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Year 1 Annual Groundwater Monitoring Report for Area A Landfill

Naval Submarine Base - New London
Groton, Connecticut

Engineering Field Activity Northeast
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298
Contract Task Order 0203

May 2001

TETRA TECH NUS, INC.

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FINAL

YEAR 1
ANNUAL GROUNDWATER MONITORING REPORT
FOR
AREA A LANDFILL

NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CONNECTICUT

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

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ACRONYMS

ANOVA	Analysis of Variance
AWQC	Ambient Water Quality Criteria
CEC	Cation exchange capacity
CLEAN	Comprehenisive Long-Term Environmental Action Navy
COC	Chemicals of Concern
COPC	Chemicals of Concern
CTDEP	Connecticut Department of Environmental Protection
CTO	Contract Task Order
GMP	Groundwater Monitoring Plan
gpm	gallons per minute
HNUS	Halliburton NUS, Inc.
IRA	Interim Remedial Action
msl	mean sea level
NSB-NLON	Naval Submarine Base New London
OBDA	Over Bank Disposal Area
OVA	Organic Vapor Analyzer
PCB	Poly-Chlorinated Biphenyls
SCS	Soil Conservation Service
SQL	Sample Quantitation Limit
SVOC	Semivolatile Organic Compound
SWPC	Surface Water Protection Criteria
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TtNUS	Tetra Tech NUS, Inc.
VOC	Volatile Organic Compound
WQS	Water Quality Standard

1.0 INTRODUCTION

This annual groundwater monitoring report for the Area A Landfill at the Naval Submarine Base New London (NSB-NLON) in Groton, Connecticut, was prepared for the U.S. Department of the Navy (Navy) by Tetra Tech NUS, Inc. (TtNUS) under the Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract Number N62472-90-D-1298, Contract Task Order (CTO) 0203. All field activities were performed in accordance with the approved Groundwater Monitoring Plan (GMP) for the Area A Landfill (TtNUS, 1999).

[Note: Brown & Root Environmental, Inc. (B&R Environmental), formerly Halliburton NUS, Inc. (HNUS), was purchased on January 1, 1998, and became Tetra Tech NUS, Inc. (TtNUS)].

1.1 PURPOSE

An Interim Remedial Action (IRA) was completed in 1997 at the Area A Landfill to address the overall risks from direct exposure to landfill material and to minimize the risk of migration of chemicals of concern (COCs) from the landfill to the surrounding areas via groundwater. The IRA consisted of capping the site with a multi-layer low-permeability cover system and installing a surface water and shallow groundwater interception and diversion system upgradient from the cover system. Groundwater monitoring is being conducted to evaluate the effectiveness of the IRA as part of post-closure associated with the Area A cap.

The purpose of this groundwater monitoring report is to present the results of the four quarterly sampling rounds of analytical data collected from monitoring wells located at the Area A landfill. The sampling was performed from October 1999 through July 2000. Trend evaluation of monitoring data is also included in this report.

The groundwater monitoring system was designed to determine the effectiveness of the existing cap at the Area A landfill in preventing further migration of constituents to the groundwater and nearby wetlands; the effectiveness of the remediation taken to eliminate health risks; whether the criteria used for evaluating the data have been met; and whether the groundwater plume interferes with any existing use of the groundwater. The ultimate goal of the monitoring program is to attain surface water protection requirements for those contaminants migrating from the site.

1.2 SCOPE AND OBJECTIVES

The objective of the groundwater monitoring is to evaluate the effectiveness of the Area A landfill cap and to confirm that contamination is not migrating through the soil into the groundwater and adjacent wetlands.

To meet this objective, the following groundwater monitoring approach was proposed for the Area A Landfill: Four quarterly rounds of groundwater monitoring were conducted over a period of one year. The schedule for subsequent monitoring will be based on an interpretation of the analytical results of the first year and regulatory input and review. Groundwater samples were collected from 4 existing monitoring wells upgradient and downgradient of the landfill, 1 existing monitoring well in the Area A Wetland, and 11 newly installed monitoring wells within the Area A Wetland. Surface water samples were collected periodically at 10 staff gauge locations within the Area A Wetland. Additionally, a surface water sample was collected from the Over Bank Disposal Area (OBDA) seep located adjacent to the site (TtNUS, 1999). Analytical results for potential Chemicals of Concern (COCs) as identified in the Phase II RI (B&R Environmental, 1997), are compared to the Connecticut Department of Environmental Protection (CTDEP) Surface Water Protection Criteria (SWPCs) as well as to the Federal Ambient Water Quality Criteria (AWQCs) and the CTDEP Water Quality Standards (WQSs) as outlined in the GMP.

1.3 REPORT ORGANIZATION

This report consists of five sections. Section 1.0 provides a brief introduction and describes the scope, objectives, and purpose of the report. Section 2.0 provides a site description of NSB-NLON including site characteristics. Additionally a discussion of previous investigation is included in Section 2.0. Section 3.0 provides the methodologies for performing the groundwater sampling. Section 4.0 presents the findings of the groundwater monitoring as well as statistical analyses of the data. Finally Section 5.0 provides conclusion and recommendations for the year one review.

2.0 BACKGROUND INFORMATION

The following sections describe the area of investigation identified as the Area A Landfill located at the NSB-NLON. Section 2.1 provides a brief site description. Section 2.2 provides site characteristics and physical features of the Area A Landfill. Finally, Section 2.3 describes the previous field investigations that have been performed to date at the Area A Landfill.

2.1 SITE DESCRIPTION

Figure 2-1 shows the location of NSB-NLON. NSB-NLON encompasses approximately 576 acres and is located in southeastern Connecticut in the towns of Ledyard and Groton. NSB-NLON is situated on the east bank of the Thames River, approximately 6 miles north of Long Island Sound. NSB-NLON is bounded to the east by Connecticut Route 12, to the south by Crystal Lake Road, and to the west by the Thames River. Figure 2-2 illustrates NSB-NLON's main features and identifies some of the more significant environmental sites at the base, including the Area A Landfill.

The Area A Landfill is located in the northeastern and north-central part of NSB-NLON and encompasses approximately 13 acres. The Area A Landfill is relatively flat and is bordered by a steep, wooded hillside that rises to the south, a steep wooded ravine to the west, and the Area A Wetland to the north. Access to the west end of the landfill is via a gate off Wahoo Avenue and access to the east end of the landfill is via a paved road and gate adjacent to a parking lot and to the Area A recreational facilities.

2.2 PHYSICAL CHARACTERISTICS

This section presents a summary of the physical characteristics for the Area A Landfill based on information generated during the previous investigations. Topography and surface features, surface water, soils, geology, and hydrogeology are discussed in the subsections that follow.

2.2.1 Topography and Surface Features

The topography and surface features of the Area A Landfill with the cover system and adjacent sites, including the Area A Wetland and Area A Downstream are described as follows. The ground surface slopes gently across the Area A Landfill toward the Area A Wetland. A steep hillside (central bedrock high) borders the southern edge of the landfill. The CBU Drum Storage Area (Site 1) is located south and on the upgradient edge of the central portion of the landfill. Near the northwestern edge of the landfill, the ground surface drops along a steep ravine to the OBDA. The ground surface increases in elevation to the east from the tennis courts to Route 12 and Baldwin Hill.

The ground surface elevation across the landfill cover system varies from approximately 80 to 87 feet above mean sea level (msl) in the eastern portion of the landfill and from 80 to 100 feet msl in the western portion of the landfill, such that the landfill cover slopes gently at a grade of approximately 3 percent toward the Area A Wetland. Adjacent to the toe of the landfill, the Area A Wetland surface is at an elevation of approximately 72 feet above msl, and the newly constructed landfill sideslope angles at a 1:4 (vertical: horizontal) grade from the surface of the wetland. Along this side slope, a layer of riprap at the higher elevations and a gabion basket system (wire-mesh containing stones) at the toe of the landfill provide slope stability and erosion protection.

A concrete structure (for salt storage) is located near the Building 460 (Hobby Shop) entrance to the landfill. The MAA Building previously located at the western end of the landfill has been demolished and replaced by a metal building located on Thresher Avenue at the entrance to the Deployed Parking area. The Deployed Parking area is located at the eastern end of the landfill, where it can be accessed from Thresher Avenue. The Deployed Parking area is a secure area where Navy personnel who are out at-sea for an extended time can store their vehicles. A 7-foot high chain-link fence with a three-strand barbed wire around its perimeter secures the area.

A crane test platform is located within the east-central portion of the landfill. This platform consists of a 24-inch thick, 50 foot x 50 foot concrete slab, with No. 8 metal reinforcing bars used for structural reinforcement. This platform allows testing of cranes where the boom of the crane can be turned through a full 360 degree rotation.

A sand bag storage area is located in the western portion of the landfill. Several thousand sand bags are stored on wooden pallets on the completed asphalt surface and kept on hand by NSB-NLON for use in protecting structures on the Lower Base during severe storm events.

The Public Works Department at NSB-NLON stores equipment and materials on various sections of the completed landfill cover system. Typically, equipment such as trailer trucks, buses, and plows is parked on the plateau of the landfill.

2.2.2 Soil Characteristics

The Soil Conservation Service (SCS) soils map (SCS, 1983) classifies the soil across most of the Area A Landfill as Udorthents-Urban land. This soil type is defined as excessively drained to moderately drained soils that have been disturbed by cutting and filling. Along the southwestern slope of the landfill and in upgradient areas, the soil is classified as the Hollis-Charlton-Rock complex. Stones and boulders are intermingled with a dark, fine, sandy loam. Bedrock outcrops are prevalent in the area.

2.2.3 Geology

The Groundwater/Leachate Modeling Study (B&R Environmental, 1996) describe the subsurface geology within and surrounding the Area A Landfill as consisting of four units. In order of their occurrence with depth they are landfill material, dredge spoil, alluvium, and competent bedrock.

The Area A Landfill contains miscellaneous fill that consists of fine- to coarse-grained sand and gravel as well as refuse including ash, wood fragments, paper, brick fragments, and asphalt. The landfill thickness generally increases from 5 to 10 feet in the western portion of the landfill to 15 to 20 feet in the far eastern portion of the landfill. The landfill material is underlain by dredge spoil within most of the landfill boundary. Where no dredge spoil is present, landfill material directly overlies a thin alluvial layer or the bedrock surface (TtNUS, 1999).

The dredge spoil is a fine-grained material that is easily identified by its silty texture, sulfurous odor, and the presence of shells. Dredge spoil is present beneath most of the landfill to a thickness up to 25 feet. This dredge spoil layer continues into the wetland and is present at the wetland surface. Dredge spoil is not present in the far western portion of the landfill area or along the southern hillside.

The alluvium includes native surface soils, unconsolidated fluvial and glacial deposits, colluvium, weathered bedrock, and re-worked clean sand and gravel soils (present to the east of the landfill). Upgradient of the landfill boundary along the hillside, alluvium is present at the ground surface but bedrock outcrops are prevalent. Typically, alluvium is present beneath the dredge spoil in the landfill and wetland areas.

The bedrock at the Area A Landfill area has been identified as the biotite-quartz-feldspar gneiss of the Mamacoke Formation. Bedrock is located at or near the ground surface along the southern hillside and beneath the alluvium throughout the landfill and wetland areas. The bedrock surface slopes to the northeast toward the Area A Wetland from the large central bedrock high in the center of the facility. There is a bedrock high in the western portion of the landfill, a small bedrock valley in the central portion of the landfill, and a bedrock island in the Area A Wetland. In the far northeastern portion of the landfill, there is a bedrock depression that is filled with a significant thickness of weathered bedrock and large boulder-like pieces of bedrock (colluvium).

The landfill is situated along the flank of the hillside such that the depth to bedrock generally increases from west to east. Thicknesses of each of the three overlying units (alluvium, dredge spoil, and landfill material) also generally increase from west to east (TtNUS, 1999).

2.2.4 Hydrogeology

As stated in Section 2.2.3, there are four identifiable units present at the Area A Landfill: landfill material, dredge spoil, alluvium, and bedrock. Except for the Groundwater/Leachate Modeling Study, previous investigations grouped the landfill material, dredge spoil, and alluvium together as overburden and most of the overburden wells were screened across some combination of these three units. During the Groundwater/Leachate Modeling Study, unit-specific wells were installed. Based on slug test results, the estimated hydraulic conductivity of the landfill material and alluvium were comparable at 6.0 ft/day and 1.7 ft/day, respectively. The estimated hydraulic conductivity of the dredge spoil and bedrock were comparable as 9.0E-03 ft/day and 1.4E-02 ft/day, respectively. Also, shelby tube permeability test results indicated that the mean vertical hydraulic conductivity of the dredge spoil was 5.4E-04 ft/day. These results in conjunction with the analysis of groundwater potentials prove that the dredge spoil, which is often present between landfill material and alluvium, is a low-permeability confining unit. A summary of groundwater flow characteristics follows.

Water Table

Groundwater flow directions generally reflect surface topography. Groundwater flows from the southern hillside, across the Area A Landfill toward the Area A Wetland across most of the landfill and toward the Area A Downstream in the far western portion of the landfill. In the western and central portions of the landfill, the hydraulic gradient is steepest along the hillside, flatter across the landfill, and nearly flat across the wetland. In these areas, groundwater elevations range from approximately 80 to 90 feet msl along the upgradient landfill boundary to 71 feet msl along the wetland boundary. In the eastern portion of the landfill, the hydraulic gradient is relatively flat across the landfill. The groundwater elevations range between 71 to 72 feet msl. Staff gauge measurements indicate that although the bedrock island in the wetland impedes flow, surface water in the wetland moves slowly northwest toward the dike and the Area A Downstream (B&R Environmental, 1996).

The saturated thickness of the landfill material typically ranges from approximately 0 to 5 feet in the western and central portions of the landfill and 5 to 10 feet in the eastern portion of the landfill. The hydraulic gradient was estimated from the water table contour lines at seven locations across the site (TtNUS, 1999). The lowest estimated hydraulic gradients at locations 5, 6, and 7 ranged from 0.0007 to 0.0018. These gradients occurred in the central portion of the landfill near the wetland boundary and across the entire eastern portion of the landfill. The highest estimated hydraulic gradients at locations 1 through 4 ranged from 0.03 to 0.09. These gradients occurred in the central portion of the landfill near the hillside boundary and the entire western portion of the landfill. Assuming these gradient ranges, a hydraulic conductivity of 6.0 ft/day for the landfill material, and a porosity of 0.30, the seepage velocity

ranges from 0.014 to 0.036 ft/day for the lower gradients and 0.6 to 1.8 ft/day for the higher gradients (B&R Environmental, 1996).

Dredge Spoil Groundwater

As stated earlier, the dredge spoil has been characterized as a relatively low permeability, confining unit that, where present, separates landfill material from the underlying alluvium and bedrock. During the Groundwater/Leachate Modeling Study, six monitoring wells were installed within the dredge spoil to assess the groundwater characteristics of the dredge spoil at different locations across the landfill. There is a downward hydraulic gradient from the landfill material to the dredge spoil at all locations, except at the 2LMW31 well cluster, which is located at the central portion of the landfill near the southern hillside boundary where the alluvium and dredge spoil are thin and strong upward gradients are present from the bedrock to the overyling units. The observed downward hydraulic gradients indicate that the dredge spoil is inhibiting upward recharge from the bedrock and alluvium to the landfill material.

A groundwater contour map was not generated for the dredge spoil during the Groundwater/Leachate Modeling Study, because of the limited number of monitoring wells and some irregular data. For example, in the eastern portion of the landfill, the measured groundwater elevation at 2LMW33DS was lower than that measured at 2LMW32DS, which is closer to the wetland but screened at a lower elevation within the dredge spoil. Also, the measured groundwater elevation at 2LMW34DS within the dredge spoil depression near the crane test pad was 57.85 ft msl, which is considerably lower than the measured elevations in the landfill material and bedrock at the same location. These irregular groundwater elevations confirm that the dredge spoil cannot be considered to be a continuous water-bearing unit where hydraulic gradients and seepage velocities can be estimated. Rather, the dredge spoil is a low permeability confining unit where groundwater elevations are irregular and dependent on local conditions such as the dredge spoil thickness and overlying and underlying groundwater elevations.

Alluvium Groundwater

During the Groundwater/Leachate Modeling Study, one monitoring well was installed in the alluvium material (2LMW29A) in the western portion of the landfill where dredge spoil is thin. As stated earlier, the estimated hydraulic conductivity of the alluvium is comparable to the landfill material. There is an upward hydraulic gradient from the alluvium to the landfill material at this location, which confirms that where dredge spoil is not present, the upward hydraulic gradient from the bedrock persists to the landfill material. Previously installed monitoring wells that are screened within landfill material and alluvium include 1MW2S, 2LMW8S, and 2LMW20S, which are all located near the hillside boundary of the landfill. There is an upward hydraulic gradient from the bedrock to the alluvium/landfill material at well clusters 2LMW8 and 2LMW20 (there is no bedrock well at 1MW2S).

A groundwater contour map was not generated for the alluvium due to the limited number of monitoring wells. However, based on the observed vertical hydraulic gradients and relatively permeable nature of the alluvium, it can be concluded that bedrock groundwater is recharging the alluvium. Where dredge spoil is present, alluvium groundwater flows preferentially through alluvium material toward the wetland and Area A Downstream. Additionally, where dredge spoil is not present, alluvium recharges the landfill material.

Bedrock Groundwater

Groundwater in the bedrock flows in similar directions as the water table. Similar to the shallow groundwater, the hydraulic gradients in the bedrock are steepest across the western and central portions of the landfill area and are flatter in the eastern portion of the landfill area where the bedrock depression is located and the overlying unconsolidated material is thickest. Between the 2LMW13D and 2LMW9D bedrock wells, there is a significant decrease in the groundwater elevation that is probably related to groundwater discharging to the OBDA groundwater seep indicated by the sampled point 3MSP01. Discharge from this seep was estimated during the Groundwater/Leachate Modeling Study as 109.5 gallons per minute (gpm).

The hydraulic gradient was estimated from the groundwater contours prepared as part of the GMP (TtNUS, 1999). In the western and central portions of the landfill the estimated hydraulic gradient is comparable at 0.09 and 0.11, respectively. In the eastern portion of the landfill the estimated hydraulic gradient is 0.02. Based on the minimum and maximum values estimated, a hydraulic conductivity of 1.4E-02 ft/day, and a porosity of 0.001, the estimated seepage velocity ranges from 0.3 to 1.5 ft/day.

Vertical Gradients and Hydraulic Connections

Although groundwater flow directions and gradients are similar in the water table and bedrock groundwater, an analysis of vertical flow gradients is necessary to determine possible hydraulic connections. Cross-sections prepared for the GMP (TtNUS 1999), show the water table and the direction of the vertical hydraulic gradients between the units. In all of these cases, except at the 2LMW9 well cluster, there is an upward gradient from the bedrock to the overlying unit (the reduced groundwater potential in the bedrock at the 2LMW9D well is probably due to bedrock groundwater discharging to the OBDA seep and the lack of hydraulic connection between the bedrock and the landfill material due to dredge spoil). Along the hillside near the boundary of the landfill, dredge spoil is either very thin or not present and there is an upward gradient from the bedrock and alluvium to the landfill material. Within the landfill where dredge spoil is present, there is a downward gradient from the landfill material to the dredge spoil.

Based on the analysis of vertical flow gradients, it can be concluded that bedrock groundwater from the hillside is recharging the overlying units. Along the hillside boundary of the landfill and in the western portion of the landfill where the alluvium is thin and dredge spoil is not present, bedrock groundwater recharges landfill material. Where dredge spoil is present, the dredge spoil inhibits upward recharge from the bedrock to the landfill material, and the bedrock groundwater recharges the alluvium (and possibly the deeper dredge spoil) only. Although there is a downward gradient from the landfill material to the dredge spoil, the dredge spoil is relatively impermeable and shallow groundwater flows preferentially from the landfill material toward the wetland.

2.3 PREVIOUS SITE INVESTIGATIONS

Six field investigations have been conducted at the Area A Landfill. These include the following:

- The field investigation performed for the base-wide Phase I RI (Atlantic, August 1992).
- The supplemental field investigation performed for the Area A Landfill FFS (Atlantic, May 1995).
- The field investigation performed for the base-wide Phase II RI (B&R Environmental, March 1997).
- The Geotechnical Field Investigation and Area A East End Investigation performed in support of the Area A Landfill Remedial Design (B&R Environmental, December 1996).
- The field investigation performed for the Groundwater/Leachate Modeling Study, which supported the Area A Landfill Remedial Design (B&R Environmental, October 1996).

2.3.1 Base-Wide Phase I RI

Atlantic conducted a field investigation at the Area A Landfill in 1992 as part of the base-wide Phase I RI. A total of 13 monitoring wells (2LMW7S, 2LMW7D, 2LMW8S, 2LMW8D, 2LMW9S, 2LMW9D, 2LMW13S, 2LMW13D, 2LMW14D, 2LMW17S, 2LMW17D, 2LMW18S, 2LMW18D) and 7 test borings (2LTB1 through 2LTB7) were installed. A total of 12 soil and 12 groundwater samples were collected from these monitoring wells and test borings. Soil samples were analyzed for TCL organics, TAL inorganics, Poly-Chlorinated Biphenyls (PCBs), pesticides, and Toxicity Characteristics Leaching Procedure (TCLP) pesticides and metals. Groundwater samples were analyzed for the same parameters, except TCLP, plus radiological elements.

2.3.2 Area A Landfill FFS

Atlantic conducted a supplemental field investigation at the Area A Landfill in October and November 1993 to support the Area A Landfill FFS. The main purpose of these field activities was to characterize the subsurface soil in the vicinity of the bituminous concrete pad located at the southwestern end of the landfill.

Twenty four soil borings (2LTB8 through 2LTB31) were drilled to a depth of 16 feet or auger refusal. Based on field screening for Volatile Organic Compounds (VOCs), with an HNu organic vapor analyzer (OVA) and for PCBs with a field gas chromatograph, 13 subsurface soil sample were selected for analysis of TCL organics, PCBs, pesticides and TAL inorganics. Selected samples were also analyzed for organic content, cation exchange capacity (CEC), Total Organic Carbon (TOC), dioxin and geotechnical parameters, including grain-size distribution, moisture content, and specific gravity. Two samples were also analyzed by the TCLP for all toxicity constituents.

2.3.3 Base-Wide Phase II RI

B&R Environmental conducted a field investigation at the Area A Landfill in 1994 as part of the base-wide Phase II RI. A total of 10 monitoring wells (2LPW1S, 2LOW1S, 2LOW1D, 2LOW2S, 2LOW3S, 2LOW4S, 2LMW19S, 2LMW19D, 2LMW20S, 2LMW20D) were installed. Eleven soil samples were collected from two soil borings (2LTB13, 2LTB23). Two rounds of groundwater level measurements and groundwater sampling were conducted, including one in March and one in August 1994. Groundwater samples were analyzed for TCL organics, TAL inorganics, PCBs, and radiological elements.

2.3.4 Geotechnical Field Investigation

B&R Environmental conducted field activities at the Area A Landfill in February and March 1995 as part of the Geotechnical Field Investigation performed in support of the Remedial Design for a landfill cover system. The purpose of the Geotechnical Field Investigation was to confirm the areal extent of the fill material and to obtain additional geotechnical field data.

Twenty test pits (LF-TP01 to LF-TP13 and LF-TP15 to LF-TP21) were excavated along the edges of the Area A Landfill to allow for visual observation of subsurface conditions. The purpose of excavating these test pits was primarily to determine the lateral extent of the fill material and, wherever practical (especially along the southern edge of the landfill), establish the depth and competence of bedrock.

Eight soil borings were drilled at strategic locations on the landfill plateau to establish the depth of bedrock and thickness of the fill and dredge spoil material. The soil borings were also used to collect six soil

samples to be tested for geotechnical parameters (particle size, moisture content, classification, Atterberg limits, and triaxial compression) and three soil samples to be tested for analytical parameters (TCL organics, TAL inorganics, PCBs, and pesticides). Four borings (LF-SB01 and LF-SB03 through LF-SB05) were advanced through the overburden to auger refusal at the bedrock. Two borings (LF-SB02, LF-SB06) were advanced through the overburden and approximately 5 feet into competent bedrock. Two borings (LF-TP01 and LF-TP07) were drilled through approximately 5 feet of.bedrock at the bottom of previously excavated test pits.

2.3.5 Area A East End Investigation

B&R Environmental conducted field activities at the Area A Landfill in September 1995 as part of the Area A East End Investigation performed in support of the Remedial Design for the landfill cover system. The purpose of the Area A East End Investigation was to verify that the fill used for the construction of the recreational facilities (Racquetball Building, tennis courts, ball field) located at the extreme east end of Area A is of a different nature from that placed in the rest of the Area A Landfill, i.e., does not contain contaminated waste material, and therefore, does not need to be capped.

Six test trenches (LF-TP22 through LF-TP27) were excavated along the eastern boundary of the Area A Landfill cover system as designed to verify the eastern limit of contaminated fill material. The test trenches were field-screened for the presence of VOCs, and four soil samples were collected and analyzed TCL organics, TAL inorganics and cyanide, PCBs, pesticides, and Total Petroleum Hydrocarbon (TPH).

Three soil borings (SB06 through SB08) were drilled in the vicinity of the Area A East End recreational facilities. These soil borings were advanced through the overburden to the bedrock to auger refusal. A total of six soil samples were collected from the fill and dredge spoil material and analyzed for TCL organics, TAL inorganics and cyanide pesticides, PCBs, and TPH.

2.3.6 Groundwater/Leachate Modeling Study

B&R Environmental conducted field activities at the Area A Landfill in November/December 1995 as part of the Groundwater/Leachate Modeling Study performed in support of the Remedial Design for the landfill cover system. The purpose of the Groundwater/Leachate Modeling Study was to evaluate the impact of the proposed landfill cover system on the saturated thickness of landfill material and on the flow and composition of the groundwater/leachate discharge from the landfill.

The Modeling Field Investigation activities included the performance of the following activities:

- Surface infiltration tests at 10 locations (2LT1 thru 2LT10) throughout the surface of the landfill

- Installation of 13 overburden monitoring wells, including 6 in the landfill material (2LMW28F through 2LMW33F) and 7 in the underlying dredge spoil or alluvium (2LMW28DS, 2LMW29A, 2LMW30DS through 2LMW34DS).

- Installation of three bedrock wells, including two located upgradient from the Area A Landfill (2LMW35B and 2LMW36B) and one at the northeast end of the landfill (2LMW32B).

- Installation of 10 piezometers, including 7 (2LPZ1DS thru 2LPZ7DS) along the boundary between the Area A Landfill and Area A Wetland and 3 (2LPZ1F, 2LPZ2F, and 2LMW32PZ) at the northeast end of the landfill.

- Installation of eight staff gauges (SG07 thru SG14) along the boundary between the Area A Landfill and Area A Wetland.

- Slug testing of the newly installed wells and one of the piezometers (2LMW32PZ).

- Water level measurement for all newly installed monitoring wells, piezometers, and staff gauges as well as for all previously existing monitoring wells.

- Flow measurement and sampling of the groundwater seep (3MSP01) from the western face of the Area A Landfill into the OBDA of the adjoining Area A Downstream (Site 3). This sample was analyzed for TCL organics and TAL inorganics.

The Groundwater/Leachate Modeling Study provided a comprehensive analysis of the site geology and hydrogeology. The report provided surface contour maps of the four units (landfill material, dredge spoil, alluvium and bedrock), thickness maps for the landfill material and dredge spoil, surface contour maps for the water table and bedrock groundwater, geologic cross-sections, conceptual flow nets, and an analysis of vertical flow gradients.

Additionally, the Groundwater/Leachate Modeling Study concluded that the Area A Landfill cover system would reduce the thickness of the saturated landfill material by approximately 0.1 foot along the Area A Wetland boundary, by approximately 0.5 foot at the eastern end of the landfill, by approximately 0.2 foot in the center of the landfill, and by over one foot at the western end of the landfill. The study concluded that the cover system would reduce the flux of groundwater COCs from the Area A Landfill to the Area A

Wetland by 16 to 55 percent and that none of these COCs would exceed either the Federal AWQCs or the Connecticut's SWPCs.

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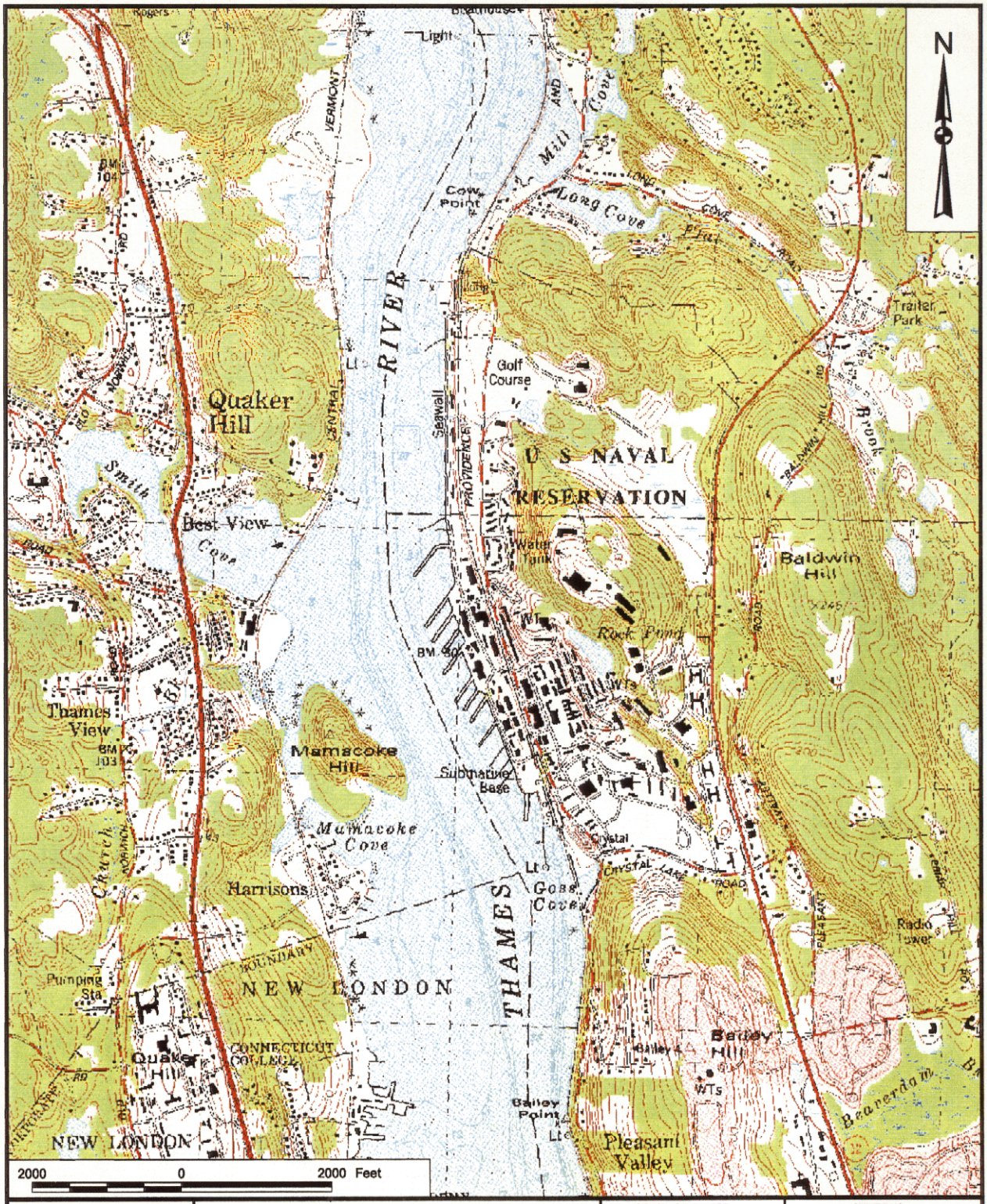

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J. BELLONE	2/16/00		5082	—
CHECKED BY	DATE	LOCATION MAP NSB-NLON GROTON, CONNECTICUT	APPROVED BY	DATE
COST/SCHEDULE-AREA			APPROVED BY Mark L. Mungel	DATE 2/6/01
SCALE AS NOTED			DRAWING NO. FIGURE 2-1	REV 0

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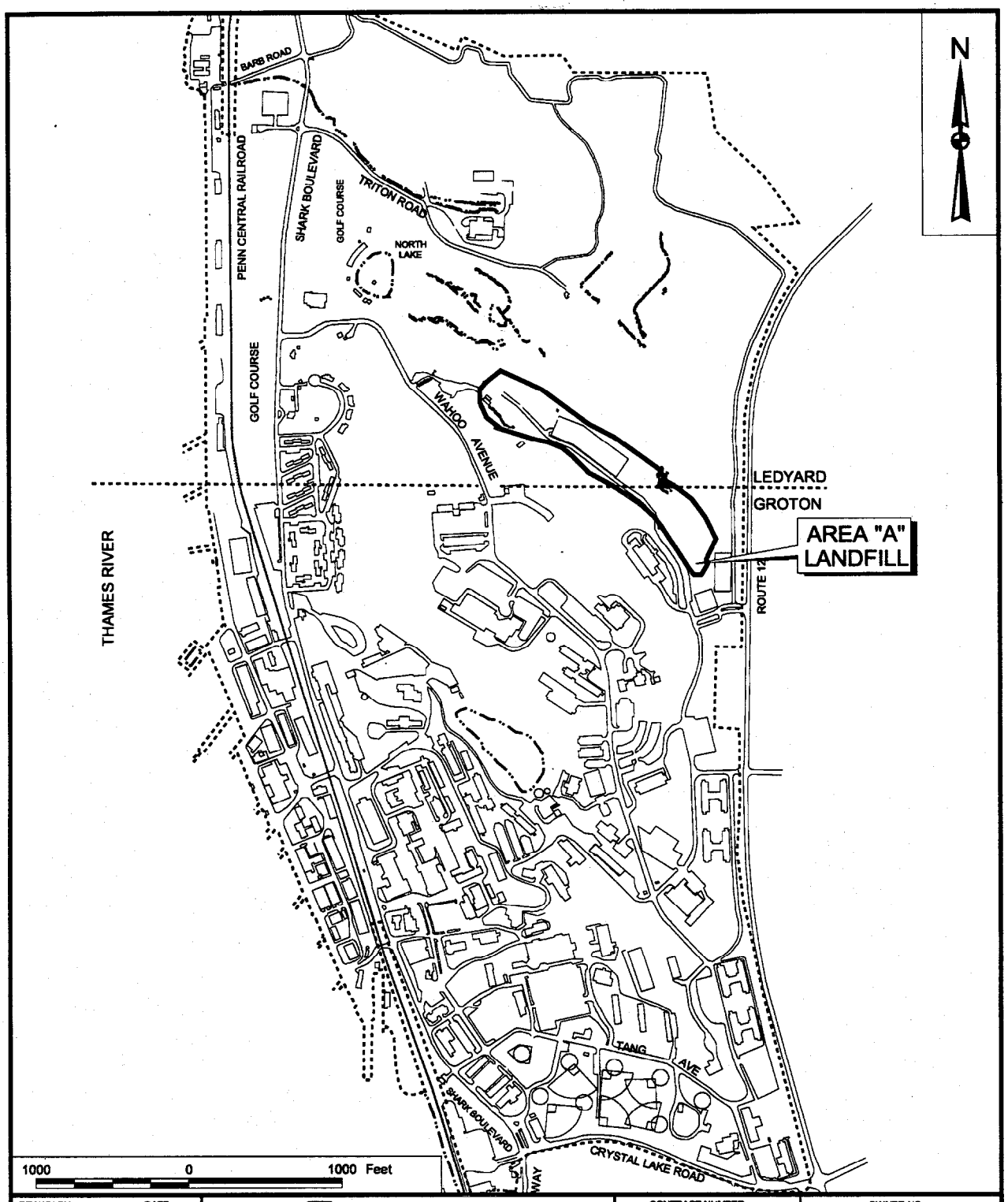

DRAWN BY J. BELLONE — DATE 2/16/00	Tetra Tech NUS, Inc.	CONTRACT NUMBER 5082	OWNER NO. —
CHECKED BY MLM — DATE 2/18/00	SITE MAP NSB NLON GROTON, CONNECTICUT	APPROVED BY Mark L. Mengel — DATE 2/18/00	
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3.0 FIELD ACTIVITIES

This section provides a discussion of the sampling procedures used to conduct the groundwater monitoring, as well as a discussion and presentation of the physical data collected during the sampling.

3.1 SAMPLING LOCATIONS AND ANALYTICAL METHODS

Sixteen monitoring wells, ten surface water locations, and one surface seep location as described in the Groundwater Monitoring Plan for the Area A Landfill (TtNUS, 1999) were sampled during the groundwater monitoring program. During the initial year of monitoring, samples were collected during the months of October 1999 (Rd. 1), January 2000 (Rd. 2), April 2000 (Rd. 3), and July 2000 (Rd. 4). Monitoring well locations are shown on Figure 3-1. Monitoring well construction details are shown on Table 3-1.

Deviations of the groundwater and/or surface water sampling program occurred at the following locations during the first year of sampling. Monitoring well 2WMW44DS was not sampled during Round 2 due to the static water being frozen within the monitoring well. The seep sample and all of the surface water samples were not collected during Round 2 as the surface water within the wetland was frozen. The seep sample was not collected during Round 3 as no water was flowing from the seep location. Monitoring well 3MW12S was not sampled during Round 4 because the well was destroyed during post remedial construction. Surface water samples were not collected from SWSG22 and SWSG24 during Round 4 because the locations were dry.

Each of the samples were analyzed for Target Compound List (TCL) organics and Target Analyte List (TAL) inorganics. Monitoring focused on the organic and inorganic Contaminants of Potential Concern (COPCs), as identified in the Groundwater Monitoring Plan (TtNUS, 1999):

- Ethylbenzene
- 1,1,2,2-Tetrachloroethane
- Xylenes
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Bis(2-ethylhexyl)phthalate
- Phenantrene
- Aroclor 1016
- Aroclor 1254
- Aroclor 1260
- Dieldrin
- Heptachlor
- Arsenic
- Berylium
- Cadmium
- Chromium
- Copper
- Lead
- Zinc

The contaminants were previously detected in soil either at concentrations that could result in exceedances of site-specific Surface Water Protection Criteria (SWPCs) or at concentrations that exceed Connecticut's Pollutant Mobility Criteria for GB groundwater.

3.2 SAMPLE COLLECTION PROCEDURES

Sixteen monitoring wells were sampled during each of the four sampling rounds using low-flow purging and sampling techniques, in accordance with the Tetra Tech NUS SOP SA-1.1 (Groundwater Sample Acquisition) and the USEPA Region I Low- Flow Purging and Sampling Procedure (GW-001) (TtNUS, 1999). Low-flow purging and sampling was implemented because this method provides the least disturbance to the surrounding formation (less turbulence while purging and sampling and hence lower turbidity), allowing for a more representative sample to be obtained.

The monitoring wells were purged using a peristaltic pump with disposable Teflon® tubing installed to the middle of the saturated screen interval. Pharmaceutical-grade silicone tubing was used in the rotaries of the peristaltic pump.

Prior to purging, during and before obtaining groundwater samples, water levels were measured using an electronic water-level indicator (M-Scope) capable of measuring 0.01-foot accuracy. Water levels were monitored and recorded every 5 to 10 minutes during the purging. Water quality parameters (pH, specific conductivity, temperature, dissolved oxygen, salinity, and Eh) were measured every 5 to 10 minutes using a QED FC4000 Water Analyzer equipped with a flow-through cell. Water quality parameters were measured until all of the parameters had stabilized and the minimum purge volume was removed (stabilized purge volume plus the extraction tubing volume). Turbidity was also measured using a Lamotte 2020 Turbidimeter. Water quality parameters obtained at the time of sample collection for each of the sampling rounds are shown on sample logs sheets in Appendix A.

