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AMENDMENT TO CLOSURE PLAN INFORMATION AND DATA FOR BULK STORAGE TANKS T-5 AND T-6 REVISION 3 NOVEMBER 1993

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CLOSURE PLAN

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AMENDMENT TO

CLOSURE PLAN INFORMATION AND DATA

FOR BULK STORAGE TANKS T-5 AND T-6

Revision 3
November 1993

Fernald Office
U. S. Department of Energy
Fernald Environmental Management Project
7400 Willey Road
Fernald, Ohio 45030

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AMENDMENT TO CLOSURE PLAN INFORMATION AND DATA
for the
Bulk Storage Tanks T-5 and T-6
U. S. Department of Energy
Fernald Environmental Management Project
Fernald, Ohio

1.0 INTRODUCTION

1.1 Background

The Bulk Storage Tanks T-5 and T-6, hereafter referred to as Tanks T5/T6, include tanks T-3, T-5, T-6, transfer pump, associated piping, and secondary containment. Clean closure of Tanks T5/T6 could not be achieved using the approach detailed in the approved closure plan information and data (CPID) (January 1991, Revision 2) due to elevated levels of volatile organic compounds (VOCs) in the final tank rinseates. The closure activities included removing the waste, residues, and visible contamination from tanks T-5 and T-6; pressure washing tanks T-5 and T-6 and associated piping; rinsing tanks T-3, T-5, T-6, transfer pump, associated piping and secondary containment; sampling and analyzing rinseate from tanks T-3, T-5, T-6, transfer pump, associated piping, and secondary containment; and collecting and analyzing soil samples adjacent to the hazardous waste management units (HWMUs) No. 31 and No. 32 (see Figure 1).

The CPID as approved, established clean standards based on analyses of rinse waters (referred to in the CPID as decontamination action limits or DALs) and followed Ohio Environmental Protection Agency (OEPA) *Draft Closure Plan Review Guidance from February 8, 1988*. In this amendment to the approved CPID, the DALs have been modified to reflect the revised guidance provided in the OEPA *Closure Plan Review Guidance, May 1991* and

the *Closure Plan Review Guidance for RCRA Facilities, Interim Final September 1, 1993.*

The final rinseate analyses from tank T-3 and the secondary containment were evaluated and determined to be clean. The final rinseate analyses of tank T-5, the transfer pump, and associated piping were evaluated and determined to be contaminated. The final rinseate analyses of tank T-6 was evaluated and determined to be inconclusive.

The laboratory conducting the analyses for tank T-6 rinseates used equipment which was calibrated for concentrated waste sample analysis. As a result, the reported laboratory detection limits for benzene (0.08 mg/L), carbon tetrachloride (0.15 mg/L), and trichlorethylene (0.22 mg/L) were greater than the DAL of 0.075 mg/L (as calculated for the three compounds in question under the revised OEPA guidance). Because tank T-6 contained clean solvent and laboratory results from all three rinses were below detection limits, it was presumed that the second and third rinses would have removed residual contamination below the DAL. To confirm this assumption, another rinse sample will be collected from tank T-6 and the laboratory conducting the analyses will be instructed to use equipment calibrated to a detection limit below the DAL.

VOC and semi-volatile organic compound (SVOC) analyses were below the detection limit for the five soil samples adjacent to Tanks T5/T6. Analyses of soil samples adjacent to and in the vicinity of the HWMUs indicated elevated levels of TCLP metals (see Table 1 and Figure 1). However, it has been concluded that the contamination is not associated with releases from the HWMUs.

Elevated levels of metals in the Pilot Plant West Area, in locations not associated with the HWMUs, have been identified through a review of analytical data from soil borings B1250, B1252, B1260, and B1411 (see Table 1 and Figure 1). Analytical results reported for wells W1247 and W1251 were in excess of maximum contaminant levels (MCLs) of 0.05 mg/L for

arsenic, 1.0 mg/L for barium (well 1247 only), 0.01 mg/L for cadmium, 0.05 mg/L for chromium, and 0.05 mg/L for silver (see Table 1 and Figure 1). These elevated levels in groundwater from wells located under the northwest corner of the Pilot Plant indicated extensive contamination in the Pilot Plant West Area.

1.2 Purpose

Consistent with recent discussions between representatives of the FEMP (DOE and FERMCO) and the OEPA Southwest District Office (OEPA/SWDO), this amendment to the approved CPID provides information and data concerning Resource Conservation and Recovery Act (RCRA) closure actions that have been performed and proposes actions that will achieve clean closure of Tanks T5/T6.

Clean closure of Tanks T5/T6 will be obtained by decontaminating tank T-5; performing an additional rinse of tank T-6; dismantling and storing the transfer pump and associated piping as radioactively contaminated hazardous debris; reviewing analytical data from tank contents, rinseates, and soil; and leaving the decontaminated tanks and secondary containment in place until final disposition under the Interim Record of Decision (ROD) for Operable Unit 3 (OU3).

2.0 REVIEW OF ANALYTICAL DATA

2.1 Tank Contents and Decontamination Rinseate Analyses

Tanks T5/T6 have been cleaned to the point that there is no threat to human health and the environment. Based on a review of tank contents and rinseate analyses, the following conclusions have been made:

- Analyses of the material stored in Tanks T5/T6 revealed high levels of VOCs (e.g., trichloroethane [TCA] is 98% by weight) and SVOCs, but relatively low levels of metals (below TCLP limits) (Table 2). The approved CPID erroneously identified metals and the generic class of chlorinated fluorocarbons as contaminants of concern (COCs). The decontamination action limit (DAL) identified in the approved CPID (Rev. 2, January 1991) has been revised to match the OEPA *Closure Guidance Documents - May 1991 and September 1993*. The revised DALs and revised COCs are listed in Table 3. The analyses discussed below has been re-evaluated to incorporate the changes initiated by the new guidance.

