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NSTC GREAT LAKES, IL
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LETTER REPORT REGARDING LEAKING UNDERGROUND STORAGE TANK TECHNICAL FILE AND SUPERFUND TECHNICAL FILE NS GREAT LAKES IL
5/2/2011
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

414 771 4490 579

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

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James R. Thompson Center, 100 West Randolph, Suite 11-300, Chicago, IL 60601 • (312) 814-6026

PAT QUINN, GOVERNOR DOUGLAS P. SCOTT, DIRECTOR

(217) 557-8155
(FAX) 782-3258

May 2, 2011

Engineering Field Activity, Midwest
Attn: Mr. Ben Simes
Building 1A, Code 931
201 Decatur Avenue
Great Lakes, Illinois 60088-5600

Re: LPC # 0971255004 -- Lake County
Naval Station Great Lakes – Building 329
Great Lakes, Illinois
IEMA Incident Nos. 922928 and 990712
Leaking UST Technical File and Superfund Technical File

Dear Mr. Simes:

The Illinois Environmental Protection Agency (Illinois EPA or Agency) is in receipt of the Navy's Corrective Action Completion Report, Building 329, Great Lakes Naval Training Center, Great Lakes, Illinois. The Completion Report was generated by Bloom Companies, LLC and was dated February 2011. It was received at the Agency on April 25, 2011. In the submittal the Navy provides information regarding the removal of one 1200 gallon diesel underground storage tank (UST) and one 500 gallon used oil UST and requests a No Further Remediation (NFR) Letter be issued based on the submitted information. The Illinois EPA has reviewed the Completion Report and has generated the following comments.

1) On the first page of the Leaking Underground Storage Tank Program form the IEPA LPC # is listed as 0978995112. Although it appears this way in the Agency's internal database, this is not the correct number. The IEPA LPC# should be 0971255004.

2) The first page also lists the incident number as 990712. Within the report it is documented that there were actually two different numbers assigned to this site with the second number being listed as 922928. As such, in order to close this site out, both numbers will have to be listed in all appropriate locations throughout the report. There should also be some discussion to explain the issuance of both numbers and that this report intends to close out both incidents, if that is the case.

3) In the List of Acronyms, the definition of TACO should be Tiered Approach to Corrective Action Objectives.

4) Section 2.4 discusses site hydrogeology and states the groundwater flow direction. A generic hydraulic conductivity value is listed based upon the referenced document. There is no mention of any recent testing to determine the hydraulic conductivity at this site. Were there no slug tests or pump tests conducted? This information would be helpful in determining which groundwater screening values to use. It is noted that in Section 4.1 a groundwater gradient is listed that was based upon groundwater elevations and survey data. The Agency would recommend that either slug tests or pump tests be conducted to determine the actual hydraulic conductivity on the site.

5) In Section 3.1, it states the boring locations are shown in Figure G-106 in Appendix A. That figure has no boring locations shown on it at all. Please revise as necessary.

6) In Section 3.3 there is discussion of the chromium exceedances in the soil samples. Upon reviewing the data listed in Table 2, several issues/questions arise. First, the inorganic screening values for the Soil Component of the Groundwater Ingestion Exposure Route should be listed in mg/L rather than mg/Kg. If the reported concentrations are actually in mg/Kg, they cannot be directly compared to those screening values. The inorganic data must be generated via analysis by TCLP or SPLP in order to be compared to those values. Were they? Second, if the reported data were not generated via those methods, they might be compared to the pH Specific Soil Remediation Objectives for Inorganics for the Soil Component of the Groundwater Ingestion Route (35 IAC 742, Appendix B, Table D), if there is pH data available. In this case, as long as the soil pH is between 4.5 and 9.0, all of the chromium concentrations would be at or below the listed remediation objectives in that table. Finally, it is mentioned that the exceedances are within one standard deviation of the background level and that there was no pattern that would indicate a source at the site. While that may be the case, it may well be that those contaminants are related to the UST and have simply been transported away, diluted, or degraded in the years since the release.

7) In Section 4.1 it states that there are exceedances of the Groundwater Remediation Objectives for Class I Groundwater. With no direct hydraulic conductivity values for this site, the Class I values are the appropriate screening levels. However, it should be noted that if the groundwater had been tested and determined to be Class II, there would be no exceedances of the screening values.

8) In Section 5.0 in the last paragraph it states that "the comparison of total to dissolved lead shows evidence for higher concentrations from the total lead due to the turbidity in the water and high background lead levels in the soil." The Agency can agree that

turbidity in the water may have an effect on the detected lead levels in the groundwater. However, the mention of high background lead levels in the soil is inaccurate. The concentrations of lead reported for the soil samples are not high and in fact are well below the listed background value for lead in Illinois.

9) The Agency would also ask that the Navy include the common street address of Building 3216B within the revised Completion Report.

The Agency cannot make a determination to close out these Leaking UST Incidents until the above-listed comments have been addressed. Once they have been properly addressed, the report revised accordingly, and a revised report submitted for review, the Agency will then determine whether a No Further Remediation Letter is appropriate.

If you have any questions regarding anything in this letter or require additional information, please contact me at (217) 557-8155 or by electronic mail at *Brian.Conrath@illinois.gov*.

In accordance with Public Act 96-0603, which went into effect on August 24, 2009, any person who knowingly makes a false, fictitious, or fraudulent material statement, orally or in writing, to the Illinois EPA commits a Class 4 felony. A second or subsequent offense after conviction is a Class 3 felony. (415 ILCS 5/44(h))

Sincerely,

Brian A. Conrath

Brian A. Conrath
Remedial Project Manager
Federal Facilities Unit
Federal Site Remediation Section
Bureau of Land

BAC:rac:H\GLNTC\LUSTs\B329CACRrvw

cc: Tom Henninger, Leaking UST

Illinois Environmental Protection Agency

Bureau of Land • 1021 N. Grand Avenue E. • P.O. Box 19276 • Springfield • Illinois • 62794-9276

The Agency is authorized to require this information under Section 4 and Title XVI of the Environmental Protection Act (415 ILCS 5/4, 5/57 – 57.17). Failure to disclose this information may result in a civil penalty of not to exceed $50,000.00 for the violation and an additional civil penalty of not to exceed $10,000.00 for each day during which the violation continues (415 ILCS 5/42). Any person who knowingly makes a false material statement or representation, orally or in writing, in any label, manifest, record, report, permit, or license, or other document filed, maintained or used for the purpose of compliance with Title XVI commits a Class 4 felony. Any second or subsequent offense after conviction hereunder is a Class 3 felony (415 ILCS 5/44 and 57.17). This form has been approved by the Forms Management Center.

Leaking Underground Storage Tank Program
Corrective Action Completion Report

A. Site Identification

IEMA Incident # (6- or 8-digit): 990712, 922928 IEPA LPC# (10-digit): 0971255004

Site Name: UST Site 10, Building 329

Site Address (Not a P.O. Box): 2218 Sampson Street Great Lakes Naval Training Center

City: Great Lakes County: Lake County ZIP Code: 60088-5600

B. Site Information

1. Has a Corrective Action Plan been approved? ☐ Yes ☑ No

   Date of approval letter: None Required

2. This completion report is being submitted pursuant to:

   a. 35 Ill. Adm. Code 731.166 ☐

   b. 35 Ill. Adm. Code 732.300(b) ☑

   c. 35 Ill. Adm. Code 732.404 ☐

   d. 35 Ill. Adm. Code 734.345 ☐

3. Method of remediation chosen:

   a. Soil None

   b. Groundwater None

4. Quantity of contaminated media remediated and/or recovered

   a. Soil 0 yds.^{3}

   b. Groundwater 0 gals.

   c. Free Product 0 gals.

C. Remedial (Corrective) Action

1. An executive summary that identifies the overall objectives of the corrective action and the technical approach utilized to meet those objectives. The summary shall contain the following information:

   a. A brief description of the site, including but not limited to a description of the release, the applicable indicator contaminants, the contaminated media, and the extents of soil and groundwater contamination that exceeded the most stringent Tier 1 remediation objectives;

b. The major components (e.g., treatment, containment, removal) of the corrective action;

c. The scope of the problems corrected or mitigated by the corrective action; and

d. The anticipated post-corrective action uses of the site and areas immediately adjacent to the site;

2. A description of the corrective action activities conducted including:

   a. A narrative description of the field activities conducted as part of corrective action;

   b. A narrative description of the remedial actions implemented at the site and the performance of each remedial technology utilized;

   c. Documentation of sampling activities:

      i. Sample collection information;

      ii. Sample preservation and shipment information;

      iii. Analytical procedure information;

      iv. Analytical results, chain of custody and control, and laboratory certification;

      v. Field and lab blanks; and

      vi. Table(s) comparing analytical results to remediation objectives approved for the site (include sample depths, date collected, and detection limits);

   d. Soil boring logs and monitoring well construction diagrams.

3. A narrative description of any special conditions relied upon as part of corrective action including:

   a. Engineered barriers utilized:

      i. Type of barrier(s); and

      ii. Map showing location(s) and dimension(s) of barrier(s);

   b. Institutional controls utilized:

      i. Copy of fully executed institutional control(s); and

      ii. Map showing location(s) of controls;

   c. Other conditions, if any, necessary for protection of human health and safety and the environment that are related to the issuance of a No Further Remediation Letter; and

   d. Any information required regarding off-site access;

4. An analysis of the effectiveness of the corrective action that compares the confirmation sampling results to the remediation objectives approved for the site;

5. A conclusion that identifies the success in meeting the remediation objectives approved for the site;

6. Appendices containing references and data sources;

7. The water supply well survey:

   a. Map(s) showing locations of community water supply wells and other potable wells and the setback zone for each well;

   b. Map(s) showing regulated recharge areas and wellhead protection areas;

   c. Map(s) showing the current extent of groundwater contamination exceeding the most stringent Tier 1 remediation objectives;

   d. Map(s) showing the modeled extent of groundwater contamination exceeding the most stringent Tier 1 remediation objectives;

   e. Table(s) listing the setback zones for each community water supply well and other potable water supply wells;

   f. A narrative identifying each entity contacted to identify potable water supply wells, the name and title of each person contacted, and any field observations associated with any wells identified; and

   g. A certification from a Licensed Professional Engineer or Licensed Professional Geologist that the survey was conducted in accordance with the requirements and that the documentation submitted includes the information obtained as a result of the survey (certification of this report satisfies this requirement);

8. Site map(s) meeting the requirements of 35 Ill. Adm. Code 732.110(a) or 734.440.
9. Development of Tier 2 or 3 remediation objectives, if applicable:
   a. Equations used;
   b. Discussion of how input variables were determined;
   c. Map(s) depicting distances used in equation; and
   d. Calculations; and
10. Property Owner Summary form.

D. Signatures

All plans, budgets, and reports must be signed by the owner or operator and list the owner's or operator's full name, address, and telephone number.

UST Owner or Operator

Name Department of the Navy
Contact
Address
City Great Lakes
State Illinois
Zip Code 60088-5600
Phone
Signature
Date 7 JUL 11

Consultant

Company Bloom Companies, LLC
Contact Judy Fassbender
Address 10501 W. Research Drive, Ste. 100
City Milwaukee
State Wisconsin
Zip Code 53226
Phone (414) 292-4545
Signature
Date July 8, 2011

E. Certification

I certify under penalty of law that all activities that are the subject of this plan, budget, or report were conducted under my supervision or were conducted under the supervision of another Licensed Professional Engineer or Licensed Professional Geologist and reviewed by me; that this plan, budget, or report and all attachments were prepared under my supervision; that, to the best of my knowledge and belief, the work described in this plan, budget, or report has been completed in accordance with the Environmental Protection Act [415 ILCS 5], 35 Ill. Adm. Code 731, 732, or 734, and generally accepted standards and practices of my profession; and that the information presented is accurate and complete. I am aware there are significant penalties for submitting false statements or representations to the Illinois EPA, including but not limited to fines, imprisonment, or both as provided in Sections 44 and 57.17 of the Environmental Protection Act [415 ILCS 5/44 and 57.17].

Licensed Professional Engineer

Name Harold Farchmin
Company Bloom Companies, LLC
Address 10501 W. Research Drive, Ste. 100
City Milwaukee
State Wisconsin
Zip Code 53226
Phone (414)292-4515
Ill. Registration No. #062.055193
License Expiration Date 11/30/2011

L.P.E. Seal

LICENSED PROFESSIONAL ENGINEER
HAROLD J. FARCHMIN
062-055193
STATE OF ILLINOIS

Signature
Date 7-8-11

CORRECTIVE ACTION CLOSURE REPORT

UST SITE 10 CLOSURE
BUILDING 329
NAVAL STATION GREAT LAKES
2218 SAMPSON STREET
GREAT LAKES, ILLINOIS

Prepared For:

DEPARTMENT OF THE NAVY
NAVAL STATION GREAT LAKES
ENVIRONMENTAL DEPARTMENT
BUILDING 1-A, 201 DECATUR AVENUE
GREAT LAKES, ILLINOIS

CONTRACT NO. N40083-10-C-0043

Bloom Project No. BMF-1114
TolTest Project No. 23456.01

Prepared By:

Bloom Companies, LLC
10501 W. Research Drive, Suite 100
Milwaukee, WI 53226

and

1480 FORD STREET
MAUMEE, OH 43537

June 2011

CORRECTIVE ACTION CLOSURE REPORT

UST SITE 10 CLOSURE
BUILDING 329
NAVAL STATION GREAT LAKES
2218 SAMPSON STREET
GREAT LAKES, ILLINOIS

Submitted by:

Bloom Companies, LLC
10501 W. Research Drive, Suite 100
Milwaukee, WI 53226

and

TolTest, Inc.
1480 Ford Street
Maumee, Ohio 43537

TolTest, Inc. hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under this contract is complete, accurate, and complies with all requirements of the contract.

Prepared By: _____ Date: 6/28/2011
Timothy A. Boos, Superintendent

Reviewed By: _____ Date: 6/28/2011
Robert R. Beckwith, LPG, Senior Hydrogeologist
Illinois LPG #196-000115

Reviewed By: _____ Date: 7/01/11
Judy Fassbender, PG, Senior Associate
Illinois LPG #196-000883

EXECUTIVE SUMMARY

Bloom and TolTest completed closure sampling on the former Underground Storage Tank (UST) system at Building 329 (UST Site 10), Naval Station Great Lakes (NAVSTA GL) in accordance with Contract N40083-10-C-0043. This report encompasses the history of the site from the initial release to the closure activities. The overall objective of the site was to seek a no further remediation letter from the Illinois Environmental Protection Agency (Illinois EPA) by meeting the requirements of the Groundwater and Soil Remediation Objectives.

The cleanup objectives for soil were 35 Illinois Administrative Code (IAC) Part 742 Soil Remediation Objectives (SRO) for Residential Properties where the SROs are based on a Class I groundwater for the site. SRO for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and polychlorinated biphenyls (PCBs) are determined by using the lowest or most conservative values from within all the listed exposure pathways in the Illinois EPA Tiered Approach to Corrective Action Objectives (TACO) regulations while taking into account the background values as provided in 35 IAC Section 742 Appendix A Table H of TACO. The SRO for inorganic metals was determined from 35 IAC Section 742 Appendix B Table C. The cleanup objectives for groundwater were per 35 IAC Section 742, Appendix B, Table E: Tier 1 Groundwater Remediation Objectives (GRO) for the Groundwater Component of the Groundwater Ingestion Route for Class I Groundwater. It was preferable to the Navy if Tier 1 residential objectives could be met through remediation of this site as no land use controls would be required. If the Tier 1 residential standards could not be met, Industrial-Commercial standards would be acceptable to the Navy because these standards are consistent with the current land use.

Building 329, UST Site 10, (2218 Sampson Street) is located on the South side of Building 329 at NAVSTA GL. Building 329 is a Diesel Engineman Trainer constructed in 1983. To support the engines, two 1,200-gallon diesel USTs and one 500-gallon used oil steel UST were installed in 1983 on the south side of the building. In 1992, the three USTs failed the initial tank tightness test; Illinois Emergency Management Agency (IEMA) #922928 was issued for the site. Following this test, the USTs were drained and the piping was disconnected.

The USTs were removed on March 25, 1999. Removal activities were under the auspices of the Office of State Fire Marshall. At that time, IEMA # 990712 was issued. In April, 1999, the Navy submitted a 20-day report and a 45-day report in June, 1999 to the Illinois EPA. In November 2001, relative risk ranking field activities were conducted at the site.

Closure sampling activities were conducted under the current contract and field work was completed in November 2010 with additional field work in January 2011. During the November 2010 field activities, soil closure samples were collected from soil borings in 6 locations that were predetermined and mutually agreed upon by the Illinois EPA and the Navy. In January 4, 2011 additional borings were installed to define the limits of the site. After completion of the soil borings, temporary monitoring wells were installed in the boreholes. After developing the temporary wells, samples were collected from 329-G, 329-H and 329-J. Temporary well 329-I had insufficient amounts of water in the temporary wells to facilitate the stabilization and

sampling of the wells. This well was evacuated of the water column and allowed to recharge overnight before a grab sample was collected.

Analytical results from the soil closure samples were compared to the Illinois EPA TACO SROs provided in 35 IAC Section 742 for Class I Groundwater site. The soil samples were analyzed for Resource Conservation and Recovery Act (RCRA) metals, polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs) and volatile organic compounds (VOCs). While various analytes were detected above their respective method detection limits (MDL), none of the soil samples exceeded their respective SROs.

Analytical results from the temporary well samples were compared to the Illinois EPA TACO GROs. Seven of the eight RCRA metals (mercury, arsenic, barium, cadmium, chromium, lead and selenium) were detected above the method detection limit in the groundwater samples collected. No PCBs or polynuclear aromatics (PNAs) were found above the method detection limits in the groundwater samples. Total lead exceeded the GRO for the samples collected from 329-A, 329-D, 329-E, 329-F, 329-H and 329-I. During the January 2011 round of field work, a dissolved RCRA metal sample was collected from 329-G, 329-H, 329-I, 329-J; results for the dissolved metals samples found arsenic and barium above the MDL with no analytes exceeding the GRO.

Soil samples were then collected to confirm the UST system removal efforts from previously undocumented activities. All of the soil samples collected met the respective SROs. Groundwater samples only exceeded the GRO for total lead in six of the eight samples collected. Four samples had a dissolved lead sample collected to compare with the total lead sample. All four total lead samples exhibited reportable quantities of lead in the sample while the dissolved lead in the four comparison samples were reported as undetected at the limit of detection. The dissolved metals comparison indicates that the turbidity of the sample is a factor in the total metals reported results.