Stabilization of the above parameters is defined as follows:

- pH $\pm$ 0.2 standard units
- Turbidity $\pm$ 10 percent for the value greater than 1 NTU
- Specific conductance $\pm$ 10 percent
- Temperature $\pm$ 3 percent
- Eh $\pm$ 10 millivolts
- Dissolved oxygen $\pm$ 10 percent

Calibration and standards checks were conducted on the flow-through cell in accordance with the manufacturers' requirements. The cell was cleaned at each well prior to purging and during purging, as necessary (e.g., when fluctuating turbidity readings were observed and confirmed by collection of a turbidity sample before the cell for comparison). A "T" connector with a valve was inserted into the pump's discharge tubing prior to the cell for collection of a turbidity sample. If the cell required cleaning

during purging activities, pumping continued and the cell was disconnected for cleaning. When completed, the cell was reconnected and monitoring activities continued. The cell was cleaned by thoroughly rinsing with deionized water.

Precautions were taken to prevent air entrapment and/or air leaks in the purging system so that potential problems with stabilizing dissolved oxygen were minimized. Precautions included: 1) taking care to fill the entire cell with water while minimizing air entrapment, prior to initiating purging and 2) maintaining a full cell of water by pinching the discharge line shut and elevating the discharge at the end of the tubing from the pump, above the cell. After purging was complete, the flow-through cell was disconnected and samples were collected directly from the pump discharge.

Purge water was containerized, labeled, and turned over to NSB-NLON for disposal.

All sample containers were filled by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence. Samples analyzed for volatile constituents were collected first and immediately sealed in a pre-preserved container so that no head space existed. For filtered inorganic samples, an in-line 0.45 micron filter was used. The filter was pre-rinsed with approximately 400 ml of deionized water and attached to the discharge end of the pump tubing.

Surface water samples were collected in accordance with TtNUS SOP SA-1.2. Due to the shallow depth of the surface water, a shovel was used to create a depression at the surface water location prior to sampling. Samples were collected approximately 24 hours later by direct filling the sample bottles from the created reservoir.

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TABLE 3-1

AREA A MONITORING WELL CONSTRUCTION DETAILS
NSB-NLON, GROTON, CONNECTICUT

Well I.D.	Construction Material	Top of Riser Elevation (ft)	Top/Bottom of Screen (ft BGS)	Screened Formation[a]	Total Depth (ft BGS)	Depth to Bedrock (ft BGS)
4MW01	PVC	129.55	8.5-18.5	Bedrock	18.5	2.5
3MW12S	PVC	72.25	2.5-12.5	Shallow OB	13.0	NA
3MW12D	PVC	43.54	Open Hole	Bedrock	26.0	15.0
2LMW20S	PVC	86.83	9.0-19.0	Shallow OB	19.0	NA
2WMW21DS	PVC	76.31	5.0-15.0	Shallow OB	15.0	NA
2MW37S	PVC	47.39	4.5-5.5	Shallow OB	5.5	NA
2WMW38DS	PVC	74.06	4.0-9.0	Shallow OB	12.0	NA
2WMW39DS	PVC	73.43	4.0-14.0	Shallow OB	15.0	NA
2WMW40DS	PVC	73.21	4.0-14.0	Shallow OB	15.0	NA
2WMW41DS	PVC	73.39	4.5-14.5	Shallow OB	15.5	NA
2WMW42DS	PVC	73.65	6.0-16.0	Shallow OB	17.0	NA
2WMW43DS	PVC	74.36	4.0-14.0	Shallow OB	15.0	NA
2WMW44DS	PVC	73.72	4.0-14.0	Shallow OB	15.0	NA
2WMW45DS	PVC	74.24	4.0-14.0	Shallow OB	15.0	NA
2WMW46DS	PVC	73.53	4.0-14.0	Shallow OB	15.0	NA
2WMW47DS	PVC	73.39	4.0-14.0	Shallow OB	15.0	NA

a OB = Overburden

Notes:
Reference elevation is top of well casing (1982 Base Traverse System).
BGS means below ground surface.
NA means information is not available.

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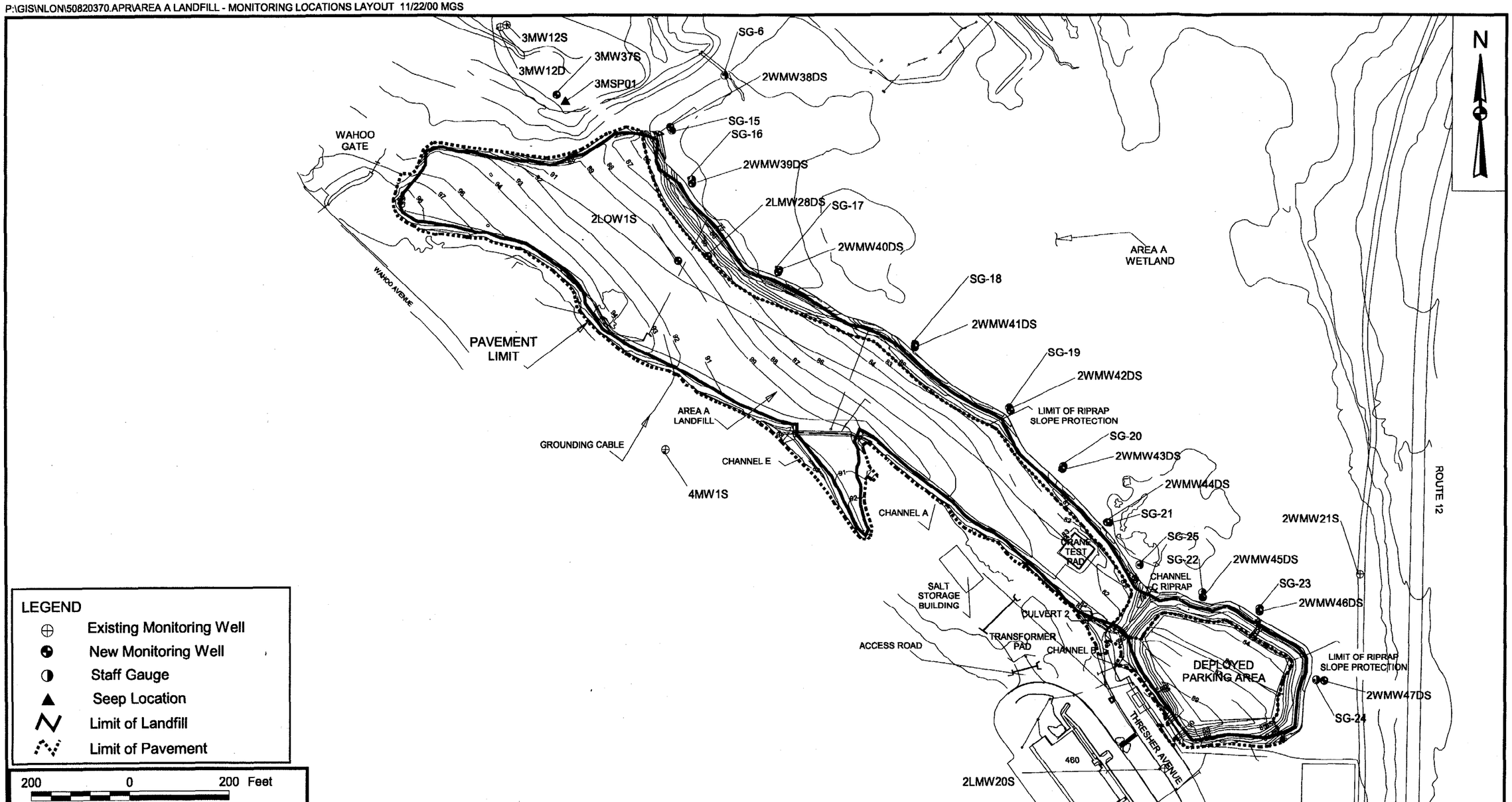

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

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SCALE AS NOTED	

Tetra Tech NUS, Inc.

SAMPLING LOCATIONS FOR
GROUNDWATER MONITORING
AREA A LANDFILL
NSB-NEW LONDON, GROTON, CONNECTICUT

CONTRACT NUMBER 5082	OWNER NUMBER —
APPROVED BY Mark L. Mengel	DATE 2/6/01
APPROVED BY —	DATE —
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4.0 DATA EVALUATION

This section presents a discussion of the analytical data as well as hydrogeological data obtained during groundwater monitoring activities performed at Area A Landfill from October 1999 through July 2000.

4.1 EXTENT OF CONTAMINATION

As described in the Groundwater Monitoring Plan (TtNUS, 1999), the Connecticut Remediation Standard Regulations (RSRs) require that all groundwater plumes be remediated to attain either a.) the Surface Water Protection Criteria (SWPCs) and the Volatilization Criteria, or b.) the background concentration for each substance in the plume (CTDEP, January 1996). However, the volatilization criteria do not apply at the Area A Landfill because there are no buildings at this site and environmental land use restrictions exist that will prevent any buildings from being erected on the surface of the landfill. Accordingly, the first tier monitoring criteria used to evaluate the analytical data are the SWPCs promulgated by the CTDEP. In addition, the groundwater analytical results were compared to secondary monitoring criteria consisting of the Federal Ambient Water Quality Criteria (AWQCs) and the Connecticut Water Quality Standards (WQSs) developed for chronic (long-term) exposure of aquatic receptors in freshwater.

Four rounds of groundwater samples were collected from each monitoring well as part of the first year evaluation. Seven duplicate samples were collected as noted in the analytical summary tables. The data discussion will be limited to only those compounds designated as contaminants of potential concern as stated in Section 3.0.

A summary of groundwater analytical results is shown on Table 4-1. The primary screening criteria used for data evaluation was the site-specific SWPCs. A summary of the exceedances of primary and secondary monitoring criteria are shown on Figure 4-1. No volatile organics compounds (VOCs) or semivolatile organic compounds (SVOCs) were detected in any samples in excess of the primary screening criteria (SWPCs) during any of the sampling rounds. Additionally, VOCs and SVOCs were not detected in excess of any secondary screening criteria. No positive results were reported in any of the samples analyzed for pesticides/PCBs.

The results of metals analyses indicated positive detections for arsenic, chromium, copper, lead, and zinc in some of the total and dissolved metals samples in excess of either primary or secondary screening criteria (SWPCs). No exceedances of metals were noted in any of the samples collected during the initial four rounds from monitoring wells 3MW37S, 2WMW44DS, and 4MW1S. The following discusses positive detections in samples collected for total metals. As noted in Table 4-1, total arsenic concentrations ranging from 5.4 µg/l to 36.3 µg/l were detected in 22 of 69 samples in excess of the primary screening

criteria of 4 µg/l, in samples collected from monitoring wells 2WMW21S, 2WMW38DS, 2WMW39DS, and 2WMW45DS (round 1); 2WMW40DS and 2WMW43DS (round 1 & 4); 2WMW41DS (round 1 & 3); 2WMW42DS (round 1, 2, & 3); and 2WMW46DS and 2WMW47DS (rounds 1, 2, 3, & 4). Total zinc (146 µg/l) was detected in one sample (2WMW46DS, round 3), slightly in excess of the primary screening criteria of 123 µg/l. None of the positive results for chromium, copper, and lead exceeded the primary screening criteria. However, some positive results for chromium (4 of 69 samples) and copper (1 of 69 samples) were detected in excess of the respective secondary monitoring criteria as shown on Figure 4-1.

A comparison of total and dissolved metals results did not show any discernable differences as the results were mostly similar. Additionally, dissolved lead concentrations in two samples (2WMW21S, 3.4 J µg/l; and 2WMW41DS, 2.6 J µg/l) were slightly in excess of the secondary monitoring criteria while the same sample analyzed for total lead were non-detect. It should be noted that some of the positive results for metals (specifically arsenic and zinc) were detected in the dissolved phase at slightly higher concentrations than in the total phase. This may be attributable to laboratory instrumentation accuracy and precision controls. Figure 4-1 depicts the monitoring criteria exceedances.

Surface Water

During this first year of monitoring, surface water samples were collected from the Area A wetlands at designated staff gauge locations as shown on Figure 3-1. Samples were collected from each designated location when possible due to weather conditions. A summary of analytical results are shown on Table 4-2. Exceedances of primary and secondary screening criteria are shown on Figure 4-2. No VOCs were detected in any samples in excess of any screening criteria. The only SVOC detected in excess of primary screening criteria was phenanthrene (0.16 µg/l) during round 4. No other positive results were reported in surface water samples analyzed for SVOCs in excess of any criteria.

The results of metals analyses in surface water samples indicate positive detections of arsenic, chromium, copper, lead, and zinc in excess of primary or secondary screening criteria. Arsenic was detected in three samples at concentrations (4.2 µg/l – 8.2 µg/l) slightly above the primary screening criteria as shown on Figure 4-2. Detections of chromium (SG-22), copper (SG-22, SG-23, and SG-24), lead (SG-18, SG-19, SG-20, and SG-23), and zinc (SG-19, SG-21, SG-22, SG-23, and SG-24) were noted in excess of the secondary screening criteria. No other positive results were detected at concentrations in excess of either primary or secondary screening criteria.

4.2 HYDROLOGIC EVALUATION

Static groundwater levels were measured during each of the four quarterly rounds of groundwater sampling. Groundwater levels were measured on October 23, 1999; January 17, 2000; April 4, 2000; and July 17, 2000. Potentiometric surface maps were prepared for each round of water level measurements and are depicted on Figures 4-3 through 4-6. The contours were drawn from the groundwater elevations measured in the shallow overburden monitoring wells. Groundwater elevations are summarized on Table 4-3.

Groundwater flow directions essentially mimic the surface topography as shown on the figures and moves from southwest to northeast across the top of the landfill toward the Area A wetlands. In the northwestern portion of the landfill, groundwater flow is to the north and northwest direction. A comparison of the figures illustrate that groundwater flow patterns are similar throughout the year.

4.3 STATISTICAL ANALYSIS

A statistical analysis was performed on the results from the groundwater monitoring effort to determine if contaminants associated with past activities at the Area A Landfill are having an impact on groundwater at the site. This groundwater monitoring program employed three upgradient wells (2LMW20S, 2WMW21S, and 4MW1S) and thirteen downgradient wells (2WMW38DS, 2WMW39DS, 2WMW40DS, 2WMW41DS, 2WMW42DS, 2WMW43DS, 2WMW44DS, 2WMW45DS, 2WMW46DS, 2WMW47DS, 3MW12D, 3MW12S, and 3MW37S) sampled over four quarters.

The specific tests performed on data collected at the Area A Landfill are identified and described in the next section.

The statistical methods proposed to evaluate the groundwater data are employed in order to:

- Develop summary statistics (found in Appendix B) that describe environmental contaminant concentrations at Area A Landfill.

- Allow comparisons of upgradient concentrations to those detected in site environmental samples (i.e., samples collected in areas potentially contaminated by waste disposal) at Area A Landfill.

4.3.1 Comparison of Downgradient Wells to Upgradient Wells

Figure 4-7 is a flow diagram taken from the Groundwater Monitoring Plan (TtNUS, 1999). It presents the approach used to compare the downgradient data to the data collected from the upgradient wells.

Downgradient data was compared to upgradient data using either parametric or non-parametric analysis. No correction for seasonal variability was required since all wells at the facility should be effected similarly. The statistical methods described in the following paragraphs were used to determine if parameter concentrations detected in downgradient wells are significantly different, from those detected in samples from the upgradient wells.

The Analysis of Variance (ANOVA) technique was the basic approach used to compare data from upgradient and downgradient monitoring well locations. The ANOVA technique is used to test whether there is statistically significant evidence of contamination. There are two types of ANOVA tests: parametric and non-parametric. Parametric ANOVA tests, the method used here, assume that the data are normally or lognormally distributed. If the parametric analysis demonstrated that this assumption was violated, a non-parametric ANOVA test was conducted using the ranks of the observations rather than the observations themselves (EPA, 1989). In this case, the Wilcoxon Rank-Sum test (non-parametric ANOVA) was used to compare the downgradient wells to the upgradient wells.

4.3.1.1 Limit of Detection

During the chemical analysis of environmental samples, some analytes may be present at concentrations that are below the sample quantitation limit (SQL) for the analytical procedure. The results are generally reported as not detected (rather than zero), and the appropriate limit of detection is given. The amount of data that are below the detection limit play an important role in selecting the statistical method of addressing the detection limit problem. The non-detects found at the Area A Landfill were replaced with the SQL, divided by two, prior to the statistical analysis. Clearly, if all the observations were non-detectable results, no statistical analysis was warranted. In addition, field duplicate results were averaged and counted as one sample for use in statistical analysis.

4.3.2 Parametric and Nonparametric Analysis of Variance (ANOVA)

ANOVA is widely used in the examination of environmental data sets. A one-way classification ANOVA is used to determine whether or not the difference between average concentrations of a parameter detected in downgradient wells and upgradient wells is statistically significant. Since only two means are compared, an ANOVA test will give the same result as the t-test for independent samples. The data residuals are the values resulting from subtracting each measured value from the arithmetic mean. The assumptions that the residuals are drawn from an underlying normal (or lognormal) distribution must be examined prior to employing a parametric ANOVA.

4.3.2.1 The Shapiro and Wilk "W-test" of Normality (n ≤50)

As stated above, the data must be analyzed to determine whether they were drawn from an underlying normal or lognormal distribution. A number of statistical evaluations may be used to determine which, if either, of the distributions are exhibited by a given data set. As recommended by the EPA, the Shapiro and Wilk "W-test" (for sample sets <50) and the Shapiro-Francia "W-test" (for sample sets >50) will be used to determine whether the data are normally or lognormally distributed (EPA, 1992). If the test is inconclusive, lognormality is assumed.

The Shapiro and Wilk W-test (Gilbert, 1987) is an effective method for determining whether a data set has been drawn from an underlying normal (or lognormal) distribution. By conducting the Shapiro and Wilk W-test on the log-transformed data, the test may be used to determine whether the data have been drawn from an underlying lognormal distribution. The null hypothesis (H_0) that is tested is:

H_O - The population has a normal (or lognormal when the data is log-transformed) distribution.

The alternate hypothesis (H_A) is:

H_A - The population does not have a normal (or lognormal when the data is log-transformed) distribution.

A "W" statistic (W_{calc}) is computed for a data set (or a log transformed data set) and compared to a test statistic (W_{test}). If $W_{calc} \geq W_{test}$, then the null hypothesis is not rejected and the data are assumed to be normally distributed (or lognormally distributed if log transformed data are tested). If $W_{calc} < W_{test}$, then the null hypothesis is rejected, H_A is accepted, the data are not assumed to be normally distributed (or not lognormally distributed if log transformed data are tested).

The following equations present a step-by-step procedure for conducting the W-test on the residuals.

- Step 1. Group all of the data from each of the individual (K) wells.

- Step 2. Calculate the mean for each of the *k* wells $\overline{x_j}$ by the equation:

$$\overline{x_j} = \frac{\sum_{i=1}^{n} x_i}{n}$$

where *n* is the total number of samples in each well.

- Step 3. Calculate the residuals for each ith well and j^{th} sampling round by:

$$R_{ij} = x_{ij} - \overline{x_i}$$

The equation for conducting the W-Test is:

$$W_{calc} = \left[\frac{b}{S_R\sqrt{n-1}}\right]^2$$

where:

$$b = \sum_{i=1}^{k} a_i \left(R_{[n-i+1]} - R_i\right) = \sum_{i=1}^{k} b_i$$

and n is the total number of sampling rounds.

- Step 4. Order the n residuals from smallest to largest:

$$x_1 \leq x_2 \leq x_3 \leq \ldots \leq x_n$$

- Step 5. Compute the standard deviation by:

$$S_R = \sqrt{\sum_{i=1}^{n} \frac{\left(R_{ij} - \overline{R}\right)^2}{(n-1)}}$$

- Step 6. Determine the coefficients a_1, $a_2, a_3, .., a_k$ for the sample size n using Table B-1 in Appendix B, where:

$$k = \frac{n}{2} \quad if\, n\ is\ even\text{; and}$$

$$k = \frac{n-1}{2} \quad if\, n\ is\ odd$$

- Step 7. Determine b by the formula:

$$b = \sum_{i=1}^{k} a_i \left(R_{[n-i+1]} - R_i\right) = \sum_{i=1}^{k} b_i$$

- Step 8. Calculate W_{calc} using b from above, where:

$$W_{calc} = \left[\frac{b}{S_R\sqrt{n-1}}\right]^2$$

- Step 9. Determine W_{test} at the 5% significance level from Table B-2.

- Step 10. Reject H_O at the 5% significance level if W_{calc} is less than W_{test}.

To test the null hypothesis for a data set drawn from an underlying lognormal distribution, transform the data to $y_{1j}, y_{2j}, y_{3j}, \ldots, y_{km}$ where $y_{ij} = ln\ R_{ij}$. Repeat steps 1 through 10 as described in the preceding paragraphs.

4.3.2.2 Parametric ANOVA

Assume that a site has k wells and that n_i data points (analyte concentrations) are available for the ith well. The following presents a step-by-step procedure for conducting the parametric ANOVA.

- Step 1 Compute the sums and means of each well (i) using the following equations as follows:

$$X_i = \sum_{j=1}^{n_i} X_{ij}, \Sigma \text{ of all } n_i \text{ observations at well } i$$

$$\overline{X} = \frac{X}{N}, \text{ grand mean of all observations}$$

$$\overline{X_i} = \frac{X_i}{n_i}, \text{average of all } n_i \text{ observations at well } i$$

$$X = \sum_{i=1}^{k} \sum_{j=1}^{n_i} X_{ij}, \text{grand total of all } n_i \text{ observations}$$

$$N = \sum_{i=1}^{k} n_i, \text{total number of observations}$$

- Step 2. Compute the sum of squares of differences between the individual well means and the grand mean by the formula:

$$SS_{sample} = \sum_{i=1}^{k} n_i \left(\overline{X_i} - \overline{X}\right)^2 = \sum_{i=1}^{k} \left[\frac{X_i^2}{n_i}\right] - \frac{X^2}{N}$$

This sum of squares has (*k-1*) degrees of freedom associated with it and is a measure of the variability between wells.

- Step 3. Compute the corrected total sum of squares by the formula:

$$SS_{total} = \sum_{i=1}^{k} \sum_{j=1}^{n_i} \left(X_{ij} - \overline{X}\right)^2 = \sum_{i=1}^{k} \sum_{j=1}^{n_i} \left[\left(X_{ij}\right)^2\right] - \frac{X^2}{N}$$

This sum of squares has (*N-1*) degrees of freedom associated with it and is a measure of variability in the whole data set.

- Step 4. Compute the sum of squares of differences of observations within wells from the well means. This value is the sum of squares due to error and is obtained by simple subtraction:

$$SS_{Error} = SS_{Total} - SS_{Sample}$$

The sum of squares due to error has associated with it (*N-k*) degrees of freedom and is a measure of the variability within wells.

- Step 5. Set up an ANOVA table as shown below. The sums of squares and their degree of freedom were obtained from Steps 2 through 4. The mean square quantities are simply obtained by dividing each sum of squares by its corresponding degrees of freedom.

ONE-WAY PARAMETRIC ANOVA TABLE

Source of Variation	Sums of Squares	Degrees of Freedom	Mean Squares	F
Between Locations	$S_{Ssample}$	MS_{Sample}=k-1	SS_{Sample}/(k-1)	F=$MS_{samples}$/MS_{Error}
Error (within Locations)	SS_{Error}	MS_{Error}=N-k	SS_{Error}/(N-k)	
Total	SS_{Total}	N-1		

- Step 6. To test the hypothesis of equal means for all *k* wells, compute $F = MS_{Sample}/MS_{Error}$ (last column in above table). Compare this statistic to the tabulated F statistic with (*k-1*) and (*N-k*) degrees of freedom (Table B-3) at the 5% significance level. If the calculated *F* value exceeds the tabulated value, reject the hypothesis of equal well means. Otherwise, conclude that there is no significant difference between the concentrations of the *k* wells and thus no evidence of contamination.

4.3.2.3 Nonparametric ANOVA

The parametric ANOVA technique is the preferred approach for comparing environmental measurements from downgradient monitoring wells to upgradient well data. However, parametric ANOVA methods make a key assumption; the results are normally (or lognormally) distributed. If this assumption is violated, non-parametric tests (i.e. Kruskal-Wallis or Wilcoxon Rank-Sum tests) may be used to determine if constituent concentrations present in the downgradient areas significantly exceed those present in the upgradient well.

The Kruskal-Wallis (EPA, 1989) test should be employed when comparing three or more data sets. However, it is not amenable to two data set comparisons. In these situations, the Wilcoxon Rank-Sum test (EPA, 1992) (also known as the Mann-Whitney U test) should be employed.

Non-parametric tests are conducted using the ranks of the analytical results rather than the analytical results themselves. Therefore, the data sets are inspected for extremely high values that may be underestimated as a result of the ranking process.

4.3.2.4 The Wilcoxon Rank-Sum Test

The Wilcoxon Rank-Sum test is described in the following paragraphs.

- Step 1. Combine the upgradient and downgradient data and rank the ordered values from 1 to *N*. Assume there are *n* downgradient samples and m upgradient samples so that $N = m + n$.

- Step 2. Compute the Wilcoxon statistic *W*:

$$W = \sum_{i=1}^{n} E_i - \frac{1}{2}n(n+1)$$

where E_i are the ranks of the downgradient samples large values of the statistic *W* give evidence of contamination in downgradient wells.

- Step 3. Compute an approximate *Z-score*. To find the critical value of *W*, a normal approximation to its distribution is used. The expected value and standard deviation of *W* under the null hypothesis (i.e., no contamination exists) are given by the formulas

$$E(W) = \frac{1}{2}mn; \qquad SD(W) = \sqrt{\frac{1}{12}mn(N+1)}$$

An approximate *Z-score* for the Wilcoxon Rank-Sum test may be calculated by the following equations:

$$Z = \frac{W - E(W) - \frac{1}{2}}{SD(W)}$$

The factor of 1/2 in the numerator serves as a continuity correction since the discrete distribution of the statistic W is being approximated by the continuous normal distribution. If $n,m > 10$ and ties are present, an adjustment to the approximate *Z-score* must be made as follows:

$$Z_{RS} = \frac{W - E(W) - \frac{1}{2}}{SD'(W)}$$

where: $$SD'(W) = \left(\frac{mn}{12} \left[N + 1 - \frac{\sum_{j=1}^{g} t_j (t_j^2 - 1)}{N(N-1)} \right] \right)^{\frac{1}{2}}$$

g = the number of tied groups and t_j is the number of tied data in the jth group.

- Step 4. For a one-tailed 0.05 significance level test for H_0 versus H_A (i.e. the measurements from population 1 tend to exceed those from population 2), reject H_0 and accept H_A if $Z_{rs} > Z_{0.95} = +1.96$.

4.3.3 Statistical Findings

The following 21 contaminants were considered potential COCs prior to statistical analysis as they were identified as COCs before round 1:

Volatile Organics

1,1,2,2-Tetrachloroethane	Ethylbenzene
Xylenes	

Semivolatile Organics

Benzo(a)anthracene	Benzo(a)pyrene
Benzo(b)fluoranthene	Benzo(k)fluoranthene
Bis(2-ethylhexyl)phthalate	Phenanthrene

Pesticides/PCBs

Aroclor-1016	Aroclor-1254

Aroclor-1260	Dieldrin
Heptaclor	

Metals

Arsenic	Beryllium
Cadmium	Chromium
Copper	Lead
Zinc	

Seven of the 21 potential COCs were detected in the downgradient wells during rounds 1 through 4. They were: Ethylbenzene, Bis(2-ethylhexyl)phthalate, Arsenic, Beryllium, Chromium, Copper, and Zinc.

Shapiro-Wilk W tests were performed to determine the underlying distribution of the upgradient and downgradient wells for each COC. Results of Shapiro-Wilk W tests for downgradient wells is shown in Table 4-4. Results of Shapiro-Wilk W tests for upgradient wells is shown in Table 4-5. If upgradient and downgradient results demonstrated the same underlying distribution (as shown on Table 4-6), a parametric ANOVA was performed at a 95% level of confidence to compare data sets. Results of parametric ANOVA are presented in Table 4-7. If the underlying distributions could not be shown to be the same, a non-parametric ANOVA (Wilcoxon Rank-Sum) test was performed at a 95% level of confidence to compare data sets. Results of non-parametric ANOVA (Wilcoxon Rank-Sum) are presented in Table 4-8. COCs that produced p-levels below 0.05 have downgradient results that are higher than upgradient results at a 95% level of significance.

The only COC that showed statistically significant differences between the downgradient and upgradient results was arsenic. The Connecticut Department of Environmental Protection Surface Water Protection Criteria (SWPC) for arsenic is 4 µg/L. The average arsenic concentration (both total and dissolved) was above this criteria for each of the four rounds.

Plots of average arsenic concentrations as a function of time for Rounds 1 through 4 are shown in Figure 4-9 (total arsenic) and Figure 4-10 (dissolved arsenic). Although the least-squared linear regression lines show downward trends it should be noted the confidence that the true trend is downward are only 43% (Figure 4-11) and 25% (Figure 4-12), respectively for total and dissolved arsenic. As more rounds of data are taken the confidence in these trend [and their underlying shapes (linear, exponential, etc)] should increase.

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	2LMW20S 2LGW20S-01 10/24/99	2LMW20S 2LGW20S-02 01/22/00	2LMW20S 2LGW20S-02-D 01/22/00	2LMW20S 2LGW20S-03 04/08/00	2LMW20S 2LGW20S-04 07/06/00
VOCs (ug/L)							
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U	1 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	1 U	1 U	1 U	1 U	1 U
SVOCs (ug/L)							
BENZO(A)ANTHRACENE	0.3	NA	0.17 U	0.17 U	0.16 U	0.16 U	2.2 U
BENZO(A)PYRENE	0.3	NA	0.17 U	0.17 U	0.16 U	0.16 U	2.2 U
BENZO(B)FLUORANTHENE	0.3	NA	0.17 U	0.17 U	0.16 U	0.16 U	2.2 U
BENZO(K)FLUORANTHENE	0.3	NA	0.17 U	0.17 U	0.16 U	0.16 U	2.2 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	0.87 J	2.1 U	2 U	2.1 U	2.2 U
PHENANTHRENE	0.077	NA	1.1 U	1.1 U	1 U	1 U	2.2 U
Pesticides/PCBs (ug/L)							
AROCLOR-1016	0.5	0.014[2]	0.2 U	0.21 U	0.21 U	0.2 U	0.21 U
AROCLOR-1254	0.5	0.014[2]	0.2 U	0.21 U	0.21 U	0.2 U	0.21 U
AROCLOR-1260	0.5	0.014[2]	0.2 U	0.21 U	0.21 U	0.2 U	0.21 U
DIELDRIN	0.1	0.0019[3]	0.02 U	0.021 U	0.021 U	0.02 U	0.021 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)							
ARSENIC	4	150[2]	3.8 U/3.8 U	2.6 U/2.6 U	2.6 U/2.6 U	3.5 U/2.3 U	2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.48 U/0.2 U	0.57 U/0.2 U	0.3 U/0.1 U	0.1 U/0.1 U
CADMIUM	6	0.62[3]	0.3 U/0.45 U	0.3 U/0.3 U	0.3 U/0.3 U	2.4 U/2.1 U	0.32 U/0.32 U
CHROMIUM[4]	110	11[2]	2.4 U/2.4 U	1 UJ/1 UJ	1 UJ/1.4 U	0.7 U/0.8 U	1.3 U/1.5 J
COPPER	48	4.8[3]	3 U/1.6 U	1.3 UJ/1.3 UJ	1.3 UJ/1.3 UJ	3.1 U/2.2 U	0.87 U/0.87 U
LEAD	13	1.2[3]	2.1 U/1.7 U	1.8 U/1.8 U	1.8 U/1.8 U	1.8 U/2.1 U	1.9 U/1.9 U
ZINC	123	58.2[3]	42.8 U/24.4 U	11.2/58.1 J	35.9/7.8 J	84.6/80.4	15.7 J/14.2
Miscellaneous Parameters (mg/L)							
ALKALINITY	NA	NA	98.3	88.6	90.7	152	68.1
CHEMICAL OXYGEN DEMAND	NA	NA	20 U	20 U	20 U	20 U	20 U
CHLORIDE	NA	NA	109	67.4	70.2	85	84.1 J
HARDNESS	NA	NA	78.8	98.5	89.5	99.3	91.1
SULFATE	NA	NA	14	20 U	20 U	20 U	20 U
TOTAL DISSOLVED SOLIDS	NA	NA	315	242	201	327	244 J
TOTAL ORGANIC CARBON	NA	NA	2.6	2.1 J	2.1 J	1.4	1.6

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	2WMW21S 2WGW21S-01 10/25/99	2WMW21S 2WGW21S-02 01/23/00	2WMW21S 2WGW21S-03 04/08/00	2WMW21S 2WGW21S-04 07/05/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	5 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	5 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	5 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.15 UJ	0.17 U	0.15 U	2.2 U
BENZO(A)PYRENE	0.3	NA	0.15 UJ	0.17 U	0.15 U	2.2 U
BENZO(B)FLUORANTHENE	0.3	NA	0.15 UJ	0.17 U	0.15 U	2.2 U
BENZO(K)FLUORANTHENE	0.3	NA	0.15 UJ	0.17 U	0.15 U	2.2 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	1.3 J	2.1 U	2 U	2.2 U
PHENANTHRENE	0.077	NA	1 UJ	1.1 U	1 U	2.2 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.22 U
AROCLOR-1254	0.5	0.014(2)	0.2 U	2 U	0.2 U	0.22 U
AROCLOR-1260	0.5	0.014(2)	0.2 U	2 U	0.2 U	0.22 U
DIELDRIN	0.1	0.0019(3)	0.02 U	0.2 U	0.02 U	0.022 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U	0.01 U	0.01 U	0.011 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150(2)	8.8/7.2 J	2.6 UJ/2.6 UJ	4.2 U/2.7 U	3 J/2.7 UJ
BERYLLIUM	4	NA	0.2 U/0.2 U	0.67 U/0.2 U	0.3 UJ/0.1 UJ	0.1 U/0.1 U
CADMIUM	6	0.62(3)	1.4 U/0.87 U	0.3 UJ/0.3 UJ	0.3 U/0.2 U	0.71 U/0.32 U
CHROMIUM(4)	110	11(2)	7.4/8.2	1 UJ/5.6 U	6.2 J/5.2 J	6.6 J/6.4 J
COPPER	48	4.8(3)	1.2 U/2 U	5.8 U/2 U	1.5 U/3 U	0.87 U/0.87 U
LEAD	13	1.2(3)	1.7 U/1.7 U	1.8 UJ/1.8 UJ	1.8 U/3.4 J	1.9 U/1.9 U
ZINC	123	58.2(3)	3.7 U/3.8 U	7.6 J/4.9 J	1.3 U/7.4 U	2.9 U/2.6 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	787	297	1620	1950
CHEMICAL OXYGEN DEMAND	NA	NA	584	1030	236	570
CHLORIDE	NA	NA	4290	9740	8560	9920 J
HARDNESS	NA	NA	1380	3580	3080	317
SULFATE	NA	NA	48.8	246	20 U	200 U
TOTAL DISSOLVED SOLIDS	NA	NA	7030	15100	14700	17100 J
TOTAL ORGANIC CARBON	NA	NA	40.1	33.3 J	39.1	37.7

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	2WMW38DS 2WGW38DS-01 10/26/99	2WMW38DS 2WGW38DS-02 01/21/00	2WMW38DS 2WGW38DS-03 04/07/00	2WMW38DS 2WGW38DS-04 07/20/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	1 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.17 U	2 U	0.17 U	2 U
BENZO(A)PYRENE	0.3	NA	0.17 U	2 U	0.17 U	2 U
BENZO(B)FLUORANTHENE	0.3	NA	0.17 U	2 U	0.17 U	2 U
BENZO(K)FLUORANTHENE	0.3	NA	0.17 U	2 U	0.17 U	2 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	0.75 J	2 U	2.1 U	2.1 U
PHENANTHRENE	0.077	NA	1.1 U	2 U	1.1 U	2 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014[2]	0.2 U	0.21 U	0.2 U	0.21 U
AROCLOR-1254	0.5	0.014[2]	0.2 U	0.21 U	0.2 U	0.21 U
AROCLOR-1260	0.5	0.014[2]	0.2 U	0.21 U	0.2 U	0.21 U
DIELDRIN	0.1	0.0019[3]	0.02 U	0.021 U	0.02 U	0.021 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U	0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150[2]	6.5 J/4.6 J	/5.1 J	6 U/4 U	2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U	/0.2 U	0.3 U/0.1 U	0.22 U
CADMIUM	6	0.62[3]	0.3 U/0.3 U	/0.3 U	0.3 U/0.2 U	0.32 U
CHROMIUM[4]	110	11[2]	2.4 U/2.4 U	/2.7 U	2.8/1.7	4.8 J
COPPER	48	4.8[3]	6.3/4.4 U	/6.7 U	4.6 U/5.2 U	4.9 U
LEAD	13	1.2[3]	1.7 U/1.7 U	/1.8 U	1.8 U/2.1 U	1.9 U
ZINC	123	58.2[3]	70.3 J/152 J	/27.7 J	19.2/24.7	6.8 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	318	298	427	303
CHEMICAL OXYGEN DEMAND	NA	NA	63.3	46.2	35.9	41.6
CHLORIDE	NA	NA	224	202	239	198 J
HARDNESS	NA	NA	249		237	201
SULFATE	NA	NA	94.1	69.6	35	55.7
TOTAL DISSOLVED SOLIDS	NA	NA	716	760	841	813
TOTAL ORGANIC CARBON	NA	NA	17.1	15.1 J	12.7	15.1

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	2WMW39DS 2WGW39DS-01 10/27/99	2WMW39DS 2WGW39DS-02 01/21/00	2WMW39DS 2WGW39DS-03 04/05/00	2WMW39DS 2WGW39DS-04 07/19/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U	1 U	1 U	0.3 J
XYLENES, TOTAL	NA	NA	1 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.2 UJ
BENZO(A)PYRENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.2 UJ
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.2 UJ
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.2 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U	2 U	2 U	2 U
PHENANTHRENE	0.077	NA	1 U	1.1 U	1.1 U	0.2 UJ
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.2 U
AROCLOR-1254	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.2 U
AROCLOR-1260	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.2 U
DIELDRIN	0.1	0.0019(3)	0.02 U	0.021 U	0.02 U	0.02 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U	0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150(2)	5.4 J/3.8 U	2.6 U/2.6 U	2.6 U/3.2 J	2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.41 U/0.2 U	0.2 U/0.2 U	0.1 U/0.1 U
CADMIUM	6	0.62(3)	0.3 U/0.3 U	0.3 U/0.3 U	0.3 U/0.3 U	0.32 U/0.32 U
CHROMIUM(4)	110	11(2)	2.4 U/4.1 J	2.2 U/1.3 U	1 U/1.3 U	1.3 U/1.3 U
COPPER	48	4.8(3)	1.2 U/1.2 U	1.3 UJ/1.3 U	2.4 U/1.4 U	0.87 U/0.87 U
LEAD	13	1.2(3)	1.8 U/2.3 U	1.8 U/1.8 U	1.8 U/1.8 U	1.9 U/1.9 U
ZINC	123	58.2(3)	11.7 J/15.4 J	11.1/7.2 J	8.9/7.1 J	6.1 J/17.2
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	176	203	155	159
CHEMICAL OXYGEN DEMAND	NA	NA	20 U	914	65.5	65.8
CHLORIDE	NA	NA	274	452	508 J	329 J
HARDNESS	NA	NA	153	154	160	110
SULFATE	NA	NA	10 U	20 U	20 U	20 U
TOTAL DISSOLVED SOLIDS	NA	NA	469	974	939	782 J
TOTAL ORGANIC CARBON	NA	NA	4.3	137 J	42	21

