

TECHNICAL MEMORANDUM

DATE: April 2, 2008

TO: Howard Hickey (NAVFAC MW)

FROM: Tim Smith (Tetra Tech, Pittsburgh, PA)  
Steve Ruffing (Tetra Tech, Pittsburgh, PA)

cc: Mr. Tom Brent, NSWC Crane (4 copies of Memorandum and attachment)  
Ms. Bonnie Capito, NAVFAC Atlantic (PDF copy of Memorandum and attachment via e-mail)  
Mr. Todd Carmichael, NWRS c/o Weston Solutions, Inc. (Memorandum and attachment)  
Mr. John Trepanowski, Tetra Tech (Memorandum and attachment)  
Mr. Ralph Basinski, Tetra Tech (Memorandum and attachment)  
Mr. Jim Goerd, Tetra Tech (Memorandum and attachment)  
Ms. Valerie Plachy, Tetra Tech (Memorandum and attachment)  
Mr. Garth Glenn, Tetra Tech (Memorandum and attachment)  
Ms. Sharon Taybron-Currie (Memorandum and attachment)  
Project File – CTO 0042

SUBJECT: Excavation and Handling of SWMU 9 (Pesticide Control Area / R-150 Tank Area) Soils Exceeding Land Disposal Restrictions

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The purpose of this Technical Memorandum is to identify the extent of soils exceeding land disposal restrictions (LDRs) within the limits of the SWMU 9 excavation area near former Building 55. The contents of this Technical Memorandum should be used in conjunction with the information and requirements presented in the December 2007 SWMU 9 Interim Measures Work Plan (IMWP). Excavation, handling, characterization, and disposal of the soils identified in this Technical Memorandum should be performed according to the requirements presented in the SWMU 9 IMWP.

#### Identification of LDR Soils

A portion of the soil delineated for excavation from the SWMU 9 former Building 55 area is being evaluated as potentially exceeding LDRs because the soil from this area has been identified as a listed hazardous waste. The results of this evaluation are intended to identify any soil within the excavation requiring treatment prior to disposal

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within a permitted hazardous waste landfill. The following describes the soil evaluation for the SWMU 9 former Building 55 excavation area.

Three areas within the limits of SWMU 9 (former fire training area, former Building 55 area, and Building 150 area) are being excavated to reduce contaminant concentrations to acceptable risk levels. The former Building 55 area was contaminated from releases of listed wastes (i.e., pesticides). Soil waste from this area must be handled as hazardous waste as long as the soil "contains" materials or contaminants that the United States Environmental Protection Agency (EPA) has identified as hazardous at concentrations that exceed the established risk-based criteria for determining whether soils contain hazardous waste. In addition to the EPA determination, the Indiana Department of Environmental Management (IDEM) has established risk-based criteria (IDEM, 2001) for determining when soil "contains" a hazardous waste. This risk based criteria, presented in Appendix 1 of the IDEM Risk Integrated System of Closure (RISC) Technical Resource Guidance document, presents the January 31, 2006 updated IDEM Direct Contact Residential and Industrial Closure Level criterion. Using this criterion, IDEM provides a "contained-in" determination as to whether the soil to be excavated from the former Building 55 area of SWMU 9 contains hazardous waste. For example, soils with contaminant concentrations below the IDEM Direct Contact Residential Closure Levels are not deemed to "contain" hazardous waste. Soils with contaminant concentrations above the IDEM Direct Contact Residential Closure Levels and below Industrial Direct Contact Closure Levels are deemed not to "contain" hazardous waste when disposed within a Resource Recovery and Recovery Act (RCRA) subtitle C (hazardous) or RCRA subtitle D (non-hazardous) landfill. Soils with contaminant concentrations that exceed the Industrial Direct Contact Closure Level criteria are considered to "contain" hazardous waste and are subject to hazardous waste LDR requirements.

Based on the contaminant concentrations within the soils being excavated from the SWMU 9 former Building 55 area, IDEM has provided a "contained-in" determination identifying five locations that exceed the IDEM Industrial Direct Contact Closure levels and are considered hazardous waste. Therefore, the soil found at these locations must also be evaluated against the LDR criteria. The results of the LDR evaluation indicates that the soil at the five IDEM identified locations, exceed applicable LDRs for one or more hazardous constituents. Therefore, the soils at these five locations will be "surgically" removed and segregated from soils that are determined to be non-hazardous waste by the IDEM "contained-in" determination.

Table 1 presents the in-place analytical data for the soil that is to be removed from the SWMU 9 former Building 55 area (i.e., analytical results from the soil samples collected from within the proposed limits of excavation). Only the pesticide results are presented in Table 1 because pesticides are the only compounds that present unacceptable risks within the excavation area. Table 1 also identifies the IDEM Industrial Default Closure Level criteria and compares these values to the analytical results. The highlighted data in Table 1 identifies contaminants with concentrations greater than IDEM Industrial Default Closure Level criteria. The soils

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associated with these sampling locations are considered hazardous and must be evaluated for LDRs. The evaluation process discussed above and provided in Table 1 was performed in conjunction with the IDEM.

