\$ 30,000
3. Mobilization/Site Preparation/Plugging MWs/Debris Disposal	\$ 959,050
4. Consolidation of Soils (AOC)	\$ 345,000
5. Backfilling Excavated Areas	\$ 327,200
6. Cap Construction and QA/QC	\$ 933,750
7. Final Survey/Institutional Controls	<u>\$ 15,000</u>
SOIL CAP TOTAL	<u>\$ 2,650,000</u>
 10% Contingency	 <u>\$ 265,000</u>
 <b>Grand Total Cost (nearest \$1000)</b>	 <b><u>\$ 7,684,900</u></b>

**CP Table I: Waste Management Units and Areas Subject to Groundwater Corrective Action and Compliance Monitoring**

A. Corrective Action<sup>1</sup> (30 TAC §335.166)

Unit Type <sup>5</sup>	Unit Name	Notice of Registration (NOR) Number, if applicable	Date Program Requirement and Remedy Standard Completed <sup>5</sup>
RCRA Regulated - SWMU 1	Closed Surface Impoundment	NOR 001	NFA requested

B. Compliance Monitoring<sup>1</sup> (30 TAC §335.165)

Unit Type <sup>5</sup>	Unit Name	Notice of Registration (NOR) Number, if applicable	Date Program Requirement and Remedy Standard Completed <sup>5</sup>
<b>RESERVED</b>			

C. Corrective Action<sup>2</sup>(30 TAC §335.167)

Unit Type <sup>5</sup>	Unit Name	Notice of Registration (NOR) Number, if applicable	Date Program Requirement and Remedy Standard Completed <sup>5</sup>
SWMU 7	Tank Car Storage Area	002	
	Sub-surface Tank	003	
	Container Storage Area	004	
	Waste Pile	005	
	Miscellaneous Storage Containers	006	
SWMU 2	Northern and Southern Drainage Ditches		
SWMU 3	Oil Drum Storage (ODS) Building		
SWMU 4	Recent Process Area		
SWMU 5	Original Process Area		
SWMU 6	Water Treatment and Boiler System		
SWMU 8	Aboveground Storage Tank Area		
SWMU 9	Location of Former UST No. 44-023-05		
SWMU 10	Location of Former Sap Water Treatment Tank		
SWMU 11	Oil Water Separators		
SWMU 12	Railroad Tie Storage Area		
AOC 1	Diesel Storage Tank		
AOC 2	Hose House		
AOC 3	Contaminated Portion of City Water Line		
AOC 4	Location of Former Incinerator		
AOC 5	City Storm Sewer		

Unit Type <sup>5</sup>	Unit Name	Notice of Registration (NOR) Number, if applicable	Date Program Requirement and Remedy Standard Completed <sup>5</sup>
AOC 6	Inactive Wastewater Lagoon		
AOC 7	Location of Former UST No. 44-023-21		

D. Alternative Corrective Action<sup>3</sup> (30 TAC §335.151)

Unit Type <sup>5</sup>	Unit Name	Notice of Registration (NOR) Number, if applicable	Date Program Requirement and Remedy Standard Completed <sup>5</sup>
<b>RESERVED</b>			

E. Facility Operations Area (FOA)<sup>4</sup> (30 TAC §335.156 and Chapter 350)

Unit Type <sup>5</sup>	Unit Name	Notice of Registration (NOR) Number, if applicable	Date Program Requirement and Remedy Standard Completed <sup>5</sup>
<b>RESERVED</b>			

**Note:** “Reserved” if a specific program (referenced in CP Table I.A., I.B., I.C., I.D., and/or I.E.) is not applicable. More than one program may apply to a facility.

Foot Note:

1. Program applies to RCRA-regulated units only.
2. Program applies to releases from solid waste management units (SWMUs) and/or areas of concern (AOCs).
3. Program applies to commingled releases from RCRA-regulated unit and from one or more SWMUs and/or AOCs.
4. List SWMUs, additional units/areas of Investigation, AOCs, RCRA-regulated units within the FOA that are subject to corrective action. For RCRA units, SWMUs and/ or AOC outside the FOA boundary for which compliance monitoring and/ or corrective action applies should be listed separately in Items A, B or C as appropriate.
5. Specify the date of Commissions No Further Action approval letter for program requirement and remedy standard completed for all media of concern.

**CP Table II: Solid Waste Management Units and/or Areas of Concern for which Corrective Action applies pursuant to 30 TAC 335.167**

Unit Number <sup>1</sup>	Unit Name	Notice of Registration (NOR) Number, if applicable	SWMU or AOC	Media Affected <sup>2</sup>	Date Program Requirement and Remedy Standard Completed <sup>3</sup>
1.	Closed Surface Impoundment	001	SWMU 1	None	NFA requested
2.	Tank Car Storage Area	002	SWMU 7	Soil	
3.	Sub-surface Tank	003		None	
4.	Container Storage Area	004		None	
5.	Waste Pile	005		None	
6.	Miscellaneous Storage Containers	006		None	
7.	Northern and Southern Drainage Ditches		SWMU 2	Soil	
8.	Oil Drum Storage (ODS) Building		SWMU 3	None	
9.	Recent Process Area		SWMU 4	Soil	
10.	Original Process Area		SWMU 5	Soil	
11.	Water Treatment and Boiler System		SWMU 6	Soil	
12.	Aboveground Storage Tank Area		SWMU 8	Soil	
13.	Location of Former UST No. 44-023-05		SWMU 9	Soil	
14.	Location of Former Sap Water Treatment Tank		SWMU 10	None	
15.	Oil Water Separators		SWMU 11	None	
16.	Railroad Tie Storage Area		SWMU 12	Soil	
17.	Diesel Storage Tank		AOC 1	Soil	
18.	Hose House		AOC 2	Soil	
19.	Contaminated Portion of City Water Line		AOC 3	Soil	
20.	Location of Former Incinerator		AOC 4	None	
21.	City Storm Sewer		AOC 5	Soil	
22.	Inactive Wastewater Lagoon		AOC 6	Soil	
23.	Location of Former UST No. 44-023-21		AOC 7	Soil	

Foot Note:

SWMU = Solid Waste Management Unit  
 AOC = Area of Concern

1. For sites with FOA Authorization, list SWMUs and/or AOCs that were not included in the FOA, and are subject to corrective action.
2. Specify affected media groundwater, soils, etc.
3. Specify the date of Commissions No Further Action approval letter for program requirement and remedy standard completed for all media of concern.

**CP Table III: Corrective Action Program Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard**

**On-Site PMZ**

Unit Name	COLUMN A Hazardous Constituents	COLUMN B Groundwater Protection Standards <sup>GW</sup> GW <sub>Ing</sub> (mg/l) (C/I)
On Site – Site Wide PMZ	1,2-Dichloroethane	5.0E-03 <sup>MCL/PCL</sup>
	Benzene	5.0E-03 <sup>MCL/PCL</sup>
	Chlorobenzene	1.0E-01 <sup>MCL/PCL</sup>
	Ethylbenzene	7.0E-01 <sup>MCL/PCL</sup>
	Methylene Chloride	5.0E-03 <sup>MCL/PCL</sup>
	Toluene	1.0E+00 <sup>MCL/PCL</sup>
	Xylenes (total)	1.0E+01 <sup>MCL/PCL</sup>
	Vinyl Chloride (selected wells)	2.0E-03 <sup>MCL/PCL</sup>
	1,2-Diphenylhydrazine	2.6E-03 <sup>PCL</sup>
	2,4-Dimethylphenol	1.5E+00 <sup>PCL</sup>
	2,4-Dinitrotoluene	3.0E-03 <sup>PCL</sup>
	2,6-Dinitrotoluene	3.0E-03 <sup>PCL</sup>
	2-Chloronaphthalene	5.8E+00 <sup>PCL</sup>
	2-Methyl-4,6-dinitrophenol	7.3E-03 <sup>PCL</sup>
	2-Methylnaphthalene	2.9E-01 <sup>PCL</sup>
	4-Nitrophenol	1.5E-01 <sup>PCL</sup>
	Acenaphthene	4.4E+00 <sup>PCL</sup>
	Acenaphthylene	4.4E+00 <sup>PCL</sup>
	Anthracene	2.2E+01 <sup>PCL</sup>
	Benzo(a)anthracene	2.8E-03 <sup>PCL</sup>
	Benzo(a)pyrene	2.0E-04 <sup>PCL</sup>
	bis(2-chloroethoxy)methane	1.9E-03 <sup>PCL</sup>
	bis(2-ethylhexyl)phthalate	6.0E-03 <sup>PCL</sup>
	Chrysene	2.8E-01 <sup>PCL</sup>
	Dibenzofuran	2.9E-01 <sup>PCL</sup>
	Di-n-butyl Phthalate	7.3E+00 <sup>PCL</sup>
	Fluoranthene	2.9E+00 <sup>PCL</sup>
	Fluorene	2.9E+00 <sup>PCL</sup>
	Naphthalene	1.5E+00 <sup>PCL</sup>
	Nitrobenzene	1.5E-01 <sup>PCL</sup>
	n-Nitrosodiphenylamine	4.2E-01 <sup>PCL</sup>
	Pentachlorophenol	1.0E-03 <sup>PCL</sup>
	Phenanthrene	2.2E+00 <sup>PCL</sup>
	Phenol	2.2E+01 <sup>PCL</sup>
	Pyrene	2.2E+00 <sup>PCL</sup>

Note:  
<sup>GW</sup>GW<sub>Ing</sub> Protective Concentration Levels, Commercial/Industrial, November 12, 2014; Table 3.

**CP Table III: Corrective Action Program Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard**

**Off-Site PMZ**

Unit Name	COLUMN A Hazardous Constituents	COLUMN B Groundwater Protection Standards GW <sub>Ing</sub> (mg/l) (Res)
Off Site PMZ	1,2-Dichloroethane	5.0E-03 <sup>MCL/PCL</sup>
	Benzene	5.0E-03 <sup>MCL/PCL</sup>
	Chlorobenzene	1.0E-01 <sup>MCL/PCL</sup>
	Ethylbenzene	7.0E-01 <sup>MCL/PCL</sup>
	Methylene Chloride	5.0E-03 <sup>MCL/PCL</sup>
	Toluene	1.0E+00 <sup>MCL/PCL</sup>
	Xylenes (total)	1.0E+01 <sup>MCL/PCL</sup>
	Vinyl Chloride (selected wells)	2.0E-03 <sup>MCL/PCL</sup>
	1,2-Diphenylhydrazine	1.1E-03 <sup>PCL</sup>
	2,4-Dimethylphenol	4.9E-01 <sup>PCL</sup>
	2,4-Dinitrotoluene	1.3E-03 <sup>PCL</sup>
	2,6-Dinitrotoluene	1.3E-03 <sup>PCL</sup>
	2-Chloronaphthalene	2.0E+00 <sup>PCL</sup>
	2-Methyl-4,6-dinitrophenol	2.4E-03 <sup>PCL</sup>
	2-Methylnaphthalene	9.8E-02 <sup>PCL</sup>
	4-Nitrophenol	4.9E-02 <sup>PCL</sup>
	Acenaphthene	1.5E+00 <sup>PCL</sup>
	Acenaphthylene	1.5E+00 <sup>PCL</sup>
	Anthracene	7.3E+00 <sup>PCL</sup>
	Benzo(a)anthracene	1.3E-03 <sup>PCL</sup>
	Benzo(a)pyrene	2.0E-04 <sup>PCL</sup>
	bis(2-chloroethoxy)methane	8.3E-04 <sup>PCL</sup>
	bis(2-ethylhexyl)phthalate	6.0E-03 <sup>PCL</sup>
	Chrysene	1.3E-01 <sup>PCL</sup>
	Dibenzofuran	9.8E-02 <sup>PCL</sup>
	Di-n-butyl Phthalate	2.4E+00 <sup>PCL</sup>
	Fluoranthene	9.8E-01 <sup>PCL</sup>
	Fluorene	9.8E-01 <sup>PCL</sup>
	Naphthalene	4.9E-01 <sup>PCL</sup>
	Nitrobenzene	4.9E-02 <sup>PCL</sup>
	n-Nitrosodiphenylamine	1.9E-01 <sup>PCL</sup>
	Pentachlorophenol	1.0E-03 <sup>PCL</sup>
	Phenanthrene	7.3E-01 <sup>PCL</sup>
	Phenol	7.3E+00 <sup>PCL</sup>
	Pyrene	7.3E-01 <sup>PCL</sup>

Note:  
<sup>GW</sup>GW<sub>Ing</sub> Protective Concentration Levels, Residential, November 12, 2014; Table 3.

