

Texas Commission on Environmental Quality
Remediation Division Correspondence Identification Form

SITE & PROGRAM AREA IDENTIFICATION			
SITE LOCATION		REMEDIATION DIVISION PROGRAM AND FACILITY IDENTIFICATION	
Site Name:	Union Pacific Railroad Houston Wood Preserving Works	Is This Site Being Managed Under A State Lead Contract? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Address 1:	4910 Liberty Road	Program Area:	IHW Corrective Action
Address 2:		Mail Code:	MC-127 (IHW)
Houston State: Texas		Is This A New Site To This Program Area? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Zip Code:	77026	County:	Harris
TCEQ Region:		Houston - 12	
		Additional Information:	SWR No. 31547
		Additional Information:	Permit/ Compliance Plan No. 50343

DOCUMENT(S) IDENTIFICATION	
PHASE OF REMEDIATION	DOCUMENT NAME
1. Miscellaneous	RESPONSE TO TCEQ COMMENT LETTER DATED JULY 16, 2020
2. Please select a phase of remediation	
3. Please select a phase of remediation	
4. Please select a phase of remediation	
5. Please select a phase of remediation	

CONTACT INFORMATION	
<input checked="" type="checkbox"/> I attest that all work has been done in accordance with TCEQ rules	<input checked="" type="checkbox"/> I certify that I am aware misrepresentation of any claim is a violation.

RESPONSIBLE PARTY/APPLICANT/CUSTOMER INFORMATION (IF APPLICABLE)			
Union Pacific Railroad			

ENVIRONMENTAL CONSULTANT/REPORT PREPARER/AGENT			
Golder Associates Inc.			

SIGNATURES			

DATABASE CODES			
Document No.	TCEQ Database Term	Document No.	TCEQ Database Term
1.		4.	
2.		5.	
3.			



August 5, 2020

Project No. 19119232

Maureen Hatfield

VCP-CA Section - Remediation Division
Texas Commission on Environmental Quality
P.O. Box 13087, MC-127
Austin, Texas 78711-3087

**RE: RESPONSE TO TCEQ COMMENT LETTER DATED JULY 16, 2020
INTERIM GROUNDWATER MONITORING REPORT (2019-2020), DATED APRIL 30, 2020
UNION PACIFIC RAILROAD – HOUSTON WOOD PRESERVING WORKS
HOUSTON, HARRIS COUNTY, TEXAS
HAZARDOUS WASTE PERMIT/ COMPLIANCE PLANE NO: 50343, ISWR NO 31547
EPA ID NO. TXD000820266; RN100674613; CN600131098**

Dear Ms. Hatfield:

Golder Associates Inc. (Golder), on behalf of Union Pacific Railroad Company (UPRR), is pleased to submit this letter as a response to the Texas Commission on Environmental Quality (TCEQ) letter dated July 16, 2020 providing comments on the Interim Groundwater Monitoring Report (2019-2020) dated April 30, 2020 (IGMR). TCEQ had the following comments and recommendations:

- 1. In the Report, UPRR explains that arsenic concentrations in the A-TZ wells don't appear to correlate with the elevated concentrations of the primary site-specific COCs and are likely associated with naturally-occurring arsenic mobilizing under reducing conditions caused by the natural degradation of petroleum hydrocarbons. However, the Report does not contain any site-specific supporting information to verify that arsenic is naturally occurring. For instance, no site-specific background groundwater concentrations have been established, and there is also no site-specific geochemical data to support a reduced environment. UPRR should provide a more detailed discussion of how arsenic will be further evaluated and if additional wells are proposed to delineate arsenic in the A-TZ and B-CZ/B-TZ.*

Response:

