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US Army Corps
of Engineers
Baltimore District

Delivery Order No. 0016
Total Environmental
Restoration Contract
DACA31-95-D-0083

SOUTHERN MARYLAND WOOD TREATING SUPERFUND SITE IN HOLLYWOOD, MARYLAND

Low Temperature Thermal Desorption Units
Proof of Performance/Summary of Full Scale Operations

Approved by EPA
4/28/98

April 1998

REPORT DOCUMENTATION PAGE

Form Approved OMB No 0704-0188

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9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

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10 South Howard Street
Baltimore, MD 21201

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13. ABSTRACT *(Maximum 200 words)*

ICF Kaiser has been authorized to conduct remedial actions at the Southern Maryland Wood Treating Site (SMWT) under contract DACA31-95-D-0083, Delivery Order 0016. Remedial actions at the SMWT consist of onsite treatment of contaminated soil, and contaminated groundwater and surface water sediment, as well as onsite treatment of wastewater generated in the thermal desorption process. Contaminated soil and sediments will be excavated and treated using thermal desorption. The treated soil will be backfilled onsite once testing has confirmed that the soil has met the performance standards established in the September 1995 Record of Decision (ROD). Two onsite water treatment systems will treat ground water extracted from areas that will be excavated, surface water from the onsite pond, and wastewater generated from the thermal desorption process. A portion of the treated water will be reused in the thermal desorption process. The remainder will be discharged to the onsite stream in accordance with effluent standards established by the Maryland Department of the Environment (MDE).

This Proof of Performance (POP) Plan discusses procedures and requirements for start-up testing and full-scale operation of the batch thermal desorption units (BTDUs) and continuous thermal desorption units (CTDUs). An estimated 145,000 tons of contaminated soils and sediments will be treated on site in thermal desorption units (TDUs) - two continuous units and two batch units. This plan discusses the testing required and the standards that must be met prior to full-scale operation. Testing and monitoring requirements and performance standards for full-scale operation are also detailed in this plan.

14. SUBJECT TERMS

Southern Maryland Wood Treating Site, Remedial Action, Low Temperature Thermal Desorption, Proof of Performance, Full Scale Operations.

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SOUTHERN MARYLAND WOOD TREATING SITE
HOLLYWOOD, MARYLAND
PROOF OF PERFORMANCE PLAN
FINAL DOCUMENT

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APRIL 1998

ORIGINAL (Red)

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

Page #

ORIGINAL RED

LIST OF TABLES

LIST OF FIGURES

ORIGINAL
(Red)

LIST OF APPENDICES

ACRONYM LIST

acfm............................actual cubic feet per minute
ACGIH..........................American Conference of Government Industrial Hygienists
APA.............................Air Pathway Analysis
B[a]P...........................Benzo(a)pyrene
BTDU...........................Batch Thermal Desorption Unit
BTU.............................British Thermal Unit
CF...............................cubic feet
CFR.............................Code of Federal Regulations
COC.............................contaminant of concern
COMAR........................Code of Maryland Regulations
cPAHs..........................Carcinogenic polynuclear aromatic hydrocarbons
CPM.............................Continuous Process Monitor
CPMS...........................Continuous Process Monitoring System
CTDU...........................Continuous Thermal Desorption Unit
EA................................EA Engineering, Science, and Technology, Inc.
EPA..............................Environmental Protection Agency
ETG..............................ETG Environmental, Inc.
°F.................................Degrees Fahrenheit
FD................................Forced Draft
FID...............................Flame-ionizing Detector
FSP..............................Field Sampling Plan
FTO..............................Flameless Thermal Oxidizer
μg/kg............................microgram per kilogram
μg/m3...........................microgram per cubic meter
g/s................................grams per second
GC...............................Gas Chromatograph
gph...............................gallons per hour
gpm..............................gallons per minute
gr..................................grains
H&S..............................Health and Safety
HCl...............................Hydrochloric Acid
Hg................................Mercury
hr..................................hour
ID.................................Induced Draft
lb/hr..............................pounds per hour
μm................................micron
MDE.............................Maryland Department of the Environment
MGLC...........................Maximum Ground-Level Concentration
min...............................minute
N/A...............................not applicable
NAAQS.........................National Ambient Air Quality Standards
NAPL............................Non-Aqueous Phase Liquid
ND...............................not detected
NFPA............................National Fire Protection Association
NR_p..............................detected, not reported
O&M.............................Operations and Maintenance
O_2...............................Oxygen
PAHs.............................Polynuclear aromatic hydrocarbons
PID...............................Photo-ionizing Detector
POP..............................Proof of Performance
ppm..............................parts per million
ppmv............................parts per million volume

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ACRONYM LIST (cont.)

PSD ....Prevention of Significant Deterioration
psi ....pounds per square inch
QC ....Quality Control
RBC ....Risk-Based Concentration
RCRA ....Resource Conservation and Recovery Act
ROD................................Record of Decision
ROI ....Redundancy of Instrumentation
RPM................................revolutions per minute
RTA ....Rotary Thermal Apparatus
SAP ....Sampling and Analysis Plan
SCFD..............................Standard Cubic Feet per Day
SCFH..............................Standard Cubic Feet per Hour
SDC ....Soil Discharge Cooler
SMECO ....Southern Maryland Electric Company
SMWT ....Southern Maryland Wood Treating Site
SOP ....Standard Operating Procedure
SVOC ....Semi-Volatile Organic Compound
TAP.................................Toxic Air Pollutant
T-BACT ....Top Down- Best Available Control Technology
TC...................................Toxicity Characteristic
TCL.................................Toxicity Characteristic Leachate
TD...................................Thermal Desorption
TDU ....Thermal Desorption Unit
THC ....Total Hydrocarbons
TLV.................................Threshold Limit Value
TO...................................Total Organics
tph...................................tons per hour
TWA ....Time Weighted Average
USACE ...........................U.S. Army Corps of Engineers
VFD ....Variable Frequency Drive
VOC................................Volatile Organic Compound
VRS ....Vapor Recovery System
w.c. ....water column
WESP.............................wet electrostatic precipitator
WFC ....Waste Feed Cutoff
WTP ....Water Treatment Plant
yd^3 ....cubic yard

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1.0 INTRODUCTION

ICF Kaiser has been authorized to conduct remedial actions at the Southern Maryland Wood Treating Site (SMWT) under contract DACA31-95-D-0083, Delivery Order 0016. Remedial actions at the SMWT consist of on-site treatment of contaminated soil and sediment, as well as on-site treatment of contaminated groundwater, surface water, and wastewater generated in the thermal desorption process. Contaminated soil and sediments will be excavated and treated using thermal desorption. The treated soil will be back-filled on-site once testing has confirmed that the soil has met the performance standards established in the September 1995 Record of Decision (ROD). Two on-site water treatment systems will treat groundwater extracted from areas that will be excavated, surface water from the on-site pond, and wastewater generated from the thermal desorption process. A portion of the treated water will be reused in the thermal desorption process. The remainder will be discharged to the on-site stream in accordance with effluent standards established by the Maryland Department of the Environment (MDE).

This Proof of Performance (POP) Plan discusses procedures and requirements for start-up testing and full scale operation of the batch thermal desorption units (BTDUs) and continuous thermal desorption units (CTDUs). An estimated 145,000 tons of contaminated soils and sediments will be treated on site in thermal desorption units (TDUs) - two continuous units and two batch units. This plan discusses the rigorous testing required and standards that must be met prior to full scale operation. Following is a summary of the contents of this plan:

- Section 2.0 of this plan describes equipment used for operation of the TDUs.
- Section 3.0 provides proof of performance standards.
- Section 4.0 describes the personnel organization for the project.
- Section 5.0 presents the estimated waste feed characterization.
- Section 6.0 describes wastewater handling, collection, and storage procedures.
- Section 7.0 presents process monitoring procedures.
- Section 8.0 presents the proof of performance test schedule.
- Section 9.0 presents a summary of performance test and full scale sampling and analysis requirements.
- Section 10.0 describes interim operations until test results are available.
- Section 11.0 describes full scale operations.
- Section 12.0 lists routine maintenance and inspections expected for each system.

This plan also includes the following appendices:

- A--TDU Air Emissions Control Equipment;
- B--Air Emission Rule Applicability Analysis;
- C--Proof of Performance Test Report Outline;
- D--Calculation of Stack Emission Limits;
- E--Soil Performance Standards;
- F--MDE Effluent Standards;
- G--Startup and Shutdown Sequences for BTDUs and CTDUs;
- H--Calculation of 95% Upper Confidence Limit for Concentration of Benzo(a)pyrene in Soil; and
- I--Thermal Desorption Unit Selection Process.

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2.0 DESCRIPTION OF THERMAL DESORPTION SYSTEMS

In overview, the thermal desorption system is comprised of multiple components to treat contaminated feed materials (soils and sludge) and contaminated vapor and liquid streams that result from the treatment process. There are a total of four individual desorption systems. Two of these systems are continuous and two are batch. A description of each system is included below. Individual components of the treatment systems and pollution control equipment are linked together on separate trailers/skids and controlled by system operators. Refer to Figures 2-1 and 2-2 for a layout of the system, which includes the following:

- Untreated materials-feed system.
- Indirectly heated batch or continuous thermal desorption units for volatilizing contaminants from feed materials.
- Treated material discharge system.
- Vapor recovery system (VRS) to remove particulates, and condense steam and contaminants from the vapor stream exiting the desorption units. The condensate will be treated at the on-site water treatment plant.
- Flameless thermal oxidizer (FTO) for final vapor polishing.

2.1 CONTINUOUS THERMAL DESORPTION SYSTEMS

Contaminated soil from the site is excavated, and stored in the soil storage area. The soil is screened to less than 2 inches in diameter and then transferred via front-end loader into a feed hopper. From the feed hopper, soil is placed inside a rotating drum in one of two indirectly heated, continuous thermal desorption units (CTDUs). Soil feed rate to the CTDU will be measured by a calibrated, choke fed, screw feeder with a Variable Frequency Drive (VFD) controller. In the CTDU, the temperature of the soil is increased by indirect heat (i.e., heat applied outside of the drum walls) to desorb contaminants as they travel from the feed to the discharge end. The indirect heat is supplied to the CTDU by #2 fuel oil burners. Nitrogen is added to the CTDU at the inlet and outlet face seals. This minimizes the intake of oxygen at these rotating seals, which helps in maintaining a low oxygen, non-combustible environment. A portion of the burner exhaust gas from the middle stack is recycled to the CTDU feed end as sweep gas. Sweep gas keeps the air flowing consistently through the drum and helps maintain a low oxygen environment.

The hot, treated soil from the CTDU is transferred (utilizing a discharge screw conveyor) to a double paddle mixer which mixes, cools, and hydrates the soil. Water is sprayed into the mixer to cool and hydrate the soils. Steam generated due to the cooling of the soils, carryover particulates, and a small amount of air that is drawn into the conveyor flow to the inlet of the scrubber in the vapor recovery system (VRS). The hydrated soils are conveyed to the treated soil stockpile area. The treated soils will be sampled and analyzed for meeting the backfill criteria.

CTDU exhaust gases, consisting of sweep gas, steam, desorbed contaminants, and particulate carryover, pass through a hot cyclone to remove larger sized particulates. The removed particulates are collected in a container for cooling and hydration. If particulates collected by the hot cyclone meet soil backfill criteria, they will be mixed with the CTDU discharge soils.

The exhaust gases then enter a direct-contact quencher/scrubber, where water contacts the vapor stream, thus cooling the vapor stream to begin condensing steam and contaminants from the vapor phase. Additional particulates are also removed in the scrubber system. The quencher/scrubber recycle stream is cooled by a plate type heat exchanger using water as the cooling medium. A cooling tower delivers non-contact cooling water to the plate heat exchanger and wet electrostatic precipitator (WESP) cooling jacket. Contaminants and remaining particulates are further removed in the WESP. Water sprays inside the WESP to help further remove particulates. The gas then enters the Flameless Thermal Oxidizer (FTO) for final polishing. Through the process of oxidation, the FTO virtually eliminates non-condensable and residual organics not removed by the vapor recovery system (VRS). The cleaned air stream is then vented to the atmosphere through a stack. A continuous process monitor (CPM) is provided to measure and record total hydrocarbons in the stack exhaust. The VRS induced draft stack fan is expected to provide a nominal 700 acfm of vapor flow.

The condensate slurry collected in the quencher/scrubber recycle tank overflows to the WESP, where it mixes with particulate matter and organic mist removed by the WESP. The condensate is then pumped from the WESP to the condensate storage tank(s). Condensate transfer pumps convey the slurry to the water treatment plant (WTP).

2.1.1 UPSET CONDITIONS FOR CONTINUOUS SYSTEMS

The following are descriptions of bypass systems for the CTDU that are utilized in the event of upset conditions.

a. The discharge screw conveyor has an alternate discharge to a roll-off box to unload the CTDU in case of an upset.

b. An emergency relief valve is provided upstream of the hot cyclone. This valve vents CTDU exhaust gases to the atmosphere to avoid pressurizing the CTDU. In the case of this unlikely event, waste feed will be cut off. On-site safety personnel will monitor TDU operators and prescribe any necessary precautions. See Section 7.1 for a detailed description of the waste feed cutoff (WFC) system.

c. An emergency bypass, located upstream of the FTO forced draft fan, is provided to continue system operation in case of FTO upset. In this event, the bypassed air vapor will pass through carbon bed(s) before being discharged to the atmosphere.

Each CTDU is provided with a propane powered emergency drive to continue rotating the CTDU drum at a very slow rate in case of power failure. A back up generator will also be installed to supply power to critical equipment (i.e., discharge conveyor, induced draft fan, scrubber recycle water pump, cooling tower recycle pump, emergency plant lighting, FTO fan, etc.).

Refer to Figures 2-3 and 2-4 for process flow diagrams of the continuous systems. The manufacturer's performance information for the CTDU equipment is provided in Appendix A.

2.2 BATCH THERMAL DESORPTION SYSTEMS

Contaminated soil from the site is excavated, and stored in the soil storage area. The soil is screened to less than 2 inches diameter and then transferred via front-end loader into a feed hopper. From there, the soil is placed inside a rotating drum in one of two indirectly heated, batch thermal desorption units (BTDUs). In the BTDU, a vacuum is applied and the temperature of the soil is increased by the indirect heat to initially release steam and desorb organic compounds with low boiling points, and then desorb organic compounds with higher boiling points. The vacuum and mild agitation enhance the desorption of the contaminants from the soil. The vacuum also helps maintain an oxygen deficient, non-combustible environment.

During the cycle, vapors from the BTDUs pass through a hot cyclone to remove particulates. In BTDU #1, the vapors then pass through two impingers to further remove the particulates. In BTDU #2, the vapors pass through a second cyclone to further remove particulates (Note: The second cyclone on BTDU #2 is functionally equivalent to the two impingers on BTDU #1). The removed particulates are collected in a container for cooling and hydration. If particulates collected by the hot cyclone meet soil backfill criteria, they will be mixed with BTDU discharge soil.

Vapors from the BTDUs then pass through primary and secondary shell-and-tube condensers where steam and contaminants are condensed. The liquid condensate is collected in the condensate collection tank(s) and the gases continue, through a liquid ring vacuum pump to a tertiary shell-and-tube condenser on the positive side of the vacuum pump. The vapors are further condensed and the condensate is collected in a tertiary condensate collection tank.

A cooling tower, common to both batch systems, delivers non-contact cooling water to a pre-cooler as well as the primary shell-and-tube condenser. In BTDU #1, the secondary condenser also receives cooling water from the cooling tower. In BTDU #2, the secondary condenser receives cooling water from a chiller. The chiller unit, common to both batch systems, also delivers chilled water to both tertiary condensers.

Both gas streams exiting the tertiary condensate collection tanks enter a single FTO for final polishing. The FTO virtually eliminates non-condensable and residual organics not removed by the VRS. The cleaned air stream is then vented to the atmosphere. A CPM is provided to measure and record total hydrocarbons in the stack exhaust. Vacuum pumps are expected to provide a nominal 400 acfm of air flow at 24 to 26 inches of mercury.

At the end of the batch cycle, the treated soil is removed by reversing the rotation of the thermal desorber drums. This hot soil is mixed with water in a screw conveyor where it is cooled and hydrated. Steam and dust generated during transfer of the soil moves to a series of steam scrubbers. The scrubbers maintain control of dust particles during unloading operations. The liquid discharged from the scrubbers is sent to the conveyor to help hydrate the clean soil. The hydrated soil is transferred to the treated soil stockpile area using a common stockpile conveyor. The treated soil will be sampled and analyzed for meeting the backfill criteria.

The condensate slurry from the condensate collection tanks is pumped to the condensate storage tanks(s). Condensate transfer pump(s) convey the slurry to the WTP.

Refer to Figures 2-4, 2-5A, and 2-5B for process flow diagrams of the batch systems. Although the drawings show slight differences between BTDU #1 and BTDU #2 (as discussed above), the units are designed to the same standards and are functionally equivalent. The manufacturer's performance information for the BTDU equipment is provided in Appendix A.

2.2.1 UPSET CONDITIONS FOR BATCH SYSTEMS

An emergency bypass located upstream of the FTO forced draft fan, is provided to continue system operation in case of FTO upset. In this event, the bypassed air vapor will pass through carbon bed(s) before being discharged to the atmosphere.

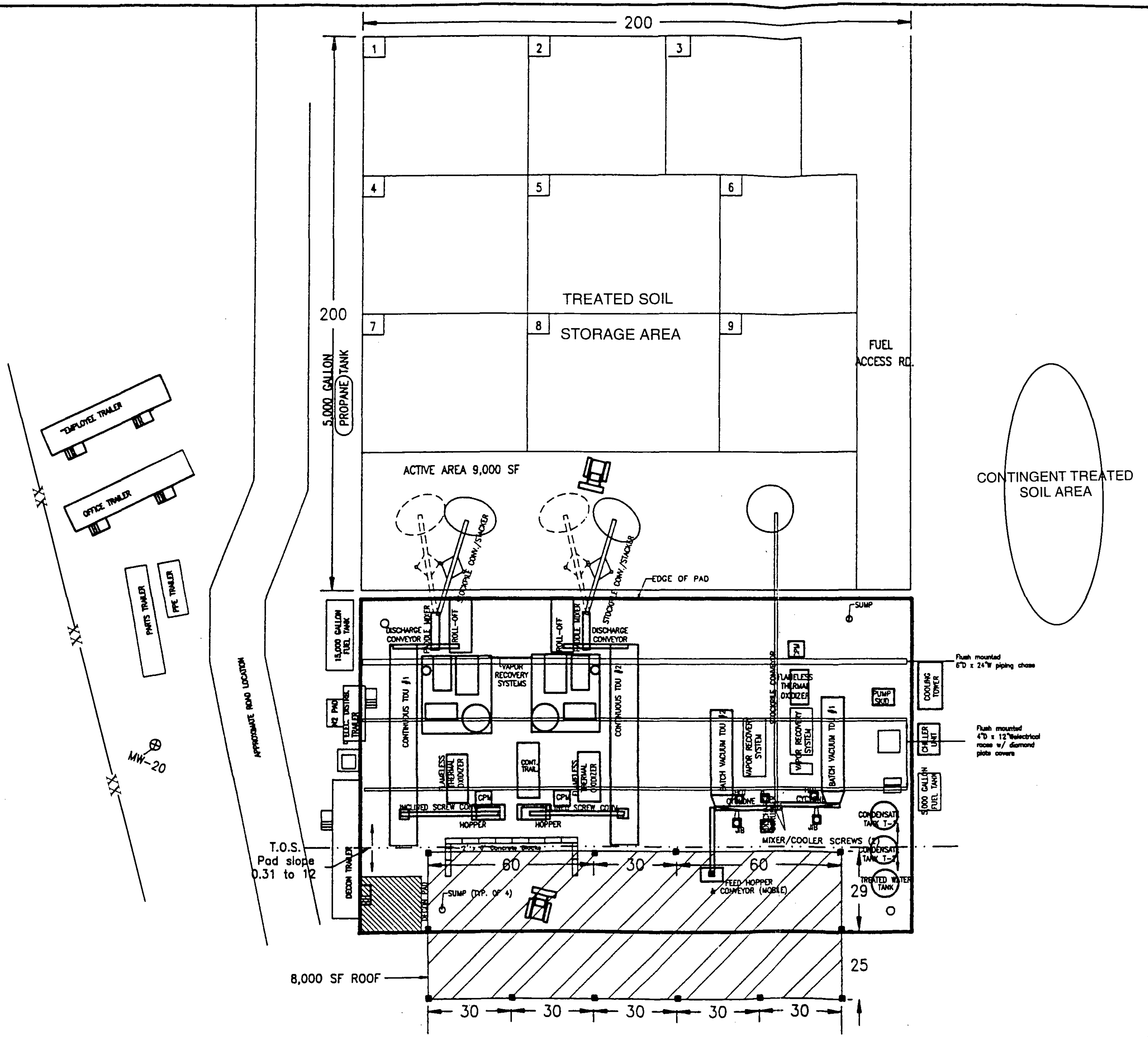
In the event of power failure in the batch system, critical equipment of the batch system (i.e. vacuum pump, cooling water recirculating pump, FTO fan, etc.) will be powered by the backup generator.

2.3 UTILITY REQUIREMENTS FOR CTDUs AND BTDUs

The entire thermal desorption system takes advantage of non-contact systems for heating the process materials. These systems isolate the contaminated materials, thereby minimizing the waste stream that must be cleaned or disposed. Design throughput is approximately 10-20 tons per hour (tph) for all systems combined. The system requires approximately 200 gallons per hour (gph) of #2 fuel oil and 1400 amp/480 volt three-phase electricity. Water usage may range from 25-100 gpm. Increase in soil moisture content could decrease throughput and increase fuel and electricity consumption.

A local power company provides electric power for the system, its ancillary equipment, office trailers, decontamination areas, and other activities as needed.

Fuel oil tanks and propane storage tanks have been located in a clean area adjacent to the treatment area. Fuel oil and propane piping have been installed from the storage tanks to the burners on each thermal desorption unit. All installations, procedures, equipment, and materials for the fuel oil and propane supply system adhere to applicable National Fire Protection Association (NFPA) and local regulations. In addition, an emergency generator will be installed prior to the proof of performance test to provide necessary power to rotate the TDUs during emergency electric cutoff to operate equipment essential to discharging soil from the units. A propane driven motor is provided to turn the drum in the event of all other power failure.