**CP Table IIIA: Corrective Action Program Table of Indicator Parameters and Groundwater Protection Standard**

**On-Site PMZ**

Unit Name	COLUMN A Hazardous Constituents	COLUMN B Point of Exposure GW <sub>GW<sub>Ing</sub></sub> (mg/L) (C/I)
<b>A-TZ</b>	Benzene	0.005 <sup>MCL/PCL</sup>
	2,4-Dimethylphenol	1.5 <sup>PCL</sup>
	2 Methyl-naphthalene	0.29 <sup>PCL</sup>
	Dibenzofuran	0.29 <sup>PCL</sup>
	Naphthalene	1.5 <sup>PCL</sup>
<b>B-CZ/B-TZ</b>	Benzene	0.005 <sup>MCL/PCL</sup>
	2,4-Dimethylphenol	1.5 <sup>PCL</sup>
	2 Methyl-naphthalene	0.29 <sup>PCL</sup>
	Dibenzofuran	0.29 <sup>PCL</sup>
	Naphthalene	1.5 <sup>PCL</sup>
<b>C-TZ</b>	Benzene	0.005 <sup>MCL/PCL</sup>
	2,4-Dimethylphenol	1.5 <sup>PCL</sup>
	2 Methyl-naphthalene	0.29 <sup>PCL</sup>
	Dibenzofuran	0.29 <sup>PCL</sup>
	Naphthalene	1.5 <sup>PCL</sup>

Note:  
<sup>GW</sup>GW<sub>Ing</sub> Protective Concentration Levels, Commercial/Industrial, November 12, 2014; Table 3.



**CP Table IIIA: Corrective Action Program Table of Indicator Parameters and Groundwater Protection Standard**

**Off-Site PMZ**

Unit Name	COLUMN A Hazardous Constituents	COLUMN B Point of Exposure <sup>GW</sup> GW <sub>Ing</sub> (mg/L) (Res)
<b>A-TZ</b>	Benzene	0.005 <sup>MCL/PCL</sup>
	2,4-Dimethylphenol	0.49 <sup>PCL</sup>
	2 Methyl-naphthalene	0.098 <sup>PCL</sup>
	Dibenzofuran	0.098 <sup>PCL</sup>
	Naphthalene	0.49 <sup>PCL</sup>
<b>B-CZ/B-TZ</b>	Benzene	0.005 <sup>MCL/PCL</sup>
	2,4-Dimethylphenol	0.49 <sup>PCL</sup>
	2 Methyl-naphthalene	0.098 <sup>PCL</sup>
	Dibenzofuran	0.098 <sup>PCL</sup>
	Naphthalene	0.49 <sup>PCL</sup>
<b>C-TZ</b>	Benzene	0.005 <sup>MCL/PCL</sup>
	2,4-Dimethylphenol	0.49 <sup>PCL</sup>
	2 Methyl-naphthalene	0.098 <sup>PCL</sup>
	Dibenzofuran	0.098 <sup>PCL</sup>
	Naphthalene	0.49 <sup>PCL</sup>

Note:  
<sup>GW</sup>GW<sub>Ing</sub> Protective Concentration Levels, Residential, November 12, 2014; Table 3.

### CP Table V: Designation of Wells

Point of Compliance Wells:

**NONE**

Point of Exposure Wells:

**NONE**

Alternate Point of Exposure Wells (PMZ Wells):

1. A-TZ  
MW-15A, MW-25A, MW-26A, MW-35A, MW-36A, MW-50A, MW-59A, MW-60A, MW-61A, MW-69A, MW-77A
2. B-TZ  
MW-14, MW-36B, MW-38B, MW-39B, MW-59B, MW-62B, MW-67B, MW-80B, MW-81B, P-11, \*PMW-82B, \*PMW-83B, \*PMW-84B
3. C-TZ  
MW-15C, MW-21C, MW-28C, MW-47C, MW-48C, MW-51C, MW-54C, \*PMW-85C

Background Wells:

**NONE**

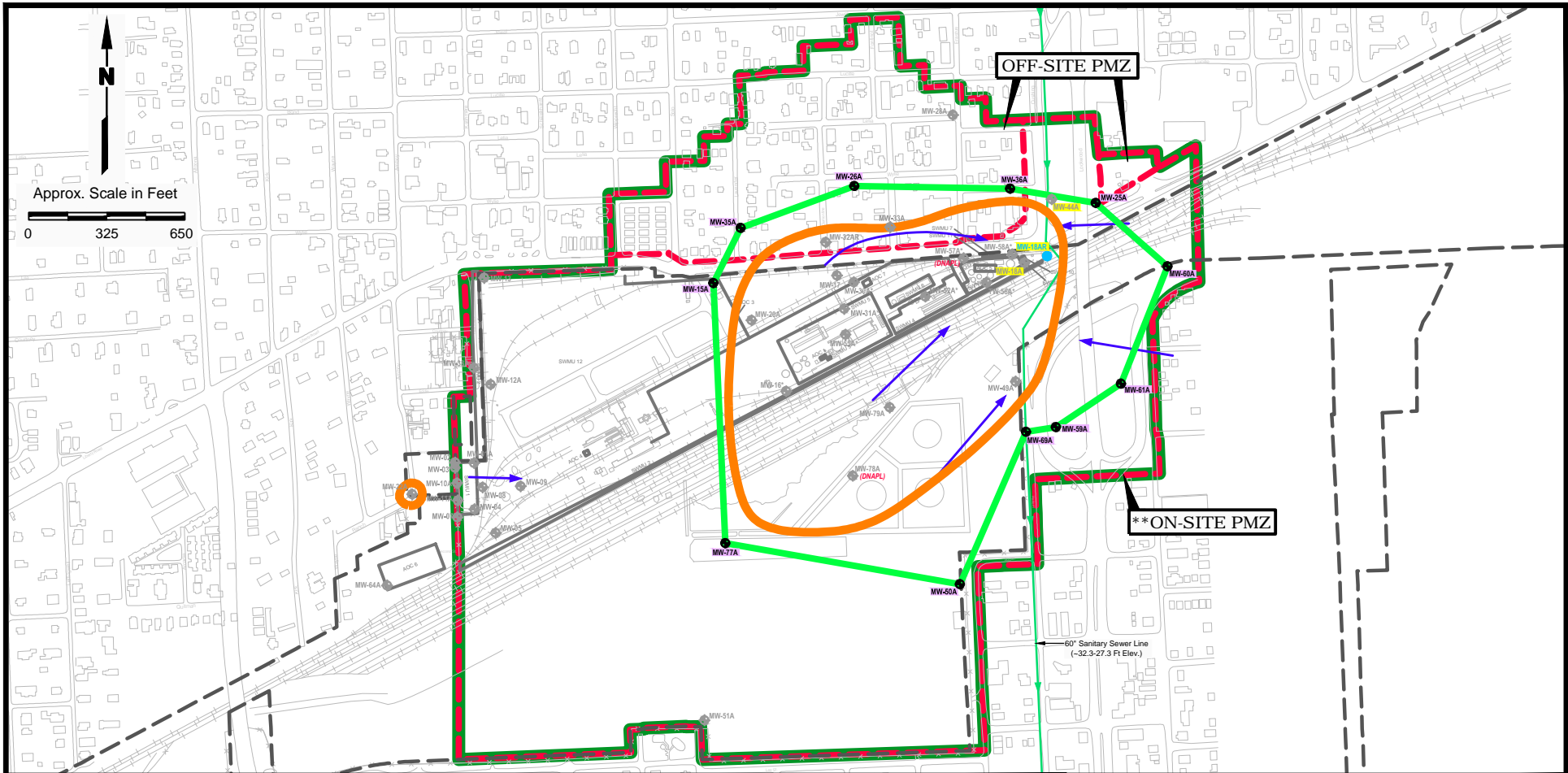
FOA Boundary of Compliance Wells Background Wells:

Exposure Pathway: (e.g. SWGW - Groundwater to surface water PCL for Brazos River or Barge Canal, etc)

**NONE**

**Note:** Wells that are not listed in this table are subject to change, upon approval by the Executive Director, without modification to the Compliance Plan.

\* - Proposed well, will be installed following approval of the Response Action Plan (see CP Attachment XI.D)



**EXPLANATION**

- UPRR Property Boundary
- Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- ××××× Fence
- +—+—+ Railroad
- ⊕ A-TZ Monitoring Well Location
- Proposed TI Zone
- PCLE Zone
- A-TZ PMZ Boundary
- Proposed Cumulative PMZ (A-TZ, B-CZ/B-TZ, and C-TZ)
- Proposed Replacement Well
- Alternate Groundwater Point of Exposure (POE)
- Attenuation Monitoring Point (AMP)
- ↙ Inferred Groundwater Flow Direction

- Notes:**
1. Vertical datum based on City of Houston Vertical Datum (HVD).
  2. DNAPL = Dense non-aqueous phase liquids detected in monitoring well (July 2014).
  3. \*- Wells fall within soil cap area and will be plugged and abandoned.
  4. \*\*- On-Site PMZ includes UPRR-owned property and City of Houston Right of Way (ROW).

Source:  
Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.