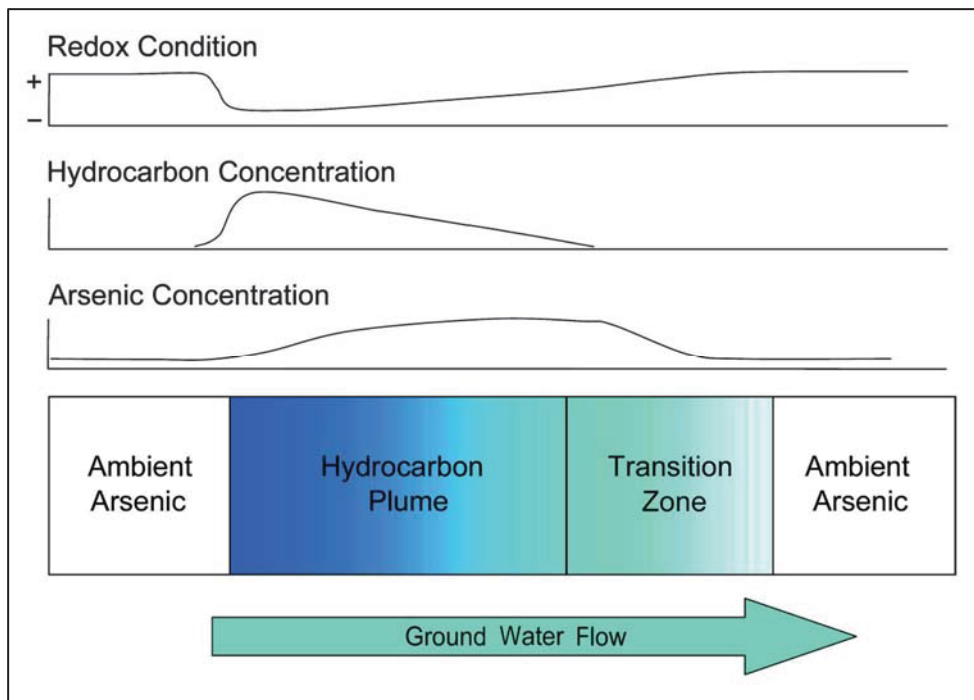
As stated in the IGMR, arsenic concentrations in the A-TZ wells do not appear to correlate with the elevated concentrations of the primary COCs. Many wells with arsenic concentrations exceeding the applicable Texas Risk Reduction Program (TRRP) Protective Concentration Level (PCL) do not have concentrations of creosote-related COCs exceeding method detection limits (MDL) and/or RALs, especially on the northwest area on-site and north off-site in the A-Transmissive Zone (A-TZ). For example, the highest arsenic concentrations detected in groundwater during the July 2019 sampling event were detected at monitoring wells MW-26A (off-site) and MW-13 (on-site), but all other COC concentrations in these two wells were detected below RALs. Similar to the July

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2019 sampling event, the highest arsenic concentrations detected in groundwater during the January-March 2020 sampling event were detected at MW-13, and all other COC concentrations in MW-13 were below RALs. In addition, most of the monitoring wells in the source areas where elevated concentrations of creosote-related COCs have been detected, arsenic concentrations are generally below the PCL. Due to this relationship of arsenic detected in the shallow groundwater bearing units (GWBUs), the presence of arsenic in groundwater is believed to be associated with naturally-occurring arsenate species within the groundwater matrix that are converted to the more soluble arsenite species due to reducing conditions resulting from the degradation of petroleum hydrocarbons (i.e. creosote-related COCs) from the Site.

The ability of the geochemical environment to enhance the solubility and thus the equilibrium concentration of naturally-occurring arsenic in groundwater is well known and has been detailed in multiple references including the American Petroleum Institute (API) Groundwater Arsenic Manual – Attenuation of Naturally-Occurring Arsenic at Petroleum Impacted Sites (API Manual) (API Publication 4761) (API, 2011). The API Manual describes the process of developing the arsenic-specific site-specific conceptual model (SSCM) for evaluating arsenic in groundwater at petroleum-impacted sites. As described in API Publication 4761, the presence of hydrocarbons perturbs ambient geochemical conditions (typically lowering the oxidation-reduction (redox) potential to more reduced conditions) in groundwater, which may increase the solubility of naturally occurring arsenic in the aquifer matrix. The conceptual model for naturally occurring arsenic dissolution and attenuation at a hydrocarbon plume is summarized in the figure below (taken from Figure 1-5 of API Publication 4761).