LIST OF ACRONYMS

CPM	Continuous Process Monitor
DCV	Differential Control Valve
FCV	Flow Control Valve
FD	Forced Draft
FT	Flow Transmitter
FTO	Flameless Thermal Oxidizer
HCV	Hand Control Valve
LCV	Level Control Valve
M	Motor Control Valve
OA	Oxygen Analyzer
PCV	Pressure Control Valve
PI	Pressure Gauge
PT	Pressure Transmitter
S	Solenoid Valve
SP	Sample Point
TDU	Thermal Desorption Unit
TI	Temperature Gauge
TT	Temperature Transmitter
VRS	Vapor Recovery System
WESP	Wet Electrostatic Precipitator

0 40 80
SCALE IN FEET

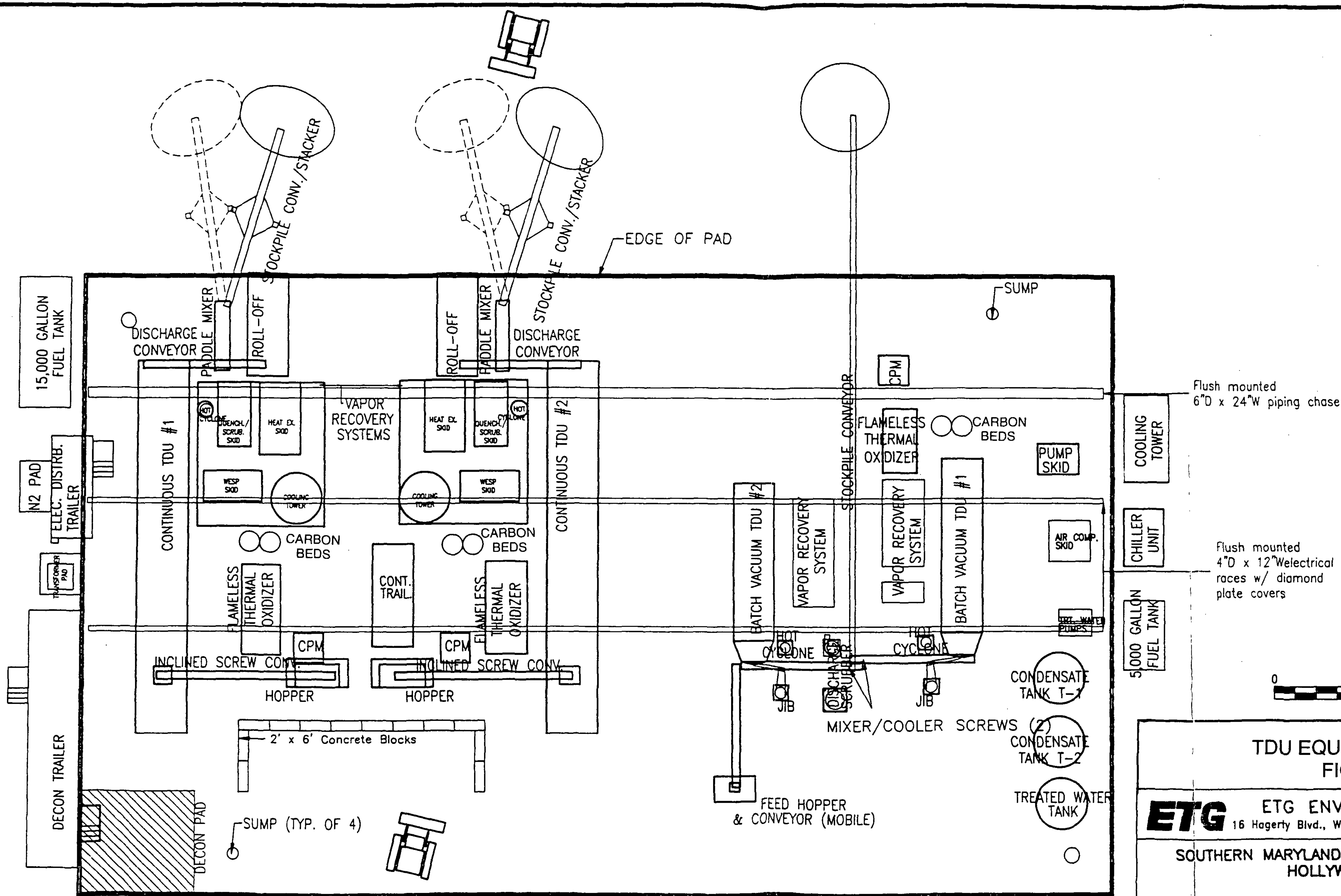
TDU PROCESS AREA LAYOUT
FIGURE 2-1

ETG ENVIRONMENTAL, INC.
16 Hagerty Blvd., West Chester PA 19382•(610)431-9100

SOUTHERN MARYLAND WOOD TREATMENT SITE
HOLLYWOOD, MD

DATE: 4/15/98 | FILE NAME: DWG\4800\ASBUILT | REV 2

Scale as shown | Drawn by: MR | Sheet FIGURE 2-1



LIST OF ACRONYMS

CPM	Continuous Process Monitor
DCV	Differential Control Valve
FCV	Flow Control Valve
FD	Forced Draft
FT	Flow Transmitter
FTO	Flameless Thermal Oxidizer
HCV	Hand Control Valve
LCV	Level Control Valve
M	Motor Control Valve
OA	Oxygen Analyzer
PCV	Pressure Control Valve
PI	Pressure Gauge
PT	Pressure Transmitter
S	Solenoid Valve
SP	Sample Point
TDU	Thermal Desorption Unit
TI	Temperature Gauge
TT	Temperature Transmitter
VRS	Vapor Recovery System
WESP	Wet Electrostatic Precipitator

TDU EQUIPMENT LAYOUT
FIGURE 2-2

ETG ENVIRONMENTAL, INC.
16 Hagerty Blvd., West Chester PA 19382•(610)431-9100

SOUTHERN MARYLAND WOOD TREATMENT SITE
HOLLYWOOD, MD

DATE:	FILE NAME:	REV
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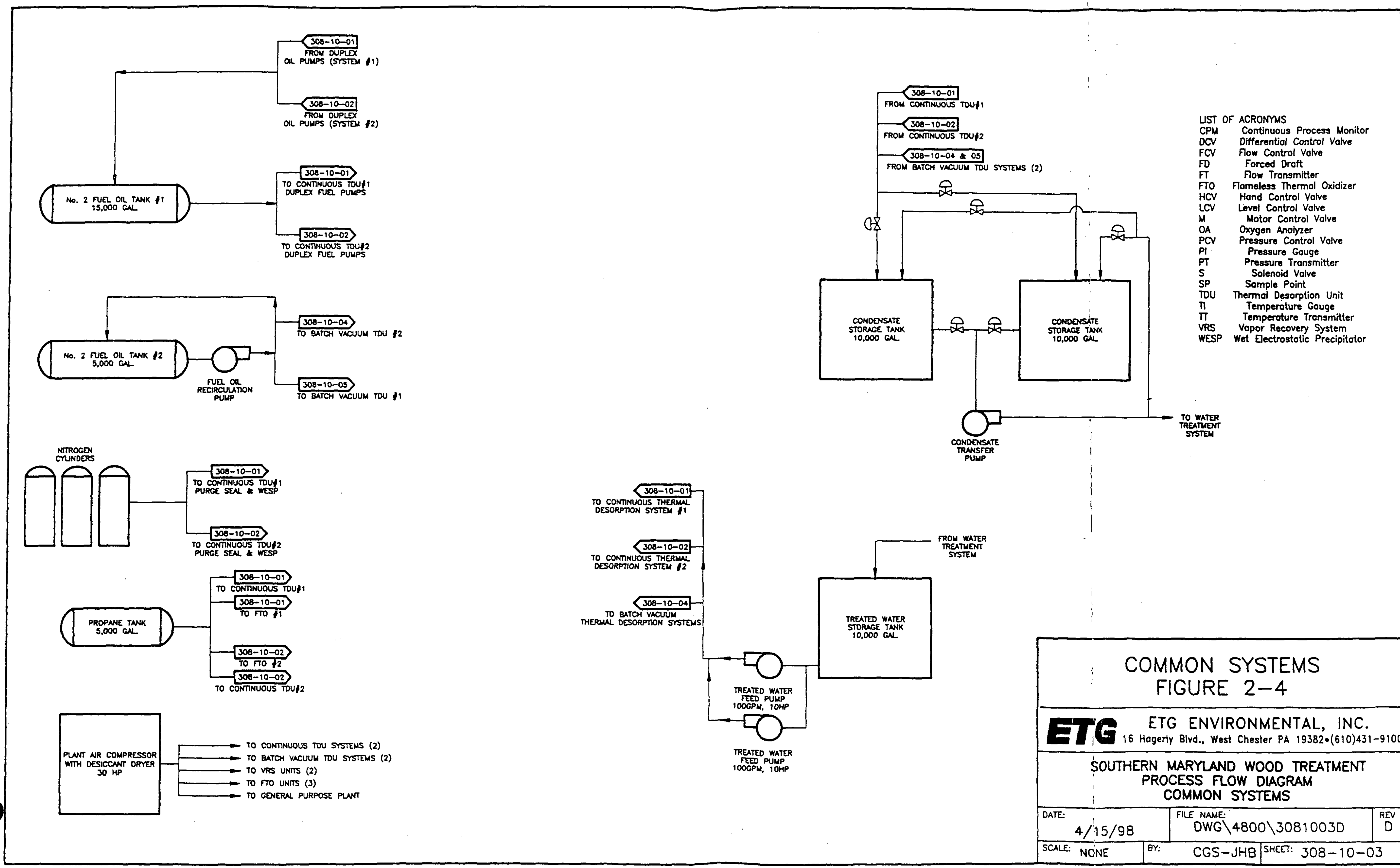
Scale as shown	Drawn by: MR	Sheet FIGURE 2-2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FROM DUPLEX OIL PUMPS (SYSTEM #1)
308-10-02
FROM DUPLEX OIL PUMPS (SYSTEM #2)
No. 2 FUEL OIL TANK #1 15,000 GAL.
308-10-01
TO CONTINUOUS TDU#1 DUPLEX FUEL PUMPS
308-10-02
TO CONTINUOUS TDU#2 DUPLEX FUEL PUMPS
No. 2 FUEL OIL TANK #2 5,000 GAL.
FUEL OIL RECIRCULATION PUMP
308-10-04
TO BATCH VACUUM TDU #2
308-10-05
TO BATCH VACUUM TDU #1
NITROGEN CYLINDERS
308-10-01
TO CONTINUOUS TDU#1 PURGE SEAL & WESP
308-10-02
TO CONTINUOUS TDU#2 PURGE SEAL & WESP
PROPANE TANK 5,000 GAL.
308-10-01
TO CONTINUOUS TDU#1
308-10-01
TO FTO #1
308-10-02
TO FTO #2
308-10-02
TO CONTINUOUS TDU#2
PLANT AIR COMPRESSOR WITH DESICCANT DRYER 30 HP
TO CONTINUOUS TDU SYSTEMS (2)
TO BATCH VACUUM TDU SYSTEMS (2)
TO VRS UNITS (2)
TO FTO UNITS (3)
TO GENERAL PURPOSE PLANT
308-10-01
FROM CONTINUOUS TDU#1
308-10-02
FROM CONTINUOUS TDU#2
308-10-04 & 05
FROM BATCH VACUUM TDU SYSTEMS (2)
CONDENSATE STORAGE TANK 10,000 GAL.
CONDENSATE STORAGE TANK 10,000 GAL.
CONDENSATE TRANSFER PUMP
TO WATER TREATMENT SYSTEM
308-10-01
TO CONTINUOUS THERMAL DESORPTION SYSTEM #1
308-10-02
TO CONTINUOUS THERMAL DESORPTION SYSTEM #2
308-10-04
TO BATCH VACUUM THERMAL DESORPTION SYSTEMS
FROM WATER TREATMENT SYSTEM
TREATED WATER STORAGE TANK 10,000 GAL.
TREATED WATER FEED PUMP 100GPM, 10HP
TREATED WATER FEED PUMP 100GPM, 10HP
LIST OF ACRONYMS
CPM Continuous Process Monitor
DCV Differential Control Valve
FCV Flow Control Valve
FD Forced Draft
FT Flow Transmitter
FTO Flameless Thermal Oxidizer
HCV Hand Control Valve
LCV Level Control Valve
M Motor Control Valve
OA Oxygen Analyzer
PCV Pressure Control Valve
PI Pressure Gauge
PT Pressure Transmitter
S Solenoid Valve
SP Sample Point
TDU Thermal Desorption Unit
TI Temperature Gauge
TT Temperature Transmitter
VRS Vapor Recovery System
WESP Wet Electrostatic Precipitator
COMMON SYSTEMS
FIGURE 2-4
ETG
ETG ENVIRONMENTAL, INC.
16 Hagerty Blvd., West Chester PA 19382•(610)431-9100
SOUTHERN MARYLAND WOOD TREATMENT
PROCESS FLOW DIAGRAM
COMMON SYSTEMS
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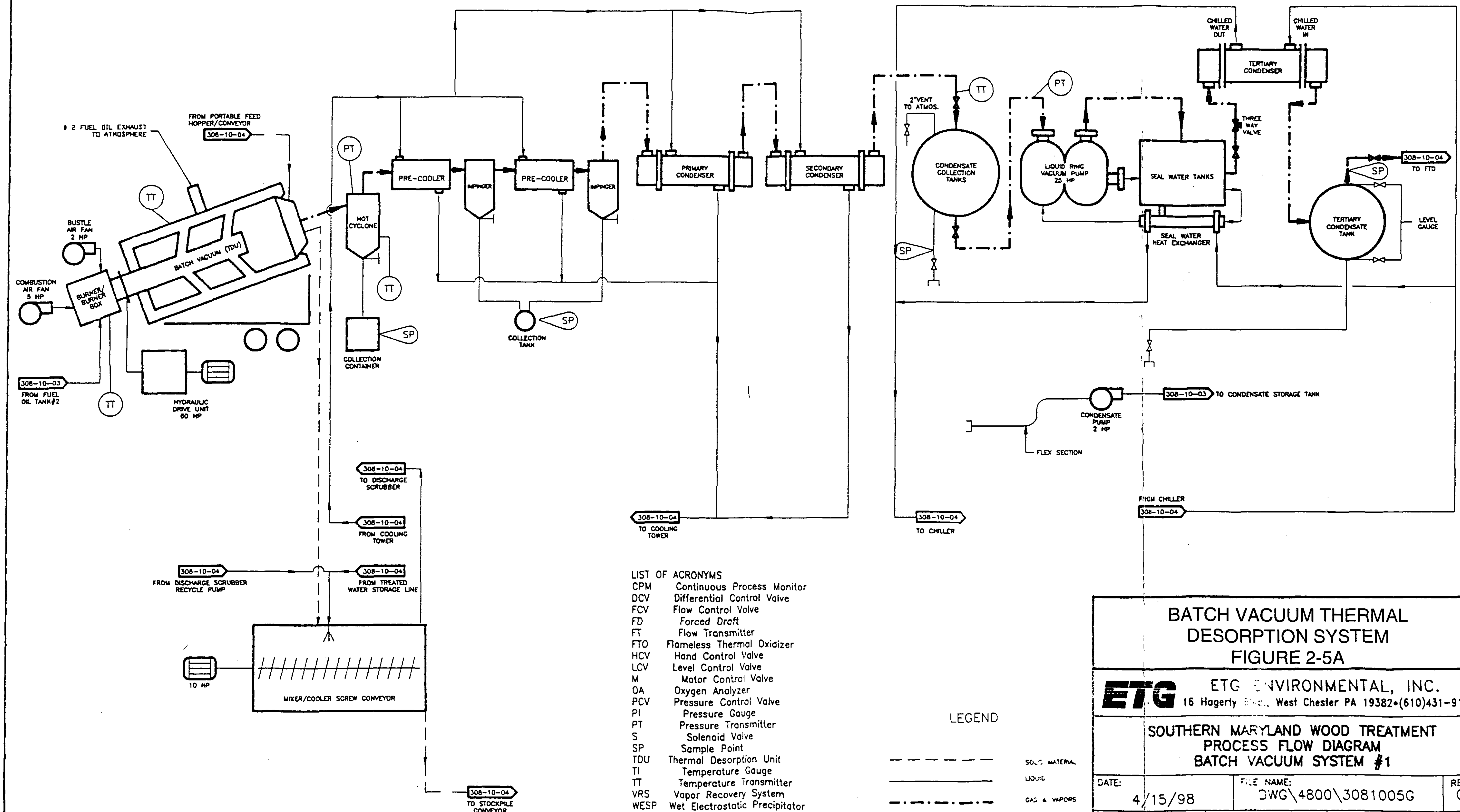

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M	Motor Control Valve
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PCV	Pressure Control Valve
PI	Pressure Gauge
PT	Pressure Transmitter
S	Solenoid Valve
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TDU	Thermal Desorption Unit
TI	Temperature Gauge
TT	Temperature Transmitter
VRS	Vapor Recovery System
WESP	Wet Electrostatic Precipitator

BATCH VACUUM THERMAL DESORPTION SYSTEM FIGURE 2-5A

ETG ETG ENVIRONMENTAL, INC. 16 Hagerty Blvd., West Chester PA 19382•(610)431-9100

SOUTHERN MARYLAND WOOD TREATMENT
PROCESS FLOW DIAGRAM
BATCH VACUUM SYSTEM #1

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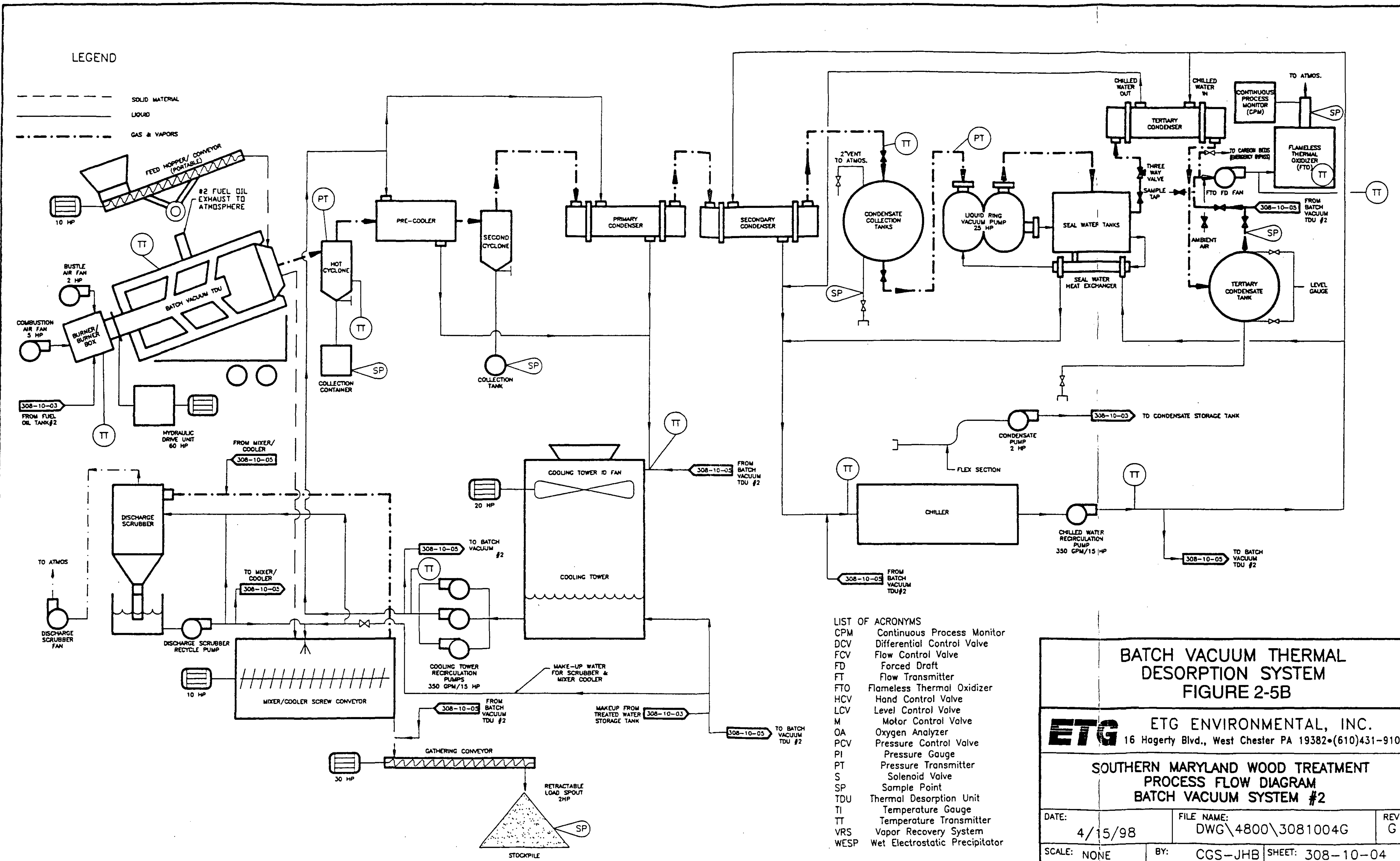

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LCV	Level Control Valve
M	Motor Control Valve
OA	Oxygen Analyzer
PCV	Pressure Control Valve
PI	Pressure Gauge
PT	Pressure Transmitter
S	Solenoid Valve
SP	Sample Point
TDU	Thermal Desorption Unit
TI	Temperature Gauge
TT	Temperature Transmitter
VRS	Vapor Recovery System
WESP	Wet Electrostatic Precipitator

BATCH VACUUM THERMAL DESORPTION SYSTEM FIGURE 2-5B

ETG ETG ENVIRONMENTAL, INC.
16 Hagerty Blvd., West Chester PA 19382•(610)431-9100

SOUTHERN MARYLAND WOOD TREATMENT PROCESS FLOW DIAGRAM BATCH VACUUM SYSTEM #2

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SCALE: NONE	BY: CGS-JHB	SHEET: 308-10-04	

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3.0 PROOF OF PERFORMANCE STANDARDS

3.1 SOIL PERFORMANCE STANDARDS

Surface and subsurface soil and sediments will be treated to meet the performance standards presented in Appendix E. Based on the results of the treatability study conducted with site soils in 1996, all of the soils that are processed in the TDUs are expected to meet the soil performance standards in one pass through the units. Treated soil (including hot cyclone dust and impinger sludge) will be back-filled on site once testing has confirmed that the soil has met performance standards. Soil that does not achieve the performance standards will either be retreated, or if untreatable due to extremely high levels of contaminants, shipped off-site for disposal.

Wastewater discharge from the TDUs will be treated by the on-site water treatment plant (WTP) and used to cool and re-hydrate the treated soil. Soil sampling for compliance with the soil performance standards will be conducted after the treated process water is added to the soil.

3.2 STACK EMISSIONS

During full scale operation, there will be three stack discharge points from the thermal desorption processes. The two batch thermal desorption units (BTDUs) are combined into one stack discharge point; each continuous thermal desorption unit (CTDU) will have a separate stack discharge. The emission control equipment was designed based on the results of pilot scale testing on soil that contained typical levels of contamination. This design was oversized to handle variability in site soil conditions to ensure compliance with emission limits.