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LIST OF ACRONYMS

bgs	Below ground surface
cm/sec	centimeters per second
GRO	Groundwater Remediation Objective
IAC	Illinois Administrative Code
IEMA	Illinois Emergency Management Agency
Illinois EPA	Illinois Environmental Protection Agency
IRP	Installation Restoration Program
ISGS	Illinois State Geologic Survey
MDL	Method Detection Limit
MW	Monitoring Well
NAVSTA GL	Naval Station Great Lakes
O&M	Operation & Maintenance
PID	Photo Ionization Detector
PNA	Polynuclear aromatic
PCBs	polychlorinated biphenyls
PVC	Polyvinyl Chloride
PW	Public Works
RCRA	Resource Conservation and Recovery Act
SB	Soil Boring
SPLP	Synthetic Precipitation Leaching Procedure
SVE	Soil Vapor Extraction
SVOCs	Semivolatile Organic Compounds
SRO	Soil Remediation Objective
TACO	Tiered Approach to Corrective Action Objectives
TolTest	TolTest, Inc.
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOA	Volatile Organic Analysis
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This Closure Report documents the past history and sampling activities at Building 329, Naval Station Great Lakes, Great Lakes, Illinois. This work was performed pursuant to the Contract Number N40083-10-C-0043. The work entailed soil sampling via Geoprobe and installation of temporary monitoring wells. This report summarizes the events from the Leaking Underground Storage Tanks (LUSTs) incidents that were associated with a 20-day report from November of 1992 under Illinois Emergency Management Agency (IEMA) incident number 922928 and with a 20-day report and a 45-day report from June, 1999 under IEMA incident number 990712, up to the Geoprobe investigation that took place in November 2010 with additional sampling in January 2011. This report is intended to close out both incident numbers.

Building 329 is a Diesel Engineman Trainer constructed in 1983. To support the engines, two 1,200-gallon diesel USTs were installed in 1983 on the south side of the building. In the same year, one 500-gallon used oil steel UST was also installed. In 1992, the three USTs failed the initial tank tightness test. Following this test, the USTs were drained and the piping was disconnected. In researching historical records, it was discovered the IEMA Incident # 922928 was initially issued for this site and a 20-day certification report was submitted to the Illinois EPA November 16, 1992. The IEMA Hazardous Materials Incident Report database listed the probable cause of the release due to a suspected hole in the tank. The 20-day certification report indicated a date of release was under evaluation. No additional information has been identified for IEMA Incident # 922928 on the Illinois EPA Leaking Underground Storage Tank Incident Tracking (LIT) database or on the IEMA Hazardous Materials Incident Report database. The IEMA incident number 922928 is listed as closed on the IEMA Hazardous Materials Incident Report database. The IEMA incident #922928 corresponds to the Illinois EPA LPC#0971255004.

The USTs were removed on March 25, 1999. Free product and groundwater were not encountered during removal activities. Petroleum hydrocarbon impact was identified in the excavation. Approximately 250 cubic yards of impacted soil and 250 cubic yards of native soil was removed and disposed. The source of the petroleum hydrocarbon releases surrounding the two diesel fuel USTs and one waste oil UST is believed to be periodic overfilling. No accurate records exist that define the quantity of fuel and/or waste oil released. Removal activities were under the auspices of the Office of State Fire Marshall. At that time, Illinois Emergency Management Agency (IEMA) # 990712 was issued. In April, 1999, the Navy submitted a 20-day report and a 45-day report in June, 1999 to the Illinois EPA.

In November 2001, relative risk ranking field activities were conducted at the site. Three soil borings were advanced utilizing GeoProbe and direct push sampling methods. One soil sample was collected from each of the three borings. Odors were noted in the soil sample from NTC-329-SB3 from 8 to 8.5 feet below ground surface (bgs). This boring was located in the former UST area and did not advance deep enough to obtain a sample from that native soil. In each of the borings, a temporary monitoring well was installed so that a sample of the groundwater could be collected from the site. Three groundwater samples were collected (NTC-329-TP1, NTC-329-TP2 and NTC-329-TP3). Volatile organic compounds (VOC) and polynuclear aromatics (PNA) constituents were not detected above the Groundwater Remediation Objectives (GRO) in any of the samples.

The Navy received comments from the Illinois EPA dated August 31, 2004 regarding the reports submitted for this site. The comments stated in regard to the 45-Day Report on file that the report was not a Corrective Action Completion Report and the original confirmation samples yielded several PNAs above the TACO Tier I Residential Screening values. The relative risk ranking sampling conducted in November 2001 did not provide useful data since two of three samples were not collected within the expected contaminated area and the third sample was collected at a depth above the native contaminated soils. The Illinois EPA suggested that the Navy collect sufficient number of confirmation samples from the appropriate locations, perform remedial actions if necessary, and then draft and submit a Corrective Action Completion Report.

Closure sampling activities were conducted under the current contract and field work was completed in November 2010 with additional field work in January 2011. During the November 2010 field activities, soil closure samples were collected from soil borings in six locations (329-A, 329-B, 329-C, 329-D, 329-E and 329-F) that were predetermined and mutually agreed upon by the Illinois EPA and the Navy. In January 4, 2011 additional borings (329-G, 329-H, 329-I and 329-J) were installed to define the limits of the site. After completion of the soil borings, temporary monitoring wells were installed in the boreholes. Soil analysis was conducted for volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PNAs), semi-volatile organic compounds (SVOCs), Resource Conservation and Recovery Act (RCRA) metals and polychlorinated biphenyl (PCBs). Groundwater samples were collected and analyzed for VOCs, PNAs, SVOCs, RCRA Metals and PCBs.

Building 329, UST Site 10 is located at 2218 Sampson Street, Naval Station Great Lakes, Lake County, Illinois on the south side of Building 329. The site is located in Section 4, Township 44 North, Range 12 East (N42.317478□, W87.840045□). The site is surrounded by Navy property in all directions. The local geography consists of government buildings consistent with the surrounding buildings for training. The local topography around the site is relatively flat, with much of the area under pavement of concrete or asphalt.

2.0 GEOLOGY

2.1 Regional Geology

According to Hansel & Johnson (Illinois State Geologic Survey (ISGS) Bulletin 104, 1996), the site overlies Lake Plain sediments of Wisconsin Pleistocene Age. The Lake Plain sediments consist of predominantly silty clay deposits, and may contain thin beds of sand and gravel. These fine-grained sediments are over 20 feet thick in this area, and may be interbedded with similar silty clay till of the Wadsworth formation. Bedrock beneath the site dips to the east at 10 to 15 feet per mile and consists of the Paleozoic Silurian dolomite of the Racine Formation, approximately 150 to 200 feet thick.

2.2 Site Stratigraphy

The area south of Building 329 is characterized by non-native clayey fill material, with crushed limestone in the former UST excavation area; surrounded by native soil consisting of overlying silts and clayey silts, which in turn overly clay to a depth of at least 16 feet bgs.

2.3 Regional Hydrogeology

Hydrogeology of the Great Lakes area is characterized by three major potable aquifer systems: (1) glacial; (2) shallow bedrock (Silurian Dolomite); (3) deep bedrock (Ordovician or Cambrian Sandstone). In addition to these three major potable aquifer systems, shallow near-surface groundwater typically occurs in various areas of the Chicago and surrounding areas within 20 feet of the ground surface. The potable aquifer systems lie deeper than the limits of this investigation and shallow water bearing units above the bedrock are not hydraulically connected to deeper aquifers. Potable water is supplied to the Navy Base by the bases own water treatment plant that obtains its source water from Lake Michigan.

2.4 Site Hydrogeology

The *Potential for Contamination of Shallow Aquifers from Land Burial of Municipal Wastes* identified the site within an area of a Type E geologic sequence. The potential for contamination in Type E areas is low because of low hydraulic conductivity, typically 1 $x10^{-9}$ to 1 $x10^{-7}$ centimeters per second (cm/sec), and good attenuation capacities.

Temporary wells were installed at each of the six locations initially and then at the four new locations during the second round of site investigations for groundwater sampling. Originally groundwater elevations were collected on November 11, 2010. The additional four wells had the groundwater elevations recorded during sampling, however they are not figured into the groundwater flow and gradient calculations since a complete set of water level readings could not be collected from all the temporary wells on site due to the weather conditions with snow and ice limiting access. The groundwater gradient and flow direction for the site was calculated from the groundwater elevations and survey data collected at the site. The groundwater gradient is 0.0280 ft/ft with a flow direction of 187.6 degrees from North.

3.0 SOIL CLOSURE SAMPLING

3.1 Determination of Soil Sampling Locations

In a meeting at Naval Station Great Lakes between the Illinois EPA, the Navy and the Bloom/TolTest Team, it was agreed upon between the Navy and Illinois EPA the initial locations for the six soil borings. Initially soil samples were collected from six approved locations around the former UST site. After the initial investigation additional sampling was required; soil samples were collected from four approved locations to define the area. At the completion of the Geoprobe soil borings a temporary 1-inch polyvinyl chloride (PVC) monitoring well would be installed for the purpose of collecting groundwater elevation measurements and sampling. The approved boring locations are shown in **Figure G-106 in Appendix A**.

3.2 Sampling Methodology

The soil borings were advanced via direct push method using a Geoprobe© rig and macro-core sampler and completed approximately 16 feet bgs. Soil samples were collected on a continuous basis using a 2-inch direct push spoon sampler equipped with a disposable acetate liner. Each soil boring was given a unique identification number and the TolTest geologist documented the boring activities using soil boring log forms. The soil was classified on the boring logs indicating lithologic descriptions and Unified Soil Classification System descriptions (based upon visual evaluation), degree of sorting, sedimentary contacts, relative moisture content, photoionization detector (PID) readings, etc. Soil boring logs for the closure confirmation sampling are provided in **Appendix B.**

Soil samples were collected based on odors, discoloration and organic vapor meter readings. Samples were collected at 2-foot intervals from the borehole. The samples were placed into two large self-sealing plastic bags. The first was filled as full as possible to eliminate as much air as possible from the bag. While filling the self-sealing plastic bags, care was taken to minimize the amount of disturbance to the soil. After filling the first bag it was sealed and placed on ice. The headspace of the second bag was analyzed with a PID after 5-10 minutes. Soil samples were collected from the layer with the highest PID readings or highest visible contamination as described below. If no contamination was observed visually or with a PID, a soil sample was collected from the bottom of the borehole to document site conditions. If initial screening results indicate the presence of organic vapors, a headspace analysis was conducted.

Samples for VOC analysis were collected by using Encore ™ sampling devices. The following procedures were followed:

1. Removed sampler from the package and attached T-handle to the sampler body.
2. Quickly pushed the sampler into the soil until the sampler (coring body) was completely full (observe O-ring in viewing window).
3. Removed the sampler from the soil and wiped excess soil from the coring body exterior. A disposable laboratory-grade wipe was used to clean the sampler.

4. Pushed the cap on with a twisting motion to firmly attach the cap. Pushed and twisted over the bottom until the locking arms seated over the ridge on the sampler body.
5. Completely filled out the circular label (from the EnCore™ sampler bag) and attached it to the sampler.
6. Returned the sample-filled sampler to a self-sealing bag. Sealed the bag and stored the samples immediately on ice.

Samples collected for PNA analyses were collected with clean new pair of nitrile disposable sampling gloves and transferred to the appropriate sample container (one 4oz sample jar). The sample jar was quickly capped. The label was completely filled out and attached to the sample jar. The sample jar was placed in a zip lock plastic bag and placed in an iced cooler held at a temperature below 4°C. The soil samples designated for laboratory analysis were appropriately labeled, placed in an ice-filled cooler and transported to the laboratory designated courier.

3.3 Sample Results

Analytical results from the soil closure samples were compared to the 35 IAC Part 742 SRO for Residential Properties where the SROs are based on a Class I groundwater for the site. SRO for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and polychlorinated biphenyls (PCBs) are determined by using the lowest or most conservative values from within all the listed exposure pathways in the Illinois EPA Tiered Approach to Corrective Action Objectives (TACO) regulations while taking into account the background values as provided in 35 IAC Section 742 Appendix A Table H of TACO. The SRO for inorganic metals was determined from 35 IAC Section 742 Appendix B Table C. For the inorganic compounds where a value was not listed in the 35 IAC Section 742 Appendix B Table C, the most stringent soil remediation objective of the exposure routes (i.e., soil ingestion exposure route, inhalation exposure route, and soil component of the groundwater ingestion exposure route) was used as the SRO to compare the concentrations of soil contaminants of concern. The soil samples were analyzed for RCRA metals, PCBs, SVOCs and VOCs. While various analytes were detected above their respective MDL, none of the soil samples exceeded their respective SROs. When comparing the results for chromium and selenium to the pH Specific Soil Component of the Groundwater Ingestion Exposure Route Value there were no exceedances for either chromium or selenium on the samples. Additional sampling was conducted in June 2011 to collect samples to test the pH in the soil. The pH results ranged from 8.45-8.72. A table summarizing the results and comparing to the SROs and background values from Table H of Appendix A and from Table C in Appendix B in TACO is provided in **Appendix C, Table 1,** and a copy of the laboratory soil analytical data can be found in **Appendix D.**

4.0 GROUNDWATER SAMPLING

4.1 Groundwater Sampling

Temporary wells were installed at each of the six locations initially and then at the four new locations during the second round of site investigations for groundwater sampling. Originally groundwater elevations were collected on November 11, 2010. Groundwater elevations were recorded for the additional four wells during sampling, however they are not used for the groundwater flow and gradient calculations since a complete set of water level readings could not be collected from all the temporary wells on site due to the weather conditions with snow and ice limiting access. The groundwater gradient and flow direction for the site was calculated from the groundwater elevations and survey data collected at the site. The groundwater gradient is 0.0280 ft/ft with a flow direction of 187.6 degrees from North.

Temporary monitoring wells 329-A, 329-D and 329-E were purged and stabilized on November 11, 2010 and water samples were collected from them for VOCs, PNAs, SVOCs, RCRA metals and PCBs. Temporary monitoring wells 329-B and 329-C purged dry during stabilization and did not produce sufficient amounts of water to recharge the wells, therefore, the two wells were not sampled on November 11, 2010. Temporary monitoring well 329-F was purged and stabilized on November 12, 2010 and water samples were collected for VOCs, PNAs, SVOCs, RCRA metals and PCBs. Temporary monitoring well 329-C was sampled on November 12, 2010 without purging, after recharging overnight. The well contained enough water from re-charging overnight to collect sample volumes for VOCs and 1 liter of water for a PNA sample, no RCRA metals and no PCBs were analyzed from 329-C. Temporary monitoring well 329-H was purged and stabilized on January 18, 2011 and water samples were collected for VOCs, PNAs, SVOCs, total RCRA metals, dissolved RCRA metals and PCBs. Temporary monitoring wells 329-G, 329-I and 329-J were purged and stabilized on January 20, 2011 and water samples were collected for VOCs, PNAs, SVOCs, total RCRA metals, dissolved RCRA metals and PCBs. On January 24, 2011 PCB sample was recollected from 329-H due to a laboratory error and total RCRA metals along with dissolved RCRA metals were collected from 329-I due to insufficient groundwater in the well to collect the sample on the 20th.

The sample results were evaluated against the Groundwater Remediation Objective (GRO) for the site which was determined per 35 IAC Section 742, Appendix B, Table E: Tier 1 GRO for the Groundwater Component of the Groundwater Ingestion Route for Class I Groundwater. Seven of the eight RCRA metals (mercury, arsenic, barium, cadmium, chromium, lead and selenium) were detected above the method detection limit in the groundwater samples collected but none exceeded the GROs with the exception of lead. No PCBs or PNAs were found above the method detection limits in the groundwater samples. Total lead exceeded the GRO for the samples collected from 329-A, 329-D, 329-E, 329-F, 329-H and 329-I. During the January 2011 round of field work a dissolved RCRA metal sample was collected from 329-G, 329-H, 329-I, 329-J; results for the dissolved metals samples found arsenic and barium above the MDL with no analytes exceeding the GRO. A table summarizing the results and comparing to the GROs is provided in **Appendix C, Table 2,** and a copy of the laboratory groundwater analytical data can be found in **Appendix D.**

5.0 RECOMMENDATIONS

Analytical results from the soil closure samples were compared to determined SROs as defined in the Illinois EPA TACO regulations as provided in 35 IAC Section 742. The soil samples were analyzed for RCRA metals, PCBs, SVOCs and VOCs. While various analytes were detected above their respective MDLs, none of the soil samples exceeded their respective SROs.

The only exceedances in the GRO are total lead, and the comparison of total lead to dissolved lead shows evidence for higher concentrations from the total lead due to the turbidity in the water. Turbidity is used to indicate the quality of the water and the higher the turbidity the more suspended particles are present in the water. Prior to collecting the groundwater sample, the field chemistry parameters are stabilized, which includes temperature, pH, conductivity, dissolved oxygen, redox potential, and turbidity. The stabilization for turbidity is defined for this project at ≤5 NTU or 10% of reading. A reading greater than 5 NTU indicates a high amount of suspended particles or sediment are present in the water. In each of the wells where the turbidity was outside the stabilization range the total lead was detected and results exceeded the GRO as shown in **Exhibit 1**.