Table 2 presents the in-place analytical data for the samples with one or more constituents whose concentrations are greater than IDEM Industrial Default Closure Level criteria (i.e., the five areas identified by IDEM to exceed the "contained-in" determination levels). All of the analytical results from these samples are compared to the "Nonwastewater" Universal Treatment Standards (UTSs) listed in 40 Code of Federal Regulations (CFR) Section 268.48 to determine if the soils associated with these samples are restricted from land disposal. In accordance with 40 CFR Section 268.48, any material exceeding these standards must be treated prior to land disposal. However, 40 CFR Section 268.49 identifies alternative treatment standards for nonwastewater (soils), which allows initial (in place) contaminant concentrations to be compared to a ten times the UTS criteria. Table 2 presents a comparison of the UTSs and the ten times UTSs criteria to the analytical data from SWMU 9 which exceeds the IDEM Industrial Direct Contact Closure Level criteria. Soils containing contaminant concentrations greater than ten times UTSs will require treatment prior to disposal within a permitted hazardous waste landfill.

As identified in Table 2, the locations that contain soils with contaminants that exceeds the IDEM Industrial Default Closure Level criteria and the ten times UTS include:

- 09SB018 (0 to 2 foot below ground surface (bgs) interval)
- 09SB026 (0 to 2 foot bgs interval)
- 09SB046 (0 to 2 foot bgs interval)
- 09SB067 (0 to 2 foot bgs interval)
- 09SB069 (0 to 2 foot bgs interval)
- 09SB070 (0 to 2 foot interval)

#### **Delineation of LDR Soils**

Figure 1 presents the delineation of soil exceeding the LDRs (LDR soil) that fall within the excavation limits near the SWMU 9 former Building 55 area. The limits of the LDR soil have been established using the results of the evaluation performed in Tables 1 and 2 (discussed above) as well as the results from sample locations that surround these LDR soils that have been determined not to be restricted from land disposal without treatment (non-LDR soils). The physical limits of LDR soils presented on Figure 1 were established based on the assumption that LDR soils extend half the distance between a LDR soil sample location and a non-LDR soil sample location. However, currently there is not enough data to say that the identified limits are the actual limits of LDR soils (meaning LDR soil may extend beyond or may not extend to the boundaries identified in Figure 1). To more accurately delineate the actual limits of LDR soil, the Navy has requested that Tetra Tech collect a series

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of additional samples at the limits identified on Figure 1 and a second series of samples collected halfway between those samples and the closest non-LDR soil location or remediation excavation limits, as appropriate. In the event that the first series of samples confirm the excavation boundaries for LDR soil, because the results indicate non-LDR soils, the LDR soil excavation limits will remain as identified on Figure 1 and the second series of soil samples will not be analyzed. In the event that one or more of the first series of soil samples indicates the presence of LDR soil, the second series of soil sample will be analyzed in an attempt to better define the actual LDR soil excavation limits. If the second series of samples indicate that the soil at this location is non-LDR soil the limits of LDR soil will be extended to these locations and Figure 1 will be revised. In the event that the second series of samples indicate the presence of LDR soil, Figure 1 will be revised to reflect that the limits of LDR soil extend to the current non-LDR soil locations or the excavation limits.

For the purposes of this Technical Memorandum, the LDR soil volume was calculated using the limits identified on Figure 1 (see Attachment 1 - LDR soil volume calculations). This LDR soil requires treatment prior to disposal at a land disposal facility.

Volume of LDR Soil = 90 cubic yards

During excavation the contractor must segregate (stockpile / containerize separately) the LDR soil from the non-LDR soil for transportation to a permitted hazardous waste treatment / disposal facility.

Excavation, handling, treatment, and disposal standards and specifications for contaminated soils are presented in the SWMU 9 IMWP. These standards and specifications, and any additional standards and specifications, imposed by the selected treatment / disposal facility must be followed.

**References**

IDEM (Indiana Department of Environmental Management), 2001. IDEM Technical Resource Guidance Document (Technical Guide). [http://www.in.gov/idem/programs/land/risc/tech\\_guide/index.html](http://www.in.gov/idem/programs/land/risc/tech_guide/index.html). February 15.

