DEPARTMENT OF THE NAVY
CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE INDIANA 47522-5001

IN REPLY REFER TO:

5090
Ser 095/2027
17 JAN 2002

U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Illinois, Indiana, and Michigan Section
ATTN: Mr. Peter Ramanauskas (DW-8J)
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Ramanauskas:

On October 31, 2001, a meeting was held at Crane Division, Naval Surface Warfare Center (NSWC Crane) to discuss the adequacy of the data collected to date from the Ammunition Burning Grounds (ABG), Solid Waste Management Unit 03/10. NSWC Crane submits, as enclosure (1), two copies of the final minutes from that meeting. The permit required Certification Statement is provided as enclosure (2).

NSWC Crane point of contact is Mr. Thomas J. Brent, Code 09510, telephone 812-854-6160.

Sincerely,

James M. Hunsicker
Director, Environmental
Protection Department
By direction of the Commander

Encl:
(1) Final Minutes for October 31, 2001 Meeting on ABG Data.
(2) Certification Statement

Copy to:
ADMINISTRATIVE RECORD
SOUTHNAVFACENGCOM (Code ES32) (w/o encl)
IDEM (Doug Griffin)
TTNUS (Ralph Basinski) (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.

James Hewitt
SIGNATURE

Environmental Protection Department Manager
TITLE

1/17/02
DATE

AMMUNITION BURNING GROUNDS
MEETING MINUTES
DATA GAPS MEETING
OCTOBER 31, 2001

A Corrective Measures Study (CMS) will be conducted for the NSWC Crane Ammunition Burning Grounds (ABG). The Navy scheduled a meeting for 9:00 AM (Central Time), October 31, 2001 at NSWC Crane on this CMS. The primary objective of this meeting was as follows.

"Determine whether any information gaps exist that must be filled to complete the CMS".

The following attended the meeting.

Bill Gates (SOUTHDIV)
Tom Brent (NSWC Crane)
Christine Freeman (NSWC Crane)
Dr. James May (US ACE WES)
Dr. Noel Krothe (Indiana University)
Matt Cochran (Tetra Tech NUS)
Ralph Basinski (Tetra Tech NUS)
Aaron Bernhardt (Tetra Tech NUS)
Steve Ruffing (Tetra Tech NUS)

The following action items were identified

1) Monitored Natural Attenuation Report. US WES ACE (Dr. James May) will provide the internal draft ground water MNA Report for Navy review by Mid-March 2002

2) Memorandum on Adequacy of Existing Jeep Trail Monitoring Well Network: Tetra Tech NUS (Matt Cochran) will develop a technical memorandum describing the basis for the conclusion that existing ground water (and other media) data is adequate to characterize nature and extent and for risk assessment. Attachment 1 contains the draft technical memorandum

3) Surface Water Explosive Data Collected by Indiana University: Dr. Noel Krothe will provide the explosives data from Little Sulphur Creek surface water samples collected in 2000.

4) Provide Dr. James May with Validated Jeep Trail / Little Sulphur Creek Data: Tetra Tech NUS (Ralph Basinski) will provide Dr. James May with validated data when available. (Information supplied will include positive hit summaries, frequency and range of detection tables, and all analytical data.) The validated data will be provided to Dr. May by December 7, 2001 (Completed).

5) Quality of Main Treatment Area Soils RFI Data for Risk Assessment: Tetra Tech NUS (Ralph Basinski) will check the Environmental Data Assessment Memorandum to determine whether the soils RFI data was properly validated for use in risk assessment. Attachment 2 contains the draft technical memorandum.

Following is a presentation of background information relevant to the ABG and the meeting agenda.

BACKGROUND

Tetra Tech NUS is currently implementing the RFI Phase III study at the Jeep Trail. Historical information shows the presence of chlorinated solvents and metals in ground water monitoring wells associated with the Jeep Trail. The Field Sampling Plan in the QAPP states that additional monitoring wells will be installed if historical information contamination patterns are confirmed.

Up to 13 monitoring wells would be installed. Each well would be sampled for explosives, metals, VOAs, SVOAs, and miscellaneous parameters.

The Ammunition Burning Grounds (SWMU 3) contains two areas where open burning has taken place. The first is the Main Treatment Area, which is currently being operated as a RCRA permitted hazardous waste treatment facility. Interim status and RFI ground water monitoring has shown that ground water is contaminated by explosives, chlorinated solvents, and metals. RFI information also shows the presence of explosives and metals in soils.

The second area is the Jeep Trail where historical open burning operations took place. Historical data has shown the presence of explosives, metals, and chlorinated solvents in ground water. TtNUS has recently completed the field portion of a Phase III RFI study. During the course of the field investigation it was determined that burning activities had taken place along the length of the area identified as the "Jeep Trail rather than in just the "burn pit" and "burn" area as originally assumed. Additional soil samples were collected along the Jeep Trail.

The subsurface geology of the Ammunition Burning Grounds (ABG) is complex. The aquifer system is interconnected and the geology is characterized by a karst system with direct discharge of ground water to springs, which feed Little Sulphur Creek. Ground water underlying both the Jeep Trail and the Main Treatment Area discharges to Little Sulphur Creek either as ground water or as spring water. The Indiana University has conducted numerous studies including dye tracer and storm water hydrographic studies to determine the behavior of the karst system.

The RCRA permit requires the Navy to undertake a Corrective Measures Study (CMS) at the Ammunition Burning Grounds. This CMS must address all media and all sources of contamination at the ABG. Bioremediation of soils in the existing bio-treatment facility has been suggested as a corrective measure for explosive-contaminated soil. However, metals would not be removed by bioremediation and their presence might preclude replacement of the soil into the Main Treatment Area. Offsite disposal (potentially as a hazardous waste) could be required. The US ACE WES is currently investigating the potential for Monitored Natural Attenuation (MNA) with phytoremediation as a corrective measure for explosives, chlorinated solvents, and metals contamination in ground water. The results of these studies must be included in the CMS.

NSWC Crane is currently conducting quarterly ground water monitoring at the Main Treatment Area. SAIC is responsible for the implementation of the ground water monitoring program.

Development of the CMS will require consideration of the following information.

- Studies regarding the behavior of the karst system conducted by the Indiana University
- MNA/phytoremediation studies conducted by the US ACE WES
- Interim status ground water monitoring data from Main Treatment Area collected by TtNUS
- Permitted facility ground water monitoring data from Main Treatment Area collected by SAIC
- Jeep Trail Phase I data collected by TtNUS
- Other data to be identified. This could include data from additional monitoring wells at the Jeep Trail.

MEETING AGENDA
AMMUNITION BURNING GROUNDS
CORRECTIVE MEASURES DATA GAPS MEETING
WEDNESDAY, OCTOBER 31, 2001

9:00 AM	Introduction of Attendees	All Attendees
9:05 AM	Meeting Objectives	Bill Gates
9:10	Regulatory Background	Ralph Basinski/Tom Brent
	Main Treatment Area Jeep Trail	
9:15 AM	Overview of ABG Studies/Reports	Dr. Krothe
	Dye Studies Storm Flow Studies Etc.	
9:35 AM	Overview of US ACE WES Studies/Reports	Dr. May
	Soils RFI Ground Water RFI Surface Water RFI MNA / Phytoremediation Studies Etc.	
9:55 AM	Overview of TtNUS Studies/Reports Baseline Risk Assessment Risk Management Plan Ground Water Monitoring Plan Main Treatment Area Ground Water monitoring Jeep Trail RFI Fieldwork	Ralph Basinski
10:15 AM	Overview of Crane Studies	Tom Brent
	Bat/Insect Studies Main Treatment Area Ground Water Monitoring Etc.	
10:30 AM	Break	
10:45 AM	Jeep Trail / Little Sulphur Creek (LSC) RFI	Matt Cochran
	Sampling and Geology Report	
11:00 AM	Jeep Trail / LSC Risk Screening	Aaron Bernhardt
	Surface Soil Subsurface Soils Ground Water Surface Water Sediment	

11:30 AM	Lunch	
12:30 PM	Identify Jeep Trail Data Gaps	Round Table
	Ground Water Other Media	
1:00 PM	Identify MNA/Phyto Data Gaps	Round Table
1:30 PM	Remedial Goals	Steve Ruffing
1:40 PM	Identify CMS Data Gaps	Round Table
3:00 PM	Other Issues	TBD
3:20 PM	Action Items	TBD
3:30 PM	Adjourn	

ATTACHMENT 1

TECHNICAL MEMORANDUM

ADEQUACY OF EXISTING JEEP TRAIL MONITORING WELL NETWORK AND ENVIRONMENTAL MEDIA SAMPLES FOR RISK ASSESSMENT AND CORRECTIVE MEASURES STUDIES

SOLID WASTE MANAGEMENT UNIT No. 3
JEEP TRAIL AREA OF CONCERN

NAVAL SURFACE WARFARE CENTER CRANE
CRANE, INDIANA

Technical Memorandum on Adequacy of Existing Jeep Trail Monitoring Well Network and Environmental Media Samples
For
Risk Assessment and Corrective Measures Studies.

The purpose of this memorandum is to summarize the findings of the preliminary ground water investigation at the Jeep Trail site, in order to make a determination regarding the need for the installation of additional monitoring wells. The ground water investigation is being performed in support of the Phase III RFI for the site.

The Final Quality Assurance Project Plan (QAPP) for the Phase III RFI, which incorporated regulatory comments; was submitted to the appropriate parties in April 2001. The contents of the QAPP included provisions and rationale (see Section 4.4.2 of the QAPP) for the installation of additional monitoring wells, that were contingent on an evaluation of soil and existing monitoring wells sample results during an initial investigative stage of the RFI. The initial stage of the RFI was performed during the summer and fall of 2001, and those results are presented in the following paragraphs with a recommendation regarding the installation of the additional wells.

The initial investigation at the Jeep Trail Site included the collection of all the proposed samples detailed in the QAPP. Those samples included the collection of surface and subsurface soil samples from 33 soil borings, ground water samples from 16 existing wells, two rounds of surface water samples from up to 15 locations, and sediment samples from two depths at 19 locations. However, during the initial investigative stage of the RFI, the northwest and southeast lateral extent of disposal activities at the Burn Pit and Burn Area was greater than originally thought, this was based on peculiarities discovered in the field and additional conversations with personnel familiar with site activities. This prompted the drilling of an additional 15 soil borings with surface and subsurface soil sampling located both northwest and southeast of the original site locations, to provide adequate coverage along the Jeep Trail. Sample locations are shown on Figures 1, 2, and 3.

The soil sampling results have been plotted on tag maps as shown on Figures 6 through 9. Figures 6 and 7 include positive detections of organic and inorganic compounds in surface soil samples, respectively. Figures 8 and 9 include positive detections of organic and inorganic compounds in subsurface soil samples, respectively. Two proposed monitoring wells, 03MWT01 and 03MWT02 were intended to be located along the downgradient slope of the Burn Area and the Burn Pit to act as shallow source wells to address ground water contamination resulting from contaminants leaching to ground water in the immediate vicinity of known soil contamination. However, it appears that there are no significant sources of soil contamination in these areas that would warrant the installation of these wells. Elevated soil contamination was found in boring 03SB48, however existing monitoring well 03-07 is already located in this area. There are no other locations that appear to warrant the installation of shallow source monitoring wells to address leaching through soil, and it appears that the soil has been adequately characterized for nature and extent and risk assessment purposes.