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	2WMW40DS 2WGW40DS-01 10/25/99	2WMW40DS 2WGW40DS-02 01/21/00	2WMW40DS 2WGW40DS-03 04/07/00	2WMW40DS 2WGW40DS-04 07/20/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	5 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	5 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	5 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.16 UJ	0.19 U	0.17 U	0.15 U
BENZO(A)PYRENE	0.3	NA	0.16 UJ	0.19 U	0.17 U	0.15 U
BENZO(B)FLUORANTHENE	0.3	NA	0.16 UJ	0.19 U	0.17 U	0.15 U
BENZO(K)FLUORANTHENE	0.3	NA	0.16 UJ	0.19 U	0.17 U	0.15 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	1.1 J	2 U	2 U	2.5 U
PHENANTHRENE	0.077	NA	1.1 UJ	1.2 U	1.1 U	1 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014[2]	0.2 U	0.21 U	0.2 U	0.29 U
AROCLOR-1254	0.5	0.014[2]	0.2 U	0.21 U	0.2 U	0.29 U
AROCLOR-1260	0.5	0.014[2]	0.2 U	0.21 U	0.2 U	0.29 U
DIELDRIN	0.1	0.0019[3]	0.02 U	0.021 U	0.02 U	0.029 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U	0.01 U	0.01 U	0.014 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150[2]	36.3/11.9	2.6 UJ/5.2 J	10.3 U/17.9 J	25.9 J/13.8 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.44 U/0.2 U	0.3 UJ/0.1 UJ	0.12 U/0.1 U
CADMIUM	6	0.62[3]	0.3 UJ/0.3 UJ	0.3 UJ/0.3 UJ	0.3 U/0.2 U	0.32 U/0.32 U
CHROMIUM[4]	110	11[2]	3.7 J/2.4 U	1 UJ/3.2 U	3.8 J/2.4 J	5 J/1.8 J
COPPER	48	4.8[3]	1.6 U/2.3 U	1:3 UJ/1.4 U	2.3 U/1.6 U	0.87 U/0.87 U
LEAD	13	1.2[3]	1.7 U/1.7 U	1.8 UJ/1.8 UJ	1.8 U/2.1 U	1.9 U/1.9 U
ZINC	123	58.2[3]	6.7 U/10.7 U	6.8 J/10.8 J	5.8 U/11.8 J	4.7 U/3.2 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	1620	1160	1180	996
CHEMICAL OXYGEN DEMAND	NA	NA	944	1280	179	1040
CHLORIDE	NA	NA	10500	9090	9350	10500 J
HARDNESS	NA	NA		2950	3070	3750
SULFATE	NA	NA	534	948	792	989
TOTAL DISSOLVED SOLIDS	NA	NA	17500	15600	15900	16700
TOTAL ORGANIC CARBON	NA	NA	25.7	32.2 J	3.3	24

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	2WMW41DS 2WGW41DS-01 10/28/99	2WMW41DS 2WGW41DS-02 01/21/00	2WMW41DS 2WGW41DS-03 04/07/00	2WMW41DS 2WGW41DS-04 07/20/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	5 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	5 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	5 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.17 U	0.17 U	0.17 U	0.15 U
BENZO(A)PYRENE	0.3	NA	0.17 U	0.17 U	0.17 U	0.15 U
BENZO(B)FLUORANTHENE	0.3	NA	0.17 U	0.17 U	0.17 U	0.15 U
BENZO(K)FLUORANTHENE	0.3	NA	0.17 U	0.17 U	0.17 U	0.15 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U	2 U	2 U	2.1 U
PHENANTHRENE	0.077	NA	1.1 U	1.1 U	1.1 U	1 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.22 U
AROCLOR-1254	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.22 U
AROCLOR-1260	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.22 U
DIELDRIN	0.1	0.0019(3)	0.02 U	0.021 U	0.02 U	0.022 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U	0.01 U	0.01 U	0.011 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150(2)	10.4 J/12.1 J	3.5 J/2.6 UJ	18.4 J/29 J	6 U/8.4 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.4 U/0.2 U	0.3 UJ/0.1 UJ	0.1 U/0.1 U
CADMIUM	6	0.62(3)	0.3 U/0.3 U	0.3 UJ/0.3 UJ	0.3 U/0.2 U	0.32 U/0.34 U
CHROMIUM(4)	110	11(2)	3.2 J/2.4 U	1 UJ/2.5 U	12.2/9.7 J	3.9 J/4.8 J
COPPER	48	4.8(3)	1.2 U/1.2 U	1.3 UJ/1.3 UJ	2.5 U/8.3 J	0.87 U/0.87 U
LEAD	13	1.2(3)	1.7 U/1.7 U	1.8 UJ/1.8 UJ	1.8 U/2.6 J	1.9 U/1.9 U
ZINC	123	58.2(3)	11.8 J/14.1 J	7.5 J/6.6 J	12.2 J/7.9 J	6.8 U/4 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	1810	2030	2190	752
CHEMICAL OXYGEN DEMAND	NA	NA	620	914	200	651
CHLORIDE	NA	NA	7790	9370	7730	7690 J
HARDNESS	NA	NA	2210	2570	2620	2350
SULFATE	NA	NA	86.7	274	282	212
TOTAL DISSOLVED SOLIDS	NA	NA	12900	15900	13400	13600
TOTAL ORGANIC CARBON	NA	NA	47	45.3 J	41.2	65.2

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	2WMW42DS 2WGW42DS-01 10/28/99	2WMW42DS 2WGW42DS-02 01/21/00	2WMW42DS 2WGW42DS-03 04/05/00	2WMW42DS 2WGW42DS-04 07/20/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	5 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	5 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	5 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.91 U	0.17 U	0.17 U	0.15 U
BENZO(A)PYRENE	0.3	NA	0.91 U	0.17 U	0.17 U	0.15 U
BENZO(B)FLUORANTHENE	0.3	NA	0.91 U	0.17 U	0.17 U	0.15 U
BENZO(K)FLUORANTHENE	0.3	NA	0.91 U	0.17 U	0.17 U	0.15 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U	2 U	2.1 U	2 U
PHENANTHRENE	0.077	NA	6.1 U	1.1 U	1.1 U	1 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.2 U
AROCLOR-1254	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.2 U
AROCLOR-1260	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.2 U
DIELDRIN	0.1	0.0019(3)	0.02 U	0.021 U	0.02 U	0.02 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U	0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150(2)	21.8 J/23.3 J	20.5 J/11.2 J	6.2/30.6	10.1 U/12.6 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.82 U/0.2 U	0.2 U/0.2 U	0.1 U/0.1 U
CADMIUM	6	0.62(3)	0.3 U/0.3 U	0.3 UJ/0.3 UJ	0.39 U/0.3 U	0.32 U/0.32 U
CHROMIUM(4)	110	11(2)	4.2 J/3.7 J	1 UJ/2 U	4.6 U/4.3 U	3.3 J/2 J
COPPER	48	4.8(3)	1.2 U/6.5 J	1.3 UJ/1.3 UJ	3.8 U/2.2 U	0.87 U/1 U
LEAD	13	1.2(3)	1.7 U/1.7 U	1.8 UJ/1.8 UJ	1.8 U/3.6 U	1.9 U/1.9 U
ZINC	123	58.2(3)	6.2 J/23.9 J	18.7 J/4.4 J	9.7/6.2 J	11 J/7.6 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	1460	1330	1080	467
CHEMICAL OXYGEN DEMAND	NA	NA	1100	686	149	362
CHLORIDE	NA	NA	8120	7140	5500 J	5140 J
HARDNESS	NA	NA	2790	3940	1520	1380
SULFATE	NA	NA	165	193	149	152
TOTAL DISSOLVED SOLIDS	NA	NA	12300	12900	9490	9310
TOTAL ORGANIC CARBON	NA	NA	32.7	29.3 J	64.2	29.2

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	2WMW43DS 2WGW43DS-01 10/27/99	2WMW43DS 2WGW43DS-02 01/22/00	2WMW43DS 2WGW43DS-03 04/08/00	2WMW43DS 2WGW43DS-04 07/21/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	5 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	5 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	5 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.16 U	0.19 U	0.15 U	2 U
BENZO(A)PYRENE	0.3	NA	0.16 U	0.19 U	0.15 U	2 U
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U	0.19 U	0.15 U	2 U
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U	0.19 U	0.15 U	2 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U	1.3 J	2 U	2 U
PHENANTHRENE	0.077	NA	1 U	1.2 U	1 U	2 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.2 U
AROCLOR-1254	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.2 U
AROCLOR-1260	0.5	0.014(2)	0.2 U	0.21 U	0.2 U	0.2 U
DIELDRIN	0.1	0.0019(3)	0.02 U	0.021 U	0.02 U	0.02 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U	0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150(2)	12.2 J/11.9 J	2.6 J/3 J	16.8 U/13.4 U	16.1 J/10.9 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.52 J/0.2 U	0.3 UJ/0.1 UJ	0.26 U/0.1 U
CADMIUM	6	0.62(3)	0.3 U/0.3 U	0.3 U/0.3 UJ	1.6 U/0.2 U	0.32 U/0.32 U
CHROMIUM(4)	110	11(2)	6.1 J/2.4 J	1 UJ/9.6 J	8.2 J/9.9 J	8.3 J/5.5 J
COPPER	48	4.8(3)	1.2 U/1.2 U	1.3 UJ/2.5 U	6.2 U/11.2 J	0.87 U/0.87 U
LEAD	13	1.2(3)	1.7 U/1.7 U	1.8 UJ/1.8 UJ	1.8 U/4.2 U	1.9 U/1.9 U
ZINC	123	58.2(3)	9.6 J/0.9 UJ	10.6 J/3.8 U	10.8 J/8.9 J	5.3 U/4.9 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	1850	1680	2340	1200
CHEMICAL OXYGEN DEMAND	NA	NA	1580	1030	236	1930
CHLORIDE	NA	NA	12900	12700	12600	13900 J
HARDNESS	NA	NA	4120	4250	4070	4630
SULFATE	NA	NA	196	340	328	375
TOTAL DISSOLVED SOLIDS	NA	NA	20900	19100	23500	24800
TOTAL ORGANIC CARBON	NA	NA	35.7	31.9 J	34.1	48.5

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	2WMW44DS 2WGW44DS-01 10/28/99	2WMW44DS 2WGW44DS-02 01/22/00	2WMW44DS 2WGW44DS-03 04/09/00	2WMW44DS 2WGW44DS-04 07/20/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	5 U		1 U	1 U
ETHYLBENZENE	580,000	NA	5 U		1 U	1 U
XYLENES, TOTAL	NA	NA	5 U		1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.17 U		0.16 U	0.15 U
BENZO(A)PYRENE	0.3	NA	0.17 U		0.16 U	0.15 U
BENZO(B)FLUORANTHENE	0.3	NA	0.17 U		0.16 U	0.15 U
BENZO(K)FLUORANTHENE	0.3	NA	0.17 U		0.16 U	0.15 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U		2 U	2 U
PHENANTHRENE	0.077	NA	1.1 U		1 U	1 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014[2]	0.2 U		0.2 U	0.22 U
AROCLOR-1254	0.5	0.014[2]	0.2 U		0.2 U	0.22 U
AROCLOR-1260	0.5	0.014[2]	0.2 U		0.2 U	0.22 U
DIELDRIN	0.1	0.0019[3]	0.02 U		0.02 U	0.022 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U		0.01 U	0.011 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150[2]	3.8 U/3.8 U		3.5 U/2.3 U	3 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U		0.3 U/0.1 U	0.27 U/0.1 U
CADMIUM	6	0.62[3]	0.32 U/0.3 U		0.3 U/0.31 U	0.32 U/0.32 U
CHROMIUM[4]	110	11[2]	2.4 U/2.4 U		1.9/0.8 U	1.3 U/1.3 U
COPPER	48	4.8[3]	1.2 U/1.2 U		1.3 U/1 U	0.87 U/0.87 U
LEAD	13	1.2[3]	1.7 U/1.7 U		1.8 U/2.1 U	1.9 U/1.9 U
ZINC	123	58.2[3]	21.2 J/15.5 J		13.4/9.6	6.7 U/6.4 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	146		566	547
CHEMICAL OXYGEN DEMAND	NA	NA	63.4		46.2	54.6
CHLORIDE	NA	NA	1660		1420	1980 J
HARDNESS	NA	NA	718		6.6 U	730
SULFATE	NA	NA	11		20 U	20 U
TOTAL DISSOLVED SOLIDS	NA	NA	3020		1910	3440
TOTAL ORGANIC CARBON	NA	NA	32.8		9	10.3

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	2WMW45DS 2WGW45DS-01 10/26/99	2WMW45DS 2WGW45DS-02 01/23/00	2WMW45DS 2WGW45DS-03 04/08/00	2WMW45DS 2WGW45DS-04 07/20/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	1 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.15 U
BENZO(A)PYRENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.15 U
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.15 U
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.15 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	0.79 J	2.1 U	2.1 U	2.1 U
PHENANTHRENE	0.077	NA	1.1 U	1.1 U	1.1 U	1 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014(2)	0.2 U	0.22 U	0.2 U	0.22 U
AROCLOR-1254	0.5	0.014(2)	0.2 U	0.22 U	0.2 U	0.22 U
AROCLOR-1260	0.5	0.014(2)	0.2 U	0.22 U	0.2 U	0.22 U
DIELDRIN	0.1	0.0019(3)	0.02 U	0.022 U	0.02 U	0.022 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U	0.011 U	0.01 U	0.011 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150(2)	10.8/12.4	2.9 J/3.2 J	11 U/9.6 U	4.2 U/4.6 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.48 U/0.2 U	0.3 U/0.1 U	0.1 U/0.1 U
CADMIUM	6	0.62(3)	0.85 U/0.92 U	0.3 U/0.81 U	0.3 U/0.86 U	0.32 U/0.32 U
CHROMIUM(4)	110	11(2)	2.4 U/2.5 J	1 UJ/3.1 U	3.5/1.8	1.4 J/1.3 U
COPPER	48	4.8(3)	1.8 U/1.8 U	1.3 UJ/1.5 U	0.8 U/1 U	0.87 U/0.87 U
LEAD	13	1.2(3)	1.7 U/1.7 U	1.8 U/1.8 U	1.8 U/2.1 U	1.9 U/1.9 U
ZINC	123	58.2(3)	7.3 U/1.8 U	10.8/4.5 J	9.1/17.9	3.1 U/4.7 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	379	315	440	870
CHEMICAL OXYGEN DEMAND	NA	NA	225	59	66.7	146
CHLORIDE	NA	NA	1490	1720	1970	4270 J
HARDNESS	NA	NA	375	912	576	2470
SULFATE	NA	NA	15.8	20 U	30.2	51.7
TOTAL DISSOLVED SOLIDS	NA	NA	2590	3100	4470	7430
TOTAL ORGANIC CARBON	NA	NA	14.7	12.9 J	12.3	16.4

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	2WMW46DS 2WGW46DS-01 10/26/99	2WMW46DS 2WGW46DS-02 01/24/00	2WMW46DS 2WGW46DS-03 04/07/00	2WMW46DS 2WGW46DS-04 07/20/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	5 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	5 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	5 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.15 U
BENZO(A)PYRENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.15 U
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.15 U
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U	0.17 U	0.17 U	0.15 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	1.2 J	2 U	2.1 U	2.1 U
PHENANTHRENE	0.077	NA	1.1 U	1.2 U	1.1 U	1 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014[2]	0.2 U	0.21 U	0.2 U	0.22 U
AROCLOR-1254	0.5	0.014[2]	0.2 U	0.21 U	0.2 U	0.22 U
AROCLOR-1260	0.5	0.014[2]	0.2 U	0.21 U	0.2 U	0.22 U
DIELDRIN	0.1	0.0019[3]	0.02 U	0.021 U	0.02 U	0.022 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U	0.01 U	0.01 U	0.011 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150[2]	33.4/30	9.4 J/10.6 J	24.4 J/31.6 U	28.4 J/29.3 J
BERYLLIUM	4	NA	0.2 U/0.2 U	0.79 U/0.2 U	0.3 UJ/0.1 UJ	0.13 U/0.1 U
CADMIUM	6	0.62[3]	0.3 UJ/0.3 UJ	0.3 UJ/0.3 UJ	0.3 U/0.2 U	0.32 U/0.32 U
CHROMIUM[4]	110	11[2]	4.2 J/11.3	6 U/4.6 U	17 J/6.5 J	11.9 J/13.6 J
COPPER	48	4.8[3]	1.7 U/2.6 U	8.6 U/1.3 UJ	6.4 U/4 U	0.87 U/1.5 U
LEAD	13	1.2[3]	1.7 U/1.7 U	1.8 UJ/1.8 UJ	3.6 U/4.2 U	3.8 U/3.8 U
ZINC	123	58.2[3]	10.9 U/9.3 U	50.4 J/9.5 J	146/8.2 J	11.1 J/6.5 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	2220	1230	2780	2420
CHEMICAL OXYGEN DEMAND	NA	NA	1800	1260	333	2410
CHLORIDE	NA	NA	16800	16300	16600	16800 J
HARDNESS	NA	NA	5130	4610	5020	5030
SULFATE	NA	NA	149	437	100 U	255
TOTAL DISSOLVED SOLIDS	NA	NA	26300	26200	29200	29400
TOTAL ORGANIC CARBON	NA	NA	36.5	4.2 J	29.8	63.2

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	2WMW47DS 2WGW47DS-01 10/25/99	2WMW47DS 2WGW47DS-02 01/24/00	2WMW47DS 2WGW47DS-03 04/05/00	2WMW47DS 2WGW47DS-04 07/18/00	2WMW47DS 2WGW47DS-04-D 07/18/00
VOCs (ug/L)							
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U	1 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	1 U	1 U	1 U	1 U	1 U
SVOCs (ug/L)							
BENZO(A)ANTHRACENE	0.3	NA	0.16 UJ	0.15 U	0.17 U	0.21 UJ	0.2 UJ
BENZO(A)PYRENE	0.3	NA	0.16 UJ	0.15 U	0.17 U	0.21 UJ	0.2 UJ
BENZO(B)FLUORANTHENE	0.3	NA	0.16 UJ	0.15 U	0.17 U	0.21 UJ	0.2 UJ
BENZO(K)FLUORANTHENE	0.3	NA	0.16 UJ	0.15 U	0.17 U	0.21 UJ	0.2 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	1 J	2 U	2 U	2.1 U	2 U
PHENANTHRENE	0.077	NA	1.1 UJ	1 U	1.1 U	0.21 UJ	0.2 UJ
Pesticides/PCBs (ug/L)							
AROCLOR-1016	0.5	0.014(2)	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
AROCLOR-1254	0.5	0.014(2)	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
AROCLOR-1260	0.5	0.014(2)	0.2 U	0.2 U	0.21 U	0.2 U	0.2 U
DIELDRIN	0.1	0.0019(3)	0.02 U	0.02 U	0.021 U	0.02 U	0.02 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)							
ARSENIC	4	150(2)	26.6/27.6	11.8 J/12.2 J	16.5/13	29.6 J/35.5 J	30.4 J/32.4 J
BERYLLIUM	4	NA	0.2 U/0.2 U	0.63 U/1.1 U	0.2 U/0.2 U	0.1 U/0.1 U	0.1 U/0.1 U
CADMIUM	6	0.62(3)	2.1 U/3.2 U	0.3 U/2.1 U	0.32 U/0.42 U	0.89 U/1.8 U	1 U/1.3 U
CHROMIUM(4)	110	11(2)	5/2.4 U	1 UJ/2.4 U	2.3 U/1.8 U	1.3 UJ/1.3 UJ	1.3 UJ/1.3 UJ
COPPER	48	4.8(3)	1.2 U/1.2 U	1.3 UJ/1.3 UJ	1.5 U/2 U	0.87 U/1 U	0.87 U/0.87 U
LEAD	13	1.2(3)	1.7 U/1.7 U	1.8 U/6.4 U	1.8 U/1.8 U	1.9 U/1.9 U	1.9 U/1.9 U
ZINC	123	58.2(3)	8 U/13.9 U	12.4/7.4 J	13.3/5.1 J	8.2 J/13.6 J	9.9 J/18.7 J
Miscellaneous Parameters (mg/L)							
ALKALINITY	NA	NA	422	365	296	323	384
CHEMICAL OXYGEN DEMAND	NA	NA	180	20 U	65.5	106	109
CHLORIDE	NA	NA	1950	1500	1420 J	3170 J	3570 J
HARDNESS	NA	NA	635	559	365	870	850
SULFATE	NA	NA	10 U	20 U	20 U	20 U	20 U
TOTAL DISSOLVED SOLIDS	NA	NA	2300	2790	2430	5680 J	6020 J
TOTAL ORGANIC CARBON	NA	NA	12.2	10.5 J	11.4	10.3	13.8

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	3MW12D 3GW12D-01 10/28/99	3MW12D 3GW12D-01-D 10/28/99	3MW12D 3GW12D-02 01/24/00	3MW12D 3GW12D-03 04/07/00	3MW12D 3GW12D-03-D 04/07/00	3MW12D 3GW12D-04 07/20/00
VOCs (ug/L)								
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U	1 U	1 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	1 U	1 U	1 U	1 U	1 U	1 U
SVOCs (ug/L)								
BENZO(A)ANTHRACENE	0.3	NA	0.16 U	0.16 U	0.16 U	0.15 U	0.17 U	0.16 U
BENZO(A)PYRENE	0.3	NA	0.16 U	0.16 U	0.16 U	0.15 U	0.17 U	0.16 U
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U	0.16 U	0.16 U	0.15 U	0.17 U	0.16 U
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U	0.16 U	0.16 U	0.15 U	0.17 U	0.16 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2.1 U	2 U	2 U	2.1 U	2.1 U	2.1 U
PHENANTHRENE	0.077	NA	1 U	1 U	1.1 U	1 U	1.1 U	1.1 U
Pesticides/PCBs (ug/L)								
AROCLOR-1016	0.5	0.014[2]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U
AROCLOR-1254	0.5	0.014[2]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U
AROCLOR-1260	0.5	0.014[2]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.21 U
DIELDRIN	0.1	0.0019[3]	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.021 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)								
ARSENIC	4	150[2]	3.8 U/3.8 U	3.8 U/3.8 U	2.6 U/2.6 U	3.5 U/2.3 U	3.5 U/2.3 U	2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.2 U/0.2 U	0.24 U/0.2 U	0.3 U/0.1 U	0.3 U/0.1 U	0.1 U/0.1 U
CADMIUM	6	0.62[3]	0.57 U/0.66 U	0.75 U/0.62 U	0.3 U/0.41 U	0.46 U/0.81 U	0.54 U/0.83 U	0.5 U/0.32 U
CHROMIUM[4]	110	11[2]	2.4 U/2.4 U	2.4 U/2.4 U	4.7 U/1 UJ	1.1 J/0.8 U	1.3 J/0.8 U	1.3 U/1.3 U
COPPER	48	4.8[3]	1.4 U/1.2 U	1.2 U/1.2 U	1.3 UJ/1.3 UJ	3.7 U/1 U	3.7 U/1 U	3 U/0.87 U
LEAD	13	1.2[3]	1.7 U/1.7 U	1.7 U/1.7 U	1.8 U/1.8 U	1.8 U/2.1 U	1.8 U/2.1 U	1.9 U/1.9 U
ZINC	123	58.2[3]	20.6 J/172 J	27 J/26.7 J	12/8.1 J	4.1 U/1.9 U	7.8/2.5 U	5.8 U/7.6 U
Miscellaneous Parameters (mg/L)								
ALKALINITY	NA	NA	217	233	200	283	239	239
CHEMICAL OXYGEN DEMAND	NA	NA	20 U	26.4	20.5	23.1	25.6	39
CHLORIDE	NA	NA	887	885	964	886	888	813 J
HARDNESS	NA	NA	536	498	448	389	408	359
SULFATE	NA	NA	93.6	93.7	85.8	63.5	63.7	70.5
TOTAL DISSOLVED SOLIDS	NA	NA	1780	1720	1830	1950	1890	1760
TOTAL ORGANIC CARBON	NA	NA	3.6	4	3.9 J	3.8	4.1	3.7

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	3MW12S 3GW12S-01 10/28/99	3MW12S 3GW12S-02 01/24/00	3MW12S 3GW12S-02-D 01/24/00	3MW12S 3GW12S-03 04/07/00	3MW12S 3GW12S-03-D 04/07/00	3MW12S 3GW12S-04 07/20/00
VOCs (ug/L)								
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U	1 U	1 U	1 U	
ETHYLBENZENE	580,000	NA	1 U	1 U	1 U	1 U	1 U	
XYLENES, TOTAL	NA	NA	1 U	1 U	1 U	1 U	1 U	
SVOCs (ug/L)								
BENZO(A)ANTHRACENE	0.3	NA	0.15 U	0.17 U	0.17 U	0.15 U	0.15 U	
BENZO(A)PYRENE	0.3	NA	0.15 U	0.17 U	0.17 U	0.15 U	0.15 U	
BENZO(B)FLUORANTHENE	0.3	NA	0.15 U	0.17 U	0.17 U	0.15 U	0.15 U	
BENZO(K)FLUORANTHENE	0.3	NA	0.15 U	0.17 U	0.17 U	0.15 U	0.15 U	
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U	2 U	2 U	2 U	2.1 U	
PHENANTHRENE	0.077	NA	1 U	1.2 U	1.1 U	1 U	1 U	
Pesticides/PCBs (ug/L)								
AROCLOR-1016	0.5	0.014[2]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	
AROCLOR-1254	0.5	0.014[2]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	
AROCLOR-1260	0.5	0.014[2]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	
DIELDRIN	0.1	0.0019[3]	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	
HEPTACHLOR	0.05	0.0038[2]	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	
Inorganics (total/dissolved) (ug/L)								
ARSENIC	4	150[2]	3.8 U/3.8 U	2.6 U/2.6 U	2.6 U/2.6 U	3.5 U/2.3 U	3.5 U/2.3 U	
BERYLLIUM	4	NA	0.2 U/0.2 U	0.2 U/0.2 U	0.87 U/0.2 U	0.3 U/0.1 U	0.3 U/0.1 U	
CADMIUM	6	0.62[3]	0.47 U/0.38 U	0.3 U/0.56 U	0.62 U/0.3 U	0.31 U/0.28 U	0.3 U/0.33 U	
CHROMIUM[4]	110	11[2]	2.4 U/2.4 U	36.2 J/1 U	1 UJ/1 UJ	1.1 J/0.8 U	1 J/0.8 U	
COPPER	48	4.8[3]	1.7 U/1.2 U	1.3 UJ/1.3 UJ	1.3 UJ/1.3 UJ	2.9 U/1.1 U	3 U/1.2 U	
LEAD	13	1.2[3]	1.7 U/1.7 U	1.8 U/1.8 U	1.8 U/1.8 U	1.8 U/2.1 U	1.8 U/2.1 U	
ZINC	123	58.2[3]	15.3 J/8.9 J	6.1 J/31.8 J	26.7/20.2 J	11.4/13.9	20.4/17.2	
Miscellaneous Parameters (mg/L)								
ALKALINITY	NA	NA	224	210	203	276	263	
CHEMICAL OXYGEN DEMAND	NA	NA	20 U	23.1	20 U	25.6	23.1	
CHLORIDE	NA	NA	970	913	1000	963	963	
HARDNESS	NA	NA	440	358	430	413	432	
SULFATE	NA	NA	98.1	74.4	85.1	85.6	85.4	
TOTAL DISSOLVED SOLIDS	NA	NA	1880	1730	1840	1890	1830	
TOTAL ORGANIC CARBON	NA	NA	4.3	3.8 J	36.3 J	4.1	4	

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	3MW37S 3GW37S-01 10/28/99	3MW37S 3GW37S-02 01/22/00	3MW37S 3GW37S-03 04/09/00	3MW37S 3GW37S-04 07/20/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	1 U	1 U	1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.16 U	0.16 U	0.17 U	0.15 U
BENZO(A)PYRENE	0.3	NA	0.16 U	0.16 U	0.17 U	0.15 U
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U	0.16 U	0.17 U	0.15 U
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U	0.16 U	0.17 U	0.15 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U	2 U	2 U	2 U
PHENANTHRENE	0.077	NA	1.1 U	1 U	1.1 U	1 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014[2]	0.2 U	0.2 U	0.2 U	0.21 U
AROCLOR-1254	0.5	0.014[2]	0.2 U	0.2 U	0.2 U	0.21 U
AROCLOR-1260	0.5	0.014[2]	0.2 U	0.2 U	0.2 U	0.21 U
DIELDRIN	0.1	0.0019[3]	0.02 U	0.02 U	0.02 U	0.021 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U	0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150[2]	3.8 U/3.8 U	2.6 U/2.6 U	3.5 U/2.3 U	2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.7 U/0.2 U	0.3 U/0.1 U	0.21 U/0.1 U
CADMIUM	6	0.62[3]	0.3 U/0.3 U	0.3 U/0.3 U	0.3 U/0.29 U	0.32 U/0.32 U
CHROMIUM[4]	110	11[2]	2.4 U/2.4 U	1 UJ/1.1 U	0.7 U/0.8 U	1.3 U/1.3 U
COPPER	48	4.8[3]	1.2 U/1.3 U	1.3 UJ/2.4 U	2.6 U/2 U	0.87 U/1.6 U
LEAD	13	1.2[3]	1.7 U/1.7 U	1.8 U/1.8 U	1.8 U/2.1 U	1.9 U/1.9 U
ZINC	123	58.2[3]	13.4 J/11.6 J	18.3/6 J	3.9 U/21.5	3.2 U/3.9 U
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	188	129	142	120
CHEMICAL OXYGEN DEMAND	NA	NA	92.4	20 U	20 U	20 U
CHLORIDE	NA	NA	91.9	238	179	107 J
HARDNESS	NA	NA	172	138	150	116
SULFATE	NA	NA	19	21.9	20.6	20
TOTAL DISSOLVED SOLIDS	NA	NA	283	481	471	336
TOTAL ORGANIC CARBON	NA	NA	4.2	3.5 J	2.8	4

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-1

ROUNDS 1 THROUGH 4 GROUNDWATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	4MW1S 4GW01S-01 10/27/99	4MW1S 4GW01S-01-D 10/27/99	4MW1S 4GW01S-02 01/23/00	4MW1S 4GW01S-03 04/08/00	4MW1S 4GW01S-04 07/06/00
VOCs (ug/L)							
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U	1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U	1 U	1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	1 U	1 U	1 U	1 U	1 U
SVOCs (ug/L)							
BENZO(A)ANTHRACENE	0.3	NA	0.16 U	0.16 U	0.17 U	0.15 U	2.1 U
BENZO(A)PYRENE	0.3	NA	0.16 U	0.16 U	0.17 U	0.15 U	2.1 U
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U	0.16 U	0.17 U	0.15 U	2.1 U
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U	0.16 U	0.17 U	0.15 U	2.1 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U	2.1 U	2 U	2.1 U	2.1 U
PHENANTHRENE	0.077	NA	1.1 U	1.1 U	1.1 U	1 U	2.1 U
Pesticides/PCBs (ug/L)							
AROCLOR-1016	0.5	0.014[2]	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U
AROCLOR-1254	0.5	0.014[2]	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U
AROCLOR-1260	0.5	0.014[2]	0.2 U	0.2 U	0.21 U	0.2 U	0.21 U
DIELDRIN	0.1	0.0019[3]	0.02 U	0.02 U	0.021 U	0.02 U	0.021 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)							
ARSENIC	4	150[2]	3.8 U/3.8 U	3.8 U/3.8 U	2.6 U/2.6 U	3.5 U/2.3 U	2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.2 U/0.2 U	0.53 U/0.2 U	0.3 U/0.1 U	0.1 U/0.1 U
CADMIUM	6	0.62[3]	0.3 U/0.3 U	0.3 U/0.3 U	0.3 U/0.3 U	0.3 U/0.26 U	0.32 U/0.32 U
CHROMIUM[4]	110	11[2]	2.4 U/4.7	2.4 U/2.4 U	1 UJ/1.6 U	0.7 U/0.8 U	1.3 U/1.7 J
COPPER	48	4.8[3]	1.2 U/1.2 U	1.2 U/1.2 U	1.3 UJ/2 U	0.8 U/1 U	0.87 U/0.87 U
LEAD	13	1.2[3]	1.7 U/1.7 U	1.7 U/1.7 U	1.8 U/1.8 U	1.8 U/2.1 U	1.9 U/1.9 U
ZINC	123	58.2[3]	7 J/5.6 J	9.7 J/5.1 J	26.8/51.3 J	9.8/25.9	5.5 U/5.2 U
Miscellaneous Parameters (mg/L)							
ALKALINITY	NA	NA	28.5	33.1	31.1	19.1	36.4
CHEMICAL OXYGEN DEMAND	NA	NA	20 U	20 U	20 U	20 U	20 U
CHLORIDE	NA	NA	18.1	18.3	23.9	80.2	39 J
HARDNESS	NA	NA	105	134	57.3	82.7	65.7
SULFATE	NA	NA	57.7	53.9	43.1	38.9	45.2
TOTAL DISSOLVED SOLIDS	NA	NA	186	192	156	254	156 J
TOTAL ORGANIC CARBON	NA	NA	2.3	2.4	1.4 J	1 U	1.3

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-2

ROUNDS 1 THROUGH 4 SURFACE WATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	3MSP01 3MSP01-01 10/24/99	3MSP01 3MSP01-02 01/23/00	3MSP01 3MSP01-03 04/08/00	3MSP01 3MSP01-04 07/21/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U			1 U
ETHYLBENZENE	580,000	NA	1 U			1 U
XYLENES, TOTAL	NA	NA	1 U			1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.16 U			2.1 U
BENZO(A)PYRENE	0.3	NA	0.16 U			2.1 U
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U			2.1 U
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U			2.1 U
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U			3.5
PHENANTHRENE	0.077	NA	1 U			2.1 U
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014[2]	0.2 U			0.2 U
AROCLOR-1254	0.5	0.014[2]	0.2 U			0.2 U
AROCLOR-1260	0.5	0.014[2]	0.2 U			0.2 U
DIELDRIN	0.1	0.0019[3]	0.02 U			0.02 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U			0.01 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150[2]	3.8 U/3.8 U			2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U			0.33 U/0.1 U
CADMIUM	6	0.62[3]	0.45 U/0.3 U			0.32 U/0.32 U
CHROMIUM[4]	110	11[2]	2.4 U/2.4 U			1.3 U/1.3 U
COPPER	48	4.8[3]	8.1 U/4.5 U			0.87 U/0.87 U
LEAD	13	1.2[3]	8.8 U/1.7 U			1.9 U/1.9 U
ZINC	123	58.2[3]	45.3 U/37.2 U			10.3/13.3
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	161			88.7
CHEMICAL OXYGEN DEMAND	NA	NA	34.3			20 U
CHLORIDE	NA	NA	10.1			239 J
HARDNESS	NA	NA	142			116
SULFATE	NA	NA	18.6			20 U
TOTAL DISSOLVED SOLIDS	NA	NA	252			522
TOTAL ORGANIC CARBON	NA	NA	9.7			3.4

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-2

ROUNDS 1 THROUGH 4 SURFACE WATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	SG-18 SWSG18-01 10/27/99	SG-18 SWSG18-02 01/23/00	SG-18 SWSG18-03 04/05/00	SG-18 SWSG18-04 07/18/00	SG-18 SWSG18-04-D 07/18/00
VOCs (ug/L)							
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U		1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U		1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	1 U		1 U	1 U	1 U
SVOCs (ug/L)							
BENZO(A)ANTHRACENE	0.3	NA	0.17 U		0.15 U	0.2 UJ	0.2 UJ
BENZO(A)PYRENE	0.3	NA	0.17 U		0.15 U	0.2 UJ	0.2 UJ
BENZO(B)FLUORANTHENE	0.3	NA	0.17 U		0.15 U	0.2 UJ	0.2 UJ
BENZO(K)FLUORANTHENE	0.3	NA	0.17 U		0.15 U	0.2 UJ	0.2 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2.1 U		2 U	2 U	2 U
PHENANTHRENE	0.077	NA	1.1 U		1 U	0.2 UJ	0.2 UJ
Pesticides/PCBs (ug/L)							
AROCLOR-1016	0.5	0.014[2]	0.2 U		0.2 U	0.2 U	0.2 U
AROCLOR-1254	0.5	0.014[2]	0.2 U		0.2 U	0.2 U	0.2 U
AROCLOR-1260	0.5	0.014[2]	0.2 U		0.2 U	0.2 U	0.2 U
DIELDRIN	0.1	0.0019[3]	0.02 U		0.02 U	0.02 U	0.02 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U		0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)							
ARSENIC	4	150[2]	3.8 U/3.8 U		2.6 U/2.6 U	2.7 U/2.7 U	2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U		0.2 U/0.2 U	0.1 U/0.1 U	0.1 U/0.1 U
CADMIUM	6	0.62[3]	0.3 U/0.3 U		0.3 U/0.3 U	0.32 U/0.33 U	0.32 U/0.32 U
CHROMIUM[4]	110	11[2]	2.4 U/2.4 U		1 U/1 U	1.3 U/1.3 U	1.3 U/1.3 U
COPPER	48	4.8[3]	1.2 U/1.2 U		3.8 U/1.3 U	2.7 U/0.87 U	2 U/0.87 U
LEAD	13	1.2[3]	1.7 U/1.7 U		1.8 U/1.8 U	1.9 U/1.9 U	2 J/1.9 U
ZINC	123	58.2[3]	31 J/49.4 J		31/33.8	27.8 J/4.1 U	31.8 J/7.6
Miscellaneous Parameters (mg/L)							
ALKALINITY	NA	NA	46.6		47.9	80.8	71.8
CHEMICAL OXYGEN DEMAND	NA	NA	26.4		20 U	50.6	40.5
CHLORIDE	NA	NA	164		95.5 J	105 J	104 J
HARDNESS	NA	NA	99.5		67	94	97
SULFATE	NA	NA	10 U		20 U	20 U	20 U
TOTAL DISSOLVED SOLIDS	NA	NA	268		202	302 J	275 J
TOTAL ORGANIC CARBON	NA	NA	7.5		3.4	9.7	9.9