- Analyses of the verification rinseate from tank T-3 show that all COCs are below the revised DAL (see Table 5). These results have confirmed the assertion in the approved CPID that tank T-3 is clean and was not used for storage of hazardous wastes. Tank T-3 will remain in place until final disposition under the Interim ROD for OU3.

- Analyses of the decontamination rinseates from tank T-5 identified residual TCA contamination in all four rinses in excess of the revised DAL (1.0 mg/L) (see Table 4). A review of metals analyses indicated that they were below the revised DAL. Additional rinses will be conducted in accordance with the approved amendment to the CPID to remove residual TCA contamination.

- Analyses of the decontamination rinseates from tank T-6 indicated levels of benzene (<0.08 mg/L), carbon tetrachloride (<0.15 mg/L), and trichlorethylene (<0.22 mg/L) below detection limit but in excess of the revised DAL (0.075 mg/L) (see Table 4). An additional rinse will be conducted in accordance with the approved amendment to the CPID and analyzed to verify decontamination.

- Analyses of the transfer pump and associated piping rinseate identified elevated levels of barium (2.36 mg/L), chromium (109 mg/L), and selenium (4.02 mg/L) in excess of the DAL (1.00 mg/L, 0.75 mg/L, and 0.15 mg/L respectively) (see Table 5). The liquid residues in the transfer pump were removed when rinse samples were collected. The transfer pump and associated piping will be placed into an approved storage container and managed as radioactively contaminated hazardous debris.

- Analyses of the containment pad rinseate confirm no COCs in excess of the revised DAL (see Table 5). The containment pad is clean and will continue to be used as a secondary containment for the thorium nitrate tank (Tank T-2) located adjacent to Tanks T5/T6.

A summary of the final rinseate analyses for tanks T-3, T-5, T-6, transfer pump and containment pad are provided in Table 5.

2.2 Environmental Media Contamination

A total of 11 soil samples were collected from five sample locations around the HWMU (see figure 1). The analytical data from the soil samples indicate metal contamination in the soil adjacent to the containment pad (Table 1). The soil analyses was compared to the FEMP background mean plus two standard deviations for the eight toxicity characteristic leaching procedure (TCLP) metals and every constituent was exceeded at least once[1]. Soil sample analyses for the COCs listed in Table 3 were not detected.

Analyses of soil and groundwater from eight soil borings and four wells located in the vicinity of Tanks T5/T6 (Pilot Plant West Area) are provided in Table 1. The boring data was compared to the FEMP background mean plus two standard deviations for the eight TCLP metals. The well data was compared to the MCLs for the eight TCLP metals listed in OAC 3745-81-11 and 40 CFR 141.11. All but one of the constituents (selenium) were exceeded at least once.

2.3 Comparison of Tank Contents to Soil Contamination

The analytical results from the Tanks T5/T6 contents indicated that metals were below TCLP limits. Based on the basic mass balance calculation given below, approximately 260 liters of solvent would have to have been released to contaminate one kilogram of soil to the level indicated in Table 2.

$$\frac{\text{Concentration in Soil (mg/kg)}}{\text{Concentration in Tanks (mg/L)}} = \text{Amount of Spillage (L) per kilogram of soil}$$

[1] "CERCLA/RCRA Background Soil Study Report" dated March 19, 1993 provides the methodology used to generate the background data. Further discussions with Regulatory Programs produced the values used in this report.

The basic mass balance calculation above uses the known concentration of mercury in the tank (0.001 mg/L) and the known concentration of mercury in the soil adjacent to the secondary containment (0.26 mg/kg) to arrive at 260 L/kg. Although other constituents (i.e., arsenic, barium, cadmium, chromium, lead, selenium, and silver) require a lesser quantity of solvent release to achieve their respective levels of soil contamination (see Table 2), the minimum release required to obtain the level of mercury contamination is 260 liters per kilogram of soil. No releases of this quantity have been documented nor can it be attributed to de minimis losses. The spill quantities reported in Table 6 are minute and never breached the secondary containment. Therefore, metal contamination in the soil is not from Tanks T5/T6.

2.4 Barium Chloride Waste Salt Treatment Operation

The Barium Chloride Waste Salt Treatment Facility (HWMU No. 30 - RCRA Closed 04-19-90) in the Pilot Plant West area is a source of barium in the soil due to its use of highly concentrated barium chloride and close proximity to Tanks T5/T6 (see Figure 1). Sample analyses of tank residues indicates that Tank D-15, located inside of the Pilot Plant, had elevated levels of barium (3700 mg/L). The contents were pumped from Tank D-15 via an underslab pipeline to Tank W-10, a 2,200 gallon tank located outside of the Pilot Plant. The filtrate was then transferred via underground pipeline to the Pilot Plant Sump (identified by "Abandoned Sump West of the Pilot Plant - HWMU No. 22). Based on the high level of barium in the barium chloride solution, the transferral of material through underground lines, and the disposition of material into tank W-10 and the Pilot Plant Sump, the Barium Chloride operation is a source of barium in the soil.

2.5 Pilot Plant West Area

The activities in the Pilot Plant included bench-scale testing of nearly all chemical processes that occurred at the FEMP. The *FEMP Upset Spill Control Document* identifies several releases inside of the Pilot Plant.

The Pilot Plant has a network of floor drains that are connected to the Pilot Plant Sump via underground drain lines. Recent activities involving the excavation of the Pilot Plant Sump have indicated that the soil adjacent to and underneath the sump is heavily contaminated with RCRA metals and organics. Visual inspections of the drain line connected to the Pilot Plant Sump have identified cracks and loose connections at pipe fittings and elbows.