The ground water sampling results are included on Figures 10 and 11 for positive detections of organic and inorganic compounds, respectively. Proposed shallow wells 03MWT03 through 03MWT09 were intended to be installed further side and downgradient of the existing monitoring well network, assuming that the 2001 ground water sample results were similar to ground water sampling results from 1994. However, the 2001 ground water organic sample results shown on Figure 10 generally indicate that ground water contaminant concentrations are lower than the 1994 organic sampling round; which is presented on Figure 1-14 in the QAPP. Specifically, contaminant concentrations of chlorinated constituents in ground water have decreased in well 03-07, which is located in an area of highest ground water contamination at the site. Elevated detections of soil contamination were also found in soil boring 03SB48 located in this general vicinity, as discussed in the previous paragraph. In addition, contaminant concentrations of explosive compounds have decreased in many of the perimeter shallow wells at the site. It also

appears that migration of contaminated ground water has been minimal since downgradient concentrations have remained somewhat unchanged, and in some cases have decreased from 1994 to 2001. Therefore, shallow ground water appears to be adequately characterized with the existing shallow monitoring well network.

A total of 4 additional deep wells were also proposed in the QAPP. The installation of these wells was also contingent on ground water sample results from 2001 being similar to 1994. Three of the wells (03MW11, 03MW12, and 03MW13) were intended to be installed adjacent to those shallow wells which detected highest concentrations of contamination, reflecting the interior of the ground water contaminant plume, if present. Monitoring well 03MW10 was intended to be installed adjacent to the upgradient shallow well 03-16 to monitor upgradient conditions in the deeper ground water. However, no laterally extensive shallow ground water plume appears to exist at the site, and shallow ground water contaminant concentrations appear to be decreasing in concentration from 1994 to 2001. Furthermore, the Elwren shale underlies the shallow ground water at the site and serves as an effective aquitard to downward migration of ground water at the site. A cross section depicting the Elwren shale has been copied from Murphy 1996, and is included attached to this memorandum. Therefore, the installation of deeper wells will not be necessary at this site since the vertical extent of ground water contamination can be reasonably ascertained with the chemical and hydrogeologic information that presently exists.

Potentiometric surface contours were developed for shallow ground water based on two rounds of synoptic water level measurements. The first round was collected on June 12, 2001 during base flow conditions and the second round was collected on September 9, 2001, immediately following a precipitation occurrence. Figures 4 and 5 represent potentiometric surface contours of those two dates. Shallow ground water flow directions appear to be relatively similar between the two dates. Shallow ground water flows toward the northeast and southwest along an axis of Little Sulphur Creek in the vicinity of the Burn Pit and Burn Area, and once exiting the site area flows to the south along the Little Sulphur Creek valley. Little Sulphur Creek is a losing stream in the vicinity of the Jeep Trail, and no significant overland flow was found in this area during either of the water level measurement rounds.

Surface water (round 1) and sediment sampling results for positive organic and inorganic compounds are included on Figures 12 and Figure 13, respectively. Round 2 surface water sampling results for positive organic and inorganic compounds are included on Figures 14 and 15, respectively. No additional surface water or sediment samples required for preparation of the RFI report.

In conclusion, it appears, based on the initial investigative activities; that additional monitoring wells are not required for purposes of the RFI. Soil contamination has been adequately characterized, and shallow wells exist in the vicinity of elevated soil contamination that may impact ground water from infiltration. Shallow ground water has been characterized both laterally and vertically, and appears to have decreased in concentration from 1994 to 2001. The Elwren Shale, which serves as an aquitard, is located at the base of the shallow ground water zone, further prohibiting downward migration of contamination. Surface water and Sediment sampling results indicate that Little Sulphur Creek has been adequately characterized for evaluation during the RFI.

ATTACHMENT 2

DATA QUALITY ASSESSMENT
EXISTING SOILS DATE FOR
MAIN TREATMENT AREA OF AMMUNITION BURNING GROUNDS
FOR USE IN RISK ASSESSMENTS

Data Quality Assessment of Existing Soils Data for Main Treatment Area of Ammunition Burning Grounds for Use in Risk Assessments

RCRA RFI investigations to characterize nature and extent of soil contamination have been conducted at the Main Treatment Area of the Ammunition Burning Grounds. Soil samples were collected in 1990 and 1993. In 1990 forty-one soil samples were collected at twelve borings. The 1990 samples were analyzed for explosives, inorganics, volatiles, semivolatiles, and pesticides/herbicides. In 1993 thirty-three surface soil grab samples and thirty-two soil borings were collected to determine the extent of soil contaminants identified in the 1990 investigation. The 1993 samples were analyzed for explosives, inorganics, volatiles and, polycyclic aromatic hydrocarbons. Three additional soil samples were collected in 1995 for dioxin/furan analysis. U.S. EPA Region 5 reviewed the data validation documentation for these samples and issued a data validation memorandum. According to EPA's memorandum the only valid data for risk assessment were the explosives data from the 1990 and 1993 RFI investigations and from three dioxin/furan samples collected in 1995.

Subsequent to the 1997 U.S. EPA data validation memorandum additional samples were collected to fill in "data gaps" in order to conduct the a risk assessment of current contamination conditions as part of the RCRA S-X permitting process for the ABG treatment units. In 1997 twenty-one additional surface soil samples were collected, along with five subsurface samples from three locations. All samples were analyzed for inorganic chemicals, with seven surface and subsurface soils samples analyzed for volatile and semi-volatile compounds and pesticides. All of these data were validated in accordance with U.S. EPA Region 5 requirements.

The following data meeting U.S. EPA Region 5 data validation requirements for use in risk assessments is available for soils at the Main Treatment Area of the ABG.

Inorganics

- 21 surface soil samples collected in 1997
- 5 subsurface soil samples collected at 2 locations in 1997

Explosives

- 41 surface and subsurface samples collected in 1990 at 12 soil boring locations
- 33 surface soil samples collected at 33 locations in 1993
- 58 subsurface soil samples collected at 32 locations in 1993

Volatiles

- 5 surface soils samples collected in 1997
- 2 subsurface soil samples collected at 1 location in 1997

Semivolatiles

- 4 surface soil collected in 1997
- 2 subsurface soil samples collected at 1 location in 1997

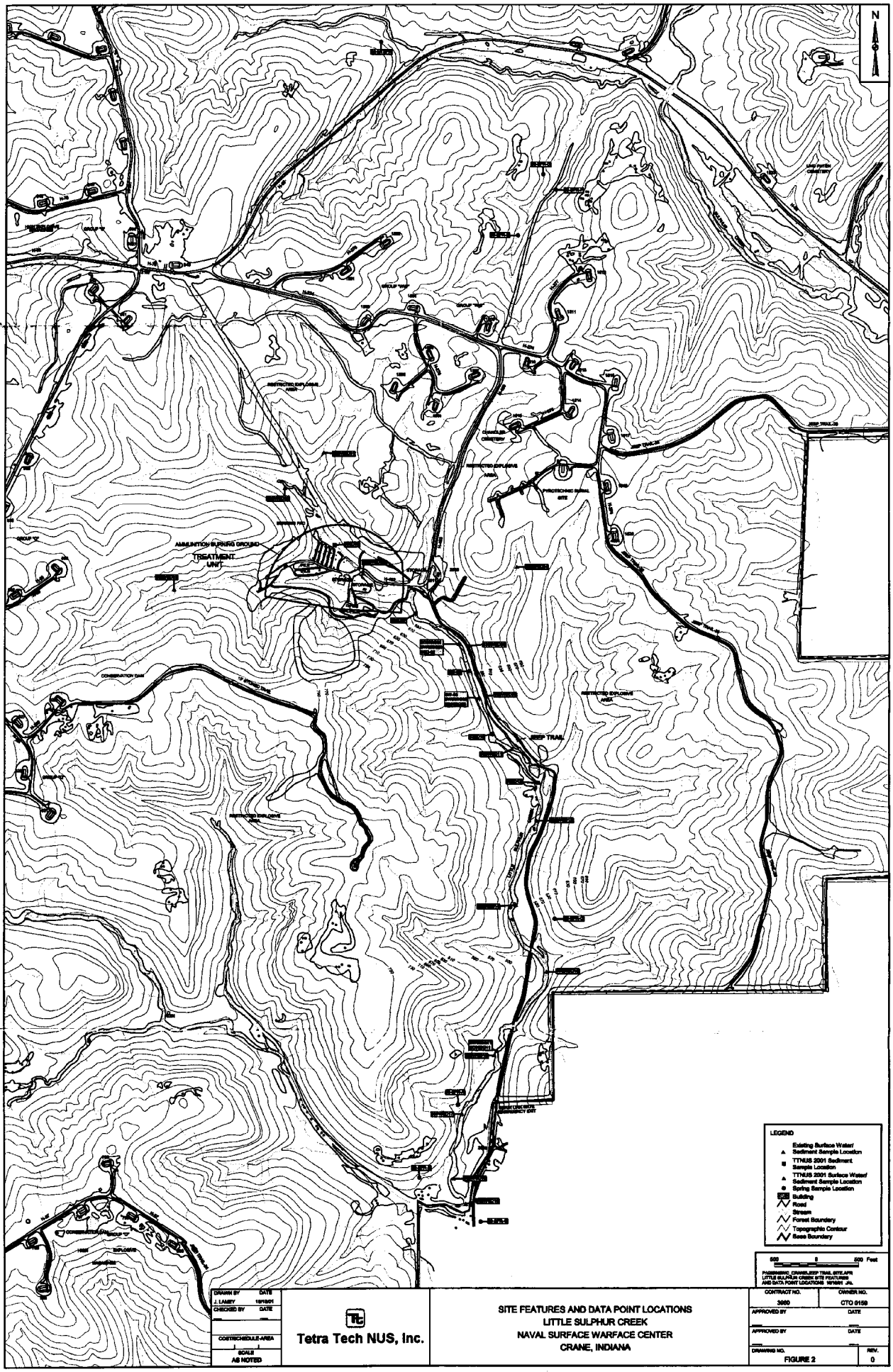
Pesticides

- 4 surface soil samples collected in 1997
- 2 subsurface soil samples collected at 1 location in 1997