**TABLES**

TABLE 1

COMPARISON OF EXCAVATED SOIL TO IDEM INDUSTRIAL DEFAULT CLOSURE LEVEL CRITERIA  
 (IDEM INDUSTRIAL DIRCT CONTACT CLOSURE LEVELS)  
 SWMU 9 - PESTICIDE CONTROL AREA / R-150 TANK AREA  
 NAVAL SURFACE WARFARE CENTER CRANE  
 CRANE, INDIANA  
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LOCATION SAMPLE NUMBER TOP DEPTH (ft bgs) BOTTOM DEPTH (ft bgs) SAMPLE DATE	IDEM Industrial Default Closure Level	09SB018 09SS180002 0 2 3/4/2005	09SB018 09SB180204 2 4 5/9/2005	09SB018 09SB180406 4 6 5/9/2005	09SB019 09SS190002 0 2 5/9/2005	09SB019 09SB190204 2 4 5/9/2005	09SB019 09SB190406 4 6 5/9/2005	09SB020 09SS200002 0 2 5/9/2005
<b>Pesticides (µg/kg)</b>								
4,4'-DDD	120,000	22,000 J	1,000	48	820 J	8.7	99	1700
4,4'-DDE	86,000	<b>130,000</b>	87	73	3,100 J	17	300 J	670
4,4'-DDT	86,000	<b>2,200,000</b>	500	2,200	27,000 J	380	7100	3500
Aldrin	800	<b>1,600 U</b>	1.56 U	1.6 U	0.778 UJ	0.804 U	3.89 U	6.9 J
alpha-BHC	4,000	1,600 U	20	1.6 U	0.778 UJ	0.804 U	3.89 U	3.97 U
alpha-Chlordane	68,000	<b>170,000</b>	52	7.7	700 J	3.1	25	140
beta-BHC	12,000	1,600 U	1.56 U	1.6 U	0.778 UJ	0.804 U	3.89 U	5.6 J
delta-BHC	NC	1,600 U	1.56 U	1.6 U	0.778 UJ	0.804 U	3.89 U	3.97 U
Dieldrin	860	<b>3300 U</b>	3.24 U	3.32 U	7 J	1.67 U	16 J	420
Endosulfan I	2,900,000	1,600 U	1.56 U	1.6 U	0.778 UJ	0.804 U	3.89 U	3.97 UJ
Endosulfan II	NC	3,300 U	3.24 U	3.32 U	1.62 UJ	1.67 U	8.08 U	8.25 U
Endosulfan Sulfate	NC	3,300 U	3.24 U	3.32 U	1.62 UJ	1.67 U	8.08 U	8.25 U
Endrin	150,000	3,300 U	3.24 U	3.32 U	1.62 UJ	1.67 U	8.08 U	8.25 U
Endrin Aldehyde	NC	3,300 U	3.24 U	3.32 U	1.62 UJ	1.67 U	8.08 U	8.25 U
Endrin Ketone	NC	3,300 U	3.24 U	3.32 U	1.62 UJ	1.67 U	8.08 U	8.25 U
gamma-BHC (Lindane)	19,000	1,600 U	1.56 U	1.6 U	0.778 UJ	0.804 U	3.89 U	3.97 U
gamma-Chlordane	68,000	<b>210,000</b>	63	8.6	700 J	2.7	25	150
Heptachlor	2,900	<b>48,000</b>	1.56 U	1.6 U	3.4 J	0.804 U	3.89 U	3.97 U
Heptachlor Epoxide	1,500	<b>1,600 U</b>	1.56 U	1.6 U	15 J	0.804 U	3.89 U	3.97 U
Methoxychlor	2,500,000	16,000 U	15.6 U	16 U	7.78 UJ	8.04 U	38.9 U	39.7 U
Toxaphene	12,000	<b>41,000 U</b>	40.8 U	41.8 U	20.4 UJ	21 U	102 U	104 U

µg/kg Micrograms per kilogram.  
 ft bgs Feet below ground surface.  
 IDEM Indiana Department of Environmental Management.  
 J Estimated Value.  
 NC No Criteria for this compound.  
 R Rejected Data  
 U Non-Detect at the concentration indicated.

**Indicates that the results for this constituent exceeds the IDEM Industrial Default Criteria.**

TABLE 1

COMPARISON OF EXCAVATED SOIL TO IDEM INDUSTRIAL DEFAULT CLOSURE LEVEL CRITERIA  
(IDEM INDUSTRIAL DIRCT CONTACT CLOSURE LEVELS)  
SWMU 9 - PESTICIDE CONTROL AREA / R-150 TANK AREA  
NAVAL SURFACE WARFARE CENTER CRANE  
CRANE, INDIANA  
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LOCATION	IDEM	09SB021	09SB022	09SB023/TW004	09SB024/TW006	09SB024/TW006	09SB024/TW006	09SB025
SAMPLE NUMBER	Industrial	09SS210002	09SS220002	09SS230002	09SS240002	09SB240204	09SB240406	09SS250002
TOP DEPTH (ft bgs)	Default	0	0	0	0	2	4	0
BOTTOM DEPTH (ft bgs)	Closure	2	2	2	2	4	6	2
SAMPLE DATE	Level	5/9/2005	5/9/2005	5/9/2005	5/9/2005	5/9/2005	5/9/2005	5/9/2005
<b>Pesticides (µg/kg)</b>								
4,4'-DDD	120,000	220	65	1.63 U	1.59 U	40 J	58	19 J
4,4'-DDE	86,000	45	10	1.63 U	70	64 J	1,800	400
4,4'-DDT	86,000	180	66	1.63 U	350	3.09 U	8,600	990
Aldrin	800	0.794 U	0.812 U	0.784 U	0.767 U	1.49 U	4.08 U	0.703 U
alpha-BHC	4,000	0.794 U	0.812 U	0.784 U	0.767 U	150	4.08 U	0.703 U
alpha-Chlordane	68,000	74	19	0.784 U	7.2 J	1.49 U	93	800
beta-BHC	12,000	2 J	0.812 U	0.784 U	0.767 U	1.49 U	4.08 U	0.703 U
delta-BHC	NC	0.794 U	0.812 U	0.784 U	0.767 U	1.49 U	4.08 U	0.703 U
Dieldrin	860	12	1.69 U	1.63 U	1.59 U	3.09 U	8.48 U	17
Endosulfan I	2,900,000	0.794 U	0.812 U	0.784 U	0.767 U	1.49 U	4.08 U	0.703 U
Endosulfan II	NC	1.65 U	1.69 U	1.63 U	1.59 U	3.09 U	8.48 U	1.46 U
Endosulfan Sulfate	NC	1.65 U	1.69 U	1.63 U	1.59 U	3.09 U	8.48 U	1.46 U
Endrin	150,000	1.65 U	1.69 U	1.63 U	1.59 U	3.09 U	8.48 U	1.46 U
Endrin Aldehyde	NC	1.65 U	1.69 U	1.63 U	1.59 U	3.09 U	8.48 U	1.46 U
Endrin Ketone	NC	1.65 U	1.69 U	1.63 U	1.59 U	3.09 U	8.48 U	1.46 U
gamma-BHC (Lindane)	19,000	0.794 U	0.812 U	0.784 U	0.767 U	1.49 U	4.08 U	0.703 U
gamma-Chlordane	68,000	50	11	0.784 U	16 J	1.49 U	98	760
Heptachlor	2,900	0.794 U	0.812 U	0.784 U	0.767 U	1.49 U	4.08 U	59
Heptachlor Epoxide	1,500	11 J	5.7 J	0.784 U	0.767 U	1.49 U	28	94
Methoxychlor	2,500,000	7.94 U	8.12 U	7.84 U	7.67 U	14.9 U	40.8 U	7.03 U
Toxaphene	12,000	20.8 U	21.2 U	20.5 U	20 U	38.9 U	107 U	18.4 U