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-2

ROUNDS 1 THROUGH 4 SURFACE WATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	SG-19 SWSG19-01 10/27/99	SG-19 SWSG19-02 01/23/00	SG-19 SWSG19-03 04/05/00	SG-19 SWSG19-04 07/19/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U		1 U	1 U
ETHYLBENZENE	580,000	NA	1 U		0.2 J	0.1 J
XYLENES, TOTAL	NA	NA	1 U		1 U	0.57 J
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.16 U		0.15 U	0.2 UJ
BENZO(A)PYRENE	0.3	NA	0.16 U		0.15 U	0.2 UJ
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U		0.15 U	0.2 UJ
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U		0.15 U	0.2 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U		2 U	2 U
PHENANTHRENE	0.077	NA	1.1 U		1 U	0.16 J
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014(2)	0.2 U		0.2 U	0.2 U
AROCLOR-1254	0.5	0.014(2)	0.2 U		0.2 U	0.2 U
AROCLOR-1260	0.5	0.014(2)	0.2 U		0.2 U	0.2 U
DIELDRIN	0.1	0.0019(3)	0.02 U		0.02 U	0.02 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U		0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150(2)	3.8 U/3.8 U		2.6 U/2.6 U	2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U		0.2 U/0.2 U	0.14 U/0.16 U
CADMIUM	6	0.62(3)	0.3 U/0.3 U		0.3 U/0.3 U	0.49 U/0.44 U
CHROMIUM(4)	110	11(2)	3.6 J/2.4 U		1 U/1 U	1.3 U/1.3 U
COPPER	48	4.8(3)	1.2 U/1.2 U		3.3 U/2.5 U	5.2 U/0.87 U
LEAD	13	1.2(3)	1.7 U/1.7 U		1.8 U/1.8 U	3.4 J/1.9 U
ZINC	123	58.2(3)	32 J/118 J		48.9/17.9	49.6 J/25.2
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	48.6		66.4	144
CHEMICAL OXYGEN DEMAND	NA	NA	26.4		20 U	58.2
CHLORIDE	NA	NA	162		121 J	160 J
HARDNESS	NA	NA	115		78.4	150
SULFATE	NA	NA	14.5		20 U	20 U
TOTAL DISSOLVED SOLIDS	NA	NA	32		248	452 J
TOTAL ORGANIC CARBON	NA	NA	7.2		3.9	12.6

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-2

ROUNDS 1 THROUGH 4 SURFACE WATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	SG-20 SWSG20-01 10/27/99	SG-20 SWSG20-02 01/23/00	SG-20 SWSG20-03 04/04/00	SG-20 SWSG20-03-D 04/04/00	SG-20 SWSG20-04 07/19/00
VOCs (ug/L)							
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U		1 U	1 U	1 U
ETHYLBENZENE	580,000	NA	1 U		1 U	1 U	1 U
XYLENES, TOTAL	NA	NA	1 U		1 U	1 U	1 U
SVOCs (ug/L)							
BENZO(A)ANTHRACENE	0.3	NA	0.15 U		0.15 U	0.15 U	0.2 UJ
BENZO(A)PYRENE	0.3	NA	0.15 U		0.15 U	0.15 U	0.2 UJ
BENZO(B)FLUORANTHENE	0.3	NA	0.15 U		0.15 U	0.15 U	0.2 UJ
BENZO(K)FLUORANTHENE	0.3	NA	0.15 U		0.15 U	0.15 U	0.2 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U		2 U	2 U	2 U
PHENANTHRENE	0.077	NA	1 U		1 U	1 U	0.2 UJ
Pesticides/PCBs (ug/L)							
AROCLOR-1016	0.5	0.014(2)	0.2 U		0.2 U	0.2 U	0.2 U
AROCLOR-1254	0.5	0.014(2)	0.2 U		0.2 U	0.2 U	0.2 U
AROCLOR-1260	0.5	0.014(2)	0.2 U		0.2 U	0.2 U	0.2 U
DIELDRIN	0.1	0.0019(3)	0.02 U		0.02 U	0.02 U	0.02 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U		0.01 U	0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)							
ARSENIC	4	150(2)	3.8 U/3.8 U		2.6 U/2.6 U	2.6 U/2.6 U	2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U		0.2 U/0.2 U	0.2 U/0.2 U	0.2 U/0.1 U
CADMIUM	6	0.62(3)	0.3 U/0.3 U		0.3 U/0.3 U	0.3 U/0.3 U	0.34 U/0.32 U
CHROMIUM(4)	110	11(2)	2.4 U/2.4 U		2.2 U/1 U	1 U/1 U	1.3 U/1.3 U
COPPER	48	4.8(3)	1.2 U/1.2 U		2.9 U/1.3 U	2.9 U/1.4 U	1.6 U/0.87 U
LEAD	13	1.2(3)	1.7 U/1.7 U		1.8 U/1.8 U	1.8 U/1.8 U	2.3 J/1.9 U
ZINC	123	58.2(3)	13.1 J/47.3 J		16.3/16.9	16/19.2	11.3 J/24.4
Miscellaneous Parameters (mg/L)							
ALKALINITY	NA	NA	49.2		24	33.2	40.1
CHEMICAL OXYGEN DEMAND	NA	NA	23.8		20 U	20 U	38
CHLORIDE	NA	NA	161		87.2 J	87.9 J	82.9 J
HARDNESS	NA	NA	95.7		51.9	52	56
SULFATE	NA	NA	14.5		20.8	20.9	20 U
TOTAL DISSOLVED SOLIDS	NA	NA	296		211	224	212 J
TOTAL ORGANIC CARBON	NA	NA	6.3		4.5	3.3	6.1

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-2

ROUNDS 1 THROUGH 4 SURFACE WATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	SG-21 SWSG21-01 10/24/99	SG-21 SWSG21-01-D 10/24/99	SG-21 SWSG21-02 01/23/00	SG-21 SWSG21-03 04/04/00	SG-21 SWSG21-04 07/19/00
VOCs (ug/L)							
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U	1 U		1 U	1 U
ETHYLBENZENE	580,000	NA	1 U	1 U		1 U	1 U
XYLENES, TOTAL	NA	NA	1 U	1 U		1 U	1 U
SVOCs (ug/L)							
BENZO(A)ANTHRACENE	0.3	NA	0.15 U	0.16 U		0.15 U	0.21 UJ
BENZO(A)PYRENE	0.3	NA	0.15 U	0.16 U		0.15 U	0.21 UJ
BENZO(B)FLUORANTHENE	0.3	NA	0.15 U	0.16 U		0.15 U	0.21 UJ
BENZO(K)FLUORANTHENE	0.3	NA	0.15 U	0.16 U		0.15 U	0.21 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U	2 U		2 U	2.1 U
PHENANTHRENE	0.077	NA	1 U	1.1 U		1 U	0.21 UJ
Pesticides/PCBs (ug/L)							
AROCLOR-1016	0.5	0.014(2)	0.2 U	0.2 U		0.2 U	0.2 U
AROCLOR-1254	0.5	0.014(2)	0.2 U	0.2 U		0.2 U	0.2 U
AROCLOR-1260	0.5	0.014(2)	0.2 U	0.2 U		0.2 U	0.2 U
DIELDRIN	0.1	0.0019(3)	0.02 U	0.02 U		0.02 U	0.02 U
HEPTACHLOR	0.05	0.0038(2)	0.01 U	0.01 U		0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)							
ARSENIC	4	150(2)	3.8 U/3.8 U	3.8 U/3.8 U		2.6 U/2.6 U	2.7 U/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U	0.2 U/0.2 U		0.2 U/0.2 U	0.1 U/0.1 U
CADMIUM	6	0.62(3)	0.42/0.3 U	0.31/0.3 U		0.3 U/0.3 U	0.32 U/0.32 U
CHROMIUM(4)	110	11(2)	2.4 U/2.4 U	2.4 U/2.4 U		1 U/1 U	1.3 U/1.3 U
COPPER	48	4.8(3)	1.2 U/1.7 U	2.3 U/1.8 U		2.5 U/1.3 U	0.87 U/0.87 U
LEAD	13	1.2(3)	1.7 U/1.7 U	1.7 U/1.7 U		2.6 U/1.8 U	1.9 U/1.9 U
ZINC	123	58.2(3)	26.2 U/24.8 U	59.2/110		15.2/21.9	18.3 J/13.9
Miscellaneous Parameters (mg/L)							
ALKALINITY	NA	NA	80.2	70.4		34.9	95.6
CHEMICAL OXYGEN DEMAND	NA	NA	21.1	20 U		20 U	50.6
CHLORIDE	NA	NA	116	129		89 J	113 J
HARDNESS	NA	NA	125	86.5		54.4	110
SULFATE	NA	NA	12.1	12.5		20.5	20 U
TOTAL DISSOLVED SOLIDS	NA	NA	315	326		193	356 J
TOTAL ORGANIC CARBON	NA	NA	5.4	5.6		4.5	11.7

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-2

ROUNDS 1 THROUGH 4 SURFACE WATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion (1)	Secondary Monitoring Criterion	SG-22 SWSG22-01 10/27/99	SG-22 SWSG22-02 01/23/00	SG-22 SWSG22-03 04/05/00	SG-22 SWSG22-04 07/19/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U		1 U	
ETHYLBENZENE	580,000	NA	1 U		1 U	
XYLENES, TOTAL	NA	NA	1 U		1 U	
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.15 U		0.15 U	
BENZO(A)PYRENE	0.3	NA	0.15 U		0.15 U	
BENZO(B)FLUORANTHENE	0.3	NA	0.15 U		0.15 U	
BENZO(K)FLUORANTHENE	0.3	NA	0.15 U		0.15 U	
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 UJ		2 U	
PHENANTHRENE	0.077	NA	1 U		1 U	
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014(2)	0.2 U		0.2 U	
AROCLOR-1254	0.5	0.014(2)	0.2 U		0.2 U	
AROCLOR-1260	0.5	0.014(2)	0.2 U		0.2 U	
DIELDRIN	0.1	0.0019(3)	0.02 U		0.02 U	
HEPTACHLOR	0.05	0.0038(2)	0.01 U		0.01 U	
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150(2)	4.5 J/3.8 U		2.6 U/2.6 U	
BERYLLIUM	4	NA	0.2 U/0.2 U		0.2 U/0.2 U	
CADMIUM	6	0.62(3)	0.31 U/0.3 U		0.32 U/0.3 U	
CHROMIUM(4)	110	11(2)	38.4 J/2.4 U		1.3 U/1 U	
COPPER	48	4.8(3)	10.8/1.2 U		6.5 U/2.8 U	
LEAD	13	1.2(3)	6.6 U/2.1 U		4.8 U/1.8 U	
ZINC	123	58.2(3)	90.2 J/37 J		14.6/10.2	
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	134		74	
CHEMICAL OXYGEN DEMAND	NA	NA	42.2		31.4	
CHLORIDE	NA	NA	64.2		53.4 J	
HARDNESS	NA	NA	140		70.6	
SULFATE	NA	NA	10 U		20 U	
TOTAL DISSOLVED SOLIDS	NA	NA	268		179	
TOTAL ORGANIC CARBON	NA	NA	9		6.2	

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-2

ROUNDS 1 THROUGH 4 SURFACE WATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	SG-23 SWSG23-01 10/27/99	SG-23 SWSG23-02 01/23/00	SG-23 SWSG23-03 04/05/00	SG-23 SWSG23-04 07/19/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U		1 U	1 U
ETHYLBENZENE	580,000	NA	1 U		1 U	1 U
XYLENES, TOTAL	NA	NA	1 U		1 U	1 U
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.16 U		0.15 U	0.2 UJ
BENZO(A)PYRENE	0.3	NA	0.16 U		0.15 U	0.2 UJ
BENZO(B)FLUORANTHENE	0.3	NA	0.16 U		0.15 U	0.2 UJ
BENZO(K)FLUORANTHENE	0.3	NA	0.16 U		0.15 U	0.2 UJ
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U		2.1 U	2 U
PHENANTHRENE	0.077	NA	1 U		1 U	0.2 UJ
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014[2]	0.2 U		0.2 U	0.2 U
AROCLOR-1254	0.5	0.014[2]	0.2 U		0.2 U	0.2 U
AROCLOR-1260	0.5	0.014[2]	0.2 U		0.2 U	0.2 U
DIELDRIN	0.1	0.0019[3]	0.02 U		0.02 U	0.02 U
HEPTACHLOR	0.05	0.0038[2]	0.01 U		0.01 U	0.01 U
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150[2]	8.2 J/5.6 J		2.6 U/2.6 U	3 J/2.7 U
BERYLLIUM	4	NA	0.2 U/0.2 U		0.2 U/0.2 U	0.11 U/0.1 U
CADMIUM	6	0.62[3]	0.33 U/0.34 U		0.3 U/0.3 U	0.48 U/0.32 U
CHROMIUM[4]	110	11[2]	2.4 U/2.4 U		1 U/1 U	1.3 U/1.3 U
COPPER	48	4.8[3]	1.7 U/1.2 U		4 U/1.5 U	6.2/0.87 U
LEAD	13	1.2[3]	3.2 U/4.6 U		1.8 U/1.8 U	5 J/1.9 U
ZINC	123	58.2[3]	119 J/96.5 J		27.9/24	65.2 J/6.4
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	99.4		78.4	35.9
CHEMICAL OXYGEN DEMAND	NA	NA	58.1		20 U	101
CHLORIDE	NA	NA	89.1		89.2 J	71.9 J
HARDNESS	NA	NA	172		68.2	78
SULFATE	NA	NA	10 U		20 U	45.5
TOTAL DISSOLVED SOLIDS	NA	NA	267		280	256 J
TOTAL ORGANIC CARBON	NA	NA	10.3		3.3	8.9

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-2

ROUNDS 1 THROUGH 4 SURFACE WATER ANALYTICAL RESULTS SUMMARY
ANNUAL GROUNDWATER MONITORING REPORT
AREA A LANDFILL, NSB-NLON, GROTON, CONNECITICUT

Chemical	Primary Monitoring Criterion [1]	Secondary Monitoring Criterion	SG-24 SWSG24-01 10/27/99	SG-24 SWSG24-02 01/23/00	SG-24 SWSG24-03 04/05/00	SG-24 SWSG24-04 07/19/00
VOCs (ug/L)						
1,1,2,2-TETRACHLOROETHANE	110	NA	1 U		1 U	
ETHYLBENZENE	580,000	NA	1 U		1 U	
XYLENES, TOTAL	NA	NA	1 U		1 U	
SVOCs (ug/L)						
BENZO(A)ANTHRACENE	0.3	NA	0.15 U		0.16 U	
BENZO(A)PYRENE	0.3	NA	0.15 U		0.16 U	
BENZO(B)FLUORANTHENE	0.3	NA	0.15 U		0.16 U	
BENZO(K)FLUORANTHENE	0.3	NA	0.15 U		0.16 U	
BIS(2-ETHYLHEXYL)PHTHALATE	59	NA	2 U		2 U	
PHENANTHRENE	0.077	NA	1 U		1 U	
Pesticides/PCBs (ug/L)						
AROCLOR-1016	0.5	0.014[2]	0.2 U		0.2 U	
AROCLOR-1254	0.5	0.014[2]	0.2 U		0.2 U	
AROCLOR-1260	0.5	0.014[2]	0.2 U		0.2 U	
DIELDRIN	0.1	0.0019[3]	0.02 U		0.02 U	
HEPTACHLOR	0.05	0.0038[2]	0.01 U		0.01 U	
Inorganics (total/dissolved) (ug/L)						
ARSENIC	4	150[2]	4.2 J/3.8 U		3.7 J/2.6 U	
BERYLLIUM	4	NA	0.2 U/0.2 U		0.2 U/0.2 U	
CADMIUM	6	0.62[3]	0.31 U/0.3 U		0.3 U/0.3 U	
CHROMIUM[4]	110	11[2]	4.3 J/2.4 U		1 U/1.5 U	
COPPER	48	4.8[3]	17/11.4		7.2 U/2 U	
LEAD	13	1.2[3]	3.2 U/2.9 U		2.5 U/1.8 U	
ZINC	123	58.2[3]	48.3 J/70.7 J		20.8/28.4	
Miscellaneous Parameters (mg/L)						
ALKALINITY	NA	NA	24.3		40.3	
CHEMICAL OXYGEN DEMAND	NA	NA	55.4		21	
CHLORIDE	NA	NA	78		398 J	
HARDNESS	NA	NA	115		131	
SULFATE	NA	NA	10 U		20 U	
TOTAL DISSOLVED SOLIDS	NA	NA	201		643	
TOTAL ORGANIC CARBON	NA	NA	14.2		9.2	

NOTES:
Bold numbers denote exceedance of primary or secondary monitoring criterion.
(1) Surface Water Protection Criteria for substances in groundwater. (CTDEP, January 1996)
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater). (USEPA, 1999)
(3) Connecticut Water Quality Criteria for protection of human health from consumption of organisms. (CTDEP, 1997)
(4) Hexavalent Chromium
J Estimated Value
R Rejected Value
U Undetected
NA Not Available

TABLE 4-3

GROUNDWATER ELEVATIONS - ROUNDS 1 THROUGH 4
AREA A LANDFILL - NSB-NLON
GROTON, CONNECTICUT

WELL	Oct-99 feet msl	Jan-00 feet msl	Apr-00 feet msl	Jul-00 feet msl
4MW01	123.79	123.31	123.42	119.94
3MW12S	38.94	41.16	39.71	(2)
3MW12D	(1)	(1)	43.19	(2)
2LMW20S	72.55	72.19	73.41	71.73
2WMW21DS	71.03	71.99	72.04	71.68
2MW37S	45.02	43.92	43.82	43.00
2WMW38DS	67.69	67.61	67.78	67.53
2WMW39DS	70.78	69.95	70.00	70.45
2WMW40DS	70.01	70.12	70.26	69.88
2WMW41DS	70.95	71.03	71.21	70.87
2WMW42DS	71.59	71.64	71.71	71.40
2WMW43DS	72.03	71.97	71.99	71.72
2WMW44DS	72.24	72.18	72.08	71.71
2WMW45DS	72.16	72.12	72.30	72.05
2WMW46DS	70.51	72.11	72.30	72.15
2WMW47DS	72.07	72.07	71.45	71.61
2LOW1S	(3)	77.55	77.49	77.52
2LMW28DS	(3)	73.43	75.07	73.12

(1) Artesian flow from well, not measured.
(2) Monitoring well destroyed.
(3) Water level not measured before Round 2.

TABLE 4-4

DOWNGRADIENT GROUNDWATER RESULTS - ROUNDS 1 THROUGH 4
DETECTION STATISTICS AND 95% UPPER CONFIDENCE LIMITS
AREA A LANDFILL, NSB-NLON, GROTON, CT

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTIONS	AVERAGE	SHAPIRO-WILK W NORMAL	SHAPIRO-WILK W LOGNORMAL	SHAPIRO-WILK W TEST	DISTRIBUTION	95% UCL NORMAL	95% UCL LOGNORMAL	MAXIMUM POSITIVE DETECTION	95% UCL
Volatile Organics (µg/L)											
1,1,2,2-TETRACHLOROETHANE	0/46	---	0.76	---	---	---	---	---	---	---	---
ETHYLBENZENE	1/46	0.3	0.76	0.415	0.4506	0.945	LOGNORMAL	0.93	0.84	0.30	0.30
XYLENES, TOTAL	0/46	---	0.76	---	---	---	---	---	---	---	---
Semivolatile Organics (µg/L)											
BENZO(A)ANTHRACENE	0/46	---	0.15	---	---	---	---	---	---	---	---
BENZO(A)PYRENE	0/46	---	0.15	---	---	---	---	---	---	---	---
BENZO(B)FLUORANTHENE	0/46	---	0.15	---	---	---	---	---	---	---	---
BENZO(K)FLUORANTHENE	0/46	---	0.15	---	---	---	---	---	---	---	---
BIS(2-ETHYLHEXYL)PHTHALATE	6/46	0.75 - 1.3	1.02	0.6793	0.6702	0.945	LOGNORMAL	1.04	1.14	1.3	1.14
PHENANTHRENE	0/46	---	0.61	---	---	---	---	---	---	---	---
Pesticides/PCBs (µg/L)											
AROCLOR-1016	0/46	---	0.10	---	---	---	---	---	---	---	---
AROCLOR-1254	0/46	---	0.10	---	---	---	---	---	---	---	---
AROCLOR-1260	0/46	---	0.10	---	---	---	---	---	---	---	---
DIELDRIN	0/46	---	0.01	---	---	---	---	---	---	---	---
HEPTACHLOR	0/46	---	0.01	---	---	---	---	---	---	---	---
Total Metals (µg/L)											
ARSENIC	22/45	2.6 - 36.3	9.04	0.7781	0.8821	0.945	LOGNORMAL	11.5	14.3	36.3	14.3
BERYLLIUM	1/45	0.52	0.15	0.7449	0.9095	0.945	LOGNORMAL	0.17	0.17	0.52	0.17
CADMIUM	0/45	---	0.20	---	---	---	---	---	---	---	---
CHROMIUM	20/45	1.4 - 17	3.10	0.7335	0.9328	0.945	LOGNORMAL	3.99	4.58	17.0	4.58
COPPER	1/45	6.3	1.11	0.6053	0.8253	0.945	LOGNORMAL	1.40	1.28	6.30	1.28
LEAD	0/45	---	0.94	---	---	---	---	---	---	---	---
ZINC	31/45	6.1 - 146	14.6	0.4768	0.9484	0.945	LOGNORMAL	20.4	18.7	146	18.7
Dissolved Metals (µg/L)											
ARSENIC	21/45	3 - 30.6	8.54	0.7638	0.8977	0.945	LOGNORMAL	10.8	13.3	30.6	13.3
BERYLLIUM	0/45	---	0.09	---	---	---	---	---	---	---	---
CADMIUM	0/45	---	0.23	---	---	---	---	---	---	---	---
CHROMIUM	17/45	1.7 - 13.6	2.72	0.6759	0.9211	0.945	LOGNORMAL	3.53	3.58	13.6	3.58
COPPER	3/45	6.5 - 11.2	1.40	0.4779	0.7766	0.945	LOGNORMAL	1.93	1.54	11.2	1.54
LEAD	0/9	---	0.88	---	---	---	---	---	---	---	---
ZINC	30/45	4.4 - 152	13.9	0.4412	0.9756	0.945	LOGNORMAL	20.3	18.9	152	18.9

Bold indicate parameter has been identified as a potential COC.
Data sets which fail the W test for normality
and lognormality are assumed to be lognormal.

TABLE 4-5

UPGRADIENT GROUNDWATER RESULTS - ROUNDS 1 THROUGH 4
DETECTION STATISTICS AND 95% UPPER CONFIDENCE LIMITS
AREA A LANDFILL, NSB-NLON, GROTON, CT

PARAMETER	FREQUENCY OF DETECTION	RANGE OF DETECTIONS	AVERAGE	SHAPIRO-WILK W NORMAL	SHAPIRO-WILK W LOGNORMAL	SHAPIRO-WILK W TEST	DISTRIBUTION	95% UCL NORMAL	95% UCL LOGNORMAL	MAXIMUM POSITIVE DETECTION	95% UCL
Volatile Organics (µg/L)											
1,1,2,2-TETRACHLOROETHANE	0/11	---	0.68	---	---	---	---	---	---	---	---
ETHYLBENZENE	0/11	---	0.68	---	---	---	---	---	---	---	---
XYLENES, TOTAL	0/11	---	0.68	---	---	---	---	---	---	---	---
Semivolatile Organics (µg/L)											
BENZO(A)ANTHRACENE	0/11	---	0.35	---	---	---	---	---	---	---	---
BENZO(A)PYRENE	0/11	---	0.35	---	---	---	---	---	---	---	---
BENZO(B)FLUORANTHENE	0/11	---	0.35	---	---	---	---	---	---	---	---
BENZO(K)FLUORANTHENE	0/11	---	0.35	---	---	---	---	---	---	---	---
BIS(2-ETHYLHEXYL)PHTHALATE	2/11	0.87 - 1.3	1.05	0.8553	0.8744	0.85	LOGNORMAL	1.11	1.13	1.3	1.13
PHENANTHRENE	0/11	---	0.68	---	---	---	---	---	---	---	---
Pesticides/PCBs (µg/L)											
AROCLOR-1016	0/11	---	0.10	---	---	---	---	---	---	---	---
AROCLOR-1254	0/11	---	0.18	---	---	---	---	---	---	---	---
AROCLOR-1260	0/11	---	0.18	---	---	---	---	---	---	---	---
DIELDRIN	0/11	---	0.02	---	---	---	---	---	---	---	---
HEPTACHLOR	0/11	---	0.01	---	---	---	---	---	---	---	---
Total Metals (µg/L)											
ARSENIC	2/11	3 - 8.8	2.41	0.5325	0.7326	0.85	LOGNORMAL	3.60	3.44	8.8	3.44
BERYLLIUM	0/11	---	0.14	---	---	---	---	---	---	---	---
CADMIUM	0/11	---	0.32	---	---	---	---	---	---	---	---
CHROMIUM	3/11	6.2 - 7.4	2.33	0.6792	0.8218	0.85	LOGNORMAL	3.89	8.59	7.4	7.40
COPPER	0/11	---	0.93	---	---	---	---	---	---	---	---
LEAD	0/11	---	0.92	---	---	---	---	---	---	---	---
ZINC	6/11	7.6 - 84.6	16.5	0.6549	0.9779	0.85	LOGNORMAL	29.65	121	84.6	84.60
Dissolved Metals (µg/L)											
ARSENIC	1/11	7.2	1.94	0.4590	0.6026	0.85	LOGNORMAL	2.90	2.67	7.2	2.67
BERYLLIUM	0/11	---	0.07	---	---	---	---	---	---	---	---
CADMIUM	0/11	---	0.26	---	---	---	---	---	---	---	---
CHROMIUM	6/11	1.5 - 8.2	2.87	0.8597	0.9475	0.85	LOGNORMAL	4.30	8.83	8.2	8.20
COPPER	0/11	---	0.80	---	---	---	---	---	---	---	---
LEAD	0/1	---	0.85	---	---	---	---	---	---	---	---
ZINC	6/11	4.9 - 80.4	18.5	0.7191	0.9545	0.85	LOGNORMAL	32.4	101.2	80.4	80.4

Bold indicate parameter has been identified as a potential COC.
Data sets which fail the W test for normality
and lognormality are assumed to be lognormal.

TABLE 4-6

GROUNDWATER - ROUNDS 1 THROUGH 4
ANOVA TEST RESULTS FOR POTENTIAL COC
COMPARISON OF DOWNGRADIENT RESULTS WITH UPGRADIENT RESULTS
AREA A LANDFILL, NSB-NLON, GROTON CT

PARAMETER	DOWNGRADIENT DISTRIBUTION	UPGRADIENT DISTRIBUTION	TYPE OF ANOVA	P LEVEL	ANOVA RESULT
Volatile Organics					
ETHYLBENZENE	LOGNORMAL	---	NON-PARAMETRIC	0.8667	PASS
Semivolatile Organics					
BIS(2-ETHYLHEXYL)PHTHALATE	LOGNORMAL	LOGNORMAL	PARAMETRIC	0.2497	PASS
Total Metals					
ARSENIC	LOGNORMAL	LOGNORMAL	PARAMETRIC	0.0315	**FAIL**
BERYLLIUM	LOGNORMAL	---	NON-PARAMETRIC	0.7034	**PASS**
CHROMIUM	LOGNORMAL	LOGNORMAL	PARAMETRIC	0.5042	PASS
COPPER	LOGNORMAL	---	NON-PARAMETRIC	0.4524	PASS
ZINC	LOGNORMAL	LOGNORMAL	PARAMETRIC	0.8126	PASS
Dissolved Metals					
ARSENIC	LOGNORMAL	LOGNORMAL	PARAMETRIC	0.0206	**FAIL**
CHROMIUM	LOGNORMAL	LOGNORMAL	PARAMETRIC	0.8916	PASS
COPPER	LOGNORMAL	---	NON-PARAMETRIC	0.7011	PASS
ZINC	LOGNORMAL	LOGNORMAL	PARAMETRIC	0.5929	PASS

Downgradient results are in statistically significant exceedance of upgradient results when p level is less than 0.05.

TABLE 4-7

GROUNDWATER - ROUND 1 THROUGH 4
PARAMETRIC ANOVA RESULTS COMPARING POTENTIAL COC
DOWNGRADIENT RESULTS WITH UPGRADIENT RESULTS
AREA A LANDFILL, NSB-NLON, GROTON, CT

Parameter	Degrees of Freedom Effect	Sum of Squares Effect	Degrees of Freedom Error	Sum of Squares Error	F	p-level	ANOVA RESULT
Semivolatile Organics							
BIS(2-ETHYLHEXYL)PHTHALATE	1	0.010383	55	0.0077	1.353651	0.2497	PASS
Total Metals							
ARSENIC	1	388.3937	54	79.6866	4.874017	0.0315	**FAIL**
CHROMIUM	1	5.323637	54	11.7731	0.452186	0.5042	PASS
ZINC	1	31.57481	54	556.3502	0.056753	0.8126	PASS
Dissolved Metals							
ARSENIC	1	385.0746	54	67.6231	5.694425	0.0206	**FAIL**
CHROMIUM	1	0.182623	54	9.7364	0.018757	0.8916	PASS
ZINC	1	192.2667	54	664.7787	0.289219	0.5929	PASS

Downgradient results are in statistically significant exceedance of upgradient results when p level is less than 0.05.

TABLE 4-8

GROUNDWATER - ROUND 1 THROUGH 4
WILCOXON RANK-SUM RESULTS COMPARING POTENTIAL COC
DOWNGRADIENT RESULTS WITH UPGRADIENT RESULTS
AREA A LANDFILL, NSB-NLON, GROTON, CT

PARAMETER	Downgradient			Upgradient			Z Score	p-level	Adjusted Z Score (1)	Adjusted p-level (2)	ANOVA RESULT
	Total of Ranks	Number of Samples	Avg Rank	Total of Ranks	Number of Samples	Avg Rank					
Volatile Organics											
ETHYLBENZENE	1339.0	46	29.1	314.0	11	28.5	0.1011	0.9195	0.1678	0.8667	PASS
Total Metals											
BERYLLIUM	1300.5	45	28.9	295.5	11	26.9	0.3712	0.7105	0.3807	0.7034	PASS
COPPER	1318.5	45	29.3	277.5	11	25.2	0.7424	0.4578	0.7514	0.4524	PASS
Dissolved Metals											
COPPER	1301.0	45	28.9	295.0	11	26.8	0.3815	0.7028	0.3838	0.7011	PASS

(1) Adjusted for tied rankings.
(2) Downgradient results are in statistically significant exceedance of upgradient results when p level is less than 0.05.

TABLE 4-9

GROUNDWATER - ROUNDS 1 THROUGH 4
COMPARISON OF POTENTIAL COCS ABOVE BACKROUND AND
UPGRADIENT CONCENTRATIONS TO SURFACE WATER PROTECTION CRITERIA
AREA A LANDFILL, NSB-NLON, GROTON, CT

	Average				Cummulative	Maximum				Cummulative	CTDEP	FED
Downgradient Metals (ug/L)	Round 1	Round 2	Round 3	Round 4	Average	Round 1	Round 2	Round 3	Round 4	Maximum	SWPC	AWQC
Total Metals												
ARSENIC	13.2	5.59	8.40	7.95	9.04	36.3	20.5	24.4	28.4	36.3	4	150
Dissolved Metals												
ARSENIC	11.0	5.06	11.39	5.99	8.39	30.0	12.2	30.6	29.3	30.6	4	150

	Average				Cummulative	Maximum				Cummulative	CTDEP	FED
Upgradient Metals (ug/L)	Round 1	Round 2	Round 3	Round 4	Average	Round 1	Round 2	Round 3	Round 4	Maximum	SWPC	AWQC
Total Metals												
ARSENIC	4.20	1.30	1.87	2.18	2.41	8.80	1.30	2.10	3.00	8.80	4	150
Dissolved Metals												
ARSENIC	3.67	1.30	1.22	1.35	1.94	7.20	1.30	1.35	1.35	7.20	4	150

(1) Surface Water Protection Criteria for Substances in Groundwater (CTDEP, January 1996).
(2) Federal Ambient Water Quality Criteria for protection of aquatic life (chronic, freshwater) (USEPA, 1999).
Bold indicated value exceeds Surface Water Protection Criteria for Substances in Groundwater (CTDEP, January 1996).

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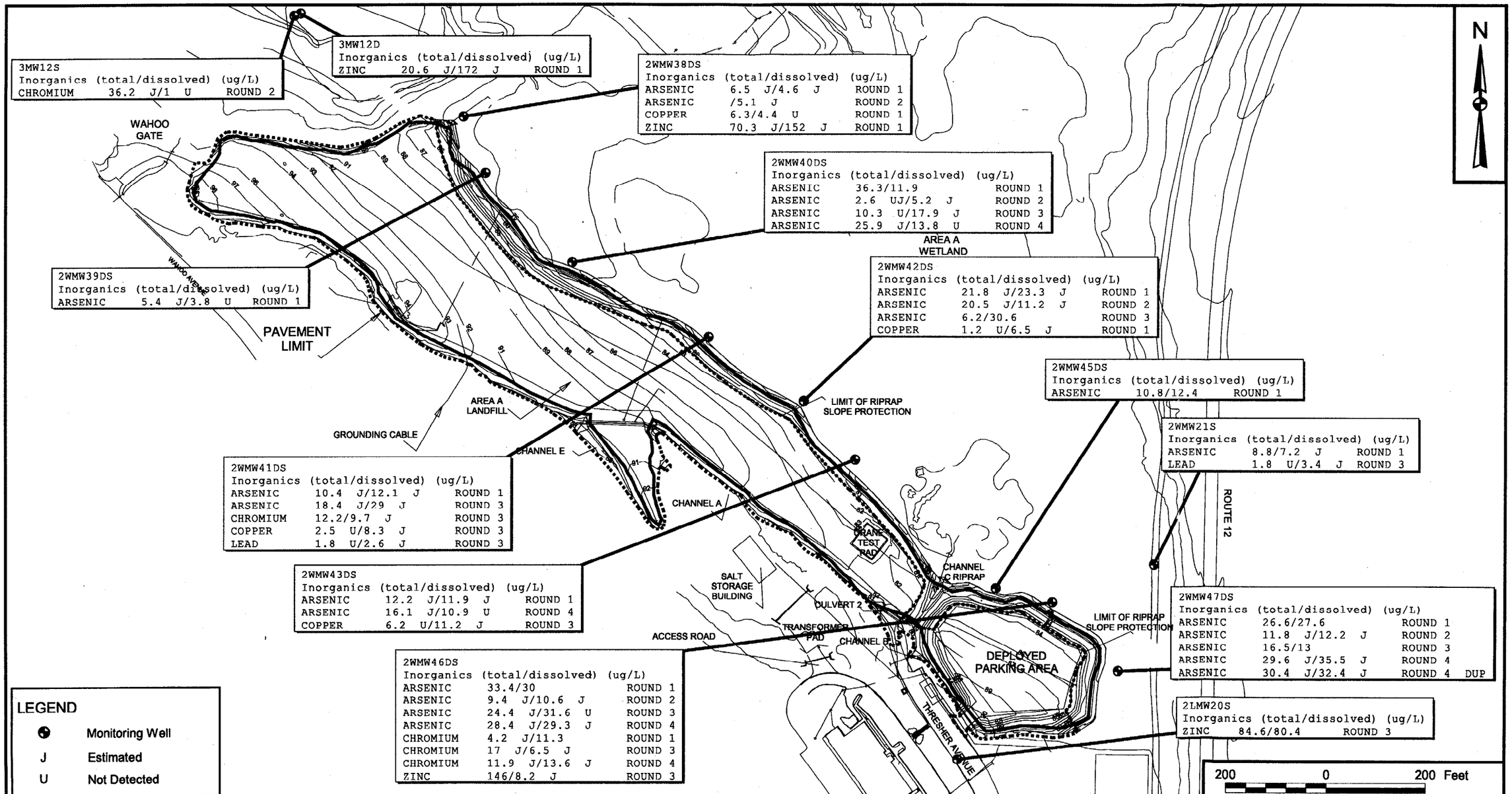

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY M. Spangenberg DATE 1-9-01
CHECKED BY DATE
COST/SCHEDULE-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

EXCEEDENCES OF MONITORING CRITERIA IN GROUNDWATER ROUNDS 1 THROUGH 4 AREA A LANDFILL NSB-NLON, GROTON,CONNETICUT

CONTRACT NUMBER 5082
OWNER NUMBER 0390
APPROVED BY Mark L. Mengel DATE 2/6/01
APPROVED BY DATE
DRAWING NO. FIGURE 4-1
REV 0

10850B33

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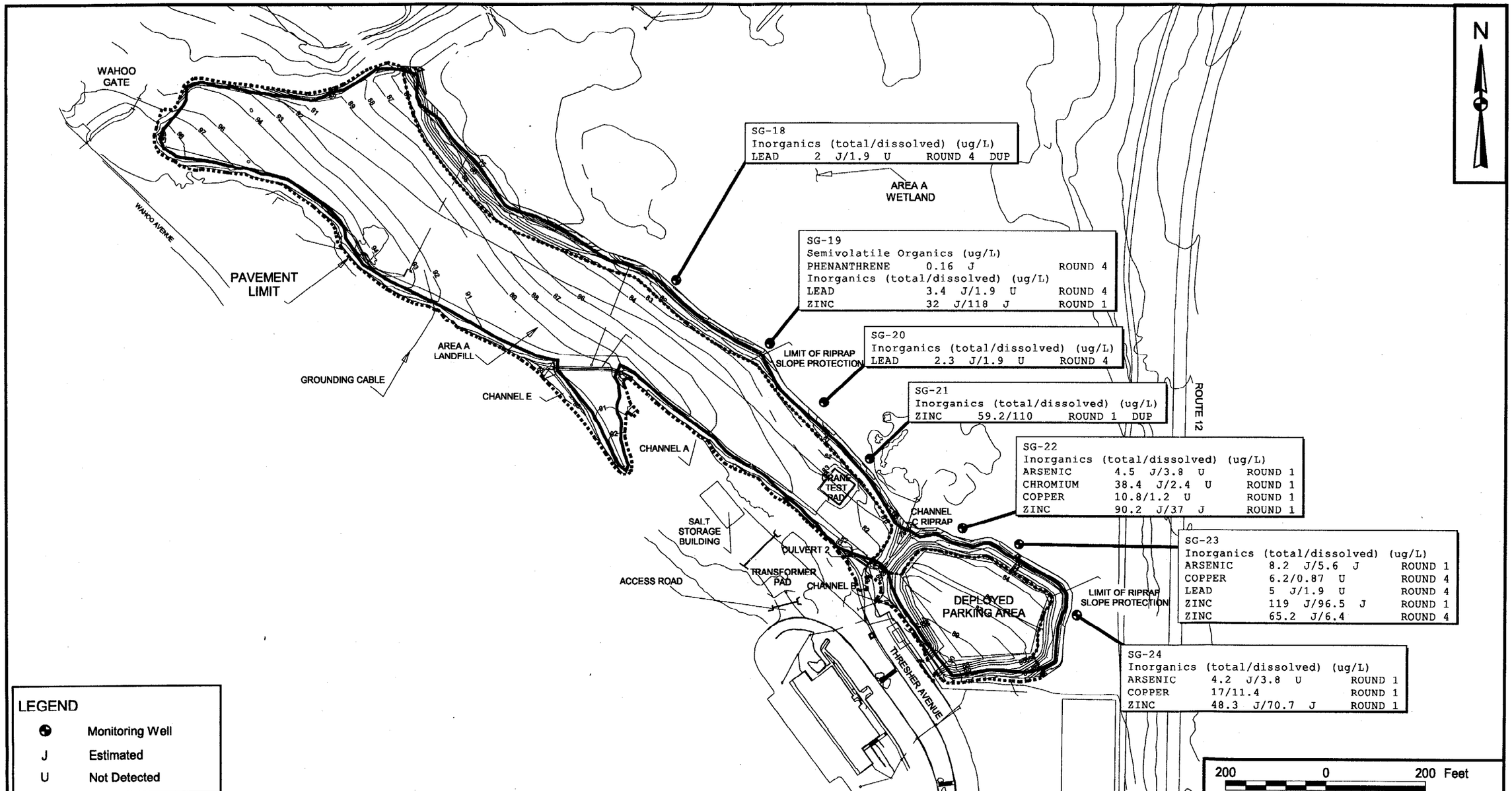


LEGEND

- Monitoring Well
- J Estimated
- U Not Detected

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

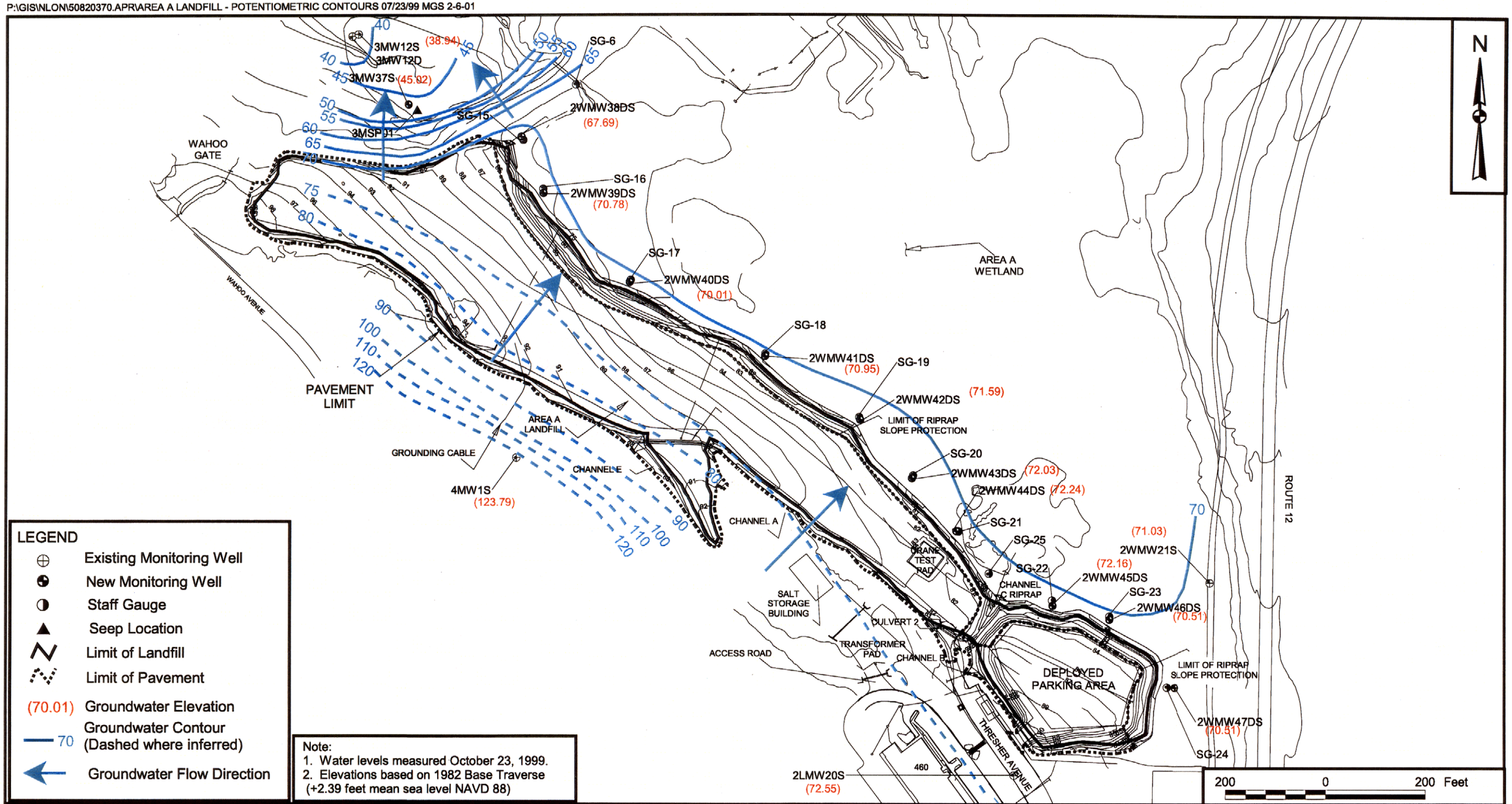
DRAWN BY M. Spangenberg DATE 1-9-01
CHECKED BY DATE
COST/SCHEDULE-AREA
SCALE AS NOTED

Tetra Tech NUS, Inc.