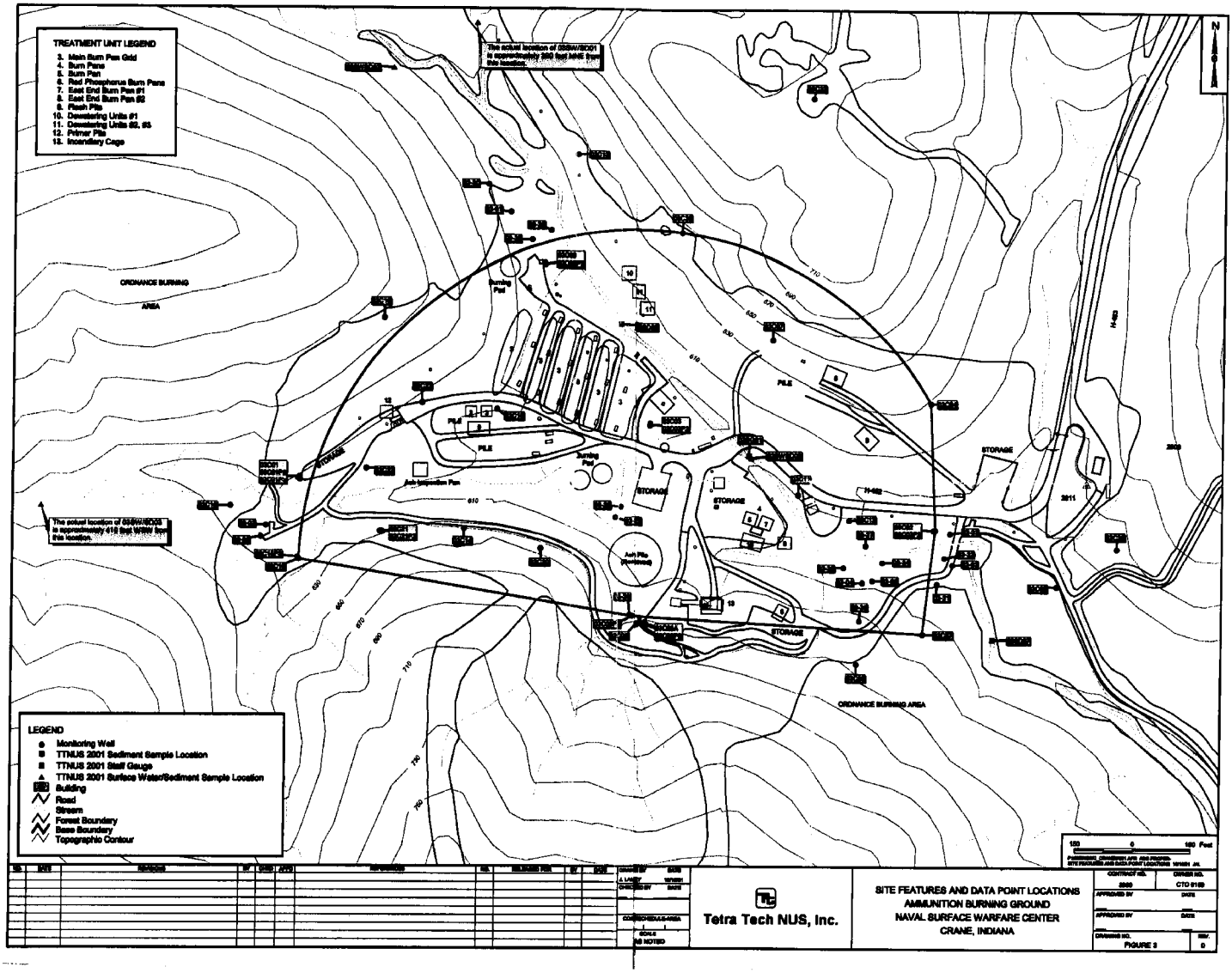
Dioxins/Furans

- 3 surface soil samples collected in 1995

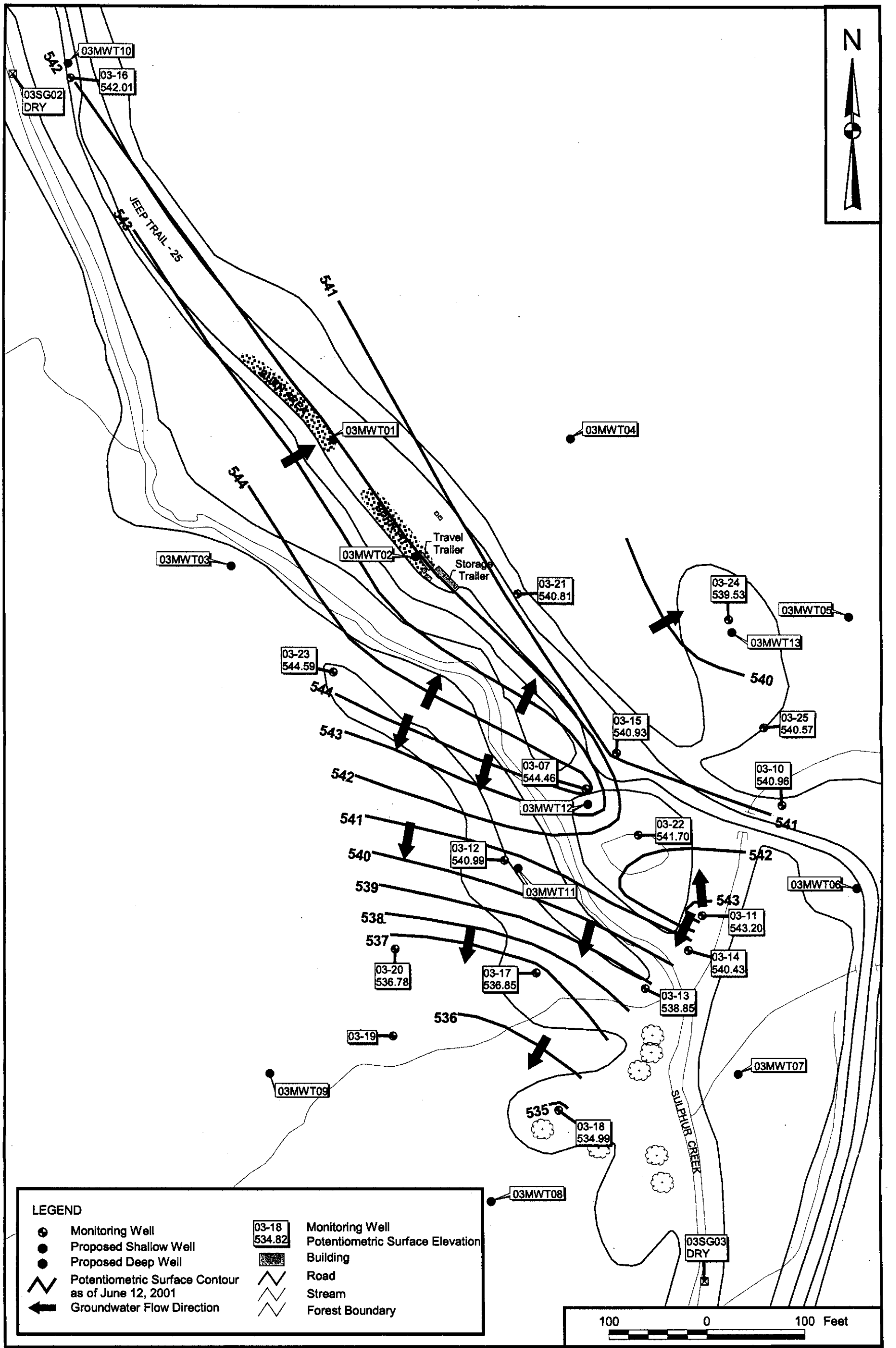
Even though the RFI data did not meet data validation requirements for use in risk assessments it was of sufficient quality for use determining which locations were most likely to have high concentrations of these contaminants. Therefore, the locations where volatiles, semivolatiles, pesticides, and dioxins/furans were collected were chosen based on the RFI data for these parameters. These locations would exhibit the highest concentrations were chosen



DRAWN BY J. LAMEY DATE 10/15/01	Tetra Tech NUS, Inc.	SITE FEATURES AND DATA POINT LOCATIONS LITTLE SULPHUR CREEK NAVAL SURFACE WARFACE CENTER CRANE, INDIANA	CONTRACT NO. 3900 OWNER NO. CTO 0159
CHECKED BY DATE			APPROVED BY DATE
COST/SCHEDULE-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 2 REV. 0


TREATMENT UNIT LEGEND
3. Main Burn Pan Grid
4. Burn Pans
5. Burn Pan
6. Red Phosphorus Burn Pans
7. East End Burn Pan #1
8. East End Burn Pan #2
9. Flash Pits
10. Dewatering Units #1
11. Dewatering Units #2, #3
12. Primer Pits
13. Incendiary Cage
The actual location of SSW/SD01 is approximately 300 feet NNE from this location.
The actual location of SSW/SD05 is approximately 410 feet WNW from this location.
ORDNANCE BURNING AREA
Burning Pad
Ash Impoundment Pond
Ash Pile (Monitoring)
PILE
STORAGE
ROAD
N
LEGEND
Monitoring Well
TTNUS 2001 Sediment Sample Location
TTNUS 2001 Staff Gauge
TTNUS 2001 Surface Water/Sediment Sample Location
Building
Road
Stream
Forest Boundary
Base Boundary
Topographic Contour
150 0 150 Feet
Tetra Tech NUS, Inc.
SITE FEATURES AND DATA POINT LOCATIONS
AMMUNITION BURNING GROUND
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA
CONTRACT NO. 2689
OWNER NO. CTO 0169
FIGURE 2
REV. 0

P:\GIS\NSWC_CRANE\JEEP TRAIL SITE.APR JEEP TRAIL SITE POTENTIOMETRIC CONTOURS-JUNE 12, 2001 10/19/01 JAL



DRAWN BY: J. LAMEY	DATE: 10/19/01	Tetra Tech NUS, Inc.	CONTRACT NUMBER: 3960 / OWNER NUMBER: CTO 0159
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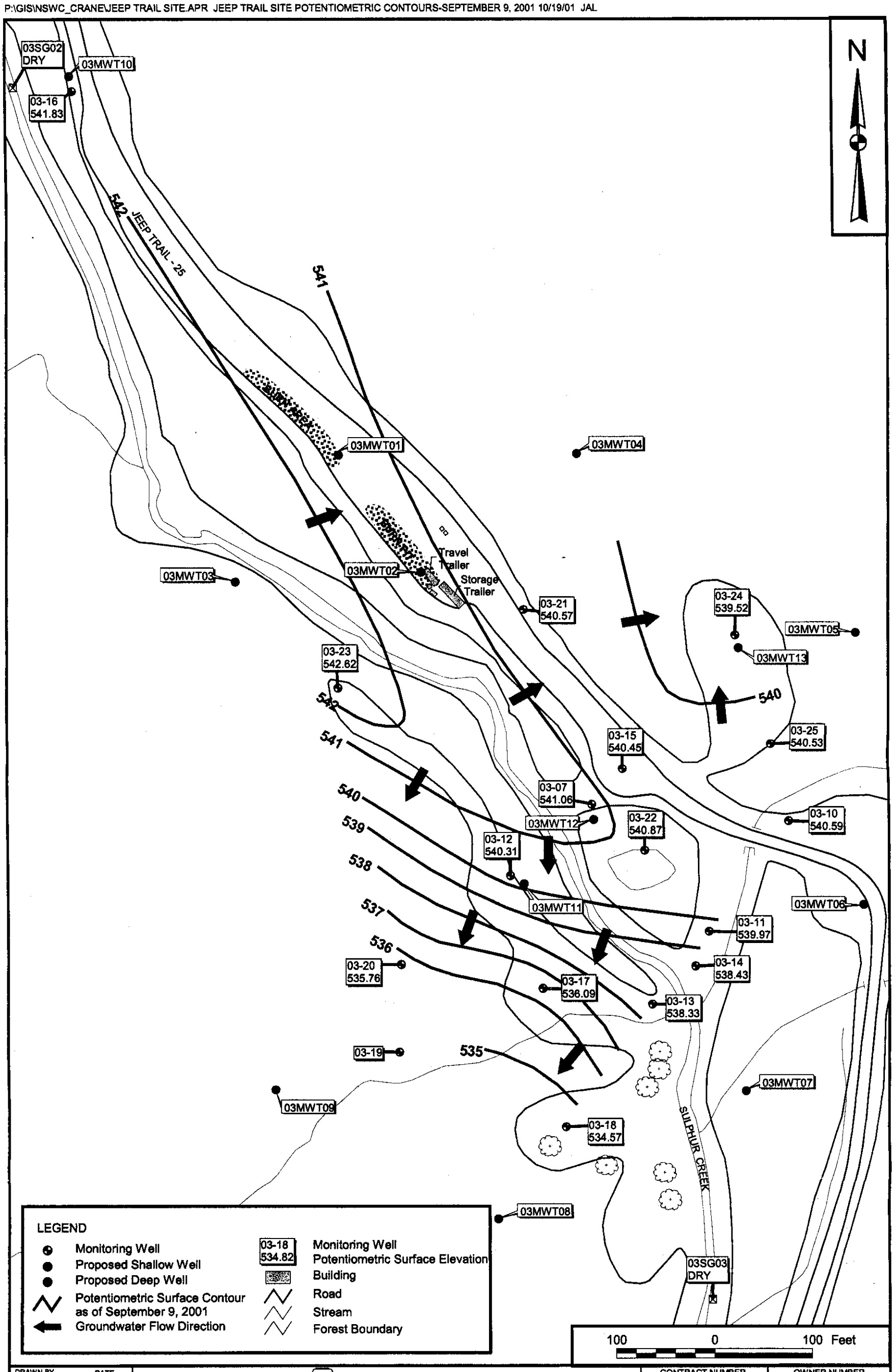
COST/SCHEDULE-AREA		JEEP TRAIL SITE POTENTIOMETRIC SURFACE CONTOURS NAVAL SURFACE WARFARE CENTER CRANE, INDIANA	APPROVED BY: — / DATE: —
SCALE: AS NOTED			DRAWING NO.: FIGURE 4 / REV: 0