The soil borings (B1250, B1252, B1260, and B1411) shown in Figure 1 and listed in Table 1 identify extensive soil contamination in the Pilot Plant West area. Borings with TCLP analyses (B1258, B1259, B1504, B1674) and wells that give groundwater analyses (W1247, W1249, W4103) are provided in Table 1 to illustrate the extent of contamination in the Pilot Plant West area. Based on analytical data, process knowledge, and the extent and level of contamination, soil and well groundwater under the Pilot Plant are sources of metals contamination in the Pilot Plant West area.

In conclusion, the media adjacent to the secondary containment of Tanks T5/T6 and throughout the Pilot Plant West area will remain in place until final remediation under the Final RODs for OU3 and OU5. Analytical results and process knowledge indicate that the sources of media contamination came from the Barium Chloride Operation and other bench-scale operations that occurred in the Pilot Plant.

3.0 CLOSURE INFORMATION

3.1 Closure Objectives

This amendment to the approved CPID is in accordance with performance standards described in OAC 3745-66-11 (40 CFR 265.111). These standards have been adopted from the approved CPID and include the following:

- Minimizing the need for further maintenance by decontaminating tank T-5, rinsing T-6, and placing the transfer pump and associated piping into approved storage containers. Post closure maintenance is not required where no hazardous wastes or unacceptable levels of contamination remain after closure (i.e., clean closed).

- Controlling, minimizing, or eliminating, to the extent necessary to protect human health and the environment, the escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere. In the event of an unexpected occurrence, the FEMP will submit a notification to OEPA no more than 30 days after the occurrence.

- Conducting closure actions in accordance with the approved CPID as amended.

In accordance with this amendment to the approved CPID, the following actions will be taken:

- Tank T-5 will be decontaminated and tested to confirm TCA contamination is below 1.0 mg/L, in accordance with the OEPA *Closure Guidance Documents - May 1991 and September 1993.*

- Tank T-6 will be rinsed and analyzed to confirm benzene, carbon tetrachloride, and trichloroethylene contamination is below 0.075

mg/L, in accordance with the OEPA *Closure Guidance Documents - May 1991 and September 1993*.

- The transfer pump and associated piping will be disconnected from the system, placed into an approved storage container, and stored as radioactively contaminated hazardous debris.

3.2 Closure Methodology

Additional closure actions will be conducted in accordance with this amendment to the approved CPID as follows:

1. The dried residues accumulated in the bottom of tank T-5 will be removed by scraping and HEPA vacuuming the material up through the open manway at the top of the tank. The dried residues will be collected and transferred into an approved storage container and managed as a mixed waste.

2. A steam line will be inserted into the manway of tank T-5 and all other openings will be closed. The tank will be steam cleaned to remove any remaining residues adhering to the side walls and bottom. The steam will be shut off and the drain valve underneath the tank will be opened to release the accumulated water into an approved storage container. A sample will be collected from the container and sent to the lab for analysis for waste characterization purposes.

3. The drain valve to tank T-5 will be closed. Tank T-5 will be rinsed with potable process water under nominal pressure (65 to 75 psi) to thoroughly rinse all interior surfaces. The drain valve will be opened to release the rinseate into an approved storage container. The tank will be rinsed two additional times. A sample will be collected from the third

rinseate and sent to the lab for analysis for waste characterization purposes and to see if TCA is ≤1.0 mg/L.

4. A visual inspection will be performed from the top of tank T-5. The cleaning operation will be complete when the interior stainless steel surfaces are visually clean.

5. Decontamination of tank T-5 will be verified if analysis for TCA is less than or equal to 1.0 mg/L, in accordance with the revised DAL (see Table 3). When tank T-5 is verified clean, it will remain in place until final disposition under the Interim ROD for OU3.

6. The drain valve to tank T-6 will be closed. Tank T-6 will be rinsed with potable process water under nominal pressure (65 to 75 psi) to thoroughly rinse all interior surfaces. The drain valve will be opened to release the rinseate into an approved storage container. A sample will be collected from the container and sent to the lab for analysis for waste characterization purposes to confirm that benzene, carbon tetrachloride, and trichloroethylene are ≤ 0.075 mg/L.

7. Decontamination of tank T-6 will be verified if analyses for benzene, carbon tetrachloride, and trichloroethylene are less than or equal to 0.075 mg/L, in accordance with the revised DAL (see Table 3). When tank T-6 is verified clean, it will remain in place until final disposition under the Interim ROD for OU3.

8. The transfer pump and associated piping will be disconnected and placed into an approved storage container and stored as radioactively contaminated hazardous debris.

Tank T-3 and the containment pad are clean and will remain in place until final disposition under the Interim ROD for OU3 as discussed in Section 1.1 of this amendment to the CPID and in Table 5. Based on evaluations of soil data (Section 2.2), no additional soil samples will be taken. Remediation of contaminated media will occur under the Final RODs for OU3 and OU5.

3.3 Sampling and Analysis

Sampling and analysis of decontamination verification rinseate water will be conducted in accordance with the approved CPID Sampling and Analysis Plan (SAP). The SAP addresses the following:

- Quality Assurance/Quality Control (QA/QC)
- Water and Rinseate Sampling
- Sample Handling Procedures
- Waste Management
- Sampling Equipment
- Report of Findings
- Health and Safety
- Decontamination Procedures for Sampling Equipment

Note: The SAP will not address additional soil sampling for the reasons presented in Section 2.2 of this document.

4.0 CLOSURE CERTIFICATION

4.1 RCRA Closure Standards

Clean closure of Tanks T5/T6 will be accomplished when decontamination of tanks T-5 and T-6 are complete and the pump and associated piping are removed. The closure certifications will be made as described in Sections 4.2 through 5.0 of the approved CPID and listed below.