During the proof of performance (POP) test, stack emissions will be quantified by conducting stack sampling and analysis. The results of the POP test stack sampling will then be compared to the applicable EPA and State of Maryland regulations presented in Appendix B to demonstrate compliance. The regulations for stack emissions include standards for visible emissions, particulate matter, and toxic air pollutants (TAPs).

In order to demonstrate that TAPs are within regulated limits, air dispersion modeling and stack sampling and analysis will be used. The Maryland Department of the Environment (MDE) Air and Radiation Management Administration has established TAPs screening levels which provide an off-site, risk-based concentration for each TAP. Through the air dispersion modeling, allowable concentrations of each TAP emitted at the stack are established so that off-site concentrations do not exceed the risk-based TAPs screening level. The actual stack concentrations measured during the POP test are then compared to the allowable stack emission limits to ensure the limits are not exceeded.

A table of the Maryland TAPs screening levels and further details of the air dispersion modeling used to establish the allowable stack emissions, are presented in Appendix D.

3.3 PROCESS WASTEWATER

Process wastewater is generated from the TDU condensers, air scrubbers, and wet electrostatic precipitators (WESPs). Process wastewater will be routed to two, approximately 10,000-gallon, vertical tanks located at the TDU area. From there, water will be transferred either directly or indirectly to an approximately 20,000-gallon horizontal type tank (T-112) at the new WTP. The indirect transfer is made via an approximately 100,000 gallon modular type tank in the event that additional holding time is desired. Process wastewater will be treated by the WTP for re-use by the thermal desorption systems and for discharge to the western tributary. Treated water discharged to the Western Tributary shall meet the effluent standards established by the MDE and presented in Appendix F.

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4.0 PROJECT ORGANIZATION

Overall project management at the Southern Maryland Wood Treating Site (SMWT) is performed by the United States Environmental Protection Agency (EPA), the Maryland Department of the Environment (MDE) and the United States Army Corps of Engineers (USACE). EPA is responsible for the overall management at SMWT with MDE providing support to the EPA on technical and regulatory issues. USACE provides general contract management and technical oversight throughout the design and cleanup at SMWT. The prime contractor for site cleanup is ICF Kaiser. The following is a brief description of the responsibilities for ICF Kaiser personnel, and its subcontractor (ETG) for thermal treatment.

4.1 ICF KAISER

ICF Kaiser will oversee quality control and health and safety programs during proof of performance (POP) testing and full scale operations. ICF Kaiser will also collect all samples for laboratory analysis; collect operating data recorded by ETG operators; and provide a written report. The following is a list of key ICF Kaiser personnel and responsibilities.

Bruce Howard, P.E. - Program Manager
As Program Manager, Bruce Howard is responsible for overall program management of this project. Mr. Howard has the authority to act as the corporate representative of ICF Kaiser in matters pertaining to this project.

Paul Karmazinski, P.G. - Project Manager
As Project Manager, Paul Karmazinski is responsible for negotiating and managing contractual aspects of this project. Mr. Karmazinski is also responsible for the overall technical direction of the project.

Kirk Ticknor, P.E. - Site Manager
As Site Manager, Kirk Ticknor is responsible for coordinating and managing all site activities during the POP test and full scale operations. He must also ensure that Quality Control (QC) and Health and Safety (H&S) issues are adequately addressed.

Joe Kelleher - QC Manager
As QC Manager, Joe Kelleher is responsible for ensuring that the POP test and full scale operations are conducted in accordance with this plan. Mr. Kelleher is also responsible for fielding, assessing and resolving QC issues raised by ICF Kaiser's QC/H&S staff.

Paul Schafer - Health and Safety Manager
As Health and Safety Manager, Paul Schafer is responsible for ensuring that contractors follow procedures outlined in the Site Safety and Health Plan. The Health and Safety Manager will be responsible for addressing health and safety issues raised by the QC/H&S Staff.

Chris Riley, P.E. - Water Treatment Plant Manager
As the Water Treatment Plant Manager, Chris Riley will be responsible for operations of the water treatment facilities. Mr. Riley will be responsible for effectively treating the wastewater produced by the POP test.

Bill Simpson - Soil Superintendent
As Soil Superintendent, Bill Simpson is responsible for the excavation and transport of soil from the contaminated areas to the thermal desorption units. Mr. Simpson is also responsible for the replacement of treated soil once it has been confirmed to meet the backfill criteria. The soil superintendent will also be responsible for supplying an adequate amount of soil to conduct the proof of performance test.

Wendy Werkheiser - Project Chemist
As the Project Chemist, Wendy Werkheiser will be responsible for sample tracking, data management, laboratory coordination, and data interpretation during the POP test and full scale operations. Ms. Werkheiser will be responsible for ensuring that all samples collected during the POP test are correctly analyzed and that all data is reported in accordance with this plan and the Sampling and Analysis Plan.

4.2 ETG

ETG will operate and maintain the thermal desorption systems at the site. The following is a list of key ETG personnel and their responsibilities.

Haren Master - Project Executive/Senior V.P. Operations
As Project Executive for the project, Haren Master will be responsible for executive and technical oversight of ETG's role in the POP test and full scale operations.

Mitch Moss - Project Manager
As Project Manager, Mitch Moss will coordinate ETG's activities pertaining to the implementation of the POP test and full scale operations at the site. He will assure that such activities adhere to the POP test plan and any applicable state and local regulations.

John Mueck - Site Manager
As Site Manager, John Mueck will be responsible for managing ETG's on-site activities during POP test implementation to ensure that these activities comply with applicable local and state regulations and this POP test plan. He will also supervise all project fieldwork, including site preparations, operations, mechanical systems, and the operators. As necessary, he will coordinate test and operational issues with Mr. Ticknor.

Chris Tabano - Project Engineer
As Project Engineer, Chris Tabano will coordinate implementation of the POP test; full scale operation of the thermal desorption systems; and communication among on-site management, engineering personnel, and the ETG Project Manager.

Tony Polini - Corporate Health and Safety Officer
The Corporate Health and Safety Officer, Tony Polini, or his qualified designee, will report all health and safety related issues to the Project Manager during the POP test.

System Operators/Technicians
During the POP test, a minimum of three ETG employees will be assigned as system operators who will operate the system. Their responsibilities will include monitoring and regulating operations associated with specific components of the thermal desorption systems. During full scale operations, a minimum of three ETG employees will be on site as operators/technicians working in shifts to provide 24-hour, 7-days-per-week operation.

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5.0 WASTE FEED CHARACTERIZATION

Tables 5-1 through 5-8 provide summaries of soil and sediment sampling results for semi-volatile organic compounds (SVOCs) conducted by Dames and Moore and taken from their June 1992 Pre-Design Report of the Southern Maryland Wood Treating Site. Table 5-1 summarizes soil sampling results in the upper site area (Pit #5 and TDU Pad Area); Table 5-2 summarizes soil sampling results in the northeast tank area (Pit #2 and Pit #3); Table 5-3 summarizes soil sampling results in the old process area outside the containment area (northwest corner of Pit #1); Table 5-4 summarizes soil sampling results in the land treatment area (Pit #1); Table 5-5 summarizes soil sampling results in the spray irrigation area (west of Pit #1); Table 5-6 summarizes soil sampling results in the containment area (Pit #4); Table 5-7 provides a summary of soil samples collected east of Pit #3; and Table 5-8 provides a summary of sediment samples taken from the stream at the southwest end of the site and Pit #2. The locations discussed above are shown in Figure 5-1, Site Map.

Prior to treatment, all soils will be screened to less than 2 inches to allow the material to be conveyed to the units. The source for BTDU material during the proof of performance (POP) test is from pond sludge that was dredged several years ago and then covered by a tarp. This sludge is expected to have among the most elevated levels of contamination at the site. The sludge is anticipated to be too contaminated for the CTDUs and has therefore been chosen for the BTDUs. The source of representative soils for the CTDU during the POP test will be from Pit #1, which has been projected to represent the level of contaminated soils on site, and is expected to fall within acceptable levels for the CTDUs. Contamination of the test soil will be confirmed prior to the POP test with on-site screening conducted in accordance with Section 9.0. Appendix I illustrates the process for determining whether to use the BTDUs or CTDUs for treatment of excavated soils.

Table 5-1
Summary of Soil Sampling Results for SVOCs (μg/kg) in the Upper Site Area (Pit #5 and TDU Pad Area)

Compound	RANGE OF DATA IN AREA		LOWEST VALUE DETECTED IN AREA	HIGHEST VALUE DETECTED IN AREA
	FROM	TO		
ANTHRACENE	ND	240	240	240
BENZO(A)ANTHRACENE	ND	170	170	170
BENZO(A)PYRENE	ND	220	220	220
BENZO(B)FLUORANTHENE	ND	430	220	430
BENZO(G,H,I)PERYLENE	ND	410	410	410
BENZO(K)FLUORANTHENE	ND	340	130	340
BIS(2-ETHYLHEXYL)PHTHALATE	ND	460	140	460
CHRYSENE	ND	340	160	340
FLUORANTHENE	ND	310	85	310
INDENO(1,2,3-CD)PYRENE	ND	320	320	320
PHENANTHRENE	ND	100	85	100
PYRENE	ND	420	100	420
TOTAL cPAHs*	ND	2,650	100	2,650
TOTAL PAHs*	ND	3,045	100	3,045

*These results are the range of values for total carcinogenic polynuclear aromatic hydrocarbons (cPAHs) and total polynuclear aromatic hydrocarbons (PAHs) that were found in individual soil borings.

Table 5-2
Summary of Soil Sampling Results for SVOCs (μg/kg) in the Northeast Tank Area (Pit #2 and Pit #3)

Compound	RANGE OF DATA IN AREA		LOWEST VALUE DETECTED IN AREA	HIGHEST VALUE DETECTED IN AREA
	FROM	TO		
BENZO(A)ANTHRACENE	ND	700	700	700
BENZO(A)PYRENE	ND	820	820	820
BENZO(B)FLUORANTHENE	ND	1,700	1,700	1,700
BENZO(K)FLUORANTHENE	ND	970	970	970
BIS(2-ETHYLHEXYL)PHTHALATE	ND	150	150	150
CHRYSENE	ND	1,600	180	1,600
FLUORANTHENE	ND	870	110	870
PHENANTHRENE	ND	110	110	110
PYRENE	ND	1,400	100	1,400
TOTAL cPAHs*	ND	7190	100	7,190
TOTAL PAHs*	ND	8,060	250	8,060

*These results are the range of values for total cPAHs and total PAHs that were found in individual soil borings.

Table 5-3
Summary of Soil Sampling Results for SVOCs (μg/kg) in the Old Process Area Outside Containment Area (Northwest Corner of Pit #1)

Compound	RANGE OF DATA IN AREA		LOWEST VALUE DETECTED IN AREA	HIGHEST VALUE DETECTED IN AREA
	FROM	TO		
ANTHRACENE	ND	2,500	110	2,500
BENZO(A)ANTHRACENE	ND	130	130	130
BENZO(B)FLUORANTHENE	ND	3,400	190	3,400
BENZO(K)FLUORANTHENE	ND	200	200	200
BIS(2-ETHYLHEXYL)PHTHALATE	ND	120	120	120
CHRYSENE	ND	2,900	190	2,900
DIBENZOFURAN	ND	300	300	300
FLUORANTHENE	ND	3,700	130	3,700
FLUORENE	ND	350	350	350
PHENANTHRENE	ND	1,100	370	1,100
PYRENE	ND	4,300	130	4,300
TOTAL cPAHs*	ND	10,600	130	10,600
TOTAL PAH*	ND	16,800	260	16,800

*These results are the range of values for total cPAHs and total PAHs that were found in individual soil borings.

Table 5-4
Summary of Soil Sampling Results for SVOCs (µg/kg)
in the Land Treatment Area (Pit #1)

Compound	RANGE OF DATA IN AREA		LOWEST VALUE DETECTED IN AREA	HIGHEST VALUE DETECTED IN AREA
	FROM	TO		
2-METHYLNAPHTHALENE	ND	540,000	180	540,000
ACENAPHTHENE	ND	630,000	91	630,000
ACENAPHTHYLENE	ND	19,000	100	19,000
ANTHRACENE	ND	1,300,000	93	1,300,000
BENZO(A)ANTHRACENE	ND	170,000	200	170,000
BENZO(A)PYRENE	ND	69,000	170	69,000
BENZO(B)FLUORANTHENE	ND	83,000	130	83,000
BENZO(G,H,I)PERYLENE	ND	32,000	1,100	32,000
BENZO(K)FLUORANTHENE	ND	70,000	190	70,000
BIS(2-ETHYLHEXYL)PHTHALATE	ND	940	120	940
CHRYSENE	ND	270,000	150	270,000
DIBENZO(A,H)ANTHRACENE	ND	1,700	530	1,700
DIBENZOFURAN	ND	490,000	170	490,000
FLUORANTHENE	ND	890,000	83	890,000
FLUORENE	ND	660,000	92	660,000
INDENO(1,2,3-CD)PYRENE	ND	31,000	1,400	31,000
NAPHTHALENE	ND	1,500,000	83	1,500,000
PENTACHLOROPHENOL	ND	150,000	1,200	150,000
PHENANTHRENE	ND	1,800,000	96	1,800,000
PYRENE	ND	670,000	140	670,000
TOTAL cPAHs*	ND	1,382,000	140	1,382,000
TOTAL PAHs*	ND	8,244,000	83	8,244,000

*These results are the range of values for total cPAHs and total PAHs that were found in individual soil borings.

Table 5-5
Summary of Soil Sampling Results for SVOCs (µg/kg)
in the Spray Irrigation Area (West of Pit #1)

Compound	RANGE OF DATA IN AREA		LOWEST VALUE DETECTED IN AREA	HIGHEST VALUE DETECTED IN AREA
	FROM	TO		
BENZO(A)PYRENE	ND	250	250	250
BENZO(B)FLUORANTHENE	ND	600	170	600
BENZO(K)FLUORANTHENE	ND	420	130	420
CHRYSENE	ND	300	300	300
PYRENE	ND	79	79	79
TOTAL cPAHs*	ND	1,570	79	1,570
TOTAL PAHs*	ND	1,570	79	1,570

*These results are the range of values for total cPAHs and total PAHs that were found in individual soil borings.

Table 5-6
Summary of Soil Sampling Results for SVOCs (μg/kg)
in the Containment Area (Pit #4)

Compound	RANGE OF DATA IN AREA		LOWEST VALUE DETECTED IN AREA	HIGHEST VALUE DETECTED IN AREA
	FROM	TO		
2,4-DIMETHYLPHENOL	ND	920	920	920
2-METHYLNAPHTHALENE	ND	2,200,000	120	2,200,000
2-METHYLPHENOL	ND	970	970	970
4-METHYLPHENOL	ND	4,900	4,900	4,900
ACENAPHTHENE	ND	3,000,000	88	3,000,000
ACENAPHTHYLENE	ND	130,000	810	130,000
ANTHRACENE	ND	130,000	110	130,000
BENZO(A)ANTHRACENE	ND	550,000	150	550,000
BENZO(A)PYRENE	ND	140,000	250	140,000
BENZO(B)FLUORANTHENE	ND	240,000	150	240,000
BENZO(G,H,I)PERYLENE	ND	7,200	490	7,200
BENZO(K)FLUORANTHENE	ND	94,000	280	94,000
BIS(2-ETHYLHEXYL)PHTHALATE	ND	530	140	530
CHRYSENE	ND	410,000	120	410,000
DIBENZO(A,H)ANTHRACENE	ND	3,900	3900	3,900
DIBENZOFURAN	ND	2,100,000	130	2,100,000
FLUORANTHENE	ND	2,800,000	110	2,800,000
FLUORENE	ND	2,200,000	110	2,200,000
INDENO(1,2,3-CD)PYRENE	ND	8,100	520	8,100
NAPHTHALENE	ND	7,500,000	280	7,500,000
PENTACHLOROPHENOL	ND	69,000	69,000	69,000
PHENANTHRENE	ND	6,800,000	100	6,800,000
PHENOL	ND	3,800	3,800	3,800
PYRENE	ND	1,900,000	120	1,900,000
TOTAL cPAHs*	ND	3,334,000	120	3,334,000
TOTAL PAHs*	ND	28,764,000	100	28,764,000

*These results are the range of values for total cPAHs and total PAHs that were found in individual soil borings.

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Table 5-7
Summary of Soil Sampling Results for SVOCs (μg/kg) East of Pit #3

Compound	RANGE OF DATA IN AREA FROM	TO	LOWEST VALUE DETECTED IN AREA	HIGHEST VALUE DETECTED IN AREA
BENZO(B)FLUORANTHENE	180	180	180	180
BENZO(K)FLUORANTHENE	230	230	230	230
CHRYSENE	140	140	140	140
FLUORANTHENE	89	89	89	89
PYRENE	130	130	130	130
TOTAL cPAHs*	680	680	680	680
TOTAL PAH	769	769	769	769

*These results are the range of values for total cPAHs and total PAHs that were found in individual soil borings.

Table 5-8
Summary of Sediment Sampling Results for SVOCs (μg/kg) from Stream at Southwest End of Site and Pit #2

Compound	RANGE OF DATA IN AREA FROM	TO	LOWEST VALUE DETECTED IN AREA	HIGHEST VALUE DETECTED IN AREA
2-METHYLNAPHTHALENE	ND	290	290	290
ACENAPHTHENE	ND	910	96	910
ACENAPHTHYLENE	ND	2,000	90	2,000
ANTHRACENE	ND	4,400	130	4,400
BENZO(A)ANTHRACENE	ND	21,000	180	21,000
BENZO(A)PYRENE	ND	28,000	210	28,000
BENZO(B)FLUORANTHENE	ND	33,000	160	33,000
BENZO(G,H,I)PERYLENE	ND	13,000	230	13,000
BENZO(K)FLUORANTHENE	ND	18,000	170	18,000
BENZOIC ACID	ND	3,500	3,500	3,500
BIS(2-ETHYLHEXYL)PHTHALATE	ND	1,000	160	1,000
CHRYSENE	ND	45,000	220	45,000
DI-N-OCTYL PHTHALATE	ND	170	170	170
DIBENZOFURAN	ND	720	720	720
FLUORANTHENE	ND	40,000	150	40,000
FLUORENE	ND	1,100	140	1,100
INDENO(1,2,3-CD)PYRENE	ND	13,000	320	13,000
NAPHTHALENE	ND	290	290	290
PENTACHLOROPHENOL	ND	1,300	1,300	1,300
PHENANTHRENE	ND	7,200	92	7,200
PYRENE	ND	47,000	120	47,000
TOTAL cPAHs*	ND	218,000	120	218,000
TOTAL PAHs*	ND	266,690	270	266,690

*These results are the range of values for total cPAHs and total PAHs that were found in individual soil borings.

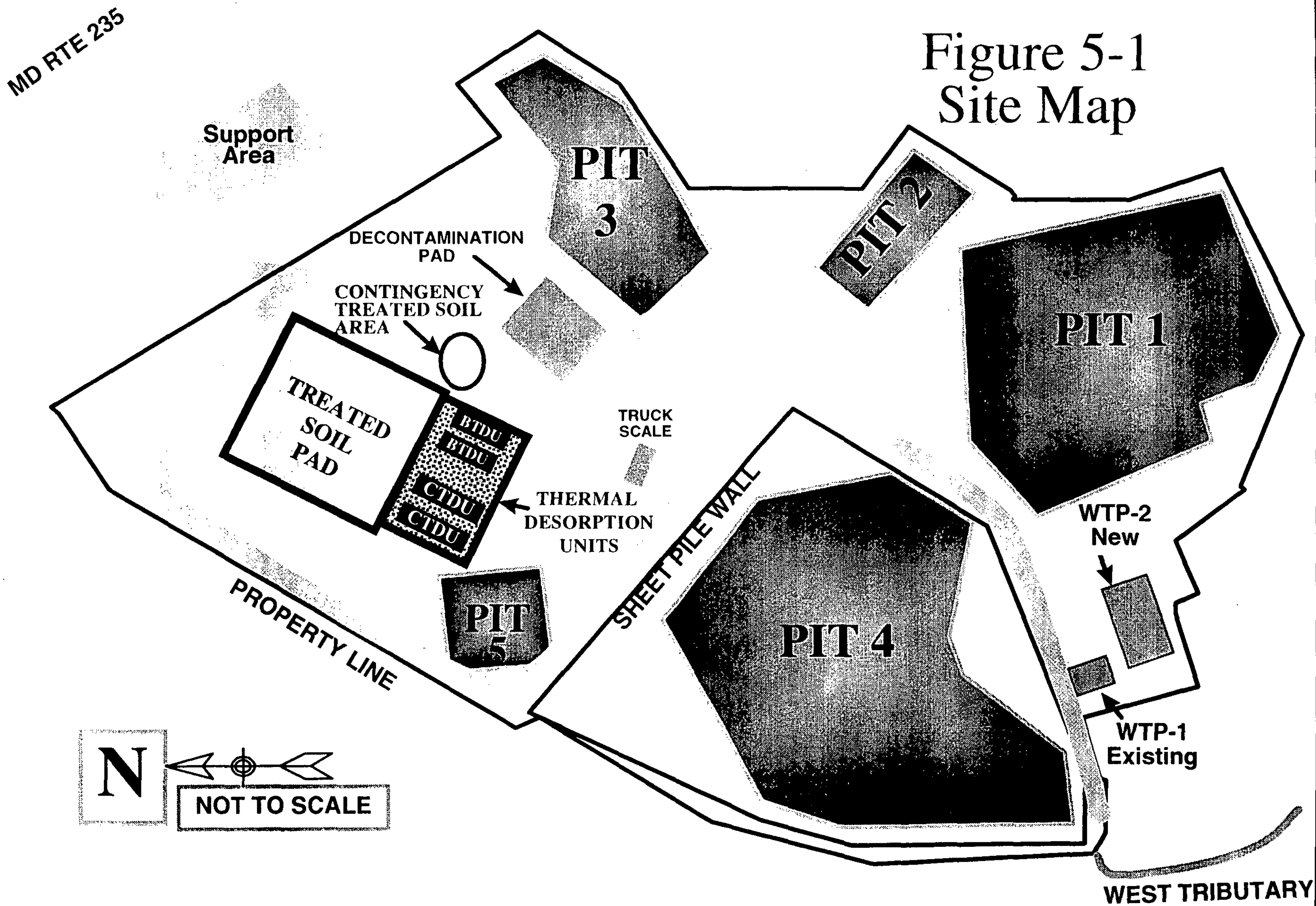

Figure 5-1
Site Map
MD RTE 235
Support Area
PIT 3
PIT 2
PIT 1
PIT 4
PIT 5
DECONTAMINATION PAD
CONTINGENCY TREATED SOIL AREA
TREATED SOIL PAD
BTDU
BTDU
CTDU
CTDU
THERMAL DESORPTION UNITS
TRUCK SCALE
SHEET PILE WALL
PROPERTY LINE
WTP-2 New
WTP-1 Existing
WEST TRIBUTARY
N
NOT TO SCALE

6.0 WASTEWATER HANDLING, COLLECTION, AND STORAGE

It is anticipated that the primary sources of wastewater will be:

(a) Thermal desorption system - Condensate from the system condensers and contaminant-laden blowdown will be generated from the WESP. The total flow from these sources range from 0 to 25 gallons per minute (gpm).