P:\GIS\NSWC_CRANE\JEEP TRAIL SITE.APR JEEP TRAIL SITE POTENTIOMETRIC CONTOURS-SEPTEMBER 9, 2001 10/19/01 JAL



DRAWN BY J. LAMEY	DATE 10/19/01	Tetra Tech NUS, Inc.	CONTRACT NUMBER 3960 / OWNER NUMBER CTO 0159
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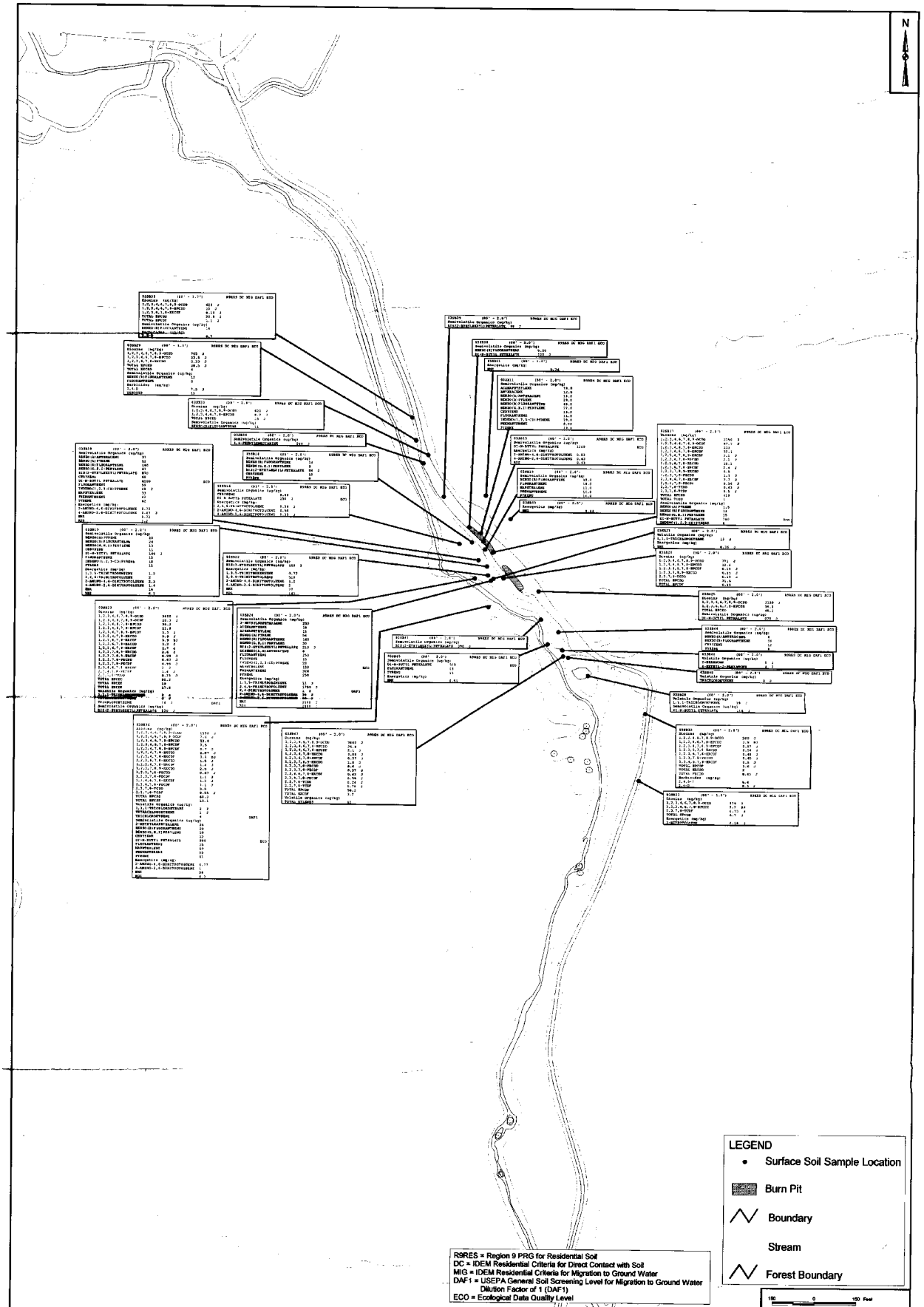
SCALE AS NOTED			DRAWING NO. FIGURE 5 / REV 0



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K. PEILA	01/13/02
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COST/SCHEDULE-AREA	
SCALE	AS NOTED

Tetra Tech NUS, Inc.

POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SURFACE SOIL
JEEP TRAIL
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

CONTRACT NO.	OWNER NO.
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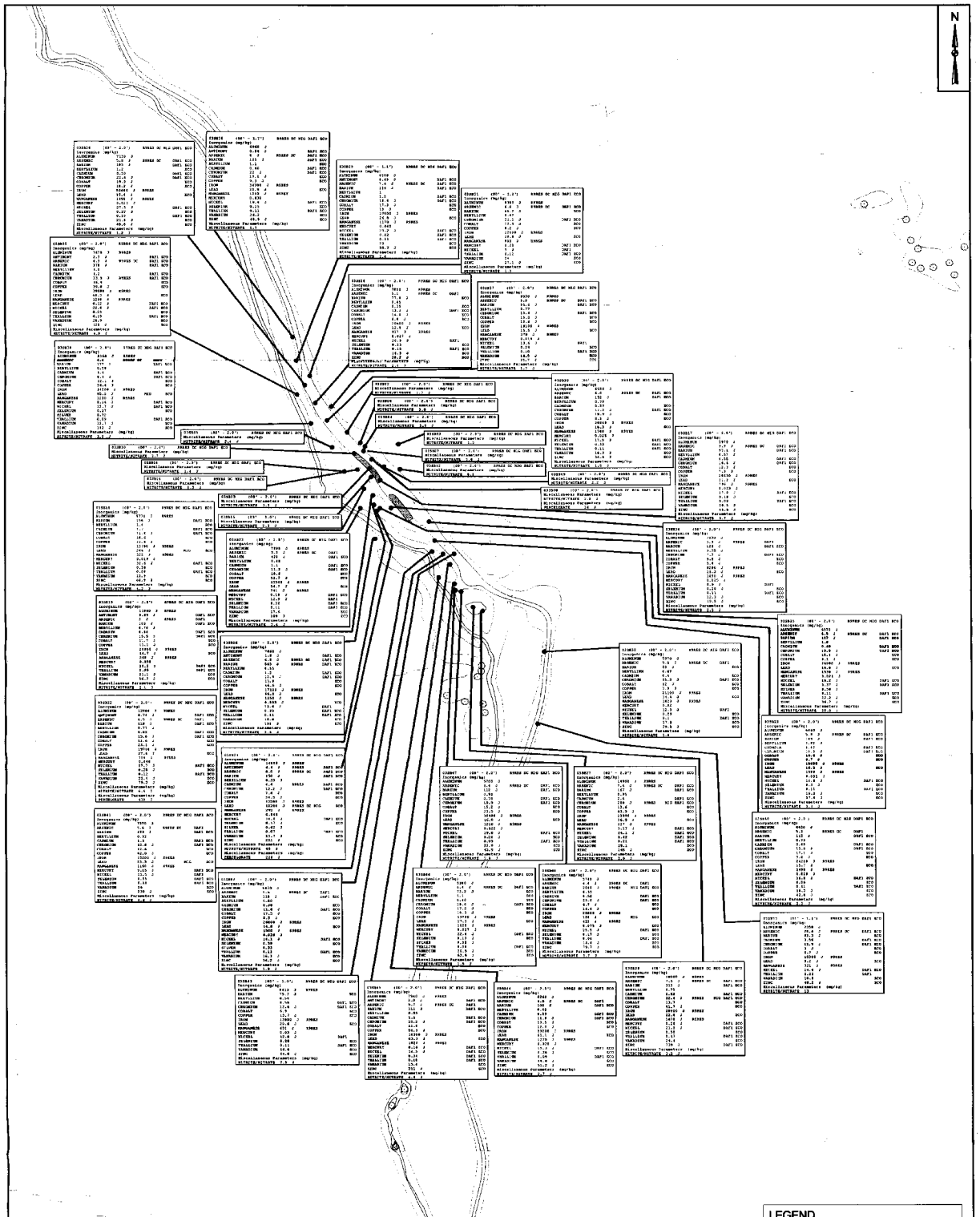
FIGURE 6	0



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COST/SCHEDULE AREA:	
SCALE: AS NOTED	

Tetra Tech NUS, Inc.