4.1.1 Decontamination Verification

For the reasons stated in Section 2.2 of this amendment to the approved CPID, metal contamination in the soil cannot be attributed to Tanks T5/T6. The COCs for these HWMUs are strictly the VOCs and SVOCs listed in Table 3. None of the eleven soil samples taken adjacent to the HWMU confirm the presence of VOCs or SVOCs. Soil remediation will not be performed as a part of this RCRA closure plan; instead, remediation will occur under the Final RODs for OU3 and OU5. Decontamination of tank T-3 and the secondary containment have been accomplished. Decontamination verification of tanks T-5 and T-6 will be based on sample analysis from the final rinseate. Decontamination of tank T-5 will be verified when final rinseate samples contain concentrations of TCA below the revised DAL (1.0 mg/L) (Table 3). Decontamination of tank T-6 will be verified when final rinseate samples contain concentrations of benzene, carbon tetrachloride, and trichloroethylene below the revised DAL (0.075 mg/L) (Table 3).

Per OEPA *Closure Guidance Documents - May 1991 and September 1993*, the following rinseate standards must be met before tanks T-5 and T-6 will be considered "clean":

(i) Fifteen times the public drinking water maximum contaminant level (MCL) for hazardous waste constituents as promulgated in 40 CFR 141.11 and OAC 3745-81-11 for inorganics and 40 CFR 141.12 and OAC 3745-81-12 for organics;

(ii) If an MCL is not available for a particular contaminant, then fifteen times the maximum contaminant level goal (MCLG) as promulgated in 40 CFR 141.50 shall be used as the clean standard; or

(iii) If the product of fifteen times the MCL or MCLG exceeds 1 mg/L or if neither and MCL nor an MCLG is available for a particular contaminant, 1 mg/L shall be used as the clean standard.

The constituents of concerns (COCs) are listed in Table 3 along with their respective MCL/MCLG and decontamination action limits.

4.2 Certification Inspections

Certification inspections by an independent engineer are an integral part of the RCRA closure certification activities. The major emphasis of closure inspections will be as follows:

- To ensure that tank cleaning and decontamination procedures are conducted in accordance with the amendment to the approved CPID.
- To ensure sample collection techniques are used throughout the RCRA closure process in accordance with the amendment to the approved CPID.
- To ensure that rinseate water is properly stored, labeled and characterized in accordance with the amendment to the approved CPID.

4.3 Certification Documents

RCRA closure certification documentation shall include a daily log of activities, field notes recorded by the owner and or the owner's representative during closure activities, copies of the laboratory

analyses reports, copies of the hazardous waste manifests (if utilized), and chain of custody forms used for sample handling and tracking. All RCRA closure certification documentation shall be compiled and retained at the FEMP for inspection/access by OEPA.

4.4 Statement of Certification

The FEMP and an independent registered engineer shall submit Certification of RCRA Closure within 60 days after unit closure is complete. The Certification will meet the requirements of OAC 3745-66-15 and 40 CFR 265.115 and will be worded as follows:

"Based on information made available to me, I ...,... (Title), do hereby certify that to the best of my knowledge, the Bulk Storage Tanks T-5 and T-6 have been closed in accordance with the Approved Closure Plan Information and Data for the Bulk Storage Tanks T-5 and T-6 with amendments, as approved by the Ohio EPA on...(date)."

4.5 Post-Closure Plan

This HWMU will be clean closed and post-closure care requirements are not applicable.

4.6 Notice In Deed

A notation in the property deed is required under OAC 3745-66-19 (B) (1) which involves post-closure care. Since post-closure care is not applicable to this unit, a notice in deed will not be required.

5.0 CLOSURE SCHEDULE

It is anticipated that the FEMP will initiate field work for closure of Tanks T5/T6 during the second quarter of the 1994 fiscal year (FY94). Assuming no modifications to the plan are required, closure activities are to be completed within 180 days from the date of OEPA approval. The schedule for closure is provided in Table 7.

The OEPA's facility inspector shall be contacted at least five (5) business days in advance of all activities associated with tank cleaning and rinseate sample collection.

Well, Boring & Sample Point Numbers		Table 1: Soil Sample Boring, and Well Analyses - Total Metals Analyses[1]							
	Matrix	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Background mean + 2 standard deviations	solid	8.601	174.516	0.784	16.303	27.285	0.157	0.546	1.409
W1247 (12-04-90)	liquid	0.3380	1.317	0.33	0.156	ND	ND	ND	0.174
W1249 (07-15-90)	liquid	ND	0.047	0.003	0.022	ND	ND	ND	0.012
B1250 (0"-6")	solid	6.30	95.50	3.40	23.80	30.30	0.34	NA	0.0029
B1250 (6"-12")	solid	6.50	88.80	4.50	23.40	15.90	1.10	NA	ND
W1251 (01-08-91)	liquid	0.29	0.684	0.016	0.104	ND	ND	ND	0.153
B1252 (0"-6")	solid	7.40	401.00	4.70	24.40	NA	0.50	NA	ND
B1252 (6"-12")	solid	6.70	406.00	3.00	19.70	26.70	0.37	NA	2.60
B1258 (TCLP)	solid	0.081	0.701	0.005	ND	0.047	ND	0.0980	ND

1 - Unless noted as TCLP
NA - Not Analyzed ND - Not Detected B - Boring (mg/kg) W - Well (mg/L) SP - Sample Point (mg/kg)
Shaded values exceeding of soil background and maximum contamination limits

Well, Boring & Sample Point Numbers		Table 1: Soil Sample Boring, and Well Analyses - Total Metals Analyses[1]							
	Matrix	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
B1259 (TCLP)	solid	ND	0.891	0.013	0.137	ND	ND	0.1600	0.1040
B1260 (0"-6")	solid	5.70	336.00	5.40	19.40	117.00	0.43	NA	ND
B1260 (6"-12")	solid	3.90	317.00	3.40	16.60	15.50	0.27	NA	3.10
B1411 (9'-6" to 10')	solid	2.20	364.00	4.50	21.20	9.30	0.24	NA	2.20
B1411 (10'-0" to 10'-6")	solid	3.70	3610.00	4.20	19.80	16.90	0.22	NA	ND
B1504 (TCLP)	solid	0.127	1.54	0.005	ND	ND	ND	0.111	ND
B1674 (TCLP)	solid	ND	1.07	0.012	0.154	ND	ND	ND	0.152
W4103 (05-03-89)	liquid	0.0048	0.0841	0.0036	ND	0.0025	0.0003	0.002	ND