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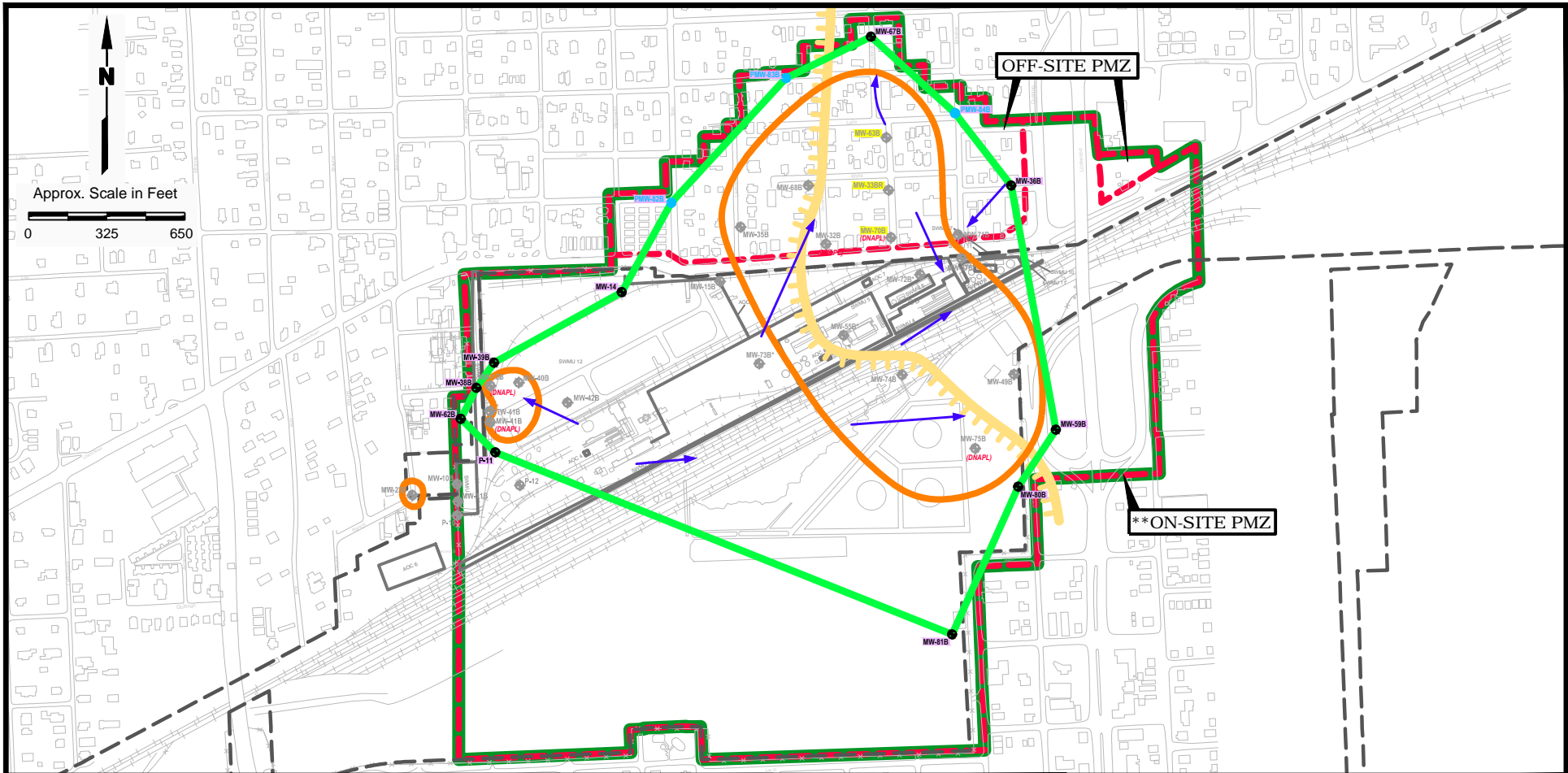
**HOUSTON WOOD PRESERVING WORKS**

CP Table V Sheet 1 of 3

**PMZ BOUNDARY MAP  
A-TZ**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS



**EXPLANATION**

- UPRR Property Boundary
- Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- Fence
- Railroad
- B Unit Monitoring Well Location
- B-TZ/B-CZ Boundary
- PCLE Zone B-TZ/B-CZ
- B-CZ/B-TZ PMZ Boundary
- Proposed Cumulative PMZ (A-TZ, B-CZ/B-TZ, and C-TZ)
- Proposed Well for PMZ
- Alternate Groundwater Point of Exposure (POE)
- Attenuation Monitoring Point (AMP)
- Inferred Groundwater Flow Direction
- Proposed TI Zone

**Notes:**

1. Vertical datum based on City of Houston Vertical Datum (HVD).
2. DNAPL = Dense non-aqueous phase liquids detected in monitoring well (July 2014).
3. \* - Wells fall within soil cap area and will be plugged and abandoned.
4. \*\* - On-Site PMZ includes UPRR-owned property and City of Houston Right of Way (ROW).

Source:  
Base map from ERM-Southwest, Inc APAR Addendum,  
Fig 3-1, dated June 2004.



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**HOUSTON WOOD PRESERVING WORKS**

CP Table V Sheet 2 of 3

**PMZ BOUNDARY MAP  
B-CZ/B-TZ**

PROJECT: 1358

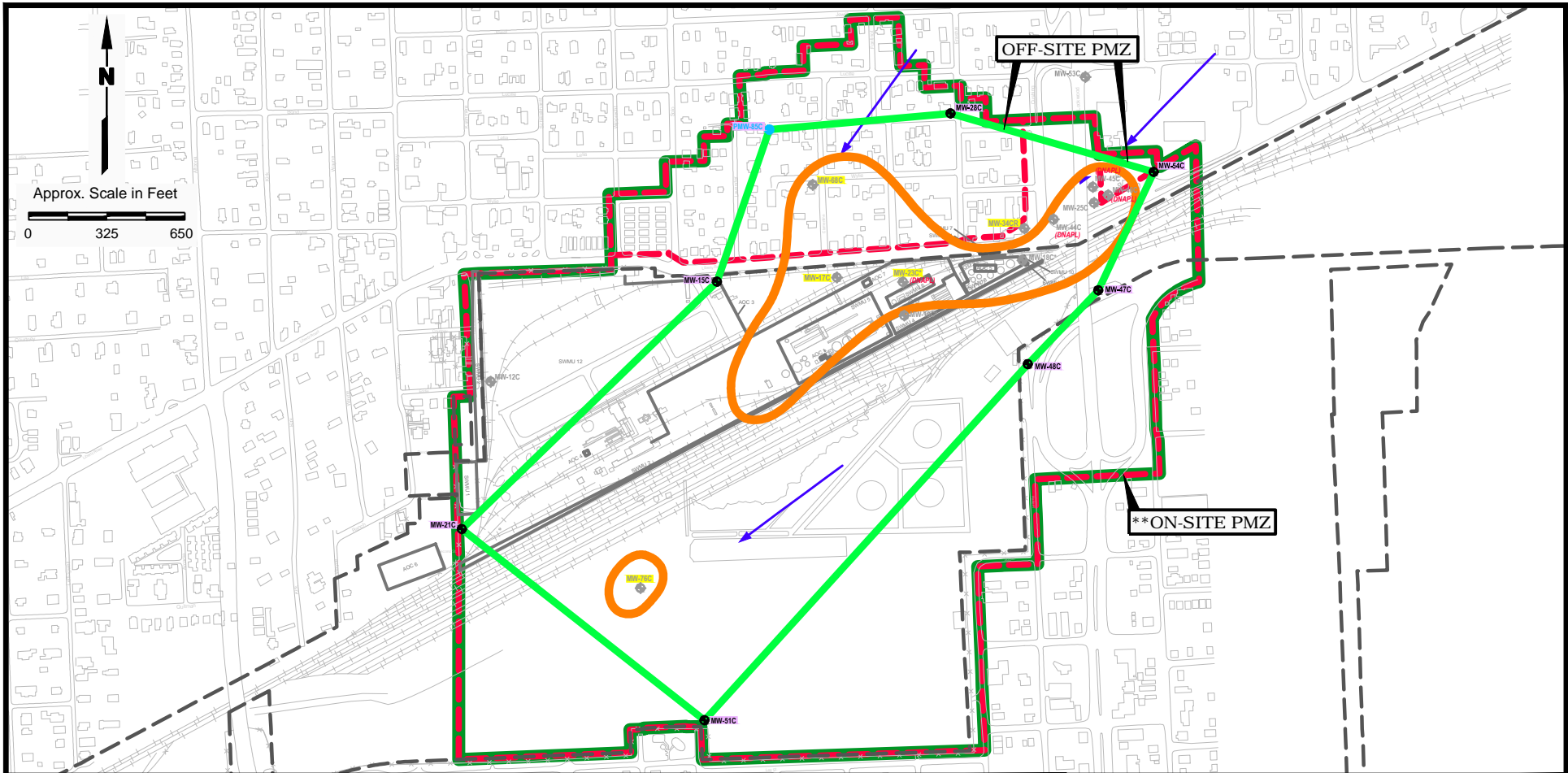
BY: AJD

REVISIONS

DATE: NOV., 2014

CHECKED: ECM

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS



### EXPLANATION

- |                                  |   |
|----------------------------------|---|
| ----- UPRR Property Boundary     | ----- C-TZ PMZ Boundary                                   |
| □ Historic Structure and Feature | ----- Proposed Cumulative PMZ (A-TZ, B-CZ/B-TZ, and C-TZ) |
| --- Road, Parking Lot, Sidewalk  | ● Proposed Well for PMZ                                   |
| --- Fence                        | □ Alternate Groundwater Point of Exposure (POE)           |
| --- Railroad                     | ■ Attenuation Monitoring Point (AMP)                      |
| ⊙ C-TZ Monitoring Well Location  | ← Inferred Groundwater Flow Direction                     |
| ○ PCLE Zone                      | ----- Proposed TI Zone                                    |

### Notes:

1. Vertical datum based on City of Houston Vertical Datum (HVD).
2. DNAPL = Dense non-aqueous phase liquids detected in monitoring well (July 2014).
3. \* - Wells fall within soil cap area and will be plugged and abandoned.
4. \*\* - On-Site PMZ includes UPRR-owned property and City of Houston Right of Way (ROW).



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

CP Table V Sheet 3 of 3

## PMZ BOUNDARY MAP C-TZ

PROJECT: 1358

BY: AJD

REVISIONS

DATE: NOV., 2014

CHECKED: ECM

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

Source:  
Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.

**CP Table VI: Compliance Period for RCRA-Regulated Units**

<b>Closed Surface Impoundment (NOR 001, SWMU 1)</b>	<b>Year or Number of Years</b>
Year Waste Management Activities Initiated	1979
Year Closed	1984
Compliance Period	None – closure requested
Compliance Period Began	1994

**CP Table VIII: Compliance Schedule**

<b>Item</b>	<b>Compliance Schedule</b> (from the date of issuance of the Compliance Plan unless otherwise specified)	<b>Regulatory Citation</b>	<b>Requirement</b>
A.	60	Compliance Plan	Submit to the Executive Director a schedule summarizing all activities required by the Compliance Plan. The schedule shall list the starting dates of all routine activities. The Permittee shall include an updated schedule in the report required by Compliance Plan CP Table VII – Reporting Requirements. The schedule shall list the activity or report, the Compliance Plan Section which requires the activity or report and the calendar date the activity or report it to be completed or submitted (if this date can be determined).
B.	720 days from Compliance Plan Issuance	30 TAC §350.31(g)	Submit to the Executive Director proof of compliance with institutional control requirements in accordance with which provides notice of the existence and location of the Plume Management Zone (PMZ) and which prevents exposure to groundwater from this zone until such a time as constituents of concern may be reduced to below the Groundwater Protection Standards of CP Table III – Corrective Action Program Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard.
C.	Notify within 30 days	30 TAC §350.33(k)	After an unexpected event occurs, or a condition is detected, during post-response action care period which indicates that additional response actions will be required at an affected property.
D.	Within 120 days of Compliance Plan Issuance		Plugging of monitoring wells within the capped area, installation of additional monitoring wells at the POEs
E.	Within 120 days of Compliance Plan Issuance		Additional soil sampling to confirm the soil excavation area within AOC 6/SWMU 2 and for the soil cap area in the Former HWPW