(b) Decontamination water - Decontamination wastewater will be generated from the cleaning of equipment, vehicles, and TDU system components.

(c) Contaminated stormwater - Stormwater coming in contact with contaminated soil or equipment will be generated.

There will be two, approximately 10,000 gallon, vertical tanks for contaminated wastewater and one tank for clean treated water on the pad for the treatment systems. Experienced field personnel will effectively collect, store, and treat the different forms of wastewater at the on-site WTP.

6.1 CONDENSATE FROM THE THERMAL DESORPTION SYSTEMS

As described in Section 2.1, the continuous thermal desorption systems employ air treatment processes involving both non-contact and direct-contact water. Non-contact cooling water is circulated through the closed-loop cooling tower. Direct-contact water is used in the quencher/scrubber and WESP. The wastewater produced by the continuous system contains condensed contaminants and particulates from the scrubber and WESP. The scrubber operates with a 200 to 400 gpm, recirculated loop of cooled slurry. Scrubber condensate overflows to the WESP sump. Condensate is pumped from the WESP sump at a typical rate of 10 to 25 gpm depending on soil moisture content.

As described in Section 2.2, the batch thermal desorption systems take advantage of non-contact, closed-loop systems for cooling process materials. The closed-loop systems isolate the contaminated materials, thereby minimizing the waste stream that must be cleaned or disposed. Notably, the chiller unit and cooling tower liquids that cool condensate are part of closed-loop, non-contact systems and will not be a source of wastewater. Condensate generated from batch systems will consist of particulate, water, and condensed contaminants that originated in the contaminated soils and sediments.

6.2 DECONTAMINATION WATER

Decontamination water will be generated from cleaning trucks, loaders and other equipment that comes in contact with contaminated soils, sediment and/or groundwater. Decontamination will be performed only on the decontamination pad where the water will be collected in sumps and transferred via pipe to the WTP for treatment.

6.3 STORMWATER

Untreated soil will be handled primarily under pole barns to minimize contact with stormwater. The existing grade in the treatment area slopes from the cleaned soil storage area, down to the contaminated soil area, with man-made diversions in place. This effect will minimize contact of stormwater with contaminated soil and will ensure that any contaminated stormwater will not flow into uncontaminated areas. Stormwater suspected of being contaminated will be collected and treated at the on-site WTP prior to re-use or discharge.

7.0 PROCESS MONITORING PROCEDURES

Operating parameters are monitored to assure the efficient operation of system components and maintenance of operating conditions. Table 7-1 identifies the parameter, instrument, target value and/or acceptance range, frequency, range and accuracy of equipment, and calibration for the continuous thermal desorption system. Table 7-2 presents the same categories of information for the batch thermal desorption system. These tables also indicate which parameters are recorded. The values for these parameters are stored in a computer and can be made available for review.

Acceptance ranges for each operating parameter and the total hydrocarbon analyzer are indicated with alarms. When the system drifts beyond the allowable limit an alarm will be triggered warning the operator. The operator can then make the necessary adjustments to allow the system to operate within normal parameters.

In addition to the operating parameters shown on Tables 7-1 and 7-2, the total hydrocarbon analyzer in the stacks' continuous process monitoring systems will be checked for calibration every day. The allowable drift will be determined during the POP test. If the drift of the analyzer exceeds the allowable limit, the analyzer's calibration will be re-adjusted.

The variable speed screw conveyor to the CTDU will be calibrated prior to the start of work. It will be calibrated using variable speed settings in order to produce a graphical representation of the full operating range of the screw. The volumetric feed calibration procedure will be used to conduct the calibration. This procedure entails positioning a tare truck or loader bucket at the discharge end of the screw feeder and running the screw feeder at differing speeds in ten minute increments. The amount of soil in the tare truck or loader bucket will be measured at the end of each segment to determine the amount of soil moved at that speed. Three trials will be conducted at the different speeds in order to achieve an average for each speed. All points at each speed setting will be plotted on a graph to develop a speed/weight curve for all soils at that specific density. Soil density tests will be performed on a daily basis to determine if a density factor will be applied.

Table 7-1 Summary of Operational Parameter Instrumentation for Continuous Thermal Desorption Units

#	PARAMETER	INSTRUMENT	TARGET VALUE AND/OR ACCEPTANCE RANGE	FREQUENCY	RANGE AND ACCURACY OF EQUIPMENT	CALIBRATION	RECORDED (YES/NO)
1	Soil Feed Rate	Variable Speed Screw Feeder	4-15 TPH	Continuous	0-60 tph ± 5% per 24 hr. period	Volumetric measurement converted to tons(yd^3 x density) on calibration curve	Yes
2	Thermal Desorber Face Pressure	Pressure Transmitter	< .25" - 2"	Continuous	-10" to 15" w.c. ± 0.25% of full scale	Factory calibrated	Yes
3	Thermal Desorber Shell Temperature	Thermocouples	1000° - 1500° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
4	Soil Exit Temperature	Thermocouples	875° - 950°	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
5	Cyclone Temperature	Thermocouples	750° - 1150°	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
6	Scrubber Outlet O_2 Level	O_2 Level Analyzer	1 - 10%	Continuous	0-100% O2 +/- 0.1% O2	Automatically Checked Daily	Yes
7	Scrubber Recycle Water Temperature	Thermocouple	50° - 120° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
8	Cooling Tower Inlet Water Temperature	Thermocouple	50° - 140° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
9	WESP Gas Exit Temperature	Thermocouple	50° - 170° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
10	FTO Bed Temperature	Thermocouple	1500° - 1800° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
11	CPM THC Level	FID Analyzer	TBD after POP	Continuous	3-10,000 PPM <1% of full span in 24 hours	Timed Automatic Calibration Check	Yes

ROI = Redundancy of Instrumentation
N/A = Not Applicable

Table 7-2 Summary of Operational Parameter Instrumentation for the Batch Thermal Desorption Units

#	PARAMETER	INSTRUMENT	TARGET VALUE AND/OR ACCEPTANCE RANGE	FREQUENCY	RANGE AND ACCURACY OF INSTRUMENT	CALIBRATION	RECORDED (YES/NO)
1	Batch Size (tons)	Volumetric Measurement of mass in BTDU converted to tons	10 - 18 Tons	Per Batch	10-25 tons per batch ±5% per batch	Volumetric measurement converted to tons(yd^3 x density)[1]	Yes
2	Burner Box Exit Gas Temperature	Thermocouple	1000° - 2000° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
3	Burner Stack Gas Temperature	Thermocouple	800° - 1100° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
4	Hot Cyclone Temperature	Thermocouple	Ambient - 900°	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
5	Hot Cyclone Vacuum	Vacuum Transmitter	10" Hg - 28" Hg	Continuous	0-30" Hg ±1% Full scale	Factory calibrated	Yes
6	Chiller Coolant Temperature	Thermocouple	35° - 50° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
7	Cooling Tower Coolant Temperature	Thermocouple	35° - 110° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
8	Vacuum Pump Inlet Temperature	Thermocouple	Ambient - 110° F	Once every 12 hours	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	No (but is monitored)
9	Vacuum Pump Inlet Pressure	Gauge	15" Hg - 30" Hg	Once every 12 hours	0 to 30" Hg ±1.5%	Factory calibrated	No (but is monitored)
10	FTO Inlet Temperature	Thermocouple	Ambient - 110° F	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
11	FTO Bed Temperature	Thermocouple	1500° - 1800°	Continuous	0-2,200°F ±4°F (0-559°F) ± 0.75% (559-2,200°F)	Factory calibrated	Yes
12	CPM THC Level	FID Analyzer	TBD after POP	Continuous	3-10,000 PPM <1% of full span in 24 hrs	Timed Automatic Calibration Check	Yes

ROI = Redundancy of Instrumentation
N/A = Not applicable

[1] The batch units are known to contain a given volume of soil. To obtain the batch size, in tons, the volume of soil is simply multiplied by the soil density.

ORIGINAL (Red)

7.1 WASTE FEED CUTOFF (WFC) SYSTEMS

The purpose of the WFC systems is to provide a mechanism for immediate action whenever operating parameters deviate outside normal control limits. There are both automatic and manual waste feed cutoff conditions. The Waste Feed Cutoff (WFC) systems are not applicable to the batch thermal desorption system and, therefore, none are provided. The continuous thermal desorption system waste feed conveyor will be shut off automatically if the following are outside limits for carrier operation: face pressure in the thermal desorber; CTDU soil exit temperature; continuous thermal desorption system gas exit temperature; and WESP exit gas temperature or total hydrocarbon emissions at the stack. The waste feed system will also shut off automatically if a power failure occurs or the discharge system fails.

Each CTDU is provided with a propane powered emergency drive to continue rotating the CTDU drum at a very slow rate in case of power failure. A back up generator will be started to supply power to critical equipment (i.e. discharge conveyor, induced draft fan, scrubber recycle water pump, cooling tower recycle pump, emergency plant lighting, FTO fan, etc.). In the event of power failure in the batch system, critical equipment (i.e., vacuum pump, cooling water recirculating pump, FTO fan, etc.) will be powered by the backup generator. A description of these components is provided in Section 2.0.

Visual inspection of particulate emissions from the stack, or any unusual situation that may occur that would require further inspection, will trigger a manual WFC. When the parameters deviate from the target values listed in Table 7-3 for the amount of time indicated, an automatic WFC will be instantaneously activated. These parameters will be monitored continuously by system operators and will be checked by the on-duty supervisor.

The WFC procedures provide assurances that the system will be operated within accepted operating conditions to avoid damage and maximize plant and public safety. If the WFC system is initiated, discharged soil will be segregated and sampled for backfill criteria. Table 7-3 lists the operating performance test parameters and actions to take if parameters deviate outside of the control limits.

Table 7-3 Summary of WFC Conditions for CTDUs

Process Operating Conditions	Acceptable Range and Time For Corrective Actions	Immediate Actions to be Taken Whenever Parameters Deviate Outside Control Limits
Thermal Desorber Face Pressure	>-0.25" water column (w.c.) for 3 minutes or ≥ atmospheric pressure for 10 seconds.	Increase fan speed.
CTDU Soil Exit Temperature	<850° F for 20 minutes	Lower feed rate.
CTDU Gas Exit Temperature	>1150° F for 15 minutes or 1200° F instantaneous	Lower CTDU shell temperature.
THC at Stack	To be established during POP test	Check air stream flow to the FTO and increase if necessary. Next check scrubber and WESP operation and make adjustments if necessary.
WESP Exit Gas Temperature	>200° F for 15 minutes	Check water level in the quencher/scrubber recycle tank and add water, if required. Run both quencher recycle pumps. run both scrubber recycle pumps. Lower scrubber recycle water temperature.

At any point during operation of the CTDU, the operator has the option to initiate a WFC sequence manually. The protocol for conducting a WFC is as follows:

a. The operator will first stop the feed and operation of the feed conveyor to a level in the hopper portion where a soil seal is maintained to prevent ambient air from entering the CTDU.

b. The CTDU will continue to process soil until it is empty and discharge to the stockpile through the discharge screw, double paddle mixer/cooler, and screw conveyor/stacker.

c. The firing rate for the CTDU burners will be reduced due to the termination of soil feed. Shell temperature will be closely monitored as the remaining soil progresses through the unit.

d. The use of treated process water to re-hydrate the treated soils will be discontinued when soil is no longer being discharged into the double paddle mixer/cooler.

e. The induced draft fan will maintain a slight draft in the CTDU to purge the system of process gases. Therefore, condensation of cooled gases and subsequent vapor phase treatment will continue to occur. Condensate collection and water treatment will continue to occur until flows decline to a negligible level. All condensed liquids will discharge to the storage tank, prior to treatment.

f. The scrubber will be manually shut down as the process gas drops below minimum temperature.

g. The induced draft fan will be shut down.

8.0 PROOF OF PERFORMANCE TEST SCHEDULE AND REPORTING

This section describes the proof of performance (POP) test, the anticipated test schedule, and identifies reports that will be prepared and reviewed to evaluate the effectiveness of the treatment process. Following is an overview of the schedule of events leading up to the POP testing.

- December 1997 to January 1998 - Build TDU pad, begin receiving components on site;
- February to April 1998 - Build roof covered areas for soil, install power, complete receipt of equipment, finish component assembly, install conveyance piping from/to wastewater treatment plant (WTP), begin shakedown and clean soil tests.
- May 1998 - Finish clean soil tests, and begin first of six proof of performance tests.

8.1 CLEAN MATERIAL - THERMAL DESORPTION SYSTEM SHAKE-DOWN

The purpose of the clean soil testing is to verify mechanical operation of the thermal desorption systems. Prior to operations with contaminated soil, both CTDUs and BTDUs, will process clean soil for 8 hours at anticipated feed rates and retention times during clean soil tests. This amount of time is the minimum needed to ensure all mechanical components are functioning properly. Key information to be collected for the CTDU clean soil test includes: retention time (10 minute minimum at 900 ºF) soil feed rate, soil exit temperature, and material handling and vapor recovery system (VRS) equipment performance. Key information to be collected for the BTDU clean soil test includes: batch volume, vacuum pressure at the first cyclone over time, soil exit temperature, and material handling and VRS equipment performance. Approximately 300 cubic yards of soil will be used during shake-down.

8.2 CONTAMINATED SOIL - THERMAL DESORPTION SYSTEM POP TEST

The goal of the POP testing is to demonstrate that each type of thermal desorption system can achieve backfill criteria and stack emissions while processing maximum throughput. POP testing will be conducted on one of each type of thermal desorption system (i.e. batch and continuous). As described in Section 2.0 of this plan, there is uniformity between the two continuous systems and two batch systems and therefore POP testing for one of each type of system is appropriate. A rigorous monitoring and sampling program will ensure that requirements are met for all systems during full scale operations. Sampling and analysis will be conducted in accordance with Section 9.0. Following is a description of the POP testing that will be performed:

- Contaminated soil will be selected for the POP testing as described in Section 5.0 and staged at the contaminated soil stockpile area located on the feed side of the thermal desorption systems.

- CTDU #1 will start with contaminated soil and will slowly ramp up to maximum throughput conditions (i.e., highest feed rate and lowest soil retention time that will still produce clean soil). Contaminated soil is needed to make this determination. This ramp up time may take approximately 24 hours or more to complete. The unit will then be shutdown for analysis of operational control parameters. In parallel with this analysis, testing of the batch system may begin.

- The day after the CTDU ramp up test is complete, POP testing will begin on BTDU #1. Soil will be added to the BTDU and the test will be started in the morning. Once heat is applied to the unit, the POP test will be started. Stabilization of vacuum in the BTDU during the first test indicates completion of soil treatment and shows that most all contaminants have been desorbed. The second and third BTDU POP tests are expected to occur during the two days following the first test. All three POP tests of the batch system are expected to be completed within approximately 9 to 12 hours of starting the BTDU. All three POP tests will be conducted at maximum throughput operating conditions (i.e., largest possible feed to the unit expected during full scale operations).

- After batch system testing is complete, POP testing will begin on CTDU #1. The test will be started in the morning. Once the CTDU has reached the proper temperature, soil will be added. Once the feed rate is stabilized, the POP test will be started. The second and third CDTU POP tests are expected to occur on the two days following the first test. All three POP tests of the continuous system are expected to be completed within 9 to 16 hours of starting up the CTDU. In between tests, the CTDU will most likely be kept at or near the operating temperature. All three POP tests will be conducted at maximum throughput operating conditions (i.e., highest feed rate and lowest retention time expected during full scale operations).

- Soil, air, and condensate sampling will be conducted and the samples will be sent to a laboratory for detailed analyses during ramp up of CTDU #1 and the six POP tests. Because stack sampling may take up to 9 hours to complete, each POP test will last at least that long. Refer to Section 9.0 for details pertaining to sampling and analysis. In addition, critical process control data is monitored and recorded as described in Section 7.0.

- Successful POP tests (i.e., chemical analyses confirming air and soil performance goals are achieved) are intended to establish a correlation between continuous process monitoring and confirmation that air emission standards are being met. Continuous process monitors will provide indirect confirmation that emission limits are met.

- Because only one of the four units will be operating at any point in time during POP testing, stack emissions are expected to be significantly less than that anticipated during full scale operations.

- A detailed test report and compilation of test data will be submitted to EPA and MDE at the conclusion of POP testing. An outline of this report is shown in Appendix C. Interim operations will be conducted as described in Section 10.0 after POP testing is completed.

9.0 PROOF OF PERFORMANCE SAMPLING AND ANALYSIS

During proof of performance (POP) testing, one batch and one continuous TDU will be tested to demonstrate attainment of soil performance, wastewater treatment plant discharge and air emission standards. Three replicate tests will be conducted for each type of TDU. Each test will be performed during a 6 to 12 hour period. All sampling and analysis will be conducted in accordance with an EPA and MDE approved sampling and analysis plan, which is summarized below. In addition, ICF Kaiser's Standard Operating Procedures (SOPs) will be used for each sampling event. These SOPs are used to ensure proper sampling protocols are used during sampling. EPA and MDE will also review and approve use of these SOPs prior to proof of performance testing.

Material will be selected for POP testing as described in Section 5.0. In summary, performance of the BTDU will be evidenced through the processing of excavated pond sediment located in the containment area. This material is expected to be highly contaminated and should provide a representative model for BTDU applications. Contaminated soil from Pit #1 is considered representative of the majority of material that will be encountered at the site and will be used to evaluate the CTDU. Material will be sampled in accordance with SOP 30.7 and analyzed for polynuclear aromatic hydrocarbons (PAHs) and moisture content on-site to verify that it is representative of material to be treated in the units. In the event that the material is not representative, then another source of contaminated soil will be identified based on historical sample results

Table 9-1 presents the approximate number and type of samples that will be collected and analyzed to form a baseline of the contaminant levels, obtain other critical parameters associated with the thermal desorption process and demonstrate attainment of standards (this table does not include samples associated with the ramp up except for air-perimeter monitoring).

9.1 UNTREATED FEED MATERIAL

Chemical and physical analyses will be performed on the untreated feed to assess feed characteristics and provide physical data for unit optimization. Additionally, this information will be used to evaluate handling methods and requirements before and after treatment.

For the ramp up, one stockpile will be created and sampled following the procedure in SOP 30.7. One composite sample will be analyzed on-site for PAHs and four grab samples will be sent off-site and analyzed for volatile organic compounds (VOCs).

For each POP test run after the ramp up, two soil stockpiles will be created, one for the batch unit and one for the continuous unit. Since there will be three test runs per unit, a total of six untreated stockpiles will be sampled. The soil will be properly screened to remove particles over 2 inches in diameter or as specified by the equipment operator. Larger clumps of soil will be broken up, as practical. Larger stones that cannot be passed through the thermal desorption system will be disposed off site with other contaminated materials, or may be stored in a designated area for later decontamination and back-filling on site. Untreated feed material will be stockpiled, sampled (see SOP 30.7) and analyzed for PAHs, pentachlorophenol (PCP), semi-volatile organic compounds (SVOCs), VOCs, dioxin/furans, total chlorides, metals, percent moisture, and density. Ten locations from each stockpile will be selected so that representative soil types and contaminant concentrations are sampled. Soil from the ten locations will be collected and homogenized in a stainless steel bowl using a stainless steel trowel before being placed in the appropriate sampling container, with the exception of samples requiring VOC analysis. Four VOC samples will be collected directly into sample jars at four locations using a disposable spatula.

9.2 CONDENSATE WATER

Condensate wastewater generated by the thermal desorption process will be transported to the on-site wastewater treatment facility for treatment. The liquid product will be temporarily stored in vertical condensate tanks prior to transportation to the on-site wastewater treatment facility. Approximately 10,000 gallons of condensate water is anticipated from each test. For each test run, a grab sample will be collected from both the batch and continuous lines to the condensate tank (see SOP 30.8) and analyzed for PAHs, PCP, VOCs, SVOCs, dioxin/furans and total suspended solids (TSS).

9.3 TDU TANK DISCHARGE

Total suspended solid loading on the WTP will be evaluated for each test run through the analysis of discharge from the second vertical condensate tank, the modular tank (if used), and the horizontal holding tank (T-112). Approximately eighteen samples will be collected (see SOP 30.8) and analyzed for TSS during the POP tests.

9.4 AIR - PROCESS MONITORING

Stack emission tests will be conducted during the POP test to verify that TDU emissions do not exceed established federal and state action levels off-site. Air samples will also be collected before the thermal oxidizers to monitor the effectiveness of the oxidizer. Three replicate stack tests will be conducted for each TDU type, batch and continuous. The stack sampling data collected during the POP tests will be compared to the allowable stack emissions determined by the air dispersion modeling. Appendix D provides an explanation of the model including inputs and resultant stack emission limits. Table 9-1 contains the sampling and analysis requirements for air samples. During the ramp up and throughout all of the POP testing, air flow will also be monitored with a flame-ionizing detector before and after the thermal oxidizer in the CTDU. In addition, all sampling protocol will be provided by the subcontractor and approved by EPA and MDE.

9.5 AIR - PERIMETER MONITORING

Air will be monitored at the perimeter of the site before and during the POP tests (including the ramp up) to ensure that emissions from excavation and materials handling activities are at acceptable levels. Prior to the POP tests, baseline monitoring will be conducted to determine air quality. Procedures for baseline monitoring are outlined in the Sampling and Analysis Plan. Based on the types of contaminants found at the site, creosote and pentachlorophenol, the most likely sources of airborne contaminants resulting from remedial activities would be volatile organic compounds (VOCs) released from the soil directly into the air and SVOCs that might be adsorbed to particulate matter or dust that might become airborne. Therefore, the perimeter air monitoring program has been designed to address these two possible off-site emissions sources and will include monitoring for VOCs and particulate matter.

During the POP, VOC monitoring will be conducted on a time-weighted basis using summa canisters. VOC samples will be collected at each sampling location for each test run or the ramp up following the procedures outlined in SOP 30.6. Particulate monitoring will target the respirable dust fraction (i.e. particles less than 10 microns in size) of total dust generated. Particulates will be monitored at each sampling location using a Miniram three times per test run or the ramp up following the procedures outlined in SOP 30.5.

A meteorological survey will be used to design the air monitoring network to take into account local wind patterns. Wind direction will be checked immediately before each POP test and if/when major weather fronts occur during the test. Because topographic relief across the site is approximately 35 feet, three wind socks will be placed on-site to ensure a representative measurement of wind direction is obtained. Additional meteorological information (i.e. wind speed, wind direction, temperature, barometric pressure and relative humidity) will be obtained from an on-site weather station prior to monitoring activities. One upgradient and three downgradient sample locations will be established for each test run based on the observed wind direction.

