Appendix D
OU2 Test Pit Technical Memorandum

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October 29, 2004

184199.RI.01

MRS. STEPHANIE LINEBAUGH
REMEDIAL PROJECT MANAGER
U.S. Environmental Protection Agency (SR-6J)
77 W. Jackson Boulevard
Chicago, IL 60604-3590

Subject: OU2 Test Pit Memorandum
Velsicol Chemical Site – Operable Unit #2, St. Louis, Michigan
Work Assignment No. 208-RARA-0532, Contract No. 68-W6-0025

Dear Mrs. Linebaugh:

Enclosed is a memorandum summarizing the findings during advancement of 14 test pits in Cell 6 and Cell 7 in September. Data collected during these activities will be incorporated into the final report at the conclusion of the source migration investigation early next year.

If you have any questions or comments, please contact me at 414-847-0430 or Gina Bayer at (920) 730-9503. Thank you.

Sincerely,

CH2M HILL

Rob Stryker
Assistant Site Manager

Enclosure

cc: Stephen Nathan, PO/U.S. EPA, Region 5 (w/o enclosure)
Dave Alberts, CO/U.S. EPA, Region 5 (w/o enclosure)
Ike Johnson, PM/CH2M HILL, Milwaukee
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2004 OU2 Test Pits
Velsicol Chemical Site

TO: Stephanie Linebaugh/USEPA

COPIES: Gina Bayer/CH2M HILL
Theo von Wallmenich/CH2M HILL
Dan Lynch/Ecology & Environment

FROM: Jennifer Myers/CH2M HILL
Rob Stryker/CH2M HILL

DATE: October 29, 2004

Introduction

Fourteen test pits were excavated in the OU2 Phase 2 Remedial Area on September 15, 16, and 17, 2004 to observe the distribution, depths, and thicknesses of sand layers within the glacial till, and to determine the presence or absence of NAPL. These test pits were numbered C6TP-1 through C6TP-8 (Cell 6) and C7TP-1 through C7TP-6 (Cell 7). Figure 1 shows the locations of these test pits, as well as areas where NAPL was encountered on the glacial till surface and within sand seams in the till in the Phase 2 area. The test pits advanced in Cell 5 in 2003 and the areas capped with clay in the Phase 1 area are also shown on Figure 1.

The test pits in the Phase 2 Remedial Area were excavated into the glacial till after sediment had been removed from the riverbed. They ranged in length from 20-35 feet, ranged in width from 8-10 feet, and were approximately 19 feet deep. After excavation was completed, the test pits were allowed to stand for 2 hours before backfilling. This was done to allow small quantities of NAPL which may have been present in very small sand seems to seep out into the test pit. After standing open for two hours, the test pits were backfilled with the excavated glacial till. Compaction was conducted using a vibrating plate excavator attachment.

Observations

Findings during excavation of the test pits are noted in Table 1. Sand layers were present within the till in Cell 6 from 680-689 FMSL and ranged from >0.5 to 2 feet in thickness. Many very small sand layers were observed within the upper 8 feet of the excavation in C6TP-1, C6TP-3, C6TP-4, C6TP-7, and C6TP-8. In Cell 7, only C7TP-1 was observed to have a sand and gravel layer, which was approximately 8 inches thick. No other test pit in Cell 7 exhibited evidence of a sand or gravel seam.

NAPL was observed in C6TP-1 and C6TP-3. In C6TP-1, NAPL appeared only in the numerous small seams located in the upper 8 feet of the excavation. The larger

(approximately 1 foot) sand and gravel seam at approximately 684 FMSL showed no signs of NAPL. In C6TP-3, NAPL appeared in both the numerous small seams located in the top 8 feet of the excavation and in the larger (approximately 4-inch thick) seam of sand and gravel located at approximately 685 FMSL (the total quantity of NAPL in the test pit after standing open for two hours was very small—only a trace was present). A sample was collected for analysis from this seam. No NAPL was observed in any of the test pits in Cell 7.

Cross-sections depicting sand seam and NAPL occurrences and distribution that incorporate data from this and previous investigations and observations from the sediment remedial action will be incorporated into the report prepared at the end of the Source Migration Investigation.

Chemical Analyses

A total of four soil samples were collected during excavation of the test pits; these were from test pits C6TP-2, C6TP-3, C7TP-1, and C7TP-4. (as noted in Table 1) and were analyzed for VOCs, SVOCs, total DDT, and metals. The sample collected from C6TP-2 was collected from a 1.5-foot-thick sand and gravel layer encountered approximately 15 feet below the till surface. The sample collected from C6TP-3 was obtained from the till directly below a coarse sand layer with NAPL in an attempt to assess the potential for downward NAPL migration from the sand seam (no such sample was collected in C6TP-1 because the quantity of NAPL present and the size of individual sand seams were so small). The two samples from C7TP-1 and C7TP-4 were both collected from the till at the bottom of the excavation.

Analytical results of these samples are shown in Tables 2 through 5.

VOCs

No VOCs were detected in C6TP-2, C7TP-1, and C7TP-4. 1,2-dichloroethane, benzene, and methylene chloride were detected at concentrations of 3.2 µg/kg, 1.3 µg/kg, and 0.92 µg/kg (respectively) in C6TP-3.