## **FIGURES**





Englewood  
Intermodal  
Yard

HWPW

**EXPLANATION**

- UPRR Property Boundary
- UPRR Facility Boundary



Approx. Scale in Feet  
0 250 500

SOURCE:  
Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure XI.A.1a

**FACILITY SITE MAP**

PROJECT: 1358

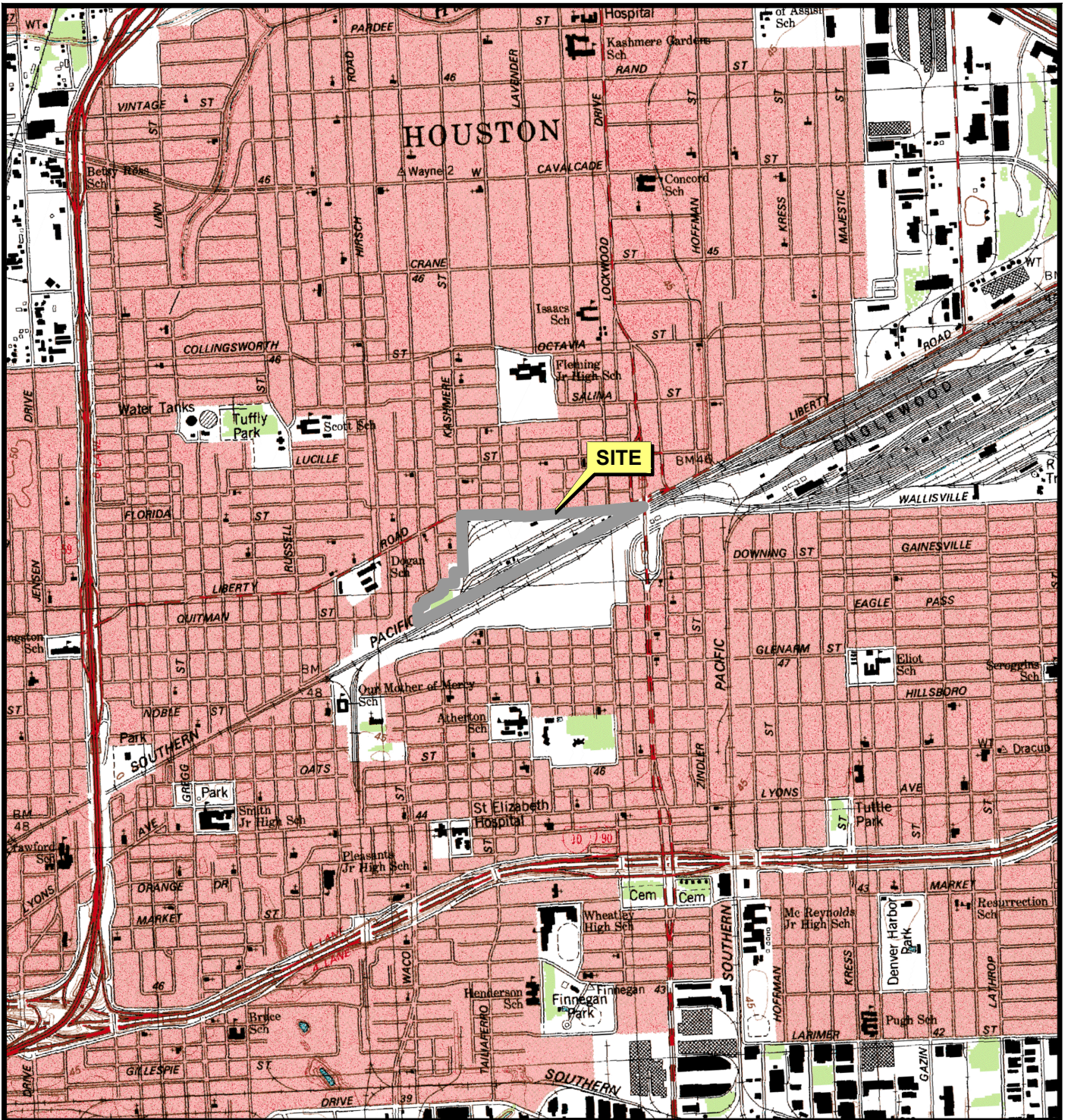
BY: AJD

REVISIONS

DATE: NOV., 2014

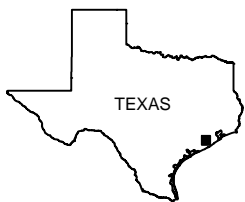
CHECKED: ECM

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS



**EXPLANATION**

— UPRR Facility Boundary



QUADRANGLE LOCATIONS



Scale in Feet



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure XI.A.1b

**TOPOGRAPHIC MAP**

PROJECT: 1358

BY: AJD

REVISIONS

DATE: NOV., 2014

CHECKED: ECM

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CONSULTING ENGINEERS AND SCIENTISTS

SOURCE:  
Base map from www.tnris.gov, Settegast, TX 7.5 min. USGS quadrangle dated 1982.



**EXPLANATION**

- UPRR Property Boundary
- UPRR Facility Boundary



Approx. Scale in Feet  
 0      300      600

SOURCE:  
 Base map from Google Earth, photography dated 12/31/43.



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure XI.A.1d

**1943 AERIAL PHOTOGRAPH**

PROJECT: 1358

BY: AJD

REVISIONS

DATE: NOV., 2014

CHECKED: ECM

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HWPW

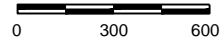
Englewood  
Intermodal  
Yard

**EXPLANATION**

- UPRR Property Boundary
- UPRR Facility Boundary



Approx. Scale in Feet



SOURCE:  
Base map from Google Earth, photography dated 12/31/88.

 **UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure XI.A.1d

**1988 AERIAL PHOTOGRAPH**

PROJECT: 1358	BY: AJD	REVISIONS
DATE: NOV., 2014	CHECKED: ECM	

**PASTOR, BEHLING & WHEELER, LLC**  
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**EXPLANATION**

- UPRR Property Boundary
- UPRR Facility Boundary



Approx. Scale in Feet  
 0 300 600

SOURCE:  
 Base map from Google Earth, photography dated 4/8/14.



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure XI.A.1d

**2014 AERIAL PHOTOGRAPH**

PROJECT: 1358

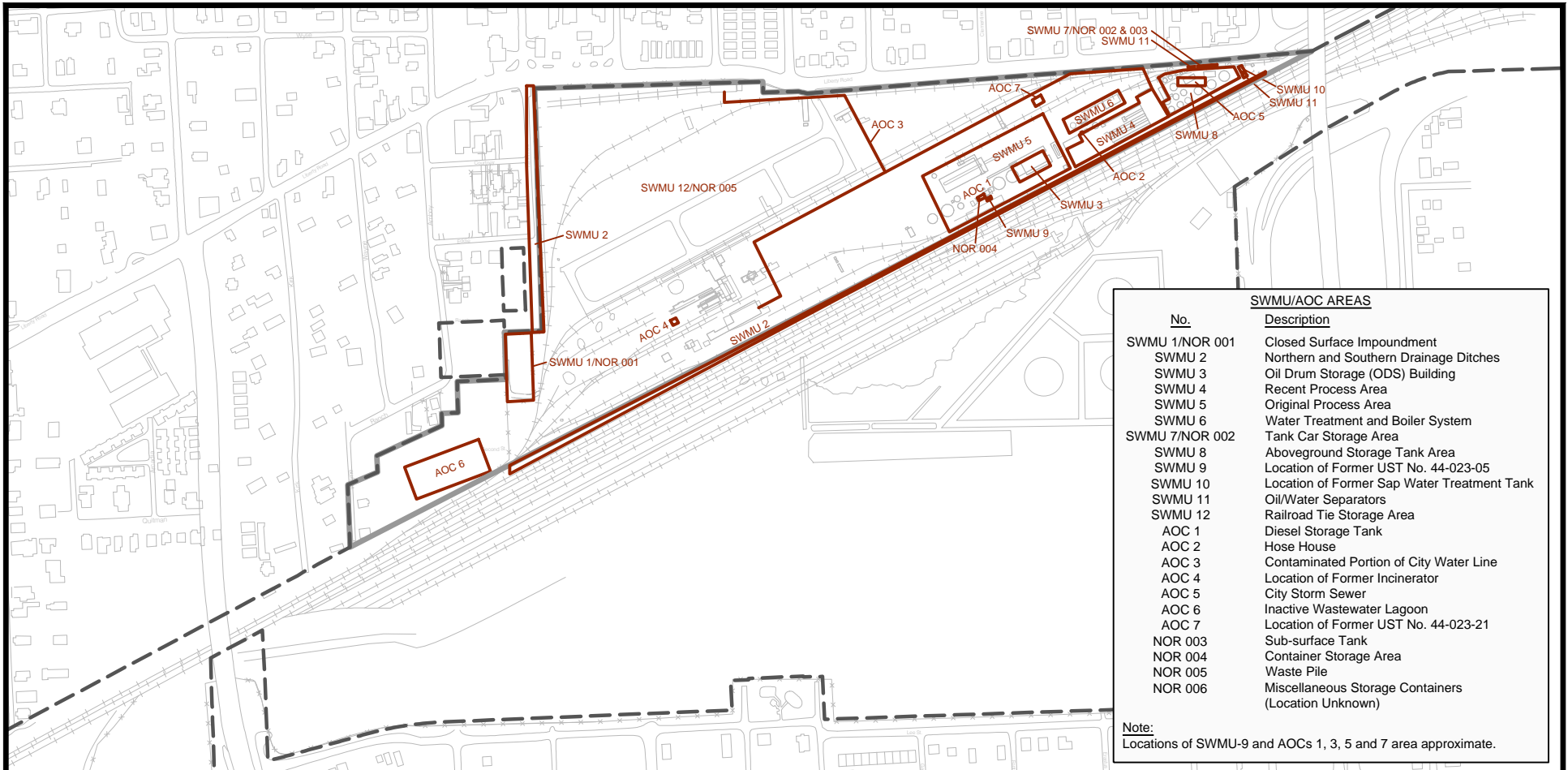
BY: AJD

REVISIONS

DATE: NOV., 2014

CHECKED: ECM

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### EXPLANATION

- UPRR Property Boundary
- UPRR Facility Boundary
- Historic Structure and Feature
- Road, Parking Lot, Sidewalk
- \*\*\*\*\* Fence
- +++++ Railroad



Approx. Scale in Feet  
0 250 500

**SOURCE:**  
Base map from ERM-Southwest, Inc APAR Addendum, Fig 3-1, dated June 2004.



**UNION PACIFIC RAILROAD CO.**

**HOUSTON WOOD PRESERVING WORKS**

Figure XI.A.2

### LOCATIONS OF FORMER WASTE MANAGEMENT UNITS

PROJECT: 1358

BY: AJD

REVISIONS

DATE: NOV., 2014

CHECKED: ECM

**PASTOR, BEHLING & WHEELER, LLC**  
CONSULTING ENGINEERS AND SCIENTISTS

**Attachment A**

**ALTERNATE CONCENTRATION LEVELS**

Union Pacific Railroad Company  
Houston Wood Preserving Works  
Houston, Texas

## ATTACHMENT A

### ALTERNATE CONCENTRATION LIMITS

Union Pacific Railroad will undertake groundwater at corrective action units at the Houston Wood Preserving Works. The Compliance Plan requires semiannual monitoring of chemicals of concern (COCs) at alternate point of exposure (POE) locations as specified in Compliance Plan Table V (Designation of Wells by Function).