POSITIVE DETECTIONS OF INORGANIC COMPOUNDS IN SURFACE SOIL
JEEP TRAIL
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

CONTRACT NO.	OWNER NO.
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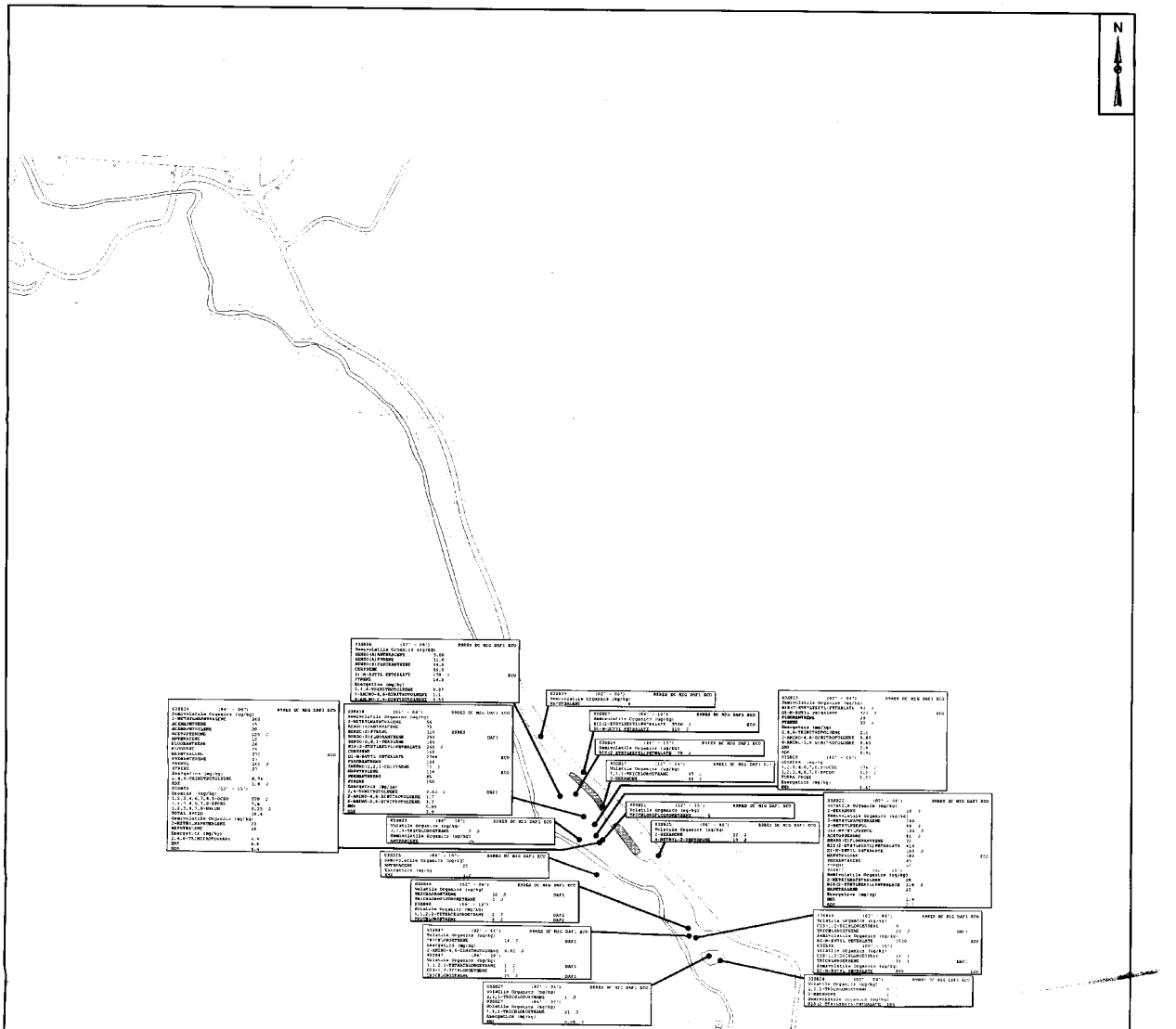
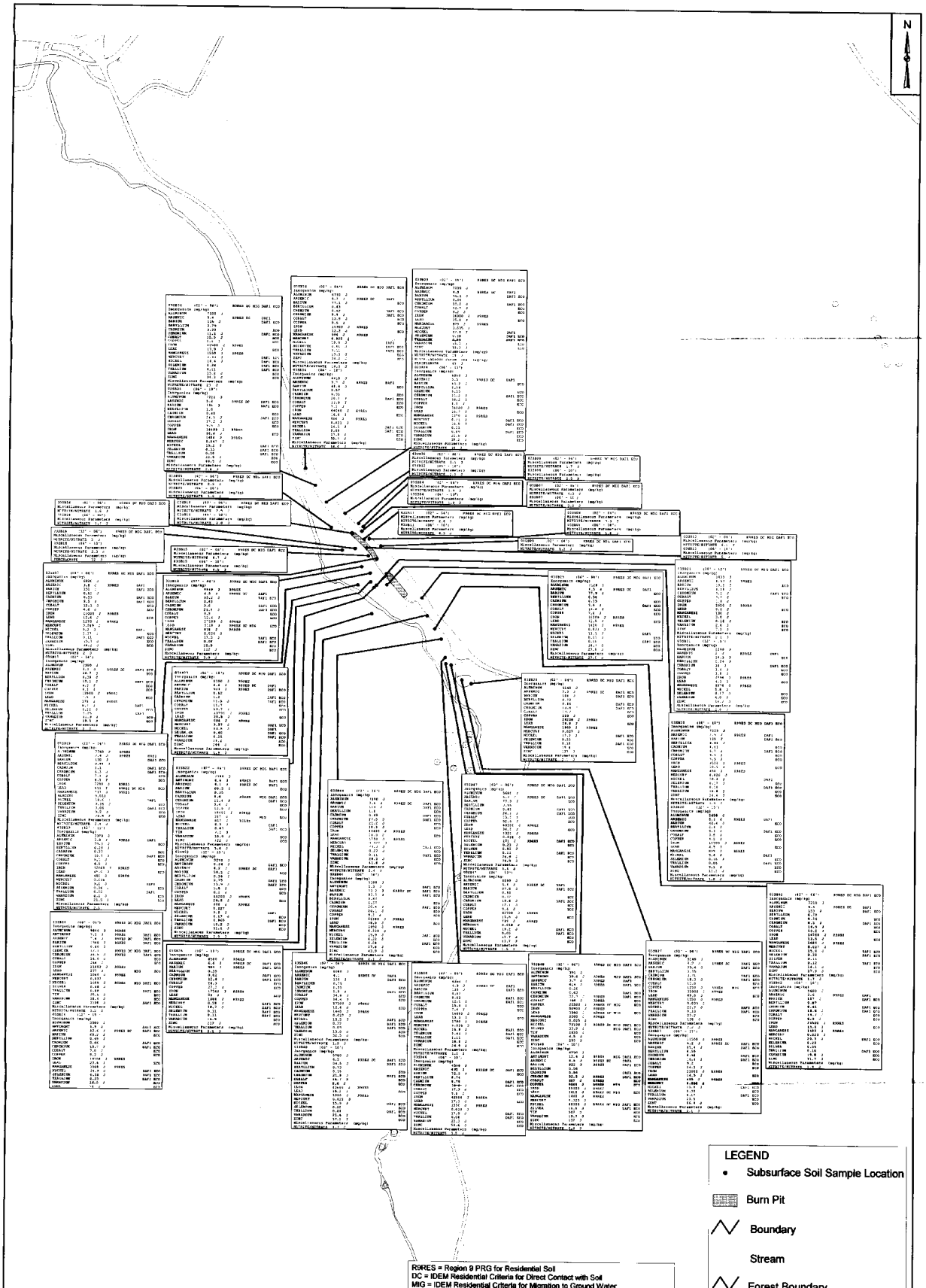


DRAWN BY: K. PEILA DATE: 01/10/02	Tetra Tech NUS, Inc.	POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SUBSURFACE SOIL JEEP TRAIL NAVAL SURFACE WARFARE CENTER CRANE, INDIANA	CONTRACT NO. / OWNER NO.
CHECKED BY: DATE:			APPROVED BY: DATE:
COST/SCHEDULE AREA:			APPROVED BY: DATE:
SCALE: AS NOTED			DRAWING NO.: FIGURE 6 / REV.: 0



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K. PEILA	01/10/02
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SCALE	
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Tetra Tech NUS, Inc.

POSITIVE DETECTIONS OF INORGANIC COMPOUNDS IN SUBSURFACE SOIL
JEEP TRAIL
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

CONTRACT NO.	OWNER NO.
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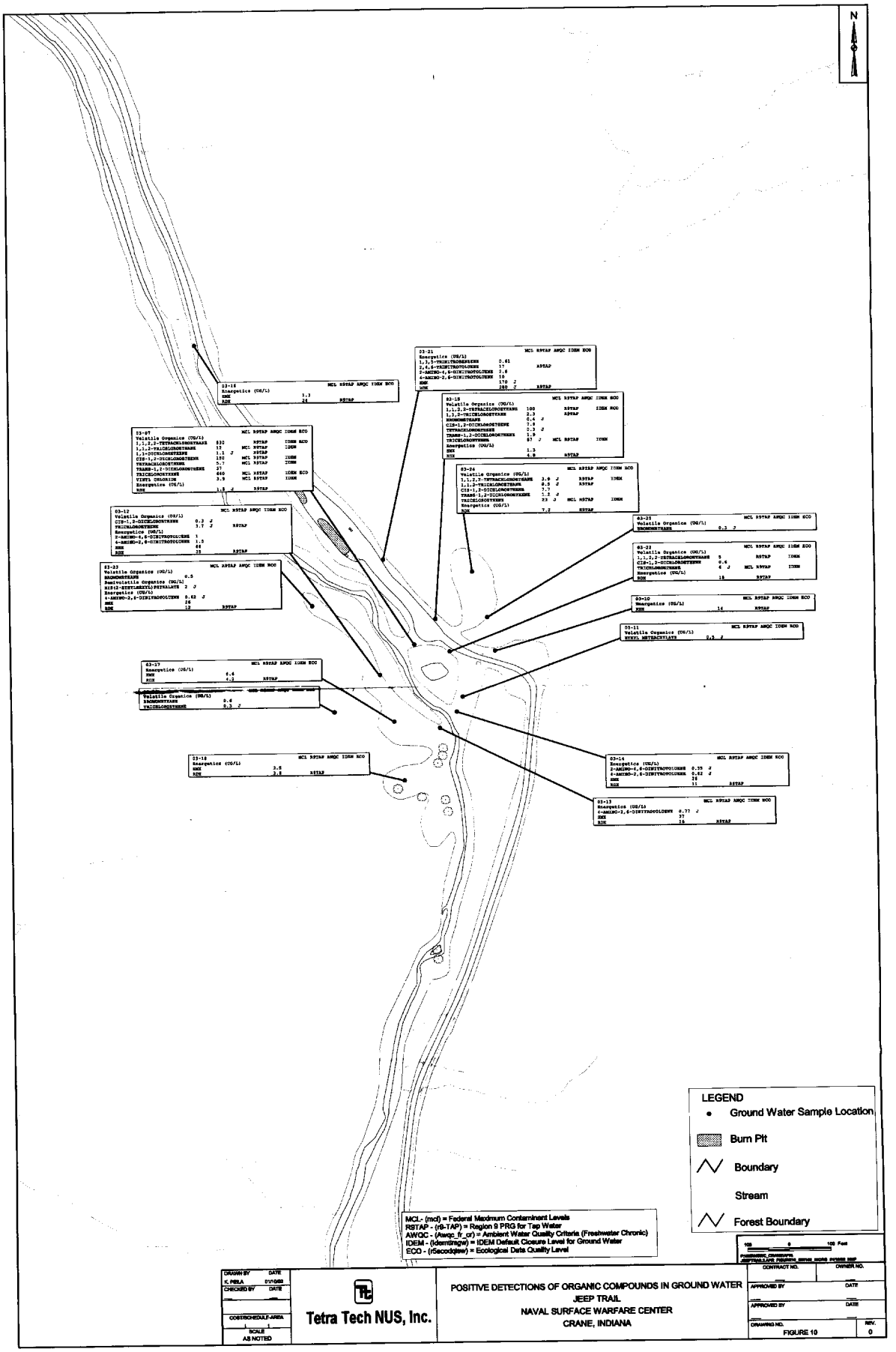
FIGURE 9	0