µg/kg      Micrograms per kilogram.  
ft bgs      Feet below ground surface.  
IDEM      Indiana Department of Environmental Management.  
J          Estimated Value.  
NC        No Criteria for this compound.  
R          Rejected Data  
U          Non-Detect at the concentration indicated.

**Constituent exceeds the IDEM Industrial Default Criteria.**

TABLE 1

COMPARISON OF EXCAVATED SOIL TO IDEM INDUSTRIAL DEFAULT CLOSURE LEVEL CRITERIA  
(IDEM INDUSTRIAL DIRCT CONTACT CLOSURE LEVELS)  
SWMU 9 - PESTICIDE CONTROL AREA / R-150 TANK AREA  
NAVAL SURFACE WARFARE CENTER CRANE  
CRANE, INDIANA  
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LOCATION	IDEM	09SB026	09SB027/TW005	09SB030	09SB044	09SB046	09SB047
SAMPLE NUMBER.	Industrial	09SS260002	09SS270002	09SS300002	09SS440002	09SS460002	09SS470002
TOP DEPTH (ft bgs)	Default	0	0	0	0	0	0
BOTTOM DEPTH (ft bgs)	Closure	2	2	2	2	2	2
SAMPLE DATE	Level	5/9/2005	5/9/2005	5/10/2005	10/3/2005	10/3/2005	9/30/2005
<b>Pesticides (µg/kg)</b>							
4,4'-DDD	120,000	1,800 J	83	1.77 U	1,500 J	1,034 U	120
4,4'-DDE	86,000	30,000 J	80	1.77 U	2,200	1,900 J	300
4,4'-DDT	86,000	<b>110,000 J</b>	47	1.77 U	570	<b>130,000 J</b>	320
Aldrin	800	93.8 U	0.742 U	0.852 U	0.806 U	498 U	0.799 UJ
alpha-BHC	4,000	93.8 U	0.742 U	0.852 U	0.806 U	498 U	0.799 UJ
alpha-Chlordane	68,000	1000 J	170	0.852 U	900	498 U	0.799 U
beta-BHC	12,000	93.8 U	0.742 U	0.852 U	0.806 U	498 U	0.799 U
delta-BHC	NC	93.8 U	0.742 U	0.852 U	0.806 U	498 U	0.799 UJ
Dieldrin	860	210 J	1.54 U	1.77 U	1.67 U	<b>1,034 U</b>	6.6
Endosulfan I	2,900,000	93.8 U	0.742 U	0.852 U	0.806 U	498 U	0.799 U
Endosulfan II	NC	195 U	1.54 U	1.77 U	1.67 U	1,034 U	1.66 U
Endosulfan Sulfate	NC	195 U	1.54 U	1.77 U	1.67 U	1,034 U	1.66 UJ
Endrin	150,000	195 U	1.54 U	1.77 U	1.67 U	1,034 U	1.66 U
Endrin Aldehyde	NC	195 U	1.54 U	1.77 U	1.67 U	1,034 U	1.66 U
Endrin Ketone	NC	195 U	1.54 U	1.77 U	1.67 U	1,034 U	1.66 UJ
gamma-BHC (Lindane)	19,000	93.8 U	0.742 U	0.852 U	0.806 U	498 U	0.799 UJ
gamma-Chlordane	68,000	1,100 J	190	0.852 U	820	498 U	0.799 U
Heptachlor	2,900	93.8 U	0.742 U	0.852 U	0.806 U	498 U	0.799 UJ
Heptachlor Epoxide	1,500	93.8 U	0.742 U	0.852 U	66	498 U	0.799 U
Methoxychlor	2,500,000	938 U	7.42 U	8.52 U	8.06 U	4,979 U	7.99 U
Toxaphene	12,000	2453 U	19.4 U	22.3 U	105 U	65,100 U	104 U

µg/kg      Micrograms per kilogram.  
ft bgs      Feet below ground surface.  
IDEM      Indiana Department of Environmental Management.  
J          Estimated Value.  
NC        No Criteria for this compound.  
R          Rejected Data  
U          Non-Detect at the concentration indicated.