Perimeter air monitoring measurements for VOCs and particulates will be compared to human health risk-based action levels developed by the EPA. The risk-based concentrations calculations, including the input parameters, are presented in Table 9.2. For VOCs, the risk-based concentration (RBC) will be the action level. For particulates, the RBC will be used in combination with an evaluation of soil contaminant concentrations to develop the action level.

For VOCs, benzene has been selected as the preliminary target compound because of its presence in the soil, volatility, and toxicity relative to other VOCs present at the site. The action level for benzene is 1.57 $\mu g/m^3$ based on a 2 year exposure for a child representing the most sensitive population that could be affected by activities at the site (see Table 9-2). Initial sampling and analysis will include all VOCs to determine if benzene is the appropriate target compound. If necessary, a new target compound will be selected and an action level developed.

For particulates, the action level was developed based on the assumption that benzo(a)pyrene is the most toxic semi-volatile present on-site and that it is found in the highest concentrations relative to other SVOCs. The RBC for benzo(a)pyrene is 0.01 μg/m^3. The action level is 2,750 μg soil/m^3 air. The action level was developed by dividing the RBC (μg B(a)P/m^3 air) by the 95% upper confidence level concentration (3,640 μg B(a)P/kg soil) in the containment area where concentrations are highest on the site. This approach is very conservative in that it assumes that all the particulates captured in the monitoring device are B(a)P. Appendix H describes the methodology used for determining the 95% UCL.

If an action level is exceeded during site activities, appropriate engineering controls will be initiated to reduce emissions. Engineering controls may include limiting the size of the open excavation, spraying water, covering sources of dust, and reducing vehicle speed on access roads on-site. In the event engineering controls are not adequate, particulate sampling and analysis will be performed to determine the actual concentrations of contaminants associated with the particulates. Particulates would be sampled and analyzed for SVOCs using methods approved by EPA and MDE. Using the sampling results for particulate matter, a new action level would be calculated in the same manner discussed above, and subsequently approved by EPA and MDE. The action level may then be adjusted according to the results.

9.6 TREATED MATERIAL

During the ramp up, one grab sample per each feed rate/retention time will be collected and analyzed on-site for PAHs. This data will be compared with soil performance standards and used to determine the optimum throughput rate for the POP tests.

The ability of the TDUs to produce material compliant with soil performance standards listed below and explained in further detail in Appendix E will be demonstrated during the POP tests:

- B[a]P equivalent: surface soil < 0.1 ppm; subsurface soil < 1.0 ppm
- Delisting criteria: carcinogenic PAHs; non-carcinogenic PAHs; SVOCs; VOCs
- Hazardous Waste Characteristics: ignitability; reactivity, corrosivity; toxicity

For each POP test run, the conveyor from the continuous system will deposit treated material creating five stockpiles. A composite sample will be collected from ten sampling locations, two in each stockpile (see SOP 30.7). For the batch system, a treated soil sample will be collected for each test run from ten locations in the stockpile (see SOP 30.7).

Care should be taken in handling the soil because temperatures may remain elevated within the stockpile. Four VOC samples will be collected from four locations directly into sample jars using a disposable spatula. The remaining soil (non-VOC) will be collected from the ten locations and homogenized in a stainless steel bowl using a stainless steel trowel before being placed in the appropriate sampling container. Table 9-1 contains the sampling and analysis requirements for treated soil.

9.7 HOT CYCLONE

Particulates from the hot cyclones in the batch and continuous systems will be segregated and stockpiled during the POP tests and sampled separately for soil performance criteria in accordance with SOP 30.7. Each stockpile will be sampled and homogenized for all parameters listed in Table 9.1 with the exception of VOCs. Four samples will be collected directly into sample containers for VOC analysis. If results during the POP tests demonstrate that hot cyclone solids meet the soil performance standards, these materials may then be blended with treated soil and back-filled on-site.

9.8 BATCH IMPINGER SLUDGE

Sludge from the TDU will be segregated and stockpiled during POP testing and sampled separately for soil performance criteria in accordance with SOP 30.7. The stockpile will be sampled and homogenized for all parameters listed in Table 9.1 with the exception of VOCs. Four samples will be collected directly into sample containers for VOC analysis. If results during the POP test demonstrate that impinger sludge meets the soil performance standards, these materials may be blended with treated soil and back-filled on-site.

9.9 WASTEWATER TREATMENT PLANT

In order to evaluate system performance and the ability of the plant to achieve the requirements of the discharge during the proof of performance, samples of the influent, effluent and mid carbon will be collected in accordance with SOP 30.9. Grab samples will be collected during the first day that condensate from POP testing is received at the plant. The condensate will be analyzed for the compounds listed in Table 9-1.

ORIGINAL (Red)

Table 9-1
Sampling and Analysis for TDU Proof of Performance Test

Sample Description	Data Use	Sampling Strategy	Sample Type	Preparation/ Analytical Method(s)	Estimated Samples
Untreated Soil	Waste feed characteristics M1 Validation	Each stockpile for the Batch and Continuous TDU units will be sampled from 10 locations and composited into one sample per POP test. All analytes will be homogenized with the exception of VOCs.	Composite	Field PAH 3540C/8310	6
				PAH 3540C/8310	6
				PCP 8151A	6
				SVOCs 3540C/8270C	6
				Dioxins/Furans 8290	6
				Total Chlorides 5050/9251A	6
				Metals 6010B/7471A	6
				Moisture % ASTM D 2216	6
				Density ASTM D 1557	6
			Grab	VOCs 5030/8260B	24
Treated Soil	Compliance with soil performance standards M3 Validation	Each stockpile from the Batch and Continuous TDU units will be sampled from 10 locations and composited into one sample per POP test. All analytes will be homogenized with the exception of VOCs.	Composite *B[a]P Equiv.*	PAH 3540C/8310	6
			Composite *Delisting*	PAH 1311/3520C/8310	6
			Composite *Delisting*	PCP 1311/8151A	6
			Grab *Delisting*	VOCs 1311/5030/8260B	24
			Composite *B[a]P Equiv.*	SVOCs 3540C/8270C	6
			Composite *Delisting*	SVOCs 1311/3520C/8270C	6
			Composite	Dioxins/Furans 8290	6
			Composite *Tox. Char.*	Pesticide 1311/3520C/8081A	6
			Composite *Tox. Char.*	Herbicides 1311/8151A	6
			Composite *Tox. Char*	Metals 1311/3005A/ 6010B/7470A	6
			Composite	Ignitability	6
			Composite	Corrosivity	6
			Composite	Reactive Cyanide and Sulfide	6

Table 9-1
Sampling and Analysis for TDU Proof of Performance Test (continued)

Sample Description	Data Use	Sampling Strategy	Sample Type	Preparation/ Analytical Method(s)	Estimated Samples
Air - Stack Sampling	Compliance with State Air Regulations M3 Validation	Continuous and Batch TDU stack emission samples	Grab	VOCs SW846 Method 30	6
				Temperature 40CFR60 Method 4	6
				Moisture 40CFR60 Method 4	6
				SVOCs SW846 Method 10	6
				HCl 40CFR60 Method 26	6
				Metals 40CFR60 Method 29	6
				Flow 40CFR60 Method 1 or 2	6
				Dioxin/Furan 40CFR60 Method 23	6
				Particulates 40CFR60 Method 5	6
				Opacity 40CFR60 Method 9	6
Air- Pre-thermal oxidizer	Effectiveness of oxidizer M1 Validation	Interim air sample before oxidizer	Grab	VOCs SW846 Method 30	6
				Temperature 40CFR60 Method 4	6
				Moisture 40CFR60 Method 4	6
				SVOCs SW846 Method 10	6
				HCL 40CFR60 Method 26	6
				Dioxin/Furans 40CFR60 Method 23	6
WTP	Effectiveness of WTP during POP M3 Validation	Influent	Grab	All parameters listed in Appendix F	1
		Effluent	Grab	All parameters listed in Appendix F	1
		Mid Carbon	Grab	VOCs/SVOCs/Phenols 5030B/8260B/3520C/ 8270C/420.1/420.2	1
				TSS 160.1	1

ORIGINAL (Red)

Table 9-1
Sampling and Analysis for TDU Proof of Performance Test (continued)

Sample Description	Data Use	Sampling Strategy	Sample Type	Preparation/ Analytical Method(s)	Estimated Samples
Condensate Water	Evaluate scrubber condensate M1 Validation	One in-line Batch and Continuous TDU water sample before entry to TDU condensate tank.	Grab	PAH 3520C/8310	6
				SVOCs 3520C/8270C	6
				PCP 8151A	6
				VOCs 5030/8260B	6
				Dioxins/Furans 8290	6
				TSS 160.1	6
TDU Tank Discharge	Total suspended solids loading M1 Validation	One sample from second vertical condensate tank, modular tank (if used) and Tank 112	Grab	TSS 160.1	18
Air	Perimeter monitoring (7 days) M1 Validation	3 downgradient 1 upgradient	Composite	VOCs summa canisters: TO-14	28
			Grab	Particulates 3 x miniram	84
Hot Cyclones and Batch Impinger Sludge	Potential blend with treated soils M3 Validation	Cyclone and batch impinger stockpiles will be sampled and composited into one sample per POP test. All analytes will be homogenized with the exception of VOCs.	Composite *B[a]P Equiv.*	PAH 3540C/8310	9
			Composite *Delisting*	PAH 1311/3520C/8310	9
			Composite *Delisting*	PCP 1311/8151A	9
			Grab *Delisting*	VOCs 1311/5030/8290B	36
			Composite *B[a]P Equiv.*	SVOCs 3540C/8270C	9
			Composite *Delisting*	SVOCs 1311/3520C/8270C	9
			Composite	Dioxins/Furans 8290	9
			Composite *Tox. Char.*	Pesticide 1311/3520C/8081A	9
			Composite *Tox. Char.*	Herbicides 1311/8151A	9
			Composite *Tox. Char.*	Metals 1311/3005A/ 6010B/7470A	9
			Composite	Ignitability	9
			Composite	Corrosivity	9
			Composite	Reactive Cyanide and Sulfide	9

Table 9-2 Risk Based Concentration for Ambient Air: Resident Child

Carcinogens: Risk-based Concentration = (TR x BW x ATc x 1000 ug/mg)(IR x EF x ED x CSFi)

Non-Carcinogens: Risk-based Concentration = (THQ X RfDi X BW x Atn x 1000 ug/mg)(IR x EF X ED)

where:

TR = target risk (unitless)	1E-06
THQ = target hazard quotient	1.0
BW = body weight (kg)	15
ATc = carcinogenic averaging time	25550
Atn = non-carcinogenic averaging time (days)	730
IR = inhalation rate (m3/day)	12
EF = exposure frequency (days/year)	350
ED = exposure duration (years)	2
CSFi = Inhalation carcinogenic slope factor (kg x day/mg)	chemical-specific
RfDi = inhalation reference dose (mg/kg/day)	chemical specific

CHEMICAL	CSFi (kg x day/mg)	RfDi (mg/kg/day)	RBC carcinogenic (ug/m3)	RBC non-carcinogenic (ug/m3)
benzo(a)pyrene	3.1	not applicable	**0.01**	not applicable
pentachlorophenol	1.2E-01	3E-02	**0.38**	39.11
benzene	2.9E-02	1.7E-03	**1.57**	2.23

Note: For benzo(a)pyrene and benzene, toxicity criteria - CSFi and RfDi, respectively - were not available in IRIS. However, EPA, NCEA has developed provisional values, which are provided in this table and considered in these calculations.

Inhalation toxicity criteria are not available for pentachlorophenol. Instead, for the sake of calculations, oral criteria are applied.

Bold print in the table denotes the most stringent RBC value (carcinogenic vs. non-carcinogenic) for a given chemical. The respective values highlighted by bold print could represent ambient air action levels during remediation. All of the selected RBC values are for carcinogenic endpoints, and protect at a level of 1E-06 which is the most stringent end of EPA's acceptable risk range.

10.0 INTERIM OPERATIONS

Project operations will continue while awaiting analytical results from the samples collected. The duration of this interim operation will be as short as possible and limited to 75% of the throughput evaluated during the proof of performance (POP) test. For example, if the combined throughput of one batch and one continuous unit is 10 tons per hour during the POP test, then the limit for two batch and two continuous units will be 15 tons per hour (i.e., 75% of 20 tons per hour) during interim operations. This will afford protection of human health and the environment.

To potentially reduce the amount of time production is performed under interim operation conditions, laboratory processing will be expedited. Continuous process monitoring will be conducted during interim operations, and treated soil and perimeter monitoring will proceed in accordance with the full scale treatment sampling plan. Cyclone and impinger dust will also be segregated pending POP test results.

Once the POP test has been completed, data review and report preparation will also be expedited. The outline of this report is presented in Appendix C. A preliminary performance test report will be submitted to the EPA/MDE within 14 calendar days. EPA and MDE will evaluate the report to determine if full scale production is to proceed or if interim operations are to cease pending additional debriefing and re-evaluation. Provided that the preliminary performance test report is submitted on time, and that all performance standards have been confirmed through analytical results, no shutdown is anticipated.

ORIGINAL (Red)

11.0 FULL SCALE OPERATIONS

11.1 OPERATIONS

During full scale operations, the combined throughput (processing rate) of all four TDUs has been predicted at 14 tons per hour (actual throughput will be as determined by POP test as described in Section 8.0). This is based on a 10-minute residence time, 10% soil moisture content, and untreated soil concentrations as listed in Section 5.0.

If soil moisture content is found to be less than 10%, or if the feed soil is less contaminated (based on previous study data, field observations, or on-field screening results), then the feed rate may be increased. Full scale throughput may not be increased to more than 10 percent greater than the throughput evaluated during the POP test. In the event that conditions warrant, the contractor may present a proposal to USACE recommending that feed rate be increased and providing supporting rationale. If warranted, USACE/EPA/MDE will schedule additional testing at the increased feed rate. If treated soil and stack emissions meet the respective performance standards, a new upper-bound throughput will be approved.

Monitoring instrumentation and equipment used for verification of processes that are operating parameters will be calibrated in accordance with manufacturer's specifications. Manufacturer's specifications for equipment and calibrations methods are provided in the Operation and Maintenance (O&M) manual. During full-scale operations, the thermal desorption system will be operated and maintained in conformance with the O&M manual. The O&M manual for the thermal desorption system consists of several volumes, which are listed below:

- Control Room/Data Acquisition System
- Instrumentation
- Feed Equipment, TDU, and Discharge Equipment
- Burners
- Condensers and Chiller
- Vapor Recovery System
- Flameless Oxidizer
- Continuous Process Monitor

11.2 SAMPLING AND ANALYSIS

Sampling and analysis during full scale operations will be performed in accordance with an EPA and MDE approved Sampling and Analysis Plan. Following is a summary of this plan.

11.2.1 Soil

Untreated soil will be sampled one time per month following procedures in SOP 30.7 and analyzed for the same parameters as listed in Table 9-1, Untreated Soil. Treated soil samples will be collected as described in the SOP 30.7. Treated soil will be segregated into 48 hour stockpiles. Samples will be composited from each stockpile at the end of each 48 hour period to obtain one sample representing two days worth of treated soil. Samples will be analyzed for the same parameters as listed in Table 9-1, Treated Soil.

Once data are received indicating that a stockpile meets backfill criteria and the excavation is verified clean, it will be released for placement back into an open excavation. Soil that does not meet back-filling criteria will be re-treated or disposed off-site.

11.2.2 Air

Process Monitoring :

During full scale operation, continuous process monitors (CPMs) will provide total hydrocarbon readings at each of the three (two CTDUs and one combined from both BTDU) process gas discharge stacks. Additionally, thermocouples from oxidizers will provide data on oxidizer bed temperature continuously. A combination of the temperature data from oxidizer beds and trend of total hydrocarbon data from the stack CPM is expected to provide guidance on the control system performance and exhaust gas emissions.

Perimeter Air Monitoring :

The purpose of periodic perimeter air monitoring is to ensure that during the full scale operation, VOC and SVOCs (measured by particulate matter) concentrations at the fence line do not exceed human health risk based levels. Samples will be collected in accordance with SOPs 30.5 and 30.6.

One upgradient (i.e., upwind) and three downgradient (i.e., downwind) sample locations along the fence line will be established on a daily basis based on the observed wind direction. Particulate concentration in the air at each location will be assessed three times a day following SOP 30.5 using a Miniram and compared against the 2,750 ug/m^3 action level.

VOC concentration in the air will be monitored once every month during full scale operations for an estimated time period of 18 months. Monitoring will also be conducted during start of excavation of each of the pits. Additionally, depending on the operational variability, daily VOC monitoring may be conducted for discretionary days in the 18-month time period of remediation activities at SMWT. VOC concentration in the air will be monitored on an 8 hour, time-weighted basis using summa canisters. Collected samples will be analyzed for VOCs using SOP 30.6. Benzene (or other selected preliminary target compound) concentration will then be compared against the RBC to ensure that site activities have not adversely affected human health based risk levels.

Appropriate engineering controls will be instituted to reduce emissions in the event the action level is exceeded during remedial activities. Examples of engineering controls for dust control include spraying of water, covering sources of dust, reducing vehicle speeds on access roads or speed of excavation. In the event engineering controls are not adequate, particulate sampling will be performed to determine the actual concentration of dust contaminants. A new action level will be developed as discussed in Section 9.5.

11.2.3 Wastewater

Wastewater will be routed to the on-site wastewater treatment plant (WTP). Sampling is conducted monthly to ensure MDE discharge limits in Appendix F are met. WTP sampling location and methods are addressed in the Sampling and Analysis Plan.

ORIGINAL

12.0 ROUTINE MAINTENANCE AND INSPECTION PROCEDURES

12.1 PRELIMINARY CONTINUOUS SYSTEM LUBRICATION SCHEDULE	*SHUTDOWN REQUIRED?*	*DURATION OF SHUTDOWN* (APPROXIMATE)
A. Daily Lubrication		
1. Lubricate trunion roller bearings (8)	NO	NA
2. Lubricate thrust roller bearings (2)	NO	NA
3. Lubricate drive chain	NONE	NA
4. Lubricate feed hopper screw bearing	NO	NA
5. Lubricate discharge screw bearing	NO	NA
6. Lubricate mixer/cooler shaft screw bearings (2)	NO	NA
7. Lubricate mobile equipment	YES	½ HR

B. Weekly CTDU Lubrication		
1. Adjust graphite on trunion tires (2)	NONE	
2. Check oil level on feed hopper screw gearbox	YES	
3. Check oil level on screw feeder drive gearbox	YES	4 HOUR TOTAL FOR WEEKLY LUBRICATION
4. Check oil level on CTDS drive gearbox	YES	
5. Check oil level on discharge drive gearbox	YES	
6. Check oil level on mixer/cooler screw gearboxes (2)	YES	
7. Check oil level on stacker screw gearbox	YES	
8. Check oil level on load spout gearbox	YES	
9. Check oil level on traversing mechanism gearbox	YES	
10. Check oil level on cooling tower fan gearbox	YES	
11. Check oil level on hot cyclone discharge screw gearbox	YES	
12. Lubricate VRS blower bearings	NO	
13. Lubricate VRS hot cyclone discharge screw bearings	NONE	
14. Lubricate VRS pumps (6)	NONE	
15. Lubricate mobile equipment	YES	

C. Monthly Schedule		
1. Lubricate load spout shaft bearings	NO	NA
2. Lubricate stacker pivot bearing	NO	NA

D. Quarterly Schedule		
1. Change oil and lubricate mobile equipment	NO	NA
2. Lubricate motors (electric)	NO	NA

E. Semi-Annual Schedule		
1. Perform service, change oil, and lubricate mobile equipment	NO	NA
2. Change oil and lubricate air compressor	YES	COORDINATE W/OTHER SHUTDOWN OPER. 4 HRS

F. Annual Schedule		
1. Change oil on all operating gearboxes	YES	1 DAY

12.2 PRELIMINARY CONTINUOUS SYSTEM INSPECTION SCHEDULE	***SHUTDOWN REQUIRED?***	***DURATION OF SHUTDOWN*** (APPROXIMATE)
A. Daily Schedule		
1. Screws		
Excessive noise and/or grinding	NO	NA
Excessive material leakage	NO	NA
Tension on drive belts	NO	NA
Build up of material in troughs and at transfer chutes	YES	1 HR
2. CTDU drive and flame control		
Excessive noise and/or grinding	NO	NA
Excessive material leakage	NO	NA
Tension on drive belts	NO	NA
Excessive metal shavings at tire and trunions	NO	NA
Excessive air leakage	NO	NA
Verify all burners functioning	NO	NA
Excessive burn marks or scorching	NO	NA
Verify damper linkages intact	YES	2 HRS
Build up of material in seals and bellows	NO	NA
3. Fans and ducts		
Excessive burn marks or scorching	NO	NA
Verify damper linkages intact	NO	NA
Excessive air leakage	NO	NA
Excessive noise and/or grinding	NO	NA
Loose flanges, bolts and/or gaskets	NO	NA
Verify all doors and hatches in proper position	NO	NA
	NO	NA
4. Discharge system		
Verify position of stacker	NO	NA
Remove obstructions for traversing unit	NO	NA
Verify load spout cones and cables in proper working order	NO	NA
5. Pumps		
Verify operation at working psi	NO	NA
Excessive water leakage	NO	NA
Loose flanges, bolts and/or gaskets	NO	NA
Excessive motor or pump housing heat	NO	NA
B. Weekly Schedule		
1. Screws		
Check tension on drive belts (visual)	NO	NA*
Scrape all build up in hoppers and chutes	YES	½ DAY * (*WILL BE COORD. WITH LUBRICATION ACTIVITIES)
Inspect packing seal	NO	NA
2. CTDU drive and flame control		
Inspect trunion tire thrust and float	NO	NA
Inspect chain drive slack	NO	NA
Inspect supports and cribbing	NO	NA
	NO	NA
3. Fans and ducts		
Inspect for material buildup in housing and inlet duct	NO	NA
4. Discharge system		
Clean build up from chutes, cones and frame	YES	4 HOURS
Inspect traversing drive chain for slack	NO	NA
Inspect traversing tires for proper psi	NO	NA
5. Pumps Inspect for excessive vibration	NO	NA

