



DEPARTMENT OF THE NAVY

CRANE DIVISION  
NAVAL SURFACE WARFARE CENTER  
300 HIGHWAY 361  
CRANE INDIANA 47522-5001

N00164.AR.000931  
NSWC CRANE  
5090.3a

IN REPLY REFER TO:  
5090/S4.7.1  
Ser RP3/5081  
28 FEB 2005

U.S. Environmental Protection Agency, Region V  
Waste, Pesticides, & Toxics Division  
Waste Management Branch  
Corrective Action Section  
77 West Jackson Blvd.  
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center submits the Final Work Plan Addendum for sampling and analysis at the Pesticide Control Area - R150 Tank (PCA-R150), Solid Waste Management Unit 9. This plan addresses a data gap identified at the former Building 55 location and is included as enclosure (1). The permit required Certification Statement is provided as enclosure (2).

If you require any further information, my point of contact is Mr. Thomas J. Brent, Code RP3-TB, at 812-854-6160, email thomas.brent@navy.mil.

Sincerely,

*James M. Hunsicker*

JAMES M. HUNSICKER  
Manager, Environmental Protection  
By direction of the Commanding Officer

Enclosures: 1. Final Workplan Addendum for PCA-R150  
2. Certification Statement

Copy to:  
ADMINISTRATIVE RECORD  
SOUTHNAVFACENCOM (Code ES31) (w/o encl)  
IDEM (Doug Griffin)  
TTNUS (Roger Clark) (w/o encl)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

  
SIGNATURE

Manager, Environmental Protection  
TITLE

2/28/05  
DATE

**WORK PLAN ADDENDUM**  
**FOR**  
**SWMU 9 (PESTICIDE CONTROL AREA)**  
**NAVAL SURFACE WARFARE CENTER CRANE, INDIANA**  
  
**COMPREHENSIVE LONG-TERM**  
**ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

**Submitted to:**  
**Southern Division**  
**Naval Facilities Engineering Command**  
**2155 Eagle Drive**  
**North Charleston, South Carolina 29406**

**Submitted by:**  
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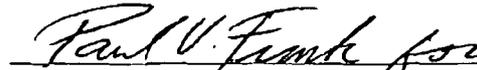
**CONTRACT NUMBER N62467-94-D-0888**  
**CONTRACT TASK ORDER 0376**

**FEBRUARY 2005**

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## **WORK PLAN ADDENDUM FOR SWMU 9 (PESTICIDE CONTROL AREA)**

### **Introduction**

This document has been prepared as an addendum to the *Work Plan for Risk Assessment at SWMUs 4, 5, 9, and 10 Naval Surface Warfare Center Crane, Indiana, Tetra Tech NUS, August 2000*. The Work Plan was reviewed and approved by USEPA Region 5 in October 2000.

Fieldwork for SWMU 9 was conducted in 2001. Figure 1 shows the sampling locations immediately north of Building 150 where nine borings and three ground water monitoring wells were installed during this fieldwork and previous field activities. The RFI Report (final version) describing the results of this investigation was prepared in December 2004. During a subsequent Navy review of the Corrective Measures Study (CMS) being prepared as part of another project, a data gap was identified for the work conducted at the former Building 55, which is located within SWMU 9. Building 55 is one of three areas of concern within SWMU 9. It is now believed that the actual location of the former Building 55 is greater than 200 feet south of the original Building 55 sampling locations. Building 55 was originally used for the management of pesticides but was demolished and, other than a concrete slab, there is no physical evidence of the former building. Prior to the field investigation of this SWMU, the location of former Building 55 was thought to be located immediately north of Building 150. It has recently been determined that the actual location of this building was further to the south and within the footprint of Building 2454.