**Indicates that the results for this constituent exceeds the IDEM Industrial Default Criteria.**

TABLE 1

COMPARISON OF EXCAVATED SOIL TO IDEM INDUSTRIAL DEFAULT CLOSURE LEVEL CRITERIA  
 (IDEM INDUSTRIAL DIRECT CONTACT CLOSURE LEVELS)  
 SWMU 9 - PESTICIDE CONTROL AREA / R-150 TANK AREA  
 NAVAL SURFACE WARFARE CENTER CRANE  
 CRANE, INDIANA  
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LOCATION	IDEM	09SB066	09SB067	09SB068	09SB069	09SB070
SAMPLE NUMBER	Industrial	09SS660002	09SS670002	09SS680002	09SS690002	09SS700002
TOP DEPTH (ft bgs)	Default	0	0	0	0	0
BOTTOM DEPTH (ft bgs)	Closure	2	2	2	2	2
SAMPLE DATE	Level	10/21/2006	10/21/2006	10/22/2006	10/22/2006	10/22/2006
<b>Pesticides (µg/kg)</b>						
4,4'-DDD	120,000	290 J	160 J	1.7 UJ	170 J	5,400 J
4,4'-DDE	86,000	730 J	1,500 J	5.9 J	180	3,700 J
4,4'-DDT	86,000	2,500 J	2,000 J	.17 J	6400	<b>190,000</b>
Aldrin	800	0.75 UR	0.72 UJ	0.84 UJ	42 U	84 U
alpha-BHC	4,000	0.75 UR	0.72 UJ	0.84 UJ	42 U	84 U
alpha-Chlordane	68,000	220 J	790 J	0.84 UJ	78 J	360 J
beta-BHC	12,000	0.75 UR	0.72 UJ	0.84 UJ	42 U	84 U
delta-BHC	NC	0.75 UR	3.0 R	0.84 UJ	42 U	84 U
Dieldrin	860	1.6 UR	<b>6,000 J</b>	1.7 UJ	360	<b>4,200 J</b>
Endosulfan I	2,900,000	0.75 UR	0.72 UJ	0.84 UJ	42 U	84 U
Endosulfan II	NC	1.6 UR	1.5 UJ	1.7 UJ	86 U	170 U
Endosulfan Sulfate	NC	1.6 UR	1.5 UJ	1.7 UJ	86 U	470 R
Endrin	150,000	1.6 UR	1.5 UJ	1.7 UJ	86 U	170 U
Endrin Aldehyde	NC	1.6 UR	1.5 UJ	1.7 UJ	86 U	170 U
Endrin Ketone	NC	1.6 UR	1.5 UJ	1.7 UJ	86 U	170 U
gamma-BHC (Lindane)	19,000	0.75 UR	0.72 UJ	0.84 UJ	42 U	84 U
gamma-Chlordane	68,000	260 J	860 J	0.84 UJ	73 J	540 J
Heptachlor	2,900	0.75 UR	0.72 UJ	0.84 UJ	42 U	84 U
Heptachlor Epoxide	1,500	0.75 UR	0.72 UJ	0.84 UJ	42 U	84 U
Methoxychlor	2,500,000	7.5 UR	7.2 UJ	8.4 UJ	420 U	840 U
Toxaphene	12,000	98 UR	94 UJ	110 UJ	5400 U	11,000 U

µg/kg Micrograms per kilogram.  
 ft bgs Feet below ground surface.  
 IDEM Indiana Department of Environmental Management.  
 J Estimated Value.  
 NC No Criteria for this compound.  
 R Rejected Data  
 U Non-Detect at the concentration indicated.