12.3 PRELIMINARY BATCH SYSTEM LUBRICATION SCHEDULE	SHUTDOWN REQUIRED?	DURATION OF SHUTDOWN (APPROXIMATE)
A. Daily Schedule		
1. Lubricate trunion roller bearings (8)	NO	NA
2. Lubricate thrust roller bearings (2)	NO	NA
3. Lubricate drive chain	NO	NA
4. Lubricate feed hopper screw bearings	NO	NA
5. Lubricate gathering screw bearings	NO	NA
6. Lubricate mixer/cooler bearing	NO	NA
7. Lubricate mobile equipment	NO	NA
8. Lubricate door-packing gland	NO	NA
B. Weekly Schedule		
1. Check oil level on feed hopper screw gearbox	NO	NA
2. Check oil level on gathering screw gearbox	NO	NA
3 Check oil level on BTDU drive gearbox	NO	NA
4 Check oil level on mixer/cooler screw gearbox	NO	NA
5 Check oil level on load spout gearbox	NO	NA
6 Check oil level on cooling tower fan gearbox	NO	NA
7 Check oil level on hydraulic power pack	NO	NA
8 Lubricate VRS vacuum pump bearings	NO	NA
9. Lubricate VRS pumps (4)	NO	NA
10 Lubricate mobile equipment	NO	NA
C. Monthly Schedule		
1. Lubricate load spout shaft bearings	NO	NA
2. Lubricate stacker pivot bearing	NO	NA
D. Quarterly Schedule		
1. Change oil and lubricate mobile equipment	YES	4 HRS
E. Semi-Annual Schedule		
1. Perform service, change oil and lubricate mobile equipment	YES	8 HRS
2. Change oil and lubricate on air compressor	YES	4 HRS
F. Annual Schedule		
1. Change oil on all operating gearboxes	YES	8 HRS

12.4 PRELIMINARY BATCH SYSTEM INSPECTION SCHEDULE	SHUTDOWN REQUIRED	DURATION OF SHUTDOWN (APPROXIMATE)
A. Daily Schedule (These items to be inspected during operations, any required adjustments to be done between loads)		
1. Screws		
Excessive noise and/or grinding	NO	NA
Excessive material leakage	NO	NA
Tension on drive belts	NO	NA
Build up of material in troughs and at transfer chutes	NO	NA
2. BTDU drive and flame control		
Excessive noise and/or grinding	NO	NA
Excessive material leakage	NO	NA

Tension on drive belts	NO	NA
Excessive metal shavings at tire and trunions	NO	NA
Excessive air leakage	NO	NA
Verify all burners functioning	NO	NA
Excessive burn marks or scorching	NO	NA
Verify damper linkages intact	NO	NA
Build up of material in seals	NO	NA
3. Fans and ducts		
Excessive burn marks or scorching	NO	NA
Verify damper linkages intact	NO	NA
Excessive air leakage	NO	NA
Excessive noise and/or grinding	NO	NA
Loose flanges, bolts and/or gaskets	NO	NA
Verify all doors and hatches in proper position	NO	NA
4. Discharge system		
Verify position of stacker	NO	NA
Verify load spout cones and cables in proper working order	NO	NA
5. Pumps		
Verify operation at working psi	NO	NA
Excessive water leakage	NO	NA
Loose flanges, bolts and/or gaskets	NO	NA
Excessive motor or pump housing heat	NO	NA
6. Mobile equipment		
Inspect for safe operation	NO	NA
Check oil levels	NO	NA

B. Weekly Schedule	***SHUTDOWN REQUIRED***	***DURATION OF SHUTDOWN*** **(APPROXIMATE**
1. Screws		
Check tension on drive belts	YES	2 HR
Scrape all build up in hoppers and chutes	YES	2 HR
Inspect packing seal	NO	NA
2. BTDU drive and flame control		
Inspect trunion tire thrust and float	NO	NA
Inspect chain drive slack	NO	NA
Inspect supports and cribbing	YES	½ HR
3. Fans and ducts		
Inspect for material buildup in housing and inlet duct	YES	4 HR
4. Discharge system		
Clean build up from chutes, cones and frame	YES	1 HR
5. Pumps	NO	NA

APPENDIX A

TDU AIR EMISSIONS CONTROL EQUIPMENT

TDU AIR EMISSION CONTROL EQUIPMENT

Continuous Thermal Desorption System

Continuous TDU
Design Criteria for individual TDU

Feed Capacity	30,000 lb./hr.
Product Capacity	27,000 lb./hr.
Feed Moisture	10 %
Feed Organics	0.3 %
Hot Product Moisture	0 %
Cooled Product Moisture	10 %
Bulk Density	85-110 lb./CF
Max. Particle Size	2 inches
Retention Time @ 900° F	15 minutes
Purge Gas Flow	700 lb./hr.
Bellows Seal Purge Gas	20 scfh

Vapor Recovery System
Design Criteria for individual vapor recovery system

Inlet Air Flow Rate	5,452 acfm @ 900° F
Particulate Size Distribution within air stream	50% above 10 microns 25% 1 - 10 microns 25% below 1 microns
Particulate Concentration Gas	up to 400 lb./hr.
Operating Temperature	up to 1,200 °F
Organic Compounds	up to 90 lb./hr.
Hot Cyclone Particulate Removal Efficiency	98% in air stream for particulates larger than 10 microns
WESP Particulate Removal Efficiency	99.99% in air stream for particulates larger than 0.3 microns

Flameless Thermal Oxidizer
Design Criteria for individual flameless thermal oxidizer

Inlet Air Flow Rate	200 - 1,000 scfm
Inlet Temperature	80-180 °F
Process Gas BTU Value	0 - 10 BTU/CF
Process Gas Composition	Oxygen Deficient with various concentrations of methane, ethane, butane, propane, pavaffinic and napthalenic hydrocarbons, and chlorinated hydrocarbons (up to 30 ppm as HCl)
Process Gas Pressure	0 - 1 inches water column
Process Gas Moisture	Saturated
Operating Temperature	1,500 - 1,700 °F
Hydrocarbon Oxidation Efficiency	95%

Batch Thermal Desorption System

Batch TDU

Design Criteria for individual TDU

Batch Capacity	18 tons/load
Feed Moisture	0 - 50%
Feed Organics	0 - 5%
Maximum Particle Size	2 inches
Product Temperature	900° F
Drive System	60 HP
Heater Capacity	5.5 Million BTU/Hr

Vapor Recovery System

Design Criteria for individual vapor recovery system

Hot Cyclone	24" diameter
Primary Condenser Heat Exchange Area	439 square feet
Secondary Condenser Heat Exchange Area	439 square feet
Tertiary Condenser Heat Exchange Area	292 square feet
Vacuum Pump	245 CFM @ 28" Hg
Condensate Collection Tank Capacity	1000 gallons

Flameless Thermal Oxidizer

Design Criteria for individual flameless thermal oxidizer

Inlet Air Flow Rate	200 - 500 SCFM
Inlet Temperature	70 - 90° F
Process Gas BTU Value	0 - 10 BTU/CF
Process Gas Composition	Oxygen deficient with various concentrations of methane, ethane, butane, propane, pavaffinic and napthalenic hydrocarbons, and chlorinated hydrocarbons (up to 30 ppm at HCl)
Process Gas Pressure	0 - 1 inches water column
Process Gas Moisture	Saturated
Operating Temperature	1,500 - 1,700 °F
Hydrocarbon Oxidation Efficiency	95%

APPENDIX B

AIR EMISSION RULE APPLICABILITY ANALYSIS

Potentially Applicable State of Maryland and Federal Air Regulatory Standards and Test Methods

Southern Maryland Wood Treating (SMWT) Site

This appendix presents applicable air regulatory requirements and compliance test methods for the SMWT site. The regulatory requirements presented here are primarily based on the record of decision (ROD) for the SMWT site prepared by the USEPA dated 09/08/95 and subsequent guidance provided by both the EPA and the MDE. The proposed compliance test methods (where applicable) are based on the general guidance on acceptable testing and monitoring methods provided in COMAR 26.11.01.04 as well as specific guidance provided in the applicable state and federal regulations. The stack test methods presented in this document were approved by the MDE as the appropriate compliance demonstration methods.

Applicable air regulatory requirements and compliance test methods are presented below for each of the pollutant or an environmental parameter identified in the ROD.

Visible Emissions

- **Regulated Under :**

  COMAR 26.11.06.02 - General Emission Standards : Visible Emissions

- **Applicable Standard :**

  COMAR 26.11.06.02(C) - Stack emissions shall not exceed 20% opacity (general emission standard for St. Mary's County- Maryland Region V)

  (This standard applies to the oxidizer stacks at the batch and continuous treatment systems)

- **Compliance Stack Test Method :**

  40 CFR 60, Appendix A, USEPA Test Method 9

Particulate Matter

- **Regulated Under :**

  COMAR 26.11.06.03 - General Emission Standards : Particulate Matter

- **Applicable Standards/Requirements :**

1. COMAR 26.11.06.03(B) - Stack emissions shall not exceed 0.05 gr/SCFD of particulate matter (general emissions standard for confined source installations constructed after 1972).

   (This standard applies to the oxidizer stacks at the batch and continuous treatment systems)

2. COMAR 26.11.06.03(D) - Reasonable precautions, such as application of water on dirt roads, stockpiles, etc., should be taken to prevent particulate matter from becoming airborne.

- **Compliance Stack Test Method** :

  40 CFR 60, Appendix A, USEPA Test Method 5

Volatile Organic Compounds (includes non-methane organic compounds)

- **Regulated Under :**

  COMAR 26.11.06.06 - General Emission Standards : Volatile Organic Compounds

  40 CFR 264, Subpart BB - Air Emission Standards for Equipment Leaks

  40 CFR 264, Subpart AA - Closed Vent Systems and Control Devices

- **Applicable Standards /Requirements:**

1. None under COMAR 26.11.06.06[1].

   Rationale for non-applicability of Standards under COMAR 26.11.06.06

   COMAR 26.11.06.06(B) - Standard does not regulate installations in St. Mary's County.
   COMAR 26.11.06(C) - SMWT site will not have the regulated source category (i.e., VOC-Water separators).
   COMAR 26.11.06(D) - Standard regulates sources that disposes of or treats wastes containing VOC in the outside atmosphere in a manner that may cause evaporation of greater than 20 pounds per day. While the SMWT will treat soils containing VOCs, the treatment operations will be conducted in *confined units* and not in the *outside atmosphere.*

2. a) 40 CFR 264, Subpart BB

   In accordance with Section 264.1050 (Applicability), these standards apply to hazardous waste streams whose total organic concentration exceeds 10% by weight. Since the only process streams expected to exceed 10% are in the gas phase, and since a gas phase is not considered a hazardous waste (by definition of hazardous waste), then the Subpart BB Standards have no impact on the TDU operations.

3. a) 40 CFR 264, Subpart AA , Sec. 264.1032 (Standards: Process Vents)

   - Combined vent emissions from affected process vents at the facility will be kept below 3.1 tons/yr, or

   - Process vent emissions control device efficiency shall be 95% (facility-wide basis).

   b) 40 CFR 264, Subpart AA, Sec. 264.1033 (Standards: Closed vent system and control devices)

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[1] Note : Overall design VOC control device efficiency (> 95%) at SMWT site is higher than the most stringent control device efficiency requirement (85%) for other applicable sources under COMAR 26.11.06.06.

ORIGINAL

- Overall VOC emissions control efficiency of 95% or more is required
- In accordance with Section 264.1033(i), the contractor is required to describe the emission control device operation and identify the process parameters that indicates proper operation and maintenance of the control device.

(These standards/requirements apply to the emission control systems for the batch and continuous units. The descriptions required by the Subpart AA regulations are contained in this Proof of Performance Plan.)

- **Compliance Stack Test Methods :**

Standard: COMAR 26.11.06.06
Test Method: Not applicable

Standard: 40 CFR 264, Subpart BB:
Test Method: 40 CFR 60, Appendix A, USEPA Test Method 21

Standard: 40 CFR 264, Subpart AA:
Test Method: SW846, Method 0030

Toxic Air Pollutants

- **Regulated Under :**

COMAR 26.11.15

- **Applicable Standards/Requirements :**

1. COMAR 26.11.15.04 - Emissions of each of the TAPs shall be quantified.
2. COMAR 26.11.15.05 - T-BACT should be installed on sources emitting Class-I TAPs[2].
3. COMAR 26.11.15.06 - Demonstration to the MDE that the total allowable emissions will not unreasonably endanger human health is required.
4. COMAR 26.11.15.07 - Screening analysis or second tier analysis[3] may be used to demonstrate compliance with COMAR 26.11.15.06. For Class I TAPs, to assess carcinogenic effects, screening analysis needs to show that total allowable emissions from the premises will not cause increases in ambient levels that exceed risk-based screening levels for the TAP. For Class I or Class II TAPs, to assess potential toxic effects other than cancer by a screening analysis showing that total allowable

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[2] According to ETG, the combination of control technologies proposed at SMWT will result in the maximum degree of overall emission reduction that is technologically and economically feasible and is, therefore, the Best Available Control Technology.

[3] The Maryland Department of the Environment (MDE) Air and Radiation Management Administration has established TAPs screening levels which provide off-site risk-based concentrations for each TAP. Through the air dispersion modeling, allowable concentrations of each TAP emitted at the stack are established so that off-site concentrations do not exceed the risk-based TAPS screening level. The actual stack concentrations measured during the POP test are then compared to the allowable stack emissions to be sure there are no exceedences.

A Table of the Maryland TAPs screening levels and further details of the air dispersion modeling used to establish the allowable stack emissions, are presented in Appendix D.

emissions from the premises will not cause increase in ambient levels that exceed applicable TLV based, threshold based, or special screening levels.

(These standards/requirements apply to oxidizer stacks from continuous and batch operations)

- **Compliance Stack Test Methods :**

  For VOC TAPs:
  SW846 Method 0030

  For SVOC TAPs:
  SW846 Method 0023

  For dioxins and furans:
  40 CFR 60, Appendix A, USEPA Test Method 23.

Nuisance

- **Regulated Under :**

  COMAR 26.11.06.08

- **Applicable Standard/Requirement :**

  Facility operations should not create nuisance or air pollution

- **Compliance Stack Test Method :**

  Not applicable

ORIGINAL
(Red)

APPENDIX C

PROOF OF PERFORMANCE TEST REPORT OUTLINE

ORIGINAL (Red)

PERFORMANCE TEST REPORT
TABLE OF CONTENTS

SECTION

List of Tables

List of Figures

List of Appendices

ORIGINAL Rec'd

APPENDIX D

CALCULATION OF STACK EMISSION LIMITS

ORIGINAL (Red)

CALCULATION OF STACK EMISSION LIMITS

INTRODUCTION

As part of the SMWT remediation, thermal desorption will be used to remove contamination from the soil. The contaminated air stream generated by the thermal desorption process will then be treated by the vapor recovery systems of each TDU to remove contaminants from the air before it is vented to the atmosphere through the three stacks. To demonstrate that air emissions are in compliance with the State of Maryland regulations discussed in Appendix B for toxic air pollutants (TAPs), stack sampling will be conducted during the POP test.

The Maryland Department of the Environment Air and Radiation Management Administration (ARMA) has established TAPs screening levels which provide an off-site risk-based concentration for each TAP. Through air dispersion modeling, allowable concentrations of each TAP emitted at the stack will be established to ensure that off-site concentrations do not exceed the risk-based TAPs screening levels. The actual stack concentrations and emission rates measured during the POP test will then be compared to the allowable stack emission limits to ensure the limits are not exceeded.

SCREENING MODELING

In any modeling study, the initial approach is to perform screening modeling first. Screening models (e.g., SCREEN3) are simple and easy to use, and they give very conservative results. If the results of a screening modeling study are acceptable, one can be confident that actual ambient air concentrations will be acceptable. In this study, SCREEN3 was used to estimate the maximum allowable limits for stack emissions. If these limits prove unacceptable when sampling is performed, refined modeling (e.g., ISC3ST) will be used to characterize the ambient air concentrations with a higher degree of accuracy.

CALCULATION OF STACK EMISSION LIMITS

The following is a step by step evaluation of how stack emission limits are calculated. The stack emission limits presented in Table D-1 are estimated at this time based on using design values for such input parameters as temperature and velocity. Once actual values are available from the POP test, these stack emission limits will be modified accordingly.

STEP 1: Determine the contaminants of concern

A list of TAPs was developed based on actual contaminants present in the soil at the site and is found in Table D-1.

STEP 2 Determine off-site screening levels for all TAPs

Off-site screening levels, as developed MDE ARMA, are presented in Table D-1.

STEP 3: Determine a maximum dilution factor using SCREEN3 modeling:

A. Assumptions for Model:

1. Assume unit (1 g/s) emission rate from each stack- results can then be read directly as dilution factor.
2. Assume rural terrain- SMWT site is located in a country (rural) location.
3. Assume the location of maximum ambient air concentration is the same for all stacks. Adding all maxima is the most conservative way to combine results. (This was done because all three stacks [i.e., one batch, two continuous] will be operating at the same time during full scale operations.)
4. Assume no chemical reactions occur as chemicals disperse in atmosphere.
5. Assume dispersion characteristics are the same for all chemicals.

B. Inputs for SCREEN3 Modeling Parameters:

1. Source Type: point (discharge stack represented as a point source)
2. Emission Rate: 1 g/s (arbitrary assumption)
3. Stack Height: 7.9248 m (measured from as-built conditions)
4. Stack Inside Diameter (measured from as-built conditions)
   a. Batch 0.1016m
   b. Continuous 0.2540m
5. Stack Exit Velocity: (variable)
   a. Batch 12.9814 m/s (worst-case)
   b. Continuous 5.1944 m/s (worst-case)
6. Stack Gas Exit Temperature: (variable)
   a. Batch 322K (worst-case) 120°F
   b. Continuos 322K (worst-case)
7. Ambient Air Temperature: 293K (worst-case) 68°F
8. Receptor Height: 0 m (ground level)
9. Urban/Rural Option: Rural Setting
10. No building downwash

C. Run SCREEN3 Model:

The SCREEN3 Model was used to determine a maximum dilution factor for each stack for 1 hour, 8 hour, and annual screening levels. The SCREEN3 results were multiplied by 0.7 to convert them from a 1-hour average into an 8-hour average, corresponding to the averaging time used for the concentration limit. The dilution factor for each of the TDUs was estimated from the SCREEN3 model using the coolest stack gas temperature and lowest flow rate from the range of values given. This gives the most conservative dilution factor.

For the batch unit's stack, the dilution factor was 995.4 (mg/m^3)/(g/s) (1-hour average). Converting to an 8-hour average gives 696.8 (mg/m^3)/(g/s) (=995.4 x 0.7). For each continuous unit's stack, the dilution factor was 995.1 (mg/m^3)/(g/s) (1-hour average). Converting to an 8-hour average gives 696.6 (mg/m^3)/(g/s) (=995.1 x 0.7).

D. Calculate Maximum Emission Rate allowed for each Contaminant listed in Table D-1 for each Source (i.e., Batch Stack, Continuous Stack 1, and Continuous Stack 2).

Following is an explanation of how the maximum allowable individual stack emission rates for each contaminant were calculated from dispersion modeling results and TAPs screening levels. The calculated results for the maximum allowable individual stack emission rates for each contaminant are shown in Table D-1.

The equation used was:

Stack Emission Rate for Each Contaminant (g/s) = TAPs Screening Level for Each Contaminant Attributed to Stack (mg/m^3) / Stack's Dilution Factor (μg/m^3)/(g/s)

Concentration in the above equation is the off-site concentration limit, listed in Table D-1, adjusted to account for the fraction attributed to the individual stack. The off-site limit concentration represents the maximum air concentration allowed from emissions from all of the sources (stacks). To estimate the maximum emission rate allowed from each individual stack, a way must be found to apportion a share of the off-site limit concentration to each stack. The most rigorous way to pro-rate this off-site limit concentration would be to determine the fraction of the total mass that each stack contributes. However, actual mass emission rates for the various contaminants will not be available until stack tests are performed. As a surrogate, design air flow rates from the stacks was chosen. This is an acceptable approximation as long as contaminant concentrations in the effluent are similar for each of the stacks.

The fraction of the off-site limit that is allowed to come from each stack can be estimated by calculating the fraction of the total flow (all three TDUs) that comes from each stack. That is:

Stack's fraction of concentration = Stack's fraction of flow x off-site limit

where 223 ft^3/min is the design flow rate from the batch TDU, 558 ft^3/min is the design flow rate from each of the continuous TDUs, batch unit's fraction of flow = 223/(558+558+223) = 0.167, each continuous stack's fraction of flow = 558/(558+558+223) = 0.417.

E. Example

For example, consider benzene emissions from the batch TDU. The off-site 8-hour limit is 0.016 mg/m^3.

Batch fraction of benzene concentration = 0.167 x 0.016 mg/m^3 = 0.0027 mg/m^3 or 2.7 $\mu g/m^3$

This is the concentration (2.7 $\mu g/m^3$) that was used, along with the dilution factor from the batch unit [696.8 $(mg/m^3)/(g/s)$], to estimate the allowable emission rate. Thus, the estimated maximum allowable emission rate for benzene from the batch TDU is:

Maximum allowable emission rate for benzene from batch TDU = 2.7 mg/m^3 / 696.8 $(mg/m^3)/(g/s)$ =3.83 x 10^{-3} g/s

Note: The total maximum emission limit for each chemical is determined by adding the individual emission limits for the batch, continuous 1, and continuous 2 stacks. One batch unit and one continuous unit will undergo POP testing. Since two of each unit will operate during full scale production, each POP sample result must be multiplied by two, combined, and then compared to the sum of the individual emission limits. If an individual emission limit for a chemical is exceeded, the result is still acceptable as long as the total emission limit is not exceeded. This is acceptable because the off-site limit will not be exceeded as long as the total emission limit is not exceeded.

*The dilution factor is the concentration output from SCREEN3 when a unit emission rate is used for input. That is, 1 g/s is used as the input emission rate. The ambient air concentration that the model gives can then be thought of as a concentration per unit of emission, or dilution factor. Models often use a unit emission rate then scale the resulting dilution factor by the actual emission rate. That way, the model does not need to be re-run for each new emission rate, providing the other input parameters remain unchanged. This works because the output air concentration is directly proportional to the input emission rate.