1 - Unless noted as TCLP
NA - Not Analyzed ND - Not Detected B - Boring (mg/kg) W - Well (mg/L) SP - Sample Point (mg/kg)
Shaded values exceeding of soil background and maximum contamination limits

Well, Boring & Sample Point Numbers		Table 1: Soil Sample Boring, and Well Analyses - Total Metals Analyses[1]							
	Matrix	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
SP 1-1 (0"-12")	solid	6.84	18.20	0.35	5.56	32.00	0.06	0.37	2.29
SP 1-2 (12"-24")	solid	5.72	189.00	7.51	29.40	17.40	0.06	0.42	1.23
SP 2-1 (0"-12")	solid	20.60	75.90	0.30	16.10	21.10	0.06	1.83	1.00
SP 3-1 (0"-12")	solid	4.73	245.00	0.35	75.40	88.00	0.26	0.38	3.60
SP 3-2 (12"-20")	solid	4.58	102.00	0.31	26.40	23.50	0.06	0.43	1.03
SP 3-4 (0"-12")	solid	3.56	298.00	0.36	60.80	82.70	0.18	0.36	1.18
SP 4-1 (0"-12")	solid	3.30	53.20	0.35	19.40	41.20	0.16	0.45	1.13
SP 4-2 (12"-24")	solid	7.55	82.60	0.36	12.70	24.10	0.06	1.56	1.20
SP 4-3 (24"-36")	solid	4.86	73.50	0.36	16.30	13.40	0.05	0.44	1.19
SP 4-4 (24"-36")	solid	4.47	66.30	0.36	12.80	12.30	0.06	0.34	5.03
SP 5-1 (0"-12")	solid	29.10	37.00	0.32	6.94	43.90	0.22	0.45	1.06

1 - Unless noted as TCLP
NA - Not Analyzed ND - Not Detected B - Boring (mg/kg) W - Well (mg/L) SP - Sample Point (mg/kg)
Shaded values exceeding of soil background and maximum contamination limits

Table 2: Metals Contamination in Tank vs. Soil

Tank Contents, Soil Concentration, and Spill Required to Generate Contamination in the Soil									
Contamination and Spillage	Matrix	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Silver	Selenium
Maximum Soil Contamination (mg/kg)	solid	29.10	298.00	7.51	75.40	88.00	0.26	1.83	5.03
Maximum Tank Contamination (mg/L)	liquid	0.46	<2.00	<3.00	3.00	9.00	0.001	<0.20	<0.70
Amount of Spillage (L)[1]	liquid	63.26	>149.00	>2.50	25.13	9.78	260.00	>9.15	>7.19

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1 - Liters of solvent per Kilogram of soil

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Table 3: Contaminants of Concern

Compound	MCL/MCLG [1] (mg/L)	Decontamination Action Limit [2] (mg/L)
Benzene [3]	0.005	0.075
Carbon tetrachloride [3]	0.005	0.075
Chlorobenzene [3]		1.0
Chloroform [3]	0.10	1.0
Chloromethane		1.0
Cresol (total) [3]		1.0
1,2-Dichlorobenzene		1.0
1,4-Dichlorobenzene [3]	0.75	1.0
1,1-Dichloroethane		1.0
1,2-Dichloroethane [3]	0.005	0.075
1,1-Dichloroethylene [3]	0.007	0.105
2,4-Dinitrotoluene [3]		1.0
Hexachlorobenzene [3]		1.0
Hexachloro-1,3-butadiene [3]		1.0
Hexachloroethane [3]		1.0
Methyl ethyl ketone [3]		1.0
Methylene chloride		1.0
Nitrobenzene [3]		1.0
Pentachlorophenol [3]		1.0
Pyridine [3]		1.0
Tetrachloroethylene [3]		1.0
1,1,1-Trichloroethane	0.20	1.0
1,1,2-Trichloroethane		1.0
Trichloroethylene [3]	0.005	0.075
1,1,2-Trichloro-1,2,2-trifluoroethane		1.0
Trichlorofluoromethane		1.0
Vinyl chloride [3]	0.002	0.03

[1] Maximum Contaminant Levels or Maximum Contaminant Level Goals as defined by Section 4.1.1 of this document.

[2] Basis for determining Decontamination Action Levels is discussed in Section 4.1.1 of this document.

[3] TCLP Listed Compounds.

Table 4: Tanks T5/T6 Rinseate Analyses

Tank T-5 - COCs	Rinse No. 1	Rinse No. 2	Rinse No. 2 (dup)	Rinse No. 3	Rinse No. 4
1,1,1-Trichloroethane	16.0 mg/L	32.0 mg/L	29.0 mg/L	44.0 mg/L	1.2 mg/L

Tank T-6 - COCs	Rinse No. 1	Rinse No. 2	Rinse No. 3	Rinse No. 3 (dup)	
Benzene[1]	<0.08 mg/L	<0.08 mg/L	<0.08 mg/L	<0.08 mg/L	
Carbon Tetrachloride[1]	<0.15 mg/L	<0.15 mg/L	<0.15 mg/L	<0.15 mg/L	
Trichloroethylene[1]	<0.22 mg/L	<0.22 mg/L	<0.22 mg/L	<0.22 mg/L	

[1] Detection Limit is higher than the Decontamination Action Limit (DAL)

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TABLE 5: FINAL RINSEATE ANALYSES (page 1 of 3)