#### 1.1 Groundwater Protection Standard

The groundwater protection standard (GWPS) is proposed as an alternate concentration limit (ACL) based on the Texas Risk Reduction Program (TRRP) Protective Concentration Levels (PCLs) determined under Remedy Standard B. PCLs are the regulatory standards that apply at groundwater POEs for a particular groundwater exposure pathway, as set in the Title 30 Texas Administrative Code Chapter 350. Therefore, for this compliance plan, the proposed ACLs shall be based on TRRP PCLs. If the groundwater POE is located at a distance from the point of compliance (POC), such as where a plume management zone (PMZ) alternate POE, the ACL considers COC attenuation along the groundwater flow path between the POC and POE locations. These attenuation-based ACLs are referred to as attenuation action levels under TRRP. All Where applicable, pathways may include the following:

- < Tier 1 Groundwater PCLs (Commercial/industrial) for Class 2 groundwater ingestion ( $^{GW}GW_{ing}$ );
- < Tier 1 Groundwater PCLs (Residential) for Class 2 groundwater ingestion ( $^{GW}GW_{ing}$ );
- < Background (BKG); and
- < Method Quantitation Limit (MQL).

The GWPS are specified in Compliance Plan Tables III (Table of Detected Hazardous and Solid Waste Constituents and the Groundwater Protection Standard) and IIIA (Table of Indicator Parameters and the Groundwater Protection Standard). Derivations of the GWPS are presented in the Affected Property Assessment Reports for Houston Wood Preserving Works.



**Attachment B**

**WELL DESIGN AND CONSTRUCTION SPECIFICATIONS**

Union Pacific Railroad Company  
Houston Wood Preserving Works  
Houston, Texas

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## ATTACHMENT B

### WELL DESIGN AND CONSTRUCTION SPECIFICATIONS

New wells installed at the site and associated installation processes will be in compliance with the TCEQ guidance document as provided below. A work plan detailing proposed deviations from the guidance outlined below will be submitted to the executive director for approval. Existing monitoring wells utilized for monitoring may not meet all of the specifications outlined below, but will be considered acceptable for use upon approval of this Compliance Plan.

1. Well drilling methods that minimize potential adverse effects on the quality of water samples withdrawn from the well and that minimize or eliminate the introduction of foreign fluids into the borehole must be utilized.
2. All wells shall be constructed such that the wells can be routinely sampled with a pump, bailer, or alternate sampling device. Piping associated with recovery wells should be fitted with sample ports or an acceptable alternative sampling method to facilitate sampling of the recovered groundwater on a well by well basis.
3. Above the saturated zone the well casing may be one (1)-inch diameter or larger schedule 40 or 80 polyvinyl chloride (PVC) rigid pipe or stainless steel or polytetrafluoroethylene (PTFE or “teflon”) or an approved alternate material. The PVC casing must bear the National Sanitation Foundation logo for potable water applications (NSF-pw). Solvent cementing compounds shall not be used to bond joints and all connections shall be flush-threaded. In and below the saturated zone, the well casing shall be stainless steel or PTFE.

PVC or fiberglass reinforced resin may be used as an alternate well casing material in and below the saturated zone provided that it yields samples for groundwater quality analysis that are unaffected by the well casing material.

4. Any well that has deteriorated due to incompatibility of the casing material with the groundwater contaminants or due to any other factors must be replaced.
5. Screen length shall not exceed ten (10) feet within a given transmissive zone unless otherwise approved by the executive director. Screen lengths exceeding ten (10) feet may be installed in

groundwater recovery or injection wells to optimize the groundwater remediation process in accordance with standard engineering practice.

6. The intake portion of a well shall be designed and constructed so as to allow sufficient water flow into the well for sampling purposes and minimize the passage of formation materials into the well during pumping. The intake portion of a well shall consist of commercially manufactured stainless steel or PTFE screen or approved alternate material. The annular space between the screen and the borehole shall be filled with clean siliceous granular material (i.e., filter pack) that has a proper size gradation to provide mechanical retention of the formation sand and silt. The well screen slot size shall be compatible with the filter pack size as determined by sieve analysis data. The filter pack should extend no more than three (3) feet above the well screen. A silt trap, no greater than one (1) foot in length, may be added to the bottom of the well screen to collect any silt that may enter the well. The bottom of the well casing shall be capped with PTFE or stainless steel or approved alternate material.

Groundwater recovery and injection wells shall be designed in accordance with standard engineering practice to ensure adequate well production and accommodate ancillary equipment. Silt traps exceeding one (1) foot may be utilized to accommodate ancillary equipment. Well heads shall be fitted with mechanical well seals, or equivalent, to prevent entry of surface water or debris.

7. A minimum of two (2) feet of pellet or granular bentonite shall immediately overlies the filter pack in the annular space between the well casing and borehole. Where the saturated zone extends above the filter pack, pellet or granular bentonite shall be used to seal the annulus. The bentonite shall be allowed to settle and hydrate for a sufficient amount of time prior to placement of grout in the annular space. Above the minimum two (2)-foot thick bentonite seal, the annular space shall be sealed with a cement/bentonite grout mixture. The grout shall be placed in the annular space by means of a tremie pipe or pressure grouting methods equivalent to tremie grouting standards.

The cement/bentonite grout mixture or TCEQ approved alternative grout mixture shall fill the annular space to within two (2) feet of the surface. A suitable amount of time shall be allowed for settling to occur. The annular space shall be sealed with concrete, blending into a cement apron at the surface that extends at least two (2) feet from the outer edge of the monitor well

for above-ground completions. Alternative annular-space seal material may be proposed with justification and must be approved by the executive director prior to installation.

In cases where flush-to-ground completions are unavoidable, a protective structure such as a utility vault or meter box should be installed around the well casing and the concrete pad design should prevent infiltration of water into the vault. In addition, the following requirements must also be met 1) the well/cap juncture is watertight; 2) the bond between the cement surface seal and the protective structure is watertight; and 3) the protective structure with a steel lid or manhole cover has a rubber seal or gasket.

8. Water added as a drilling fluid to a well shall contain no bacteriological or chemical constituents that could interfere with the formation or with the chemical constituents being monitored. For groundwater recovery and injection wells, drilling fluids containing freshwater and treatment agents may be utilized in accordance with standard engineering practice to facilitate proper well installation. In these cases, the water and agents added should be chemically analyzed to evaluate their potential impact on in-situ water quality and to assess the potential for formation damage. All such additives shall be removed to the extent practicable during well development.
9. Upon completion of installation of a well, the well must be developed to remove any fluids used during well drilling and to remove fines from the formation to provide a particulate-free discharge to the extent achievable by accepted completion methods and by commercially available well screens. Development shall be accomplished by reversing flow direction, surging the well or by air lift procedures. No fluids other than formation water shall be added during development of a well unless the aquifer to be screened is a low-yielding water-bearing aquifer. In these cases, the water to be added should be chemically analyzed to evaluate its potential impact on in-situ water quality, and to assess the potential for formation damage.

For recovery and injection wells, well development methods may be utilized in accordance with standard engineering practice to remove fines and maximize well efficiency and specific capacity. Addition of freshwater and treatment agents may be utilized during well development or re-development to remove drilling fluids, inorganic scale or bacterial slime. In these cases, the water and agents added should be chemically analyzed to evaluate their potential impact on in-situ water quality and to assess the potential for formation damage. All such additives shall be removed to the extent practicable during well development.

10. Each well shall be secured and/or designed to maintain the integrity of the well borehole and groundwater.
  
11. The above-ground portion of the well must be protected by bumper guards and/or metal outer casing protection when wells are located in traffic areas or outside the secured plant area.
  
12. Copies of drilling and construction details demonstrating compliance with the items of this provision shall be kept on site. This record shall include the following information:
  - < name/number of well (well designation);
  - < intended use of the well (sampling, recovery, etc.);
  - < date/time of construction;
  - < drilling method and drilling fluid used;
  - < well location (+ 0.5 ft.);
  - < bore hole diameter and well casing diameter;
  - < well depth (+ 0.1 ft.);
  - < drilling and lithologic logs;
  - < depth to first saturated zone;
  - < casing materials;
  - < screen materials and design;
  - < casing and screen joint type;
  - < screen slot size/length;
  - < filter pack material/size;
  - < filter pack volume (how many bags, buckets, etc.);
  - < filter pack placement method;
  - < sealant materials;
  - < sealant volume (how many bags, buckets, etc.);
  - < sealant placement method;
  - < surface seal design/construction;
  - < well development procedure;
  - < type of protective well cap;
  - < ground surface elevation (+ 0.01 ft. MSL);

- < top of casing elevation (+ 0.01 ft. MSL); and,
- < detailed drawing of well (include dimensions).

13. Construction or plugging and abandonment of each well shall be completed in accordance with the requirements of 16 TAC Chapter 76 and must be reported/certified to the TCEQ that such proper construction or plugging and abandonment has occurred following installation or plugging and abandonment. Well completion logs for each newly installed or replaced well shall be included with the report. The certification shall be prepared by a qualified geologist or geotechnical engineer. Each well certification shall be accompanied by a certification report, including an accurate log of the soil boring, which thoroughly describes and depicts the location, elevations, material specifications, construction details, and soil conditions encountered in the boring for the well. A copy of the certification and certification report shall be kept on-site, and a second copy shall be submitted to the executive director.
14. The well number must be clearly marked and maintained on each well at the site.
15. The elevation of the top of each well casing must be measured in feet above mean sea level to the nearest 0.01 foot.
16. Wells must be replaced at any time the well integrity or materials of construction or well placement no longer enable the well to yield samples representative of groundwater quality.
17. Soil test borings shall be plugged and wells removed from service with a cement/bentonite grout mixture so as to prevent the preferential migration of fluids in the area of the borehole. Certification of each plugging shall be reported in accordance with Provision 14. The plugging of wells shall be in accordance with 16 TAC Chapter 76 dealing with Well Drilling, Completion, Capping and Plugging.
18. A well's screened interval shall be appropriately designed and installed to meet the well's specific objective (i.e., either DNAPL, LNAPL, both, or other objective of the well). All wells designed to detect, monitor, or recover DNAPL must be drilled to intercept the bottom confining layer of the aquifer. The screened interval to detect DNAPL should extend from the top of the lower confining layer to above the portion of the aquifer saturated with DNAPL. In addition, the

sand packs for the recovery or monitoring well's screened interval shall be coarser than surrounding media to ensure the movement of NAPL to the well.

**Attachment C**

**GROUNDWATER SAMPLING AND ANALYSIS PLAN**

Union Pacific Railroad Company  
Houston Wood Preserving Works  
Houston, Texas



**COMPLIANCE PLAN ATTACHMENT C  
GROUNDWATER SAMPLING AND ANALYSIS PLAN  
PART B PERMIT APPLICATION  
UNION PACIFIC RAILROAD COMPANY  
HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

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## 1.0 INTRODUCTION

This Groundwater Sampling and Analysis Plan (SAP) presents the procedures for the post-closure groundwater corrective action program for the Houston Wood Preserving Works (HWPW) in Houston, Texas to meet the requirements of 30 Texas Administrative Code (TAC) 335.163(4) and (5) and also 40 CFR 270.30(j). The HWPW facility is located 4910 Liberty Road in Houston, Harris County, Texas (hereafter, the Site). A Facility Site Map is provided in Compliance Plan (CP) Figure XI.A.1a.