SVOCs

No SVOCs were detected in C6TP-2 and C6TP-3. The only SVOC detected in C7TP-1 and C7TP-4 was diethylphthalate, detected at a concentrations of 323 µg/kg and 261 µg/kg, respectively.

Total DDT

No DDT, DDD, or DDE was detected in any of the four samples.

Total Metals/Mercury

The inorganic compounds detected in the highest concentrations were calcium, magnesium, iron, and aluminum. Mercury was not detected in C6TP-2, and was detected at low estimated concentrations in C6TP-3, C7TP-1 and C7TP-4 ranging between 0.00191 mg/kg and 0.0113 mg/kg.

TABLE 1
Cell 6 and 7 Test Pit Observations
Velsicol Chemical Site

Test Pit	Top Elevation of Sand Seam (FMSL)[1]	Thickness of Sand Seam (ft)	Soil Description	Observations & Samples Collected
C6TP-1	684	1	SW	Traces of NAPL present in very small sand seams in top 8' of till. No NAPL or odor in lower 1'-thick seam. No sample collected.
C6TP-2	685	1.5	SW	No NAPL, no odor, coarse sand and gravel. Sample collected from the sand & gravel layer.
C6TP-3	685	0.33	SW	NAPL within SW (coarse), Strong odor, many other small (<.3') within top 8' of excavation. Sample collected from soft glacial till immediately below the coarse sand layer.
C6TP-4	699	<.5	SP	No NAPL, no odor, coarse sand seam, many other small (<.3') throughout. No sample collected.
C6TP-5	689	1	SW	No NAPL, no odor, coarse sand and gravel. No sample collected.
C6TP-6	680	2	SP	No NAPL, no odor, medium to coarse sand in both seams fining downward, 6" seam intersecting top of till sloping eastward to level at 699. No sample collected.
	690	1.5	SP	
C6TP-7	698	1.5	SP	No NAPL, no odor, medium to coarse sand seam intersecting top of till sloping to east level at 689. No sample collected.
C6TP-8	Various	Various	SP	No NAPL, no odor, medium to coarse sand lenses throughout. No sample collected.
C7TP-1	687	0.67	GW/SW	No NAPL, no odor, Gravel fining downward into coarse sand. Sample collected from bottom of test pit excavation.
C7TP-2	N/A	N/A	N/A	No NAPL, no odor, no sand seams. No sample collected.
C7TP-3	N/A	N/A	N/A	No NAPL, no odor, no sand seams. No sample collected.
C7TP-4	N/A	N/A	N/A	No NAPL, no odor, no sand seams. Sample collected from bottom of test pit excavation.
C7TP-5	N/A	N/A	N/A	No NAPL, no odor, no sand seams. No sample collected.
C7TP-6	N/A	N/A	N/A	No NAPL, no odor, no sand seams. No sample collected.

[1] Elevations are currently estimated. More precise elevations will be determined after the results of the post-excavation surveys from the remedial activities become available.

TABLE 2
C6TP-2 Soil Sample - Analytical Results
Velsicol Chemical Site–2004 Test Pits Memorandum

Date/Time Sampled: 9/15/2004 16:20
Sample ID: 04CB12-38

VOCs - Analytical Method SW8260B

Compound	Result	Units
1,1,1-Trichloroethane	<23.3	µg/kg
1,1,2,2-Tetrachloroethane	<23.3	µg/kg
1,1,2-Trichloroethane	<23.3	µg/kg
1,1-Dichloroethane	<23.3	µg/kg
1,1-Dichloroethene	<23.3	µg/kg
1,2-Dibromo-3-chloropropane	<11.6	µg/kg
1,2-Dichloroethane	<23.3	µg/kg
1,2-Dichloroethene, Total	<23.3	µg/kg
1,2-Dichloropropane	<23.3	µg/kg
1-Chlorohexane	<4.6	µg/kg
2-Butanone	<23.3	µg/kg
2-Hexanone	<23.3	µg/kg
4-Methyl-2-Pentanone	<23.3	µg/kg
Acetone	<23.3	µg/kg
Benzene	<23.3	µg/kg
Bromodichloromethane	<23.3	µg/kg
Bromoform	<23.3	µg/kg
Bromomethane	<23.3	µg/kg
Carbon Disulfide	<23.3	µg/kg
Carbon Tetrachloride	<23.3	µg/kg
Chlorobenzene	<23.3	µg/kg
Chloroethane	<23.3	µg/kg
Chloroform	<23.3	µg/kg
Chloromethane	<23.3	µg/kg
cis-1,3-Dichloropropene	<23.3	µg/kg
Dibromochloromethane	<23.3	µg/kg
Ethylbenzene	<23.3	µg/kg
Methylene Chloride	<23.3	µg/kg
Styrene	<23.3	µg/kg
Tetrachloroethene	<23.3	µg/kg
Toluene	<23.3	µg/kg
trans-1,3-Dichloropropene	<23.3	µg/kg
Trichloroethene	<23.3	µg/kg
Vinyl Chloride	<23.3	µg/kg
Xylenes, Total	<23.3	µg/kg