In order to confirm the actual location of the former Building 55, the Base Historian (Mr. John Allen) was interviewed in December 2004. He provided the following observations. "Building 55 was used as the Pest Control Shop. It was located in the northwest corner of Building 2454 toward the boiler house (Building 150). Building 2189 (located north of Building 150) was used as a carpenter shop - in fact he worked there. At that time, the lead pest controller was Mr. Walter Berry and Mr. Dale Bledsoe was his assistant. They worked in a small area in Building 55. Mr. Allen called Mr. Bledsoe who said they moved into Building 55 in early 1952. Pest Control then moved into Building 2189 in late 1957 to early 1958. After they moved out, Building 55 was used for equipment storage and hose drying." Neither of them knew when Building 55 was torn down. Following this interview, Mr. Tom Brent (Crane Environmental Site Manager) went to the Building 55 area and observed that the former Building 55 was currently being used as for forklift training and crane testing. The only structure remaining on site is the Building 150 boiler house. No remaining structure of Building 2454 exists now. However, the pad for Building 55 is evident, albeit crumbling.

### **Proposed Field Activities**

In order to fill data gaps from the previous sampling at SWMU 9 and to meet the objectives as described in the Work Plan, additional sampling and analysis is required. These activities will include sampling and analysis of surface and subsurface soils, perched water, ground water, and surface water and sediment. The following sections describe the details of this sampling and analysis. A summary of the objectives of the proposed sampling plan is described in Table 1. All previous and proposed borings, ground water monitoring wells, and surface water and sediment locations are shown on Figure 1. It should be noted that field activities, including methods of sample collection and analysis, will be conducted as described in the approved Work Plan (TtNUS, August 2000).

### Soils

Objective- to evaluate contaminant concentrations at varying depths at the former location of Building 55 and along migration pathways. Proposed soil depths for sample collection reflect the exposure pathways for the identified receptors.

In order for the stated objectives for these locations to be achieved it will be necessary to collect additional samples as follows.

09SB12 - North edge Building 2454 (former Building 55) - Collect samples at three depths (0 to 2 feet, 2 - 4 feet (or at a depth based on PID readings, visual staining, or field judgment), and just above the water table- assumed to be 10 to 15 feet bgs).

09SB13 - East edge Building 2454 (former Building 55) - Collect samples at three depths (0 to 2 feet, 2 - 4 feet (or at a depth based on PID readings, visual staining, or field judgment), and just above the water table- assumed to be 10 to 15 feet bgs).

09SB14 - South edge Building 2454 (former Building 55) - Collect samples at three depths (0 to 2 feet, 2 - 4 feet (or at a depth based on PID readings, visual staining, or field judgment), and just above the water table- assumed to be 10 to 15 feet bgs).

09SB15 - West edge Building 2454 (former Building 55) - Collect samples at three depths (0 to 2 feet, 2 - 4 feet (or at a depth based on PID readings, visual staining, or field judgment), and just above the water table- assumed to be 10 to 15 feet bgs).

09SB16 - Within the former floor or within the former footprint of Building 55 - Collect samples at three depths (0 to 2 feet, 2 - 4 feet (or at a depth based on PID readings, visual staining, or field judgment), and just above the water table- assumed to be 10 to 15 feet bgs).

09SB17 – Within the former floor or within the former footprint of Building 55 – Collect samples at three depths (0 to 2 feet, 2 - 4 feet (or at a depth based on PID readings, visual staining, or field judgment), and just above the water table- assumed to be 10 to 15 feet bgs).

09TW01 - Perched water sample from one of the above-listed soil boring, if encountered - Collect one sample.

This is a total of 19 samples (18 soils and 1 water), all of which will be collected via a DPT sampling device. It should be noted that in the event bedrock is encountered before reaching 15 feet bgs, three soil samples will still be collected. The depths of sampling will adhere to the above-listed plan if possible or will be determined in the field based on PID readings, visual staining, or field judgment

#### Groundwater

Objective – Evaluate groundwater at a location immediately upgradient of the former location of Building 55. Evaluate downgradient groundwater quality at locations potentially affected by site activities at the former location of Building 55.