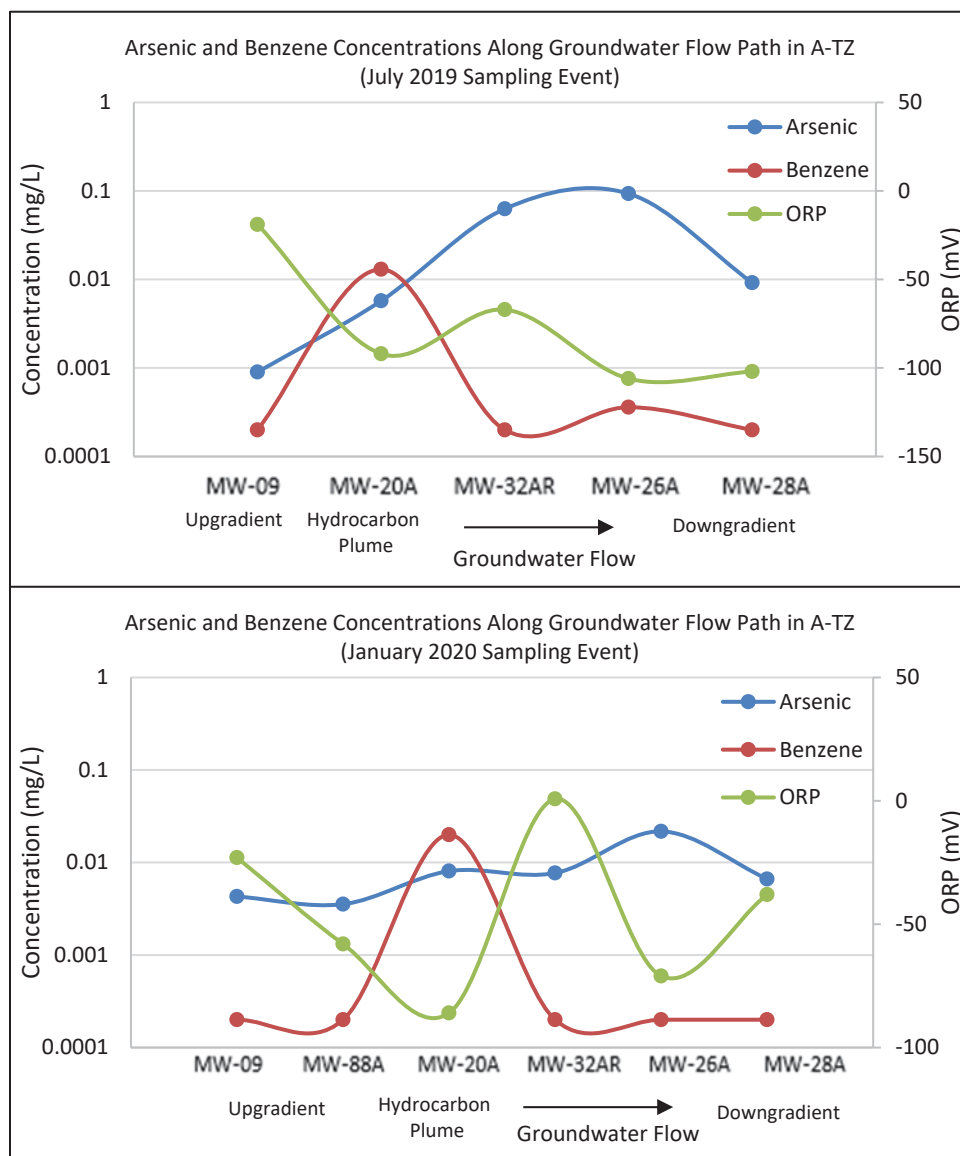


Source: API, 2011

Upgradient of the hydrocarbon plume, ambient conditions exist with typically higher (i.e., less reducing) redox potential and background or ambient arsenic concentrations. Within the hydrocarbon plume, hydrocarbon COC concentrations are elevated, which induce reducing conditions (i.e., negative redox), and thereby create a geochemical environment that allows natural arsenic in the aquifer matrix to go into solution resulting in higher concentrations. Downgradient of the hydrocarbon plume, within the “transition zone” where hydrocarbon COC

concentrations degrade to near background conditions, arsenic concentrations may continue to be slightly elevated due to this localized redox shift before decreasing to background arsenic concentrations where groundwater reaches ambient conditions.

Site-specific petroleum hydrocarbon COC concentrations in the A-TZ wells located off-Site were below their respective PCLs and/or MDLs during the sampling events conducted in 2019 and January-March 2020. Since some of the highest arsenic concentrations were observed in off-Site A-TZ wells in 2019 and January-March 2020, the area north of the Site appears to be within the “transition zone” identified in the API Manual. Arsenic and benzene concentrations with oxidation-reduction potential (ORP) readings along the groundwater flow path in the A-TZ are presented below for the July 2019 and January 2020 sampling events. These graphs show the change in the geochemical environment as groundwater flows from upgradient of the A-TZ groundwater PCL exceedance (PCLE) Zone at MW-09 (and newly installed well MW-88A in January 2020) to within the PCLE Zone at MW-20, and downgradient of the groundwater PCLE Zone at MW-32AR, MW-26A and MW-28A.



The graphs illustrate a similar geochemical setting compared to the model shown on Figure 1-5 of API Publication 4761 presented on page 2 of this letter.