SVOCs - Analytical Method SW8270C

Compound	Result	Units
2,2-Oxybis(1-chloropropane)	<344	µg/kg
2,4,5-Trichlorophenol	<865	µg/kg
2,4,6-Trichlorophenol	<344	µg/kg
2,4-Dichlorophenol	<344	µg/kg
2,4-Dimethylphenol	<344	µg/kg

SVOCs - Analytical Method SW8270C (cont'd)

Compound	Result	Units
2,4-Dinitrophenol	<865	µg/kg
2,4-Dinitrotoluene	<344	µg/kg
2,6-Dinitrotoluene	<344	µg/kg
2-Chloronaphthalene	<344	µg/kg
2-Chlorophenol	<344	µg/kg
2-Methylnaphthalene	<344	µg/kg
2-Methylphenol (O-Cresol)	<344	µg/kg
2-Nitroaniline	<865	µg/kg
2-Nitrophenol	<344	µg/kg
3,3'-Dichlorobenzidine	<344	µg/kg
3-Nitroaniline	<865	µg/kg
2-Methyl-4,6-dinitrophenol	<865	µg/kg
4-Bromophenyl Phenyl Ether	<344	µg/kg
4-Chloro-3-Methylphenol	<344	µg/kg
4-Chloroaniline	<344	µg/kg
4-Chlorophenyl Phenyl Ether	<344	µg/kg
4-Methylphenol	<344	µg/kg
4-Nitroaniline	<865	µg/kg
4-Nitrophenol	<865	µg/kg
Acenaphthene	<344	µg/kg
Acenaphthylene	<344	µg/kg
Anthracene	<344	µg/kg
Benzo(A)Anthracene	<344	µg/kg
Benzo(A)Pyrene	<344	µg/kg
Benzo(B)Fluoranthene	<344	µg/kg
Benzo(G,H,I)Perylene	<344	µg/kg
Benzo(K)Fluoranthene	<344	µg/kg
Butylbenzylphthalate	<344	µg/kg
Bis(2-Chloroethoxy) Methane	<344	µg/kg
Bis(2-Chloroethyl) Ether	<344	µg/kg
Bis(2-Ethylhexyl) Phthalate	<344	µg/kg
Caprolactam	<344	µg/kg
Carbazole	<344	µg/kg
Chrysene	<344	µg/kg
Dibenz(A,H)Anthracene	<344	µg/kg
Dibenzofuran	<344	µg/kg
Diethyl Phthalate	<344	µg/kg
Dimethyl Phthalate	<344	µg/kg
Di-N-Butyl Phthalate	<344	µg/kg
Di-N-Octylphthalate	<344	µg/kg
Fluoranthene	<344	µg/kg
Fluorene	<344	µg/kg
Hexachlorobenzene	<344	µg/kg

J flagged results are estimated values.

TABLE 2
C6TP-2 Soil Sample - Analytical Results
Velsicol Chemical Site–2004 Test Pits Memorandum

Date/Time Sampled: 9/15/2004 16:20
Sample ID: 04CB12-38

SVOCs - Analytical Method SW8270C (cont'd)

Compound	Result	Units
Hexachlorobutadiene	<344	µg/kg
Hexachlorocyclopentadiene	<344	µg/kg
Hexachloroethane	<344	µg/kg
Indeno(1,2,3-C,D)Pyrene	<344	µg/kg
Isophorone	<344	µg/kg
Naphthalene	<344	µg/kg
Nitrobenzene	<344	µg/kg
N-Nitroso-di-N-Propylamine	<344	µg/kg
N-Nitrosodiphenylamine	<344	µg/kg
Pentachlorophenol	<865	µg/kg
Phenanthrene	<344	µg/kg
Phenol	<344	µg/kg
Pyrene	<344	µg/kg

Pesticides - Analytical Method SW8081

Compound	Result	Units
4,4-DDD	<21	µg/kg
4,4-DDE	<21	µg/kg
4,4-DDT	<21	µg/kg
2,4-DDD	<21	µg/kg
2,4-DDE	<21	µg/kg
2,4-DDT	<21	µg/kg

Total Metals - Analytical Method SW6010B

Compound	Result		Units
Aluminum	1,740		mg/kg
Antimony	<3.68		mg/kg
Arsenic	19.8		mg/kg
Barium	5.51	J	mg/kg
Beryllium	0.288	J	mg/kg
Cadmium	<0.413		mg/kg
Calcium	134,000		mg/kg
Chromium	30.4		mg/kg
Cobalt	3.37	J	mg/kg
Copper	6.64		mg/kg
Iron	5,640		mg/kg
Lead	<2.47		mg/kg
Magnesium	51,900		mg/kg
Manganese	270		mg/kg
Nickel	31.5		mg/kg
Potassium	120		mg/kg
Selenium	<3.35		mg/kg
Silver	<0.314		mg/kg
Sodium	267	J	mg/kg
Thallium	<3.35		mg/kg
Vanadium	8.58	J	mg/kg
Zinc	2.77	J	mg/kg

Specialty Compounds

Compound	Result	Units	Analytical Method
Mercury	<0.00153	mg/kg	SW7471A

J flagged results are estimated values.