**Indicates that the results for this constituent exceeds the IDEM Industrial Default Criteria.**

TABLE 2

COMPARISON OF IDEM INDUSTRIAL DEFAULT CLOSURE LEVEL CRITERIA TO THE UNIVERSAL TREATMENT STANDARDS  
 SWMU 9 - PESITCIDE CONTROL AREA / R-150 TANK AREA  
 NAVAL SURFACE WARFARE CENTER CRANE  
 CRANE, INDIANA  
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LOCATION SAMPLE NUMBER TOP DEPTH (ft bgs) BOTTOM DEPTH (ft bgs) SAMPLE DATE	Universal Treatment Standards	10 Times Universal Treatment Standards	09SB018 09SS180002 0 2 3/4/2005	09SB026 09SS260002 0 2 5/9/2005	09SB046 09SS460002 0 2 10/3/2005	09SB067 09SS670002 0 2 10/21/2006	09SB070 09SS700002 0 2 10/22/2006
<b>Pesticides (µg/kg)</b>							
4,4'-DDD	87	870	<b>22,000 J</b>	<b>1,800 J</b>	<b>1,034 U</b>	<b>160 J</b>	<b>5,400 J</b>
4,4'-DDE	87	870	<b>130,000</b>	<b>30,000 J</b>	<b>1,900 J</b>	<b>1,500 J</b>	<b>3,700 J</b>
4,4'-DDT	87	870	<b>2,200,000</b>	<b>110,000 J</b>	<b>130,000 J</b>	<b>2,000 J</b>	<b>190,000</b>
Aldrin	66	660	<b>1,600 U</b>	93.8 U	498 U	0.72 UJ	84 U
alpha-BHC	66	660	<b>1,600 U</b>	93.8 U	498 U	0.72 UJ	84 U
alpha-Chlordane	260	2,600	<b>170,000</b>	1000 J	498 U	790 J	360 J
beta-BHC	66	660	<b>1,600 U</b>	93.8 U	498 U	0.72 UJ	84 U
delta-BHC	66	660	<b>1,600 U</b>	93.8 U	498 U	0.72 UJ	84 U
Dieldrin	130	1,300	<b>3,300 U</b>	210 J	1,034 U	<b>6,000 J</b>	<b>4,200 J</b>
Endosulfan I	66	660	<b>1,600 U</b>	93.8 U	498 U	0.72 UJ	84 U
Endosulfan II	130	1,300	<b>3,300 U</b>	195 U	1,034 U	1.5 UJ	170 U
Endosulfan Sulfate	130	1,300	<b>3,300 U</b>	195 U	1,034 U	1.5 UJ	470 R
Endrin	130	1,300	<b>3,300 U</b>	195 U	1,034 U	1.5 UJ	170 U
Endrin Aldehyde	130	1,300	<b>3,300 U</b>	195 U	1,034 U	1.5 UJ	170 U
Endrin Ketone	NA	NA	<b>3,300 U</b>	195 U	1,034 U	1.5 UJ	170 U
gamma-BHC (Lindane)	66	660	<b>1,600 U</b>	93.8 U	498 U	0.72 UJ	84 U
gamma-Chlordane	260	2,600	<b>210,000</b>	1,100 J	498 U	860 J	540 J
Heptachlor	66	660	<b>48,000</b>	93.8 U	498 U	0.72 UJ	84 U
Heptachlor Epoxide	66	660	<b>1,600 U</b>	93.8 U	498 U	0.72 UJ	84 U
Methoxychlor	180	1,800	<b>16,000 U</b>	938 U	<b>4,979 U</b>	7.2 UJ	840 U
Toxaphene	2,600	26,000	<b>41,000 U</b>	2,453 U	<b>65,100 U</b>	94 UJ	11,000 U

µg/kg Micrograms per kilogram.  
 ft bgs Feet below ground surface.  
 J Estimated Value.  
 NA Universal Treatment Standards are not available for this compound.  
 R Rejected Data.  
 U Non-Detect at the concentration indicated.