COMPONENT BEING EVALUATED	TANK T-3		PUMP		
Sample No.	92-138A-4068	92-138A-4069	92-138A-4070	92-138A-4071	DECONTAMINATION ACTION LIMIT (DAL)(1)
Description	T3 INLET	T3 OUTLET	T3 OUT-DUP	TRANS. PUMP	
ANALIS No.	920415-078	920415-079	920415-080	920415-081	
ITAS ID	1990-001	1990-002	1990-003	1990-004	
Matrix	Liquid	Liquid	Liquid	Liquid	
VOLATILE ORGANICS	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(ug/L)
CHLOROMETHANE	10 U	10 U	10 U	100 U	1000.00
VINYL CHLORIDE	10 U	10 U	10 U	100 U	30.00
CHLOROETHANE	10 U	10 U	10 U	100 U	NA
TRICHLOROFLUOROMETHANE	10 U	10 U	10 U	100 U	1000.00
METHYLENE CHLORIDE	10 U	10 U	10 U	100 U	1000.00
ACETONE	10 U	10 U	16 U	210 U	NA
CARBON DISULFIDE	5 U	5 U	5 U	50 U	NA
1,1-DICHLOROETHENE	5 U	5 U	5 U	50 U	105.00
trans-1,2-DICHLOROETHENE	5 U	5 U	5 U	50 U	NA
1,2-DICHLOROETHANE	5 U	5 U	5 U	50 U	75.00
2-BUTANONE	10 U	10 U	11 U	100 U	NA
1,1,1-TRICHLOROETHANE	5 U	5 U	5 U	620 U	1000.00
CARBON TETRACHLORIDE	5 U	5 U	5 U	50 U	75.00
TRICHLOROETHENE	5 U	5 U	5 U	50 U	75.00
1,1,2-TRICHLOROETHANE	5 U	5 U	5 U	50 U	1000.00
BENZENE	5 U	5 U	5 U	50 U	75.00
4-METHYL-2-PENTANONE	10 U	10 U	10 U	100 U	NA
TERTACHLOROETHYLENE	5 U	5 U	5 U	50 U	1000.00
TOLUENE	5 U	5 U	5 U	50 U	NA
CHLOROBENZENE	2 J	1 J	1 J	50 U	1000.00
ETHYLBENZENE	5 U	5 U	5 U	50 U	NA
XYLENES (TOTAL)	5 U	5 U	5 U	50 U	NA
SEMI-VOLATILE ORGANICS	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
2-METHYLPHENOL	10 U	10 U	10 U	NR	1000.00
3-METHYLPHENOL	10 U	10 U	10 U	NR	1000.00
4-METHYLPHENOL	10 U	10 U	10 U	NR	1000.00
1,4-DICHLOROBENZENE	10 U	10 U	10 U	NR	1000.00
2,4-DINITROTOLUENE	10 U	10 U	10 U	NR	1000.00
HEXACHLOROBENZENE	10 U	10 U	10 U	NR	1000.00
HEXACHLORO-1,3-BUTADIENE	10 U	10 U	10 U	NR	1000.00
HEXACHLOROETHANE	10 U	10 U	10 U	NR	1000.00
NITROBENZENE	10 U	10 U	10 U	NR	1000.00
PENTACHLOROPHENOL	52 U	52 U	52 U	NR	1000.00
PYRIDINE	10 U	10 U	10 U	NR	1000.00
2,4,5-TRICHLOROPHENOL	10 U	10 U	10 U	NR	NA
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	NR	NA
METALS (Totals)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
ARSENIC	0.50 U	0.50 U	0.50 U	0.50 U	0.75
BARIUM	0.01 U	0.01 U	0.01 U	**2.36**	1.00
CADMIUM	0.01 U	0.01 U	0.01 U	0.03	0.15
CHROMIUM	0.025 U	0.025 U	0.025 U	**109.00**	0.75
LEAD	0.10 U	0.10 U	0.10 U	0.10 U	0.75
MERCURY	0.0002 U	0.00024	0.00025	0.015	0.03
SELENIUM	0.50 U	0.50 U	0.50 U	**4.02**	0.15
SILVER	0.02 U	0.02 U	0.02 U	0.02 U	0.75
RADIOLOGICAL	NR	NR	NR	NR	NA
Gross Alpha	NR	NR	NR	NR	NA
Gross Beta	NR	NR	NR	NR	NA

(J) Estimated value
(NR) Not Reported
(U) Not detected at concentration listed
(NA) Not Applicable (Not a CPID Target Analyte)

(1) Limits modified to reflect the revised guidance provided in the Ohio EPA Closure Plan Review Guidance Documents – May 1991 and September 1993.

Highlighted Data Indicates Concentrations Reported are Above CPID Decontamination Verification Limits

TABLE 5: FINAL RINSEATE ANALYSES (page 2 of 3)