TABLE 3
C6TP-3 Soil Sample - Analytical Results
Velsicol Chemical Site–2004 Test Pits Memorandum

Date/Time Sampled: 9/15/2004 12:00
Sample ID: 04CB12-39

VOCs - Analytical Method SW8260B

Compound	Result		Units
1,1,1-Trichloroethane	<11.1		µg/kg
1,1,2,2-Tetrachloroethane	<11.1		µg/kg
1,1,2-Trichloroethane	<11.1		µg/kg
1,1-Dichloroethane	<11.1		µg/kg
1,1-Dichloroethene	<11.1		µg/kg
1,2-Dibromo-3-chloropropane	<11.6		µg/kg
1,2-Dichloroethane	3.2	J	µg/kg
1,2-Dichloroethene, Total	<11.1		µg/kg
1,2-Dichloropropane	<11.1		µg/kg
1-Chlorohexane	<2.2		µg/kg
2-Butanone	<11.1		µg/kg
2-Hexanone	<11.1		µg/kg
4-Methyl-2-Pentanone	<11.1		µg/kg
Acetone	<11.1		µg/kg
Benzene	1.3	J	µg/kg
Bromodichloromethane	<11.1		µg/kg
Bromoform	<11.1		µg/kg
Bromomethane	<11.1		µg/kg
Carbon Disulfide	<11.1		µg/kg
Carbon Tetrachloride	<11.1		µg/kg
Chlorobenzene	<11.1		µg/kg
Chloroethane	<11.1		µg/kg
Chloroform	<11.1		µg/kg
Chloromethane	<11.1		µg/kg
cis-1,3-Dichloropropene	<11.1		µg/kg
Dibromochloromethane	<11.1		µg/kg
Ethylbenzene	<11.1		µg/kg
Methylene Chloride	0.92	J	µg/kg
Styrene	<11.1		µg/kg
Tetrachloroethene	<11.1		µg/kg
Toluene	<11.1		µg/kg
trans-1,3-Dichloropropene	<11.1		µg/kg
Trichloroethene	<11.1		µg/kg
Vinyl Chloride	<11.1		µg/kg
Xylenes, Total	<11.1		µg/kg

SVOCs - Analytical Method SW8270C

Compound	Result		Units
2,2-Oxybis(1-chloropropane)	<376		µg/kg
2,4,5-Trichlorophenol	<945		µg/kg
2,4,6-Trichlorophenol	<376		µg/kg
2,4-Dichlorophenol	<376		µg/kg
2,4-Dimethylphenol	<376		µg/kg

SVOCs - Analytical Method SW8270C (cont'd)

Compound	Result	Units
2,4-Dinitrophenol	<945	µg/kg
2,4-Dinitrotoluene	<376	µg/kg
2,6-Dinitrotoluene	<376	µg/kg
2-Chloronaphthalene	<376	µg/kg
2-Chlorophenol	<376	µg/kg
2-Methylnaphthalene	<376	µg/kg
2-Methylphenol (O-Cresol)	<376	µg/kg
2-Nitroaniline	<945	µg/kg
2-Nitrophenol	<376	µg/kg
3,3'-Dichlorobenzidine	<376	µg/kg
3-Nitroaniline	<945	µg/kg
2-Methyl-4,6-dinitrophenol	<945	µg/kg
4-Bromophenyl Phenyl Ether	<376	µg/kg
4-Chloro-3-Methylphenol	<376	µg/kg
4-Chloroaniline	<376	µg/kg
4-Chlorophenyl Phenyl Ether	<376	µg/kg
4-Methylphenol	<376	µg/kg
4-Nitroaniline	<945	µg/kg
4-Nitrophenol	<945	µg/kg
Acenaphthene	<376	µg/kg
Acenaphthylene	<376	µg/kg
Anthracene	<376	µg/kg
Benzo(A)Anthracene	<376	µg/kg
Benzo(A)Pyrene	<376	µg/kg
Benzo(B)Fluoranthene	<376	µg/kg
Benzo(G,H,I)Perylene	<376	µg/kg
Benzo(K)Fluoranthene	<376	µg/kg
Butylbenzylphthalate	<376	µg/kg
Bis(2-Chloroethoxy) Methane	<376	µg/kg
Bis(2-Chloroethyl) Ether	<376	µg/kg
Bis(2-Ethylhexyl) Phthalate	<376	µg/kg
Caprolactam	<376	µg/kg
Carbazole	<376	µg/kg
Chrysene	<376	µg/kg
Dibenz(A,H)Anthracene	<376	µg/kg
Dibenzofuran	<376	µg/kg
Diethyl Phthalate	<376	µg/kg
Dimethyl Phthalate	<376	µg/kg
Di-N-Butyl Phthalate	<376	µg/kg
Di-N-Octylphthalate	<376	µg/kg
Fluoranthene	<376	µg/kg
Fluorene	<376	µg/kg
Hexachlorobenzene	<376	µg/kg

TABLE 3

J flagged results are estimated values.