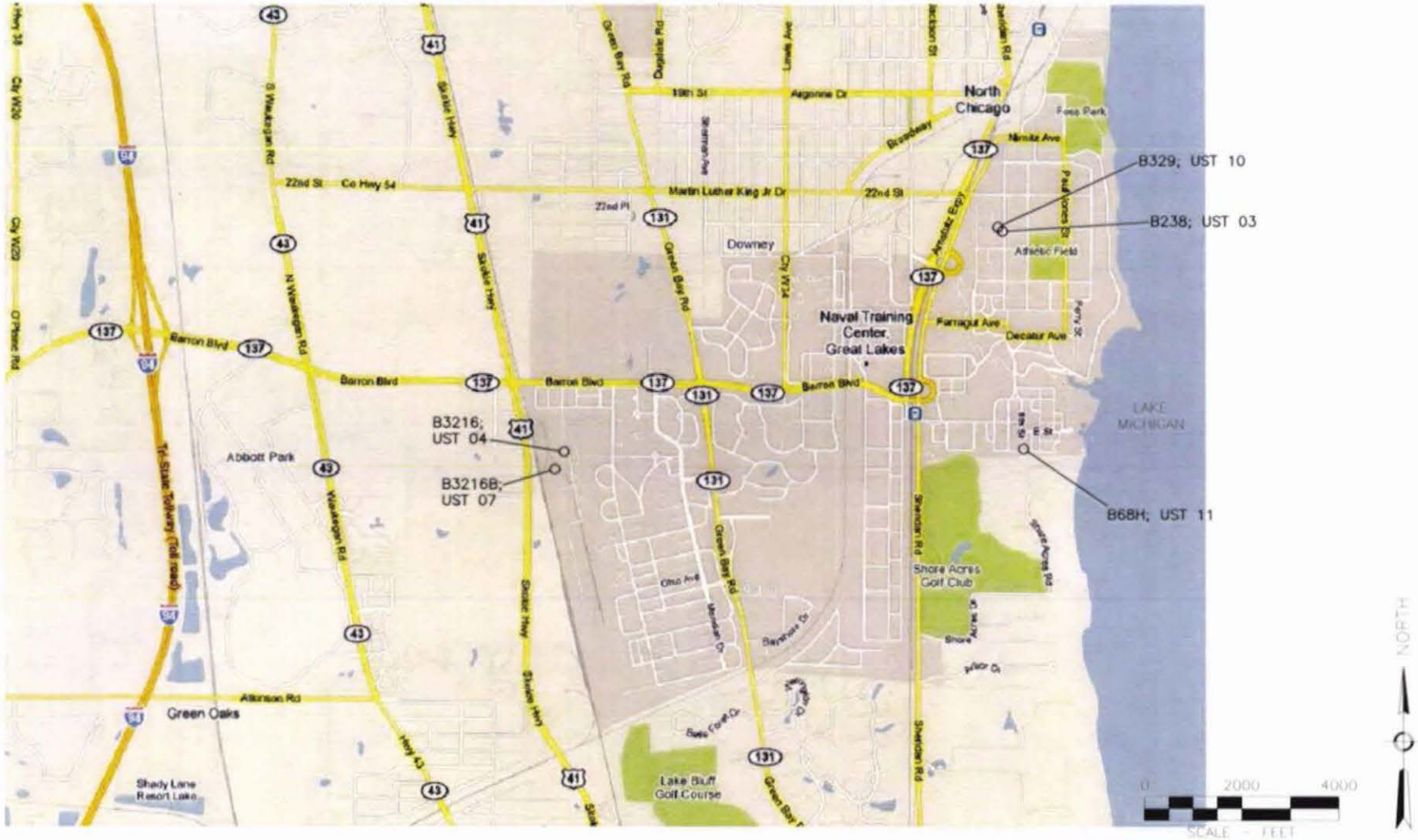
Exhibit 1, Total Lead and Dissolved Lead Result Comparisons

Sample ID	*Turbidity NTU*	*Total Lead Result mg/L*	*Dissolved Lead Result mg/L*	*GRO for Lead mg/L*
329-A	154	**0.0091**		0.0075
329-B	>800	No sample		0.0075
329-C		No sample		0.0075
329-D	>800	**0.035**		0.0075
329-E	>800	**0.015**		0.0075
329-F	>800	**0.014**		0.0075
329-G	394	0.0047J	0.0017u	0.0075
329-H	>1,000	**0.066**	0.0017u	0.0075
329-I		**0.022**	0.0017u	0.0075
329-J	21.5	0.0017J	0.0017u	0.0075

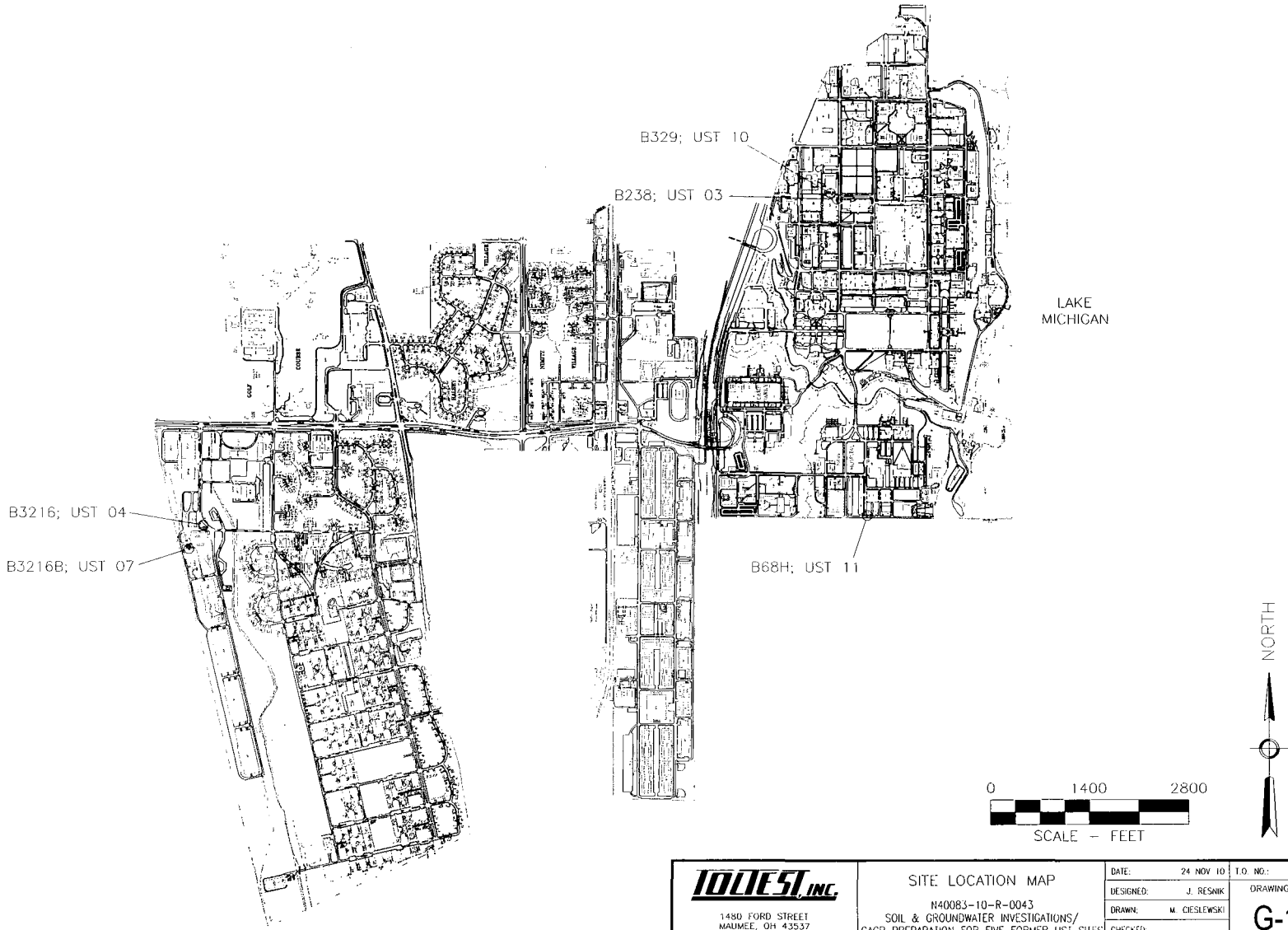
When the samples were collected it was noted in the field notes that there was a lot of sediment present in the water. Turbidity was one of the field chemistry parameters that posed difficulties reaching stabilization. For comparison, groundwater samples were filtered in the field to overcome high turbidity. Low water volume from the wells did not permit a filtered sample to be collected from each of the wells. As shown in **Exhibit 1** above, where each of the groundwater samples were filtered lead was not detected in the sample suggesting that the high sediment content in the water sample is causing the high groundwater sample results for lead. It is recommended that the site be closed and a No Further Action letter be issued for this site.

APPENDIX A

FIGURES



LOUIS INC. 1480 FORD STREET MALMEE, OH 43537 PHONE (419) 794-3500 FAX (419) 794-3807	SITE VICINITY MAP N40085-10-R-0043 SOIL & GROUNDWATER INVESTIGATIONS/ CACR PREPARATION FOR FIVE FORMER UST SITES NAVAL STATION GREAT LAKES, IL	DATE 24 NOV 10 DESIGNED J. REGNIK DRAWN M. DESLONDE CHECKED APPROVED T. BEKIS	T.O. NO. DRAWING NUMBER G-100 SHEET 1 OF 19

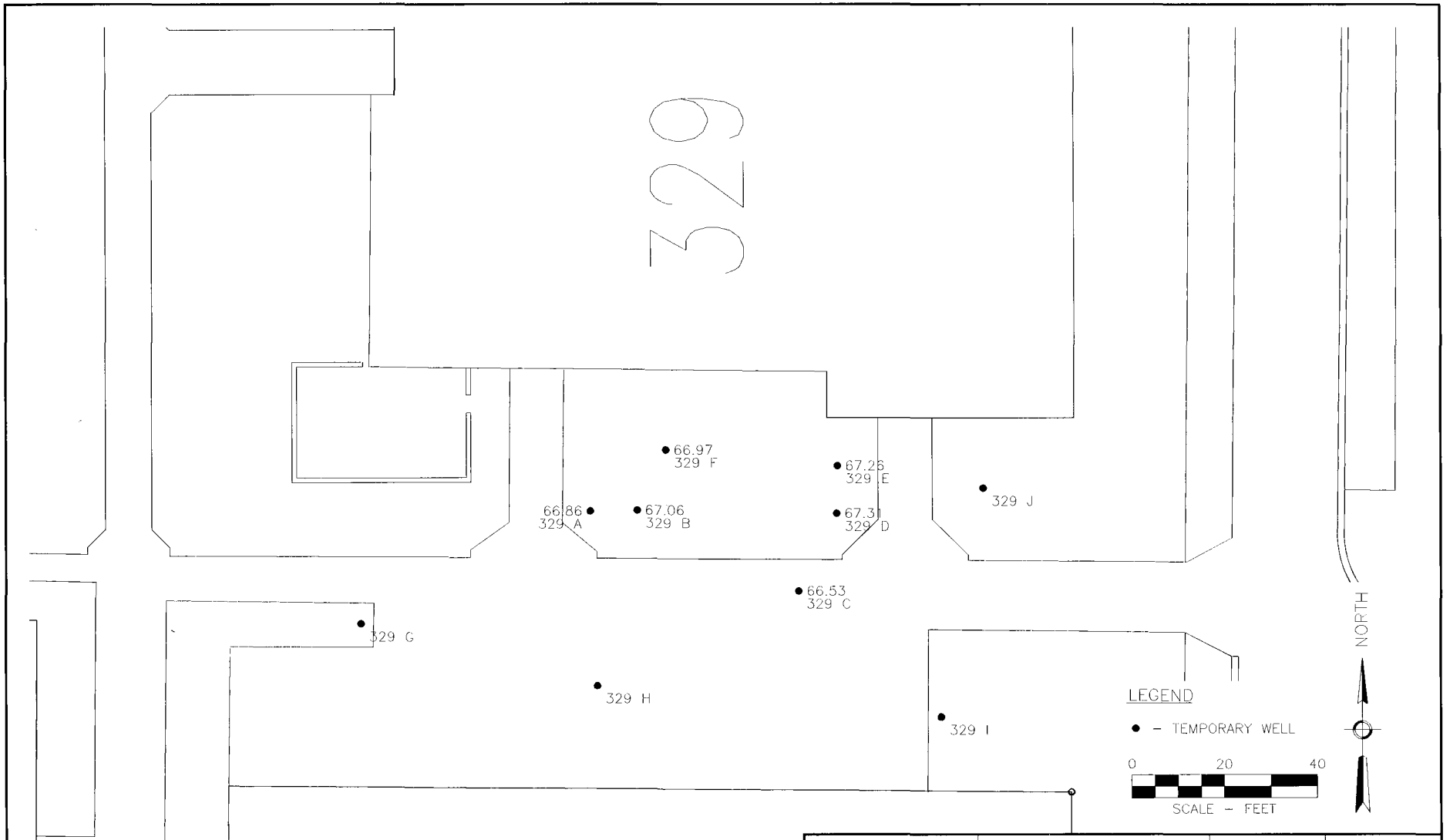


TOLTEST, INC.
1480 FORD STREET
MAUMEE, OH 43537
PHONE: (419) 794-3500
FAX: (419) 794-3901

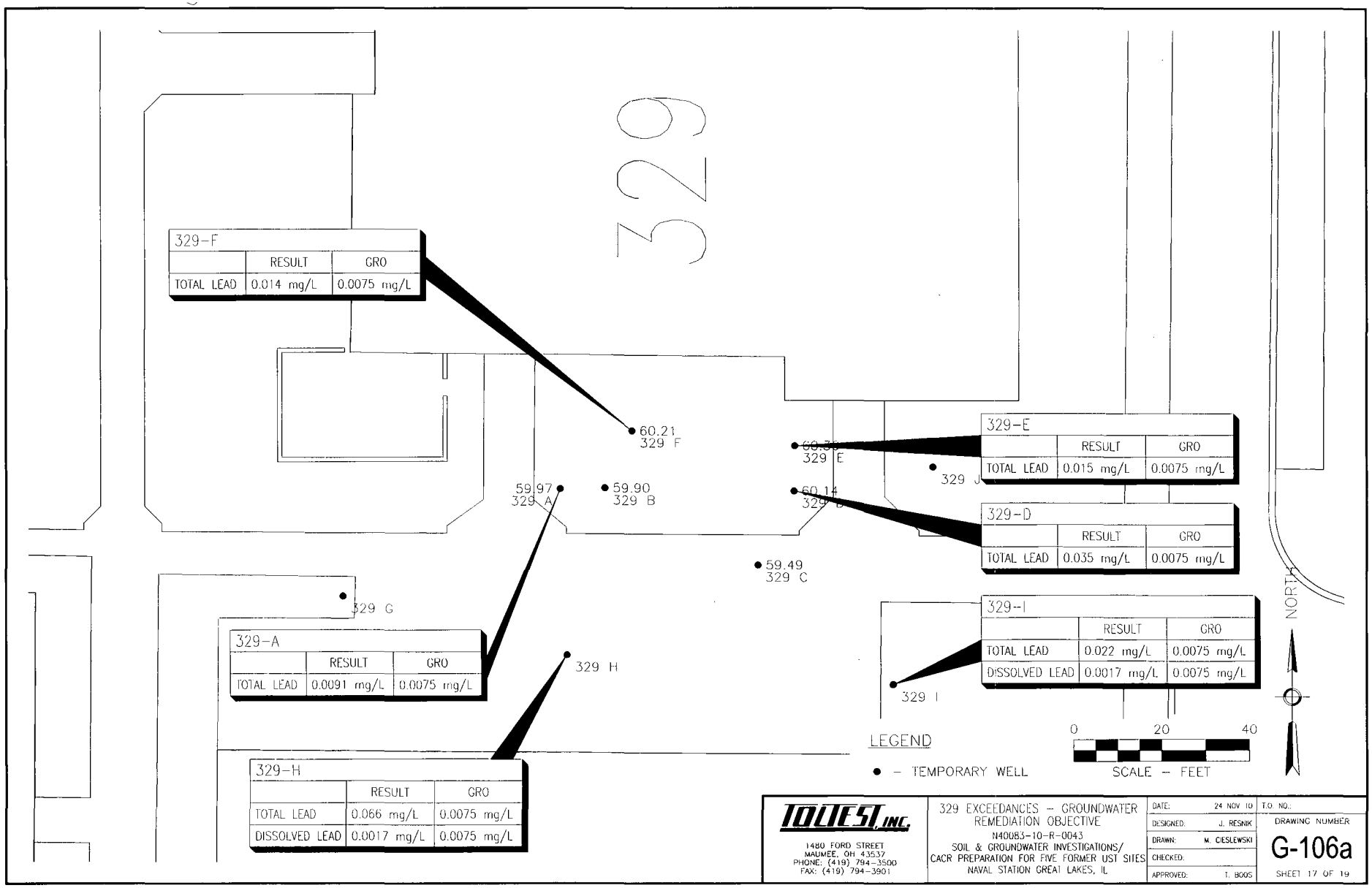
SITE LOCATION MAP

N40083-10-R-0043
SOIL & GROUNDWATER INVESTIGATIONS/
CACR PREPARATION FOR FIVE FORMER UST SITES
NAVAL STATION GREAT LAKES, IL

DATE:	24 NOV 10	T.O. NO.:
DESIGNED:	J. RESNIK	DRAWING NUMBER
DRAWN:	M. CIESLEWSKI	G-101
CHECKED:		
APPROVED:	T. BOOS	SHEET 2 OF 19



IDL TEST, INC. 1480 FORD STREET MAUMEE, OH 43537 PHONE: (419) 794-3500 FAX: (419) 794-3901	329 SAMPLE LOCATION PLAN N40083-10-R-0043 SOIL & GROUNDWATER INVESTIGATIONS/ CACR PREPARATION FOR FIVE FORMER UST SITES NAVAL STATION GREAT LAKES, IL	DATE: 24 NOV 10 DESIGNED: J. RESNIK DRAWN: M. CIESLEWSKI CHECKED: APPROVED: T. BOOS	T.O. NO.: DRAWING NUMBER G-106 SHEET 16 OF 19



TOLTEST, INC.
1480 FORD STREET
MAUMEE, OH 43537
PHONE: (419) 794-3500
FAX: (419) 794-3901

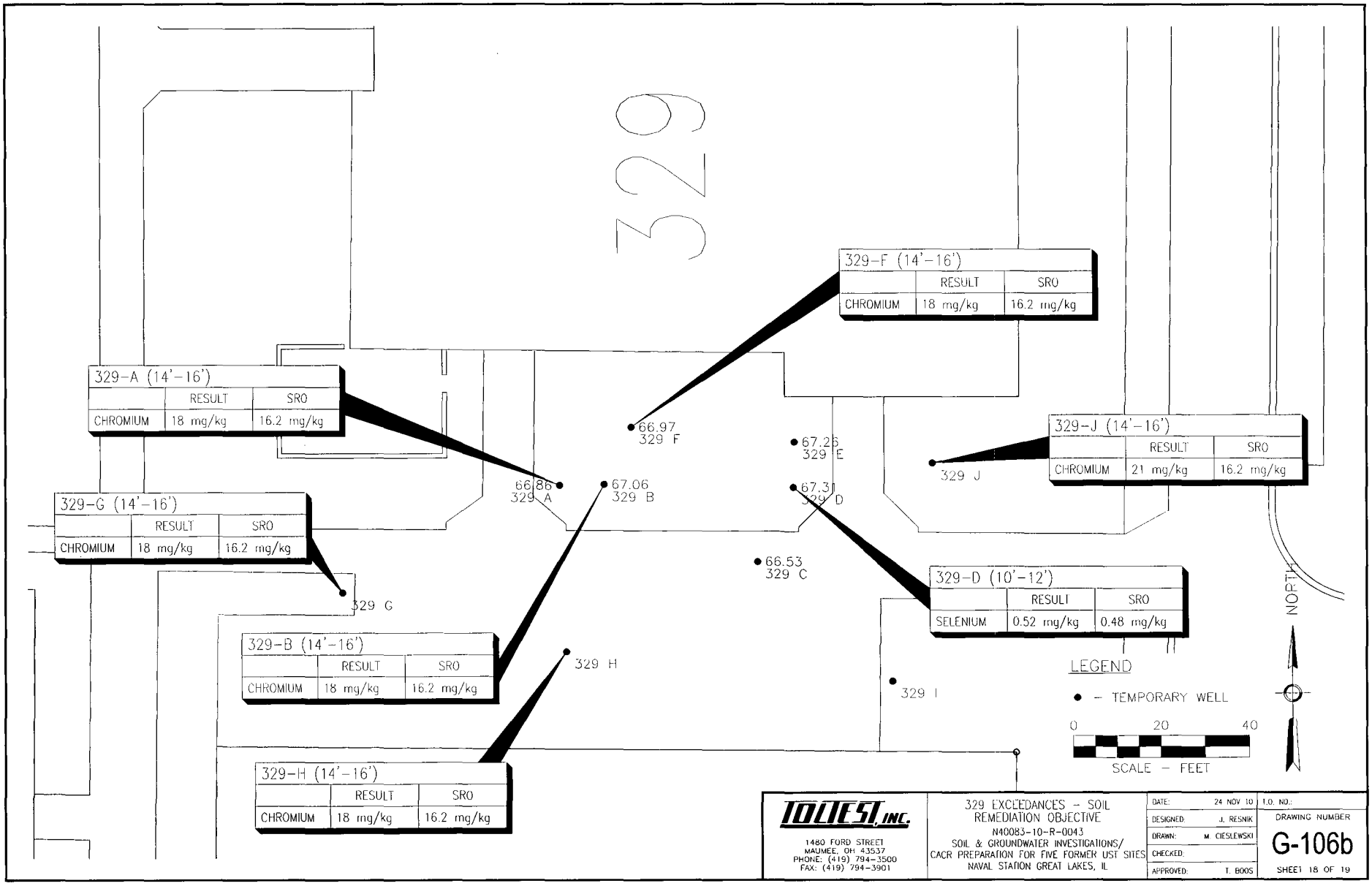
329 EXCEEDANCES – GROUNDWATER REMEDIATION OBJECTIVE
N40083-10-R-0043
SOIL & GROUNDWATER INVESTIGATIONS/
CACR PREPARATION FOR FIVE FORMER UST SITES
NAVAL STATION GREAT LAKES, IL