N
03-16
Energetics (UG/L)
RDX 24 RSTAP
03-21
Energetics (UG/L)
1,3,5-TRINITROBENZENE 0.61
2,4,6-TRINITROTOLUENE 17 RSTAP
2-AMINO-4,6-DINITROTOLUENE 2.6
4-AMINO-2,6-DINITROTOLUENE 15
RDX 170 J
HMX 280 J RSTAP
03-18
Volatile Organics (UG/L)
1,1,2,2-TETRACHLOROETHANE 100 RSTAP IDEM ECO
1,1,2-TRICHLOROETHANE 2.9 RSTAP
BROMOMETHANE 0.4 J
CIS-1,2-DICHLOROETHENE 3.6
TETRACHLOROETHENE 1.9 J
TRANS-1,2-DICHLOROETHENE 17
TRICHLOROETHENE 97 J MCL RSTAP IDEM
Energetics (UG/L)
HMX 1.3
RDX 4.9 RSTAP
03-97
Volatile Organics (UG/L)
1,1,2,2-TETRACHLOROETHANE 530 RSTAP IDEM ECO
1,1,2-TRICHLOROETHANE 15 MCL RSTAP IDEM
1,1-DICHLOROETHENE 1.1 J RSTAP
CIS-1,2-DICHLOROETHENE 150 MCL RSTAP IDEM
TETRACHLOROETHENE 5.7 MCL RSTAP IDEM
TRANS-1,2-DICHLOROETHENE 27
TRICHLOROETHENE 660 MCL RSTAP IDEM ECO
VINYL CHLORIDE 3.9 MCL RSTAP IDEM
Energetics (UG/L)
RDX 1.8 J RSTAP
03-24
Volatile Organics (UG/L)
1,1,2,2-TETRACHLOROETHANE 3.8 J RSTAP IDEM
1,1,2-TRICHLOROETHANE 0.5 J RSTAP
CIS-1,2-DICHLOROETHENE 7.7
TRANS-1,2-DICHLOROETHENE 1.2 J
TRICHLOROETHENE 23 J MCL RSTAP IDEM
Energetics (UG/L)
RDX 7.2 RSTAP
03-12
Volatile Organics (UG/L)
CIS-1,2-DICHLOROETHENE 0.3 J
TRICHLOROETHENE 3.7 J RSTAP
Energetics (UG/L)
2-AMINO-4,6-DINITROTOLUENE 1
4-AMINO-2,6-DINITROTOLUENE 1.5
HMX 46
RDX 35 RSTAP
03-23
Volatile Organics (UG/L)
BROMOMETHANE 0.5
Semivolatile Organics (UG/L)
BIS(2-ETHYLHEXYL) PHTHALATE 2 J
Energetics (UG/L)
4-AMINO-2,6-DINITROTOLUENE 0.69 J
HMX 26
RDX 12 RSTAP
03-25
Volatile Organics (UG/L)
BROMOMETHANE 0.3 J
03-22
Volatile Organics (UG/L)
1,1,2,2-TETRACHLOROETHANE 5 RSTAP IDEM
CIS-1,2-DICHLOROETHENE 0.6
TRICHLOROETHENE 6 J MCL RSTAP IDEM
Energetics (UG/L)
RDX 15 RSTAP
03-10
Energetics (UG/L)
RDX 16 RSTAP
03-11
Volatile Organics (UG/L)
METHYL METHACRYLATE 0.5 J
03-17
Energetics (UG/L)
HMX 6.4
RDX 4.2 RSTAP
Volatile Organics (UG/L)
BROMOMETHANE 0.6
TRICHLOROETHENE 0.3 J
03-15
Energetics (UG/L)
HMX 3.5
RDX 3.8 RSTAP
03-14
Energetics (UG/L)
2-AMINO-4,6-DINITROTOLUENE 0.35 J
4-AMINO-2,6-DINITROTOLUENE 0.62 J
HMX 26
RDX 11 RSTAP
03-13
Energetics (UG/L)
4-AMINO-2,6-DINITROTOLUENE 0.77 J
HMX 37
RDX 16 RSTAP
LEGEND
Ground Water Sample Location
Burn Pit
Boundary
Stream
Forest Boundary
MCL- (mcl) = Federal Maximum Contaminant Levels
RSTAP - (r9-TAP) = Region 9 PRG for Tap Water
AWQC - (Awqc_fr_cr) = Ambient Water Quality Criteria (Freshwater Chronic)
IDEM - (Idemtrigw) = IDEM Default Closure Level for Ground Water
ECO - (rSecodqtow) = Ecological Data Quality Level
100 0 100 Feet
DRAWN BY K. PIRLA DATE 01/08/03
CHECKED BY DATE
COST/SCHEDULE-AREA
SCALE AS NOTED
Tetra Tech NUS, Inc.
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN GROUND WATER
JEEP TRAIL
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA
CONTRACT NO.
OWNER NO.
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DATE
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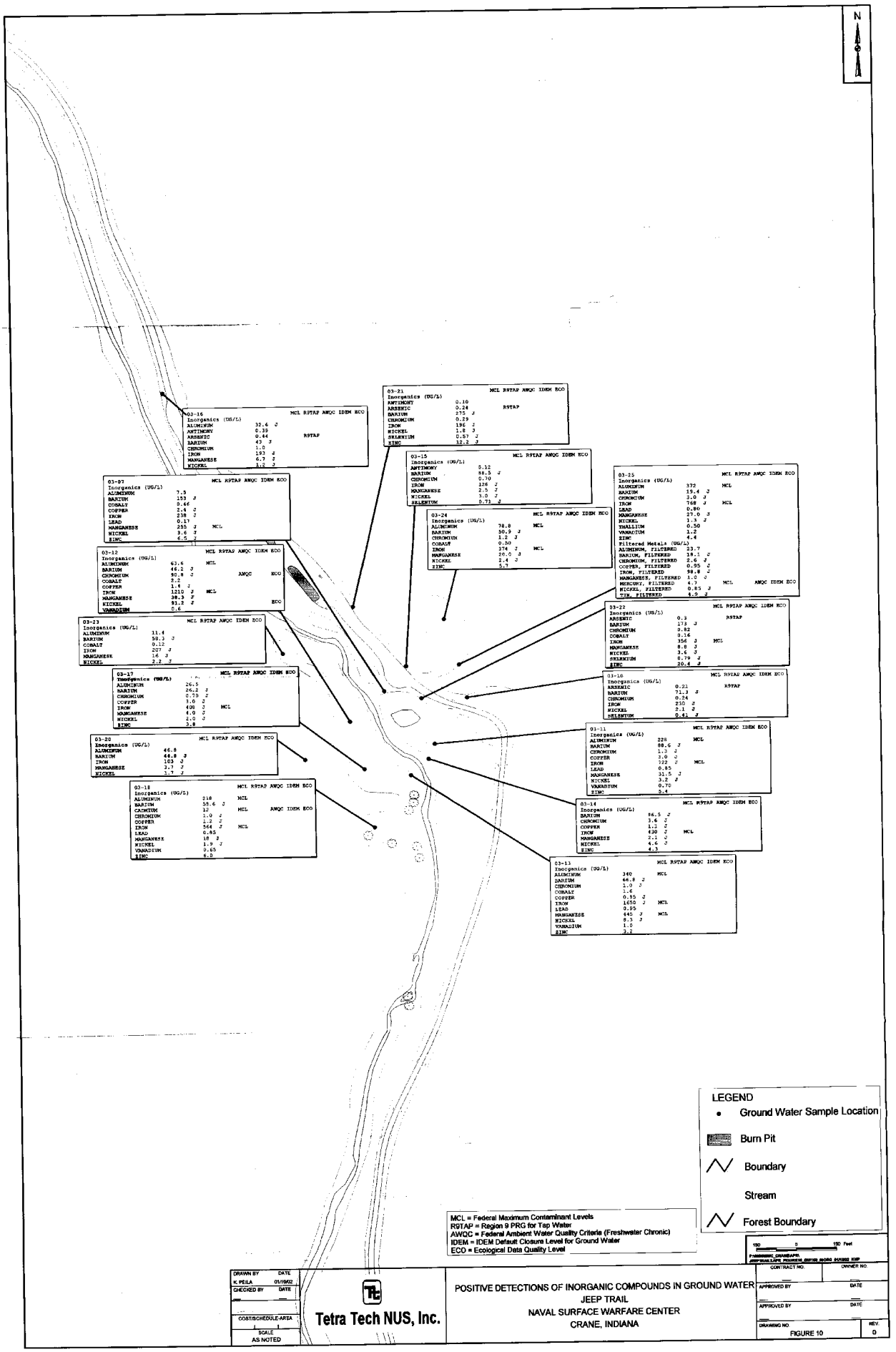
FIGURE 10
REV. 0