EXCEEDENCES OF MONITORING CRITERIA IN SURFACEWATER ROUNDS 1 THROUGH 4 AREA A LANDFILL NSB-NLON, GROTON,CONNETICUT

CONTRACT NUMBER 5082
OWNER NUMBER 0390
APPROVED BY Mark L. Mengel DATE 2/6/01
APPROVED BY DATE
DRAWING NO. FIGURE 4-2
REV 0

P:\GIS\NLON\50820370.APR\AREA A LANDFILL - POTENTIOMETRIC CONTOURS 07/23/99 MGS 2-6-01



LEGEND

- Existing Monitoring Well
- New Monitoring Well
- Staff Gauge
- Seep Location
- Limit of Landfill
- Limit of Pavement
- (70.01) Groundwater Elevation
- 70 Groundwater Contour (Dashed where inferred)
- Groundwater Flow Direction

Note:
1. Water levels measured October 23, 1999.
2. Elevations based on 1982 Base Traverse (+2.39 feet mean sea level NAVD 88)

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

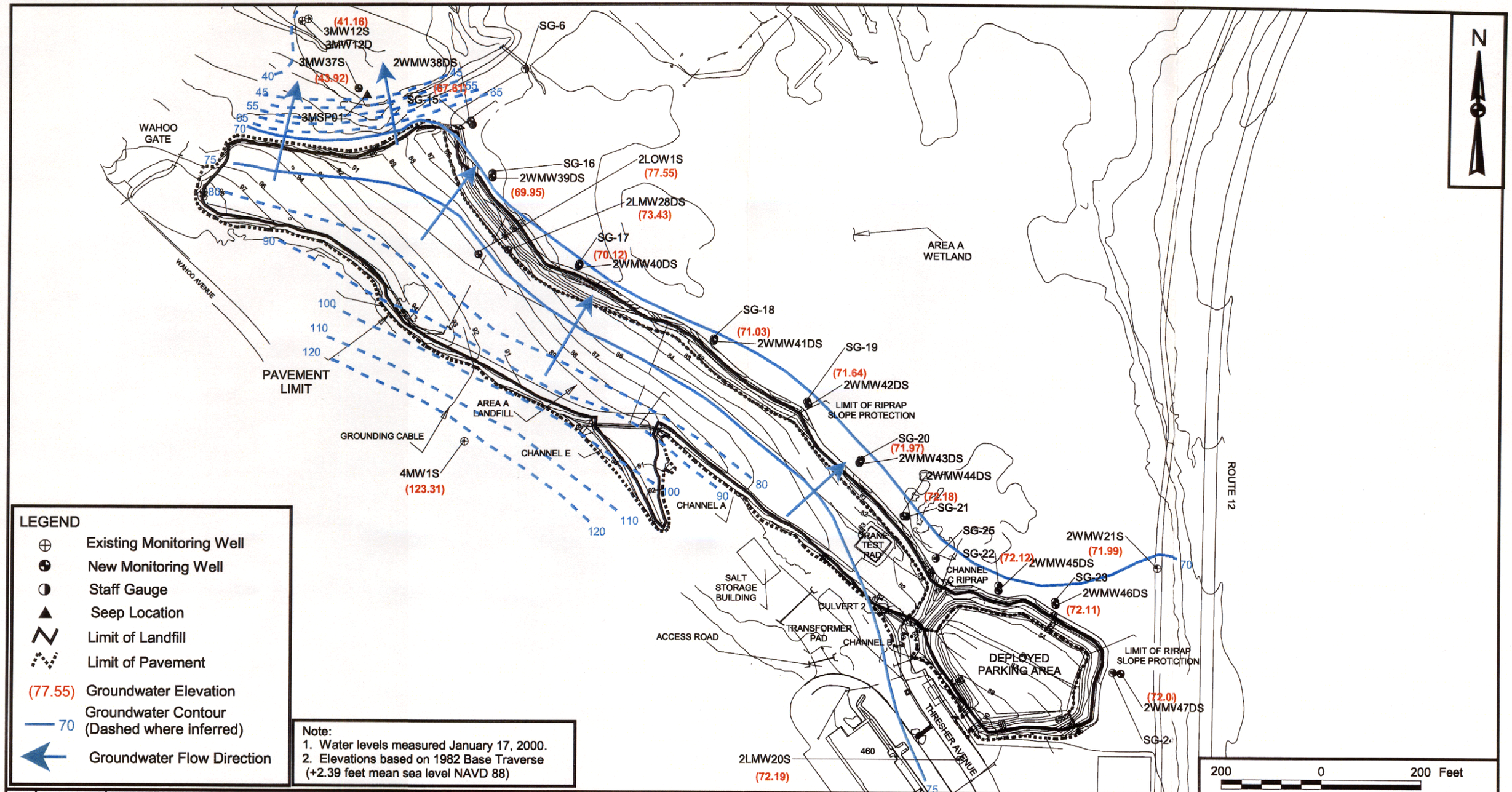
DRAWN BY J. BELLONE	DATE 2/18/00
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	

Tetra Tech NUS, Inc.

POTENTIOMETRIC SURFACE MAP
ROUND 1 GROUNDWATER MONITORING
AREA A LANDFILL
NSB-NEW LONDON, GROTON, CONNECTICUT

CONTRACT NUMBER 5082	OWNER NUMBER —
APPROVED BY —	DATE —
APPROVED BY Mark L. Mengel	DATE 2/6/01
DRAWING NO. FIGURE 4-3	REV 0

P:\GIS\NLON\50820370.APR\AREA A - POTENTIOMETRIC CONTOURS - ROUND 2 2-6-01 MGS



LEGEND

- Existing Monitoring Well
- New Monitoring Well
- Staff Gauge
- Seep Location
- Limit of Landfill
- Limit of Pavement
- (77.55) Groundwater Elevation
- 70 Groundwater Contour (Dashed where inferred)
- Groundwater Flow Direction

Note:
1. Water levels measured January 17, 2000.
2. Elevations based on 1982 Base Traverse (+2.39 feet mean sea level NAVD 88)

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

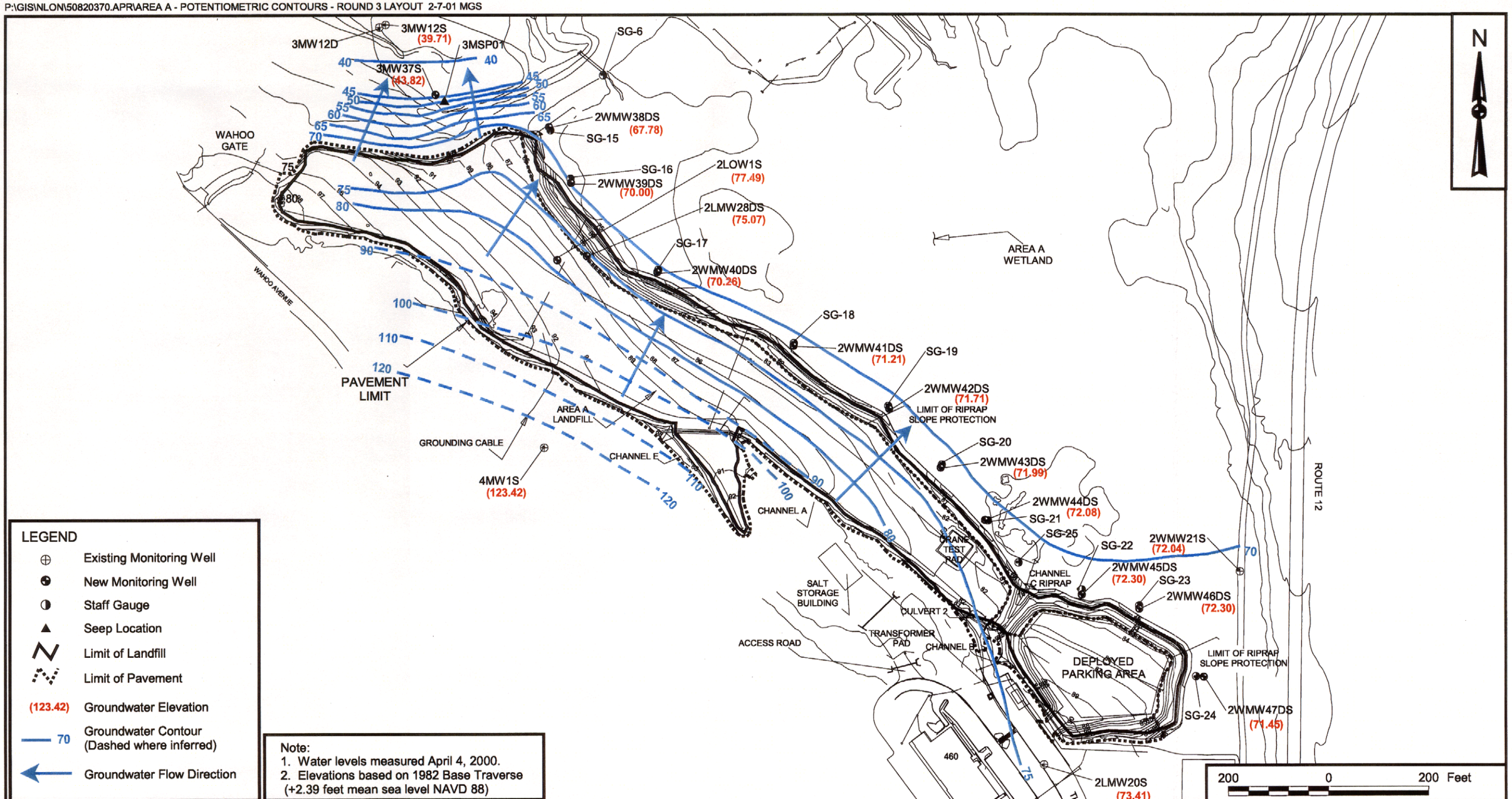
DRAWN BY J. BELLONE	DATE 4/13/00
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	

Tetra Tech NUS, Inc.

POTENTIOMETRIC SURFACE MAP
ROUND 2 GROUNDWATER MONITORING
AREA A LANDFILL
NSB-NEW LONDON, GROTON, CONNECTICUT

CONTRACT NUMBER 5082	OWNER NUMBER —
APPROVED BY —	DATE —
APPROVED BY Mark L. Mingel	DATE 2/6/01
DRAWING NO. FIGURE 4-4	REV 0

P:\GIS\NLON\50820370.APR\AREA A - POTENTIOMETRIC CONTOURS - ROUND 3 LAYOUT 2-7-01 MGS



LEGEND

- Existing Monitoring Well
- New Monitoring Well
- Staff Gauge
- Seep Location
- Limit of Landfill
- Limit of Pavement
- (123.42) Groundwater Elevation
- 70 Groundwater Contour (Dashed where inferred)
- Groundwater Flow Direction

Note:
1. Water levels measured April 4, 2000.
2. Elevations based on 1982 Base Traverse (+2.39 feet mean sea level NAVD 88)

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

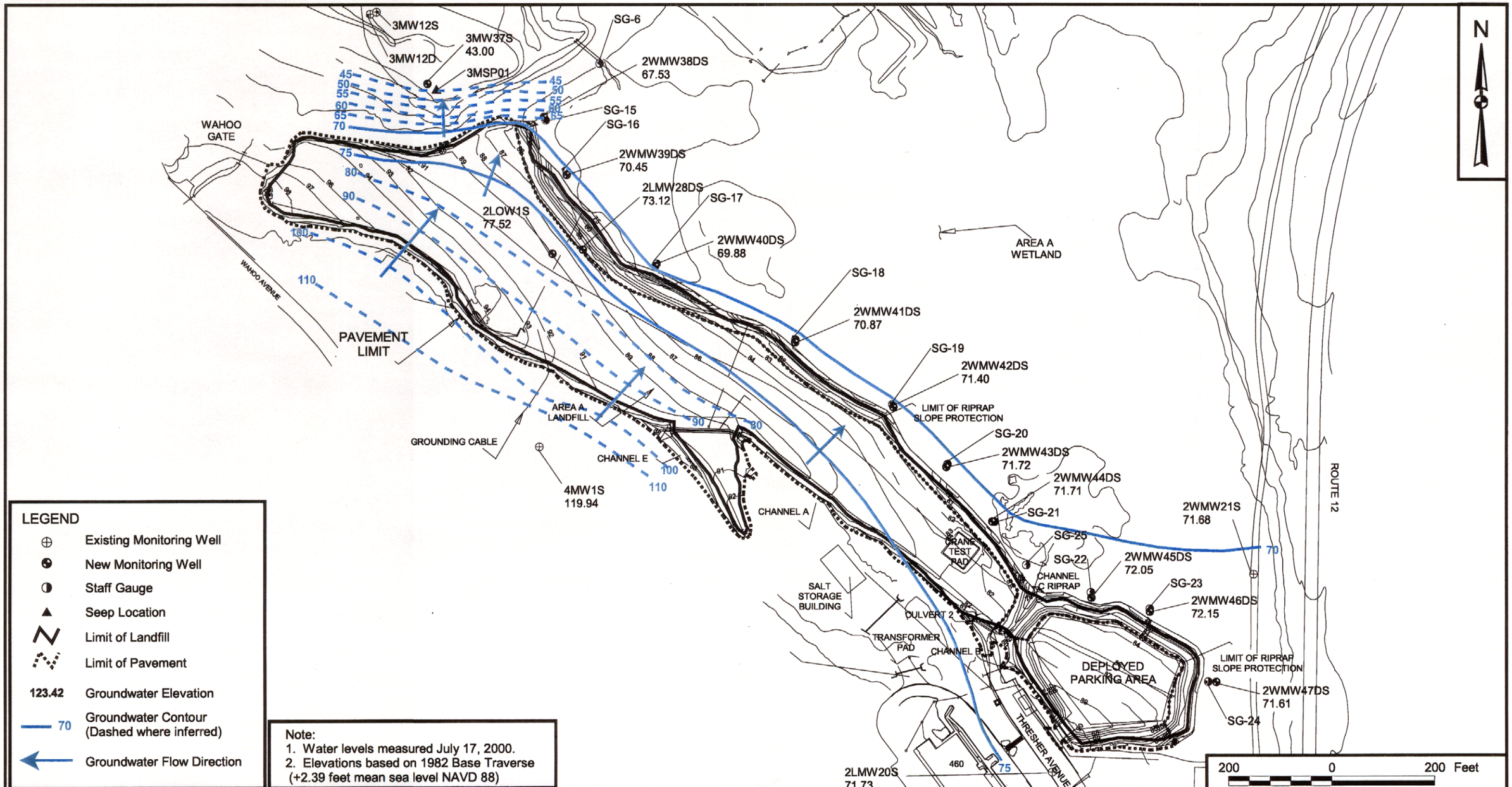
DRAWN BY J. LAMEY	DATE 7/19/00
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	

Tetra Tech NUS, Inc.

POTENTIOMETRIC SURFACE MAP
ROUND 3 GROUNDWATER MONITORING
AREA A LANDFILL
NSB-NEW LONDON, GROTON, CONNECTICUT

CONTRACT NUMBER 5082	OWNER NUMBER —
APPROVED BY —	DATE —
APPROVED BY Mark L. Mangel	DATE 2/6/01
DRAWING NO. FIGURE 4-5	REV 0

P:\GIS\NLON\50820370.APR\AREA A - POTENTIOMETRIC CONTOURS - ROUND 4 LAYOUT MGS 2-6-01



LEGEND

- Existing Monitoring Well
- New Monitoring Well
- Staff Gauge
- Seep Location
- Limit of Landfill
- Limit of Pavement
- 123.42 Groundwater Elevation
- 70 Groundwater Contour (Dashed where inferred)
- Groundwater Flow Direction

Note:
1. Water levels measured July 17, 2000.
2. Elevations based on 1982 Base Traverse (+2.39 feet mean sea level NAVD 88)

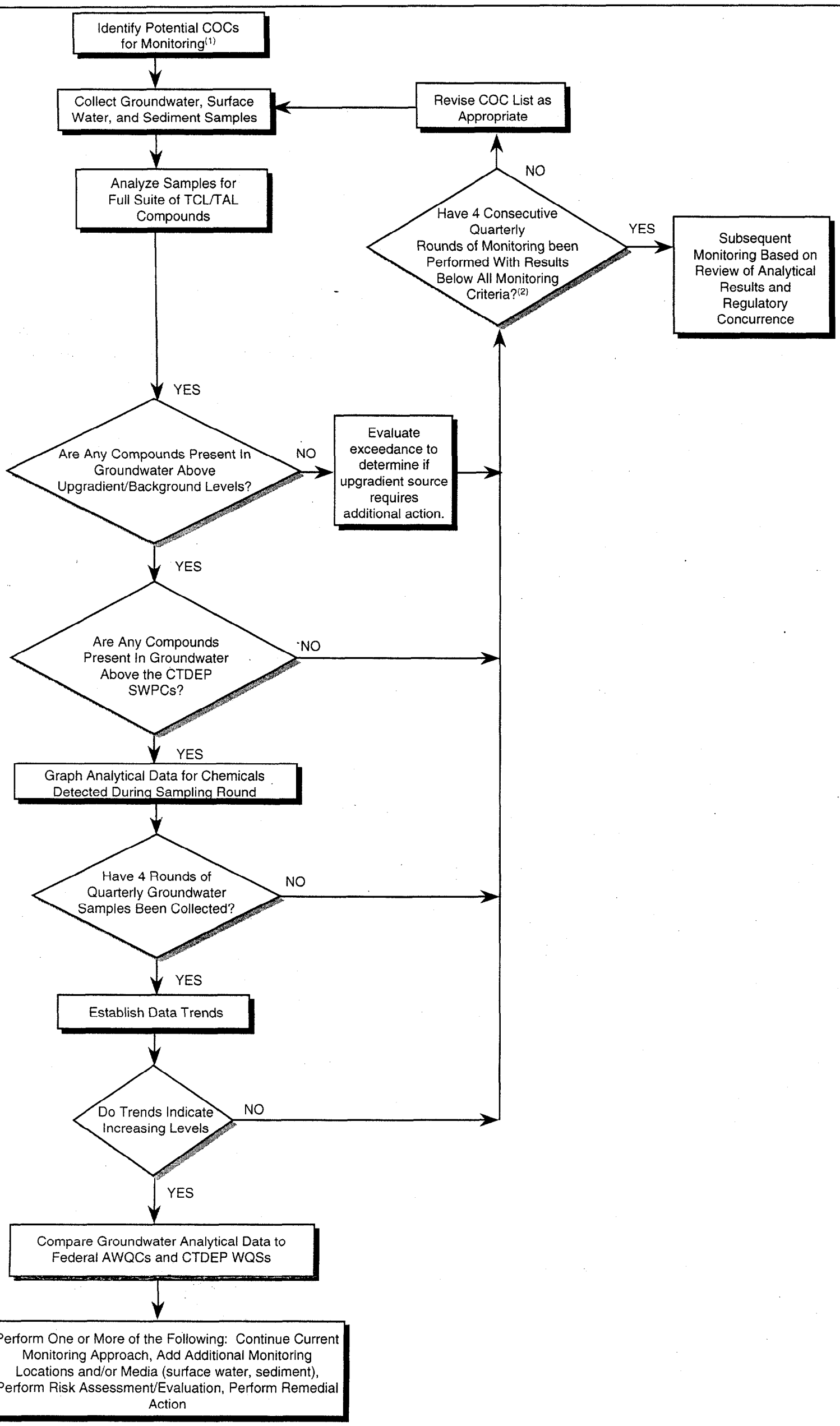
NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY M. Spangenberg	DATE 12/1/00
CHECKED BY	DATE
COST/SCHEDULE-AREA	
SCALE AS NOTED	

Tetra Tech NUS, Inc.

POTENTIOMETRIC SURFACE MAP
ROUND 4 GROUNDWATER MONITORING
AREA A LANDFILL
NSB-NEW LONDON, GROTON, CONNECTICUT

CONTRACT NUMBER 5082	OWNER NUMBER —
APPROVED BY —	DATE —
APPROVED BY Mark L. Mengel	DATE 2/6/01
DRAWING NO. FIGURE 4-6	REV 0



(1) Evaluate chemicals in groundwater which exceed the site-specific Surface Water Protection Criteria (SWPCs). Also evaluate soil contaminants which exceed the CTDEP Pollutant Mobility Criteria for GB classified groundwater.

(2) Or, is the concentration of each substance in the plume immediately upgradient of the point at which the groundwater discharge to the receiving surface water body equal to or less than the applicable SWPC, provided that the areal extent of the plume is not increasing over time, and that, except for seasonal variations, the concentration of the subject substance is not increasing, except as a result of natural attenuation at any point over time?

FIGURE 4-7

GROUNDWATER MONITORING PLAN DECISION DIAGRAM
AREA A LANDFILL
NSB-NLON, GROTON, CONNECTICUT

Brown & Root Environmental

1085C05Z

Figure 4 - 8
Average Total Arsenic Concentrations as a Function of Time
Rounds 1 through 4
AREA A LANDFILL, NSB - NLON, Groton, CT

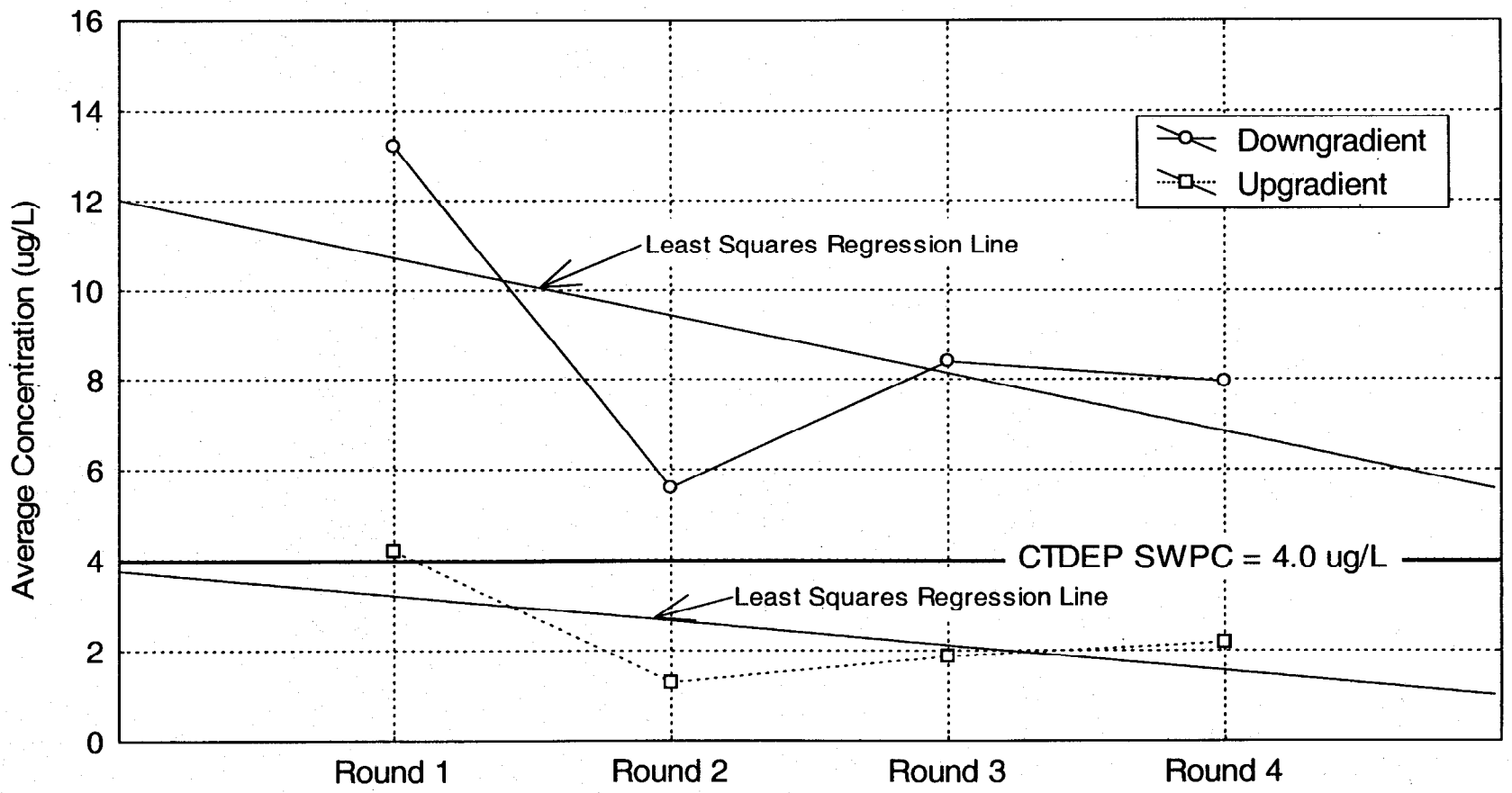


Figure 4 - 9

Average Dissolved Arsenic Concentrations as a Function of Time

Rounds 1 through 4

AREA A LANDFILL, NSB- NLON, Groton, CT

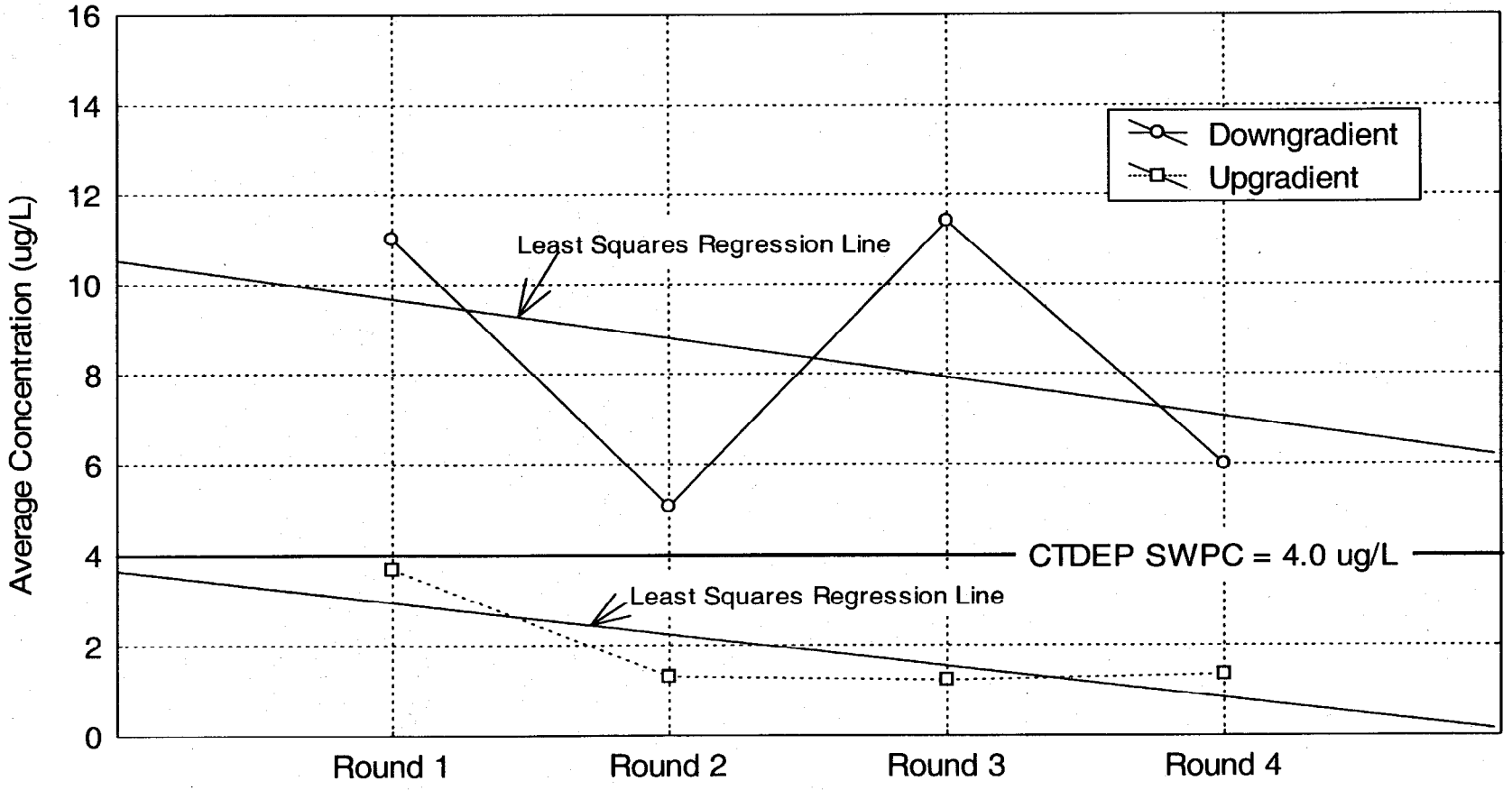


Figure 4 - 10

Confidence in Downgradient Total Arsenic Temporal Trends

Rounds 1 through 4

AREA A LANDFILL, NSB - NLON, Groton, CT

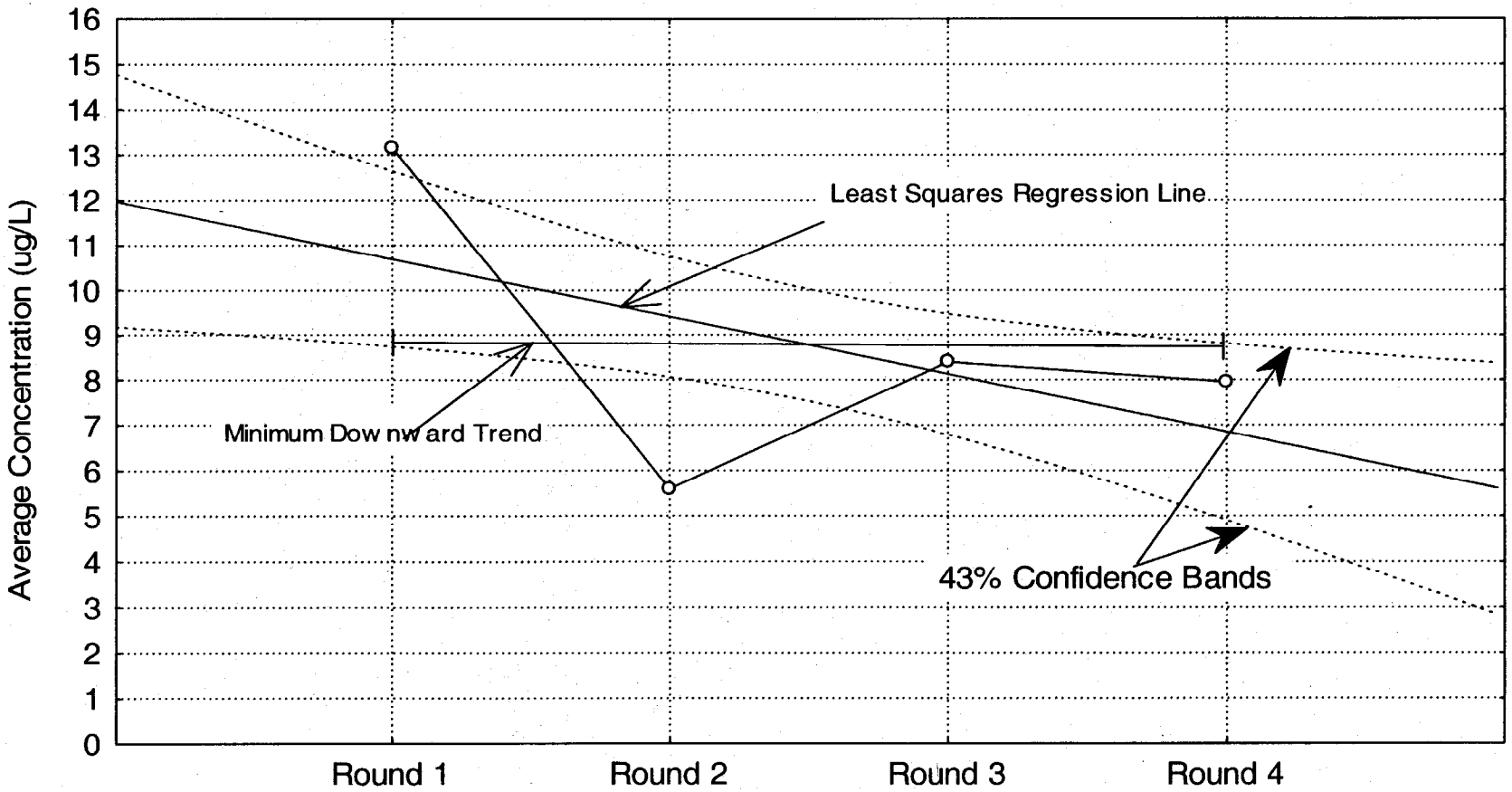
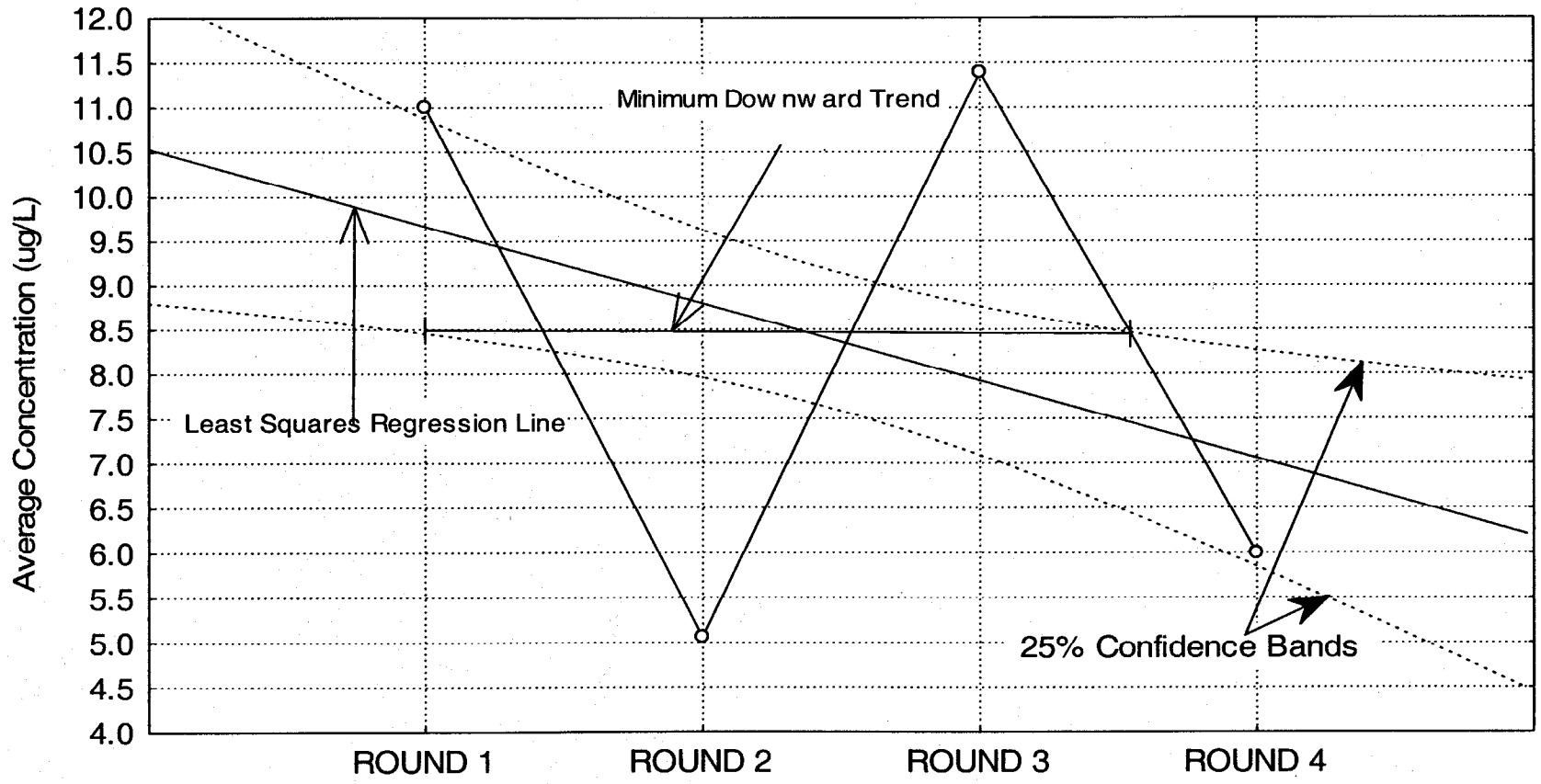


Figure 4 - 11

Confidence in Downgradient Dissolved Arsenic Temporal Trends

Rounds 1 through 4

AREA A LANDFILL, NSB-NLON, Groton, CT



5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

This Annual groundwater monitoring report summarizes the initial 4 rounds of quarterly groundwater analytical data collected from 16 monitoring wells installed at the Area A landfill and Area A wetland. The wells were installed to monitor groundwater quality beneath the asphalt cap installed as part during an Interim Remedial Action (IRA) completed in 1997. As previously stated, the list of COCs evaluated consists of those contaminants identified in the Groundwater Monitoring Plan as shown on Table 4-1 of this report. To verify that contaminants are not migrating from the site at concentrations above criteria, the analytical results were compared to site-specific SWPCs. The analytical results were also compared to Federal AWQCs and the Connecticut WQSs as secondary monitoring criteria. The ultimate goal of the monitoring program is to attain surface water protection requirements for those contaminants.