DATE:	24 NOV 10
DESIGNED:	J. RESNIK
DRAWN:	M. CIESLEWSKI
CHECKED:	
APPROVED:	T. BOOS

T.O. NO.:

DRAWING NUMBER
G-106a

SHEET 17 OF 19

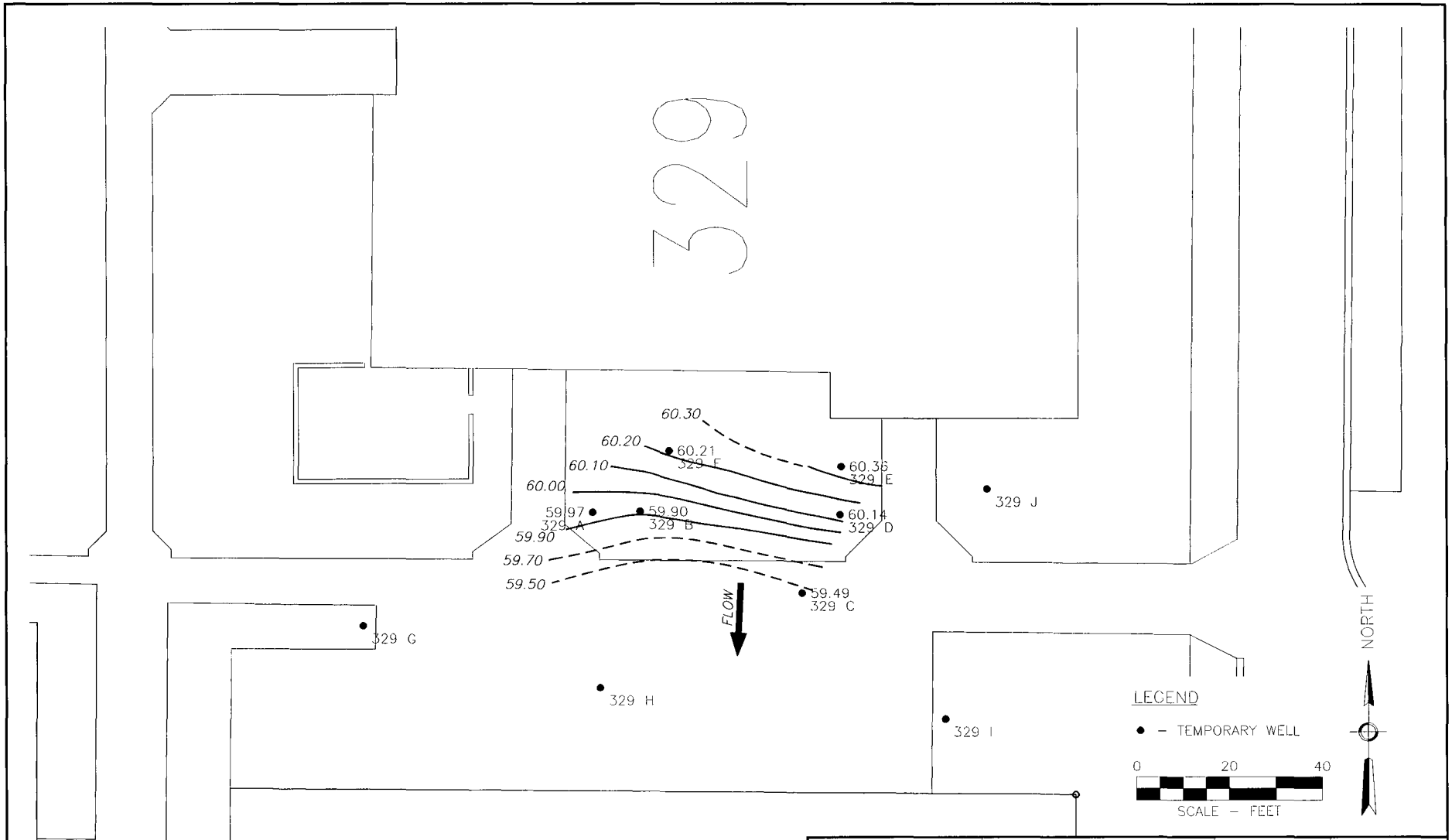


TOLTEST, INC.
1480 FORD STREET
MAUMEE, OH 43537
PHONE: (419) 794-3500
FAX: (419) 794-3901

329 EXCEEDANCES - SOIL REMEDIATION OBJECTIVE
N40083-10-R-0043
SOIL & GROUNDWATER INVESTIGATIONS/
CACR PREPARATION FOR FIVE FORMER UST SITES
NAVAL STATION GREAT LAKES, IL

DATE:	24 NOV 10
DESIGNED:	J. RESNIK
DRAWN:	M CIESLEWSKI
CHECKED:	
APPROVED:	T. BOOS

T.O. NO.:
DRAWING NUMBER
G-106b
SHEET 18 OF 19



TOLTEST, INC.
1480 FORD STREET
MAUMEE, OH 43537
PHONE: (419) 794-3500
FAX: (419) 794-3901

329 GROUNDWATER FLOW
N40083-10-R-0043
SOIL & GROUNDWATER INVESTIGATIONS/
CACR PREPARATION FOR FIVE FORMER UST SITES
NAVAL STATION GREAT LAKES, IL

DATE:	24 NOV 10	I.O. NO.:	
DESIGNED:	J. RESNIK	DRAWING NUMBER	
DRAWN:	M. CIESLEWSKI	G-106c	
CHECKED:			
APPROVED:	T. BOOS	SHEET 19 OF 19	

APPENDIX B

SOIL BORING LOGS

TOLTEST, INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329- A

CLIENT: Naval Station Great Lakes, IL	LOCATION: West of ~~USTs~~ former USTs
DATE: 11/01/10 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16ft	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE: 6.89 / 11-11-10
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
							Grass, Topsoil
	01		2	3.0	0.0	1	Very stiff, black silt (ML) trace sand, dry
	02		2	2.75	0.0		
	03		2	2.25	0.0	4	Medium stiff to stiff, brown gray mottled silt (ML)
	04		2	1.75	0.0		
	05		2	1.5	0.0	9.5	Stiff, gray silt (ML), wet
	06		2	1.75	0.0	11	Stiff to very stiff, gray silty clay (CL) trace sand, moist
	07		2	3	0.0		
*	08		2	1.75	0.0		
						16	Bottom of Boring at 16ft.

* Sample submitted to laboratory for analysis

Soil Descriptors

Cohesive Soils (clays and silts)		
Term	**Blows per Foot**	**Penetrometer**
Very Soft	0 - 2	<0.25
Soft	3 - 4	0.25 - 0.50
Medium Stiff	5 - 8	0.50 - 1.0
Stiff	9 - 16	1.0 - 2.0
Very Stiff	17 - 32	2.0 - 4.0
Hard	over 32	>4.0

Granular Soils (sands)	
Term	**Blows per Foot**
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	over 50

Content	
Term	**%**
Trace	0 - 10
Little (Few)	10 - 20
Some	20 - 35
And (With)	35 - 50

Note: Typically blow counts for the 2nd and 3rd 0.5' intervals should be summed to determine the blows per foot.

Field Tests	
Soil Type	**Test**
Clay	rolls into ribbons when moist (>1" long); content identified by streaking paper
Silty Clay	rolls into ribbons when moist (<1" long), particles not evident to naked eye
Silt	particles only evident under magnification; does not roll into ribbons easily
Sand	sand grains evident with naked eye; feels gritty when rubbed between fingers
Sandy Clay	rolls into ribbons when moist (<1" long), sand grains evident to naked eye; may feel gritty

Sample Type	
Sampling Method	**Sample Symbol**
Auger Cuttings	A
Air Rotary Cuttings	AR
Split Spoon	S
Shelby Tube	ST

Grain Size (Wentworth Scale)		
Particle Size (mm)	**Particle Term**	**Rock Term**
>256	Boulder	Boulder Conglomerate
64 - 256	Cobble	Cobble Conglomerate
4 - 64	Pebble	Pebble Conglomerate
2 - 4	Granule	Granule
1 - 2	V. coarse gr. sand	Conglomerate
0.5 - 1	Coarse gr. sand	Sandstone
0.25 - 0.5	Medium gr. sand	Sandstone
0.125 - 0.25	Fine grained sand	Sandstone
0.0625 - 0.125	Very Fine gr. sand	Sandstone
0.004 - 0.0625	Silt	Siltstone or Silty Shale
<0.004	Clay	Claystone or Shale

Mottling	
Abundance Term	**%**
None	0
Few	<2
Common	2 - 20
Many	>20
Contrast Term	**Description**
Faint	indistinct
Distinct	easily seen
Prominent	outstanding

Bedding	
Term	**Thickness**
Very Thickly Bedded	thicker than 1 m (3.3')
Thickly Bedded	30 - 100 cm (1'-3.3')
Medium Bedded	10 - 30 cm (4" - 1')
Thinly Bedded	3 - 10 cm (1" - 4")
Very Thinly Bedded	1 - 3 cm (0.4" - 1")
Thickly Laminated	0.3-1 cm (0.12"-0.4")
Thinly Laminated	<0.3 cm (<0.12")

Descriptive Terms	
Lens	Zone equal to or less that 1-inch (2.5 cm) in thickness
Layer	Zone greater than 1-inch (2.5 cm) in thickness
Interbedded	Alternating lenses and/or layers of different media types
Slickensided	Materials having inclined planes of weakness, glossy in appearance
Pockets	Inclusion of one media type in a matrix of another media

Moisture		
Term	**% (Cohesive)**	**% (Granular)**
Dry	<5	<5
Damp	5 - 12	5 - 10
Moist	12 - 25	10 - 20
Wet	>25	>20

Standard TolTest Description Format

density, color, CLASSIFICATION, additional descriptors, moisture

next NEW CLASSIFICATION

Use dashed line between CLASSIFICATIONS if actual contact depth is not known. Do not use lines (solid or dashed) unless CLASSIFICATION changes (not for color, density, etc.).

[1] If evidence exists that soil is not natural (i.e., mixed with plastic, bricks, red dog, etc.) use FILL as the classification but describe all components.

Example:

	0.5'	ASPHALT AND SUBBASE
S-1		– loose, brown FILL, predominantly silty clay, some bricks, damp [1]
	3.0'	– stiff, brown and gray SILTY CLAY, mottled, trace fine-grained sand, moist
S-2		– becomes orange, hard at 5'
	7.7'	– loose, gray SAND AND GRAVEL, medium to coarse-grained, little silt, wet
*S-3		– becomes medium dense at 9'

BOTTOM OF BORING AT 14.5'

*indicates sample submitted for analysis

Well Installation Information

Parameter	*Depth (feet)*	*Type*
Bottom of Sand	16	
Bottom of Bentonite	2	
Bottom of Grout		
Bottom of Cement		
Bottom of Screen	16	1-inch PVC, 0.10 slotted
Bottom of Riser	6	1-inch threaded PVC
Top of Riser	0.1	
Well Cover		

Additional Information

TOLTEST, INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329-B

CLIENT: Naval Station Great Lakes, IL	LOCATION: SW of former USTs
DATE: 11/01/10 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16ft.	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE: 7.16/11-11-10
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
	01		2	2.75	64.1	1	Grass, topsoil
						2	Silty fill material brown w/ sand and streak of brick mixed
	02		2	2.0	100		Stiff, black silt (ML) trace sand, dry
	03		2	1.0	1973	4.5 5.0	Medium stiff, gray brown mottled sandy silt (ML), dry
	04		2	0.5	1224		Soft, gray brown mottled, silty clay (CL) trace sand, becomes moist at 8 ft
	05		2	1.75	2008	8.5	Medium stiff to stiff, gray brown mottled, silt (ML), dry
	06		2	0.75	3186		– becomes moist at 11 ft.
	07		2	0.25	3824		– becomes soft at 12 ft.
						13	Stiff, gray silty clay (CL) trace sand and gravel, dry
*	08		2	1.75	3974		
						16	Bottom of Boring at 16ft.

Note: High PID readings with no noticable hydrocarbon odor in sample, most likely due to moisture in soil samples.

* Sample submitted for laboratory analysis.

Soil Descriptors

Cohesive Soils (clays and silts)		
Term	**Blows per Foot**	**Penetrometer**
Very Soft	0 - 2	<0.25
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And (With)	35 - 50

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Sample Type	
Sampling Method	**Sample Symbol**
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Air Rotary Cuttings	AR
Split Spoon	S
Shelby Tube	ST

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Particle Size (mm)	**Particle Term**	**Rock Term**
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64 - 256	Cobble	Cobble Conglomerate
4 - 64	Pebble	Pebble Conglomerate
2 - 4	Granule	Granule
1 - 2	V. coarse gr. sand	Conglomerate
0.5 - 1	Coarse gr. sand	Sandstone
0.25 - 0.5	Medium gr. sand	Sandstone
0.125 - 0.25	Fine grained sand	Sandstone
0.0625 - 0.125	Very Fine gr. sand	Sandstone
0.004 - 0.0625	Silt	Siltstone or Silty Shale
<0.004	Clay	Claystone or Shale

Mottling	
Abundance Term	**%**
None	0
Few	<2
Common	2 - 20
Many	>20
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Layer	Zone greater than 1-inch (2.5 cm) in thickness
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Slickensided	Materials having inclined planes of weakness, glossy in appearance
Pockets	Inclusion of one media type in a matrix of another media

Moisture		
Term	**% (Cohesive)**	**% (Granular)**
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Damp	5 - 12	5 - 10
Moist	12 - 25	10 - 20
Wet	>25	>20

Standard TolTest Description Format

density, color, CLASSIFICATION, additional descriptors, moisture

next NEW CLASSIFICATION

Use dashed line between CLASSIFICATIONS if actual contact depth is not known. Do not use lines (solid or dashed) unless CLASSIFICATION changes (not for color, density, etc.).

[1] If evidence exists that soil is not natural (i.e., mixed with plastic, bricks, red dog, etc.) use FILL as the classification but describe all components.

Example:

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	3.0'	– stiff, brown and gray SILTY CLAY, mottled, trace fine-grained sand, moist
S-2		
		– becomes orange, hard at 5'
	7.7'	– loose, gray SAND AND GRAVEL, medium to coarse-grained, little silt, wet
*S-3		
		– becomes medium dense at 9'

BOTTOM OF BORING AT 14.5'

*indicates sample submitted for analysis

Well Installation Information

Parameter	*Depth (feet)*	*Type*
Bottom of Sand	16	
Bottom of Bentonite	2	
Bottom of Grout		
Bottom of Cement		
Bottom of Screen	16	1-inch PVC, 0.10 slotted
Bottom of Riser	6	1-inch threaded PVC
Top of Riser	0.1	
Well Cover		

Additional Information

TOLTEST, INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329-C

CLIENT: Naval Station Great Lakes, IL	LOCATION: South of former USTs
DATE: 11/02/10 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE: 7.04/11-11-10
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
	01		0		N/A	0.5	Concrete
							No recovery (crushed stone)
	02		2		15.1	2	Medium stiff brown gray mottled silty clay (CL), damp.
	03		2	1.0	18.0		
	04		2	0.75	17.4		
*	05		2	2.5	17.9	8	Medium stiff brown clayey silt (ML) trace gravel, damp.
	06		2	1.0	12.0	10	Stiff gray silty clay (CL) trace sand, moist
	07		2	2.5	9.0		
	08		2	1.75	7.4		
						16	Bottom of Boring at 16ft.

* Sample submitted for laboratory analysis

Soil Descriptors

Cohesive Soils (clays and silts)		
Term	**Blows per Foot**	**Penetrometer**
Very Soft	0 - 2	<0.25
Soft	3 - 4	0.25 - 0.50
Medium Stiff	5 - 8	0.50 - 1.0
Stiff	9 - 16	1.0 - 2.0
Very Stiff	17 - 32	2.0 - 4.0
Hard	over 32	>4.0

Granular Soils (sands)	
Term	**Blows per Foot**
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	over 50

Content	
Term	**%**
Trace	0 - 10
Little (Few)	10 - 20
Some	20 - 35
And (With)	35 - 50

Note: Typically blow counts for the 2nd and 3rd 0.5' intervals should be summed to determine the blows per foot.

Field Tests	
Soil Type	**Test**
Clay	rolls into ribbons when moist (>1" long); content identified by streaking paper
Silty Clay	rolls into ribbons when moist (<1" long), particles not evident to naked eye
Silt	particles only evident under magnification; does not roll into ribbons easily
Sand	sand grains evident with naked eye; feels gritty when rubbed between fingers
Sandy Clay	rolls into ribbons when moist (<1" long), sand grains evident to naked eye; may feel gritty

Sample Type	
Sampling Method	**Sample Symbol**
Auger Cuttings	A
Air Rotary Cuttings	AR
Split Spoon	S
Shelby Tube	ST

Grain Size (Wentworth Scale)		
Particle Size (mm)	**Particle Term**	**Rock Term**
>256	Boulder	Boulder Conglomerate
64 - 256	Cobble	Cobble Conglomerate
4 - 64	Pebble	Pebble Conglomerate
2 - 4	Granule	Granule
1 - 2	V. coarse gr. sand	Conglomerate
0.5 - 1	Coarse gr. sand	Sandstone
0.25 - 0.5	Medium gr. sand	Sandstone
0.125 - 0.25	Fine grained sand	Sandstone
0.0625 - 0.125	Very Fine gr. sand	Sandstone
0.004 - 0.0625	Silt	Siltstone or Silty Shale
<0.004	Clay	Claystone or Shale

Mottling	
Abundance Term	**%**
None	0
Few	<2
Common	2 - 20
Many	>20
Contrast Term	**Description**
Faint	indistinct
Distinct	easily seen
Prominent	outstanding

Bedding	
Term	**Thickness**
Very Thickly Bedded	thicker than 1 m (3.3')
Thickly Bedded	30 - 100 cm (1'-3.3')
Medium Bedded	10 - 30 cm (4" - 1')
Thinly Bedded	3 - 10 cm (1" - 4")
Very Thinly Bedded	1 - 3 cm (0.4" - 1")
Thickly Laminated	0.3-1 cm (0.12"-0.4")
Thinly Laminated	<0.3 cm (<0.12")

Descriptive Terms	
Lens	Zone equal to or less that 1-inch (2.5 cm) in thickness
Layer	Zone greater than 1-inch (2.5 cm) in thickness
Interbedded	Alternating lenses and/or layers of different media types
Slickensided	Materials having inclined planes of weakness, glossy in appearance
Pockets	Inclusion of one media type in a matrix of another media

Moisture		
Term	**% (Cohesive)**	**% (Granular)**
Dry	<5	<5
Damp	5 - 12	5 - 10
Moist	12 - 25	10 - 20
Wet	>25	>20

Standard TolTest Description Format

density, color, CLASSIFICATION, additional descriptors, moisture

next NEW CLASSIFICATION

Use dashed line between CLASSIFICATIONS if actual contact depth is not known. Do not use lines (solid or dashed) unless CLASSIFICATION changes (not for color, density, etc.).