A Remedy Standard B Plume Management Zone (PMZ) using monitored natural attenuation (MNA) was selected as the response action for the groundwater Protective Concentration Level Exceedance (PCLE) Zones within the Affected Property as detailed in the Response Action Plan (RAP) (CP Attachment XI.D). This SAP for monitoring the groundwater PCLE zone was developed in accordance with PMZ monitoring procedures provided in 30 TAC §350.33(f)(4)(D). Groundwater monitoring will be performed as part of the PMZ to confirm that the lateral extent of COC concentrations greater than their respective critical PCLs (cPCLs) continue to remain within the boundaries of the PMZ at the alternate points of exposure (POE) wells for each groundwater bearing unit (GWBU).

The monitoring well network for the alternate POE wells is listed on CP Table V. Alternate POE wells have been designated within each of the three transmissive zones. In addition to the alternate POE wells, selected monitoring wells at the Site will continue to be monitored to evaluate potential groundwater conditions within the PCLE Zone and underlying GWBU. Details of the additional monitoring are provided in the RAP (CP Attachment XI.D).

This GWSAP addresses the following activities to be conducted at the Site:

- Pre-Sampling Activities (Section 2);
- Fluid level measurement (Section 3);
- Groundwater sampling (Section 4); and
- Quality Assurance/Quality Control Plan (Section 5).

## **2.0 PRE-SAMPLING ACTIVITIES**

### **2.1 Well Inspection And Decontamination Procedures**

The integrity of the monitoring wells will be checked prior to commencement of any well gauging or sampling. The concrete pad, manhole cover and PVC casing will be checked for damage. Condition of the wells including damage or irregularities will be noted on the Monitoring Well Evaluation Form (Appendix A).

Decontamination of all non-disposable field measurement, purging and sampling equipment will be performed before any gauging or purging/sampling activities begin, after each well, and at the end of the event. Decontamination will generally be limited to measuring devices since dedicated tubing will be used for sampling activities. The equipment will be decontaminated by the following procedure:

- 1) wash the equipment with non-phosphate soap;
- 2) rinse with deionized water;
- 3) rinse again with isopropyl alcohol; and
- 4) a final rinse with deionized water.

Decontamination fluids and purge water from the sampling activities will be drummed in labeled 55-gallon drums and left on-site at the Container Storage Area (CSA). Disposable equipment used for purging and sampling and personal protective equipment (PPE) will be stored in labeled 55-gallon drums and left at the CSA. An UPRR-approved disposal company will transport and dispose (T&D) of the investigative-derived wastes (IDW) in accordance with state and federal regulations.

### **2.2 Fluid Level Measurement**

Fluid levels in the monitoring wells (Figure 1) at the Site will be gauged during each scheduled sampling event. Before fluid levels are measured, monitoring well caps shall be unlocked and the well should be left open to equilibrate with atmospheric pressure.

At each well, the presence of light and dense non-aqueous phase liquids (LNAPL and DNAPL, respectively) will be measured using a decontaminated oil-water interface probe, or equivalent measuring device. The probe will be lowered into the well until the instrument indicates contact of the probe with the NAPL surface, if present, then the top of the water surface, and to the total depth of the well to evaluate for the presence of

DNAPL. The depth to NAPL and water measurements will be referenced to the surveyed reference point at the top of the well casing. Levels will be measured to the nearest 0.01 foot and recorded on the water level measurement form. The total depth of each well will also be measured to evaluate silt in the well. Fluid levels and total depth measurements will be recorded on the Fluid Level Monitoring Record (Appendix A).

### **3.0 GROUNDWATER PURGING AND SAMPLING**

#### **3.1 Low-Flow Well Purging**

Prior to collecting groundwater samples from the Site, fluid levels will be measured from the monitoring well network (Section 3.0). Monitoring wells will be purged using a low flow sampling technique as described in the USEPA guidance document *Low-Flow (Minimal Drawdown) Ground Water Sampling Procedures (USEPA, 1995)*. Purging will be accomplished in such a way as to minimize disturbance of sediments at the bottom of the well, and therefore minimize turbidity of the water samples. Typically, this is accomplished by purging at a low flow rate (less than one liter per minute) with the pump intake near the middle of the screened interval, unless creosote DNAPL is present in the well. Dedicated tubing compatible with the chemicals of concern will be used during the purging and sampling for each well.

Purging of a well will be accomplished by purging at a rate between 0.1 and 0.5 liters per minute while monitoring the following field parameters every 5 to 10 minutes: specific conductance, pH, temperature, dissolved oxygen, oxidation-reduction potential (Redox), and turbidity. These measurements will be recorded on the groundwater sampling record (Appendix A). The odor and color of the purge water will also be noted. Meters will be calibrated before sampling each day, using the manufacturer's procedure. The well will be purged until these parameters stabilize or the well purges dry. If a well purges dry, a sample will be collected as soon as a sufficient volume of groundwater has entered the well to enable sample collection. The water level in the well will also be checked periodically during purging. The goal of low-flow sampling is not to lower the water column greater than one foot; however, under some circumstances where the geologic formation cannot sustain the low-flow rate, adjustments may be necessary.

Recommended criteria for establishing stabilization of the field parameters between successive measurements are as follows, and in this general order:

<u>Parameter</u>	<u>Stabilization</u>
Specific conductivity	10 percent
pH	0.1 standard units
Temperature	1 degree Celsius
Redox	+/-10 millivolts
D.O.	10 percent
Turbidity	less than 10 NTU (last measurement only) or 10 percent

Water will be collected in containers provided by the UPRR-approved laboratory. IDW (decontamination and purge water) will be stored in 55-gallon drums on Site at the CSA.

### **3.2 Sample Collection**

Sample collection will be performed as soon as possible after purging. The collection of aliquots for the laboratory will be performed using the same dedicated pump or other appropriate sampling device as was used for purging. Because sampling will immediately follow well purging, substantial quantities of water from the well to be sampled will have moved through the pump and discharge tubing, thereby providing substantial rinsing of the sampling equipment with the water to be sampled. Sampling personnel will, at a minimum, wear a new pair of gloves at each well site and change gloves, as appropriate.

Samples will be withdrawn from the well at a low flow rate (similar to the flow rate used to purge the well) to minimize aeration of the sample during collection at the wellhead. Samples will be collected and containerized for laboratory analysis, taking into consideration the specific sample preservation methods for the methods described in Section 3.4. Field measurements such as water temperature, specific conductance, pH, D.O., Redox, odor, color, and turbidity of the unfiltered water sample will be recorded immediately preceding the collection of sample aliquots. These values will be recorded on the groundwater sampling record (Appendix A).

### **3.3 Sample Containers**

Containers used to transport samples for laboratory analyses will be provided by the UPRR-approved laboratory performing the analyses. The bottles will be prepared and preserved according to EPA specifications (EPA, 1996). The bottles will not be opened until they are to be filled with sample water. The typical bottle type to be used and the minimum volume of water to be collected for each specific analytical parameter or method will be in accordance with the EPA analytical method. Substitutions of bottle type and sample volumes may be allowed if acceptable to the project manager and the laboratory performing the analyses and if compatible or improved over EPA requirements. Volume requirements should be confirmed with the laboratory prior to each sampling event to ensure that adequate sample volume is provided for QA/QC analyses.

### **3.4 Groundwater Analytical Plan**

The alternate POE monitoring wells at the Site will be sampled semi-annually as presented on CP Table V: Designation of Wells based on the requirements of the RAP (CP Attachment XI.D). The alternate POE monitoring wells at the Site will be sampled semi-annually in January and July. In addition to the alternate POE wells, additional monitoring wells (RAP Attachment 3, CP Attachment XI.D) will also be monitored to evaluate DNAPL thickness and sentry wells for the D-TZ. After each sampling event, the sampling frequency for these monitoring wells will be evaluated.

Using the list of COCs identified in the RCRA Facility Investigation Work Plan (SPTCo, 1994) for the Site, CP Attachment C Table 1 contains the analytical methods that will be used and CP Table IIIA (Corrective Action Program Table of Indicator Parameters and the Groundwater Protection Standard) provides the specific list of analytes for which groundwater samples will be analyzed. As detailed in the RAP (CP Attachment XI.D), Site monitoring wells will also be sampled one-time for RCRA metals arsenic and lead in 2015. If arsenic and lead concentrations are detected above TRRP PCLs, those COCs will be added to the routine groundwater sampling analytical list. In addition, MNA parameters may be added to a sampling event every three years to support the MNA evaluation for the PMZs.



### **3.5 Sample Storage and Transport**

Samples for will be placed on ice and transported to the laboratory as soon as possible. The sample containers will be placed in an insulated ice chest containing ice immediately after collection to lower the sample temperature to 4°C or less. Every effort will be made to maintain these samples at, or near this temperature, prior to and during shipment to the laboratory. Sample coolers will be either couriered or delivered via overnight delivery to the designated laboratory.

### **3.6 Sample Documentation**

A sample documentation program will be implemented to document possession and handling of water samples from the time of field collection through laboratory analysis. The program will include:

- Sample labels which clearly identify sample locations and analyses to be performed;
- A custody seal placed on the shipping container to preserve the integrity of the sample from the time it is collected until shipped and opened in the laboratory;
- A sampling record (Appendix A) on which to log information about each sample collected during the monitoring event; and
- A chain-of-custody record will be used to establish sample possession from the time of collection to analysis (this form may be combined with, or supplemented by a sample analysis request form).

#### **3.6.1 Sample Labels**

To prevent misidentification of samples, labels will be affixed to each sample container. Information will be written on the label with a permanent marker. The labels will be sufficiently durable to remain legible even when wet and will contain the following information:

- Facility/project identification number;
- Sampling point identification name and/or number;
- Name or initials of collector;
- Date and time of collection;
- Analysis required (if space on label allows); and
- Preservative inside bottle, if applicable.

An alpha-numeric sample identification coding system consistent with the UPRR SysDat protocols will be used to uniquely identify each sample, including the duplicate sample. The sample identification will follow the following format:

**Example: WG-1620-MW25A-20150123**

Where “WG” is the designation for groundwater sample, “1620” is the SysDat Facility ID for the Site, “MW25A” is the unique sample location for monitoring wells, and “20150123” is the sample date (yyyymmdd format).

### **3.6.2 Sampling Record**

A groundwater sampling record (Appendix A) will be maintained for all sample collection activities. The following specific data will be documented on a field form where applicable:

- Name of collector(s);
- Identification of well or sampling point;
- Climatic conditions, including estimated air temperature;
- Depth to bottom of well;
- Depth to water in wells referenced from top of casing (before and after well purging);
- Well purging method;
- Purge volume, time, and date;
- Well yield characteristics, if appropriate;
- Results of field analyses (pH, temperature, specific conductance, Redox, dissolved oxygen, and turbidity for each measurement period);
- Sample observations (color, odor, etc.);
- Sample withdrawal procedures;
- Types of sample containers used;
- Preservatives used in addition to ice;
- Sequence and time of field activities conducted;
- Field observations (e.g., broken lock, cracked casing, etc.);
- Cross reference to Chain-of-Custody; and
- Any other pertinent data.

Additional field forms will be completed as needed pursuant to the GWSAP. Any sampling activities will be documented on the appropriate field forms and will contain at a minimum the sample ID, sampling location, sampling time and date, sampling method, calibration of field equipment, field parameter measurements, and sample collector's name and signature.