The results obtained during the initial four rounds of groundwater monitoring for volatile and semivolatile organic compounds indicated no exceedances of any State of Connecticut SWPCs. Additionally, no volatile and semivolatile compounds exceeded the secondary monitoring criteria.

Results of the inorganics analyses indicated some positive results for arsenic which exceeded the SWPC, the primary screening criteria. Additionally, zinc exceeded the SWPC in one sample. Some positive results for copper, chromium, lead, and zinc in excess of the secondary screening criteria; however, none of the positive results exceeded the respective SWPCs. No other metals exceeded either primary or secondary screening criteria.

As stated in Section 4.3, contaminant concentrations detected in upgradient monitoring wells (2LMW20S, 2WMW21S, and 4MW1S) were compared to the remaining monitoring wells located downgradient. The statistical comparisons indicated that upgradient and downgradient concentrations of both organic and inorganic COCs were found to be similar except for total arsenic. The average arsenic concentrations for each round were plotted as a function of time and compared to the Connecticut SWPCs. As shown on Figure 4-9 the average concentrations for total arsenic, although currently above the SWPC, show a slight downward temporal trend. A similar trend is shown for dissolved arsenic concentrations on Figure 4-10.

A review of the inorganic results revealed that in several instances total metal concentrations were lower than dissolved metal concentrations. Typically, dissolved metal concentrations are lower since the filtering process removes particulate matter to which the metals bond. For the instances where dissolved metal concentrations exceed total metal concentrations, the concentration variance is primarily attributed

to instrumentation fluctuation near the instrument detection limit. Instrumentation signal fluctuation can result in the reporting of concentrations that marginally exceed the instrument detection limit. Another condition suspected of contributing to the variance between total and dissolved metal concentrations is random laboratory contamination.

A cursory review of water chemistry parameters indicates a correlation between elevated turbidity and total dissolved solids (TDS). Similarly, elevated TDS is noted in some samples when dissolved metals are detected at increased levels relative to total metals results. Arsenic (As) has been used widely in pesticides and as a wood preservative. Land-surface applications or disposal of arsenic-containing products have resulted in arsenic contamination of shallow groundwater. Dissolved arsenic does not react strongly with aquifer solids and its transport in groundwater is not retarded.

A comparison of groundwater analytical data to surface water data collected form the Area A wetland was completed for this report. Detections of arsenic above the SWPC were noted in several surface water samples (SG-22, SG-23, and SG-24) during round 1. Arsenic was also noted in the adjacent monitoring wells during round 1 at higher concentrations, indicating that groundwater may be mixing with surface water in this area. A similar condition exists with lead at SG-18 and the adjoining well location. Lead was detected in the surface water sample and groundwater sample at a concentration slightly in excess of the secondary screening criteria. Several other metals (copper, chromium and zinc) were detected in some of the surface water samples in excess of secondary screening criteria, however only arsenic was detected above the primary criteria (SWPC).

Groundwater arsenic concentrations at the Area A Landfill are often near the detection limit with many of the analyses qualified as estimated. Geochemical conditions in and near the downgradient side of the Area A Landfill are neutral to slightly acidic and mildly to strongly reducing. Under these conditions the arsenic species present in groundwater will be predominantly the reduced form]i.e., As(III) or arsenite] and as the neutral molecule H_3AsO_3. Similarities in the total and dissolved concentrations tend to support the lack of any association with particles.

5.2 RECOMMENDATIONS

The analytical results for the first year of groundwater monitoring sampling indicate several exceedances of the SWPCs, in addition to those compounds detected in excess of the secondary monitoring criteria. Because of the various exceedances of primary and secondary monitoring criteria, groundwater monitoring should be continued through year two to further evaluate these chemical concentrations.

The following considerations should be discussed between the Navy, EPA and CTDEP should contaminant concentrations remain similar to those exhibited to date.

- Through 4 rounds of groundwater monitoring, no exceedances of primary or secondary monitoring criteria have been noted for volatile organic compounds and semivolatile organic compounds. Consideration should be given to reducing the sampling frequency for VOCs.

- Round 5 sampling has recently been completed and Round 6 will be performed soon. At the completion of Rounds 7 and 8 (Year 2), consideration should be given to reducing some of the parameters to be analyzed.

- Maintain monitoring well integrity (well maintenance, well development) in case of extended monitoring.

- Discuss endpoint for groundwater monitoring if current trends continue.

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APPENDIX A

GROUNDWATER SAMPLE LOGSHEETS AND LOW-FLOW PURGE DATA SHEETS

ROUND 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - N LCN / AREA A
Project No.: JOB # 5082 CTO #03

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 4 GW015-01
Sample Location: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 102799-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-27-99	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 1040	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	CLEAR	5.69	0.293	13.7	0.1	1.37	124	0.14

PURGE DATA:

Date: 10-27-99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump								
Monitor Reading (ppm): 0								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 20.30								
Static Water Level (WL): 7.13			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.2								
Start Purge (hrs): 0927								
End Purge (hrs): 1035								
Total Purge Time (min): 68								
Total Vol. Purged (gal/L): 2.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	6 (3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	4 (2) 1L Amber Glass	✓
TCL PAH	4°C	4 (2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	4 (2) 1L Amber Glass	✓
TAL Metals (Total) + HARDNESS	HNO_3/4°C	2 (1) 1L Polyethylene	✓
Dissolved Metals	HNO_3/4°C	2 (1) 1L Polyethylene	✓
Total Organic Carbon (TOC)	HCl/4°C	2 (1) 60mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	2 (1) 250mL Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	2 (1) 1L Polyethylene	✓
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	
		2X VOL FOR DUP	

OBSERVATIONS / NOTES:

END SAMPLE @ 1225
END WL = 7.39'

SET PUMP INLET 1' OFF BTM.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	GWFD-102799

Signature(s): K. E. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 4MW01
DATE: 10-27-99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
0925	7.13	180	—	—	—	—	—	—	—	START PURGE
0930	7.20		6.30	0.358	1.6	8.36	12.7	65	0.16	CLEAR, NO ODOR
0935	7.20		5.76	0.314	0.5	8.45	13.3	87	0.15	
0945	7.22		5.71	0.296	0.3	5.54	13.5	110	0.14	
0950	7.20	155	5.70	0.295	0.4	4.14	13.5	116	0.14	
1000	7.21		5.67	0.298	0.1	2.97	13.6	124	0.14	
1005	7.22		5.68	0.292		2.43	13.6	127	0.14	
1010	7.23		5.70	0.291		2.21	13.6	125	0.14	
1015	7.23		5.68	0.294		1.82	13.7	129	0.14	
1020	7.24		5.70	0.290		1.57	13.7	124	0.14	
1025	7.24		5.70	0.293		1.35	13.7	128	0.14	
1030	7.25		5.70	0.292		1.40	13.7	126	0.14	
1035	7.25	145	5.69	0.293		1.37	13.7	124	0.14	
1035	END PURGE									

SIGNATURE(S): [illegible]

50 MIN.

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - N LCN / AREA A
Project No.: JOB # 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[]. QA Sample Type:

Sample ID No.: 3-GW12S-01
Sample Location: 3MW12S - AREA A
Sampled By: S. NEIL
C.O.C. No.: 102899-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/28/99	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 1510	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump/LOW FLOW	CLEAR	6.08	3.288	12.3	9.7	0.29	30.4	1.73

PURGE DATA:

Date: 10/28/99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump/LOW FLOW								
Monitor Reading (ppm): 1.6								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 15.11'								
Static Water Level (WL): 2.53'			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.1								
Start Purge (hrs): 1321								
End Purge (hrs): 1507								
Total Purge Time (min): 106								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	✓
TAL Metals (Total) + Hardness	HNO_3/4°C	(1) 1L Polyethylene	✓
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	✓
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	✓
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

End sampling @ 1628.
Final water level = 2.75 ft.

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

Scott Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082
WELL ID.: 3MW12S
DATE: 10/28/99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
1321	2.53								→	Begin Purging.
1326	2.69	120	6.15	3.205	50.1	1.53	12.8	0.7	1.69	Rust-colored solids.
1331	2.74	120	6.15	3.210	25.5	1.71	12.6	1.3	1.69	Changed battery.
1336	2.74	120	6.13	3.217	19.9	1.18	12.4	6.6	1.69	Solids have cleared
1341	2.74	120	6.14	3.231	13.1	1.51	12.4	6.5	1.70	
3000 1346	2.76	120	6.11	3.243	24.3	1.00	12.4	12.9	1.70	
1351	2.77	130	6.10	3.249	31.6	1.03	12.4	17.0	1.71	
1300 1356	2.78	130	6.10	3.257	32.9	0.83	12.4	18.6	1.71	
1401	2.79	140	6.09	3.260	34.4	0.68	12.4	20.5	1.72	
1406	2.77	140	6.10	3.267	31.9	0.74	12.3	22.3	1.72	
1411	2.77	140	6.10	3.273	27.8	0.67	12.3	21.8	1.72	
1416	2.77	140	6.11	3.276	27.4	0.59	12.3	22.9	1.73	
3500 1421	2.77	140	6.09	3.277	24.1	0.53	12.3	24.1	1.73	
1426	2.78	130	6.08	3.278	21.2	0.46	12.3	25.1	1.73	
1431	2.78	130	6.09	3.280	18.9	0.48	12.3	26.0	1.73	
1436	2.77	130	6.09	3.280	16.0	0.47	12.3	26.7	1.73	
1441	2.77	130	6.08	3.281	14.8	0.46	12.3	28.7	1.73	
1446	2.78	130	6.08	3.283	13.0	0.44	12.3	29.5	1.73	
1451	2.78	130	6.09	3.285	10.99	0.39	12.3	29.1	1.73	
1456	2.78	130	6.08	3.287	11.7	0.33	12.3	30.5	1.73	
1501	2.78	130	6.08	3.288	10.5	0.32	12.3	31.3	1.73	
1504	2.77	130	6.08	3.288	10.1	0.33	12.3	30.3	1.73	
1507	2.77	130	6.08	3.288	9.7	0.29	12.3	30.4	1.73	End purging.
	Begin sampling @ 1510 - Sample ID 3-GW12S-01									
	End sampling @									

SIGNATURE(S): Scott A. Reid

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - N LCN / AREA A
Project No.: JOB # 5082 CTO #03

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 364120-01
Sample Location: AREA A
Sampled By: R. SIMPSON
C.O.C. No.: 102999-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-28-99	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 1440	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	CLEAR	6.44	3.48	11.9	11	0.50	-86	1.84

PURGE DATA:

Date: 10.28.99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump								
Monitor Reading (ppm): 0								
Well Casing Diameter & Material								
Type: ~~2 inch PVC~~ 4" STEEL								
Total Well Depth (TD): 27.50								
Static Water Level (WL): 0.34			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 17.7								
Start Purge (hrs): 1319								
End Purge (hrs): 1435								
Total Purge Time (min): 76								
Total Vol. Purged (gal/L): 3.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative		Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	6	(3) 40mL Vials	—
TCL Semivolatile Organic Compounds	4°C	4	(2) 1L Amber Glass	—
TCL PAH	4°C	4	(2) 1L Amber Glass	—
TCL Pesticides/PCB	4°C	4	(2) 1L Amber Glass	—
TAL Metals (Total) + HARDNESS	HNO_3/4°C	2	(1) 1L Polyethylene	—
Dissolved Metals	HNO_3/4°C	2	(1) 1L Polyethylene	—
Total Organic Carbon (TOC)	HCl/4°C	2	(1) 60mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	2	(1) 250mL Polyethylene	—
Alkalinity, Chloride, Sulfate, TDS	4°C	2	(1) 1L Polyethylene	—
~~Hardness~~	~~HNO_3/4°C~~		~~(1) 250mL Polyethylene~~	—
		2X VOL FOR DUP		

OBSERVATIONS / NOTES:

NO PVC RISER, OPEN 4" STEEL PIPE

4" OPEN BORE HOLE 17.7 GAL, NO DRAWDOWN STABLE PARAMETERS SAMPLED @ 1440
VERY SLIGHT SULFUR ODOR

4" WELL = .653 GAL/FT

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	GWFD 102999

Signature(s): R. S. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 3MW12D
DATE: 10.28.99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
1322	0.45	240	6.54	3.482	50	4.53	12.4	-83	1.84	
1335	0.49	180	6.46	3.419	17	5.09	12.0	-73	1.80	
1340			6.50	3.477	13	1.57	12.0	-97	1.84	
1345			6.52	3.481	13	1.39	11.9	-100	1.84	
1350			6.50	3.482	13	1.31	11.9	-101	1.84	
1355			6.51	3.484	15	1.16	11.9	-101	1.84	
1400			6.52	3.489	14	0.87	12.0	-102	1.84	
1405			6.51	3.490	13	0.80	11.9	-102	1.84	
1410			6.46	3.487	12	0.64	11.9	-93	1.84	
1415			6.44	3.485	12	0.58	11.8	-85	1.84	
1420			6.46	3.483	13	0.62	11.9	-85	1.84	
1425			6.50	3.483	12	0.59	11.9	-89	1.84	
1430			6.45	3.483	11	0.49	11.9	-88	1.84	
1435			6.44	3.481	11	0.50	11.9	-86	1.84	

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2L-GW205-01
Sample Location: 2LMW205
Sampled By: S. NEIL
C.O.C. No.: 102399-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 10/24/99								
Time: 0900								
Method: Peristaltic Pump / LOW FLOW	CLEAR	6.09	0.568	15.7	0.0	1.37	32	0.28

PURGE DATA:

Date: 10/24/99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump / LOW FLOW								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 18.85'								
* Static Water Level (WL): 14.58'			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 0.7								
Start Purge (hrs): 0754								
End Purge (hrs): 0855								
Total Purge Time (min): 61								
Total Vol. Purged (gal/L): 2.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	✓
TAL Metals (Total) & Hardness	HNO_3/4°C	(1) 1L Polyethylene	✓
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	✓
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	✓
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

Final H_2O Level = 14.71 FT.
End Sampling @ 1007.

* water level is below top of the screen.

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): Scott Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2LMW205
DATE: 10/24/99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
0754	14.58								→	BEGIN PURGING.
0757	14.68	310	6.23	0.645	9.6	3.25	15.8	6.5	0.31	930 Adjust pump
0800	14.69	180	6.16	0.590	4.2	5.89	15.6	17.1	0.29	540
0805	14.73	180	6.13	0.580	2.3	6.01	15.8	27.2	0.28	900
0810	14.74	210	6.16	0.583	0.3	5.43	15.7	28	0.28	1050 Adjust pump
0815	14.72	155 ✓	6.13	0.580	0.0	4.28	15.6	31	0.28	775
0820	14.72	155 ✓	6.14	0.577	0.0	3.72	15.7	31	0.28	775
0825	14.72	155	6.12	0.574	0.0	3.01	15.7	31	0.28	775
0830	14.73	164 ✓	6.12	0.570	0.0	2.43	15.8	30	0.28	820
0835	14.73	164	6.12	0.568	0.0	1.98	16.1	32	0.28	820
0840	14.72	188 ✓	6.10	0.567	0.0	1.79	15.8	32	0.28	940 Adjust pump.
0845	14.72	148 ✓	6.10	0.564	0.0	1.62	15.7	31	0.28	740
0850	14.72	148	6.09	0.566	0.0	1.51	15.8	33	0.27	740
0855	14.72	148 ✓	6.09	0.568	0.0	1.37	15.7	32	0.28	740 END PURGING
	BEGIN SAMPLING @ 0900 - SAMPLE ID 2L-GW205-01.									
	END SAMPLING @									

SIGNATURE(S): Scott Neal

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - N LCN / AREA A
Project No.: JOB # 5082 CTO 303

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W~~AW~~G215-01
Sample Location: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 102399-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 10-25-99 Time: 1625 Method: Peristaltic Pump	BLACK	6.72	30.27	13.5	190	5.78	-333	18.79

PURGE DATA:

Date: 10-25-99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump								
Monitor Reading (ppm): 44.5	← IN RISER		0 PPM	IN BZ				
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 17.30								
Static Water Level (WL): 4.71			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (~~gal~~): 2.1								
Start Purge (hrs): 1425								
End Purge (hrs): 1620								
Total Purge Time (min): 115								
Total Vol. Purged (~~gal~~): 3.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	9
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	6
TCL PAH	4°C	(2) 1L Amber Glass	6
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	6
TAL Metals (Total) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene	3
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	3
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	3
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	3
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	3
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	
		3X VOL FOR MS/MSD	

OBSERVATIONS / NOTES:

PUMP INLET SET ~~IN CENTER~~ 1.5' OFF BTM
END SAMPLE @ 1915 LS
END WL = 8.51'

SAMPLE EFFERVESCING IN HCL

Circle if Applicable:

MS/MSD	Duplicate ID No.:
YES	—

Signature(s): K. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2W MW21S
DATE: 10-25-99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
1427	5.55	180	6.94	44.67	18	14.68	14.2	-303	28.73	STRONG SULFUR ODOR
1435	5.90	125	6.90	43.72	13	12.13	14.6	-314	28.24	
1440	6.16		6.94	43.39	10.0	12.14	14.8	-316	27.97	
1445	6.37		6.94	42.85	7.5	13.27	14.8	-318	27.59	
1455	6.63		6.92	41.16	7.5	14.45	14.9	-320	26.38	
1500	6.79		6.90	40.38	7.6	13.82	14.9	-320	25.88	
1505	6.75	140	6.87	38.94	6.1	12.29	15.0	-319	24.75	
1510	6.78		6.87	37.58	6.3	12.13	14.9	-317	23.95	
1515	6.80		6.87	35.84	6.7	10.47	14.6	-313	22.56	
1520	6.82		6.84	34.97	8.2	8.78	14.4	-310	22.06	
1525	6.81		6.84	34.47	9.1	8.93	14.3	-312	21.70	
1530	6.81		6.85	33.89	30	9.04	14.2	-320	21.07	
1535	6.81		6.78	33.37	39	7.55	14.1	-323	20.94	
1540	6.79		6.74	33.90	65	7.03	14.1	-332	20.69	TURNING BLACK COLOR
1550	6.72		6.75	31.87	120	7.57	13.9	-354	19.87	
1600	6.68	120	6.70	31.41	160	6.35	13.8	-353	19.57	
1610	6.67		6.68	30.63	180	5.56	13.65	-353	19.03	
1615	6.65		6.68	30.44	190	5.46	13.56	-352	18.91	
1620	6.62		6.72	30.27	190	5.78	13.5	-355	18.79	
	END PURGE									

SIGNATURE(S): Kit E. Simpson

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - N LON / AREA A
Project No.: JOB # 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 3GW375-01
Sample Location: AREA A
Sampled By: R. SIMPSON
C.O.C. No.: 102899-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/28/99	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 1750	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump / LOW FLOW	CLEAR	6.10	0.581	12.7	5.8	2.08	600	0.28

PURGE DATA:

Date: 10.28.99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump / LOW FLOW								
Monitor Reading (ppm): 8.3								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 8.45								
Static Water Level (WL): 3.54			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 0.8								
Start Purge (hrs): 1645								
End Purge (hrs): 1745								
Total Purge Time (min): 60								
Total Vol. Purged (gal/L): 1.7								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	✓
TAL Metals (Total) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene	✓
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	✓
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	✓
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	—

OBSERVATIONS / NOTES:

PUMP INLET SET 1' OFF BTM.
END SAMPLE @ 1915 WL = 4.12

Circle if Applicable:

MS/MSD — Duplicate ID No.: —

Signature(s): R. S. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 3MW37S
DATE: 10-28-99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
1650	3.83	110	6.33	0.592	34	8.24	12.1	66	0.29	Changed battery
1655	3.86	110	6.27	0.578	27	5.71	11.8	75	0.28	
1700	4.95	110	6.24	0.576	19	5.96	12.0	73	0.28	
1705	4.01	110	6.26	0.573	12	5.62	12.2	71	0.28	
1710	4.03	110	6.23	0.572	10	5.18	12.4	71	0.28	
1715	4.05	110	6.22	0.571	8.9	4.54	12.6	73	0.28	
1720	4.05	110	6.19	0.571	7.1	3.15	12.7	72	0.28	
1725	4.03	110	6.15	0.572	6.0	2.55	12.8	71	0.28	
1730	3.99	110	6.12	0.575	5.4	2.29	12.7	69	0.28	
1735	3.98	90	6.10	0.579	6.3	2.14	12.7	61	0.28	LOW PUMP BATTERY.
1740	3.96	85	6.10	0.580	6.0	2.24	12.7	64	0.28	
1745	3.98	95	6.10	0.581	5.8	2.08	12.7	60	0.28	END PURGING CHANGED BATTERY AT BEGINNING OF SAMPLING.
	BEGIN SAMPLING @		1750	Sample ID 3-GW37S-01.						
	END SAMPLING @									

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO #03

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W GW 38DS-01
Sample Location: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 102599-01, 102799-01 & 102899-01
Type of Sample: 3 COC's
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-26/28/29-99	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: SEE BELOW	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	CLEAR	6.83	1.130	14.8	6.8	2.48	199	0.57

PURGE DATA:

Date: 10-24-99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump								
Monitor Reading (ppm): 11.6 RP	← RISER PIPE			BZ=0				
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 11.70								
Static Water Level (WL): 6.92			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 0.8								
Start Purge (hrs): 1554								
End Purge (hrs): 1635								
Total Purge Time (min): 42								
Total Vol. Purged (gal/L): 1.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials 10-26-99	0950
TCL Semivolatile Organic Compounds	4°C	1 (X) 1L Amber Glass 10-26-99	0950
TCL PAH	4°C	(2) 1L Amber Glass 10-28-99	0755
TCL Pesticides/PCB	4°C	1 (X) 1L Amber Glass 10-26-99	0950
TAL Metals (Total) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene 10-29-99	0715
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene 10-29-99	0715
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass 10-26-99	0950
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene 10-28-99	0755
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene 10-29-99	0715
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

PUMP INLET SET @ 1' OFF BTM PRIOR TO SAMPLING PURGED 300ML ±
10-25-99 WL @ 1310 = 10.25'
10-26-99 WL @ 0745 = 9.45' @ 0945 WL = 9.37
TURB. 10-26-99 ALL OTHER PARAMETERS 10-24-99
PURGE 10-24-99 TO DRY - SAMPLE 10-26-99, 10-28-99

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): K. Simpson

10-28-99 WL @ 0745 = 9.22'

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WGW38DS-01
DATE: 10 24 99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
1600	7.80	150	7.02	1.014	31	5.64	15.4	198	0.50	
1605	8.35	120	6.88	0.980	21	4.37	15.3	209	0.49	120 ML/MIN IS
1610	8.77	↓	6.90	0.966	12	4.70	15.3	212	0.48	LOWER LIMIT OF PUMP
1615	9.31		6.80	1.018	6.6	4.00	15.2	217	0.51	
1620	9.68		6.82	1.056	6.3	3.45	15.1	214	0.53	
1625	10.19		6.82	1.107	6.2	2.90	15.0	207	0.56	
16,30	10.68		6.83	1.130	7.9	2.48	14.8	199	0.57	
1632	10.70	↓	DRY	TO	10.70'					
	DISCONNECT CELL AND PUMP WELL DRY TO BTM.									
	WILL ALLOW TO RECHARGE OVERNITE & SAMPLE 10.25.99									

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - N LCN / AREA A
Project No.: JOB # 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W-GW39DS-01
Sample Location: 2WGW39DS- ~~AREA A~~
Sampled By: S. NEIL
C.O.C. No.: 102799-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/27/99	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Time: 0828								
Method: Peristaltic Pump/LOW FLOW	LT. GRAY	6.82	4.398	13.6	112	2.03	-125	2.47

PURGE DATA:

Date: 10/26/99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump/LOW FLOW								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 16.7'								
Static Water Level (WL): 3.01'			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.2								
Start Purge (hrs): 1128								
End Purge (hrs): 1410								
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	3
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	2
TCL PAH	4°C	(2) 1L Amber Glass	2
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	2
TAL Metals (Total) + Hardness	HNO_3/4°C	(1) 1L Polyethylene	1
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	1
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	1
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	1
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

Water level at beginning of sampling - 4.14 Ft.
Turbidity at beginning of sampling = 18 NTUs.
Sample flow rate = 100 ml/min
End sampling @ 1011
Final H_2O Level = 12.54 Ft.

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): Scott Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW39DS
DATE: 10/26/99

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
	1128	3.01								→	BEGIN PURGING. ORANGE
450	1133	3.58	90	6.81	4.911	80	4.79	13.5	-77	2.65	SOLIDS AT BEGINNING OF
900	1138	3.98	90	6.87	4.811	50	4.38	13.5	-79	2.59	PURGE.
1350	1143	4.51	90	6.81	4.455	36	4.15	13.4	-73	2.39	SOLIDS HAVE CLEARED.
1800	1148	4.97	90	6.72	4.277	24	3.24	13.4	-76	2.29	TRACE ORANGE SOLIDS
2225	1153	5.20	85	6.71	4.059	26	3.14	13.3	-76	2.16	↓
2650	1158	5.57	55	6.70	3.853	22	2.70	13.3	-72	2.05	↓
3100	1203	5.93	90	6.68	2.936	17	4.11	13.3	-70	1.54	CLEANED SOLIDS FROM BOTTOM
3550	1208	6.27	90	6.67	2.872	15	3.44	13.4	-67	1.50	OF FLOW-THRU CELL.
4000	1213	6.58	90	6.62	2.584	19	3.59	13.4	-66	1.34	TRACE ORANGE SOLIDS
4450	1218	6.58	90	6.64	2.336	16	2.76	13.4	-63	1.21	
4900	1223	6.80	90	6.61	2.098	23	2.34	13.5	-55	1.07	
5325	1228	7.05	85	6.56	1.908	21	2.16	13.5	-49	0.98	
5750	1233	7.31	85	6.55	1.725	26	2.14	13.5	-43	0.87	
6250	1238	7.48	100	6.48	1.584	20	1.91	13.5	-39	0.80	CHANGED PUMP BATTERY
6750	1243	7.73	100	6.47	1.522	27	2.06	13.6	-36	0.77	
	1248	8.00	100	6.49	1.625	34	1.44	13.5	-37	0.83	CHANGED PUMP BATTERY
	1253	8.24	100	6.47	1.530	32	1.71	13.6	-36	0.77	CHANGED PUMP BATTERY
	1258	8.52	90	6.45	1.454	32	1.67	13.6	-38	0.73	~~water level~~
	1303	8.78	90	6.44	1.421	28	1.56	13.6	-33	0.72	~~Parameters~~ not stabilizing -
	1304	9.40	160	6.44	1.392	25	1.11	13.2	-40	0.70	will purge "dry" and
	1313	9.87	160	6.44	1.386	23	1.00	13.2	-46	0.70	sample on 10/27/99.
	1318	10.33	175	6.45	1.464	22	0.98	13.2	-53	0.74	CHANGED PUMP BATTERY
	1323	10.77	175	6.46	1.533	22	0.88	13.3	-57	0.78	↓
	1328	11.36	185	6.55	2.104	29	0.83	13.2	-70	1.08	↓
	1333	12.03	185	6.53	2.056	31	0.72	13.2	-74	1.06	↓
	1338	12.79	190	6.54	2.242	40	0.82	13.3	-73	1.16	↓
	1343	13.27	190	6.56	2.405	32	0.75	13.1	-81	1.25	↓
	1348	13.66	180	6.57	2.541	20	0.51	13.4	-86	1.32	↓
	1351	14.03	160	6.61	3.138	23	0.56	13.5	-92	1.65	↓

SIGNATURE(S): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW39DS
DATE: 10/26/99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
1356	14.47	170	6.67	3.829	57	0.98	13.5	-99	1.77	
1401	14.91	170	6.72	4.117	79	1.21	13.6	-109	2.01	
1406	15.39	170	6.79	4.301	101	1.79	13.6	-122	2.30	
1410	15.57	170	6.82	4.398	112	2.03	13.6	-125	2.47	END PURGE - DRY WILL SAMPLE ON 10/27/99

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W-GW40DS-01
Sample Location: 2W MW 40DS
Sampled By: S. NEIL
C.O.C. No.:
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/25/99 & 10/26/99	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 1310 & 0745	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump/LOW FLOW	LT. GRN	7.14	19.23	13.8	11	3.29	-324	11.48

PURGE DATA:

Date: 10/24/99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump/LOW FLOW								
Monitor Reading (ppm): 0.4								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 16.40'								
Static Water Level (WL): 3.85			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume(gal/L): 2.0								
Start Purge (hrs): 1058								
End Purge (hrs): 1204								
Total Purge Time (min): 66								
Total Vol. Purged (gal/L): 2.9								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials 10/25/99	3
TCL Semivolatile Organic Compounds	4°C	1 (~~2~~) 1L Amber Glass 10/25/99	1
TCL PAH	4°C	(2) 1L Amber Glass 10/25/99	2
TCL Pesticides/PCB	4°C	1 (~~2~~) 1L Amber Glass 10/25/99	1
TAL Metals (Total) + Hardness	HNO_3/4°C	(1) 1L Polyethylene 10/26/99	1
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene 10/26/99	1
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass 10/25/99	1
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene 10/25/99	1
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene 10/25/99	1
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

-well purged dry on 10/24/99 - will sample on 10/25/99.

10/26/99 - METALS
H_2O LEVEL = 11.4 FT
TURBIDITY = 14 NTUs

-Sample date parameters measured on 10/25/99 prior to sampling.
-well did not recover enough to sample all parameters at the same time - will will sample Metals (T + Dis) on 10/26/99.
-Water level at start of sampling = 9.03 FT. Sample flow rate ≈ 100 ml/min.

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Scott W. [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW400S
DATE: 10/24/99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
1058	3.85									BEGIN PURGING
1101	4.78	155 ✓	6.93	35.31	26.0	9.90	12.5	-259	22.26	405
1104	5.71	160 ✓	6.85	32.86	23.8	2.17	12.3	-285	20.49	480
1109	6.74	163 ✓	6.85	31.97	23.6	2.34	12.3	-288	19.94	515
1114	7.19	169 ✓	6.82	31.37	21.4	2.05	12.4	-291	19.52	545
1119	7.80	163 ✓	6.86	28.54	22.5	2.15	12.5	-297	17.60	615
1124	8.58	163	6.86	26.13	16.1	2.27	12.6	-299	15.97	615
1129	9.34	163	6.87	23.42	13.2	2.78	12.7	-298	14.17	615
1134	9.92	163	6.87	20.82	13.9	2.66	12.8	-295	12.46	815
1139	10.85	163	6.90	19.09	12.7	2.74	12.8	-294	11.75	815 Changed pump battery.
1144	11.54	175 ✓	6.99	18.72	21.8	2.60	12.8	-291	11.14	875
1149	(SW) ~~12.28~~ 12.28	175	6.99	19.47	33.7	2.41	12.7	-298	11.64	875
1154	13.20	180 ✓	6.97	21.13	41.4	2.52	12.6	-306	12.72	900
1159	14.53	180	6.98	23.82	115	2.77	12.6	-314	14.49	900
1204	15.00	180	6.93	26.01	179	2.83	12.6	-310	15.93	900 Dry - recovery rate = 0.20FT/10min. Dewatered the well - will sample on 10/25/99.
~~1~~ (SW)										

SIGNATURE(S): Scott W. Reid

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-N LCN / AREA A
Project No.: JOB # 5082 CTO # 03

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W GW 4 DS 01
Sample Location: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 102899-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10-28-99	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 0925	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	CLEAR	6.99	31.86	12.2	14	8.94	-292	19.82
PURGE DATA:	10-28-99	— 10-26-99		—	10-28-99	— 10-26-99		—

Date: 10-26-99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump								
Monitor Reading (ppm): 15.7								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 16.65								
Static Water Level (WL): 2.51			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.3								
Start Purge (hrs): 1347								
End Purge (hrs): 1519								
Total Purge Time (min): 92								
Total Vol. Purged (gal/L): 3.6								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	✓
TAL Metals (Total)	HNO_3/4°C	(1) 1L Polyethylene	✓
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	✓
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	✓
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	—

OBSERVATIONS / NOTES:

PUMP INLET SET @ 1' OFF BTM. SAMPLE EFFERVESCING IN HCL
LIGHT SULFUR ODOR

WL 10-28-99 @ 0911 = 6.75'
WL 10-27-99 @ 0826 = 10.35'

END WL 10-28-99 @ 1006 = 14.35'

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): K. S. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2W GW 41 DS 01
DATE: 10.26.99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
1350	3.82	200	6.93	29.83	66	19.11	12.9	-249	18.47	VERY LT. YELLOW COLOR
1355	4.44	135	6.86	28.66	41	17.67	13.1	-282	17.75	
1400	5.15	↓	6.84	27.30	25	15.39	13.2	-290	16.87	
1405	6.16	↓	6.84	25.71	26	12.65	13.3	-286	15.49	
1410	~~7~~ 6.93	140	6.81	23.80	27	12.37	13.3	-282	14.50	
1415	7.62	↓	6.83	20.63	28	10.91	13.4	-278	12.45	
1420	8.11	↓	6.86	19.21	27	10.43	13.3	-276	11.86	
1425	8.85	↓	6.89	17.80	27	9.65	13.3	-275	10.60	
1430	9.28	↓	6.91	17.27	21	9.59	13.3	-276	10.22	
1440	10.23	↓	6.86	17.03	16	7.47	13.4	-282	10.14	
1445	11.11	↓	6.86	17.87	19	7.76	13.2	-290	10.61	
1450	11.83	150	6.86	19.26	22	6.49	13.2	-291	11.39	TURNING DARK GRAY
1455	12.25	↓	6.83	19.78	23	6.60	13.1	-296	11.80	BACK TO LT TEA/YELLOW COLOR
1500	13.08	↓	6.85	21.54	20	7.98	13.0	-298	12.91	
1505	14.09	170	6.82	23.39	30	6.68	12.8	-300	14.32	
1510	14.65	↓	6.85	25.54	73	6.51	12.7	-301	15.51	
1515	15.34	↓	6.88	31.86	104	8.94	12.2	-292	19.82	
1518	15.60	↓	DRY	TO	PUMP	INLET,	LOWERED	TO	BTM	& PUMP DRY

SIGNATURE(S): [illegible]

BTM 16.65

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-N LCN / AREA A
Project No.: JOB# 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W-GW420S-01
Sample Location: 2WMW420S-AREA A
Sampled By: S. NEIL
C.O.C. No.: 102899-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 10/28/99 Time: 0945								
Method: Peristaltic Pump/LOW FLOW	GRAY	6.97	32.56	12.1	142	9.65	-339	20.39

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Date: 10/27/99								
Method: Peristaltic Pump/LOW FLOW								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 16.25'								
Static Water Level (WL): 2.10'			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.3								
Start Purge (hrs): 1242								
End Purge (hrs): 1412								
Total Purge Time (min): 90								
Total Vol. Purged (gal/L): 3.5								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	3
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	2
TCL PAH	4°C	(2) 1L Amber Glass	2
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	2
TAL Metals (Total) + Hardness	HNO_3/4°C	(1) 1L Polyethylene	1
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	1
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	1
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	1
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

Water level at sample time = 5.80 ft.
Turbidity at sample time = 71.1 NTUs.
Water has strong sulfur odor.
Sample flow rate ≈ 115 mL/min.
End sampling @ 1127.

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW42DS
DATE: 10/27/99

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
	1242	SW ~~2.50~~ 2.10								→	BEGIN PURGING.
700	1247	2.97	140	7.02	37.04	47.0	4.55	12.6	-304	23.45	DECREASE FLOW. WATER
	1252	3.92	120	6.97	36.23	19.6	6.13	12.6	-332	22.87	HAS SULPHUR ODOR.
	1257	4.45	120	6.98	35.39	20.4	9.01	12.7	-333	22.30	
	1302	5.29	120	6.95	33.99	19.7	8.58	12.7	-330	21.28	
	1307	5.88	120	6.94	30.12	15.1	8.98	12.7	-328	18.69	
	1312	6.64	120	6.91	31.17	12.5	9.57	12.8	-323	20.01	
	1317	7.33	120	6.86	27.73	11.0	9.75	12.9	-315	17.05	
	1322	8.14	120	6.83	24.98	12.8	9.71	13.0	-314	15.22	
4800	1327	8.73	120	6.82	22.85	18.6	9.62	13.00	-306	13.73	WATER LEVEL NOT STABILIZING
	1332	9.34	160	6.83	20.65	21.8	9.84	12.9	-321	12.37	WELL NOT MAKING MUCH
	1337	10.03	160	6.86	19.96	24.2	9.70	12.8	-326	11.92	WATER. INCREASE FLOW TO
2400 4800	1342	10.66	160	6.92	19.07	23.6	9.47	12.8	-328	11.35	PURGE DRY - SAMPLE ON
	1347	11.35	180	6.95	18.47	29.8	9.90	12.8	-326	10.97	10/28/99.
	1352	12.03	180	6.94	19.20	22.4	9.87	12.7	-320	11.46	
	SW ~~13~~ 1357	12.68	180	6.93	21.53	27.3	9.79	12.5	-319	12.99	
	1402	13.59	180	6.94	25.42	53.5	8.31	12.6	-325	15.55	
	1407	14.23	180	6.91	27.71	75.8	9.43	12.4	-332	17.10	
	1412	SW ~~14.90~~ 14.90	180	6.97	32.56	142	9.65	12.1	-339	20.39	Well purged dry - will sample on 10/28/99.