COMPONENT BEING EVALUATED	PAD	PAD DRAIN PIPE	TANK T-5	
Sample No.	4200	92-138A-4072	4219	
Description	Pad Rinse 3	PAD DRAIN PIPE	T5-R4 (Tank 5)	DECONTAMINATION ACTION LIMIT (DAL)(1)
ANALIS No.	920430-056	920415-082	920501-010	
ITAS ID	2018-005	1990-005	2018-004	
Matrix	Water	Liquid	Water	
VOLATILE ORGANICS	(µg/L)	(µg/L)	(µg/L)	(ug/L)
CHLOROMETHANE	10 U	10 U	10 U	1000.00
VINYL CHLORIDE	10 U	10 U	10 U	30.00
CHLOROETHANE	10 U	10 U	10 U	NA
TRICHLOROFLUOROMETHANE	10 U	10 U	10 U	1000.00
METHYLENE CHLORIDE	5 U	10 U	5 U	1000.00
ACETONE	10 U	10 U	10 U	NA
CARBON DISULFIDE	5 U	5 U	5 U	NA
1,1-DICHLOROETHENE	5 U	5 U	3 J	1000.00
trans-1,2-DICHLOROETHENE	5 U	5 U	5 U	NA
1,2-DICHLOROETHANE	5 U	5 U	3 J	75.00
2-BUTANONE	10 U	10 U	10 U	NA
1,1,1-TRICHLOROETHANE	5 U	5 U	**1200**	1000.00
CARBON TETRACHLORIDE	5 U	5 U	5 U	75.00
TRICHLOROETHENE	5 U	5 U	3 J	75.00
1,1,2-TRICHLOROETHANE	5 U	5 U	43	1000.00
BENZENE	5 U	5 U	5 U	75.00
4-METHYL-2-PENTANONE	10 U	10 U	1 J	NA
TERTACHLOROETHYLENE	5 U	5 U	13	1000.00
TOLUENE	5 U	5 U	70	NA
CHLOROBENZENE	5 U	2 J	5 U	1000.00
ETHYLBENZENE	5 U	5 U	27	NA
XYLENES (TOTAL)	5 U	5 U	190	NA
SEMI-VOLATILE ORGANICS	(µg/L)	(µg/L)	(µg/L)	(µg/L)
2-METHYLPHENOL	10 U	10 U	10 U	1000.00
3-METHYLPHENOL	10 U	10 U	10 U	1000.00
4-METHYLPHENOL	10 U	10 U	10 U	1000.00
1,4-DICHLOROBENZENE	10 U	10 U	10 U	1000.00
2,4-DINITROTOLUENE	10 U	10 U	10 U	1000.00
HEXACHLOROBENZENE	10 U	10 U	10 U	1000.00
HEXACHLORO-1,3-BUTADIENE	10 U	10 U	10 U	1000.00
HEXACHLOROETHANE	10 U	10 U	10 U	1000.00
NITROBENZENE	10 U	10 U	10 U	1000.00
PENTACHLOROPHENOL	52 U	52 U	51 U	1000.00
PYRIDINE	10 U	10 U	10 U	1000.00
2,4,5-TRICHLOROPHENOL	10 U	10 U	10 U	NA
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U	NA
METALS (Totals)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
ARSENIC	0.50 U	0.50 U	0.50 U	0.75
BARIUM	0.09 R	0.01 U	0.01 U	1.00
CADMIUM	0.01 U	0.01 U	0.01 U	0.15
CHROMIUM	0.039	0.025 U	0.03 U	0.75
LEAD	0.109	0.10 U	0.10 U	0.75
MERCURY	0.0002 U	0.0002 U	0.0002 U	0.03
SELENIUM	0.50 U	0.50 U	0.50 U	0.15
SILVER	0.02 U	0.02 U	0.02 U	0.75
RADIOLOGICAL	(pCi/mL)	(pCi/mL)	(pCi/mL)	NA
Gross Alpha	0.03 J	0.08 J	0.13 J	NA
Gross Beta	1.23 J	0.18 J	1.13 J	NA

(J) Estimated value
(NR) Not Reported
(R) Rejected
(U) Not detected at concentration listed
(NA) Not Applicable (Not a CPID Target Analyte)

(1) Limits modified to reflect guidance provided in the Ohio EPA Closure Plan Guidance Documents – May 1991 and September 1993.

Highlighted Data Indicates Concentrations Reported are Above CPID Decontamination Verification Limits.

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TABLE 5: FINAL RINSEATE ANALYSES (page 3 of 3)

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COMPONENT BEING EVALUATED TANK T-6

Sample No.	4135	4136	
Description	T6-R3	R3(DUP)	DECONTAMINATION ACTION LIMIT (DAL)(1)
ANALIS No.	920423-64	920423-65	
CNLSI NO.	924567	924567	
Matrix	Liquid	Liquid	
VOLATILE ORGANICS	(mg/L)	(mg/L)	(mg/L)
TRICHLOROFLUROROMETHANE	0.17 U	0.17 U	1.000
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.17 U	0.17 U	1.000
ACETONE	0.42 U	0.42 U	NA
CARBON DISULFIDE	0.12 U	0.12 U	NA
METHYLENE CHLORIDE	0.10 U	0.10 U	1.000
2-BUTANONE (MEK)	0.25 U	0.25 U	1.000
1,1,1-TRICHLOROETHANE	0.20 U	0.20 U	1.000
CARBON TETRACHLORIDE	0.15 U (2)	0.15 U (2)	0.075
BENZENE	0.08 U (2)	0.08 U (2)	0.075
TRICHLOROETHYLENE	0.22 U (2)	0.22 U (2)	0.075
METHYL ISOBUTYL KETONE	0.17 U	0.17 U	NA
TOLUENE	0.17 U	0.17 U	NA
CHLOROBENZENE	0.18 U	0.18 U	1.000
1,1,2-TRICHLOROETHANE	0.10 U	0.10 U	1.000
TETRATCHLOROETHYLENE	0.47 U	0.47 U	1.000
ETHYLBENZENE	0.08 U	0.08 U	NA
m,p-XYLENES	0.10 U	0.10 U	NA
o-XYLENE	0.07 U	0.07 U	NA
o-DICHLOROBENZENE	0.23 U	0.23 U	1.000
2-NITROPROPANE	ND	ND	NA
CYCLOHEXANONE	ND	ND	NA
ETHYL ACETATE	ND	ND	NA
ETHYL ETHER	ND	ND	NA
PYRIDINE	ND	ND	1.000
CHLORINATED FLUOROCARBONS	ND	ND	1.000
SEMI-VOLATILE ORGANICS	(mg/L)	(mg/L)	(mg/L)
PYRIDINE	0.2 U	0.2 U	1.000
o-CRESOL	0.1 U	0.1 U	1.000
HEXACHLOROETHANE	0.1 U	0.1 U	1.000
m,p-CRESOL	0.1 U	0.1 U	1.000
NITROBENZENE	0.1 U	0.1 U	1.000
HEXACHLOROBUTADIENE	0.1 U	0.1 U	1.000
2,4,6-TRICHLOROPHENOL	0.1 U	0.1 U	NA
2,4,5-TRICHLOROPHENOL	0.1 U	0.1 U	NA
2,4-DINITROTOLUENE	0.1 U	0.1 U	1.000
HEXACHLOROBENZENE	0.1 U	0.1 U	1.000
PENTACHLOROPHENOL	0.1 U	0.1 U	1.000
METALS	(mg/L)	(mg/L)	(mg/L)
ARSENIC	NR	NR	0.750
BARIUM	NR	NR	1.000
CADMIUM	NR	NR	0.150
CHROMIUM	NR	NR	0.750
LEAD	NR	NR	0.750
MERCURY	NR	NR	0.030
SELENIUM	NR	NR	0.150
SILVER	NR	NR	0.750
RADIOLOGICAL	(pCi/L)	(pCi/L)	NA
Gross Alpha	NR	NR	NA
Gross Beta	NR	NR	NA