### **3.6.3 Chain-Of-Custody Documentation**

Evidence of collection, shipment, and laboratory receipt must be documented on a Chain-of-Custody record by the signature of the individuals collecting, shipping and receiving each sample. After samples have been collected, they will be maintained under strict chain-of-custody procedures. The procedures described below document the transfer of custody of the samples from the field to the designated analytical laboratory and the associated documentation requirements. The field sampling personnel will complete a Chain-of-Custody Record and Request for Analysis (CC/RA) form for each shipping container (i.e., cooler, ice chest or other container) of samples to be sent to the laboratory for analysis. The CC/RA for a shipping container will list only those samples in that shipping container. The sample collector will cross out any blank space on the CC/RA below the last sample number listed (on the part of the form where samples are listed).

The sampling personnel whose signature appears on the CC/RA is responsible for the custody of the sample from the time of sample collection until the custody of the sample is transferred to a designated laboratory, a courier, or to another project employee for the purpose of transporting the sample to the designated laboratory. The sample is considered to be in custody when the sample is: (1) in the direct possession of the sample custodian; (2) in plain view of the sample custodian; or (3) is securely locked in a restricted access area by the sample custodian.

Custody is transferred when both parties to the transfer complete the portion of the CC/RA under "Relinquished by" and "Received by". Signatures, printed names, company names, date, and time are required. Upon transfer of custody, the sampling personnel who relinquished the samples will retain a copy (pink copy) of the CC/RA. When the samples are shipped by a common carrier, a Bill of Lading supplied by the carrier will be used to document the sample custody, and its identification number will be entered on the CC/RA. Copies, receipts, or carbons of Bills of Lading will be retained as part of the permanent documentation in the project file. It is not necessary for courier personnel to sign the CC/RA.

The samples will be shipped to the selected analytical laboratory. When the samples are received by the laboratory, the CC/RA will be immediately signed along with the date and time of receipt. The top sheet

(white copy) of the CC/RA will be returned with the final analytical report. The laboratory will maintain a record of sample handling according to the procedures described in *Review and Reporting of COC Concentration Data*, (RG-366/TRRP-13) (TCEQ, 2010).

#### **4.0 DATA QUALITY ASSURANCE AND QUALITY CONTROL**

The Quality Assurance/Quality Control (QA/QC) Plan has been developed to address general quality assurance (QA) issues pertaining to the sampling at the Site. This QA/QC Plan describes the specific protocols that will be followed for sample handling and storage, chain of custody and laboratory analysis. The information contained in this QA/QC Plan is meant to be used in conjunction with the sampling methods and procedures described in the associated GWSAP.

The goal of the QA/QC Plan is to assure that the data collected meet the data quality objectives of the GWSAP. All QA/QC procedures will be in accordance with applicable professional standards, government regulations and guidelines, and specific project goals and requirements. This QA/QC Plan details the approach that will be taken to provide precise, accurate, and representative data for evaluating groundwater conditions at the Site.

Analytical data collected pursuant to the GWSAP will be reviewed in order to evaluate if data are suitable for use to assess the effectiveness of the proposed response action. Analytical data will be supported by the QA documentation required by the Texas Commission on Environmental Quality (TCEQ) Texas Risk Reduction Program (TRRP) Regulatory Guidelines Document RG-366/TRRP-13 *Review and Reporting of COC Concentration Data* (TCEQ, 2010). The analytical data will be validated in accordance with TCEQ protocols.

#### **4.1 Documents and Records**

Field records, sample labels, and chain-of-custody documents will be completed and packing and shipping procedures will be performed by the field staff according to the instructions presented in Section 4 of the GWSAP.

The laboratory will prepare data packages that include the TRRP-13 (TCEQ, 2010) Laboratory Signature Page and Laboratory Review Checklist(s) (LRCs). The LRCs include Reportable Data, Supporting Data, and the Exception Report when there are exceptions noted on these checklists.

#### **4.2 Analytical Procedures**

Samples will be analyzed in accordance with the guidelines of EPA SW-846, *Test Methods for Evaluating Solid Waste-Physical/Chemical Methods* for the parameters detailed in the GWSAP. The procedures for

laboratory analysis, with any modifications, are further documented in the laboratory standard operating procedures, which are maintained at the laboratory, and are listed in the laboratory's quality assurance plan.

### **4.3 Quality Control**

Quality Control (QC) will be achieved by collecting and/or analyzing the appropriate field and laboratory QC samples to ensure that the analytical results meet the measurement objectives. Results from analyses of QC samples are used to quantify precision and accuracy and identify any problems or limitations of those data.

For this project, field QC will include the collection of field blanks and field duplicates. Equipment blanks will not be necessary because dedicated tubing will be used for groundwater sampling. A temperature blank will be included with every cooler and a trip blank will be included containing samples for VOC analysis. Laboratory QC will include calibration standards, method blanks, laboratory control samples and duplicates, matrix spikes/matrix spike duplicates, and analytical duplicates. The QC samples, their QA objectives, and acceptance limits are described in the following sections and are summarized in Table 5.

Field QC will be controlled by compliance with standard sample collection and handling methods and by the periodic collection of field QC samples. QC samples will be collected as blind samples so that the laboratory remains unaware of the nature of those samples and performs QC sample analyses by the same manner as all other sample analyses. The appropriate types and frequency of field QC samples depend on the sample type, sample matrix, and intended data use.

A field duplicate sample is a second sample collected at the same location as the original sample. It is collected simultaneously with or in immediate succession to the original sample using identical recovery techniques, and is treated in an identical manner during storage, transportation and analysis. Field duplicates measure the sampling and analytical variability (precision) associated with the groundwater sample concentrations. One sampling location will be selected at random for duplicate sampling (one duplicate for every 20 samples). At groundwater sampling locations, duplicate samples will be collected from the pump tubing in successive aliquots alternating with collection of the original sample. The field duplicate will be submitted as a "blind" sample to the laboratory. The relative percent difference (RPD) between the original sample and field duplicate will be calculated for each parameter as part of the data evaluation. Field precision outside the acceptance limit of 25 percent RPD will indicate high variability, and therefore estimated concentrations, associated with the field duplicate and original sample.

A trip blank consists of analyte-free deionized water (ASTM Type II) that is supplied by the laboratory, transported to the sampling location, and transported to the laboratory for analysis without having been exposed to the sampling procedure. One trip blank is taken to the sampling location and is transported to the laboratory for each cooler containing field samples for volatile organic analytes. Trip blanks assess any cross-contamination of volatile organic compounds that may occur during sample transport.

Laboratory QC is necessary to control the analytical process, assess the precision and accuracy of analytical results, and identify assignable causes for atypical analytical results. Detailed laboratory QC requirements are contained within each individual method and Laboratory Quality Assurance Manuals.

#### **4.4 Equipment Inspection, Testing, Calibration, and Maintenance**

All sampling equipment testing and maintenance requirements are detailed in the manufacturer's specifications for a particular piece of equipment. Sampling equipment is inspected and tested upon receipt and is assured appropriate for use. Field instruments and equipment will be maintained in accordance with the manufacturer's instructions. Field instruments that fail two consecutive calibration requirements will be tagged as "nonfunctional" and returned to the manufacturer for repair or replacement. Acceptance criteria are detailed in the manufacturer's documentation for each instrument.

All laboratory tools, gauges, instruments, and equipment testing and maintenance requirements are contained within the laboratory's quality assurance plan. Testing and maintenance records are maintained and are available for inspection. Instruments requiring daily or in-use testing may include, but are not limited to, water baths, ovens, autoclaves, incubators, refrigerators, and laboratory pure water. Critical spare parts for essential equipment are maintained or are available through a preferred vendor status to prevent downtime. Maintenance records are available for inspection.

#### **4.5 Data Validation, Interpretation, and Reporting**

Field personnel will supply sample custody information to the data management staff, including sample logs and chain-of-custody documents. Laboratories will supply deliverables on the normal turnaround time schedule, unless expedited delivery of results is necessary. The data management staff will produce reports for review by the project's QA staff, and will make available data files that can be transferred into compatible

software packages, if necessary. The data collected for this GWSAP will be considered Level II and Level III data.

Hard copy data packages will be sent directly by the laboratory to the project manager for review. Data review will include verification of completeness of data packages. The data reviewer will evaluate and describe data quality to identify measurement uncertainties or other factors that may affect data use (i.e., measurement goals not met). Data will be reviewed and validated as described in *Review and Reporting of COC Concentration Data*, (RG-366/TRRP-13) and the results of the review/validation will be summarized in a Data Usability Summary (DUS).

Data deliverables will be uncensored in that they will include a result for all analyses, even those below the project-required sample detection limit, as appropriate for the specific analytical instrument. Data collected during this investigation will be incorporated and managed in a database with the existing data from the Site.

The validated groundwater analytical data will be directly compared to the respective GWPS concentration limit on CP Table IIIA, and determine if the value is less than, equal to, or greater than the concentration limit.

In the event that a GWPS concentration in an alternate POE well is exceeded in an initial monitoring sample, a second confirmation sample will be collected within 60 days from the monitoring well where the initial unverified exceedance was observed and analyzed for the specific COC that exceeded its GWPS. If the COC concentration in the second sample is greater than the GWPS, a confirmed exceedance will be concluded and further action will be required, unless an alternate source demonstration can explain the detection. Possible further actions for the Site following a confirmed GWPS exceedance may include modifications to the monitoring frequency or monitoring locations (e.g., installation of additional monitoring locations), re-evaluation of concentration trends in existing monitoring wells, or evaluation of the COC data trends (see CP Attachment XI.D, Appendix 7 for Statistical Methodology).



## 5.0 REFERENCES

Southern Pacific Transportation Company (SPTCo), 1994. RCRA Facility Investigation Work Plan – Permit Number HW-50343-000. October 14, prepared by IC.

Texas Commission on Environmental Quality (TCEQ), 2010; *Review and Reporting of COC Concentration Data*, RG-366/TRRP-13, Revised May 2010

United States Environmental Protection Agency (EPA), 1995. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. EPA 540/S-95/504. December.

———, 1996. *SW-846: Test Methods for Evaluating Solid Waste-Physical/Chemical Methods, Final Edition*. Office of Solid Waste and Emergency Response. December.

## **TABLES**

**TABLE 1**

**LIST OF ANALYTICAL PARAMETERS, ANALYTICAL METHODS, BOTTLE TYPES, PRESERVATIVES AND SAMPLE HOLDING TIMES  
UPRR HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

<b>Parameter</b>	<b>Analytical Method &amp; Reporting Limit</b>	<b>Volume (ml.)</b>	<b>Container*</b>	<b>Preservative</b>	<b>Holding Time</b>
VOCs	SW846, 8260B	3x40 mL VOA Vials	4 degrees C, HCL to pH<2	14 days	VOCs
SVOCs	SW846, 8270C - Low Level* SW846, 8270C - SIMs*	2 x 1-Liter Amber Glass	None	7days	SVOCs
RCRA Metals <sup>1</sup>	SW 6020	500	Plastic	HNO <sub>3</sub> to pH<2	6 months

Notes:

\* - either method may be used if Sample Detection Limits (SDLs) satisfy the GWPS.

1 - RCRA Metals arsenic and lead will be analyzed during the groundwater sampling event in 2015 as a one-time event. Arsenic and lead may be added pending the initial results.