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

2WMW43D

Project Site Name: NSB - N LCN / AREA A
Project No.: JOB# 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W-GW43DS-01
Sample Location: 2WMW43DS - Area A
Sampled By: S. Neil
C.O.C. No.: 102799-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 10/27/99								
Time: 1750								
Method: Peristaltic Pump/LOW FLOW	LT. GRAY	6.52	36.50	12.3	109	8.29	-345	23.06

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Date: 10/26/99								
Method: Peristaltic Pump/LOW FLOW								
Monitor Reading (ppm): 231								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 15.45'								
Static Water Level (WL): 2.47'			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.2								
Start Purge (hrs): 1623								
End Purge (hrs): 1757								
Total Purge Time (min): 94								
Total Vol. Purged (gal/L): 3.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	3
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	2
TCL PAH	4°C	(SN) (2) 1L Amber Glass	2
TCL Pesticides/PCB	4°C	(1) ~~(2)~~ 1L Amber Glass	1
TAL Metals (Total) + Hardness	HNO_3/4°C	(1) 1L Polyethylene	1
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	1
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	1
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	1
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

Water level at sample time = 6.78 ft.
Turbidity at sample time = 360 NTUs
Pump rate at sampling = 115 mL/min.
Strong effervescing in VOAs & TOC (HCL preservative)
End sampling @ 1927. Filled all bottles except one PCB.
All samples had strong sulfur odor.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW4/DS 3 (SW)
DATE: 10/26/99

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
	1623	2.47								→	BEGIN PURGING
	1628	3.33	120	6.54	41.48	45	1.16	13.0	-338	26.57	STRONG SWAMP /
	1633	4.17	120	6.48	39.24	20	0.55	13.0	-338	24.95	SULPHUR ODOR.
	1638	4.86	120	6.48	37.99	15	0.02	13.0	-336	24.11	
	1643	5.45	120	6.45	37.05	14	3.87	12.9	-334	23.45	
	1648	6.06	120	6.49	35.93	14	6.09	12.9	-330	22.64	
	1653	6.63	120	6.51	34.50	12	6.75	12.8	-331	21.68	
	1658	7.18	120	6.57	32.67	16	7.74	12.8	-333	20.41	
	1703	7.70	120	6.59	31.89	17	7.22	12.8	-336	19.48	
	1708	8.23	120	6.63	30.93	20	7.12	12.7	-339	19.24	
	1713	8.93	120	6.65	30.58	22	7.21	12.7	-343	19.01	
	1718	9.71	120	6.65	30.54	23	7.26	12.6	-346	18.97	
	1723	10.23	120	6.64	30.54	20	7.26	12.6	-348	18.98	
	1728	10.77	120	6.63	30.70	19.7	6.90	12.6	-347	19.08	
8410	1733	11.28	120	~~6.66~~	30.88	23.4	6.86	12.6	-345	19.21	INCREASE FLOW TO PURGE
	1738	12.02	170	6.59	31.43	40.5	7.65	12.5	-342	19.58	DRY - SAMPLE ON
	1743	12.62	170	6.57	32.16	45.6	7.41	12.5	-344	20.08	10/27/99 WATER LEVEL
	1748	13.20	170	6.55	33.15	63.1	7.21	12.5	-344	20.76	NOT STABILIZING.
	1753	14.00	170	6.53	34.74	96.5	7.61	12.4	-344	21.86	
4150	1757	14.43	170	6.52	36.50	109	8.29	12.3	-345	23.06	END PURGE - DRY.
											WILL SAMPLE ON
											10/27/99.

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-N LCN / AREA A
Project No.: JOB# 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2N-GW44DS-01
Sample Location: 2NMW44DS - AREA A
Sampled By: S. NEIL
C.O.C. No.: 102799-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 10/25/99								
Time: 0750								
Method: Peristaltic Pump / LOW FLOW	GRAY	6.46	18.73	12.9	145	13.21	-307	11.04

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Date: 10/27/99								
Method: Peristaltic Pump / LOW FLOW								
Monitor Reading (ppm):								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 16.9'								
Static Water Level (WL): 1.62'			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.5								
Start Purge (hrs): 1510								
End Purge (hrs): 1720								
Total Purge Time (min): 130								
Total Vol. Purged (gal/L): 4.8								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	3
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	2
TCL PAH	4°C	(2) 1L Amber Glass	2
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	2
TAL Metals (Total) + Hardness	HNO_3/4°C	(1) 1L Polyethylene	1
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	1
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	1
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	1
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

water level at sampling = 1.73 FT.
Turbidity at sampling = 21.6 NTUs.
water has strong sulfur odor.
Sample flow rate = 115 mL/min.
End sampling @ 0919.
Water level at end of sampling = 7.83 FT.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW440S
DATE: 10/27/99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
1510	1.62								→	Begin purging - water
1515	3.47	140	6.98	42.81	54.0	13.64	13.1	-336	27.52	has strong sulfur
1520	3.29	125	6.92	42.53	43.0	11.75	13.3	-337	27.33	odor.
1525	4.05	125	6.92	42.24	43.9	10.57	13.2	-337	27.12	
1530	4.68	125	6.93	41.97	40.8	10.47	13.3	-337	26.93	
1535	5.22	125	6.94	41.24	31.8	12.04	13.2	-338	26.41	
1540	5.69	125	6.94	40.59	33.2	13.10	13.3	-338	25.95	
1545	5.98	125	6.92	38.95	30.2	14.01	13.3	-337	24.78	
1550	6.29	125	6.91	36.45	32.0	14.18	13.3	-336	23.38	
1555	6.57	125	6.91	33.42	37.7	15.56	13.3	-331	20.92	
1600	6.84	125	6.91	28.97	44.9	14.38	13.2	-328	17.87	
1605	7.07	125	6.90	24.85	48.0	11.96	13.2	-324	15.12	
1610	7.27	125	6.90	22.79	47.8	11.45	13.2	-322	13.77	
7:00 1615	7.52	125	6.90	21.09	64.9	11.08	13.1	-322	12.66	
1620	8.14	150	6.93	19.36	66.4	9.86	13.1	-322	11.54	water level continuing
1625	8.90	150	6.92	18.06	77.2	9.27	13.0	-319	10.70	to drop. Increase flow
1630	9.39	150	6.83	16.32	91.0	8.37	13.1	-324	9.59	to purge dry, then
1635	10.04	150	6.79	15.32	110	7.66	13.2	-323	8.97	sample on 10/28/99.
1640	10.55	150	6.79	16.14	125	6.83	13.2	-318	9.49	
1645	11.27	150	6.82	16.98	117	6.84	13.1	-315	10.04	
1650	11.82	150	6.86	17.68	116	8.08	13.1	-315	10.47	
1655	12.25	155	6.87	17.99	131	7.52	13.1	-311	10.56	
1700	12.81	155	6.87	17.84	122	8.30	13.1	-308	10.90	
1705	13.40	150	6.89	18.20	140	8.59	13.0	-312	10.91	
1710	13.95	150	6.93	18.73	163	10.96	13.0	-313	11.15	
1715	14.55	150	6.94	18.95	156	11.44	12.9	-312	11.29	
1720	15.03	150	6.96	18.73	145	13.21	12.9	-307	11.04	End purging - dry.

SIGNATURE(S): Scott W. [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB# 5082 CTO 303

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 24GW450S
Sample Location: AREA A
Sampled By: R. SIMPSON
C.O.C. No.: 102599-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10.26.99	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 0830	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	CLEAR	6.79	42.12	11.3	17	6.22	-321	26.43

PURGE DATA:

Date: 10.25.99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump								
Monitor Reading (ppm): 258	← RISER PIPE, BZ = 0							
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 16.75								
Static Water Level (WL): 2.19			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.4								
Start Purge (hrs): 0946								
End Purge (hrs): 1045								
Total Purge Time (min): 119								
Total Vol. Purged (gal/L): 4.3								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	✓
TAL Metals (Total) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene	✓
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	✓
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	✓
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	—

OBSERVATIONS / NOTES:

PUMP INLET SET @ 1' OFF BTM. END W/L 10.26.99 = 9.47
STRONG SULFUR ODOR
TURBIDITY 10.26.99 ALL OTHER PARAMETERS 10.25.99
W/L 10.26.99 @ 0825 = 2.25, REMOVED 300ML± PRIOR TO START OF SAMPLING

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): R. S. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2W MW45 DS
DATE: 10.25.99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
0850	3.41	140	6.91	41.58	6.3	8.52	11.6	-282	26.65	
0855	3.75	110	6.80	42.20	5.8	7.12	11.6	-306	27.04	
0900	4.33		6.81	42.01	5.2	6.34	11.6	-312	26.89	
0910	5.31		6.84	41.35	7.3	6.97	11.7	-320	26.44	
0915	5.85		6.85	40.69	7.5	7.58	11.8	-322	26.00	WELL IS MAKING VERY
0920	6.28	↓	6.85	39.59	7.9	7.27	11.9	-322	25.15	LITTLE WATER. INCREASE
0925	6.60	150	6.85	37.40	9.5	6.49	12.0	-317	23.73	PUMP RATE, PUMP DRY
0930	6.93		6.85	34.72	10.0	5.76	12.0	-316	22.02	& SAMPLE 10.26.99
0940	7.75	↓	6.88	28.28	17	6.20	12.1	-310	17.50	
0945	8.45	155	6.90	27.02	20	6.58	12.2	-307	16.54	
0950	9.03		6.87	26.04	21	5.99	12.3	-304	15.87	
1000	9.68	↓	6.82	25.01	19	6.47	12.0	-302	15.26	
1005	10.52	220	6.80	24.40	12	5.60	12.4	-306	14.84	
1010	11.38		6.81	25.99	9.0	5.03	12.4	-310	15.85	
1015	11.95	↓	6.84	28.37	9.0	4.56	12.4	-310	17.45	
1020	12.37	240	6.85	29.15	8.7	4.42	12.3	-307	18.00	
1025	12.67	140	6.84	31.46	10.2	5.21	12.1	-315	19.94	BAT. RUNNING LOW
1030	13.70	250	6.83	35.21	11	3.73	12.1	-319	22.01	NEW BAT.
1035	14.32	250	6.88	39.15	20	5.02	11.9	-329	24.90	
1040	15.23		6.78	42.87	33	7.83	11.3	-313	27.40	MOVED INLET TO BTM.
1045	16.38	↓	6.79	42.12	140	6.22	11.3	-321	26.43	
	DRY @ 1045		END	PURGE						

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB# 5082 CTO 303

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W-GW46DS-01
Sample Location: 2WMW46DS
Sampled By: S. Neil
C.O.C. No.: 102599-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/26/99	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 0830	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump/LOW FLOW	GRN-TINT	6.83	41.17	11.3	223	3.97	-331	26.30

PURGE DATA:

Date: 10/25/99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump/LOW FLOW								
Monitor Reading (ppm): 0.4								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 16.46								
Static Water Level (WL): 1.58			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.4								
Start Purge (hrs): 0845								
End Purge (hrs): 1011								
Total Purge Time (min): 86								
Total Vol. Purged (gal/L): 3.2								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	3
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	2
TCL PAH	4°C	(2) 1L Amber Glass	2
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	2
TAL Metals (Total) + Hardness	HNO_3/4°C	(1) 1L Polyethylene	1
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	1
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	1
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	1
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

* Water level steadily dropping - well making very little water. Increased the flow rate on purging. Will dewater and sample within 24 hours.
- water level at beginning of sampling (10/26/99) = 5.73 FT.
- Turbidity at the beginning of sampling = 8.9 NTUs.
- Samples have "swampy" odor.
- Samples effervescing in vOAs (HCL preservative).

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW46DS
DATE: 10/25/99

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
0845	1.58	—							→	Begin purging.
0850	2.40	125	6.92	44.66	26.5	1.71	10.1	-267	28.74	625 Water has a
0855	3.37	125	6.74	44.94	19.5	0.04	10.2	-328	28.62	1250 "swampy" odor.
0900	4.16	120	6.73	44.96	19.8	0.05	10.7	-341	28.96	1850
0905	4.93	120	6.74	44.95	18.8	0.01	10.8	-337	28.96	2450
0910	5.70	130	6.79	44.95	13.0	0.34	10.9	-338	28.97	3100
0915	6.51	130	6.77	44.77	13.9	0.62	11.1	-341	28.84	3750
0920	7.08	120	6.77	44.61	13.5	1.40	11.1	-343	28.74	4350
0925	7.73	120	6.75	44.37	14.8	2.62	11.2	-343	28.57	4950
0930	8.74	160	6.72	43.79	15.4	3.82	11.4	-339	28.16	5750 Increased flow to
0935	9.83	160	6.73	42.38	23.7	6.47	11.5	-335	27.08	6550 purge dry
0940	10.88	160	6.75	40.29	50.0	5.40	11.6	-327	25.68	7350
0945	11.68	165	6.79	39.73	70	3.98	11.6	-329	25.29	8175
0950	12.53	165	6.82	39.65	130	4.11	11.7	-330	25.25	9000
0955	13.48	165	6.83	40.03	120	3.17	11.7	-331	25.53	9825
1000	14.50	165	6.84	40.44	200	4.02	11.5	-333	25.80	10650
1005	15.21	150	6.84	40.86	210	4.00	11.4	-332	26.09	11400
1011	16.40	150	6.83	41.17	223	3.97	11.3	-331	26.30	Dry-End Purging

Begin sampling on 10/26/99 @ 0830 - Sample ID 2W-GW46DS-01.
End sampling on 10/26/99 @ 1021.

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-N LCN / AREA A
Project No.: JOB# 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W-GW47DS-01
Sample Location: 2WMW47DS
Sampled By: S. NEIL
C.O.C. No.: 102599-01
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 10/25/99 Time: 1720	Color Visual	pH Standard	S.C. mS/cm	Temp. °C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Method: Peristaltic Pump/LOW FLOW	LT. GRAY	6.45	7.183	13.2	19	0.60	-187	3.97

PURGE DATA:

Date: 10/25/99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump/LOW FLOW								
Monitor Reading (ppm): 0.0								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 16.2'								
Static Water Level (WL): 1.32'			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume (gal/L): 2.4								
Start Purge (hrs): 1500								
End Purge (hrs): 1715								
Total Purge Time (min): 135								
Total Vol. Purged (gal/L): 4.0								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	3
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	2
TCL PAH	4°C	(2) 1L Amber Glass	2
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	2
TAL Metals (Total) + Hardness	HNO_3/4°C	(1) 1L Polyethylene	1
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	1
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	1
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	1
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	~~2~~

OBSERVATIONS / NOTES:

END SAMPLING @ 1858
FINAL WATER LEVEL = 7.48 FT.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Scott A. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW47DS
DATE: 10/25/99

	Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (%)	Comments
	1500	1.32									BEGIN PURGING. MANY BLK
575	1505	2.40	115	6.90	37.29	55	1.27	14.1	-332	23.64	SOLIDS AT BEGINNING.
1165	1510	2.83	118	6.87	35.25	21	0.49	13.7	-326	22.21	SOLIDS HAVE CLEARED.
1755	1515	3.18	118	6.82	32.67	11	0.33	13.7	-323	20.30	
2345	1520	3.42	118	6.78	30.06	10	0.57	13.6	-320	18.54	
2920	1525	3.71	115	6.74	27.78	22	0.43	13.7	-320	17.09	WATER TURNING GRAY.
3495	1530	3.93	115	6.62	24.37	55	0.39	13.7	-317	14.88	BLACK SOLIDS RETURN
4070	1535	4.08	115	6.54	21.16	75	0.54	13.8	-320	12.71	
4645	1540	4.25	115	6.51	18.62	80	0.65	13.8	-310	10.75	
5220	1545	4.36	115	6.51	12.19	37	1.05	13.8	-236	7.05	WATER BEGINNING TO CLEAR
5795	1550	4.46	115	6.52	9.314	26	1.03	13.8	-223	5.23	
6355	1555	4.51	112	6.53	7.772	21	1.27	13.8	-213	4.32	
6915	1600	4.55	112	6.51	7.083	18	1.39	13.8	-208	3.90	
7465	1605	4.63	110	6.51	6.635	22	0.85	13.8	-203	3.65	
8015	1610	4.66	110	6.51	6.518	12	1.23	13.8	-198	3.58	WATER IS "CLEAR"
8565	1615	4.68	110	6.51	6.422	15	1.06	13.8	-197	3.53	
9115	1620	4.70	110	6.51	6.385	13	1.21	13.8	-189	3.50	
9665	1625	4.73	110	6.50	6.345	12	1.13	13.7	-188	3.48	
10215	1630	4.73	110	6.49	6.378	13	1.18	13.7	-191	3.50	
10765	1635	4.74	110	6.47	6.445	15	1.21	13.6	-185	3.54	WATER TURNING DARK GRAY.
11315	1640	4.74	110	6.45	6.652	16	1.14	13.6	-207	3.66	
11865	1645	4.75	110	6.46	6.782	15	1.05	13.5	-209	3.74	
12415	1650	4.75	110	6.45	6.866	18	0.80	13.5	-212	3.79	
12975	1655	4.76	112	6.45	7.157	18	0.85	13.4	-227	3.96	
13535	1700	4.76	112	6.44	7.151	17	0.74	13.4	-207	3.96	
14095	1705	4.76	112	6.46	7.167	18	0.55	13.3	-183	3.96	
14655	1710	4.76	112	6.46	7.166	18	0.61	13.2	-182	3.96	
15215	1715	4.75	112	6.45	7.183	19	0.60	13.2	-187	3.97	End purging.
		Begin sampling @ 1720 - Sample ID 2W-GW47DS-01									
		END sampling @									

SIGNATURE(S): Scott W. Neil

ROUND 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 3-GW375-01
Sample Location: 3MW375
Sampled By: S. NEIL
C.O.C. No.: 012000-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1/22/00								
Time: 1048								
Method: Peristaltic Pump	Clear	6.22	0.841	4.8	0.5	1.67	55	0.41

PURGE DATA:

Date: 1/22/00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.9
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 8.45'
Static Water Level (WL): 4.60'
One Casing Volume(gal): 0.6
Start Purge (hrs): 0930
End Purge (hrs): 1045
Total Purge Time (min): 75
Total Vol. Purged (gal): 1.9

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	3
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	2
TCL PEST/PCBs	4° C	Qt. Amber Glass	2
TCL PAH	4° C	Qt. Amber Glass	2
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	1
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	1
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	1
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	1

OBSERVATIONS / NOTES:

END SAMPLING @ 1224.
FINAL H_2O LEVEL = 5.08 FT.

Circle if Applicable:

MS/MSD
Duplicate ID No.:

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW375
DATE: 11/02/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (ppt)	Comments
0930	4.62								→	BEGIN PURGING
0935	5.06	115	6.72	0.455	54	4.31	3.0	26	0.42	REDUCE FLOW.
0940	5.05	95	6.53	0.450	22	7.62	2.8	49	0.42	
0945	5.05	95	6.39	0.541	17	6.03	3.7	57	0.41	
0950	5.05	95	6.35	0.541	16	5.25	3.8	61	0.41	
0955	5.06	95	6.29	0.531	6.7	4.19	3.9	63	0.41	
1000	5.06	95	6.27	0.830	4.9	3.68	4.1	63	0.41	
1005	5.06	95	6.25	0.819	3.0	2.76	4.3	63	0.40	
1010	5.06	95	6.25	0.811	4.3	2.55	4.6	60	0.40	
1015	5.05	95	6.24	0.819	4.8	2.32	4.1	59	0.40	
1020	5.04	95	6.24	0.818	2.9	1.72	4.0	59	0.40	
1025	5.05	95	6.23	0.804	2.6	1.69	4.1	58	0.39	
1030	5.04	95	6.23	0.801	2.0	1.63	4.9	57	0.39	
1035	5.04	95	6.22	0.844	0.8	1.70	4.7	55	0.41	
1040	5.04	95	6.22	0.831	0.8	1.61	4.7	55	0.41	
1045	5.04	95	6.22	0.841	0.5	1.67	4.8	55	0.41	End purging.
	BEGIN SAMPLING @ 1048. SAMPLE ID 2W-GW375-02.									
	END SAMPLING @ 1224.									

SIGNATURE(S): Scott Neil

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW38DS-02
Sample Location: 2W MW 38 DS
Sampled By: S. NEIL
C.O.C. No.: 012400-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1/21, 23, 25/00								
Time: 0745, 0751, 0728								
Method: Peristaltic Pump	CLEAR	7.10	0.811	8.6	4.3	4.40	47	0.39

PURGE DATA:

Date: 1/19/00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 12.51'
Static Water Level (WL): 7.58'
One Casing Volume(gal): 0.8
Start Purge (hrs): 0815
End Purge (hrs): 0858
Total Purge Time (min): 43
Total Vol. Purged (gal): 0.8

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial 1/21/00 C	0745
TCL SEMIVOLATILES	4° C	(1) Qt. Amber Glass 1/21/00 C	0745
TCL PEST/PCBs	4° C	(1) Qt. Amber Glass 1/25/00 C	0728
TCL PAH	4° C	(1) Qt. Amber Glass 1/21/00 C	0745
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE 1/23/00 C	0751
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE 1/23/00 C	0751
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass 1/23/00 C	0751
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE 1/23/00 C	0751
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) 500 mL PE 1/25/00 C	0728

OBSERVATIONS / NOTES:

well purged dry on 1/19/00.
water level prior to sampling on 1/21/00 = 10.44 ft.
water level prior to sampling on 1/23/00 = 10.53 ft.
water level prior to sampling on 1/25/00 = 10.52 ft.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082

WELL ID.: 2WMW38DS
DATE: ~~1/18~~ 1/19/00 (EN)

Time	Water Level	Flow	pH	S. Cond.	Turb.	DO	Temp.	Eh	Sal.	Comments
(24 hr)	(ft. below TOC)	(ml/min)	(SU)	(mS/cm)	(NTU)	(mg/L)	(Celsius)	(mV)	ppt	
0815	7.58									Begin Purging.
0820	8.24	155	7.83	0.847	8.4	8.60	8.3	55	0.42	Reduce flow.
0825	8.84	130	7.87	0.782	7.1	6.96	8.2	54	0.38	
0830	9.64		7.15	0.782	6.5	5.61	8.5	61	0.38	
0835	10.21		7.13	0.786	4.7	5.08	8.6	58	0.39	
0840	10.67		7.12	0.801	4.1	4.77	8.6	55	0.39	
0845	11.20		7.10	0.811	4.3	4.40	8.6	47	0.39	
0847	11.34	Purged dry. Disconnect the flow-thru cell and pump dry to the bottom. Let recharge overnight. End purging @ 0858.								

SIGNATURE(S): Scott W. Neil

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2WGW39DS 02
Sample Location: 39DS: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 012000-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO ~~mg/l~~	Eh mV	Salinity ppt
Date: 1.21.00								
Time: 0915								
Method: Peristaltic Pump	CLEAR	7.02	6.446	8.4	4.7	~~7.53~~ 0	-206	3.52

PURGE DATA:

Date: 1.20.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.7
Static Water Level (WL): 3.62
One Casing Volume(gal): 2.1
Start Purge (hrs): 0920
End Purge (hrs): 1115
Total Purge Time (min): 115
Total Vol. Purged (gal): 4.2

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	
TCL PEST/PCBs	4° C	Qt. Amber Glass	
TCL PAH	4° C	Qt. Amber Glass	
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	

OBSERVATIONS / NOTES:

LT SULFUR ODOR PURGED 1.20.00
SAMPLED AFTER RECHARGE

SAMPLED 1.21.00 WL = 4.19 PUMP RATE = 100 ML/MIN.
END SAMPLING @1025 WL = 12.20 . CLEAR

Circle if Applicable:

MS/MSD —
Duplicate ID No.:

Signature(s): K. S. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082

WELL ID.: 2WMW39DS
DATE: 1.20.00

Time	Water Level	Flow	pH	S. Cond.	Turb.	DO	Temp.	Eh	Sal.	Comments
(HR)	(Ft bgs)	(ml)		(mS/cm)	(NTU)	(mg/L)	(Celsius)	(mv)		
0925	4.36	250	7.03	7.985	2.5	0	8.9	-198	4.47	
0935	6.30	140	6.98	7.245	2.3	0	8.2	-227	4.01	
0945	7.21	130	6.90	5.960	2.2	0	8.3	-216	3.29	
0950	7.63	150	6.88	5.500	2.4		8.3	-218	3.00	
0955	8.04		6.85	4.968	2.7		8.3	-203	2.69	
1005	8.94		6.85	3.833	3.9		8.2	-183	2.05	
1015	9.81		6.88	3.472	4.5		8.2	-178	1.82	
1025	10.86		6.86	3.295	5.4		8.2	-165	1.73	
1035	11.78	140	6.83	3.614	4.6		8.5	-181	1.90	
1045	12.64		6.82	4.006	4.6		9.0	-188	2.12	
1055	13.79		6.84	4.831	3.8		9.2	-208	2.59	
1105	15.08		6.89	6.002	4.9		9.4	-243	3.26	
1115	15.96		7.02	6.446	4.7		8.4	-206	3.52	END PURGE DRY TO PUMP INLET

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW40DS-02
Sample Location: 2WMW40DS (AREA A)
Sampled By: K. SIMPSON
C.O.C. No.: 012000-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1.21.00								
Time: 0740								
Method: Peristaltic Pump	Grey	7.11	26.20	9.4	42	0.16	-328	15.98

PURGE DATA:

Date: 1/19/00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 17.38'
Static Water Level (WL): 4.15'
One Casing Volume(gal): 2.2
Start Purge (hrs): 1000
End Purge (hrs): 1059
Total Purge Time (min): 59
Total Vol. Purged (gal): 2.2

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLED 1.21.00 WL = 7.29 FLOW = 100 ML/MIN
END SAMPLE @ 0845 WL = 16.80'

BLACK FINES INCREASED AS WL DROPPED

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	3
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	2
TCL PEST/PCBs	4° C	Qt. Amber Glass	2
TCL PAH	4° C	Qt. Amber Glass	2
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	1
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	1
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	1
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	1

OBSERVATIONS / NOTES:

Well was purged dry on 1/19/00 and will be sampled on 1/20/00.

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5092

WELL ID.: 2W.MW-10DS
DATE: 1/15/02

Time	Water Level	Flow	pH	S. Cond.	Turb.	DO	Temp.	Eh	Sal.	Comments
(Hrs)	(ft. below TOC)	(ml/min)	(S.U.)	(mS/cm)	(NTU)	(mg/L)	(Celcius)	(mV)	(ppt)	
1000	4.15	—							→	Begin Purging
1005	5.40	150	7.08	35.74	3.4	0.34	8.5	-336	22.35	Swampy odor - Suspended
1010	6.44	150	7.06	34.63	3.2	0.20	8.7	-331	21.62	black fines.
1015	7.47	150	7.05	32.62	2.6	0.26	8.9	-342	20.23	
1020	8.55	150	7.04	29.08	4.1	0.17	8.9	-337	17.82	
1025	9.42	150	7.02	25.91	4.6	0.15	8.9	-334	15.73	
1030	10.56	150	7.09	20.58	11	0.23	8.5	-332	13.01	
1035	11.30	150	7.16	19.06	14	0.30	8.8	-330	11.50	
1040	12.11	150	7.25	18.20	20	0.33	8.6	-329	10.75	
1045	13.70	150	7.19	20.03	25	0.18	8.9	-333	11.99	
1050	15.21	150	7.15	22.42	27	0.05	9.3	-338	13.51	
1055	15.73	150	7.12	24.36	37	0.09	9.3	-334	14.76	
1059	16.07	150	7.11	26.20	42	0.16	9.4	-328	15.98	well is dry - discontinue
										flow - thru cell and
										evaluate to bottom -
										and purging @ 1109.

SIGNATURE(S): [signature]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB - N LCN / AREA A
Project No.: JOB# 5082 CTO 203

[] Domestic Well Data
[x] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 2W-GW41DS-02
Sample Location: 2WMW41DS (AREA A)
Sampled By: S. NEIL
C.O.C. No.: 012000 02
Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 1/21/00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: ~~0847~~ 0843	Visual	Standard	mS/cm	°C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	LGT yellow	6.86	27.73	9.7	32	4.02	-326	17.07

PURGE DATA:

Date: 1/19/00	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Eh	Salinity
Method: Peristaltic Pump								
Monitor Reading (ppm): 6.2								
Well Casing Diameter & Material								
Type: 2-inch PVC								
Total Well Depth (TD): 16.65'								
Static Water Level (WL): 3.46'			SEE LOW FLOW PURGE DATA SHEET					
One Casing Volume(gal/L): 2.1								
Start Purge (hrs): 1610								
End Purge (hrs): 1727								
Total Purge Time (min): 77								
Total Vol. Purged (gal/L): 3.4								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	
TAL Metals (Total)	HNO_3/4°C	(1) 1L Polyethylene	
Dissolved Metals	HNO_3/4°C	(1) 1L Polyethylene	
Total Organic Carbon (TOC)	HCl/4°C	(1) 60mL Glass	
Chemical Oxygen Demand (COD)	H_2SO_4/4°C	(1) 250mL Polyethylene	
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	~~✓~~ SW

OBSERVATIONS / NOTES:

Purged well "dry" on 1/19/00. Begin sampling on 1/21/00. water level did not recover sufficiently on 1/20/00 to sample.
water level on 1/21/00 prior to sampling = 8.05 ft.
Sample water is light yellow - heavy effervessence in VOAs.
unpreserved sample bottles - water is dark gray
End sampling @ 1048 on 1/21/00.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082

WELL ID.: 2W.MW 41DS
DATE: 1/19/00

Time	Water Level	Flow	pH	S. Cond.	Turb.	DO	Temp.	Eh	Sal.	Comments
(Hr)	(ft below TOC)	(ml/min)	(S.U.)	(mS/cm)	(NTU)	(mg/L)	(Celcius)	(mV)	(ppt)	
									→	BEGIN PURGING
1610	3.46									STRONG SULPHUR ODOR / FLOATING FINES / LOT YELLOW 1050
1615	5.34	210	7.01	30.74	6.8	3.14	8.8	-309	18.99	
1620	5.92	150	6.96	29.52	5.1	4.46	8.3	-306	18.04	DECREASE FLOW @ 1616
1625	6.82	150	6.91	29.83	4.3	4.89	8.5	-314	18.44	
1630	7.87	150	6.90	27.04	5.5	4.04	8.2	-317	16.43	2250
1635	8.81	170	6.90	25.01	9.6	3.94	8.0	-320	16.03	
1640	9.94	170	6.88	24.17	15	3.75	7.9	-327	15.42	Pump stopped & changed batteries
1645	9. 10.60	170	6.86	22.24	21	3.49	9.0	-317	13.35	
1650	11.12	170	6.89	19.63	28	3.84	9.4	-312	11.63	
1655	11.69	170	6.99	17.29	37	3.08	9.0	-303	10.17	
1700	12.15	170	6.97	16.15	29	3.01	8.8	-283	9.44	
1705	13.26	170	6.92	17.59	25	3.27	8.9	-296	10.07	
1710	14.18	170	6.88	19.59	24	3.52	9.2	-310	11.69	
1715	14.95	170	6.87	21.51	27	4.14	9.4	-316	12.91	
1720	15.49	170	6.87	24.20	35	4.65	9.5	-322	14.68	
1725	15.57	170	6.86	27.73	32	4.02	9.7	-326	17.07	
1727	"Dry" to level of the inlet of tubing. Disconnect flow-thru cell and lower tubing to bottom of the well to evacuate completely.									

SIGNATURE(S): Scott W. Stein

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2WGW42DS-02
Sample Location: 2WMW42DS (AREA A)
Sampled By: S. NGIL
C.O.C. No.: 012000-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1/21/00								
Time: 1555								
Method: Peristaltic Pump	LGT YELLOW	6.96	28.94	8.6	22	2.04	-328	19.21

PURGE DATA:

Date: 1/20/00
Method: Peristaltic Pump
Monitor Reading (ppm): 11.4
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.91'
Static Water Level (WL): 3.18
One Casing Volume(gal): 2.2
Start Purge (hrs): 1005
End Purge (hrs): 1158
Total Purge Time (min): 110
Total Vol. Purged (gal): 3.5

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	3
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	2
TCL PEST/PCBs	4° C	Qt. Amber Glass	(SN) ~~2~~ 1
TCL PAH	4° C	Qt. Amber Glass	2
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	1
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	1
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	1
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	1

OBSERVATIONS / NOTES:

Purged "dry" on 1/20/00. Will attempt to sample on 1/21/00.
Water level at sample time = 5.18 ft.
Sample color is gray. VOAs have a strong effervescence when filling.
End sampling @ 1756.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082

WELL ID.: SW-MW-12D5
DATE: 1/20/01

Time (Hrs)	Water Level (Ft bgs)	Flow (ml/min)	pH (SU)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh (mV)	Sal. ppt	Comments
1005	3.18								→	BEGIN PURGING
1010	4.31	190	7.21	37.33	21	2.47	7.2	-318	24.07	[illegible] FLOW
1015	5.60	140	7.09	37.95	10	0.76	7.1	-341	23.81	SLIGHTLY CLOUDY - SLIGHTLY [illegible]
1020	6.55	140	7.01	36.67	14	0.29	7.0	-337	22.94	YELLOW TINT.
1025	6.91	110	6.98	34.53	1[illegible]	0.30	7.2	-329	21.67	
1030	7.30	140	6.95	33.18	10	0.80	6.9	-320	20.52	REDUCE FLOW
1035	8.61	110	6.91	32.21	41	0.62	7.2	-316	19.67	
1040	9.04	110	6.86	24.31	10	0.72	7.2	-307	17.26	
1045	9.91	110	6.81	24.01	7.4	0.99	7.4	-308	15.11	
1050	10.42	110	6.79	21.43	7.6	1.58	7.4	-311	12.[illegible]	
1055	10.86	110	6.85	19.39	9.0	1.18	7.4	-312	11.40	
1100	11.40	110	6.88	17.99	7.4	1.69	7.3	-312	10.57	
1105	11.92	110	6.94	17.51	7.4	1.77	7.3	-310	10.28	
1110	12.28	110	6.97	17.53	6.0	1.12	7.3	-310	10.58	
1115	12.61	110	6.96	18.09	7.0	0.76	7.7	-314	10.70	
1120	12.95	110	6.96	18.73	5.4	0.45	7.8	-309	11.08	
1125	13.52	110	6.95	19.93	4.9	0.45	8.0	-31[illegible]	11.80	
1130	13.98	110	6.95	20.95	4.4	2.11	8.2	-312	12.51	
1135	14.71	110	6.95	23.25	5.0	2.09	8.4	-316	14.02	
1140	15.33	110	6.96	24.95	6.1	1.98	8.4	-321	15.88	
1145	15.97	110	6.95	26.19	10.0	1.50	8.2	-323	17.04	
1150	16.55	110	6.96	27.55	14	1.91	8.5	-327	18.51	
1155	16.84	110	6.96	28.94	22	2.04	8.6	-328	19.21	✓ Purged "dry" to the inlet of the sample tubing. Disconnected the flow-thru cell and lowered tubing to the bottom of the well. Evacuated well completely @ 1158.

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW43DS-02
Sample Location: 2WMW43DS (AREA A)
Sampled By: S. NGIL
C.O.C. No.: 012000-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Date: 1.22.00	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Time: 1510								
Method: Peristaltic Pump	DARK GRAY	6.69	38.66	7.4	90.2	6.30	-320	24.34

PURGE DATA:

Date: 1/21/00
Method: Peristaltic Pump
Monitor Reading (ppm): 26.5
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.98'
Static Water Level (WL): 3.35'
One Casing Volume(gal): 2.2
Start Purge (hrs): 1300
End Purge (hrs): 1459
Total Purge Time (min): 119
Total Vol. Purged (gal): 3.7

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	3
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	2
TCL PEST/PCBs	4° C	Qt. Amber Glass	2
TCL PAH	4° C	Qt. Amber Glass	2
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	1
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	1
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	1
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	1

OBSERVATIONS / NOTES:

Purged dry on 1/21/00. EFFERVECSING IN HCL
WL 1.22.00 @ 1505 = 6.97'
SAMPLE PUMP RATE = 130 ML/MIN - LT. GRAY COLOR
STRONG "SWAMP" SULFUR ODOR

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB # 5082

WELL ID.: 2WMW43DS
DATE: 1/21/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. (ppt)	Comments
1300	3.35									BEGIN PURGING
1305	4.58	140	6.77	42.21	9.6	1.83	6.8	-321	26.71	DECREASE FLOW. 700
1310	5.49	125	6.74	41.39	4.9	0.18	6.7	-317	26.12	WATER HAS A STRONG
1315	6.03	125	6.72	39.30	3.1	0.08	6.4	-312	24.67	SULPHUR" ODOR AND LOT
1320	6.61	125	6.71	37.57	4.6	1.35	6.1	-309	23.47	YELLOW COLOR; SUSPENDED 1575
1325	7.21	105	6.74	35.15	6.2	2.27	5.8	-306	21.79	BLK FINES.
1330	7.69	105	6.79	33.70	6.6	2.96	5.8	-304	20.91	
1335	8.06	105	6.81	32.58	6.9	3.09	6.0	-305	20.05	
1340	8.40	105	6.83	32.16	8.0	2.42	6.1	-306	19.82	
1345	8.84	105	6.82	32.14	8.1	1.77	6.2	-308	19.81	
1350	9.22	105	6.83	31.92	9.7	2.20	6.3	-307	19.67	
1355	9.44	105	6.83	31.90	9.4	1.74	6.2	-310	19.65	
1400	9.85	105	6.83	31.96	9.0	2.20	6.2	-311	19.65	
1405	10.24	105	6.82	31.87	10.4	2.12	6.1	-311	19.62	
1410	10.62	105	6.82	31.90	9.4	2.24	5.6	-310	19.64	
1415	10.97	105	6.81	31.93	10.[illegible]	2.06	6.1	-310	19.65	
1420	11.35	105	6.82	31.93	10.2	1.54	6.0	-312	19.64	
1425	11.73	105	6.80	31.51	12.4	2.15	6.4	-312	19.43	
1430	12.26	105	6.78	31.89	11.4	2.34	6.9	-311	19.70	1350
1435	12.92	145	6.78	31.38	21.8	2.95	7.2	-317	19.35	Increase flow due to
1440	13.51	145	6.75	32.53	33.7	4.10	7.4	-320	20.38	unstable H2O level - will
1445	14.12	145	6.74	33.61	50.3	4.32	7.6	-320	20.59	purge completely and
1450	14.65	145	6.73	34.42	70.8	4.78	7.6	-322	21.46	sample on 1/22/00
1455	15.12	145	6.70	34.39	81.6	5.72	7.9	-323	22.83	
1459	15.44	145	6.69	3[illegible].66	96.2	6.30	7.4	-320	24.34	End of purging to 1205
										tubing inlet; lower
										tubing to the bottom
										of the well and evacuate
										completely.