The previously established objectives of the groundwater investigation (i.e., to establish groundwater quality immediately upgradient of the former location of Building 55 (09T05) and to evaluate downgradient groundwater quality at locations potentially affected by site activities at the location of former Building 55 (09T03 and 09T04) have not been achieved. Well 09T05 is not immediately upgradient of the actual location of former Building 55. Wells 09T03 and 09T04 are actually upgradient of the actual former location of Building 55. Even though the stated objectives have not been achieved, results of ground water data within this general area indicate there is no evidence to suggest that pesticides have contaminated soils or ground water within the area of former Building 55. Nonetheless, to confirm this, two temporary ground water monitoring wells will be installed. A water sample will be collected from either a perched zone or the water table. This is assuming that water will be encountered prior to hitting bedrock. If bedrock is encountered prior to water, a water sample will not be collected. If laboratory results of soil or perched water indicate the presence of pesticides, two permanent ground water monitoring wells will be installed during a future phase of field work. The following provides further support to this rationale.

Upgradient Well: Pesticides are not naturally occurring and were detected in only one groundwater sample collected over 1000 feet to the north of Building 55 during the RFI sampling. It can be assumed pesticides are not present in the upgradient ground water. Therefore it is not necessary to have an upgradient well above the actual former location of Building 55.

**Downgradient Wells:** As a class of compounds pesticides are not very mobile in soils. Pesticides would have to pass through the soil column in order to contaminate groundwater. If soils do not have pesticides, or if pesticides are only present in the surface soils and not in deeper layers, it would be reasonable to assume that ground water could not have been contaminated with pesticides. The decision to install permanent ground water monitoring well(s) will therefore be based on whether pesticides (and other compounds) are present in soil and at which depths. Collection/analysis of perched water samples will also provide useful information. A deliberate attempt will be made to collect up to three perched water (or ground water if encountered) samples via DPT.

Additionally, some specific information is available regarding the types of pesticides stored at Building 55. Pesticides and herbicides stored at Building 55 included, but were not limited to, 2,4-D, 2,4,5-T, silvex (a mixture of 2,4-D and 2,4-T), fenac, monuron, ureabor, carbaryl, chlordane, DDT, diazinon, dieldrin, lindane, malathion, and pyrethrum. In addition to the chemicals stored and used at Building 55, the pesticide krovar (a mixture of duron and bromac) was added to the chemical inventory when pesticide control operations were moved from Building 55 to Building 2189.

Generally speaking, most pesticides are relatively immobile in soil and are preferentially bound to soil, particularly soils with a high organic content. The partition coefficient for organic carbon, or Koc (in liters per kilogram [L/kg]) is defined as the ratio of the amount of chemical adsorbed per unit weight of organic carbon in the soil to the concentration of the chemical in solution in equilibrium. This parameter (Koc) is one indicator of chemical mobility. As a general rule, pesticides are not subject to groundwater transport to the same extent as volatile organic compounds. The majority of compounds previously stored at Building 55 have published Koc values. Most have reported Koc values greater than 2,000 L/kg and, thus, by at least one reference, would be described as relatively immobile in the soil matrix. Two of the chemicals (2,4-D and lindane) have Kocs between 150 and 2000 L/kg and, thus, would be described as having intermediate to low mobility in the soil matrix. Based on the results of previous laboratory analysis of groundwater at SWMU 9 which indicated that only dieldrin was found at a low concentration (0.03 ug/L) in only one well (09T01- located east of Building 2189 which is over 1000 feet north of Building 55), it is unlikely that the pesticides/herbicides are a groundwater problem. The Koc reported for dieldrin in at least one reference (10,700 L/kg) indicates that dieldrin is a relatively immobile chemical.

#### Surface Water / Sediment

Objective- Evaluate surface water / sediment quality at a location affected by site activities

The previously stated objectives have not been achieved for Building 55 activities. The previous sample collected (09SW/SD05) is upstream of the locations which could have been impacted by runoff from Building 55 activities. It is therefore necessary to collect the following additional sample.

09SWSD06 – Surface water and sediment sample(s) downstream of Building 55 - Collect sediment grab sample at a depth of 0-6" bgs.