Table D-1 Summary of Maryland Screening Levels and Emission Rates for the TDU Stacks

Contaminant	Off-Site Limits: 1-Hour Screening Level (TLV-STEL[3] or TLV-C[4] /100)	Off-Site Limits: 8-Hour Screening Level (TLV-TWA/100) 2	Off-Site Limits: Annual Screening Level[1] (70 year exposure)	Maximum Allowable Emission Rates: 1-Hour Screening Level: Batch	1-Hour Screening Level: Continuous 1	1-Hour Screening Level: Continuous 2	8-Hour Screening Level: Batch	8-Hour Screening Level: Continuous 1	8-Hour Screening Level: Continuous 2	Annual Screening Level: Batch	Annual Screening Level: Continuous 1	Annual Screening Level: Continuous 2
	(mg/m³)	(mg/m³)	(mg/m³)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)
Polynuclear Aromatic Hydrocarbons (PAHs)												
Acenaphthene		2					4.78E-04	1.20E-03	1.20E-03			
Acenapthylene		24.6					5.88E-03	1.47E-02	1.47E-02			
Anthracene		2					4.78E-04	1.20E-03	1.20E-03			
Benzo(a)anthracene			0.0575							1.20E-04	3.01E-04	3.01E-04
Benzo(a)pyrene		2	0.00478				4.78E-04	1.20E-03	1.20E-03	1.00E-05	2.50E-05	2.50E-05
Benzo(b)fluoranthene	206.4		0.0575	3.45E-02	8.64E-02	8.64E-02				1.20E-04	3.01E-04	3.01E-04
Benzo(k)fluoranthene			0.0575							1.20E-04	3.01E-04	3.01E-04
Chrysene		2					4.78E-04	1.20E-03	1.20E-03			
Dibenzo(a,h)anthracene			0.0575							1.20E-04	3.01E-04	3.01E-04
Fluoranthene		82					1.96E-02	4.91E-02	4.91E-02			
Fluorene		2					4.78E-04	1.20E-03	1.20E-03			
Indeno(1,2,3-cd)pyrene			0.0575							1.20E-04	3.01E-04	3.01E-04
Napthalene	790	520		1.32E-01	3.31E-01	3.31E-01	1.24E-01	3.11E-01	3.11E-01			
Phenanthrene		9.8					2.34E-03	5.86E-03	5.86E-03			
Pyrene		2					4.78E-04	1.20E-03	1.20E-03			
Semi-volatile Organic Compounds (SVOCs)												
Carbazole		5.6					1.34E-03	3.35E-03	3.35E-03			
Bis (2-Ethylhexyl)phthalate		202					4.83E-02	1.21E-01	1.21E-01			
Phenol		190					4.54E-02	1.14E-01	1.14E-01			
2,4-Dimethylphenol		131.2					3.14E-02	7.85E-02	7.85E-02			
2-Methylphenol		220					5.26E-02	1.32E-01	1.32E-01			
4-Methylphenol		220					5.26E-02	1.32E-01	1.32E-01			
Pentachlorophenol		5					1.20E-03	2.99E-03	2.99E-03			
1,2 Dichlorobenzene	3010	1500		5.04E-01	1.26E+00	1.26E+00	3.59E-01	8.97E-01	8.97E-01			
Nitrobenzene		50					1.20E-02	2.99E-02	2.99E-02			
Volatile Organic Compounds (VOCs)												
Benzene	80	16	1.21	1.34E-02	3.35E-02	3.35E-02	3.83E-03	9.57E-03	9.57E-03	2.53E-03	6.33E-03	6.33E-03
Chlorobenzene		460					1.10E-01	2.75E-01	2.75E-01			
1,1 Dichloroethene	790	200		1.32E-01	3.31E-01	3.31E-01	4.78E-02	1.20E-01	1.20E-01			
Tetrachloroethene	6850	1700		1.15E+00	2.87E+00	2.87E+00	4.07E-01	1.02E+00	1.02E+00			
Ethylbenzene	5430	4340		9.09E-01	2.27E+00	2.27E+00	1.04E+00	2.60E+00	2.60E+00			
Styrene	1700	850		2.85E-01	7.12E-01	7.12E-01	2.03E-01	5.08E-01	5.08E-01			
Toluene		1880					4.50E-01	1.12E+00	1.12E+00			
Xylene (o-, m-, p- isomers)	6510	4340		1.09E+00	2.73E+00	2.73E+00	1.04E+00	2.60E+00	2.60E+00			
Vinyl Chloride		130	0.117				3.11E-02	7.78E-02	7.78E-02	2.45E-04	6.12E-04	6.12E-04
1,1,1 Trichloroethane	24600	19100		4.12E+00	1.03E+01	1.03E+01	4.57E+00	1.14E+01	1.14E+01			
1,4 Dichlorobenzene		600	1.46				1.43E-01	3.59E-01	3.59E-01	3.05E-03	7.64E-03	7.64E-03
Bromomethane		39					9.33E-03	2.33E-02	2.33E-02			
Carbon disulfide		310					7.41E-02	1.85E-01	1.85E-01			
Chloroethane	13	2.6		2.18E-03	5.44E-03	5.44E-03	6.22E-04	1.56E-03	1.56E-03			
Chloromethane	525	105		8.79E-02	2.20E-01	2.20E-01	2.51E-02	6.28E-02	6.28E-02			
Other Detected Chemicals												
Dioxins and Furans		0.0002	3.E-07				4.78E-08	1.20E-07	1.20E-07	6.28E-10	1.57E-09	1.57E-09

1. State Screening Level for Carcinogens = risk-based annual average chemical concentration that would increase a persons lifetime cancer risk by 1 in 100,000 if exposed continuously for 70 years.
2. TLV-TWA = threshold limit value-time weighted average means a concentration recommended by ACGIH for a normal 8-hour workday and 40-hour work week, or based on animal toxicity data for compounds without an ACGIH recommended value.
3. TLV-STEL - short term exposure limit-TLV means a 15-minute time-weighted average concentration that ACGIH indicates should not be exceeded at any time during the workday.
4. TLV-C means a concentration that ACGIH indicates should not be exceeded even instantaneously in a workplace.

APPENDIX E

SOIL PERFORMANCE STANDARDS

ORIGINAL (Red)

SOIL PERFORMANCE STANDARDS

In order to backfill on-site, treated soil and sediments must meet the following performance standards:

1. Benzo(a)pyrene [B(a)P] equivalence of 0.1 ppm for surface soil defined as surface to 2 foot depth, B(a)P equivalence of 1.0 ppm for soil below 2 foot depth. B(a)P equivalence is calculated based on concentrations of carcinogenic PAHs (CPAHs). CPAHs and their toxicity equivalence factors are listed in Table E-1.

Table E-1
Carcinogenic PAHs Toxicity Equivalence Factors

CPAH	Benzo(a)pyrene Toxicity Equivalence Factor
benzo(a)anthracene	0.1
benzo(b)fluoranthene	0.1
benzo(k)fluoranthene	0.01
benzo(a)pyrene	1.0
chrysene	0.001
dibenzo(a,h)anthracene	1.0
indeno(1,2,3-cd)pyrene	0.1
carbozole	0.003

2. Delisting criteria presented in Table E-2 and determined with the leachate from the Toxicity Characteristic Leaching Procedure (TCLP), EPA Method 1311.
3. Hazardous Waste Toxicity Characteristic is based on the definition presented in 40 CFR 261.24. Table E-3 presents the Maximum Concentration of Contaminants for the Toxicity Characteristic (TC).

TABLE E-2
DELISTING LEVELS

CARCINOGENIC PAHs	DELISTING LEVEL
Benzo (a) anthracene	2×10^{-4}
Benzo (b) fluoranthene	6×10^{-3}
Benzo (k) fluoranthene	2×10^{-1}
Benzo (a) pyrene	1×10^{-2}
Chrysene	6×10^{-2}
Dibenzo (a, h) anthracene	1×10^{-4}
Indeno (1, 2, 3-cd) pyrene	6×10^{-3}
NON-CARCINOGENIC PAHs	**DELISTING LEVEL**
Acenaphthene	1×10^{2}
Anthracene	6×10^{2}
Fluoranthene	6×10^{1}
Naphthalene	6×10^{1}
Phenanthrene	1×10^{-1} *
Pyrene	6×10^{1}
SEMIVOLATILE AROMATIC HYDROCARBONS	**DELISTING LEVEL**
p-Chloro-m-cresol	1×10^{1} *
2-Chlorophenol	1×10^{1}
2,4-Dimethylphenol	4×10^{1}
2,4-Dinitrophenol	4×10^{0}
Carbazole	2×10^{-1}
Pentachlorophenol	6×10^{-2}
Phenol	1×10^{3}
2,3,4,6-Tetrachlorophenol	6×10^{1}
2,4,5-Trichlorophenol	2×10^{2}
2,4,6-Trichlorophenol	5×10^{-1}
VOLATILE AROMATIC HYDROCARBONS	**DELISTING LEVEL**
Benzene	3×10^{-1}
Ethylbenzene	4×10^{1}
Styrene	6×10^{0}
Xylene	6×10^{2}

All values given in mg/L

* - HBLs for these compounds obtained from information provided by the Office of Solid Waste, Health Assessment Section.

Treated soils will be analyzed using the EPA Method 1311 TCLP. The concentrations in the resultant extract must meet the delisting levels in the table above. Provided these levels are achieved, the waste is delisted, and the treated soils are no longer required to be managed as hazardous waste.

Delisting Levels = HBL x DAF

HBL = Health-based level in drinking water at a hypothetical downgradient well. The HBLs are found in Docket Report on Health-Based Levels and Solubilities Used in the Evaluation of Delisting Petitions Submitted Under 40 CFR §260.20 and §260.22, U.S. EPA, Office of Solid Waste, Waste Identification Branch, Delisting Section, December 1994.

DAF = Dilution attenuation factor calculated using the EPA Composite Model for Landfills (CML) (See 56 CFR 32993, July 18, 1991).

The exposure assumption that is used to assess the hazard of a petitioned waste is ingestion of contaminated ground water, leachate, or wastewater. The EPA CML models what happens when waste is placed in a landfill. Leaching occurs, and contaminants are transported in ground water to a drinking water well.

TABLE E-3
TC RULE REGULATORY LEVELS

Parameter	TC Regulatory Level (μg/L)
1,4-Dichlorobenzene	7500
2,4 Dinitrotoluene	130
Hexachlorobenzene	130
Hexachlorobutadiene	500
Hexachloroethane	3000
2-Methylphenol	200000
3-Methylphenol	200000
4-Methylphenol	200000
Nitrobenzene	2000
Pyridine	5000
2,4,5-Trichlorophenol	400000
2,4,6-Trichlorophenol	2000
γ-BHC (Lindane)	400
Chlordane	30
Endrin	20
Heptachlor (and its oxides)	8
Methoxychlor	10000
Toxaphene	500
Benzene	500
2-Butanone (MEK)	200000
Carbon Tetrachloride	500
Chlorobenzene	100000
Chloroform	6000
1,2-Dichloroethane	500
1,1-Dichloroethene	700
Tetrachloroethene	700
Trichloroethene	500
Vinyl Chloride	200
2,4-D	10000
2,4,5-TP	1000
Pentachlorophenol	100
Mercury	200
Arsenic	5000
Barium	100000
Cadmium	1000
Chromium	5000
Lead	5000
Selenium	1000
Silver	5000
Additional Parameters	**Limits and Units**
Ignitability (Flashpoint)	140° F
Corrosivity	6.35 mm/yr.
Releasable Cyanide	250 mg/kg
Releasable Cyanide	500 mg/kg

APPENDIX F

MDE EFFLUENT STANDARDS

Appendix F
MDE Effluent Standards

Parameter	Average Discharge Limit (1)	Maximum (or Minimum) Discharge Limit (1)
Polynuclear Aromatic Hydrocarbons (PAHs) by HPLC - SW-846 3520B/ 8310		
Acenaphthene (ug/L)	22	59
Acenaphthylene (ug/L)	22	59
Anthracene (ug/L)	22	59
Benzo(a)anthracene (ug/L)	22	59
Benzo(k)fluoranthene (ug/L)	22	59
Benzo(a)pyrene (ug/L)	23	61
Chrysene (ug/L)	22	59
Dibenzo(a,h)anthracene (ug/L)	--	--
Fluoranthene (ug/L)	25	68
Fluorene (ug/L)	22	59
Indeno(1,2,3-cd)pyrene (ug/L)	--	--
Naphthalene (ug/L)	22	59
Phenanthrene (ug/L)	22	59
Pyrene (ug/L)	25	67
Semivolatile Organic Compounds by GC/MS - SW-846 3540C/8270C		
Bis (2-ethylhexyl)phthalate (ug/L)	103	279
Di-n-butyl phthalate (ug/L)	27	57
Diethyl phthalate (ug/L)	81	203
Dimethyl phthalate (ug/L)	19	47
Phenol (ug/L)	15	26
2,4-Dimethylphenol (ug/L)	18	36
Pentachlorophenol (ug/L)	13	20
Volatile Organic Compounds by GC/MS - SW-846 5030/8260B		
Toluene (ug/L)	26	80
Chloroform (ug/L)	21	46
Methylene chloride (ug/L)	40	89
Benzene (ug/L)	37	136
Ethylbenzene (ug/L)	32	108
Total Purgeables (ug/L)	--	100
BOD5 by USEPA 405.1		
BOD5 (mg/L)	5	10
TKN by USEPA 351.4		
TKN (mg/L)	--	20
TPH by GC - SW-846 8015BM		
TPH (mg/L)	--	15
TSS by USEPA 160.2		
TSS (mg/L)	30	45

Appendix F
MDE Effluent Standards (continued)

Parameter	Average Discharge Limit (1)	Maximum (or Minimum) Discharge Limit (1)
pH by Probe - SW-846 9040B		
pH (field)	--	6.5 to 8.5
Temperature by Probe - USEPA 170.1		
Temperature (°F) (field)	--	90
Turbidity by Nephelometric USEPA 180.1		
Turbidity (NTU)	50	150
Total Phosphorus by USEPA 365.1		
Total Phosphorus (ug/L)	500	1000
Dissolved Oxygen by USEPA 360.1		
Dissolved Oxygen (field) (ug/L)	--	>5000 (2)
Fluoride by USEPA 340.2		
Fluoride (ug/L)	10000	20000
Ammonia by USEPA 350.1		
Ammonia (ug/L)	1200 @ pH = 7 760 @ pH = 8	18900 @ pH = 7 5600 @ pH = 8
Metals by ICP - SW-846 6010B		
Arsenic (total) (ug/L)	200	400
Barium (ug/L)	1000	2000
Cadmium (ug/L)	1.1	3.9
Chromium (ug/L)	500	1000
Copper (ug/L)	12	18
Iron (ug/L)	1500	3000
Lead (ug/L)	3.2	82
Nickel (ug/L)	160	1400
Selenium (ug/L)	5.0	20
Silver (ug/L)	--	4.1
Zinc (ug/L)	110	120
Mercury by Cold Vapor - SW-846 7470A		
Mercury (ug/L)	0.012	2.4
Hexavalent Chromium by colorimetric - Hach 8023		
Hexavalent Chromium (field) (ug/L)	11	16
Iron by colorimetric - Hach 8008		
Iron (field) (ug/L)	1500	3000
Trivalent Arsenic by - SM3114B		
Trivalent Arsenic (ug/L)	190	360
Cyanide Amenable to Chlorination by SW 846 - 9010B		
Cyanide Amenable to Chlorination (ug/L)	7.3	31.3

(1) COMAR 26.08.02.02
(2) Minimum Discharge Limit

APPENDIX G

STARTUP AND SHUTDOWN SEQUENCES FOR BTDUs AND CTDUs

STARTUP AND SHUTDOWN SEQUENCES FOR BTDUs AND CTDUs

Continuous Thermal Desorption System Start-Up Sequence

The normal start-up sequence for continuous thermal desorption system is presented to clarify the method of operations. This sequence may be subject to change. The initial test run of this equipment will involve the processing of a minimum of 50 tons of clean soils representing the general physical properties of materials found on site prior to processing contaminated soils.

CTDU # 1

(1) Start up computer monitoring system
(2) Verify readout points operating
(3) Start CPM system
(4) Verify CPM system
(5) Start FTO in pre-heat mode (to heat beds)
(6) Once bed temperature is achieved, start blower and begin puff chamber cycling
(7) FTO "Run Mode" displayed
(8) Start VRS ID fan
(9) Energize WESP high voltage rods and purge air blower
(10) Verify draft control setting
(11) Start cooling tower fan
(12) Select and start scrubber recycle pump
(13) Select and start cooling tower pump
(14) Select and start WESP recycle pump
(15) Select and start quencher recycle pump
(16) Open stack bypass valve
(17) Verify all readings and system permissives
(18) Position stockpile conveyor/stacker screw and load spout
(19) Start stockpile conveyor/stacker screw
(20) Start paddle mixer/cooler motors (2)
(21) Start discharge screw
(22) Start Continuous Thermal Desorption System #1 drive
(23) Start burners on low fire
(24) Bring to start temperature
(25) Close bypass stack damper
(26) Start incline screw
(27) Load feed screw hopper with untreated soils
(28) Start Continuous Thermal Desorption System #1 feed screw
(29) Set temperature to high fire setting as material progresses through the cylinder
(30) Verify draft control operation
(31) Start water sprays to paddle mixer/cooler
(32) Adjust feed rate and Continuous Thermal Desorption System #1 drive rpm's to achieve desired production rates
(33) Monitor all control points and adjust as required

CTDU # 2

(1) Start up computer monitoring system
(2) Verify readout points operating
(3) Start CPM system
(4) Verify CPM system
(5) Start FTO in pre-heat mode (to heat beds)
(6) Once bed temperature is achieved, start blower and begin puff chamber cycling

(7) FTO "Run Mode" displayed
(8) Start VRS ID fan
(9) Energize WESP high voltage rods and purge air blower.
(10) Verify draft control setting. (Initial setting to be consistent with operating set points from CTDS Unit # 1
(11) Start cooling tower fan
(12) Select and start scrubber recycle pump
(13) Select and start cooling tower pump
(14) Select and start WESP recycle pump
(15) Select and start quencher recycle pump
(16) Open stack bypass valve
(17) Verify all readings and system permissives. (Initial setting to be consistent with operating set points from CTDS Unit # 1)
(18) Position stockpile conveyor/stacker screw and load spout.
(19) Start stockpile conveyor/stacker screw
(20) Start paddle mixer/cooler motors (2)
(21) Start discharge screw
(22) Start CTDS #2 drive
(23) Start burners on low fire
(24) Bring to start temperature
(25) Close bypass stack damper
(26) Start incline screw
(27) Load feed screw hopper with untreated soils
(28) Start CTDS #2 feed screw. (Initial setting to be consistent with operating set points from CTDS Unit # 1)
(29) Set temperature to high fire setting as material progresses through the cylinder
(30) Verify draft control operation. (Initial setting to be consistent with operating set points from CTDS Unit # 1)
(31) Start water sprays to paddle mixer/cooler
(32) Adjust feed rate and CTDS #2 drive rpm's to achieve desired production rates (Initial setting to be consistent with operating set points from CTDS Unit # 1)
(33) Monitor all control points and adjust as required

Continuous Thermal Desorption System Shutdown Sequence

The normal shutdown sequence for the Continuous Thermal Desorption System is presented to clarify the method of operations. This sequence may be subject to change or modification.

(1) Stop the feed and operation of the screw feeder, allow a minimum level in the hopper to maintain a soil seal and prevent ambient air from entering the Continuous Thermal Desorption System
(2) Complete processing of soil until the Continuous Thermal Desorption System is empty and the discharge is complete
(3) Reduce firing rate for the Continuous Thermal Desorption System burners as soils are processed as dictated by shell temperature
(4) Discontinue use of recycle water to re-hydrate soils upon completion of discharge
(5) Maintain slight draft in the Continuous Thermal Desorption System to purge the system of process gases
(6) Shut down the scrubber when the process gas drops below minimum temperature
(7) Turn down all burners, if not already automatically shut off
(8) Shut down incline screw conveyor
(9) Shut down discharge screw
(10) Shut down the mixer/cooler
(11) Shut down the cooling tower fan
(12) Shut down the WESP
(13) Shut down the stockpile conveyor and load spout
(14) Shut down the quencher recycle pump

ORIGINAL (Red)

(15) Shut down the WESP recycle pump
(16) Shut down the cooling tower pump
(17) Shut down the scrubber recycle pump
(18) Shut down CTDS drive
(19) Shut down the VRS ID fan
(20) Shut down the FTO blower
(21) Turn off the FTO
(22) Open by pass stack damper

Batch Thermal Desorption System Start-Up Sequence

The normal start-up sequence for the Batch Thermal Desorption System is presented to clarify the method of operations. This sequence may be subject to change or modification. The initial testing of this system will use a minimum of 12 tons of clean soils representing the general physical properties of materials found on site. Note that the start up sequence is essentially identical for both BTDUs.

(1) Start up computer monitoring system
(2) Verify read out points are operational
(3) Start CPM system
(4) Verify CPM system is operational
(5) Start FTO in pre-heat mode (to heat beds)
(6) Once bed temperature is achieved, start the blower and begin puff chamber cycling
(7) FTO "Run Mode" displayed
(8) Start the VRS
(9) Start the cooling tower water pumps
(10) Start the chiller
(11) Start the chiller water pump
(12) Verify the water level within the vacuum pump seal water tank
(13) Close the 6-in vapor valve
(14) Start the vacuum pump
(15) Verify all readings and system permissive(s)
(16) Start the feeder screw
(17) Start the TDU drive, adjust the speed control
(18) Feed material to the TDU until the hydraulic system pressure gauge reaches 4000 to 4200 pounds per square inch (psi)
(19) Discontinue loading; turn off the feeder screw
(20) Move vacuum door into position
(21) Quickly open the 6-in vapor line valve and evacuate the TDU vessel
(22) Adjust the gasket to seal any remaining vacuum leaks
(23) Allow the system to reach normal vacuum range (24 to 28-in Mercury (Hg))
(24) Slow the vessel rotation by adjusting the hydraulic system speed control valve
(25) Rotate vessel 1/3 to 1 revolutions per minute (RPM)
(26) Start the burner on low fire
(27) Allow unit to warm up for approximately 15 minutes
(28) Switch burner control to automatic
(29) Adjust temperature to high fire setting
(30) Monitor vacuum pump performance and cooling systems

Batch Thermal Desorption System Shut-Down Sequence

The normal shut-up sequence for the BTDU is presented to clarify the method of operations. This sequence may be subject to change or modification.

(1) Shut-off the burner, allow BTDU vessel to rotate during cool down
(2) Stop the BTDU vessel rotation
(3) Shut-off the vacuum pump

(4) Utilizing the vacuum in the system, drain the seal water, positive condensate tank, and vapor recycle lines of all condensate
(5) Start the steam scrubber fan
(6) Start the steam scrubber recycle pump
(7) Release the remaining vacuum from the BTDU system
(8) Remove the vacuum door
(9) Close doors on hood
(10) Start the mixer/cooler screw conveyor
(11) Start the mixer/cooler
(12) Start the gathering screw conveyor
(13) Start the BTDU drive unit
(14) Rotate the BTDU vessel slowly to discharge treated soils
(15) Monitor system during off-load
(16) Stop the BTDU vessel rotation
(17) Shut down the gathering screw conveyor
(18) Shut down the mixer/cooler
(19) Shut down the mixer/cooler screw conveyor
(20) Shut down the steam scrubber fan
(21) Shut down the steam scrubber recycle pump
(22) Pump condensate from the VRS to the condensate storage collection tanks

The following procedures will be implemented in the event of a long-term shutdown to protect equipment and piping. These items do not require such action during normal operations.