[1] If evidence exists that soil is not natural (i.e., mixed with plastic, bricks, red dog, etc.) use FILL as the classification but describe all components.

Example:

	0.5'	ASPHALT AND SUBBASE
S-1		– loose, brown FILL, predominantly silty clay, some bricks, damp [1]
	3.0'	– stiff, brown and gray SILTY CLAY, mottled, trace fine-grained sand, moist
S-2		
		– becomes orange, hard at 5'
	7.7'	– loose, gray SAND AND GRAVEL, medium to coarse-grained, little silt, wet
*S-3		
		– becomes medium dense at 9'

BOTTOM OF BORING AT 14.5' *indicates sample submitted for analysis

Well Installation Information

Parameter	*Depth (feet)*	*Type*
Bottom of Sand	16	
Bottom of Bentonite	2	
Bottom of Grout		
Bottom of Cement		
Bottom of Screen	16	1-inch PVC, 0.10 slotted
Bottom of Riser	6	1-inch threaded PVC
Top of Riser	0.1	
Well Cover		

Additional Information

TOLTEST INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329-D

CLIENT: Naval Station Great Lakes, IL	LOCATION: SE corner of former USTs
DATE: 11/01/10 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16ft.	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE: 7.17 / 11-11-10
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
							Grass, topsoil
	01		2	0.5	247	1	Fill material (Black silt w/ sand, gravel and streaks of red brick) dry.
	02		2	3.5	589		
	03		1.5	1.25	797	4	Stiff, brown silt (ML) trace sand, dry.
	04		1.5	2.25	613	7	- becomes moist at 7ft.
	05		2	2.25	659	8	Very Stiff, brown gray mottled clayey silt (ML) trace sand, moist.
*	06		2	1.0	1793		
	07		2	1.75	1192	12	Stiff gray clayey silt (ML) trace sand and gravel, moist
	08		2	3.0	1205	14	- becomes hard and dry at 14ft.
						16	Bottom of Boring at 16ft.

Note: High PID readings with no noticable hydrocarbon odors in sample, most likely due to moisture in the soil samples.

* Sample submitted to laboratory for analysis.

Soil Descriptors

Cohesive Soils (clays and silts)		
Term	**Blows per Foot**	**Penetrometer**
Very Soft	0 - 2	< 0.25
Soft	3 - 4	0.25 - 0.50
Medium Stiff	5 - 8	0.50 - 1.0
Stiff	9 - 16	1.0 - 2.0
Very Stiff	17 - 32	2.0 - 4.0
Hard	over 32	> 4.0

Granular Soils (sands)	
Term	**Blows per Foot**
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	over 50

Content	
Term	**%**
Trace	0 - 10
Little (Few)	10 - 20
Some	20 - 35
And (With)	35 - 50

Note: Typically blow counts for the 2nd and 3rd 0.5' intervals should be summed to determine the blows per foot.

Field Tests	
Soil Type	**Test**
Clay	rolls into ribbons when moist (>1" long); content identified by streaking paper
Silty Clay	rolls into ribbons when moist (<1" long), particles not evident to naked eye
Silt	particles only evident under magnification; does not roll into ribbons easily
Sand	sand grains evident with naked eye; feels gritty when rubbed between fingers
Sandy Clay	rolls into ribbons when moist (<1" long), sand grains evident to naked eye; may feel gritty

Sample Type	
Sampling Method	**Sample Symbol**
Auger Cuttings	A
Air Rotary Cuttings	AR
Split Spoon	S
Shelby Tube	ST

Grain Size (Wentworth Scale)		
Particle Size (mm)	**Particle Term**	**Rock Term**
> 256	Boulder	Boulder Conglomerate
64 - 256	Cobble	Cobble Conglomerate
4 - 64	Pebble	Pebble Conglomerate
2 - 4	Granule	Granule
1 - 2	V. coarse gr. sand	Conglomerate
0.5 - 1	Coarse gr. sand	Sandstone
0.25 - 0.5	Medium gr. sand	Sandstone
0.125 - 0.25	Fine grained sand	Sandstone
0.0625 - 0.125	Very Fine gr. sand	Sandstone
0.004 - 0.0625	Silt	Siltstone or Silty Shale
< 0.004	Clay	Claystone or Shale

Mottling	
Abundance Term	**%**
None	0
Few	< 2
Common	2 - 20
Many	> 20
Contrast Term	**Description**
Faint	indistinct
Distinct	easily seen
Prominent	outstanding

Bedding	
Term	**Thickness**
Very Thickly Bedded	thicker than 1 m (3.3')
Thickly Bedded	30 - 100 cm (1'-3.3')
Medium Bedded	10 - 30 cm (4" - 1')
Thinly Bedded	3 - 10 cm (1" - 4")
Very Thinly Bedded	1 - 3 cm (0.4" - 1")
Thickly Laminated	0.3-1 cm (0.12" - 0.4")
Thinly Laminated	< 0.3 cm (< 0.12")

Descriptive Terms	
Lens	Zone equal to or less that 1-inch (2.5 cm) in thickness
Layer	Zone greater than 1-inch (2.5 cm) in thickness
Interbedded	Alternating lenses and/or layers of different media types
Slickensided	Materials having inclined planes of weakness, glossy in appearance
Pockets	Inclusion of one media type in a matrix of another media

Moisture		
Term	**% (Cohesive)**	**% (Granular)**
Dry	< 5	< 5
Damp	5 - 12	5 - 10
Moist	12 - 25	10 - 20
Wet	> 25	> 20

Standard TolTest Description Format

density, color, CLASSIFICATION, additional descriptors, moisture

next NEW CLASSIFICATION

Use dashed line between CLASSIFICATIONS if actual contact depth is not known. Do not use lines (solid or dashed) unless CLASSIFICATION changes (not for color, density, etc.).

[1] If evidence exists that soil is not natural (i.e., mixed with plastic, bricks, red dog, etc.) use FILL as the classification but describe all components.

Example:

	0.5'	ASPHALT AND SUBBASE
S-1		– loose, brown FILL, predominantly silty clay, some bricks, damp [1]
	3.0'	– stiff, brown and gray SILTY CLAY, mottled, trace fine-grained sand, moist
S-2		
		– becomes orange, hard at 5'
	7.7'	– loose, gray SAND AND GRAVEL, medium to coarse-grained, little silt, wet
*S-3		
		– becomes medium dense at 9'

BOTTOM OF BORING AT 14.5'

*indicates sample submitted for analysis

Well Installation Information

Parameter	*Depth (feet)*	*Type*
Bottom of Sand	16	
Bottom of Bentonite	2	
Bottom of Grout		
Bottom of Cement		
Bottom of Screen	16	1-inch PVC, 0.10 slotted
Bottom of Riser	6	1-inch threaded PVC
Top of Riser	0.1	
Well Cover		

Additional Information

TOLTEST, INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329-E

CLIENT: Naval Station Great Lakes, IL	LOCATION: NE of former USTs
DATE: 11/01/10 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16ft	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE: 6.90 / 11-11-10
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
	01		2	N/A	177		Topsoil (fill material, oily soil with crushed stone, brown brick)
	02		2	N/A	211	2	Brown fill (silt with crushed stone mixed)
	03		1	N/A	323	4	Brown sand (SW)
	04		1	1.75	2417	6	Stiff, gray brown mottled, silt (ML), moist
	05		2	1.5	2272	8	Brown sand (SW) wet
						9	Stiff brown gray mottled clayey silt (ML), moist
*	06		2	1.75	3622	10	Stiff gray clayey silt (ML) moist
	07		2	N/A	1506	12	gray silty sand (SM) wet
	08		2		1386	15	Gray silt (ML), moist
						16	Bottom of Boring at 16ft.

Note: High PID readings most likely due to moisture in soil. The soil in this boring was very warm, boring may be in close proximity to an unmarked steam line.

* Sample submitted to the laboratory for analysis.

Soil Descriptors

Cohesive Soils (clays and silts)		
Term	**Blows per Foot**	**Penetrometer**
Very Soft	0 - 2	<0.25
Soft	3 - 4	0.25 - 0.50
Medium Stiff	5 - 8	0.50 - 1.0
Stiff	9 - 16	1.0 - 2.0
Very Stiff	17 - 32	2.0 - 4.0
Hard	over 32	>4.0

Note: Typically blow counts for the 2nd and 3rd 0.5' intervals should be summed to determine the blows per foot.

Granular Soils (sands)	
Term	**Blows per Foot**
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	over 50

Content	
Term	**%**
Trace	0 - 10
Little (Few)	10 - 20
Some	20 - 35
And (With)	35 - 50

Field Tests	
Soil Type	**Test**
Clay	rolls into ribbons when moist (>1" long); content identified by streaking paper
Silty Clay	rolls into ribbons when moist (<1" long), particles not evident to naked eye
Silt	particles only evident under magnification; does not roll into ribbons easily
Sand	sand grains evident with naked eye; feels gritty when rubbed between fingers
Sandy Clay	rolls into ribbons when moist (<1" long), sand grains evident to naked eye; may feel gritty

Sample Type	
Sampling Method	**Sample Symbol**
Auger Cuttings	A
Air Rotary Cuttings	AR
Split Spoon	S
Shelby Tube	ST

Grain Size	(Wentworth Scale)	
Particle Size (mm)	**Particle Term**	**Rock Term**
>256	Boulder	Boulder Conglomerate
64 - 256	Cobble	Cobble Conglomerate
4 - 64	Pebble	Pebble Conglomerate
2 - 4	Granule	Granule
1 - 2	V. coarse gr. sand	Conglomerate
0.5 - 1	Coarse gr. sand	Sandstone
0.25 - 0.5	Medium gr. sand	Sandstone
0.125 - 0.25	Fine grained sand	Sandstone
0.0625 - 0.125	Very Fine gr. sand	Sandstone
0.004 - 0.0625	Silt	Siltstone or Silty Shale
<0.004	Clay	Claystone or Shale

Mottling	
Abundance Term	**%**
None	0
Few	<2
Common	2 - 20
Many	>20
Contrast Term	**Description**
Faint	indistinct
Distinct	easily seen
Prominent	outstanding

Bedding	
Term	**Thickness**
Very Thickly Bedded	thicker than 1 m (3.3')
Thickly Bedded	30 - 100 cm (1'-3.3')
Medium Bedded	10 - 30 cm (4" - 1')
Thinly Bedded	3 - 10 cm (1" - 4")
Very Thinly Bedded	1 - 3 cm (0.4" - 1")
Thickly Laminated	0.3-1 cm (0.12"-0.4")
Thinly Laminated	<0.3 cm (<0.12")

Descriptive Terms	
Lens	Zone equal to or less that 1-inch (2.5 cm) in thickness
Layer	Zone greater than 1-inch (2.5 cm) in thickness
Interbedded	Alternating lenses and/or layers of different media types
Slickensided	Materials having inclined planes of weakness, glossy in appearance
Pockets	Inclusion of one media type in a matrix of another media

Moisture		
Term	**% (Cohesive)**	**% (Granular)**
Dry	<5	<5
Damp	5 - 12	5 - 10
Moist	12 - 25	10 - 20
Wet	>25	>20

Standard TolTest Description Format

density, color, CLASSIFICATION, additional descriptors, moisture

next NEW CLASSIFICATION

Use dashed line between CLASSIFICATIONS if actual contact depth is not known. Do not use lines (solid or dashed) unless CLASSIFICATION changes (not for color, density, etc.).

[1] If evidence exists that soil is not natural (i.e., mixed with plastic, bricks, red dog, etc.) use FILL as the classification but describe all components.

Example:

	0.5'	ASPHALT AND SUBBASE
S-1		– loose, brown FILL, predominantly silty clay, some bricks, damp [1]
	3.0'	– stiff, brown and gray SILTY CLAY, mottled, trace fine-grained sand, moist
S-2		
		– becomes orange, hard at 5'
	7.7'	– loose, gray SAND AND GRAVEL, medium to coarse-grained, little silt, wet
*S-3		
		– becomes medium dense at 9'

BOTTOM OF BORING AT 14.5'

*indicates sample submitted for analysis

Well Installation Information

Parameter	*Depth (feet)*	*Type*
Bottom of Sand	16	
Bottom of Bentonite	2	
Bottom of Grout		
Bottom of Cement		
Bottom of Screen	16	1-inch PVC, 0.10 slotted
Bottom of Riser	6	1-inch threaded PVC
Top of Riser	0.1	
Well Cover		

Additional Information

TOLTEST, INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329-F

CLIENT: Naval Station Great Lakes, IL	LOCATION: Center of former waste oil UST
DATE: 11/01/10 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16 ft	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE: 6.76 / 11-11-10
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
	01		0		N/A		Concrete Brown clay fill with gravel and sand, dry
	02		2		68.5		
						4	
	03		0				
	04		1		52.5		crushed limestone with some black silty clay (CL) in the shoe of the sample spoon.
						8	refusal at 10ft on concrete; moved boring 4ft to the west.
	05		2	0.5	18.1		Gray brown mottled clayey silt (ML) trace sand, moist
						10	
	06		2	0.75	40.7		Very soft gray clayey silt (ML) trace sand, moist.
	07		2	1.0	25.8	13	Medium stiff gray silty clay (CL) trace sand and gravel, damp.
*	08		2	1.0	74.5	16	Bottom of Boring at 16ft.

* Sample submitted to the laboratory for analysis

Soil Descriptors

Cohesive Soils (clays and silts)		
Term	Blows per Foot	Penetrometer
Very Soft	0 - 2	<0.25
Soft	3 - 4	0.25 - 0.50
Medium Stiff	5 - 8	0.50 - 1.0
Stiff	9 - 16	1.0 - 2.0
Very Stiff	17 - 32	2.0 - 4.0
Hard	over 32	>4.0

Granular Soils (sands)	
Term	Blows per Foot
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	over 50

Content	
Term	%
Trace	0 - 10
Little (Few)	10 - 20
Some	20 - 35
And (With)	35 - 50

Note: Typically blow counts for the 2nd and 3rd 0.5' intervals should be summed to determine the blows per foot.

Field Tests	
Soil Type	Test
Clay	rolls into ribbons when moist (>1" long); content identified by streaking paper
Silty Clay	rolls into ribbons when moist (<1" long), particles not evident to naked eye
Silt	particles only evident under magnification; does not roll into ribbons easily
Sand	sand grains evident with naked eye; feels gritty when rubbed between fingers
Sandy Clay	rolls into ribbons when moist (<1" long), sand grains evident to naked eye; may feel gritty

Sample Type	
Sampling Method	Sample Symbol
Auger Cuttings	A
Air Rotary Cuttings	AR
Split Spoon	S
Shelby Tube	ST

Grain Size (Wentworth Scale)		
Particle Size (mm)	Particle Term	Rock Term
>256	Boulder	Boulder Conglomerate
64 - 256	Cobble	Cobble Conglomerate
4 - 64	Pebble	Pebble Conglomerate
2 - 4	Granule	Granule
1 - 2	V. coarse gr. sand	Conglomerate
0.5 - 1	Coarse gr. sand	Sandstone
0.25 - 0.5	Medium gr. sand	Sandstone
0.125 - 0.25	Fine grained sand	Sandstone
0.0625 - 0.125	Very Fine gr. sand	Sandstone
0.004 - 0.0625	Silt	Siltstone or Silty Shale
<0.004	Clay	Claystone or Shale

Mottling	
Abundance Term	%
None	0
Few	<2
Common	2 - 20
Many	>20
Contrast Term	**Description**
Faint	indistinct
Distinct	easily seen
Prominent	outstanding

Bedding	
Term	Thickness
Very Thickly Bedded	thicker than 1 m (3.3')
Thickly Bedded	30 - 100 cm (1'-3.3')
Medium Bedded	10 - 30 cm (4" - 1')
Thinly Bedded	3 - 10 cm (1" - 4")
Very Thinly Bedded	1 - 3 cm (0.4" - 1")
Thickly Laminated	0.3-1 cm (0.12"-0.4")
Thinly Laminated	<0.3 cm (<0.12")

Descriptive Terms	
Lens	Zone equal to or less that 1-inch (2.5 cm) in thickness
Layer	Zone greater than 1-inch (2.5 cm) in thickness
Interbedded	Alternating lenses and/or layers of different media types
Slickensided	Materials having inclined planes of weakness, glossy in appearance
Pockets	Inclusion of one media type in a matrix of another media

Moisture		
Term	% (Cohesive)	% (Granular)
Dry	<5	<5
Damp	5 - 12	5 - 10
Moist	12 - 25	10 - 20
Wet	>25	>20

Standard TolTest Description Format

density, color, CLASSIFICATION, additional descriptors, moisture

next NEW CLASSIFICATION

Use dashed line between CLASSIFICATIONS if actual contact depth is not known. Do not use lines (solid or dashed) unless CLASSIFICATION changes (not for color, density, etc.).

[1] If evidence exists that soil is not natural (i.e., mixed with plastic, bricks, red dog, etc.) use FILL as the classification but describe all components.

Example:

	0.5'	ASPHALT AND SUBBASE
S-1		– loose, brown FILL, predominantly silty clay, some bricks, damp [1]
	3.0'	– stiff, brown and gray SILTY CLAY, mottled, trace fine-grained sand, moist
S-2		
		– becomes orange, hard at 5'
	7.7'	
*S-3		– loose, gray SAND AND GRAVEL, medium to coarse-grained, little silt, wet
		– becomes medium dense at 9'

BOTTOM OF BORING AT 14.5'

*indicates sample submitted for analysis

Well Installation Information

Parameter	*Depth (feet)*	*Type*
Bottom of Sand	16	
Bottom of Bentonite	2	
Bottom of Grout		
Bottom of Cement		
Bottom of Screen	16	1-inch PVC, 0.10 slotted
Bottom of Riser	6	1-inch threaded PVC
Top of Riser	0.1	
Well Cover		

Additional Information

TOLTEST, INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329-G

CLIENT: Naval Station Great Lakes, IL	LOCATION: SW of UST location
DATE: 1/14/11 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16ft.	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE:
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
							0'-20
	01		2		0.4		Concrete Sandy silty Brown fill material
	02		2		0.6	3	Blue gray silty clay
						4	
	03		2		0.6		Brown gray mottled clayey silt
	04		2		0.6		
	05		2		0.6	9	Grey silt trace sand, moist.
	06		2		0.5		
						12.5	
	07		2		0.5		Grey silty clay trace sand & gravel, moist.
*	08		2		0.6		

EOB 16

well 15ft.

11:15 sampled.

TOLTEST, INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329-11

CLIENT: Naval Station Great Lakes, IL	LOCATION: Bldg 329 Concrete pad
DATE: 1/14/11 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16ft.	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE:
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
	01		2		0.3		Concrete 5" Brushed stone 6" Brown sandy silt (fill)
	02		2		0.3	3.75	Grey/Blue silty clay, dry
	03		2		0.3	4.5	Brown clayey silt dry
	04		2		0.4	6.5	Brown silty clay, dry.
	05		2		0.3	9	Brown clayey silt, moist.
	06		2		0.4	10.5	Grey clayey silt, moist.
	07		2		0.2		
X	08		2		0.3	15	Grey silty clay trace sand dry

EOB
16
Well 15 10' Screen
12:45 sample.