N
03-16
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 32.6 J
ANTIMONY 0.39
ARSENIC 0.44 RSTAP
BARIUM 43 J
CHROMIUM 1.0
IRON 193 J
MANGANESE 6.7 J
NICKEL 1.2 J
03-21
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ANTIMONY 0.10
ARSENIC 0.24 RSTAP
BARIUM 275 J
CHROMIUM 0.29
IRON 196 J
NICKEL 1.8 J
SELENIUM 0.57 J
ZINC 12.2 J
03-15
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ANTIMONY 0.12
BARIUM 88.5 J
CHROMIUM 0.70
IRON 126 J
MANGANESE 2.5 J
NICKEL 1.0 J
SELENIUM 0.73 J
03-25
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 372 MCL
BARIUM 19.4 J
CHROMIUM 3.0 J
IRON 768 J MCL
LEAD 0.80
MANGANESE 27.0 J
NICKEL 1.3 J
THALLIUM 0.50
VANADIUM 1.2
ZINC 4.4
Filtered Metals (UG/L)
ALUMINUM, FILTERED 23.7
BARIUM, FILTERED 18.1 J
CHROMIUM, FILTERED 2.6 J
COPPER, FILTERED 0.95 J
IRON, FILTERED 98.8 J
MANGANESE, FILTERED 1.0 J
MERCURY, FILTERED 4.7 MCL AWQC IDEM ECO
NICKEL, FILTERED 0.85 J
ZINC, FILTERED 4.9 J
03-07
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 7.5
BARIUM 153 J
COBALT 0.46
COPPER 2.4 J
IRON 238 J
LEAD 0.17
MANGANESE 255 J MCL
NICKEL 3.6 J
ZINC 6.5 J
03-24
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 78.8 MCL
BARIUM 50.9 J
CHROMIUM 1.2 J
COBALT 0.30
IRON 374 J MCL
MANGANESE 26.0 J
NICKEL 2.4 J
ZINC 5.7
03-12
Inorganics (UG/L) MCL
ALUMINUM 63.6
BARIUM 46.2 J
CHROMIUM 80.8 J AWQC ECO
COBALT 2.2
COPPER 1.4 J
IRON 1210 J MCL
MANGANESE 38.3 J
NICKEL 81.2 J ECO
VANADIUM 0.6
03-22
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ARSENIC 0.3 RSTAP
BARIUM 173 J
CHROMIUM 0.82
COBALT 0.16
IRON 356 J MCL
MANGANESE 8.8 J
NICKEL 3.6 J
SELENIUM 0.79 J
ZINC 20.4 J
03-23
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 11.4
BARIUM 58.3 J
COBALT 0.12
IRON 207 J
MANGANESE 16 J
NICKEL 2.2 J
03-10
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ARSENIC 0.21 RSTAP
BARIUM 71.3 J
CHROMIUM 0.24
IRON 230 J
NICKEL 2.1 J
SELENIUM 0.61 J
03-17
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 26.5
BARIUM 26.2 J
CHROMIUM 0.70 J
COPPER 3.0 J
IRON 436 J MCL
MANGANESE 4.0 J
NICKEL 2.0 J
ZINC 3.8
03-11
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 228 MCL
BARIUM 88.6 J
CHROMIUM 1.3 J
COPPER 3.0 J
IRON 722 J MCL
LEAD 0.85
MANGANESE 31.5 J
NICKEL 3.2 J
VANADIUM 0.79
ZINC 5.4
03-20
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 46.8
BARIUM 44.8 J
IRON 103 J
MANGANESE 3.7 J
NICKEL 1.7 J
03-14
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
BARIUM 86.5 J
CHROMIUM 3.6 J
COPPER 1.1 J
IRON 430 J MCL
MANGANESE 2.1 J
NICKEL 4.6 J
ZINC 4.3
03-18
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 518 MCL
BARIUM 55.6 J
CADMIUM 12 MCL AWQC IDEM ECO
CHROMIUM 1.0 J
COPPER 1.2 J
IRON 564 J MCL
LEAD 0.85
MANGANESE 10 J
NICKEL 1.9 J
VANADIUM 0.65
ZINC 6.0
03-13
Inorganics (UG/L) MCL RSTAP AWQC IDEM ECO
ALUMINUM 340 MCL
BARIUM 66.8 J
CHROMIUM 1.0 J
COBALT 1.6
COPPER 0.95 J
IRON 1650 J MCL
LEAD 0.95
MANGANESE 440 J MCL
NICKEL 3.3 J
VANADIUM 1.0
ZINC 3.2
LEGEND
Ground Water Sample Location
Burn Pit
Boundary
Stream
Forest Boundary
MCL = Federal Maximum Contaminant Levels
RSTAP = Region 9 PRG for Tap Water
AWQC = Federal Ambient Water Quality Criteria (Freshwater Chronic)
IDEM = IDEM Default Closure Level for Ground Water
ECO = Ecological Data Quality Level
150 0 150 Feet
DRAWN BY K.PEILA DATE 01/19/02
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COST/SCHEDULE-AREA
SCALE AS NOTED
Tetra Tech NUS, Inc.
POSITIVE DETECTIONS OF INORGANIC COMPOUNDS IN GROUND WATER
JEEP TRAIL
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA
CONTRACT NO.
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APPROVED BY DATE
APPROVED BY DATE
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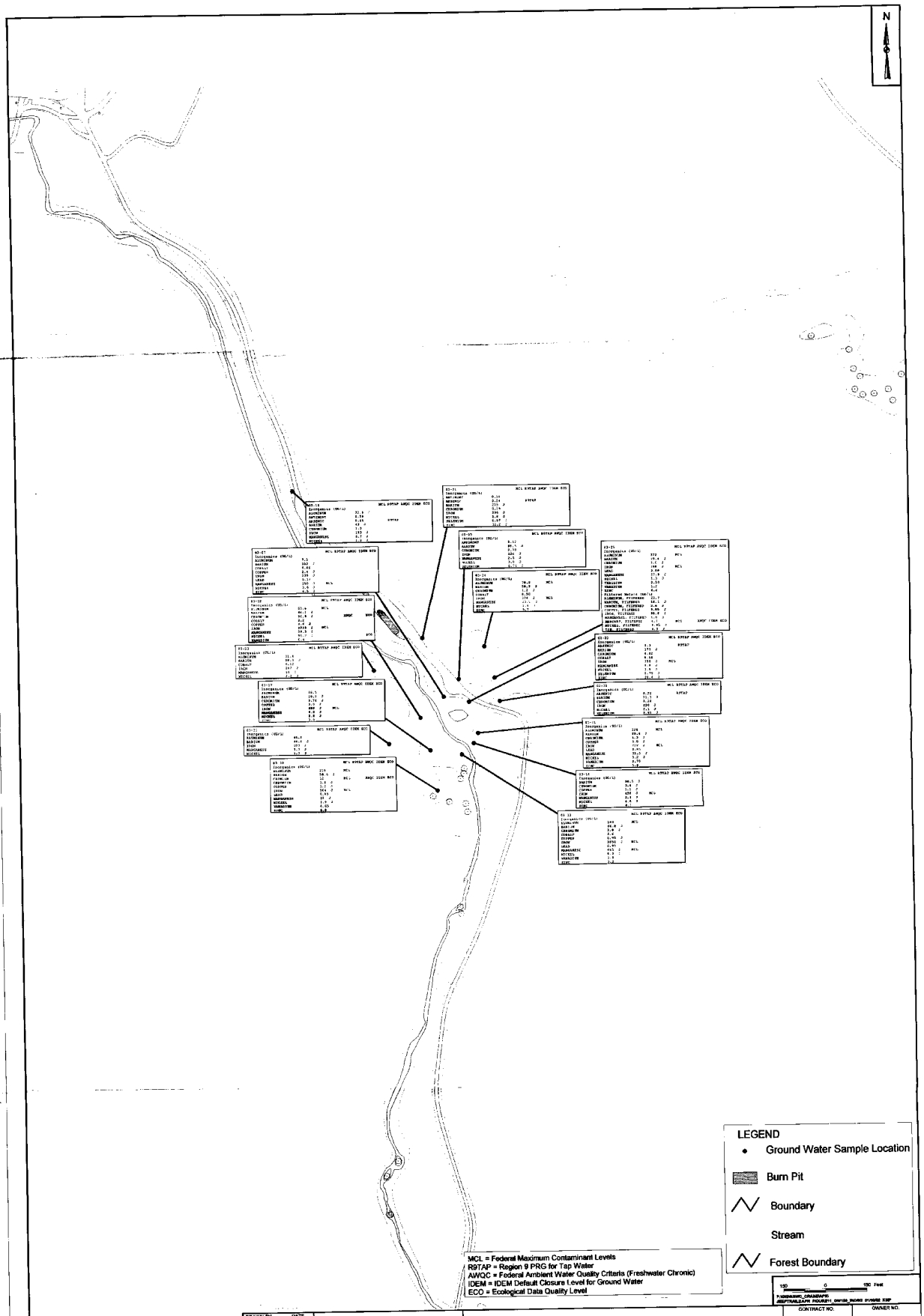
REV. 0



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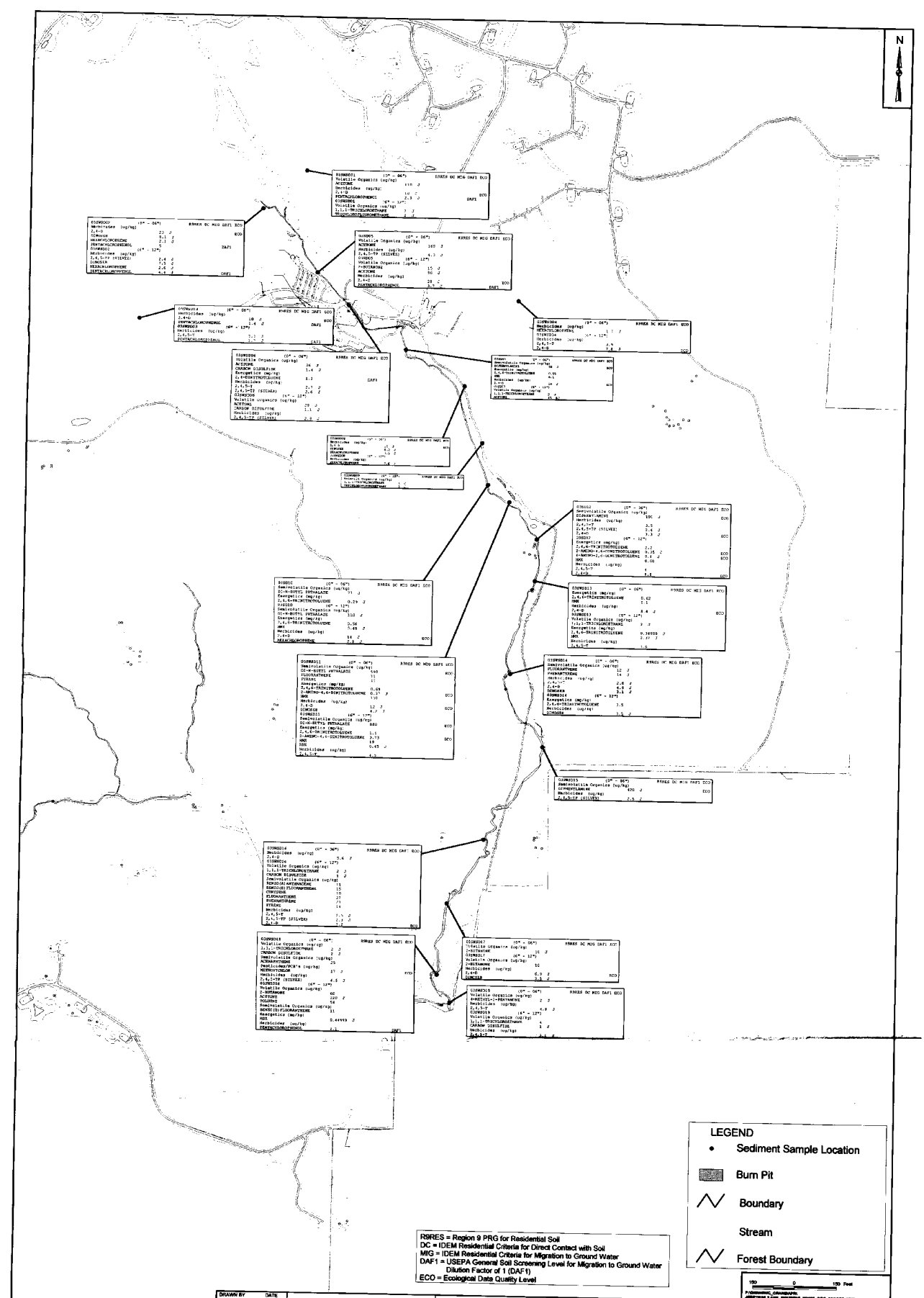
COST/SCHEDULE-AREA:			APPROVED BY: DATE:
SCALE: AS NOTED			APPROVED BY: DATE:
			DRAWING NO.: FIGURE 11 REV.: 0



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SCALE: AS NOTED	

Tetra Tech NUS, Inc.

POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SEDIMENT
JEEP TRAIL
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

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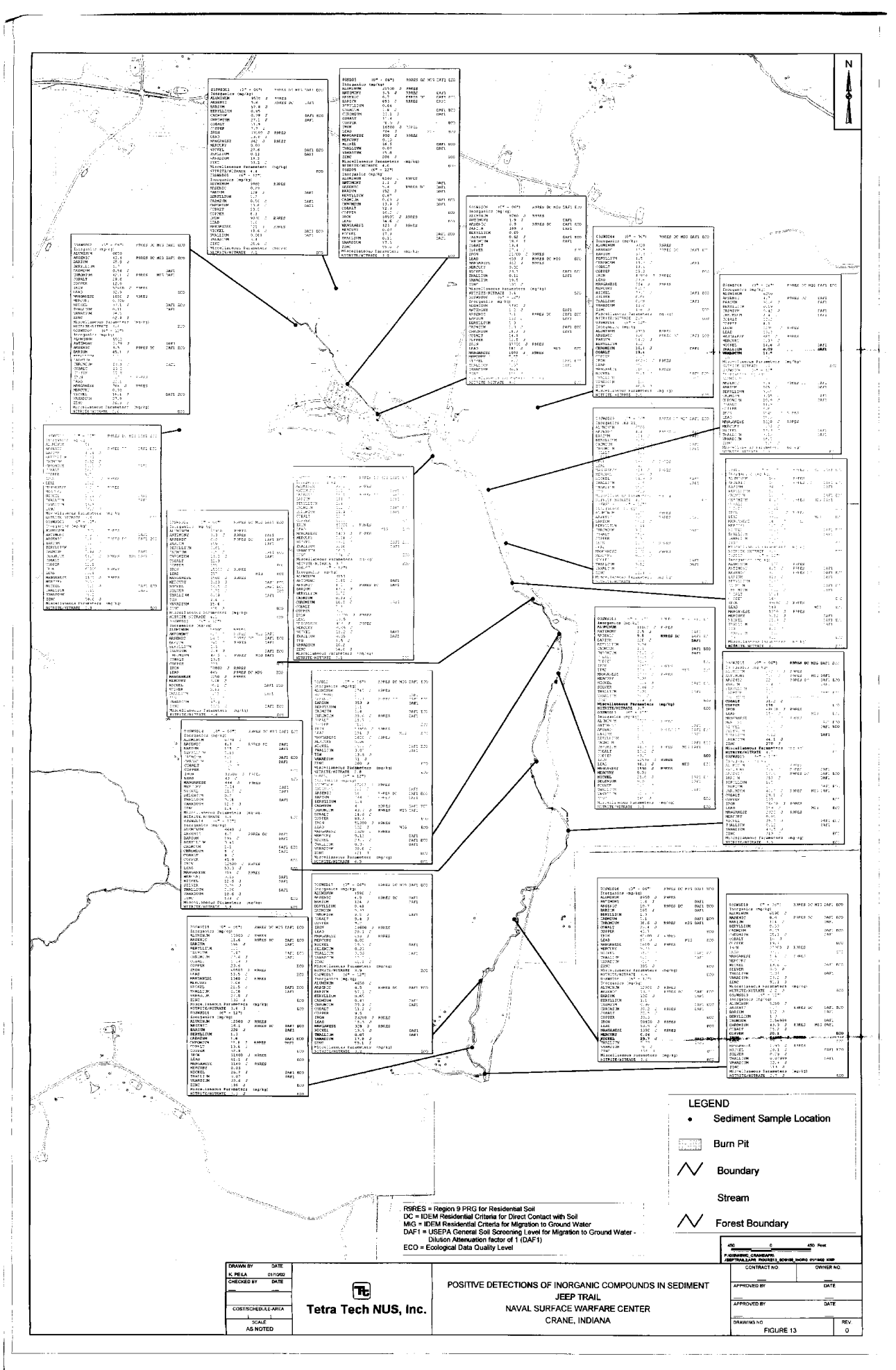
N
LEGEND
Sediment Sample Location
Burn Pit
Boundary
Stream
Forest Boundary
R9RES = Region 9 PRG for Residential Soil
DC = IDEM Residential Criteria for Direct Contact with Soil
MiG = IDEM Residential Criteria for Migration to Ground Water
DAF1 = USEPA General Soil Screening Level for Migration to Ground Water - Dilution Attenuation factor of 1 (DAF1)
ECO = Ecological Data Quality Level
450 0 450 Feet
P:\GRAPHICS_CRANE\APR_JEEP\TRAIL\JEEP_TRAIL_SOIL100_INORG 01/10/02 KMP
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COST/SCHEDULE-AREA
SCALE
AS NOTED
Tetra Tech NUS, Inc.
POSITIVE DETECTIONS OF INORGANIC COMPOUNDS IN SEDIMENT
JEEP TRAIL
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA
CONTRACT NO.
OWNER NO.
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DATE
APPROVED BY
DATE
DRAWING NO.
FIGURE 13
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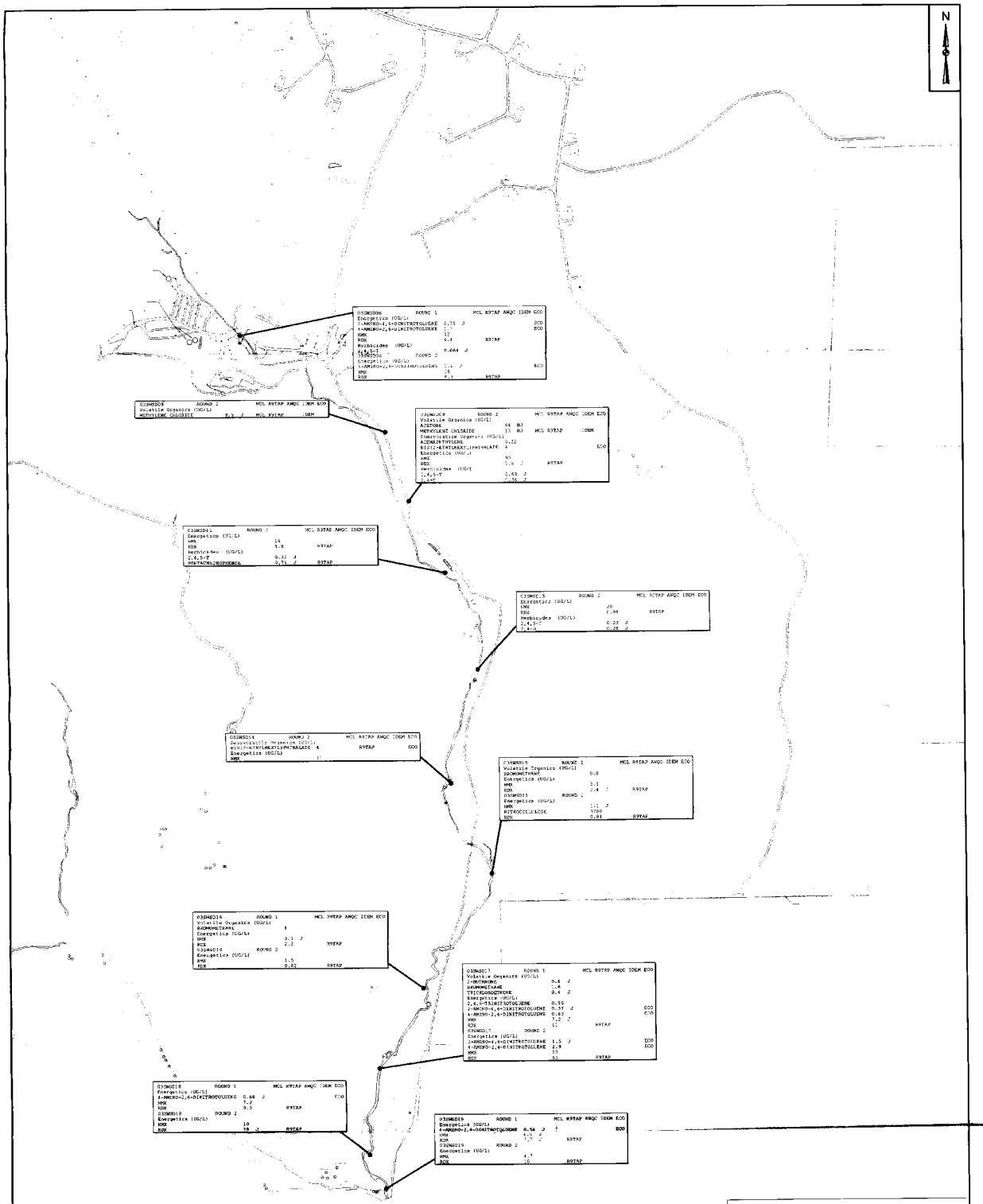

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SCALE: AS NOTED		

POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN SURFACE WATER - ROUNDS 1 & 2
JEEP TRAIL
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA

CONTRACT NO.	OWNER NO.
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DRAWING NO. FIGURE 14	REV 0

N
LEGEND
Surface Water Sample Location
Burn Pit
Boundary
Stream
Forest Boundary
MCL = Federal Maximum Contaminant Levels
R9TAP = Region 9 PRG for Tap Water
AWQC = Federal Ambient Water Quality Criteria (Freshwater Chronic)
IDEM = IDEM Default Closure Level for Ground Water
ECO = Ecological Data Quality Level
400 0 400 Feet
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SCALE AS NOTED
Tetra Tech NUS, Inc.
POSITIVE DETECTIONS OF INORGANIC COMPOUNDS IN SURFACE WATER
ROUNDS 1 & 2
JEEP TRAIL
NAVAL SURFACE WARFARE CENTER
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FIGURE 15
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TETRA TECH NUS, INC.
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(412) 921-7090 ▪ FAX (412) 921-4040 ▪ www.tetratech.com

PITT-01-2-036

January 30, 2002

Project Number N3960

Mr. William Gates (Code ES324)
Commander, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive, P.O. Box 190010
North Charleston, SC 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0159

Subject: Final Meeting Minutes for October 31, 2001 Meeting on Ammunition Burning Grounds Resubmitted of Figure 10.

Dear Mr. Gates:

Several investigations have been conducted at the Ammunition Burning Grounds including the Jeep Trail and Little Sulphur Creek. A meeting was held at NSWC Crane on October 31, 2001 regarding the adequacy of existing data collected from these investigations for risk assessment and corrective measures studies.

Final meeting minutes including supporting figures were provided to you. Figure 10, which was part of the package, is incorrect. Figure 10 should show positive detection of organics in ground water. The correct Figure is enclosed. Please remove and discard the existing Figure 10 and replace with the attached Figure 10 labeled "Positive Detections of Organics in Ground Water Jeep Trail."

Please contact Ralph Basinski at 412-921-8308 (e-mail basinskir@ttnus.com)with any questions or comments.

Sincerely,

Ralph R. Basinski
Task Order Manager

RRB/ads

Enclosures

C: Mr. Tom Brent, NSWC Crane (2 copies of letter and figure)
Ms. Debbie Wroblewski, TtNUS, Inc. (letter only)
Mr. Mark Perry, TtNUS, Inc. (1 copy including figure)
Mr. Tom Johnston, TtNUS, Inc. (1 copy letter)
Mr. Ralph Basinski, TtNUS, Inc. (1 copy including figure)
Mr. Aaron Bernhardt, TtNUS, Inc. (1 copy including figure)
Mr. Matt Cochran (1copy letter)
Ms. Christine Freeman (1 copy including figures)
Mr. Peter Ramanauskar (3 copies including figure)
Dr. James May, US ACE WES (1 copy including figure)
Crane Library (1 copy including figure)
File Copy-CTO 205 (1 copy including figure)