(U) Analyte Was Not Detected at Listed Detection Limit
(ND) Not detected; detection limit not reported by lab
(NR) Not Reported
(NA) Not Applicable (Not a CPID Target Analyte)

(1) Limits modified to reflect the revised guidance provided in the Ohio EPA Closure Plan Review Guidance Documents – May 1991 and September 1993.

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(2) Clean determination based on non-detection is qualified because the detection limit reported was greater than the limit set in the closure plan.

Table 6: Bulk Storage Tanks T-5 and T-6 Spill Summary

Date	Material Released	Released To	Released From	Response Action Taken
16-Jun-89	No release observed	Not Applicable	2 pin holes were discovered in the south wall of Tank T-5 while performing a tank wall thickness inspection.	An RTV/Metal patch was placed over the pin holes.
20-Jun-89	2-3 drops of solvent (1,1,1-Trichloroethane)	Containment Area	Droplets were observed on Tank T-6 drain valve flange while performing a routine inspection.	Surface area of the concrete where spotting occurred was cleaned up with absorbent pads.
24-Jun-89	4-6 ounces of solvent (1,1,1-Trichloroethane)	Containment Area	4-6 ounces of TCA were released from Tank T-5 while performing maintenance on the drain line.	Surface area of the concrete where spotting release occurred was cleaned up with absorbent cloths.

Table 7: Tanks T5/T6 Closure Schedule

Action	Cumulative Days to Complete
• Begin field work	0
• Mobilize work force	30
• Remove dry residues from tank T-5, steam clean tank T-5, rinse tanks T-5 and T-6, collect samples, dismantle and containerize transfer pump and piping, review analytical results, and attempt additional cleaning, if necessary (Section 3.2)	105
• Review analytical results for verification of tanks T-5 and T-6 decontamination (Section 3.2)	165
• Complete all field work	180[1]
• Compile certification documents and submit closure certification statement	240

[1] Total days after OEPA Approval.

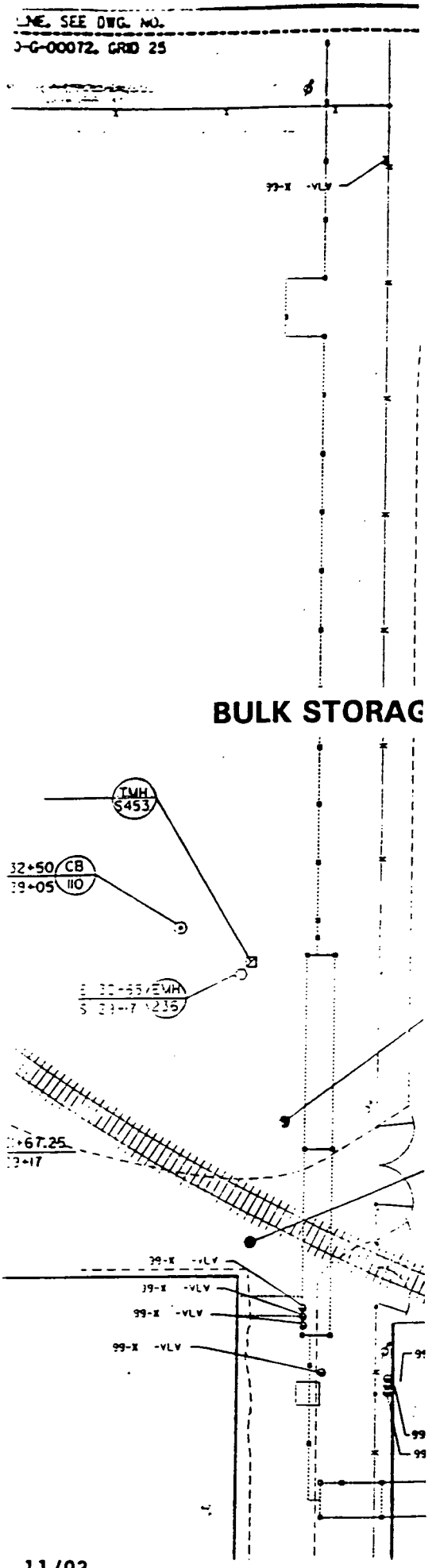

FIGURE 1: Pilot Plant West Area Tanks T5/T6

LEGEND

- POST INDICATOR VALVE (P.I.V.)
- FIRE HYDRANT (F.H.)
- MANHOLE (MH)
- CATCH BASIN (CB)
- LAMP POLE
- UTILITY POLE
- POWER POLE W/LAMP
- ELECTRICAL POWER POLE
- PIPE SUPPORT
- ELECTRICAL MANHOLE
- TELEPHONE MANHOLE
- VALVE BOX
- MONITORING WELL
- ELECTRICAL PULLBOX
- WELL/BORING WITH ANALYSIS

NOT TO SCALE