### **Laboratory Analyses**

Analytical results are available from previous investigations conducted at SWMU 9 including the results of the 2004 RFI Report. As part of the RFI, all ground water samples were analyzed for Appendix IX VOCs, Appendix IX SVOCs, Appendix IX pesticides, Appendix IX PCBs, Appendix IX herbicides, total TAL metals (plus tin), and cyanide. Based on the results of this analytical information and the historical operations conducted at SWMU 9, the Navy and the USEPA Region 5 have agreed that only pesticides and PCBs will be analyzed for all proposed media in the proposed data gap investigation for Building 55. Additionally, miscellaneous parameters will be analyzed including total organic carbon (TOC); pH; and cation exchange capacity (CEC).

The primary objective of the proposed field investigation is to collect field and laboratory data needed to evaluate the potential risks for those human health and ecological receptors identified in the CMS. Table 1 summarizes the proposed sampling and analysis for SWMU 9, the Pesticide Control Area, including overall objectives and sampling rationale for the selection of a particular sampling point. Sampling and analysis will be conducted as described in Section 7.5.2 of the Work Plan (TtNUS, August 2000).

TABLE 1  
SUMMARY OF OBJECTIVES/PROPOSED SAMPLING  
SWMU 9 - PESTICIDE CONTROL / R-150 TANK AREA  
NSWC CRANE, INDIANA

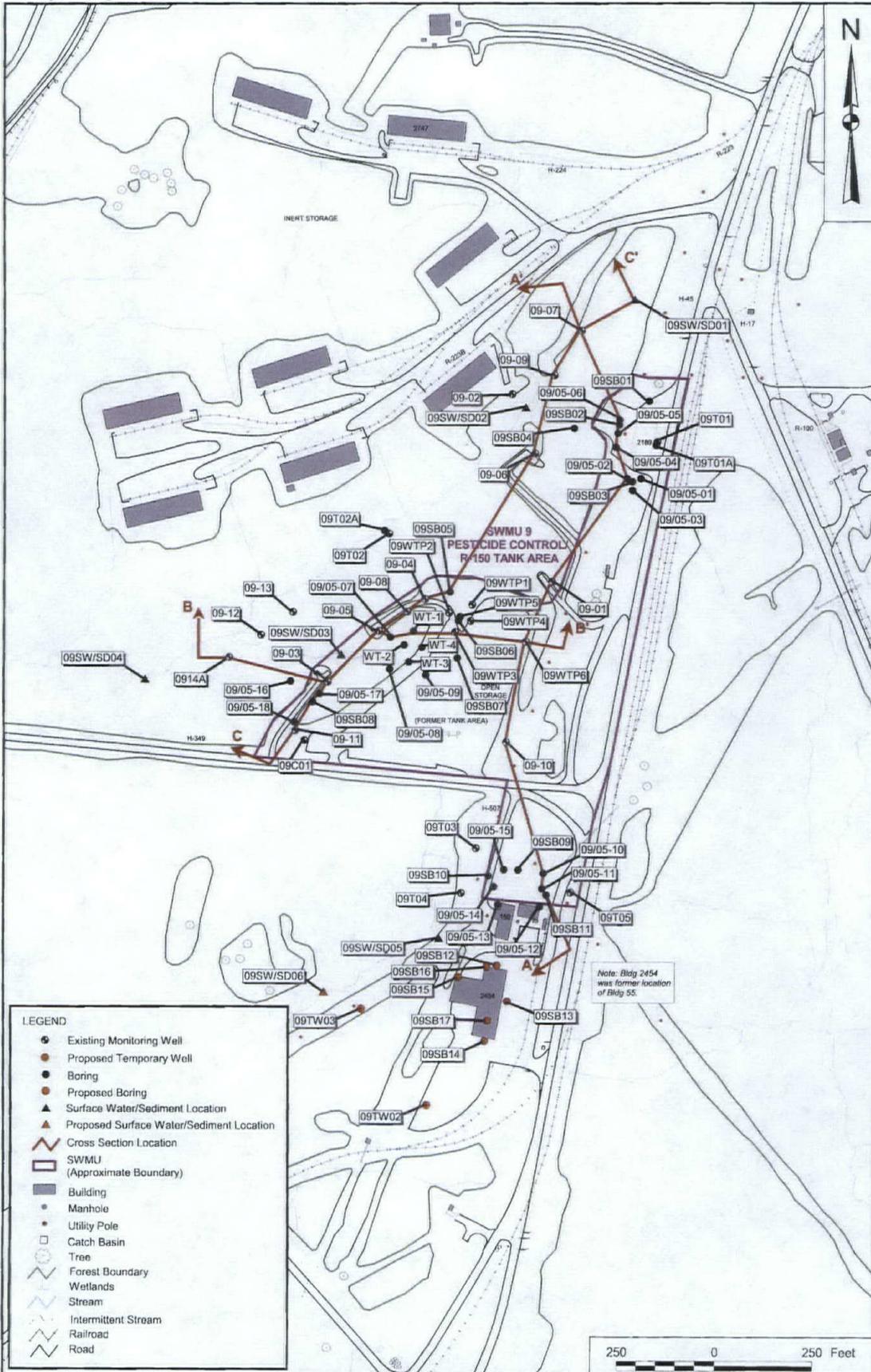
OVERALL OBJECTIVES FOR SAMPLING PROGRAM					
TYPE OF PROGRAM / SAMPLING OBJECTIVE	PARAMETER TYPE	TARGET CONSTITUENTS <sup>(1)(2)</sup>	OBJECTIVE FOR ANALYSIS	LIMIT OF DETECTION	EVALUATIONS TO BE PERFORMED
<p>Type: RCRA Risk Assessment to fulfill requirements of RCRA Part B permit.</p> <p>Objectives: Determine human health and ecological risks for potential receptors exposed to site media under current and future land use.</p> <p>Determine if there has been a release of hazardous constituents to SWMU soil and groundwater or off-SWMU surface water and sediment.</p>	Field (Soil, Ground Water and Surface Water)	Dissolved Oxygen Oxidation Reduction Potential pH Specific Conductivity Temperature Turbidity PID Reading <sup>(3)</sup>	Evaluate general water quality <sup>(4)</sup> .  Determine if well water is equivalent to formation water (i.e., stability).  To determine the appropriate subsurface soil interval (PID reading).	As per selected field instrumentation. Instrumentation will be calibrated according to the manufacturer's manuals.	Qualitatively used to evaluate general water quality.
	Laboratory (Soil, Ground Water, Surface Water, and Sediment)	Appendix IX Pesticides/PCBs	To obtain a representative presentation of the nature and quantity of constituents that were released to media by past operational activities.	Reporting limit low enough to meet Federal/State ARARs/TBCs and evaluate adverse human health and environmental impacts.	Comparison of constituents found in site media to risk-based screening criteria to determine if these media were affected by past site activities.  Comparison of inorganic site soil data to established Basewide background levels for similar soil types  Estimate human health risks, as outlined in Section 10.0, Figure 10-1 of the Work Plan (TINUS, August 2000).  Estimate ecological risks, as outlined in Section 11.0, Figure 11-1 of the Work Plan (TINUS, August 2000).