TOLTEST, INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329-I

CLIENT: Naval Station Great Lakes, IL	LOCATION: SE of former USTs
DATE: 1/14/11 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16ft	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE:
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

Mini RAE 2000

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
	01		2		0.2		grass topsoil
							Sandy fill, crushed stone, clay.
	02		2		0.3	3	Black clayey silt (topsoil?)
						4	Brown grey mottled silty clay, dry
	03		2		0.2	5	Grey Clayey silt, dry
						6	Grey Sandy Silt damp.
	04		2		0.3	7	Grey clayey silt damp
	05		2		0.3		
	06		2		0.5	12	trace gravel 4" in clayey silt
	07		2		0.4	12	Brown clayey silt, dry.
*	08		2		0.5	14.5	Grey silty clay trace sand, dry

1345 sampled

TOLTEST, INC.

PROJECT NUMBER: 23456.01

SOIL BORING LOG OF 329-J

CLIENT: Naval Station Great Lakes, IL	LOCATION: East of former USTs
DATE: 1/14/11 GEOLOGIST: Tim Boos	SURFACE ELEVATION (ft.):
TOTAL DEPTH (ft): 16	CASING ELEVATION (ft.):
DRILLING METHOD: GeoProbe	DEPTH TO WATER (ft.)/DATE:
DRILLING COMPANY: Terra-Trace	DEPTH TO WATER (ft.)/DATE:

DEPTH (feet)	SAMPLE TYPE AND NUMBER	SPT BLOWS PER 0.5 feet	RECOVERY (feet)	PENETROMETER READING (TSF)	PID READING (ppm) TYPE:	STRAT CHANGE DEPTH (feet)	GEOLOGIC DESCRIPTION
	01		2		0.5		top soil ~~black~~ loam silty clay
	02		2		0.2		
						4	lt gray ~~silt~~ trace sand.
	03		2		0.4		
	04		2		0.5	6½	brown silt trace sand moist.
	05		2		0.5	9	
							Grey silt trace sand, moist.
	06		2		0.5		
	07		2		0.4	13	Brown medium sand, wet.
						13.5	
*	08		2		0.5		Grey silty clay trace sand, moist.
							EOB 16'
							15 ft well
							0910 329-J

APPENDIX C

ANALYTICAL SUMMARY TABLES

Table 2, Groundwater Remediation Objectives
UST Site 10 Closure NAVSTA Great Lakes, Bldg 329

Analyte		Groundwater Remediation Objectives (GROs)		Groundwater Samples								
		Class I (mg/L)	Class II (mg/L)	329-A	329-C	329-D	329-E	329-F	329-G	329-H	329-I	329-J
Metals	Mercury	0.002c	0.01c	0.000051u	No Sample	0.000051u	0.000051u	0.000051u	0.000051u	**0.00017j**	**0.000060j**	0.000051u
	Arsenic	0.05c	0.2c	**0.0044j**	No Sample	**0.024**	**0.013**	**0.029**	**0.0038J**	**0.047**	**0.015**	0.0017u
	Barium	2.0c	2.0c	**0.082**	No Sample	**0.13**	**0.17**	**0.13**	**0.064**	**0.2**	**0.12**	**0.041**
	Cadmium	0.005c	0.05c	0.00025u	No Sample	0.00025u	0.00025u	0.00025u	0.00025u	**0.00050j**	0.00025u	0.00025u
	Chromium	0.1c	1.0c	**0.01**	No Sample	**0.046**	**0.019**	**0.019**	**0.0084J**	**0.089**	**0.028**	0.0014u
	Lead	0.0075c	0.1c	**0.0091**	No Sample	**0.035**	**0.015**	**0.014**	**0.0047J**	**0.066**	**0.022**	**0.0017J**
	Selenium	0.05c	0.05c	**0.0043j**	No Sample	**0.0038j**	**0.0035j**	**0.0027j**	0.0024u	0.0024u	0.0024u	0.0024u
	Silver	0.05c		0.00086u	No Sample	0.00086u	0.00086u	0.00086u	0.00086u	0.00086u	0.00086u	0.00086u
Dissolved Metals	Mercury	0.002c	0.01c	No Sample	No Sample	No Sample	No Sample	No Sample	0.051u	0.051u	0.051u	0.051u
	Arsenic	0.05c	0.2c	No Sample	No Sample	No Sample	No Sample	No Sample	0.0017u	**0.0034j**	0.0017u	0.0017u
	Barium	2.0c	2.0c	No Sample	No Sample	No Sample	No Sample	No Sample	**0.043**	**0.037**	**0.045**	**0.041**
	Cadmium	0.005c	0.05c	No Sample	No Sample	No Sample	No Sample	No Sample	0.00025u	0.00025u	0.00025u	0.00025u
	Chromium	0.1c	1.0c	No Sample	No Sample	No Sample	No Sample	No Sample	0.0014u	0.0014u	0.0014u	0.0014u
	Lead	0.0075c	0.1c	No Sample	No Sample	No Sample	No Sample	No Sample	0.0017u	0.0017u	0.0017u	0.0017u
	Selenium	0.05c	0.05c	No Sample	No Sample	No Sample	No Sample	No Sample	0.0024u	0.0024u	0.0024u	0.0024u
	Silver	0.05c		No Sample	No Sample	No Sample	No Sample	No Sample	0.00086u	0.00086u	0.00086u	0.00086u
PCBs	PCB-1016	0.0005c	0.0025c	0.00019u	No Sample	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u
	PCB-1221	0.0005c	0.0025c	0.00025u	No Sample	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u
	PCB-1232	0.0005c	0.0025c	0.00018u	No Sample	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u
	PCB-1242	0.0005c	0.0025c	0.00017u	No Sample	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u
	PCB-1248	0.0005c	0.0025c	0.000047u	No Sample	0.000047u	0.000047u	0.000047u	0.000047u	0.000047u	0.000047u	0.000047u
	PCB-1254	0.0005c	0.0025c	0.000078u	No Sample	0.000078u	0.000078u	0.000078u	0.000078u	0.000078u	0.000078u	0.000078u
	PCB-1260	0.0005c	0.0025c	0.000067u	No Sample	0.000067u	0.000067u	0.000067u	0.000067u	0.000067u	0.000067u	0.000067u
SVOCs	1,2,4-Trichlorobenzene	0.07c	0.7c	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00025u	0.00037u	0.00024u
	1,2-Dichlorobenzene	0.6c	1.5c	0.00023u	0.00023u	0.00023u	0.00023u	0.00023u	0.00023u	0.00024u	0.00036u	0.00023u
	1,3-Dichlorobenzene			0.00020u	0.00020u	0.00020u	0.00020u	0.00020u	0.0002u	0.0002u	0.0003u	0.0002u
	1,4-Dichlorobenzene	0.075c	0.375c	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00023u	0.00034u	0.00022u
	2,4-Dinitrotoluene	0.00002a	0.00002	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.0004u	0.00026u
	2,6-Dinitrotoluene	0.00031a	0.00031	0.00012u	0.00012u	0.00012u	0.00012u	0.00012u	0.00012u	0.00012u	0.00019u	0.00012u
	2-Chloronaphthalene			0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00031u	0.00021u
	2-Methylnaphthalene			0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00021u	0.00014u
	2-Nitroaniline			0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.002u	0.0013u
	3-Nitroaniline			0.0018u	0.0018u	0.0018u	0.0018u	0.0018u	0.0018u	0.0018u	0.0027u	0.0018u
	3,3'-Dichlorobenzidine	0.02a	0.1	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0019u	0.0012u
	4-Bromophenyl phenyl ether			0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.002u	0.0013u
	4-Chloroaniline	0.028	0.028	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0019u	0.0012u
	4-Chlorophenyl phenyl ether			0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0019u	0.0012u
	4-Nitroaniline			0.0019u	0.0019u	0.0019u	0.0019u	0.0019u	0.0019u	0.0019u	0.0029u	0.0019u
	Acenaphthylene			0.000093u	0.000093u	0.000093u	0.000093u	0.000093u	0.000093u	0.000094u	0.00014u	0.000093u
	Acenaphthene	0.42	2.1	0.000085u	0.000085u	0.000085u	0.000085u	0.000085u	0.000085u	0.000086u	0.00013u	0.000085u
	Anthracene	2.1	10.5	0.00011u	0.00011u	0.00011u	0.00011u	0.00011u	0.00011u	0.00011u	0.00017u	0.00011u
	Benzo[a]anthracene	0.00013a	0.00065	0.000050u	0.000050u	0.000050u	0.000050u	0.000050u	0.00005u	0.000051u	0.000077u	0.00005u
	Benzo[a]pyrene	0.0002a,c	0.002c	0.000042u	0.000042u	0.000042u	0.000042u	0.000042u	0.000042u	0.000042u	0.000064u	0.000042u
	Benzo[k]fluoranthene	0.00017a	0.00085	0.000087u	0.000087u	0.000087u	0.000087u	0.000087u	0.000087u	0.000088u	0.00013u	0.000087u
	Benzo[b]fluoranthene	0.00018a	0.0009	0.000064u	0.000064u	0.000064u	0.000064u	0.000064u	0.000064u	0.000065u	0.000099u	0.000064u
	Benzo[g,h,i]perylene			0.00010u	0.00010u	0.00010u	0.00010u	0.00010u	0.0001u	0.0001u	0.00016u	0.0001u
	Benzyl alcohol			0.0046u	0.0046u	0.0046u	0.0046u	0.0046u	0.0046u	0.0046u	0.007u	0.0046u
	Bis(2-chloroethoxy)methane			0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00025u	0.00037u	0.00024u
	Bis(2-chloroethyl)ether	0.01a	0.01	0.00042u	0.00042u	0.00042u	0.00042u	0.00042u	0.00042u	0.00042u	0.00064u	0.00042u
	bis (2-chloroisopropyl) ether			0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00025u	0.00037u	0.00024u
	Bis(2-ethylhexyl) phthalate	0.006c	0.06c	0.0011u	0.0011u	0.0011u	0.0011u	0.0011u	0.0011u	0.0011u	0.0017u	0.0011u
	Butyl benzyl phthalate	1.4	7	0.00028u	0.00028u	0.00028u	0.00028u	0.00028u	0.00028u	0.00028u	0.00043u	0.00028u
	Chrysene	0.0015a	0.0075	0.00010u	0.00010u	0.00010u	0.00010u	0.00010u	0.0001u	0.0001u	0.00016u	0.0001u
	Di-n-butyl phthalate	0.7	3.5	0.0011u	0.0011u	0.0011u	0.0011u	0.0011u	0.0011u	0.0011u	0.0017u	0.0011u
	Di-n-octyl phthalate	0.14	0.7	0.0015u	0.0015u	0.0015u	0.0015u	0.0015u	0.0015u	0.0015u	0.0023u	0.0015u
	Dibenz(a,h)anthracene	0.0003a	0.0015	0.00011u	0.00011u	0.00011u	0.00011u	0.00011u	0.00011u	0.00011u	0.00017u	0.00011u
	Dibenzofuran			0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u, q	0.0004u	0.00026u
	Diethyl phthalate	5.6	5.6	0.00029u	0.00029u	0.00029u	0.00029u	0.00029u	0.00029u	0.00029u	0.00044u	0.00029u
	Dimethyl phthalate			0.00069u	0.00069u	0.00069u	0.00069u	0.00069u	0.00069u	0.0007u	0.0011u	0.00069u
	Fluoranthene	0.28	1.4	0.000093u	0.000093u	0.000093u	0.000093u	0.000093u	0.000093u	0.000094u	0.00014u	0.000093u
	Fluorene	0.28	1.4	0.00011u	0.00011u	0.00011u	0.00011u	0.00011u	0.00011u	0.00011u	0.00017u	0.00011u
	Hexachlorobenzene	0.00006a	0.0003	0.000088u	0.000088u	0.000088u	0.000088u	0.000088u	0.000088u	0.000089u	0.00013u	0.000088u
	Hexachlorobutadiene			0.0014u	0.0014u	0.0014u	0.0014u	0.0014u	0.0014u	0.0014u	0.0021u	0.0014u
	Hexachloroethane	0.007	0.035	0.0011u	0.0011u	0.0011u	0.0011u	0.0011u	0.0011u	0.0011u	0.0017u	0.0011u
	Indeno[1,2,3-cd]pyrene	0.00043a	0.00215	0.000062u	0.000062u	0.000062u	0.000062u	0.000062u	0.000062u	0.000062u	0.000094u	0.000062u
	Isophorone	1.4	1.4	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00025u, q	0.00037u	0.00024u
	N-Nitrosodiphenylamine			0.00023u	0.00023u	0.00023u	0.00023u	0.00023u	0.00023u	0.00024u	0.00036u	0.00023u
	N-Nitrosodi-n-propylamine	0.0018a	0.0018	0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00021u	0.00014u
	Naphthalene	0.14	0.22	0.00013u	0.00013u	0.00013u	0.00013u	0.00013u	0.00013u	0.00013u	0.0002u	0.00013u
	Nitrobenzene[b]	0.0035	0.0035	0.00035u	0.00035u	0.00035u	0.00035u	0.00035u	0.00035u	0.00035u	0.00053u	0.00035u
	Phenanthrene			0.000073u	0.000073u	0.000073u	0.000073u	0.000073u	0.000073u	0.000074u	0.00011u	0.000073u
	Pyrene	0.21	1.05	0.000089u	0.000089u	0.000089u	0.000089u	0.000089u	0.000089u	0.00009u	0.00014u	0.000089u
	2,4,5-Trichlorophenol	0.7	0.7	0.0017u	0.0017u	0.0017u	0.0017u	0.0017u	0.0017u	0.0017u	0.0026u	0.0017u
	2,4,6-Trichlorophenol	0.01	0.01	0.0010u	0.0010u	0.0010u	0.0010u	0.0010u	0.001u	0.001u	0.0016u	0.001u
	2,4-Dichlorophenol	0.021	0.021	0.00093u	0.00093u	0.00093u	0.00093u	0.00093u	0.00093u	0.00094u, q	0.0014u	0.00093u
	2,4-Dimethylphenol	0.14	0.14	0.0015u	0.0015u	0.0015u	0.0015u	0.0015u	0.0015u	0.0015u	0.0023u	0.0015u
	2,4-Dinitrophenol	0.014	0.014	0.0073u	0.0073u	0.0073u	0.0073u	0.0073u	0.0073u	0.0074u	0.011u	0.0073u

Table 2, Groundwater Remediation Objectives
UST Site 10 Closure NAVSTA Great Lakes, Bldg 329

Analyte		Groundwater Remediation Objectives (GROs)		Groundwater Samples								
		Class I	Class II									
		(mg/L)	(mg/L)	329-A	329-C	329-D	329-E	329-F	329-G	329-H	329-I	329-J
	2-Chlorophenol	0.035	0.035	0.0010u	0.0010u	0.0010u	0.0010u	0.0010u	0.001u	0.001u	0.0016u	0.001u
	2-Methylphenol	0.35	0.35	0.00023u	0.00023u	0.00023u	0.00023u	0.00023u	0.00023u	0.00024u	0.00036u	0.00023u
	2-Nitrophenol			0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.002u	0.0013u
	4,6-Dinitro-2-methylphenol			0.0047u	0.0047u	0.0047u	0.0047u	0.0047u	0.0047u	0.0047u	0.0071u	0.0047u
	4-Chloro-3-methylphenol			0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.0013u	0.002u	0.0013u
	3 & 4 Methylphenol			0.00023u	0.00023u	0.00023u	0.00023u	0.00023u	0.00023u	0.00024u	0.00036u	0.00023u
	4-Nitrophenol			0.0035u	0.0035u	0.0035u	0.0035u	0.0035u	0.0035u	0.0035u	0.0053u	0.0035u
	Benzoic acid			0.0044u	0.0044u	0.0044u	0.0044u	0.0044u	0.0044u	0.0044u	0.0067u	0.0044u
	Pentachlorophenol	0.001c	0.005c	0.0030u	0.0030u	0.0030u	0.0030u	0.0030u	0.003u	0.003u	0.0046u	0.003u
	Phenol	0.1c	0.1c	0.00072u	0.00072u	0.00072u	0.00072u	0.00072u	0.00072u	0.00073u, q	0.0011u	0.00072u
VOCs	1,1,1,2-Tetrachloroethane			0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u
	1,1,1-Trichloroethane[b]	0.2c	1.0c	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u
	1,1,2,2-Tetrachloroethane			0.00029u	0.00029u	0.00029u	0.00029u	0.00029u	0.00029u	0.00029u	0.00029u	0.00029u
	1,1,2-Trichloroethane	0.005c	0.05c	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u
	1,1-Dichloroethane	0.7	3.5	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u
	1,1-Dichloroethene			0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u
	1,1-Dichloropropene			0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u
	1,2,3-Trichlorobenzene			0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u
	1,2,3-Trichloropropane			0.00048u	0.00048u	0.00048u	0.00048u	0.00048u	0.00048u	0.00048u	0.00048u	0.00048u
	1,2,4-Trichlorobenzene	0.07c	0.7c	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u
	1,2,4-Trimethylbenzene			0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00014u	0.00014u
	1,2-Dichloroethane	0.005c	0.025c	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u
	1,2-Dichlorobenzene			0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u
	1,2-Dibromo-3-Chloropropane	0.0002c	0.002c	0.00096u	0.00096u	0.00096u	0.00096u	0.00096u	0.00096u	0.00096u	0.00096u	0.00096u
	1,2-Dichloropropane	0.005c	0.025c	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u
	1,2-Dibromoethane	0.00005c	0.0005c	0.00037u	0.00037u	0.00037u	0.00037u	0.00037u	0.00037u	0.00037u	0.00037u	0.00037u
	1,3,5-Trimethylbenzene			0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u
	1,3-Dichlorobenzene			0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u
	1,3-Dichloropropane			0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u
	1,4-Dichlorobenzene			0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u
	1-Chlorohexane			0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u
	2,2-Dichloropropane			0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u
	2-Chlorotoluene			0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u
	4-Chlorotoluene			0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u
	Acetone	6.3	6.3	0.0016u	0.0016u	0.0016u	0.0016u	0.0016u	0.0016u	0.0016u, q	0.0016u	0.0016u
	Benzene	0.005c	0.025c	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u
	Bromobenzene			0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u	0.00021u
	Bromochloromethane			0.00035u	0.00035u	0.00035u	0.00035u	0.00035u	0.00035u	0.00035u	0.00035u	0.00035u
	Bromodichloromethane	0.0002a,c	0.0002	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u
	Bromoform	0.001a	0.001	0.00042u	0.00042u	0.00042u	0.00042u	0.00042u	0.00042u	0.00042u	0.00042u	0.00042u
	Bromomethane			0.00038u	0.00038u	0.00038u	0.00038u	0.00038u	0.00038u	0.00038u	0.00038u	0.00038u
	Carbon tetrachloride	0.005c	0.025c	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u
	Chlorobenzene	0.1c	0.5c	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u
	Chloroethane			0.00036u	0.00036u	0.00036u	0.00036u	0.00036u	0.00036u	0.00036u, q	0.00036u	0.00036u
	Chloroform	0.0002a	0.001	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u
	Chloromethane			0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u
	cis-1,2-Dichloroethene			0.00027u	0.00027u	0.00027u	0.00027u	0.00027u	0.00027u	0.00027u	0.00027u	0.00027u
	cis-1,3-Dichloropropene	0.001a	0.005	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u	0.00017u
	Dibromochloromethane			0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u	0.00025u
	Dibromomethane			0.00030u	0.00030u	0.00030u	0.00030u	0.00030u	0.0003u	0.0003u	0.0003u	0.0003u
	Dichlorodifluoromethane			0.00031u	0.00031u	0.00031u	0.00031u	0.00031u	0.00031u	0.00031u	0.00031u	0.00031u
	Ethylbenzene	0.7c	1.0c	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u
	Hexachlorobutadiene			0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u	0.00026u
	Isopropylbenzene			0.00020u	0.00020u	0.00020u	0.00020u	0.00020u	0.0002u	0.0002u	0.0002u	0.0002u
	Methylene Chloride	0.005c	0.05c	0.00067u	0.00067u	0.00067u	0.00067u	0.00067u	0.00067u	0.00067u	0.00067u	0.00067u
	Methyl tert-butyl ether	0.07	0.07	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u
	2-Butanone (MEK)			0.0023u	0.0023u	0.0023u	0.0023u	0.0023u	0.0023u	0.0023u	0.0023u	0.0023u
	4-Methyl-2-pentanone (MIBK)			0.00084u	0.00084u	0.00084u	0.00084u	0.00084u	0.00084u	0.00084u	0.00084u	0.00084u
	n-Butylbenzene			0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u	0.00018u
	N-Propylbenzene			0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u
	m-Xylene			0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u
	o-Xylene			0.00038u	0.00038u	0.00038u	0.00038u	0.00038u	0.00038u	0.00038u	0.00038u	0.00038u
	p-Xylene			0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u
	Xylenes, Total	10.0c	10.0c	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u
	Naphthalene	0.14	0.22	0.00044u	0.00044u	0.00044u	0.00044u	0.00044u	0.00044u	0.00044u	0.00044u	0.00044u
	p-Isopropyltoluene			0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u
	sec-Butylbenzene			0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u
	Styrene	0.1c	0.5c	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u	0.00015u
	Trichloroethene			0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u
	tert-Butylbenzene			0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u	0.00016u
	Tetrachloroethene			0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u	0.00022u
	Toluene	1.0c	2.5c	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u	0.00019u
	trans-1,2-Dichloroethene			0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u	0.00032u
	trans-1,3-Dichloropropene	0.001a	0.005	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u	0.00024u
	Trichlorofluoromethane			0.00020u	0.00020u	0.00020u	0.00020u	0.00020u	0.0002u	0.0002u	0.0002u	0.0002u
	Vinyl chloride	0.002c	0.01c	0.00020u	0.00020u	0.00020u	0.00020u	0.00020u	0.0002u	0.0002u	0.0002u	0.0002u