C6TP-3 Soil Sample - Analytical Results
Velsicol Chemical Site–2004 Test Pits Memorandum

Date/Time Sampled: 9/15/2004 12:00
Sample ID: 04CB12-39

SVOCs - Analytical Method SW8270C (cont'd)

Compound	Result	Units
Hexachlorobutadiene	<376	µg/kg
Hexachlorocyclopentadiene	<376	µg/kg
Hexachloroethane	<376	µg/kg
Indeno(1,2,3-C,D)Pyrene	<376	µg/kg
Isophorone	<376	µg/kg
Naphthalene	<376	µg/kg
Nitrobenzene	<376	µg/kg
N-Nitroso-di-N-Propylamine	<376	µg/kg
N-Nitrosodiphenylamine	<376	µg/kg
Pentachlorophenol	<945	µg/kg
Phenanthrene	<376	µg/kg
Phenol	<376	µg/kg
Pyrene	<376	µg/kg

Pesticides - Analytical Method SW8081

Compound	Result	Units
4,4-DDD	<23	µg/kg
4,4-DDE	<23	µg/kg
4,4-DDT	<23	µg/kg
2,4-DDD	<23	µg/kg
2,4-DDE	<23	µg/kg
2,4-DDT	<23	µg/kg

Total Metals - Analytical Method SW6010B

Compound	Result		Units
Aluminum	7,280		mg/kg
Antimony	<2.59		mg/kg
Arsenic	16.2		mg/kg
Barium	60		mg/kg
Beryllium	0.685	J	mg/kg
Cadmium	<0.29		mg/kg
Calcium	94,100		mg/kg
Chromium	15.2		mg/kg
Cobalt	7.21		mg/kg
Copper	11.4		mg/kg
Iron	16,700		mg/kg
Lead	4.83	J	mg/kg
Magnesium	35,400		mg/kg
Manganese	326		mg/kg
Nickel	17		mg/kg
Potassium	1,580		mg/kg
Selenium	<2.35		mg/kg
Silver	<0.22		mg/kg
Sodium	1,130		mg/kg
Thallium	<2.35		mg/kg
Vanadium	21.6		mg/kg
Zinc	31	J	mg/kg

Specialty Compounds

Compound	Result		Units	Analytical Method
Mercury	0.0113	J	mg/kg	SW7471A

J flagged results are estimated values.

TABLE 4
C7TP-1 Soil Sample - Analytical Results
Velsicol Chemical Site–2004 Test Pits Memorandum

Date/Time Sampled: 9/17/2004 11:30
Sample ID: 04CB12-40

VOCs - Analytical Method SW8260B

Compound	Result	Units
1,1,1-Trichloroethane	<24.1	µg/kg
1,1,2,2-Tetrachloroethane	<24.1	µg/kg
1,1,2-Trichloroethane	<24.1	µg/kg
1,1-Dichloroethane	<24.1	µg/kg
1,1-Dichloroethene	<24.1	µg/kg
1,2-Dibromo-3-chloropropane	<12	µg/kg
1,2-Dichloroethane	<24.1	µg/kg
1,2-Dichloroethene, Total	<24.1	µg/kg
1,2-Dichloropropane	<24.1	µg/kg
1-Chlorohexane	<4.8	µg/kg
2-Butanone	<24.1	µg/kg
2-Hexanone	<24.1	µg/kg
4-Methyl-2-Pentanone	<24.1	µg/kg
Acetone	<24.1	µg/kg
Benzene	<24.1	µg/kg
Bromodichloromethane	<24.1	µg/kg
Bromoform	<24.1	µg/kg
Bromomethane	<24.1	µg/kg
Carbon Disulfide	<24.1	µg/kg
Carbon Tetrachloride	<24.1	µg/kg
Chlorobenzene	<24.1	µg/kg
Chloroethane	<24.1	µg/kg
Chloroform	<24.1	µg/kg
Chloromethane	<24.1	µg/kg
cis-1,3-Dichloropropene	<24.1	µg/kg
Dibromochloromethane	<24.1	µg/kg
Ethylbenzene	<24.1	µg/kg
Methylene Chloride	<24.1	µg/kg
Styrene	<24.1	µg/kg
Tetrachloroethene	<24.1	µg/kg
Toluene	<24.1	µg/kg
trans-1,3-Dichloropropene	<24.1	µg/kg
Trichloroethene	<24.1	µg/kg
Vinyl Chloride	<24.1	µg/kg
Xylenes, Total	<24.1	µg/kg

SVOCs - Analytical Method SW8270C

Compound	Result	Units
2,2-Oxybis(1-chloropropane)	<351	µg/kg
2,4,5-Trichlorophenol	<884	µg/kg
2,4,6-Trichlorophenol	<351	µg/kg
2,4-Dichlorophenol	<351	µg/kg
2,4-Dimethylphenol	<351	µg/kg

SVOCs - Analytical Method SW8270C (cont'd)