		CEC <sup>(5)</sup> pH <sup>(6)</sup> TOC <sup>(7)(8)</sup>	Evaluate soil and/or sediment conditions.	As per chosen laboratory methods.	For soil, evaluate the potential for contaminant migration from the site and the potential for risks outside the site boundaries. For sediment, to be used to assess potential risks for ecological receptors.
SPECIFIC OBJECTIVES FOR SAMPLING LOCATIONS					
MEDIUM	SAMPLE COLLECTION TECHNIQUE	SAMPLE LOCATION	COMMENT	SAMPLING POINT <sup>(9)</sup>	OBJECTIVE OF LOCATION
Surface/Subsurface Soil	<p>Grab surface soil sample; specific collection technique identified in FSP, Section 2.4.2.1 of the Work Plan (TINUS, August 2000).</p> <p>Grab subsurface soil sample; specific collection technique identified in FSP, Section 2.4.2.3 of the Work Plan (TINUS, August 2000).</p>	09SB12 through 09SB15	Three locations surrounding Building 2454 and 1 location west of Building 2454 where ground surface slopes toward an unnamed tributary. Samples collected at ground surface (0 to 2 feet bgs) and at two discrete depths from 2 to 15 feet (interval based on PID readings) <sup>(10)</sup> . Three samples per location for a total of 12 samples.		Evaluate contaminant concentrations at varying depths at Building 2454 and along migration pathways. Soil depths reflect the exposure pathways for the identified potential receptors.
		09SB16 and 09SB17	Two locations within the (former) floor or within the former footprint of Building 55 (biased toward cracked areas of concrete).  Three samples per location for a total of 6 samples.		Evaluate contaminant concentrations at varying depths in the general vicinity of the R-150 Tank area. Soil depths reflect the exposure pathways for the identified potential receptors.  Evaluate contaminant concentrations at varying depths at Building 2454 and along migration pathways. Soil depths reflect the exposure pathways for the identified receptors.
Surface Water/Sediment <sup>(11)</sup>	Grab sample; specific collection technique identified in the FSP, Section 2.4.3 (surface water) and 2.4.4 (sediment) of the Work Plan (TINUS, August 2000).	09SW/SD06	Location in unnamed tributary southwest of Building 2454.		Evaluate surface water/sediment quality at a location immediately downstream of the site.
Ground Water <sup>(11)</sup>	Grab sample; specific collection technique identified in FSP, Section 2.4.1 of the Work Plan (TINUS, August 2000).	091W01	Perched water if encountered.		Evaluate ground water quality at a location immediately downgradient of Building 2454. Evaluate ground water quality at locations affected by site activities downgradient of Building 2454.
		09T06 and 09T07	Install and sample two new temporary monitoring wells west and southwest of Building 2454.		Evaluate ground water quality at a location immediately upgradient of Building 2454.