Notes:

a - The groundwater remediation objective is equal to the ADL for carcinogens according to the procedures specified in 35 Ill. Adm. Code 620.
b - Oral Refence Dose and/or Reference Concentration under review by USEPA. Listed values subject to change.
c - Value listed is also the Groundwater Quality Standard for this chemical puruant to 35 Ill. Adm. Code 620.410 for Class I Groundwater or 35 Ill. Adm. Code 620.420 for Class II Groundwater.

d - This chemical is included in the Total Dissolved Solids (TDS) Groundwater Quality Standard of 1,200 mg/l pursuant to 35 Ill. Adm. Code 620.410 for Class I Groundwater or 35 Ill. Adm. Code 620.420 for Class II Groundwater.
j - Estimated: The analyte was positively identified; the quantitation is an estimate.
u - Undetected at the Limit of Detection.
q - One or more quality control criteria failed.
GRO - Groundwater Remediation Objective
Results that are highlighted and in bold are compounds that exceed the GRO for the site.
Highlighted values indicate the GRO for the site.

Table 1, Tier 1 Soil Remediation Objectives for Residential Properties
UST Site 10 Closure NAVSTA Great Lakes, Bldg 329

Analyte		Exposure Route-Specific Values for Soils			Soil Component of the Groundwater Ingestion Exposure Route Values	Section 742 Appendix B, Table C pH Specific SRO for Inorganics for the Soil Component of the Groundwater Ingestion Route (Class I Groundwater)	Section 742 Table H Concentrations of Polynuclear Aromatic Hydrocarbon Chemicals in Background Soils (Metropolitan Areas)	Soil Borings									
				Construction Worker	Class I												
		Ingestion (mg/Kg)	Inhalation (mg/Kg)	Inhalation (mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	329-A	329-B	329-C	329-D	329-E	329-F	329-G	329-H	329-I	329-J
								14-16 ft	14-16 ft	08-10 ft	10-12 ft	10-12 ft	14-16 ft	14-16 ft	14-16 ft	14-16 ft	14-16 ft
pH	pH							**8.63**	no sample	no sample	no sample	no sample	**8.62**	**8.72**	**8.48**	no sample	**8.45**
Metals	Mercury	23b	10b, x	0.1b		a		**0.037**	**0.036**	**0.034**	**0.035**	**0.036**	**0.038**	**0.022**	**0.021**	**0.021**	**0.022**
	Arsenic	t	750e	25,000e		32		**5.5**	**5.4**	**8.5**	**8.6**	**7.9**	**6**	**5.6**	**5.5**	**5.6**	**5.9**
	Barium	5,500b	690,000b	870,000b		a		**47**	**36**	**29j***	**29**	**25**	**61**	**41**	**39**	**63**	**75**
	Cadmium	78b, r	1,800e	59,000e		a		**0.21j***	**0.22**	**0.19j***	**0.23**	**0.17j***	**0.24**	**0.3**	**0.26**	**0.25**	**0.26**
	Chromium	230b	270e	690b		24		**18**	**18**	**12j***	**15**	**12**	**18**	**18**	**18**	**16**	**21**
	Lead	400k	c	c		107		**10**	**11**	**10**	**28**	**10**	**11**	**9.6**	**9.6**	**8.5**	**10**
	Selenium	390b	c	c		1.8		**0.42j***	**0.24j***	**0.46j***	**0.52j***	0.26u	0.26u	**0.38j**	0.26u	0.22u	**0.27**
	Silver	390b	c	c		a		**0.29j*,b***	**0.19j*,b***	**0.11j*,b***	**0.11j*,b***	**0.10j***	**0.18j*,b***	0.088u	0.09u	0.076u	0.089u
PCBs	PCB-1016	1h	c,h	c,h	h			0.0046u	0.0044u	0.0046u	0.0045u	0.0043u	0.0046u	0.0046u	0.0046u	0.0046u	0.0046u
	PCB-1221	1h	c,h	c,h	h			0.0072u	0.0069u	0.0073u	0.0071u	0.0068u	0.0073u	0.0073u	0.0072u	0.0072u	0.0072u
	PCB-1232	1h	c,h	c,h	h			0.0067u	0.0063u	0.0067u	0.0065u	0.0063u	0.0067u	0.0067u	0.0067u	0.0066u	0.0066u
	PCB-1242	1h	c,h	c,h	h			0.0059u	0.0056u	0.0059u	0.0057u	0.0055u	0.0059u	0.0059u	0.0058u	0.0058u	0.0058u
	PCB-1248	1h	c,h	c,h	h			0.0066u	0.0062u	**0.058**	0.0064u	0.0062u	0.0066u	0.0066u	0.0065u	0.0065u	0.0065u
	PCB-1254	1h	c,h	c,h	h			0.006u	0.0057u	0.0060u	0.0058u	0.0056u	0.0060u	0.006u	0.006u	0.0059u	0.0059u
	PCB-1260	1h	c,h	c,h	h			0.0062u	0.0059u	0.0062u	0.0061u	0.0059u	0.0063u	0.0062u	0.0062u	0.0061u	0.0061u
SVOCs	1,2,4-Trichlorobenzene	780b	3,200b, x	920b	5			0.023u	0.023u	0.024u	0.024u	0.022u	0.024u	0.023u	0.023u	0.023u	0.023u
	1,2-Dichlorobenzene	7,000b	560d, x	310b	17			0.020u	0.021u	0.021u	0.021u	0.02u	0.021u	0.02u	0.02u	0.02u	0.02u
	1,3-Dichlorobenzene							0.020u	0.021u	0.021u	0.021u	0.02u	0.021u	0.02u	0.021u	0.02u	0.021u
	1,4-Dichlorobenzene	c	11,000b, x	340b	2			0.021u	0.021u	0.022u	0.022u	0.02u	0.022u	0.021u	0.021u	0.021u	0.021u
	2,4-Dinitrotoluene	0.9e	c	c	0.0008e			0.038u	0.039u	0.040u	0.040u	0.037u	0.040u	0.038u	0.039u	0.038u	0.039u
	2,6-Dinitrotoluene	0.9e	c	c	0.0007e			0.025u	0.025u	0.026u	0.026u	0.024u	0.026u	0.025u	0.025u	0.025u	0.025u
	2-Chloronaphthalene	6,300b	c	c	49b			0.015u	0.015u	0.016u	0.016u	0.015u	0.015u	0.015u	0.015u	0.015u	0.015u
	2-Methylnaphthalene						0.14	**0.074j***	**0.073j***	0.015u	0.015u	0.014u	**0.023j***	**0.046j**	**0.11j**	**0.017j**	**0.035j**
	2-Nitroaniline	230b	35b	3.6b	0.14b			0.022u	0.022u	0.023u	0.023u	0.021u	0.022u	0.022u	0.022u	0.022u	0.022u
	3-Nitroaniline	23b	250b	26b	0.01b			0.064u	0.066u	0.068u	0.067u	0.063u	0.067u	0.064u	0.065u	0.065u	0.065u
	3,3'-Dichlorobenzidine	1e	c	c	0.007e			0.027u	0.028u	0.029u	0.028u	0.027u	0.028u	0.027u	0.028u	0.027u	0.028u
	4-Bromophenyl phenyl ether							0.023u	0.023u	0.024u	0.024u	0.022u	0.024u	0.023u	0.023u	0.023u	0.023u
	4-Chloroaniline	310b	c	c	0.7b			0.12u	0.12u	0.12u	0.12u	0.11u	0.12u	0.12u	0.12u	0.12u	0.12u
	4-Chlorophenyl phenyl ether							0.041u	0.042u	0.043u	0.043u	0.04u	0.043u	0.041u	0.041u	0.041u	0.041u
	4-Nitroaniline	230b	1,000b	110b	0.1b			0.063u	0.065u	0.067u	0.066u	0.062u	0.066u	0.063u	0.064u	0.064u	0.064u
	Acenaphthylene	2,300b	c	c	85b		0.13	0.0057u	0.0059u	0.0060u	0.0060u	0.0056u	0.006u	0.0057u	0.0058u	0.0058u	0.0058u
	Acenaphthene	4,700b	c	c	570b		0.07	0.0077u	0.0079u	0.0081u	0.0081u	0.0076u	0.008u	0.0077u	0.0078u	0.0077u	0.0078u
	Anthracene	23,000b	c	c	12,000b		0.4	0.0067u	0.0069u	0.0071u	0.0071u	0.0066u	0.007u	0.0067u	0.0069u	0.0068u	0.0069u
	Benzo[a]anthracene	0.9e, w	c	c	2		1.8	0.0079u	0.0081u	0.0084u	0.0083u	0.0078u	0.0083u	0.0079u	0.0081u	0.008u	0.008u
	Benzo[a]pyrene	0.09e, w	c	c	8		2.1	0.0071u	0.0073u	0.0075u	0.0074u	0.0070u	0.0074u	0.0071u	0.0072u	0.0071u	0.0072u, j
	Benzo[k]fluoranthene	9e	c	c	49		1.7	0.0086u	0.0089u	0.0091u	0.0091u	0.0085u	0.009u	0.0087u	0.0088u	0.0087u	0.0088u
	Benzo[b]fluoranthene	0.9e, w	c	c	5		2.1	0.0076u	0.0078u	0.0081u	0.0080u	0.0075u	0.008u	0.0076u	0.0078u	0.0077u	0.0078u
	Benzo[g,h,i]perylene	2,300b	c	c	27,000b		1.7	**0.022j***	**0.014j***	0.0095u	**0.012j***	**0.0091j***	**0.012j***	**0.029j**	**0.032j**	**0.021j**	**0.032j**
	Benzyl alcohol	39,000b	6,100d	6,100d	15b			0.096u	0.098u	0.10u	0.10u	0.094u	0.1u	0.096u	0.098u	0.096u	0.097u

Table 1, Tier 1 Soil Remediation Objectives for Residential Properties
UST Site 10 Closure NAVSTA Great Lakes, Bldg 329

Analyte	Exposure Route-Specific Values for Soils			Soil Component of the Groundwater Ingestion Exposure Route Values	Section 742 Appendix B, Table C pH Specific SRO for Inorganics for the Soil Component of the Groundwater Ingestion Route (Class I Groundwater)	Section 742 Table H Concentrations of Polynuclear Aromatic Hydrocarbon Chemicals in Background Soils (Metropolitan Areas)	Soil Borings									
			Construction Worker	Class I												
	Ingestion (mg/Kg)	Inhalation (mg/Kg)	Inhalation (mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	329-A	329-B	329-C	329-D	329-E	329-F	329-G	329-H	329-I	329-J
Bis(2-chloroethoxy)methane							0.015u	0.015u	0.016u	0.016u	0.015u	0.016u	0.015u	0.015u	0.015u	0.015u
Bis(2-chloroethyl)ether	0.6e	0.2e	0.66e	0.0004e			0.021u	0.022u	0.023u	0.022u	0.021u	0.022u	0.021u	0.022u	0.021u	0.022u
bis (2-chloroisopropyl) ether	3,100b	1,300d	1,300d	2.4b			0.040u	0.041u	0.042u	0.042u	0.039u	0.041u	0.04u	0.04u	0.04u	0.04u
Bis(2-ethylhexyl) phthalate	46e	31,000d	31,000d	3,600			0.020u	0.021u	0.021u	0.021u	0.020u	0.021u	0.02u	0.02u	0.02u	0.02u
Butyl benzyl phthalate	16,000b	930d	930d	930d			0.031u	0.032u	0.033u	0.032u	0.030u	0.032u	0.031u	0.031u	0.031u	0.031u
Chrysene	88e	c	e	160		2.7	**0.026j***	**0.023j*,m***	**0.017j***	**0.029j***	**0.021j***	**0.022j***	**0.023j**	**0.031j**	**0.023j**	**0.037**
Di-n-butyl phthalate	7,800b	2,300d	2,300d	2,300d			0.020u	0.021u	**0.030j***	0.021u	0.02u	0.021u	0.02u	0.021u	0.021u	0.021u
Di-n-octyl phthalate	1,600b	10,000d	10,000d	10,000d			0.030u	0.030u	0.031u	0.031u	0.029u	0.031u	0.03u	0.03u	0.03u	0.03u
Dibenzo(a,h)anthracene	0.09e, w	c	c	2		0.42	0.0093u	0.0096u	0.0098u	0.0098u	0.0092u	0.0097u	0.0093u	0.0095u	0.0094u	0.0095u
Dibenzofuran	c	c	c	c			0.042u	0.043u	0.044u	0.044u	0.041u	0.044u	0.042u	0.043u	0.042u	0.043u
Diethyl phthalate	63,000b	2,000d	2,000d	470b			0.040u	0.041u	0.042u	0.042u	0.04u	0.042u	0.04u	0.041u	0.04u	0.041u
Dimethyl phthalate							0.016u	0.017u	0.017u	0.017u	0.016u	0.017u	0.016u	0.017u	0.016u	0.016u
Fluoranthene	3,100b	c	c	4,300b		4.1	0.0069u	0.0071u	0.0073u	0.0072u	0.0068u	0.0072u	0.0069u	0.007u	0.0069u	0.007u
Fluorene	3,100b	c	c	560b		0.18	0.0070u	0.0072u	0.0074u	0.0074u	0.0069u	0.0073u	0.007u	0.0072u	0.0071u	0.0072u
Hexachlorobenzene	0.4e	1e	2.6e	2			0.0071u	0.0073u	0.0075u	0.0075u	0.007u	0.0074u	0.0071u	0.0072u	0.0072u	0.0072u
Hexachlorobutadiene	78b, r	150d	72	2.2b			0.028u	0.029u	0.030u	0.03u	0.028u	0.03u	0.028u	0.029u	0.029u	0.029u
Hexachloroethane	78b	c	c	0.5b			0.028u	0.029u	0.030u	0.029u	0.028u	0.029u	0.028u	0.028u	0.028u	0.028u
Indeno[1,2,3-cd]pyrene	0.9e, w	c	c	14		1.6	0.0094u	0.0097u	0.0099u	0.0099u	0.0092u	0.0098u	0.0094u	0.0096u	0.0094u	0.0095u, j
Isophorone	15,600b	4,600d	4,600d	8b			0.082u	0.084u	0.087u	0.086u	0.081u	0.086u	0.082u	0.084u	0.083u	0.084u
N-Nitrosodiphenylamine	130e	c	c	1e			0.020u	0.021u	0.027u	0.021u	0.02u	0.021u	0.02u	0.02u	0.02u	0.02u
N-Nitrosodi-n-propylamine	0.09e	c	c	0.00005e			0.026u	0.026u	0.027u	0.027u	0.025u	0.027u	0.026u	0.026u	0.026u	0.026u
Naphthalene	1,600b	170b, x	1.8b	12b		0.2	**0.019j***	**0.026j***	0.0071u	0.007u	0.0066u	0.007u	0.0067u	0.0068u	0.0067u	0.0068u
Nitrobenzene	39b	92b,x	9.4b	0.1b			0.0089u	0.0091u	0.0094u	0.0093u	0.0088u	0.0093u	0.0089u	0.0091u	0.009u	0.0091u
Phenanthrene	2,300b	c	c	200b		2.5	0.053	**0.05**	0.0077u	**0.026j***	**0.022j***	**0.041**	**0.044**	**0.058**	**0.034j**	**0.041**
Pyrene	2,300b	c	c	4,200b		3	0.013u	0.013u	0.013u	0.013u	0.012u	0.013u	0.013u	0.013u	0.013u	**0.013j**
2,4,5-Trichlorophenol	7,800b	c	c	270b,i			0.082u	0.084u	0.087u	0.086u	0.081u	0.086u	0.082u	0.084u	0.083u	0.084u
2,4,6-Trichlorophenol	58e	200e	540e	0.2e,i			0.079u	0.082u	0.084u	0.083u	0.078u	0.083u	0.079u	0.081u	0.08u	0.081u
2,4-Dichlorophenol	230b	c	c	1b,i			0.047u	0.048u	0.049u	0.049u	0.046u	0.049u	0.047u	0.048u	0.047u	0.048u
2,4-Dimethylphenol	1,600b	c	c	9b			0.12u	0.13u	0.13u	0.13u	0.12u	0.13u	0.12u	0.12u	0.12u	0.12u
2,4-Dinitrophenol	160b	c	c	0.2b			0.27u	0.28u	0.29u,q	0.28u	0.27u	0.28u	0.27u, q	0.28u, q	0.27u, q	0.28u, q
2-Chlorophenol	390b	53,000d	53,000d	4b,i			0.019u	0.020u	0.020u	0.02u	0.019u	0.02u	0.019u	0.019u	0.019u	0.019u
2-Methylphenol	3,900b	c	c	15b			0.027u	0.028u	0.029u	0.029u	0.027u	0.029u	0.027u	0.028u	0.028u	0.028u
2-Nitrophenol							0.11u	0.11u	0.11u	0.11u	0.11u	0.11u	0.11u	0.11u	0.11u	0.11u
4,6-Dinitro-2-methylphenol							0.069u	0.071u	0.073u,q	0.073u	0.068u	0.073u	0.07u, q	0.071u, q	0.07u, q	0.071u, q
4-Chloro-3-methylphenol							0.090u	0.093u	0.095u	0.095u	0.089u	0.094u	0.09u	0.092u	0.091u	0.092u
3 & 4 Methylphenol	390b	c	c	0.2b			0.037u	0.038u	0.039u	0.039u	0.036u	0.038u	0.037u	0.038u	0.037u	0.037u
4-Nitrophenol							0.30u	0.31u	0.31u	0.31u	0.29u	0.31u	0.3u	0.3u	0.3u	0.3u
Benzoic acid							0.35u	0.36u	0.37u,q	0.37u	0.35u	0.37u	0.35u, q	0.36u, q	0.36u, q	0.36u, q
Pentachlorophenol	3e,j	c	c	0.03i			0.12u	0.13u	0.13u	0.13u	0.12u	0.13u	0.12u	0.12u	0.12u	0.12u