Compound	Result		Units
2,4-Dinitrophenol	<884		µg/kg
2,4-Dinitrotoluene	<351		µg/kg
2,6-Dinitrotoluene	<351		µg/kg
2-Chloronaphthalene	<351		µg/kg
2-Chlorophenol	<351		µg/kg
2-Methylnaphthalene	<351		µg/kg
2-Methylphenol (O-Cresol)	<351		µg/kg
2-Nitroaniline	<884		µg/kg
2-Nitrophenol	<351		µg/kg
3,3'-Dichlorobenzidine	<351		µg/kg
3-Nitroaniline	<884		µg/kg
2-Methyl-4,6-dinitrophenol	<884		µg/kg
4-Bromophenyl Phenyl Ether	<351		µg/kg
4-Chloro-3-Methylphenol	<351		µg/kg
4-Chloroaniline	<351		µg/kg
4-Chlorophenyl Phenyl Ether	<351		µg/kg
4-Methylphenol	<351		µg/kg
4-Nitroaniline	<884		µg/kg
4-Nitrophenol	<884		µg/kg
Acenaphthene	<351		µg/kg
Acenaphthylene	<351		µg/kg
Anthracene	<351		µg/kg
Benzo(A)Anthracene	<351		µg/kg
Benzo(A)Pyrene	<351		µg/kg
Benzo(B)Fluoranthene	<351		µg/kg
Benzo(G,H,I)Perylene	<351		µg/kg
Benzo(K)Fluoranthene	<351		µg/kg
Butylbenzylphthalate	<351		µg/kg
Bis(2-Chloroethoxy) Methane	<351		µg/kg
Bis(2-Chloroethyl) Ether	<351		µg/kg
Bis(2-Ethylhexyl) Phthalate	<351		µg/kg
Caprolactam	<351		µg/kg
Carbazole	<351		µg/kg
Chrysene	<351		µg/kg
Dibenz(A,H)Anthracene	<351		µg/kg
Dibenzofuran	<351		µg/kg
Diethyl Phthalate	323	J	µg/kg
Dimethyl Phthalate	<351		µg/kg
Di-N-Butyl Phthalate	<351		µg/kg
Di-N-Octylphthalate	<351		µg/kg
Fluoranthene	<351		µg/kg
Fluorene	<351		µg/kg
Hexachlorobenzene	<351		µg/kg

TABLE 4

J flagged results are estimated values.

C7TP-1 Soil Sample - Analytical Results
Velsicol Chemical Site–2004 Test Pits Memorandum

Date/Time Sampled: 9/17/2004 11:30
Sample ID: 04CB12-40

SVOCs - Analytical Method SW8270C (cont'd)

Compound	Result	Units
Hexachlorobutadiene	<351	µg/kg
Hexachlorocyclopentadiene	<351	µg/kg
Hexachloroethane	<351	µg/kg
Indeno(1,2,3-C,D)Pyrene	<351	µg/kg
Isophorone	<351	µg/kg
Naphthalene	<351	µg/kg
Nitrobenzene	<351	µg/kg
N-Nitroso-di-N-Propylamine	<351	µg/kg
N-Nitrosodiphenylamine	<351	µg/kg
Pentachlorophenol	<884	µg/kg
Phenanthrene	<351	µg/kg
Phenol	<351	µg/kg
Pyrene	<351	µg/kg

Pesticides - Analytical Method SW8081

Compound	Result	Units
4,4-DDD	<21	µg/kg
4,4-DDE	<21	µg/kg
4,4-DDT	<21	µg/kg
2,4-DDD	<21	µg/kg
2,4-DDE	<21	µg/kg
2,4-DDT	<21	µg/kg

Total Metals - Analytical Method SW6010B

Compound	Result		Units
Aluminum	2,730		mg/kg
Antimony	<2.21		mg/kg
Arsenic	10.7		mg/kg
Barium	16.9		mg/kg
Beryllium	0.339	J	mg/kg
Cadmium	<0.248		mg/kg
Calcium	87,900		mg/kg
Chromium	7.48		mg/kg
Cobalt	3.46		mg/kg
Copper	6.78		mg/kg
Iron	7,470		mg/kg
Lead	<1.48		mg/kg
Magnesium	23,900		mg/kg
Manganese	167		mg/kg
Nickel	8.77		mg/kg
Potassium	567		mg/kg
Selenium	<2.01		mg/kg
Silver	<0.189		mg/kg
Sodium	658		mg/kg
Thallium	<2.01		mg/kg
Vanadium	11.5		mg/kg
Zinc	11.5	J	mg/kg

Specialty Compounds

Compound	Result		Units	Analytical Method
Mercury	0.00191	J	mg/kg	SW7471A

J flagged results are estimated values.

TABLE 5
C7TP-4 Soil Sample - Analytical Results
Velsicol Chemical Site–2004 Test Pits Memorandum