**TABLE 2**

**QUALITY ASSURANCE/QUALITY CONTROL SAMPLE OBJECTIVES  
UPRR HOUSTON WOOD PRESERVING WORKS  
HOUSTON, TEXAS**

SAMPLE TYPE	PURPOSE	QA OBJECTIVE
Field Duplicates  Sampling Frequency: Once per every 20 samples or once per sampling day, whichever is greater.	Measure sampling and analytical precision	Precision: 25% RPD
Field Blanks  Sampling Frequency: Once per sampling day.	To check crosscontamination during sample collection, sample shipment, and in the laboratory. Also to check sample containers.	Chemicals of concern not detected.
Matrix Spike/Matrix Spike Duplicate  Prepared by the analytical laboratory	Measure accuracy (MS) and precision (MS/MSD) to indicate possible bias from matrix effects	Within laboratory control limits
Trip Blanks  Frequency: Supplied by laboratory. One per every cooler containing groundwater samples	Quantify artifacts introduced during transport or storage of samples - measure of accuracy and representativeness	Volatile organic compounds not detected.
Laboratory Control Samples	Method and instrument are operating appropriately, measures accuracy and	Within laboratory control limits
Analytical Duplicates	Measure analytical precision	Within laboratory control limits
Laboratory Calibration Standards	Insures that sample concentration is accurately measured by instrument - also a measure of representativeness	Within laboratory control limits

## **APPENDICES**

**APPENDIX A**  
**FIELD FORMS**



**GROUNDWATER SAMPLING RECORD** PAGE \_\_\_\_ of \_\_\_\_

Project Number: _____		Project Name: _____		Date: _____
Sample Number: _____		Starting Water Level (ft. BMP): _____		
Sampling Location (well ID, etc.): _____		Casing Stickup (ft.): _____		
Sampled by: _____		Starting Water Level (ft. BGL): _____		
Measuring Point (MP) of Well: _____		Total Depth (ft. BGL): _____		
Screened Interval (ft. BGL): _____		Casing Diameter (In ID): _____		
Filter Pack Interval (ft. BGL): _____		Casing Volume (gal.): _____		

**QUALITY ASSURANCE**

METHODS (describe): \_\_\_\_\_

Cleaning Equipment: \_\_\_\_\_

Purging: \_\_\_\_\_ Sampling: \_\_\_\_\_

Disposal of Discharged Water: \_\_\_\_\_

**INSTRUMENTS (Indicate make, model, I.d.)**

Water Level: \_\_\_\_\_ Thermometer: \_\_\_\_\_

pH Meter: \_\_\_\_\_ Field Calibration: \_\_\_\_\_

Conductivity Meter: \_\_\_\_\_ Field Calibration: \_\_\_\_\_

Filter / Filter Size: \_\_\_\_\_ Other: \_\_\_\_\_

**SAMPLING MEASUREMENTS**

Time	Cum. Vol. (gal. or L)	Purge Rate (gal. or L / m)	Temp. (oC)	pH	Spec. Cond. (mmhos/cm)	Color	Turbidity & Sediment	Remarks

Water Level (ft. BMP) at End of Purge: \_\_\_\_\_ Sample Intake Depth (ft. BMP): \_\_\_\_\_

**SAMPLE INVENTORY**

Bottles Collected				Filtration (Y / N)	Preservation (type)	Remarks (quality control sample, other)
Time	Volume	Composition (G, P)	No.			

Comments: _____ _____ _____	<b>Pastor, Behling &amp; Wheeler, LLC</b> <b>2201 Double Creek Dr., Suite 4004</b> <b>Round Rock, Texas 78664</b> <b>Phone: (512) 671-3434 Fax: (512) 671-3446</b>
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**Attachment D**

**RESPONSE ACTION PLAN**  
(Submitted in separate binders)

Union Pacific Railroad Company  
Houston Wood Preserving Works  
Houston, Texas

## XII. Hazardous Waste Permit Application Fee

In accordance with 30 TAC 305.53, complete Tables XII.A. - Hazardous Waste Units (For Application Fee Calculations) and XII.B. - Hazardous Waste Permit Application Fee Worksheet . Use the following information in calculating your fee. The application fee will be non-refundable once an initial review of the application has been completed. The applicant's fees are subject to evaluation by the technical staff of the Texas Commission on Environmental Quality (TCEQ). However, the TCEQ reserves the right to assess further fees as may be necessary.

- A. The minimum permit application fee for a permit or a permit renewal for each hazardous waste facility to be used for Storage, Processing, Disposal, or Closure/Post-Closure Care (disposal has already occurred) of hazardous waste shall be \$2,000, plus notice fee, and the maximum shall be \$50,000, calculated according to these instructions:
1. Process Analysis - \$1,000.00.
  2. Management/Facility Analysis - \$500.00.
  3. A facility unit(s) analysis of \$500 per unit is charged for the following:
    - a. each cell of a landfill (note that multiple cells that are identical in type and use are subject to a single \$500 fee);
    - b. tanks and container storage areas (note that multiple tanks and container storage areas that are identical in type and use are subject to a single \$500 fee)
    - c. identical in type and use means the following:
      - (1) made of the same material and same design;
      - (2) the same size/capacity within + 10%;
      - (3) store the same waste (as identified by USEPA hazardous waste number - 40 CFR 261 Subparts C & D); and
      - (4) have the same management characteristics (e.g., storage only).
  4. Site Evaluation - \$100 per acre of surface used for hazardous waste management up to 300 acres. No additional fee thereafter. This shall be calculated as any acreage which will be permitted to manage hazardous waste. This shall include, for example, the entire area within the secondary containment of a tank farm, the area within a fence that surrounds individual units (other than the facility fence), or the area defined by the toe of the dike surrounding a landfill or impoundment, etc.
  5. An applicant shall also include with each initial application a fee of \$50 to be applied toward the cost of providing the required notice. An additional notice fee of \$15 is required with each application for renewal.
- B. The application fee for a major amendment or a Class 2 or 3 modification to a hazardous waste permit for operation, closure, or post-closure care is subject to the fees listed below:
1. A management/facility analysis fee of \$500.
  2. The notice fee is \$50.
  3. If a unit is added or a unit area is expanded for any purpose, \$100 per additional acre is assessed, until the total additional acreage reaches 300 acres.

4. If one or more of the following reports are added or are significantly revised, the process analysis fee of \$1000 is assessed:
    - a. waste analysis plan;
    - b. site-specific or regional geology report;
    - c. site-specific or regional geohydrology report;
    - d. groundwater and/or unsaturated zone monitoring;
    - e. closure and/or post-closure care plan; or
    - f. RCRA Facility Assessments (RFAs), or corrective action reports;
    - g. Alternate Concentration Limit (ACL) demonstration or Development of Protective Concentration Limits (PCLs);
    - h. Regulated Unit Facility Assessment, Corrective Action (CA) work plans or reports for Regulated Units; and/or
    - i. RCRA Facility Investigation (RFI)/Affected Property Assessment (APA), Remedy Selection, Corrective Measure Implementation (CMI)/Remedial Action Plan for solid waste management units, and/or areas of concern;
    - j. Facility Operations Area (FOA).
  5. A unit analysis fee of \$500 per unit is assessed if any of the following occur:
    - a. if a unit is added (even if identical to units already in place, using the criteria discussed in A.3 above);
    - b. if there are design changes in an existing unit; or
    - c. if a unit status changes from closure to post-closure care;
    - d. Changes in the number, location, depth, or design of wells approved in compliance plan or a permit (unless it is a replacement well);
    - e. Changes in point of compliance and compliance monitoring program;
    - f. Changes in Groundwater Protection Standards, indicator parameters, Alternate Concentration Limits or Protective Concentration Limits; and/or
    - g. Changes in corrective action program.
- C. The application fee for a minor amendment, a Class 1, or a Class 11 modification of a hazardous waste permit is \$100 plus a notice fee of \$50.



**XII. HAZARDOUS WASTE PERMIT APPLICATION FEE**

**Table XII.A. - Hazardous Waste Units (For Application Fee Calculations)**

Verbal Description of Unit	Rated Capacity	Surface Acreage <sup>1</sup>	# of Unit Types <sup>2</sup>	Identical Unit Justification <sup>3</sup>
Closed Surface Impoundment	5,065 yd <sup>3</sup>	0.44	1	NA
		<b>Total<sup>4</sup></b>	<b>Total<sup>4</sup></b>	
		0.44	1	

- 1 Number of calculated acres.
- 2 Enter number of units except for units identical in type and use which only count toward a single \$500.00 fee.
- 3 Explain justification for any units claimed as identical in type and use.
- 4 Enter these totals on the worksheet.

**TABLE XII.B. - HAZARDOUS WASTE PERMIT APPLICATION FEE WORKSHEET**

Name of Facility: Union Pacific Railroad Company Houston Wood Preserving Works

Solid Waste Registration Number: 31547

1. Process Analysis - \$1,000	\$ <u>1,000.00</u>
2. Facility Management Analysis - \$500	\$ <u>500.00</u>
3. Unit Analysis <sup>6</sup> - 1 units @ \$500 per unit	\$ <u>500.00</u>
4. Site Evaluation <sup>6</sup> - <u>0.44</u> acres @ \$100 per acre (Maximum of 300 acres)	\$ <u>44.0</u>
5. Minor amendment, Class 1, or Class 1 <sup>1</sup> modification - \$100	\$ <u>-</u>
6. Cost of Providing Notice - \$50 (+ \$15 for a renewal)	\$ <u>65.00</u>
<b>PAY THIS AMOUNT</b>	<b>TOTAL</b> \$ <u>2,109.00</u>

**MAKE CHECKS PAYABLE TO:**

Texas Commission on Environmental Quality - **Fund 549**  
(your canceled check will be your receipt)

**COMPLETE AND RETURN WITH PAYMENT TO:**

Texas Commission on Environmental Quality  
Financial Administration Division - MC 214  
P.O. BOX 13087  
Austin, Texas 78711-3087

The applicant's fees are subject to evaluation by the technical staff of the Texas Commission on Environmental Quality (TCEQ). However, the TCEQ reserves the right to assess further fees as may be necessitated.

Pastor, Behling & Wheeler, LLC

2201 Double Creek Drive  
Suite 4004  
Round Rock, TX 78664

First Citizens Bank  
88-9390/1149

12018

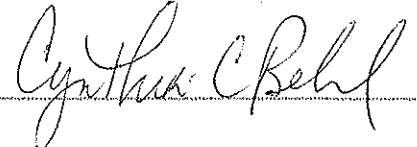
12/8/2014

PAY TO THE ORDER OF TCEQ - Fund 549

\$\*\*2,109.00

Two Thousand One Hundred Nine and 00/100\*\*\*\*\* DOLLARS

Texas Commission on Environmental Quality



MEMO Fund 549

⑈012018⑈ ⑆114993906⑆009160050569⑈

PASTOR, BEHLING & WHEELER, LLC

12018

TCEQ

12/8/2014

Permit Renewal Fee

2,109.00

RECEIVED  
DEC 10 2014  
TCEQ Revenue Section

Checking - First Citize Fund 549

2,109.00



### XIII. Confidential Material **Not Applicable**

Any information requested in the previous Sections I. through XI. of this application which is deemed confidential shall be provided in this Section as a separate collective document and clearly labeled **CONFIDENTIAL**.