Table 1, Tier 1 Soil Remediation Objectives for Residential Properties
UST Site 10 Closure NAVSTA Great Lakes, Bldg 329

Analyte		Exposure Route-Specific Values for Soils			Soil Component of the Groundwater Ingestion Exposure Route Values	Section 742 Appendix B, Table C pH Specific SRO for Inorganics for the Soil Component of the Groundwater Ingestion Route (Class I Groundwater)	Section 742 Table H Concentrations of Polynuclear Aromatic Hydrocarbon Chemicals in Background Soils (Metropolitan Areas)	Soil Borings									
				Construction Worker	Class I												
		Ingestion (mg/Kg)	Inhalation (mg/Kg)	Inhalation (mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	329-A	329-B	329-C	329-D	329-E	329-F	329-G	329-H	329-I	329-J
	Phenol	23,000b	c	c	100b			0.039u	0.040u	0.041u	0.041u	0.038u	0.04u	0.039u	0.039u	0.039u	0.039u
VOCs	1,1,1,2-Tetrachloroethane	2,300b	2,100d	2,100d	3.2b			0.00088u	0.00078u	0.00090u	0.0097u	0.00081u	0.00082u	0.0008u	0.00082u	0.00081u	0.00083u
	1,1,1-Trichloroethane	c	1,200d	1,200d	2			0.00080u	0.00070u	0.00081u	0.013u	0.00073u	0.00074u	0.00072u	0.00074u	0.00073u	0.00075u
	1,1,2,2-Tetrachloroethane	310b	2,000d	2,000d	0.22b			0.00070u	0.00062u	0.00071u	0.014u	0.00065u	0.00065u	0.00063u	0.00065u	0.00064u	0.00066u
	1,1,2-Trichloroethane	310b	1,800d	1,800d	0.02			0.00092u	0.00081u	0.00094u	0.020u	0.00085u	0.00086u	0.00083u	0.00085u	0.00084u	0.00086u
	1,1-Dichloroethane	7,800b	1,300b,x	130b	23b			0.00059u	0.00052u	0.00060u	0.0086u	0.00054u	0.00055u	0.00053u	0.00054u	0.00053u	0.00055u
	1,1-Dichloroethene							0.0011u	0.00093u	0.0011u	0.013u	0.00097u	0.00099u	0.00096u	0.00098u	0.00096u	0.00099u
	1,1-Dichloropropene							0.00091u	0.00081u	0.00093u	0.013u	0.00084u	0.00085u	0.00083u	0.00084u	0.00083u	0.00085u
	1,2,3-Trichlorobenzene							0.0015u	0.0013u	0.0015u	0.033u	0.0014u	0.0014u	0.0014u	0.0014u	0.0014u	0.0014u
	1,2,3-Trichloropropane	0.092e	730d	730d	0.0001e			0.00075u	0.00066u	0.00076u	0.030u,q	0.00069u	0.00070u	0.00068u	0.00069u	0.00068u	0.0007u
	1,2,4-Trichlorobenzene							0.0013u	0.0012u	0.0014u	0.014u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u
	1,2,4-Trimethylbenzene	c	87b	0.87b	c,h			0.00091u	0.00081u	0.00093u	0.011u	0.00084u	0.00085u	0.00083u	0.00084u	0.00083u	0.00085u
	1,2-Dichloroethane	7e	0.4e	0.99e	0.02			0.00077u	0.00068u	0.00078u	0.010u	0.00071u	0.00072u	0.0007u	0.00071u	0.0007u	0.00072u
	1,2-Dichlorobenzene	7,000b	560d,x	310b	17			0.00077u	0.00068u	0.00078u	0.020u	0.00071u	0.00072u	0.0007u	0.00071u	0.0007u	0.00072u
	1,2-Dibromo-3-Chloropropane	0.46e	11b,x	0.11b	0.002			0.00081u	0.00071u	0.00082u	0.026u	0.00074u	0.00075u	0.00073u	0.00075u	0.00074u	0.00076u
	1,2-Dichloropropane	9e	15b,x	0.50b	0.03			0.00071u	0.00063u	0.00072u	0.014u	0.00066u	0.00066u	0.00064u	0.00066u	0.00065u	0.00067u
	1,2-Dibromoethane	0.32e	0.06e	0.16e	0.0004			0.00078u	0.00069u	0.00079u	0.031u	0.00072u	0.00073u	0.0007u	0.00072u	0.00071u	0.00073u
	1,3,5-Trimethylbenzene	3,900b	46b	4.7b	10b			0.00087u	0.00077u	0.00089u	0.013u	0.00081u	0.00082u	0.00079u	0.00081u	0.0008u	0.00082u
	1,3-Dichlorobenzene							0.00086u	0.00076u	0.00088u	0.017u	0.00080u	0.00081u	0.00078u	0.0008u	0.00079u	0.00081u
	1,3-Dichloropropane	1,600b	1,000d	1,000d	0.83b			0.00075u	0.00066u	0.00076u	0.013u,q	0.00069u	0.00070u	0.00068u	0.00069u	0.00068u	0.0007u
	1,4-Dichlorobenzene	c	11,000b,x	340b	2			0.00086u	0.00076u	0.00088u	0.015u	0.00080u	0.00081u	0.00078u	0.0008u	0.00079u	0.00081u
	1-Chlorohexane							0.00071u	0.00063u	0.00072u	0.013u	0.00066u	0.00066u	0.00064u	0.00066u	0.00065u	0.00067u
	2,2-Dichloropropane							0.00095u	0.00084u	0.00097u	0.011u	0.00088u	0.00089u	0.00086u	0.00088u	0.00087u	0.00089u
	2-Chlorotoluene	1,600b	1,400d	1,400d	4b			0.00088u	0.00078u	0.00090u	0.0098u	0.00081u	0.00082u	0.0008u	0.00082u	0.00081u	0.00083u
	4-Chlorotoluene	1,600b	1,400d	1,400d	4b			0.00088u	0.00078u	0.00090u	0.0087u	0.00081u	0.00082u	0.0008u	0.00082u	0.00081u	0.00083u
	Acetone	70,000b	100,000d	100,000d	25b			0.0020u	0.0018u	0.0021u	0.11u	**0.0095m***	0.0019u	0.0018u, q	0.0019u, q	0.0018u, q	0.0019u, q
	Benzene	12e	0.8e	2.2e	0.03			0.00069u	0.00061u	0.00070u	0.0050u	0.00064u	0.00065u	0.00063u	0.00064u	0.00063u	0.00065u
	Bromobenzene	1,600b	100b	11b	2.2b			0.00085u	0.00076u	0.00087u	0.014u	0.00079u	0.00080u	0.00077u	0.00079u	0.00078u	0.0008u
	Bromochloromethane							0.00081u	0.00071u	0.00082u	0.037u	0.00074u	0.00075u	0.00073u	0.00075u	0.00074u	0.00076u
	Bromodichloromethane	10e	3,000d	3,000d	0.6			0.00074u	0.00065u	0.00075u	0.017u	0.00068u	0.00069u	0.00067u	0.00068u	0.00067u	0.00069u
	Bromoform	81e	53e	140e	0.8			0.00078u	0.00069u	0.00079u	0.023u	0.00072u	0.00073u	0.0007u	0.00072u	0.00071u	0.00073u
	Bromomethane							0.0018u,q	0.0016u	0.0018u	0.030u,q	0.0016u	0.0017u	0.0016u	0.0016u	0.0016u	0.0017u
	Carbon tetrachloride	5e	0.3e	0.90e	0.07			0.0011u	0.00098u	0.0011u	0.020u	0.0010u	0.0010u	0.001u	0.001u	0.001u	0.001u
	Chlorobenzene	1,600b	130b,x	1.3b	1			0.00080u	0.00070u	0.00081u	0.0099u	0.00073u	0.00074u	0.00072u	0.00074u	0.00073u	0.00075u
	Chloroethane	c	1,500d	97b	c			0.0013u	0.0012u	0.0013u	0.026u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u	0.0012u
	Chloroform	100e	0.3e	0.76e	0.6			0.00068u	0.00060u	0.00069u	0.0066u	0.00063u	0.00064u	0.00062u	0.00063u	0.00062u	0.00064u
	Chloromethane	c	110b	11b	c			0.00095u	0.00084u	0.00097u	0.020u	0.00088u	0.00089u	0.00086u	0.00088u	0.00087u	0.00089u
	cis-1,2-Dichloroethene							0.00072u	0.00064u	0.00073u	0.013u	0.00066u	0.00067u	0.00065u	0.00067u	0.00066u	0.00067u
	cis-1,3-Dichloropropene							0.00048u	0.00042u	0.00049u	0.0074u	0.00044u	0.00045u	0.00043u	0.00044u	0.00044u	0.00045u
	Dibromochloromethane	1,600b	1,300d	1,300d	0.4			0.00070u	0.00062u	0.00071u	0.018u	0.00065u	0.00065u	0.00063u	0.00065u	0.00064u	0.00066u
	Dibromomethane							0.00068u	0.00060u	0.00069u	0.035u	0.00063u	0.00064u	0.00062u	0.00063u	0.00062u	0.00064u
	Dichlorodifluoromethane							0.0014u	0.0012u	0.0014u	0.033u	0.0013u	0.0013u	0.0012u	0.0013u	0.0012u	0.0013u
	Ethylbenzene	7,800b	400d, x	58b	13			0.00077u	0.00068u	0.00078u	0.0044u	0.00071u	0.00072u	0.0007u	0.00071u	0.0007u	0.00072u

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Analyte	Exposure Route-Specific Values for Soils			Soil Component of the Groundwater Ingestion Exposure Route Values	Section 742 Appendix B, Table C pH Specific SRO for Inorganics for the Soil Component of the Groundwater Ingestion Route (Class I Groundwater)	Section 742 Table H Concentrations of Polynuclear Aromatic Hydrocarbon Chemicals in Background Soils (Metropolitan Areas)	Soil Borings									
			Construction Worker	Class I												
	Ingestion (mg/Kg)	Inhalation (mg/Kg)	Inhalation (mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	329-A	329-B	329-C	329-D	329-E	329-F	329-G	329-H	329-I	329-J
Hexachlorobutadiene	78b	150d	72	2.2b			0.0010u	0.00092u	0.0011u	0.032u	0.00096u	0.00097u	0.00094u	0.00096u	0.00095u	0.00097u
Isopropylbenzene							0.00091u	0.00081u	0.00093u	0.015u	0.00084u	0.00085u	0.00083u	0.00084u	0.00083u	0.00085u
Methylene Chloride	85e	13e	34e	0.02e			0.0017u	0.0015u	0.0017u	0.027u	0.0016u	0.0016u	0.0015u	0.0016u	0.0016u	0.0016u
Methyl tert-butyl ether	780b	8,800d,x	140b	0.32			0.00084u	0.00074u	0.00085u	0.013u	0.00077u	0.00078u	0.00076u	0.00077u	0.00076u	0.00078u
2-Butanone (MEK)							0.0022u	0.0020u	0.0022u	0.084u	0.0020u	0.0021u	0.002u	0.002u	0.002u	0.0021u
4-Methyl-2-pentanone (MIBK)							0.00097u	0.00086u	0.00099u	0.049u	0.00089u	0.00091u	0.00088u	0.0009u	0.00089u	0.00091u
n-Butylbenzene							0.00091u	0.00081u	0.00093u	0.0085u	0.00084u	0.00085u	0.00083u	0.00084u	0.00083u	0.00085u
N-Propylbenzene							0.00082u	0.00072u	0.00083u	0.0095u	0.00075u	0.00076u	0.00074u	0.00075u	0.00075u	0.00076u
m-Xylene	16,000b	420d,x	6.4b	210			0.0015u	0.0013u	0.0015u	0.010u	0.0014u	0.0014u	0.0013u	0.0014u	0.0013u	0.0014u
o-Xylene	16,000b	410d,x	6.5b	190			0.00084u	0.00074u	0.00085u	0.0022u	0.00077u	0.00078u	0.00076u	0.00077u	0.00076u	0.00078u
p-Xylene	16,000b	460d,x	5.9b	200			0.0015u	0.0013u	0.0015u	0.010u	0.0014u	0.0014u	0.0013u	0.0014u	0.0013u	0.0014u
Xylenes, Total	16,000b	320d,x	5.6b	150			0.00084u	0.00074u	0.00085u	0.0022u	0.00077u	0.00078u	0.00076u	0.00077u	0.00076u	0.00078u
Naphthalene							0.0022u	0.0020u	0.0023u	0.016u	0.0021u	0.0021u	0.002u	0.0021u	0.002u	0.0021u
p-Isopropyltoluene							0.00088u	0.00078u	0.00090u	0.014u	0.00081u	0.00082u	0.0008u	0.00082u	0.00081u	0.00083u
sec-Butylbenzene							0.00093u	0.00082u	0.00095u	0.0089u	0.00086u	0.00087u	0.00084u	0.00086u	0.00085u	0.00087u
Styrene	16,000b	1,500d,x	430b	4			0.00079u	0.00070u	0.00080u	0.014u	0.00073u	0.00074u	0.00071u	0.00073u	0.00072u	0.00074u
Trichloroethene							0.00073u	0.00064u	0.00074u	0.0044u	0.00067u	0.00068u	0.00066u	0.00067u	0.00067u	0.00068u
tert-Butylbenzene							0.00089u	0.00079u	0.00091u	0.011u	0.00082u	0.00083u	0.00081u	0.00082u	0.00082u	0.00084u
Tetrachloroethene							0.00087u	0.00077u	0.00089u	0.013u	0.00081u	0.00082u	0.00079u	0.00081u	0.0008u	0.00082u
Toluene	16,000b	650d,x	42b	12			0.00068u	0.00060u	0.00069u	0.0036u	0.00063u	0.00064u	0.00062u	0.00063u	0.00062u	0.00064u
trans-1,2-Dichloroethene							0.00083u	0.00073u	0.00084u	0.016u	0.00076u	0.00077u	0.00075u	0.00076u	0.00075u	0.00077u
trans-1,3-Dichloropropene							0.00070u	0.00062u	0.00071u	0.016u	0.00065u	0.00065u	0.00063u	0.00065u	0.00064u	0.00066u
Trichlorofluoromethane							0.00099u	0.00087u	0.0010u	0.016u	0.00091u	0.00092u	0.0009u	0.00091u	0.0009u	0.00093u
Vinyl chloride	0.46e	0.28e	1.1b	0.01			0.00090u	0.00080u	0.00092u	0.0037u	0.00083u	0.00084u	0.00082u	0.00083u	0.00082u	0.00084u

Notes:

a - no data available for this pH range

b - Calculated values correspond to a target hazard quotient of 1.

c - No toxicity criteria available for the route of exposure.

d - Soil saturation concentration ($C_{(sat)}$) = the concentration at which the absorptive limits of the soil particles, the solubility limits of the available soil moisture, and saturation of soil pore air have been reached. Above the soil saturation concentration, the assumptions regarding vapor transport to air and/or dissolved phase transport to groundwater (for chemicals which are liquid at ambient soil temperatures) have been violated, and alternative modeling approaches are required.

e - Calculated values correspond to a cancer risk level of 1 in 1,000,000.

h - 40 CFR 761 contains applicability requirements and methodologies for the development of PCB remediation objectives. Requests for approval of Tier 3 evaluation must address the applicability of 40 CFR 761.

i- Soil remediation objective for pH of 6.8. If soil pH is other than 6.8, refer to Appendix B, Tables C and D in this Part.

j - Ingestion soil remediation objective adjusted by a factor of 0.5 to account for dermal route.

k - A preliminary remediation goal of 400 mg/kg has been set for lead based on Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, OSWER Directive #9355.4-12

l - Potential for soil-plant-human exposure.

m - The person conducting the remediation has the option to use: 1) TCLP or SPLP test results to compare with the remediation objectives listed in this Table; 2) where applicable, the total amount of contaminant in the soil sample results to compare with pH specific remediation objectives listed in Appendix B, Table C or D of this Part (see Section 742.510); or 3) the appropriate background value listed in Appendix A, Table G. If the person conducting the remediation wishes to calculate soil remediation objectives based on background concentrations, this should be done in accordance with Subpart D of this Part.

Table 1, Tier 1 Soil Remediation Objectives for Residential Properties UST Site 10 Closure NAVSTA Great Lakes, Bldg 329																
Analyte	Exposure Route-Specific Values for Soils			Soil Component of the Groundwater Ingestion Exposure Route Values	Section 742 Appendix B, Table C pH Specific SRO for Inorganics for the Soil Component of the Groundwater Ingestion Route (Class I Groundwater)	Section 742 Table H Concentrations of Polynuclear Aromatic Hydrocarbon Chemicals in Background Soils (Metropolitan Areas)	Soil Borings									
			Construction Worker	Class I												
	Ingestion (mg/Kg)	Inhalation (mg/Kg)	Inhalation (mg/Kg)	(mg/Kg)	(mg/Kg)	(mg/Kg)	329-A	329-B	329-C	329-D	329-E	329-F	329-G	329-H	329-I	329-J

n - The Agency reserves the right to evaluate the potential for remaining contaminant concentrations to pose significant threats to crops, livestock, or wildlife.
r - Value based on dietary Reference Dose.
t - For the ingestion route for arsenic for industrial/commercial, see 742. Appendix A, Table G.
x - For any populated areas as defined in Section 742.200, Appendix A, Table H may be used.
y - Value based on maintaining fetal blood lead below 10 ug/dl, using the USEPA adult Blood Lead Model.
* - indicates that the ADL is less than or equal to the specified remediation objective.
u - Undetected at the Limit of Detection.
j* - Estimated: The analyte was positively identified; the quanitation is an estimate.
q - One or more quality control criteria failed.
b* - Blank contamination: The analyte was detected above one-half the reporting limit in an associated blank.
m* - Manual intergrated compound.
SRO - Soil Remediation Objective
Results that are highlighted and in bold are compounds that exceed the SRO for the site.
Highlighted values indicate the soil remediation objective for the site accounting for the background values as provided in Table G of Appendix A in TACO for residentual properties.

APPENDIX D

LABORATORY ANALYTICAL DATA