**Indicates that the reported concentration is greater than 10 times the Universal Treatment Standard.**

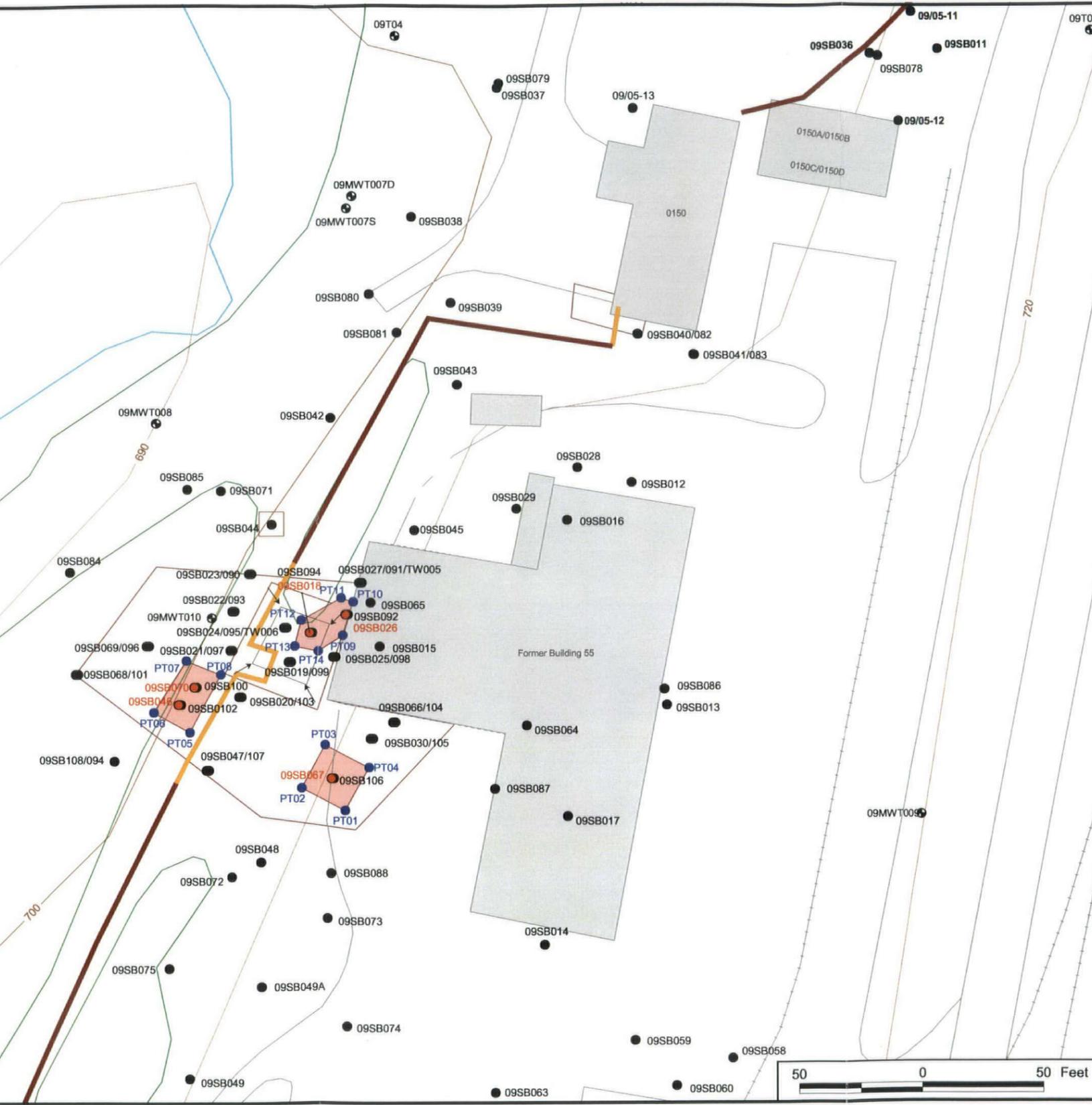
**FIGURES**



POINT	EASTING	NORTHING
PT01	3025237.3015	1311361.4840
PT02	3025219.6874	1311370.8386
PT03	3025229.2085	1311388.4394
PT04	3025246.8305	1311378.9361
PT05	3025174.4332	1311393.5361
PT06	3025159.8910	1311401.6291
PT07	3025172.9157	1311422.7469
PT08	3025186.8257	1311417.1830
PT09	3025236.3956	1311433.1161
PT10	3025240.5686	1311446.7732
PT11	3025235.6369	1311448.4171
PT12	3025219.5772	1311439.4388
PT13	3025216.7953	1311428.8167
PT14	3025226.2793	1311426.7935

**LEGEND**

- Soil Boring
- Soil Boring (Pesticide LDR Exceedence)
- ⊕ Monitoring Well
- Excavation Limits Identified in the IMWP
- Pesticide LDR Soils (0 to 2 feet bgs)
- ▭ Building
- Steam Line
- Steam Line Requiring Support System
- - - Former Building
- Road
- Railroad
- Tree Line
- Stream
- Topographic Contour



CONTRACT NO. CTO 00042	DATE
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	FIGURE 1
REV	0

PERSTICIDE LDR SOIL EXCAVATION  
 SWMU 9  
 NSWCRANE  
 CRANE, INDIANA



DRAWN BY S. STROZ	DATE 3/29/07	CHECKED BY T. SMITH	DATE 3/17/08	COST/SCHED-AREA	SCALE AS NOTED
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**ATTACHMENT 1**

CLIENT: NAVAL SURFACE WARFARE CENTER CRANE CRANE, INDIANA		JOB NUMBER: 112G00477 - 14.116	
SUBJECT: SWMU 9 - PESTICIDE CONTROL AREA / R-150 TANK AREA			
BASED ON: Limits of LDR Soil Excavation Drawing		DRAWING NUMBER: Figure 1	
BY: TWS	CHECKED BY: VJP	APPROVED BY:	DATE:
Date: 3-21-08	Date: 4-1-08		

**OBJECTIVE:**

The purpose of this calculation is to estimate the volume of soil that has been identified as restricted material (hazardous material that requires treatment prior to land disposal within a hazardous waste landfill).

**APPROACH:**

Use the areas calculated from the software used to produce Figure 1 and multiply this area by the depth interval that is represented by the sample containing the contaminant concentrations that require treatment prior to land disposal.

**REFERENCES:**

Figure 1 provided with this technical memorandum (attached to this calculation).

**CALCULATIONS**

Volume rounded up to the nearest 10 cubic yards.

**Area 1** - This area encompasses sample location 09SB067 and is defined by survey nodes PT01, PT02, PT03, and PT04. The contaminants that are detected at unacceptable concentrations for land disposal are found in the 0 to 2 foot depth interval below ground surface (bgs).

**Area 2** - This area encompasses sample locations 09SB046 and 09SB070 and is defined by survey nodes PT05, PT06, PT07, and PT08. The contaminants that are detected at unacceptable concentrations for land disposal are found in the 0 to 2 foot depth interval bgs.

**Area 3** - This area encompasses sample locations 09SB018 and 09SB026 and is defined by survey nodes PT09, PT10, PT11, PT12, PT13, and PT14. The contaminants that are detected at unacceptable concentrations for land disposal are found in the 0 to 2 foot depth interval bgs.