ARARs Applicable, Relevant, and Appropriate Requirements  
CEC Cation Exchange Capacity  
FSP Field Sampling Plan  
QAPP Quality Assurance Project Plan

PCBs Polychlorinated biphenyls  
PID Photoluminescence detector  
TBCs To Be Considered Values

TOC Total Organic Carbon  
VOCs Volatile Organic Compounds

- The list of specific chemicals included as target constituents is identified in the QAPP, Section 1.0, Table 1-1 of the Work Plan (TINUS, August 2000). Constituents to be analyzed for all samples, all matrices collected, unless otherwise noted.
- VOCs, SVOCs, herbicides, inorganics, cyanide, and tin were not included in the list of target constituents for this site since these chemicals have not been detected during historical site investigations. Associated sample quantitation limits for the historical data were less than human health and ecological criteria, indicating that if these chemicals were present at concentrations of potential concern they would have been detected at the site during historical investigations.
- Soil samples only will be monitored with a PID. The other identified field parameters will be collected for ground water and surface water.
- Analyzed by field tests.
- Two temporary wells will be installed only if soil or perched water sample laboratory results indicate contamination.
- Analyses to be performed on 30 percent of the soil samples collected.
- TOC analyses will be conducted for all sediment samples.
- Proposed sampling locations are identified on Figure 7-8 of the Work Plan (TINUS, August 2000).
- If ground water is encountered prior to 15 feet bgs, a soil sample will be collected from a depth above the water table.
- Due to the intermittent flow, surface water may not be available at all sample locations.



LEGEND	
	Existing Monitoring Well
	Proposed Temporary Well
	Boring
	Proposed Boring
	Surface Water/Sediment Location
	Proposed Surface Water/Sediment Location
	Cross Section Location
	SWMU (Approximate Boundary)
	Building
	Manhole
	Utility Pole
	Catch Basin
	Tree
	Forest Boundary
	Wetlands
	Stream
	Intermittent Stream
	Railroad
	Road

DRAWN BY K. PELA	DATE 2/15/05
CHECKED BY R. CLARK	DATE 2/25/05
COST/SCHEDULE AREA	
SCALE AS NOTED	

**Tetra Tech NUS, Inc.**

PROPOSED SAMPLE LOCATIONS  
SWMU 9 - PESTICIDE CONTROL/R-150 TANK AREA  
NSWC CRANE, INDIANA

CONTRACT NUMBER 0042	
APPROVED BY <i>[Signature]</i>	DATE 2/15/05
APPROVED BY <i>[Signature]</i>	DATE
DRAWING NO. FIGURE 1	REV 0