(1) Shut down the cooling tower fan
(2) Shut down the cooling water pumps
(3) Open the cooling tower basin and drain
(4) Open pump manifold drains
(5) Open vents on both pre-coolers and heat exchangers
(6) After drainage through the pump manifolds, open heat exchanger drains on the shell
(7) Leave drains open during shutdown
(8) Shut down the chiller system pump, leave power on to the compressors and controls
(9) Verify anti-freeze solution level in expansion tank of chiller, adjust if necessary
(10) Ensure chiller expansion tank is open and no more than half full
(11) Shut-off all make up water to the system and drain
(12) Drain all water discharge system water lines
(13) Drain the water from the steam scrubber recycle tank
(14) Shut down the flame-less thermal oxidizer
(15) Shut down the CPMS system

APPENDIX H

CALCULATION OF 95% UPPER CONFIDENCE LIMIT FOR CONCENTRATION OF BENZO(a)PYRENE IN SOIL

ORIGINAL
(Red)

Calculation of 95% Upper Confidence Limit for Concentration of Benzo(a)pyrene in Soil

The following steps, which are in accordance with USEPA (1989) guidance, were used to calculate the 95% UCL concentration of benzo(a)pyrene in soil in the containment area (Pit #4).

Step 1: Obtain input data. Analytical soil data from the containment area was obtained from the Remedial Investigation/Feasibility Study Report for the SMWT Site prepared by CDM in May 1988 (p. F-38) and from the Hazardous Waste Remedial Action Predesign Report prepared by Dames & Moore in June 1992 (Table D-2). The data used is summarized in the following table.

Sample	B(a)P in ug/kg	Sample	B(a)P in ug/kg	Sample	B(a)P in ug/kg
MW9	38	SB9 20-22'	150U	SB11 10-12'	5,800
MW16	30,000	SB925-27'	190U	SB11 12-14'	3,400
MW28 0-2'	32,000	SB9 30-32'	170U	SB12 2-4'	1,000
MW28 10-12'	170U	SB9 35-37'	170U	SB1210-12'	4,200U
MW28 14-18'	140,000	SB9 40-42'	210U	SO23 0-1.5'	160U
SB8 0-2'	160U	SB10 0-2'	160U	SO23 1.5-3'	160U
SB8 5-7'	150U	SB10 5-7'	170U	SO23 3-4.5'	160U
SB8 10-12'	160U	SB10 10-12'	150U	SO24 0-1.5'	810U
SB815-17'	170U	SB10 15-17'	150U	SO24 1.5-3'	160U
SB8 18-20'	150U	SB10 20-22'	150U	SO24 3-4.5'	160U
SB9 0-2'	150U	SB10 25-27'	170U	SO25 0-1.5'	160U
SB9 5-7'	170U	SB10 30-32'	170U	SO25 1.5-3'	160U
SB9 10-12'	250	SB10 35-37'	170U	SO25 3-4.5'	160U
SB9 15-17'	150U	SB11 0-2'	150U		

Step 2: Determine appropriate equation. The distribution data set was tested for distribution using the Shapiro-Wilks test of normality (Gilbert, 1987), and the data were determined to be lognormally distributed. Therefore, the equation used for calculating the UCL, discussed by Gilbert (1987) and Land (1975) and presented in USEPA (1992), is:

$$UCL_{0.95} = \exp\left(y + 0.5(s_y)^2 + (s_y \times H_{0.95})/(n-1)^{1/2}\right)$$

where:

- UCL = upper confidence limit;
- y = mean of the logtransformed data;
- s_y = standard deviation of the logtransformed data;
- $(s_y)^2$ = variance of the logtransformed data;
- H = H-statistic (i.e., from Gilbert 1987, p. 265); and
- n = number of samples in population.

Step 3: Calculation of the mean of the logtransformed data. A "U" qualifier (indicating the compound had not been detected at or above the given detection limit) was present in the data set. Values with this qualifier were divided in half before being logtransformed. One-half the detection limit is typically used in risk assessments (USEPA 1989) when averaging non-detect concentrations, because the actual value can be between zero and a value just below the detection limit. All data were then logtransfromed by taking the natural log of each value. Mean chemical concentrations were calculated by averaging the logtransformed data. Standard deviation and variance were also calculated from this data.

Step 4: Calculation of the 95% UCL: Using the standard deviation and the number of samples (41), the H-statistic was determined. Plugging all these values into the equation in Step 2, the 95% UCL concentration of benzo(a)pyrene in soil in the containment area was calculated to be 3,640 μg/kg.

GILBERT, R.O. 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold, New York

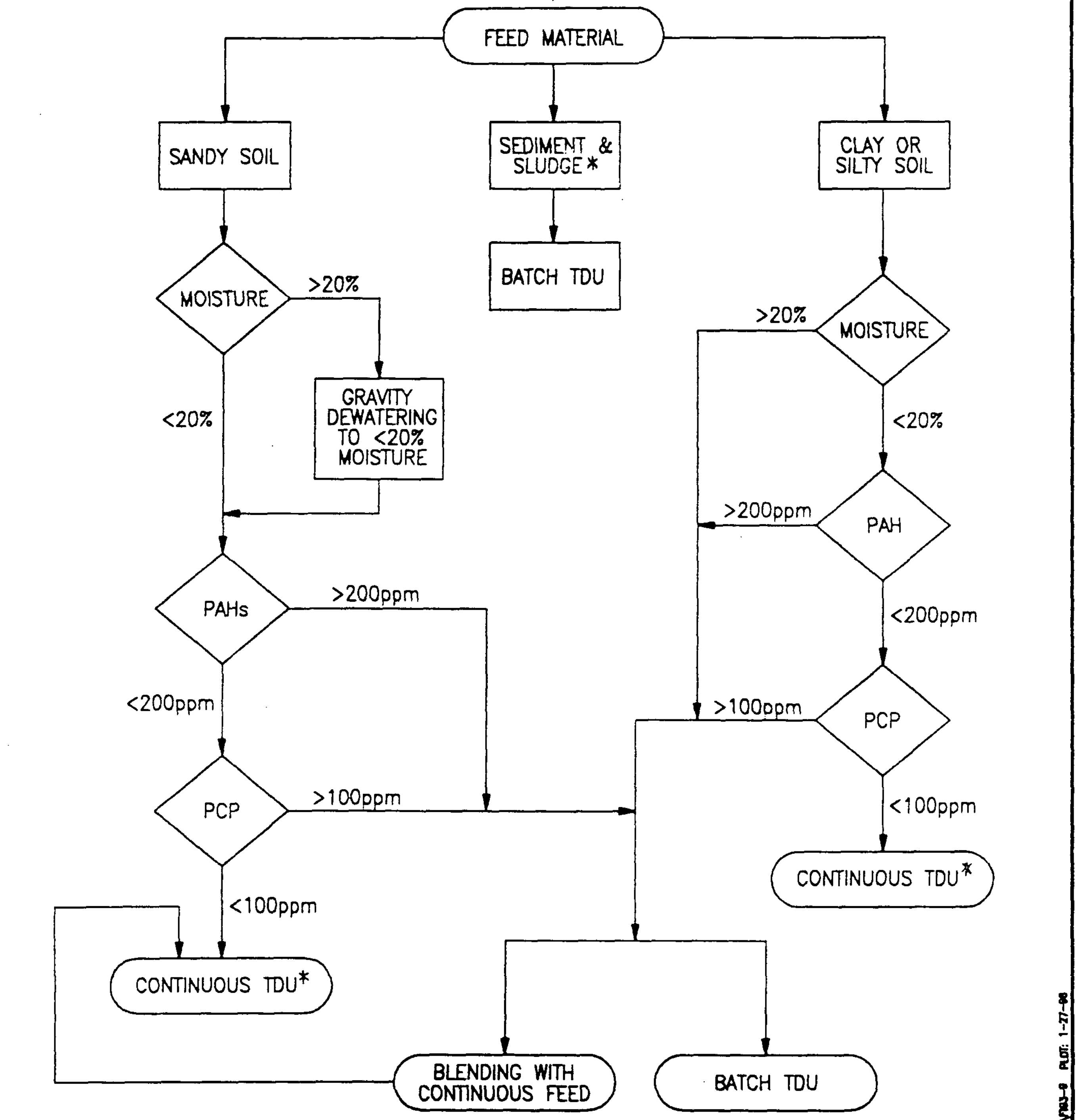
LAND, C.E. 1975. Tables of confidence limits for linear functions of the normal mean and variance. Math. Stat. 3:385-419

U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA). 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Part A. Interim Final. EPA/540/1-89/002. December 1989

U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA). 1992. Supplemental Guidance to RAGS: Calculating the Concentration Term. Office of Solid Waste and Emergency Response, Washington, D.C. PB92-963373. May 1992

APPENDIX I

THERMAL DESORPTION UNIT SELECTION PROCESS



* NOTE: WHENEVER POSSIBLE, SOIL WILL BE TREATED IN THE CONTINUOUS UNITS IN ORDER TO EXPEDITE SOIL PROCESSING.

U.S. ARMY ENGINEER DISTRICT, BALTIMORE
CORPS OF ENGINEERS
BALTIMORE, MARYLAND

ICF KAISER
2113 Emmorton Park Drive
Suite 100
Edgewood, Maryland 21040
(410) 612-6350

PREPARED BY:	PMH	TASK NO:	66716
CHECKED:	LH	ICF DWG NO:	FIG3-9
DATE:	1-27-98		

TDU SELECTION PROCESS

SOUTHERN MARYLAND WOOD TREATMENT SITE
HOLLYWOOD, MARYLAND

FILE: SOLMD. WOOD\FIG3-9 PLOT: 1-27-98

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

ORIGINAL
(Red)

April 28, 1998

Eric Brandt, P.E.
U.S. Army Corps of Engineers
Southern Maryland Wood Treating Site
25202 Three Notch Road
Hollywood, MD 20636

RE: Proof of Performance Test Plan, April 1998

Dear Eric:

EPA has reviewed the document "Low Temperature Thermal Desorption Units Proof of Performance/Summary of Full Scale Operations" submitted April 27, 1998. With a few minor exceptions, it appears to incorporate revisions necessary to address comments submitted by EPA on the previous version and therefore is approved as submitted. Please keep in mind, however, that there are still several outstanding issues that need to be resolved before the start of the POP Test.

1. Sampling and Analysis Plan -

    - Several sampling SOPs need to be revised and approved by EPA/MDE.
    - Stack sampling subcontractor and SOPs must be approved by EPA/MDE
    - Offsite laboratory must provide qualifications for analytical methods actually proposed in the SAP. There is some discrepancy between the methods listed in the SAP and the methods the offsite lab has provided qualifications for.
    - Onsite laboratory capabilities relative to the methods stated in the SAP need to be provided and the SAP needs to provide more specific documentation as to the methods being used for the "field screening."

2. The back up generator for the TDUs must be installed and functional in case of power failure.

ORIGINAL

United States Environmental Protection Agency
Region III
Office of Analytical Services and Quality Assurance
(410) 573-2600

2932

839 Bestgate Road
Annapolis, MD 21401
FAX: (410) 573-2698
(410) 573-2702

201 Defense Hwy., Suite 200
Annapolis, MD 21401
FAX: (410) 573-2771

DATE: February 23, 1998

SUBJECT: Field Sampling/Quality Assurance Project Plan for Southern MD Wood Treatment Site - Draft Final Document (FY98081)

FROM: Cynthia Caporale, Environmental Scientist
Quality Assurance Team (3ES20)

C. Caporale

TO: Stephanie Dehnhard, Project Manage
General Remedial Section (3HW23)

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL	# of pages ▸ 5
To STEPHANIE DEHNHARD	From CYNTHIA CAPORALE
Dept./Agency	Phone #
Fax # 301-373-5965	Fax #
NSN 7540-01-317-7368 5099-101	GENERAL SERVICES ADMINISTRATIO

The revised *Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) for Remedial Activities at Southern Maryland Wood Treatment Site* (dated February 1998) addressed the majority of my previous comments. Items that still need addressed because they may impact data quality are highlighted below. Specific comments concerning these items follow.

- *Sampling procedures are missing for many of the sampling activities. Documenting sampling procedures is important to provide consistent sampling techniques to be used through out the project.*

- *The sample collection mechanism for air sampling needs to be determined (SUMMA versus sorbent tubes).*

- *Although the laboratory QAPP was provided for the off-site laboratory (Paragon), the capabilities for this laboratory to perform the methods as specified in the FSP/QAPP are still unclear because the methods listed in the QAPP are inconsistent with those in the FSP/QAPP (newer versus older methods).*

- *On-site (ON-SITE) laboratory capabilities relative to the methods stated in the FSP/QAPP need to be provided. And, the FSP/QAPP needs to provide more specific documentation as to the methods being used for the "field screening."*

- *Data Validation levels were provided for some of the sampling events but not all. The QAPP inadquately addressed these levels.*

Specific Comments:

FSP

Section 3.1 - Air Monitoring:

- Sampling procedures need to be provided for both baseline and perimeter monitoring (references to SOPs not provided and an SOP for particulate sampling is missing).

- The monitoring network design being used as the basis for establishing the upgradient and downgradient sampling locations during baseline monitoring needs defined or discussed.

- Decision on using either the SUMMA canisters or sorbent tubes for air sample collection needs to be made prior to start of air monitoring activities.

- The one target compound that will be used to base future monitoring needs to be defined (either provide specific compound or process used to determine the target compound).

- The text in this section needs to state that samples will be collected three times per day as stated in Table 3-1.

- Perimeter monitoring during Proof of Performance activities needs to be included in Section 3.1.2.

- Table 3-1 inaccurately references Tables 3-4 and 3-5 for the estimated perimeter monitoring samples. Table 3-1 is missing the perimeter monitoring during excavations (under continuous TDU).

Section 3.2.1.2 - Excavation Procedures and Soil Screening

- SOP 30.1 was referenced for the soil sample collection procedures; however, this SOP lacks any discussion of "unique" procedures needed for this type of sampling. It includes surficial and subsurface sampling. A statement on whether the soil samples collected from the backhoe are considered surficial or subsurface may assist in providing clear directions on how these samples are to be collected.

- Table 3-2 needs to include analytical procedures for PAH and PCP analyses (for both field and verification tests). Validation level (M3) also missing from Table 3-2 (verification samples).

Section 3.2.1.3 - Verification Sampling

- Procedures for decontamination of the bucket and sampling tools need to be referenced.

Section 3.2.2 - Excavation of West Tributary

- Sampling procedures for sediment samples (during delineation and excavation) need to be provided (reference SOPs).

- This section needs to state whether samples are being analyzed on-site or off-site during delineation and excavation.

Section 3.3 - Thermal Desorption

- Analysis of percent solids was missing from list for the condensate water (Table 3-3, page 3-23).

- For both untreated and treated feed, the procedure being used to determine the 10 sample locations needs to be provided.

- SOP references or sampling procedures are needed for the condenstate water (Section 3.3.1.2), TDU Tank discharged (Section 3.3.1.3), Stack Sampling (Section 3.3.1.4), Perimeter monitoring (Sectin 3.3.1.5), Hot Cyclone Impinger (Section 3.3.1.7).

- From my notes taken at the January meetings, I have the validation level, M3, listed for the continuous air monitoring but Table 3-4 (page 3-27) states M1 Validation.

Section 3.4.2 - New Water Treatment Plant

- SOP for collection of composite and grabs samples during the acceptance test needs to provided. Collection of process samples after acceptance test (whether composites or grabs) needs to be provided. [An SOP was faxed to my attention on 2/23/98; however, I am still unclear as to how the compositing will be done (2-hour period versus 24-hour period).]

- Validation levels need to be provided for both the acceptance testing and operational testing (my notes have M3 level validation).

Section 3.5-Quarterly Groundwater Monitoring

- Table 3-8 needs to include the validation level of M3.

ORIGINAL (Red)

QAPP

Section 2.0 - Organization and Responsibilities

- Data Validation Manager and Project Chemist need to be identified.

Section 3.0 - Data Quality Objectives

- References to other tables provided in Table 3-2 (page 3-3) are from FSP and are incorrect references for the tables in the QAPP.

- Tables for the Water Treatment Plant and Quarterly Groundwater Monitoring are missing from this section.

- Section 3.1.3.1 has incorrect table references (Table 8.3 and Table 8.4 probably should be Table 7.3 and Table 7.4, respectively).

- The last bullet in Section 3.1.3.2 needs to be re-written to state that facility operations should **not** create nuisance or air pollution.

Section 4.0 - Sample Management

- This Section still needs to include information related to air samples (sample containers, holding times, etc.).

Section 5.0 - Analytical Procedures

- Analytical methods for on-site analyses need to be clearly defined. If the same parameter lists and methods are being used by on-site laboratory then this needs to be stated in QAPP.

- The Analytical Methodology Parameter List (Table 5-1), in most instances, has newer methods than those listed in the off-site laboratory QAPP.

Section 6.2 - Field Quality Control

- The use of air trip blanks was included; however, the preparation of these blanks needs to be discussed (e.g., blank sorbent tubes).

Section 7.0 - Data Validation

- Section 7.5 is lacking a full discussion of the various levels of data validation that have been included in the FSP tables.

- Section 7.6 needs to include discussion of air blanks and temperature blanks and how the results from these blanks will be assessed.

Laboratory QAPPs

- The off-site laboratory QAPP provided a list of analytical methods; however, the methods identified in the FSP/QAPP are different (updated methods). A statement from the laboratory, stating that the lab is capable of using the methods identified in the QAPP, is needed. From the off-site laboratory QAPP provided, capabilities for air analysis and some of the methods for the Water Treatment plant sampling could not be assessed.

- Since the on-site laboratory QAPP inadequately provided information on capabilities for performing the methods, as stated in the QAPP, an assessment could not be made.

- Results from previous audits or performance evaluation samples (relevant to methods stated in QAPP) are desired to assess laboratory capabilities.

If you should have any questions please call me at (410) 573-2732.

ORIGINAL Red)

From: MARTA RICHARDS
To: RTPMAINHUB:RTPMAINHUB.INTERNET:"Eric.Brandt@nab02....
Date: 4/24/98 11:42am
Subject: FW: POP plan -Reply

I'm going to try to send the comments that I have. I have a meeting scheduled at 11 I thought that I would be done with the Pop review.

General comments:

not addressed

I can not find a discussion of any condensate that is highly contaminated, oily, whatever that may need to be sent off-site. There has been a question whether it will be formed, but there are references to such things as contaminant-laden blowdown (sect 6.0(a)) and condensed contaminants (CTDU - sect 6.1). I think the shipping-off-site potential should be mentioned in Section 2.0 and probably 2.1 and 2.2, and 3.3.

I'm assuming that you are looking at the page numbers as well as the headers and footers and the fonts. The font sizes in the section titles don't make sense, but that may be in the translation of the word-processing-package differences.

Specific comments:

Section 1.0, in the Bullets I thought we discussed adding Appendices J and K, but can't find the reference in my notes. Does anyone else remember that?

Kaiser to provide separately

Section 2.1.1(b) I think ICF Kaiser was going to do a calculation for the emergency relief valve, but I don't know if it was to go into the PopPlan.

[the font for the (a) thru © and the following para. is different from that of the rest of the document.]

Section 6.0 In the last sentence of that section, perhaps the word treat should be **transfer**. The phrase treat... to the WTP needs correction.

Section 6.0 What happened to the discussion about the sanitary wastewater the second paragraph after the source listings?.

In Table 7-1 and Table 7-2 the fonts in the last column headings need to be checked. It appears to be a capital vs lower-case substitution in the small-cap font.

In the first paragraph of section 7.1, I think the colon (:) after face pressure...desorber should be a semi-colon. In that same sentence, to avoid confusion, I suggest removing the and before the WESP , and putting a semi-colon after WESP exit gas temperature .

Was Table 7-3 going to be changed from 20 minutes to read **more than 20 minutes** (in the Soil exit temp)?
In Section 8.0, I thought an estimate of soil usage during the POP Test was to

ORIGINAL (Red)

be added more detail about feed rates and batch charge/test.

In section 8.2, in the 3rd bullet, change BDTU to **BTDU**

Section 8.2, 4th bullet from the end In trying to avoid confusion, I suggest changing the first line to read Soil, air, and... conducted, **and the samples will be** sent to...

In the same bullet, pop needs to be changed to **POP**

In section 8.2, I'm not sure why the next to last bullet is in the Plan. I think it might cause unnecessary concern..

I will try to get some more reviewed before drop-dead deadline. I delayed my meeting as long as I could. More later maybe.

mkr
4/24/98 11:34

>>> "Brandt, Eric NAB02" <Eric.Brandt@nab02.usace.army.mil> 04/23/98 03:52pm
>>>

> ----------
> From: Brandt, Eric NAB02
> Sent: Thursday, April 23, 1998 3:47 PM
> To: 'dehnhard.stephanie@epamail.epa.gov'
> Cc: Rizzieri, Robert NAB02; Yakuchev, Edward I NAB02
> Subject: POP plan
>
> <<appendix A-C+covers>> <<appendix D>> <<appendix F>> <<appendix G>>
> <<appendix H>> <<appenidx E>> <<POP Plan>> <<Table of
> Contents(Revised)>>
>
> Per ICF K, ignore headers & footers these are being updated/proofed and
> will be double checked on printed version.
>
> Revised Table D-1 will be faxed seperately tommorrow morning.
>
> All attachments are Word 6.0 files, if you cannot access these files or if
> you have any problems reading, please call we will try and convert to
> another format (this would probably generate some format glitches, but the
> text could be reviewed).
>
> Figures 2-1 thru 2-5 are not included, nor is figure 5-1(site layout, same
> as draft public mtg presentation).
>
> I am e-mail this seperately each individual will get a copy to : de
> Percin, Richards, Healy/Grills, Newman.
>
> EB
>

ORIGINAL (Red)

From: MARTA RICHARDS
To: RTPMAINHUB:RTPMAINHUB.INTERNET:"Eric.Brandt@nab02....
Date: 4/24/98 1:41pm
Subject: FW: POP plan -Reply last today

My last comments today--

A few more comments:

Still working on these — General: Have the SOPs been revised?

Section 9.0 2nd para, last line. I suggest adding to the end of the sentence to read:

sample results **and will be retested.**

not addressed — Section 9.2 brings up the condensate/water samples and analysis. If there are two layers, there should be two sets of samples one for the water portion and one for the oily portion. This comment would need follow-up in the appropriate Tables.

Section 9.4 change the POT to **POP**

Section 9.5 , 2nd para add the word **test** after POP

2nd para , 2nd sentence I suggest changing ...test run or the ramp... to ... test run **and for** the ramp...

wasn't revised — Table 9-1 My notes from the meeting indicated that ramp-up sampling was going to be added to the Table

In the Sampling-Strategy column, Untreated soil and global the analytes are not homogenized, the **soil samples** are.

in the Treated-Soil section you need a line between Corrosivity and Reactive Cyanide and Sulfide (maybe a word-processing-translation glitch

.Section 10.0 I thought the word **design** was to be added before the word throughput in the 2nd sentence

-- This concept might be clearer if after the 10 tons per hour during the POP test , we added **(equaling a design throughput of 20 tons per hour)**

mkr
4/24/98 1:35 pm