Date/Time Sampled: 9/16/2004 15:45
Sample ID: 04CB12-41

VOCs - Analytical Method SW8260B

Compound	Result	Units
1,1,1-Trichloroethane	<14.8	µg/kg
1,1,2,2-Tetrachloroethane	<14.8	µg/kg
1,1,2-Trichloroethane	<14.8	µg/kg
1,1-Dichloroethane	<14.8	µg/kg
1,1-Dichloroethene	<14.8	µg/kg
1,2-Dibromo-3-chloropropane	<7.4	µg/kg
1,2-Dichloroethane	<14.8	µg/kg
1,2-Dichloroethene, Total	<14.8	µg/kg
1,2-Dichloropropane	<14.8	µg/kg
1-Chlorohexane	<3	µg/kg
2-Butanone	<14.8	µg/kg
2-Hexanone	<14.8	µg/kg
4-Methyl-2-Pentanone	<14.8	µg/kg
Acetone	<14.8	µg/kg
Benzene	<14.8	µg/kg
Bromodichloromethane	<14.8	µg/kg
Bromoform	<14.8	µg/kg
Bromomethane	<14.8	µg/kg
Carbon Disulfide	<14.8	µg/kg
Carbon Tetrachloride	<14.8	µg/kg
Chlorobenzene	<14.8	µg/kg
Chloroethane	<14.8	µg/kg
Chloroform	<14.8	µg/kg
Chloromethane	<14.8	µg/kg
cis-1,3-Dichloropropene	<14.8	µg/kg
Dibromochloromethane	<14.8	µg/kg
Ethylbenzene	<14.8	µg/kg
Methylene Chloride	<14.8	µg/kg
Styrene	<14.8	µg/kg
Tetrachloroethene	<14.8	µg/kg
Toluene	<14.8	µg/kg
trans-1,3-Dichloropropene	<14.8	µg/kg
Trichloroethene	<14.8	µg/kg
Vinyl Chloride	<14.8	µg/kg
Xylenes, Total	<14.8	µg/kg

SVOCs - Analytical Method SW8270C

Compound	Result	Units
2,2-Oxybis(1-chloropropane)	<363	µg/kg
2,4,5-Trichlorophenol	<914	µg/kg
2,4,6-Trichlorophenol	<363	µg/kg
2,4-Dichlorophenol	<363	µg/kg
2,4-Dimethylphenol	<363	µg/kg

SVOCs - Analytical Method SW8270C (cont'd)

Compound	Result		Units
2,4-Dinitrophenol	<914		µg/kg
2,4-Dinitrotoluene	<363		µg/kg
2,6-Dinitrotoluene	<363		µg/kg
2-Chloronaphthalene	<363		µg/kg
2-Chlorophenol	<363		µg/kg
2-Methylnaphthalene	<363		µg/kg
2-Methylphenol (O-Cresol)	<363		µg/kg
2-Nitroaniline	<914		µg/kg
2-Nitrophenol	<363		µg/kg
3,3'-Dichlorobenzidine	<363		µg/kg
3-Nitroaniline	<914		µg/kg
2-Methyl-4,6-dinitrophenol	<914		µg/kg
4-Bromophenyl Phenyl Ether	<363		µg/kg
4-Chloro-3-Methylphenol	<363		µg/kg
4-Chloroaniline	<363		µg/kg
4-Chlorophenyl Phenyl Ether	<363		µg/kg
4-Methylphenol	<363		µg/kg
4-Nitroaniline	<914		µg/kg
4-Nitrophenol	<914		µg/kg
Acenaphthene	<363		µg/kg
Acenaphthylene	<363		µg/kg
Anthracene	<363		µg/kg
Benzo(A)Anthracene	<363		µg/kg
Benzo(A)Pyrene	<363		µg/kg
Benzo(B)Fluoranthene	<363		µg/kg
Benzo(G,H,I)Perylene	<363		µg/kg
Benzo(K)Fluoranthene	<363		µg/kg
Butylbenzylphthalate	<363		µg/kg
Bis(2-Chloroethoxy) Methane	<363		µg/kg
Bis(2-Chloroethyl) Ether	<363		µg/kg
Bis(2-Ethylhexyl) Phthalate	<363		µg/kg
Caprolactam	<363		µg/kg
Carbazole	<363		µg/kg
Chrysene	<363		µg/kg
Dibenz(A,H)Anthracene	<363		µg/kg
Dibenzofuran	<363		µg/kg
Diethyl Phthalate	261	J	µg/kg
Dimethyl Phthalate	<363		µg/kg
Di-N-Butyl Phthalate	<363		µg/kg
Di-N-Octylphthalate	<363		µg/kg
Fluoranthene	<363		µg/kg
Fluorene	<363		µg/kg
Hexachlorobenzene	<363		µg/kg

TABLE 5

J flagged results are estimated.

C7TP-4 Soil Sample - Analytical Results
Velsicol Chemical Site–2004 Test Pits Memorandum

Date/Time Sampled: 9/16/2004 15:45
Sample ID: 04CB12-41

SVOCs - Analytical Method SW8270C (cont'd)

Compound	Result	Units
Hexachlorobutadiene	<363	µg/kg
Hexachlorocyclopentadiene	<363	µg/kg
Hexachloroethane	<363	µg/kg
Indeno(1,2,3-C,D)Pyrene	<363	µg/kg
Isophorone	<363	µg/kg
Naphthalene	<363	µg/kg
Nitrobenzene	<363	µg/kg
N-Nitroso-di-N-Propylamine	<363	µg/kg
N-Nitrosodiphenylamine	<363	µg/kg
Pentachlorophenol	<914	µg/kg
Phenanthrene	<363	µg/kg
Phenol	<363	µg/kg
Pyrene	<363	µg/kg

Pesticides - Analytical Method SW8081

Compound	Result	Units
4,4-DDD	<22	µg/kg
4,4-DDE	<22	µg/kg
4,4-DDT	<22	µg/kg
2,4-DDD	<22	µg/kg
2,4-DDE	<22	µg/kg
2,4-DDT	<22	µg/kg