In response to the TCEQ comment and to further evaluate arsenic at the Site and to develop the arsenic-specific SSCM, the following conditions at the Site have been or will be evaluated:

- Overall site-conditions, such as basic stratigraphy and hydrogeologic conditions;
- Extent of creosote-related hydrocarbon source and plume; and
- Arsenic dissolution/attenuation processes within and surrounding the creosote-related hydrocarbon plume.

The overall site stratigraphy and hydrogeologic conditions and the extent of the creosote-related hydrocarbon source and hydrocarbon plume have been thoroughly evaluated as detailed in the Updated Affected Property Assessment Report (APAR) Addendum (PBW, 2010), Response Action Plan (RAP) Revisions (PBW, 2017), and IGMR (Golder, 2020) for the recent groundwater conditions. As part of the assessment of evaluating arsenic dissolution and attenuation processes in groundwater, field parameters, including ORP, are recorded during site-wide groundwater monitoring at the Site. ORP values have typically been between -100 mv and 0 mv during most of the sampling events in the A-TZ, B-CZ/B-TZ, and C-TZ across the Site, indicating overall reducing conditions.

However, in order to obtain a better understanding of the redox conditions and potential arsenic dissolution/attenuation processes in the A-TZ and B-CZ/B-TZ GWBUs, the following geochemical parameters as recommended in API Publication 4761 are proposed to be added to the sampling plan for A-TZ and B-CZ/B-TZ wells during the next two semi-annual sampling events:

- Dissolved iron/manganese (electron acceptor);
- Alkalinity (to assess buffering capacity and geochemical facies);
- Sulfate (electron acceptor);
- Nitrate (electron acceptor); and
- Total organic carbon (to assess capacity for microbial processes).

Electron acceptors (ferric iron, manganic manganese, nitrate, and sulfate) provide information on redox conditions, degradation of hydrocarbons, and attenuation capacity (API, 2011). The evaluation of the geochemical parameters will be provided in the annual groundwater monitoring report summarizing the sampling activities to be conducted in 2021.

Currently, UPRR does not propose installation of additional monitoring wells to further delineate arsenic in the A-TZ and B-CZ/B-TZ until the additional geochemical analyses are completed to confirm if the arsenic concentration trends follow the SSCM detailed in the API Manual. Once the SSCM for arsenic is established (including an evaluation of background arsenic concentrations) and the processes causing the fluctuations in concentrations are identified, UPRR will assess the need to conduct further delineation if necessary.

2. *Currently, the RCRA permitted waste management unit (WMU) 001 is in corrective action under the existing permit. Per the Permit Renewal application, UPRR proposes to switch from corrective action monitoring to a compliance monitoring program. Results of the July and October 2019 sampling events indicate that Naphthalene concentrations were detected above its sample detection limit (SDL) in point-of-*

compliance well MW-11B. However, the January 2020 sampling results for MW-11B indicated Naphthalene concentrations were less than its respective SDL. In the Report, UPRR explains that they will determine if WMU 001 remains in corrective action monitoring or switches to compliance monitoring based on the results of the July 2020. Since the Naphthalene concentrations keep fluctuating over the last year, the TCEQ has concerns as to whether the compliance monitoring objectives will be met now or in the future and recommends WMU 001 remain in the Corrective Action Program. Secondly, UPRR will likely not have sufficient time to make such a determination when the revised Conceptual RAP, the response to TCEQ's April 11, 2019 4th NOD, and the September 6, 2019 additional comment letter are due August 31, 2020.

Response: UPRR is in the process of reviewing the July 2020 groundwater monitoring data, and the preliminary results indicate the concentrations are less than the groundwater protection standards (GWPS) for naphthalene at MW-11B. However, consistent with this comment, WMU 001 will remain in the Corrective Action Program until concentrations in point-of-compliance (POC) wells are below the Groundwater Protective Standards (GWPS) established in the approval Compliance Plan (CP) Table III for three consecutive years in accordance with Section IV.F.3 of the CP. Once the compliance monitoring objectives are met, UPRR will propose to switch the monitoring program to the compliance monitoring program.

If you have any questions or comments on this response letter, please feel free to give us at (512) 671-3434 or Mr. Kevin Peterburs of UPRR a call at (414) 267-4164.

Sincerely,

Golder Associates Inc.



Michelle Hermiston, P.G.
Senior Project Hydrogeologist



Eric C. Matzner, P.G.
Principal / Practice Leader



CC: Kevin Peterburs, UPRR
TCEQ Region 12, Waste Section Manager