Location	Area (square feet)	Depth (feet)
Area 1	400	2
Area 2	410	2
Area 3	310	2

Total Excavation Surface Area =	1,120 square feet
Excavation Depth =	2 feet
Volume =	2,240 cubic feet
Volume =	<b>90 cubic yards</b>

P:\GIS\CRANE\_NSWC\MAPDOCS\APR\SWMU09\_TAGMAPS.APR\_ZOOMED VIEW BLDG 55 LOCATION LAYOUT 3/17/08 KM

POINT	EASTING	NORTHING
PT01	3025237.3015	1311361.4840
PT02	3025219.6874	1311370.8386
PT03	3025229.2085	1311388.4394
PT04	3025246.8305	1311378.9361
PT05	3025174.4332	1311393.5361
PT06	3025159.8910	1311401.6291
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PT12	3025219.5772	1311439.4388
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PT14	3025226.2793	1311426.7935

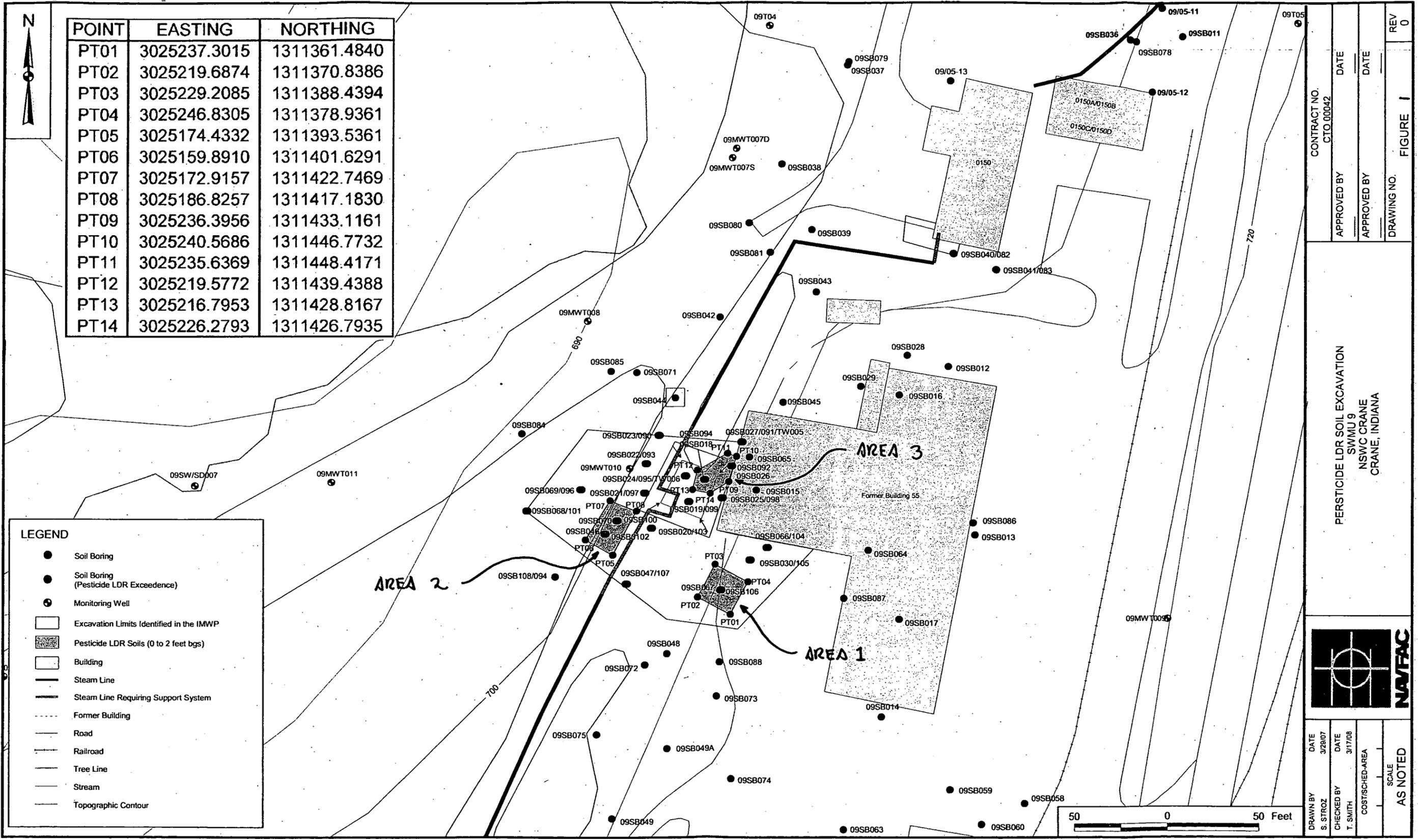
**LEGEND**

- Soil Boring
- Soil Boring (Pesticide LDR Exceedence)
- ⊙ Monitoring Well
- Excavation Limits Identified in the IMWP
- ▨ Pesticide LDR Soils (0 to 2 feet bgs)
- ▭ Building
- Steam Line
- Steam Line Requiring Support System
- - - Former Building
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- Tree Line
- Stream
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AREA 2

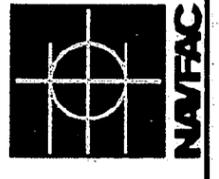
AREA 3

AREA 1



CONTRACT NO. CTO 00042	DATE
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	FIGURE 1
REV	0

PERSTICIDE LDR SOIL EXCAVATION  
 SWMU 9  
 NSWC CRANE  
 CRANE, INDIANA



DRAWN BY S. STROZ	DATE 3/28/07	CHECKED BY T. SMITH	DATE 3/17/08	COST/SCHED-AREA	SCALE AS NOTED
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