Total Metals - Analytical Method SW6010B

Compound	Result		Units
Aluminum	3,620		mg/kg
Antimony	<2.4		mg/kg
Arsenic	15.3		mg/kg
Barium	33.9		mg/kg
Beryllium	0.449	J	mg/kg
Cadmium	<0.269		mg/kg
Calcium	94,800		mg/kg
Chromium	8.32		mg/kg
Cobalt	4.17		mg/kg
Copper	6.81		mg/kg
Iron	11,000		mg/kg
Lead	3.54	J	mg/kg
Magnesium	25,200		mg/kg
Manganese	205		mg/kg
Nickel	11.2		mg/kg
Potassium	789		mg/kg
Selenium	<2.18		mg/kg
Silver	<0.204		mg/kg
Sodium	430		mg/kg
Thallium	<2.18		mg/kg
Vanadium	12.5		mg/kg
Zinc	17	J	mg/kg

Specialty Compounds

Compound	Result		Units	Analytical Method
Mercury	0.00565	J	mg/kg	SW7471A

J flagged results are estimated.

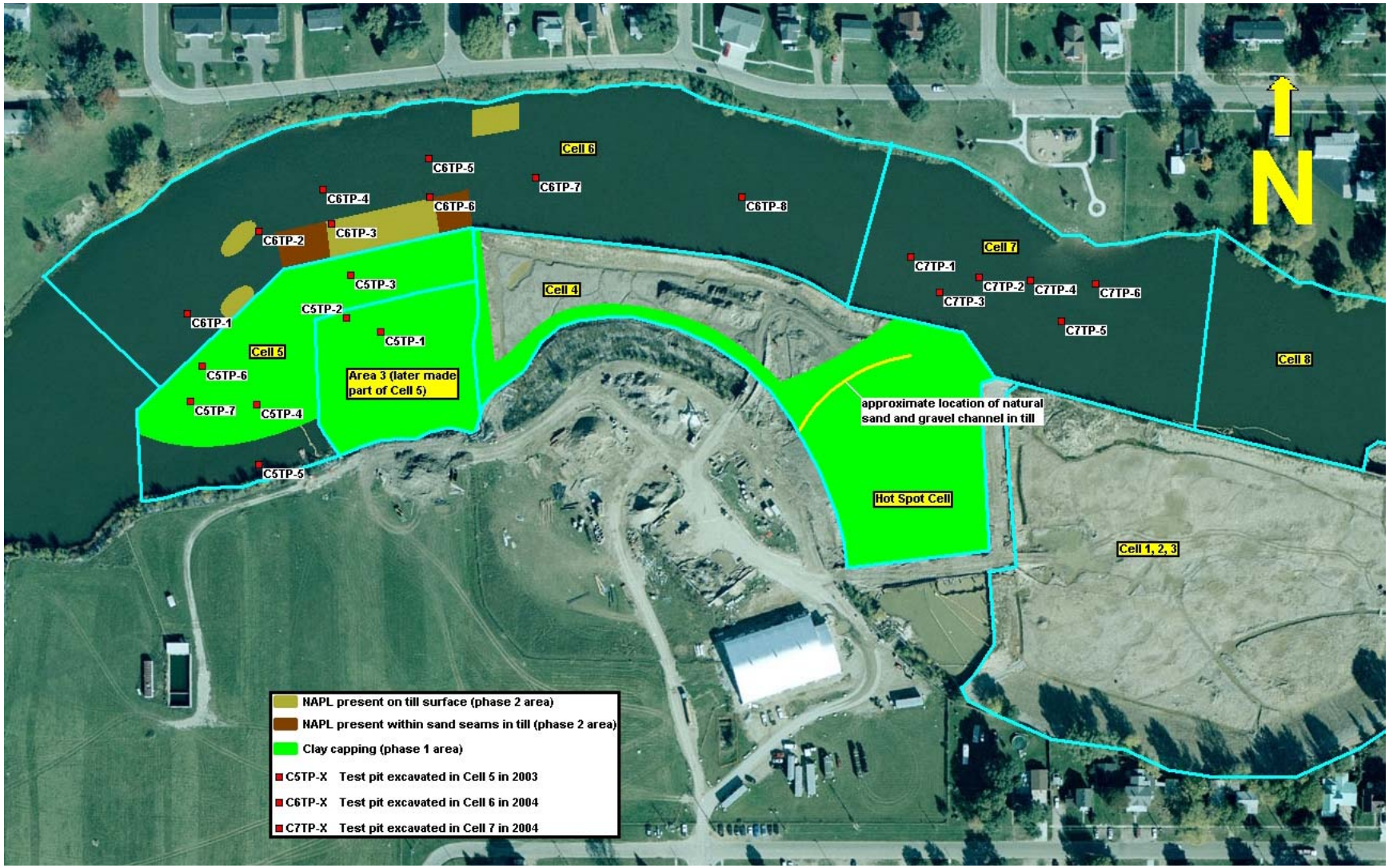


Figure 1. Location of Test Pits in OU2 Remedial Area **Scale: 1″=240′**
Velsicol Chemical/Pine River Site in St. Louis, Michigan
2004 Test Pits Memorandum **Aerial photo dated October 14, 2002**