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W GW44DS 02
Sample Location: 2W MW44DS
Sampled By: K. SIMPSON
C.O.C. No.: NA
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1.25.00								
Time: 0730								
Method: Peristaltic Pump								

PURGE DATA:

Date:
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD):
Static Water Level (WL):
One Casing Volume(gal):
Start Purge (hrs):
End Purge (hrs):
Total Purge Time (min):
Total Vol. Purged (gal):

(NO PG. 2)

See Attached Low Flow Purge Data Sheet for Purge Data

NOT SAMPLED

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	
TCL PEST/PCBs	4° C	Qt. Amber Glass	
TCL PAH	4° C	Qt. Amber Glass	
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	

OBSERVATIONS / NOTES:

GW IN RISER IS FROZEN, TRIED TO BREAK THRU OVER THE LAST 4 DAY. WE WERE ABLE TO MOVE THE ICE DOWN THE RISER (LIKE A PISTON) AND IT FLOATED BACK TO THE SURFACE. UNABLE TO GET SAMPLE TUBING PAST ICE.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): K. S. Simpson

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW45DS-02
Sample Location: 2WMW45DS
Sampled By: S. NEIL
C.O.C. No.: 012000-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1.23.00								
Time: 1515								
Method: Peristaltic Pump	Clear	6.85	39.68	8.1	6.2	5.17	-340	24.93

PURGE DATA:

Date: 1/22/00
Method: Peristaltic Pump
Monitor Reading (ppm): 19.1
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.75'
Static Water Level (WL): 3.13'
One Casing Volume(gal): 2.2
Start Purge (hrs): 1545
End Purge (hrs): 1741
Total Purge Time (min): 116
Total Vol. Purged (gal): 4.7

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	3
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	2
TCL PEST/PCBs	4° C	Qt. Amber Glass	2
TCL PAH	4° C	Qt. Amber Glass	2
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	1
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	1
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	1
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	1

OBSERVATIONS / NOTES:

1.23.00 @ 1510 WL = 2.13'
STRONG SULFUR ODOR
END SAMPLING @ 1623 WL = 9.61
SAMPLE PUMP RATE = 130 ML/MIN

CLEAR @ START TURNING DARK GRAY AFTER PAH'S

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082

WELL ID.: 2W MW45DS
DATE: 1/22/00

Time	Water Level	Flow	pH	S. Cond.	Turb.	DO	Temp.	Eh	Sal. ppt	Comments
										Begin Purging
1545	3.13									
1550	4.48	100	7.00	41.53	6.7	1.58	4.2	-326	26.03	Water in riser pipe
1555	5.08	100	6.97	41.05	1.9	0.31	4.4	-316	25.72	frozen @ static H2O
1600	5.70	100	6.94	40.48	1.0	0.34	5.2	-321	25.40	level; also residual
1605	6.20	100	6.92	40.11	1.6	1.31	5.5	-311	25.19	H2O frozen in reducer
1610	6.77	130	6.90	39.47	1.6	1.70	5.8	-314	24.76	tubing - had to chan
1615	7.23	130	6.90	35.63	2.4	2.36	6.1	-320	24.22	ice out in tubing.
1620	7.59	130	6.90	37.29	2.7	3.45	6.6	-326	23.66	Water has strong
1625	7.97	130	6.90	36.47	3.1	2.01	6.3	-321	22.57	"swampy" odor and
1630	8.30	130	6.90	35.44	3.3	2.02	6.3	-317	22.05	BLK suspended lines.
1635	8.72	130	6.91	32.78	3.9	4.28	6.3	-320	20.15	
1640	9.14	165	6.93	28.18	3.5	4.69	6.5	-321	17.13	
1645	9.58	165	6.91	23.50	3.9	4.21	6.6	-315	14.19	
1645 52	10.31	165	6.88	21.38	4.4	4.16	6.7	-313	12.73	
1655	10.84	165	6.86	21.81	6.0	3.64	6.8	-315	13.62	
1700	11.33	165	6.86	22.66	7.1	3.01	6.9	-316	13.92	
1705	11.91	165	6.86	24.98	6.9	3.55	7.1	-320	14.58	
1710	12.61	165	6.87	27.30	NA	4.14	7.2	-322	16.71	TURBIDITY METER NOT
1715	13.08	165	6.88	25.58		3.06	7.4	-319	17.51	WORKING DUE TO FREEZING
1720	13.57	165	6.89	21.14		4.36	7.7	-322	17.88	CONDITIONS.
1725	13.96	165	6.91	31.66		7.44	8.0	-327	19.65	
1730	14.36	165	6.92	34.31		5.04	8.1	-333	21.36	
1735	15.04	165	6.87	37.69	10.1	5.81	8.0	-336	23.51	
1740	15.58	165	6.85	39.68	6.2	5.17	8.1	-340	24.93	End Purging
1741	well purged dry to the inlet of the pump tubing.									

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2N-MW46DS-02
Sample Location: 2NMW46DS
Sampled By: K. SIMPSON
C.O.C. No.: 012400-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1.24.00								
Time: 1350								
Method: Peristaltic Pump	YELLOW	7.12	41.45	7.4	67	2.76	-328	26.28

PURGE DATA:

Date: 1/23/00
Method: Peristaltic Pump
Monitor Reading (ppm): 20.3
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 17.32'
Static Water Level (WL): 2.65'
One Casing Volume(gal):
Start Purge (hrs): 1615
End Purge (hrs): 1817
Total Purge Time (min): 122
Total Vol. Purged (gal): 3.9

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	3
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	2
TCL PEST/PCBs	4° C	(1.5 QT) Qt. Amber Glass	2
TCL PAH	4° C	Qt. Amber Glass	2
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	1
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	1
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	1
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	1

OBSERVATIONS / NOTES:

Well purged on 1/23/00. will sample on 1/24/00.
"SWAMPY" ODOR
SAMPLES EFFERVESCING IN HCL (VOC, TOC)
SAMPLE PUMP RATE = 130 MS/L
1.24.00 WL = 6.91 @ 1338

DRY @ 1515
LOW VOL ON DIS. METALS & PEST/PCB

Circle if Applicable:

MS/MSD
Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5092

WELL ID.: 2WMW460S
DATE: 1/23/00

Time (Hrs)	Water Level (ft below TOC)	Flow (ml/min)	pH (SU)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (deg C)	Eh (mV)	Sal. (ppt)	Comments
1615	2.65								→	BEGIN PURGING
1620	3.69	115	7.08	45.13	16	1.65	6.3	-332	28.75	Strong sulphur
1625	4.77	115	7.06	44.50	6.0	1.23	6.6	-330	28.57	odor / yellow color
1630	5.45	115	7.02	44.89	5.9	2.77	6.6	-327	28.65	
1635	6.26	115	7.00	45.21	4.6	3.41	6.8	-326	28.55	
1640	7.00	120	6.98	45.28	5.0	3.32	7.0	-326	28.88	
1645	7.68	120	6.98	45.67	5.3	3.76	7.3	-327	28.82	
1650	8.06	120	6.97	45.02	5.7	3.97	7.3	-328	28.74	
1655	8.59	120	6.97	44.75	8.2	3.59	7.3	-328	28.58	
1700	9.16	120	6.99	44.37	7.5	4.09	7.2	-326	28.24	
1705	9.84	120	7.00	43.77	8.6	3.73	7.2	-327	27.86	
1710	10.45	120	7.14	42.26	15	3.44	7.1	-323	26.53	
1715	11.03	120	7.15	41.76	22	2.43	6.9	-323	26.44	
1720	11.42	120	7.17	41.52	26	2.21	7.0	-323	26.30	
1725	11.83	120	7.19	41.54	27	1.90	6.9	-323	26.30	
1730	12.46	120	7.19	41.54	31	2.12	6.8	-324	26.29	
1735	12.97	120	7.15	41.50	37	2.21	6.7	-324	26.27	
1740	13.22	120	7.15	41.23	46	2.12	6.8	-324	26.67	
1745	13.98	120	7.16	41.59	59	3.14	6.9	-324	25.76	Bottom [illegible] - discolored
1750	14.45	130	7.16	41.07	57	3.27	7.2	-325	26.01	
1755	14.90	130	7.14	41.58	138	2.59	7.3	-327	25.97	
1800	15.45	130	7.13	41.30	61	2.46	7.3	-328	26.20	
1805	15.96	130	7.13	41.09	64	2.56	7.2	-327	26.03	
1810	16.34	130	7.12	41.75	67	2.61	7.5	-330	26.50	
1815	16.90	130	7.12	41.45	67	2.76	7.4	-328	26.28	
1817	End of purging - well purged dry to inlet of pump tubing.									

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW47DS-02
Sample Location: 2WMW47DS
Sampled By: S. NEIL
C.O.C. No.: 012400 02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1/24/00								
Time: 1605								
Method: Peristaltic Pump	G.2.74	6.62	7.341	6.5	52	0.76	-308	4.03

PURGE DATA:

Date: 1/24/00
Method: Peristaltic Pump
Monitor Reading (ppm): 1.4
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.20'
Static Water Level (WL): 2.23'
One Casing Volume(gal): 2.3
Start Purge (hrs): 1425
End Purge (hrs): 1600
Total Purge Time (min): 95
Total Vol. Purged (gal): 2.8

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	3
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	2
TCL PEST/PCBs	4° C	Qt. Amber Glass	2
TCL PAH	4° C	Qt. Amber Glass	2
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	1
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	1
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	1
Alkalinity, Chloride, Sulfate, TDS	4° C	500 mL PE	1

OBSERVATIONS / NOTES:

Sample effervessing in VOAs
End sampling @ 1748.

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082
WELL ID.: 2W-MW-47DS
DATE: 1/24/00

Time	Water Level	Flow	pH	S. Cond.	Turb.	DO	Temp.	Eh	Sal. PPT	Comments
(hrs)	(ft. below TOC)	(ml/min)	(S.U.)	(mS/cm)	(NTU)	(mg/L)	(Celcius)	(mV)	(%)	
1425	2.23*								→	BEGIN PURGING.
1430		130	7.19	40.50	91	2.72	7.4	-251	25.62	*Static water level
1435		130	7.16	38.03	54	1.46	7.4	-298	23.55	is measured to a layer
1440		110	7.17	36.14	27	1.29	7.4	-311	22.51	of unpenetratable ice
1445		110	7.08	32.41	19	0.85	7.4	-309	20.02	therefore water levels
1450		110	7.01	29.33	20	0.71	7.3	-306	17.96	cannot be measured during
1455		110	6.96	27.16	22	0.77	7.3	-309	16.52	purging. Water contains
1500		110	6.88	24.11	52	0.69	7.3	-312	14.50	moderate BLK solids.
1505		110	6.76	18.07	52	0.91	7.3	-297	10.60	
1510		110	6.73	14.36	32	0.74	7.2	-262	8.25	
1515		110	6.71	11.92	36	0.81	7.1	-238	6.77	
1520		110	6.69	9.966	35	0.82	7.1	-235	5.59	
1525		110	6.67	8.582	33	1.08	6.9	-241	4.95	
1530		110	6.67	8.395	36	0.92	6.8	-241	4.66	
1535		110	6.62	7.592	41	0.98	6.7	-273	4.37	
1540		110	6.65	7.812	50	0.70	6.7	-275	4.31	
1545		110	6.64	7.553	50	0.73	6.7	-289	4.21	
1550		110	6.61	7.543	52	0.77	6.6	-313	4.16	
1555		110	6.61	7.311	49	0.70	6.6	-310	4.00	
1600		110	6.62	7.341	52	0.76	6.5	-308	4.03	END PURGING.
										*Ice at static
	BEGIN SAMPLING @ 1605. Sample ID 2W-GW47DS-02.									water level never
	END SAMPLING @ 1748.									thawed to allow
										water level measurements.

SIGNATURE(S): Scott W. Neil

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2N-GW21S-02
Sample Location: 2NMW21S
Sampled By: S. NEIL
C.O.C. No.: 012000-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 1/23/00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 1048	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	BLACK	6.84	34.25	7.6	3.2	3.48	-338	21.32

PURGE DATA:

Date: 1/23/00
Method: Peristaltic Pump
Monitor Reading (ppm): 29.9
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 17.30'
Static Water Level (WL): 5.30'
One Casing Volume(gal): 2.0
Start Purge (hrs): 0910
End Purge (hrs): 1045
Total Purge Time (min): 95
Total Vol. Purged (gal): 2.5

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) 500mL PE	✓

OBSERVATIONS / NOTES:

Sample in VOAs effervessing. Samples have strong sulphur odor.
End water level = 7.33 FT.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082

WELL ID.: 2WMW215
DATE: 1/23/00

Time (Hrs)	Water Level (Feet/Inches)	Flow (ml/Min)	pH (SU)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celsius)	Eh (mV)	Sal. (ppt)	Comments
0910	5.30								→	Begin purging. Water is
0915	5.87	120	7.08	44.35	15	5.31	6.1	-327	28.20	yellow w/ Blk fines; sulfur odor
0920	6.16	120	7.06	43.89	5.4	1.25	6.3	-327	27.89	Decrease flow.
0925	6.26	95	7.04	43.74	3.0	0.80	6.0	-325	27.78	
0930	6.38	95	7.00	43.54	2.5	1.21	6.0	-321	27.62	
0935	6.46	95	6.99	43.38	3.4	2.71	6.0	-303	27.52	
0940	6.56	95	6.98	42.73	2.3	3.55	6.1	-321	27.05	
0945	6.56	95	6.97	42.28	1.9	3.10	6.2	-323	26.75	
0950	6.58	95	6.96	41.71	1.8	2.32	6.3	-318	26.37	
0955	6.63	95	6.95	41.03	1.6	4.37	6.5	-320	25.91	
1000	6.70	95	6.95	40.49	1.7	2.47	6.6	-314	25.56	
1005	6.84	95	6.93	39.61	1.5	2.48	6.8	-303	24.93	
1010	6.92	95	6.92	38.96	1.5	2.61	6.9	-306	24.51	
1015	6.96	95	6.90	38.14	1.4	2.74	6.9	-316	23.95	
1020	7.04	95	6.87	37.08	1.4	3.07	7.2	-317	23.23	
1025	7.06	95	6.85	36.03	2.9	3.13	7.3	-321	22.51	
1030	7.07	95	6.84	35.35	3.1	3.26	7.4	-329	22.00	
1035	7.06	95	6.85	34.72	3.2	3.39	7.5	-334	21.65	
1040	7.06	95	6.84	34.50	3.5	3.41	7.6	-335	21.49	
1045	7.07	95	6.84	34.25	3.2	3.48	7.6	-338	21.32	End purging. ↓
	Begin sampling @ 1048. Sample ID 2W-GW215-02.									
	End sampling @									

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 4GW01 S 02
Sample Location: 4MW01
Sampled By: R. SIMPSON
C.O.C. No.: 012000-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1.23.00								
Time: 0915								
Method: Peristaltic Pump	CLEAR	5.70	0.234	8.1	0	1.08	219	0.11

PURGE DATA:

Date: 1.23.00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 20.30
Static Water Level (WL): 6.49
One Casing Volume(gal): 2.3
Start Purge (hrs): 0752
End Purge (hrs): 0910
Total Purge Time (min): 78
Total Vol. Purged (gal): 2.7

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	3
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	2
TCL PEST/PCBs	4° C	Qt. Amber Glass	2
TCL PAH	4° C	Qt. Amber Glass	2
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	1
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	1
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	1
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	1

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): R. S Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082

WELL ID.: 4MW01S
DATE: 1.23.00

Time	Water Level	Flow	pH	S. Cond.	Turb.	DO	Temp.	Eh	Sal. ppt	Comments
0755	6.54	140	6.51	0.236	3.2	8.04	7.8	114	0.11	START PURGE
0800	6.54		5.82	0.227	1.6	9.62	8.1	149	0.11	CLEAR, NO ODOR
0810	6.55		5.72	0.230	0.9	7.22	7.9	186	0.11	
0815	6.55		5.72	0.230	0.6	8.37	7.8	191	0.11	
0820	6.56		5.71	0.231	0.3	7.98	7.8	197		
0830	6.56		5.71	0.232	0.2	4.58	7.7	206		
0835	6.57		5.71	0.232	0	2.51	7.8	208		
0840	6.58		5.70	0.233		2.26	7.9	210		
0845	6.58		5.70	0.234		2.15	8.0	213		
0850	6.60		5.70	0.235		2.61	8.1	215		
0855	6.60		5.70	0.234		1.53	8.1	217		
0900	6.60		5.70	0.233		0.99	8.1	218		
0905	6.61		5.70	0.234		1.06	8.1	219		
0910	6.61		5.70	0.234		1.08	8.1	219		END PURGE
	END SAMPLING @ 1012 WL = 6.63									

SIGNATURE(S): K. E. Simp

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2LGW20S02
Sample Location: 2LMW20S
Sampled By: K. SIMPSON
C.O.C. No.: 012000 02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1-22-00								
Time: 0935								
Method: Peristaltic Pump	CLEAR	6.42	0.394	8.8	0.5	2.19	-7	0.19

PURGE DATA:

Date: 1-22-00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 18.85
Static Water Level (WL): 14.66
One Casing Volume(gal): 0.7
Start Purge (hrs): 0812
End Purge (hrs): 0927
Total Purge Time (min): 75
Total Vol. Purged (gal): 2.6

See Attached Low Flow Purge Data Sheet for Purge Data

HIGH WINDS MAY HAVE BLOWN SOME DUST/ROAD GRIT INTO SAMPLES.

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	12
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	8
TCL PEST/PCBs	4° C	Qt. Amber Glass	8
TCL PAH	4° C	Qt. Amber Glass	8
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	3 ~~4~~ KS
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	3 ~~4~~ KS
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	4
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	4
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	4
		COLLECTED 4X VOL	
		DUP. SAMPLE & MS/MSD	

OBSERVATIONS / NOTES:

THIS FLUSH MT. IS ≈ 1.5" LOWER THAN THE ROAD SURFACE
THE VAULT IS ALWAYS FULL OF WATER/ICE AND MUST BE CLEANED EACH QTR.

FLUSH MT.

Circle if Applicable:

MS/MSD YES

Duplicate ID No.: GWFD 012200

Signature(s): K. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082

WELL ID.: 2LMW/20S
DATE: 1-22-00

Time	Water Level	Flow	pH	S. Cond.	Turb.	DO	Temp.	Eh	Sal. PPT	Comments
0820	14.82	200	6.68	0.683	4.9	-0.52	9.6	-38	0.33	START PURGE
0825	14.82	130	6.57	0.461	4.0	1.98	9.4	-47	0.22	
0835			6.48	0.439	3.5	4.47	8.9	-18	0.20	
0840			6.46	0.415	2.7	5.24	9.0	-16	0.20	
0850			6.44	0.430	2.5	4.73	8.6	-38	0.21	
0900			6.42	0.406	2.4	3.86	8.4	-19	0.20	
0905			6.42	0.406	1.3	3.27	8.4	-17	0.20	
0910			6.42	0.399	0.8	2.15	8.8	-8	0.19	
0915			6.42	0.397	0.4	2.19	8.7	-7	0.19	
0920			6.41	0.396	0.4	2.18	8.8	-6	0.19	
0925			6.42	0.394	0.5	2.19	8.8	-7	0.19	END PURGE
		START SAMPLING @		0928						
		END SAMPLING @		1348	WL	=	14.82			

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 3-GW125-02
Sample Location: 3MW125
Sampled By: S. NEIL
C.O.C. No.: 012400-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1/24/00								
Time: 0935								
Method: Peristaltic Pump	CLEAR	6.13	3.522	8.2	21	0.91	10	1.87

PURGE DATA:

Date: 1/24/00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 15.11'
Static Water Level (WL): 3.52'
One Casing Volume(gal): 1.9
Start Purge (hrs): 0832
End Purge (hrs): 0932
Total Purge Time (min): 60
Total Vol. Purged (gal): 2.1

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	6 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	4 Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	4 Qt. Amber Glass	✓
TCL PAH	4° C	4 Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	2 L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	2 L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	2 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	2 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	2 500 mL PE	✓

OBSERVATIONS / NOTES:

END SAMPLING @ 1128
FINAL H_2O LEVEL = 3.69 FT.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	GW FD012400

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5092

WELL ID.: 3MW12S
DATE: 1/24/00

Time (Hrs.)	Water Level (ft. below TOC)	Flow (mL/Min)	pH (SU)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh (mV)	Sal. ppt (ppm)	Comments
										Begin purging
0832	3.52									
0837	3.63	115	6.45	3.645	45	5.24	6.6	-4	1.91	Red silicks.
0842	3.66	115	6.22	3.534	34	2.93	7.2	6	1.86	
0847	3.65	115	6.19	3.545	18	2.07	7.4	9	1.87	
0852	3.65	115	6.16	3.564	17	1.81	7.5	11	1.88	
0857	3.66	115	6.16	3.575	17	1.65	7.5	10	1.88	
0902	3.65	115	6.16	3.562	17	1.65	7.6	11	1.88	Increase flow.
0907	3.67	135	6.15	3.560	19	1.33	7.7	11	1.88	
0912	3.68	135	6.14	3.574	17	1.15	7.7	10	1.89	
0917	3.67	135	6.15	3.603	18	0.94	7.9	10	1.90	Increase flow.
0922	3.67	165	6.14	3.578	19	0.93	8.2	10	1.89	
0927	3.68	165	6.14	3.561	21	0.93	8.1	10	1.88	
0932	3.68	165	6.13	3.522	21	0.91	8.2	10	1.87	End purging.
	BEGIN SAMPLING @ 0935. SAMPLE ID 3-GMW12S-02									
	END SAMPLING @ 1123.									

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 3GW12D-02
Sample Location: 3MW12D
Sampled By: R. SIMPSON
C.O.C. No.: 012400-02
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 1.24.00								
Time: 0945								
Method: Peristaltic Pump	CLEAR	6.80	3.434	7.9	3.3	1.2	-107	1.81

PURGE DATA:

Date: 1.24.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0
Well Casing Diameter & Material
Type: ~~2" PVC~~ 4" STEEL
Total Well Depth (TD): 27.5
Static Water Level (WL): 0.4
One Casing Volume(gal): 15.4
Start Purge (hrs): 0923
End Purge (hrs): 0943
Total Purge Time (min): 80
Total Vol. Purged (gal): 2.8

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	3
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	2
TCL PEST/PCBs	4° C	Qt. Amber Glass	2
TCL PAH	4° C	Qt. Amber Glass	2
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	1
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	1
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	1
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	1
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	1

OBSERVATIONS / NOTES:

4" OPEN BOREHOLE (NO RISER) EXISTING WELL, STICK-UP.

4" = .653 GAL/FT

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): R. S. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A
PROJECT NUMBER: CTO 203 JOB# 5082
WELL ID.: 3MW12D
DATE: 1.24.00

Time (Hrs)	Water Level (ft. Below TOC)	Flow (ml/min)	pH (SU)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh (mV)	Sal. PPT (ppt)	Comments
0930	0.45	100	6.83	3.408	10	0	6.2	-83	1.78	BLACK FINES IN PURGE WATER
0840	0.50	160	6.83	3.431	7.3	0	6.5	-86	1.80	CLEARING
0945	↓	130	6.85	3.426	3.1	0	7.1	-89	1.80	CLEANED CELL
0950	↓	↓	6.83	3.428	3.0	0	7.2	-93	1.80	
0955	↓	↓	6.83	3.430	2.9	-8.9	7.4	-97	1.80	
0900	↓	↓	6.83	3.433	3.1	-4.2	7.5	-99	1.81	
0905	↓	↓	6.82	3.434	3.5	-0.5	7.6	-102	1.81	
0910	↓	↓	6.83	3.437	3.6	-0.9	7.6	-103	1.81	
0915	↓	↓	6.83	3.437	3.7	0.1	7.7	-105	1.81	
0920	↓	↓	6.82	3.436	3.4	-0.1	7.8	-105	1.81	
0925	0.54	↓	6.82	3.437	3.1	1.0	7.9	-107	1.81	
0930	↓	↓	6.81	3.435	3.2	1.3	7.9	-107	1.81	
0935	↓	↓	6.81	3.436	3.2	1.4	7.9	-109	↓	
0940	0.55	↓	6.80	3.434	3.3	1.2	7.9	-107	↓	END PURGE
		END	SAMPLE @		1042	WL =	0.55			

SIGNATURE(S): [illegible]

ROUND 3

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 3-GW37S-03
Sample Location: 3MW37S
Sampled By: S. NEIL / K. SIMPSON
C.O.C. No.: 040900-03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 4/9/00 Time: 1400 Method: Peristaltic Pump	CLEAR	6.21	0.624	7.6	2.4		68	0.41

PURGE DATA:

Date: 4/9/00
Method: Peristaltic Pump
Monitor Reading (ppm): 0
Well Casing Diameter & Material Type: 2" PVC
Total Well Depth (TD): 8.45
Static Water Level (WL): 3.22
One Casing Volume(gal): 0.9
Start Purge (hrs): 1312
End Purge (hrs): 1357
Total Purge Time (min): 45
Total Vol. Purged (gal): 0.9

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) L PE	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 3 MW 37S (SN) ~~dwmw 37DS~~
DATE: 4/9/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. PPT.	Comments
1312	3.22								→	Begin purging.
1317	3.51	85	6.21	0.907	50		7.8	110	0.45	
1322	3.50	85	6.21	0.876	17		7.8	98	0.43	
1327	3.50	85	6.21	0.864	9.7		7.7	93	0.43	
1332	3.51	85	6.22	0.862	5.3		7.5	88	0.42	
1337	3.51	85	6.22	0.857	3.6		7.6	83	0.42	
1342	3.51	85	6.22	0.844	4.1		7.8	79	0.42	
1347	3.51	85	6.22	0.830	2.5		7.9	75	0.41	
1352	3.51	85	6.21	0.825	2.3		7.8	71	0.41	
1357	3.51	85	6.21	0.824	2.4		7.6	68	0.41	End purging

SIGNATURE(S): Scott W. Neil

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W GW38DS-03
Sample Location: 2WMW38DS
Sampled By: K. SIMPSON
C.O.C. No.: 040900 -03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA: 4.5.00

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	~~Eh~~ ORP mV	Salinity ppt
Date: 4.7/9.00								
Time: SEE BELOW								
Method: Peristaltic Pump	CLEAR	7.13	1.223	9.1	4.1	3.93	39	0.61

PURGE DATA:

Date: 4.5.00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 12.51
Static Water Level (WL): 5.61
One Casing Volume(gal): 1.1
Start Purge (hrs): 0844
End Purge (hrs): 0930
Total Purge Time (min): 46
Total Vol. Purged (gal): 1.6

ROUND 3

See Attached Low Flow Purge Data Sheet
for Purge Data

4.7.00 WL = 9.02 @ 0808 PUMP RATE = 140 ML/MIN
4.9.00 WL = 9.00 @ 0940 PUMP RATE = 110 ML/MIN

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial 0815	4.7.00
TCL SEMIVOLATILES	4° C	Qt. Amber Glass 0940	4.9.00
TCL PEST/PCBs	4° C	Qt. Amber Glass 0940	4.9.00
TCL PAH	4° C	Qt. Amber Glass 0815	4.7.00
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE 0815	4.7.00
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE 0815	4.7.00
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass 0815	4.7.00
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE 0815	4.7.00
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE 0940	4.9.00

OBSERVATIONS / NOTES:

TUBING INLET START 1'± OFF BTM
LOWERED TO PURGE DRY

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): K. S. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 24MW38DS
DATE: 4.5.00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. PPT.	Comments
										START PURGE
0837	5.61	150								
0849	6.69	↓	7.06	1.217	1.2	12.75	9.9	184	0.61	
0855	7.11	140	7.03	1.210	1.0	10.22	9.8	181	0.61	
0900	7.83		7.02	1.196	1.0	7.91	9.3	180	0.60	
0905	8.32		7.01	1.184	1.2	7.15	9.3	143	0.59	
0910	9.17		7.00	1.181	2.0	6.19	9.1	96	0.59	
0915	10.20		7.01	1.210	2.7	6.39	9.2	75	0.61	
0920	10.31		7.03	1.237	2.9	5.05	9.1	70	0.62	
0925	11.48		7.06	1.265	2.9	3.76	9.0	59	0.63	0926 MOVED INLET TO BTM.
0930	12.46	↓	7.13	1.223	4.1	3.93	9.1	39	0.61	DRY
										END PURGE

SIGNATURE(S): K-1 S. Sunja

12.5 BTM

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2WG4W39DS-03
Sample Location: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 040500 -03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA: 4.6.00

	* Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh ORP mV	Salinity ppt
Date: 4.6.00 Time: 0740 Method: Peristaltic Pump	CLEAR	6.94	5.968	9.2	12	0.13	-110	3.24

PURGE DATA:

Date: 4.5.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.70
Static Water Level (WL): 3.15
One Casing Volume(gal): 2.2
Start Purge (hrs): 1006
End Purge (hrs): 1143
Total Purge Time (min): 97
Total Vol. Purged (gal): 3.6

ROUND 3

*TRACE FINES IN SAMPLE, NO ODOR

See Attached Low Flow Purge Data Sheet for Purge Data

43
<9
7

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	✓

OBSERVATIONS / NOTES:

PUMP INLET SET 1' ± OFF BTM (15.7')
PURGED 4.5.00 SAMPLED 4.6.00
END WL 4.6.00 @ 0858 = 10.73'
SAMPLED 4.6.00 WL = 2.59; PUMP RATE 100 ML/MIN

Circle if Applicable:

MS/MSD
Duplicate ID No.:

Signature(s): K. S. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW39DS
DATE: 4.5.00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. PPT.	Comments
1005	3.15	200								START PURGE
1010	4.68	140	7.00	7.243	1.3	1.09	9.1	-54	3.99	
1015	5.38		6.95	6.794	1.2	0.88	8.9	-68	3.74	
1020	5.97		6.92	6.299	1.0	0.84	8.7	-74	3.44	
1030	7.05		6.87	4.895	1.0	0.45	8.4	-87	2.68	
1035	7.86		6.84	4.172	1.2	0.34	8.6	-93	2.23	
1045	8.59		6.79	3.118	1.5	0.24	8.6	-98	1.65	
1055	9.85		6.78	2.990	1.9	0.18	8.8	-96	1.56	
1105	10.98		6.84	2.999	16	0.17	8.8	-97	1.57	
1115	12.01		6.85	3.401	18	0.17	9.0	-103	1.79	
1125	13.43		6.87	4.170	14	0.14	9.1	-109	2.22	
1130	14.57		6.88	4.767	13	0.14	9.2	-111	2.55	
1135	15.68		6.90	5.234	12	0.14	9.2	-111	2.82	
1140	15.88		6.94	5.968	12	0.13	9.2	-110	3.24	
1143	16:00									DRY, END PURGE

SIGNATURE(S): [signature]

16.7' BTM

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2WGW40DS-03
Sample Location: AREA A
Sampled By: R. SIMPSON
C.O.C. No.: 040700 -03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA: 4.5.00

Date: 4.7.00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh ORP	Salinity
Time: 0920	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	CLEAR	6.95	25.33	8.9	51	0	-319	15.35

PURGE DATA:

Date: 4.5.00
Method: Peristaltic Pump
Monitor Reading (ppm): 1.2
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 17.38
Static Water Level (WL): 2.84
One Casing Volume(gal): 2.4
Start Purge (hrs): 1352
End Purge (hrs): 1510
Total Purge Time (min): 78
Total Vol. Purged (gal): 3.0

ROUND 3

See Attached Low Flow Purge Data Sheet
for Purge Data

SAMPLE
4.7.00 @ 0911 WL = 7.47' PUMP RATE 110 ML/MIN

60
18
78

BLACK FINES INCREASING AS WL DROPS

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	—
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	—
TCL PEST/PCBs	4° C	Qt. Amber Glass	—
TCL PAH	4° C	Qt. Amber Glass	—
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	—
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	—
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	—
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	—

OBSERVATIONS / NOTES:

BLACK FINES IN PURGE WATER, SULFUR ODOR
PUMP INLET SET 1' ± OFF BTM.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW40DS-03
DATE: 4-5-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. PPT.	Comments
1350	2.84	150								START PURGE
1356	4.40	↓	7.05	37.88	4.3	0	9.4	-316	23.17	
1405	5.32	140	6.98	36.07	3.5	0	9.5	-318	22.80	
1410	6.78		6.96	33.05	2.9	0	9.3	-312	20.51	
1415	7.35		6.93	31.23	2.9	0	9.1	-307	19.41	
1420	7.90		6.90	28.83	2.9	0	8.9	-301	17.75	
1430	9.00	↓	6.91	23.87	7.8	0	8.9	-303	14.46	
1440	10.35	150	6.86	18.63	56	0.19	8.7	-352	11.04	WATER TURNING BLACK
1450	12.30		6.93	19.03	43	0	8.6	-331	11.25	
1500	14.04		6.94	22.50	48	0	8.8	-319	13.50	
1505	15.22		6.94	24.31	50	0	8.9	-318	14.80	
1510	16.43	↓	6.95	25.33	51	0	8.9	-319	15.35	DRY, END PURGE

SIGNATURE(S): [illegible]

BTM = 17.4

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW41DS-03
Sample Location: 2WMW41DS
Sampled By: S. NEIL
C.O.C. No.: 040700-03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 4/7/00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 0820	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	V.LT. BRN	6.55	27.06	9.1	23	17.06	-325	16.59

PURGE DATA:

Date: 4/5/00
Method: Peristaltic Pump
Monitor Reading (ppm): 1.4
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.65'
Static Water Level (WL): 2.20'
One Casing Volume(gal): 2.4
Start Purge (hrs): 0845
End Purge (hrs): 1036
Total Purge Time (min): 111
Total Vol. Purged (gal): 3.8

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) L PE	✓

OBSERVATIONS / NOTES:

*Parameters are final purge parameters taken on 4/5/00. Returned on 4/6/00 @ 1535 to sample - water level at 8.45 ft - insufficient volume for samples - will return on 4/7/00 to sample. water level prior to sampling: 6.19 ft. Sample effervesces in VOAs.

Circle if Applicable:

MS/MSD —
Duplicate ID No.: —

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW41DS
DATE: 4/5/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. PPT.	Comments
0845	2.20								→	BEGIN PURGING.
0850	2.56	120	6.75	32.18	8.7	10.67	8.5	-224	19.97	
0855 ~~0900~~	3.91	120	6.74	30.51	4.9	16.76	8.6	-265	18.82	
0900	4.48	120	6.65	29.67	3.7	9.53	8.5	-272	18.26	
0905	5.32	125	6.62	27.85	6.8	29.62	8.5	-283	17.04	
0910	6.03	125	6.61	26.97	3.9	21.88	8.5	-290	16.45	
0915	6.78	125	6.62	24.75	3.3	14.47	8.5	-293	14.98	
0920	7.24	125	6.61	22.79	16	11.36	8.5	-300	13.69	
0925	7.69	130	6.60	20.91	14	12.32	8.4	-304	12.48	
0930	8.17	130	6.57	19.11	6.7	15.19	8.4	-302	11.31	
0935	8.54	130	6.54	16.62	5.4	14.47	8.3	-312	9.72	
0940	9.31	130	6.53	16.35	7.6	16.32	8.2	-330	9.54	
0945	9.78	130	6.54	15.85	13	17.07	8.1	-334	9.24	
0950	10.16	130	6.54	16.05	15	17.79	8.1	-332	9.38	
0955	10.59	130	6.53	16.45	19	18.59	8.2	-333	9.63	
1000	11.14	130	6.52	16.85	16	19.34	8.2	-330	9.90	
1005	11.63	130	6.52	17.72	18	19.93	8.3	-332	10.45	
1010	12.16	125	6.53	18.96	18	20.27	8.4	-333	11.23	
1015	12.82	125	6.54	20.30	20	19.70	8.5	-332	12.13	
1020	13.43	155	6.54	21.13	20	22.06	8.6	-331	12.63	
1025	14.26	150	6.54	22.50	22	23.27	8.7	-330	13.53	
1030	14.87	150	6.54	24.10	22	24.83	8.9	-329	14.58	
1035	15.24	150	6.54	24.63	22	27.81	9.1	-326	16.33	
1036	15.29	150	6.55	27.06	23	17.06	9.1	-325	16.59	END PURGING.
	Well purged dry; will sample in 24-48 Hrs.									

SIGNATURE(S): Scott W. [illegible]

PAGE 1 of 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2N-GW42DS-03
Sample Location: 2NMW42DS
Sampled By: J. NAIL
C.O.C. No.: 040500-03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 4/6/00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 1400	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	V. LT. BRN	6.67	29.97	9.1	25	26.81	-338	18.49

PURGE DATA:

Date: 4/5/00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.6
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.91'
Static Water Level (WL): 1.90'
One Casing Volume(gal): 2.5
Start Purge (hrs): 1410
End Purge (hrs): 1547
Total Purge Time (min): 97
Total Vol. Purged (gal): 3.1

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) L PE	✓

OBSERVATIONS / NOTES:

*Parameters are final purge parameters from 4/5/00.
Well was purged dry and will be sampled within 24-48 HRS, depending on recharge.
Water level prior to sampling on 4/6/00 is 4.5 FT.
Suspended black fines in sample; VOAs effervesce.

Circle if Applicable:

MS/MSD
Duplicate ID No.:

Signature(s): Scott L. Reid

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2NMW42D5
DATE: 4/5/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. PPT.	Comments
1410	1.90	—							→	BEGIN PURGING
1415	3.11	140	6.76	36.45	6.8	15.81	9.2	-344	22.87	REDUCE FLOW.
1420	3.91	120	6.73	36.14	4.1	14.73	9.1	-342	22.69	
1425	4.67	120	6.72	35.17	3.4	18.08	9.0	-340	22.01	
1430	5.44	120	6.71	33.52	3.5	15.64	9.0	-337	20.88	
1435	6.23	120	6.71	31.14	2.9	14.32	8.9	-333	19.62	
1440	6.98	120	6.68	28.66	2.8	14.25	8.8	-330	17.56	
1445	7.76	120	6.57	22.39	3.9	15.42	8.7	-325	13.42	
1450	8.58	120	6.52	20.37	11	17.42	8.7	-329	12.13	
1455	9.10	120	6.50	19.25	19	17.68	8.7	-332	11.42	
1500	9.68	120	6.54	17.65	37	17.91	8.6	-339	10.39	
1505	10.25	120	6.65	16.17	35	21.04	8.6	-340	9.45	
1510	10.78	120	6.75	15.31	30	18.57	8.5	-341	8.91	
1515	11.34	120	6.76	15.46	25	16.60	8.5	-335	9.03	
1520	11.95	120	6.72	17.00	20	20.37	8.6	-334	9.99	
1525	12.44	120	6.70	18.41	18	22.31	8.6	-334	11.21	
1530	13.15	120	6.67	21.03	16	22.29	8.7	-336	12.59	
1535	13.79	120	6.66	23.20	16	23.97	8.7	-339	14.01	
1540	14.38	120	6.64	26.06	21	28.10	8.9	-340	15.98	
1545	14.81	120	6.64	27.59	24	29.59	9.0	-342	16.92	
1547 1550	15.10	120	6.67	29.97	25	26.81	9.1	-338	18.49	END PURGING.
	WELL PURGED DRY; WILL SAMPLE IN 24-48 HRS.									

SIGNATURE(S): Scott L. Neil

PAGE 1 OF 1

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW43DS-03
Sample Location: 2WMW43DS
Sampled By: S. NAIL
C.O.C. No.: 040700-03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 4/8/00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 0800	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	LT. BRN	6.46	38.31	10.6	133	11.76	-355	24.31

PURGE DATA:

Date: 4/6/00
Method: Peristaltic Pump
Monitor Reading (ppm): 24.5
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 15.67'
Static Water Level (WL): 2.36'
One Casing Volume(gal): 2.2
Start Purge (hrs): 1529
End Purge (hrs): 1714
Total Purge Time (min): 105
Total Vol. Purged (gal): 3.4

ROUND 3

See Attached Low Flow Purge Data Sheet
for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) L PE	✓

OBSERVATIONS / NOTES:

Purged dry on 4/6/00. Field parameters are final purge parameters.
Water level prior to sampling on 4/8/00 = 4.79 FT.
Sample effervesces in VOAs.

Circle if Applicable:

MS/MSD
Duplicate ID No.:

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW43DS
DATE: 4/6/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. PPT.	Comments
1529	2.36									→ Begin purging.
1534	3.24	150	6.64	41.96	13	5.05	10.9	-356	26.84	
1539	4.08	150	6.60	40.09	14	3.83	10.8	-353	25.48	Decrease flow 150
1544	5.01	135	6.59	37.74	5.9	6.01	10.6	-353	23.85	Decrease flow 135
1549	5.85	120	6.58	36.44	9.3	6.33	10.6	-352	22.97	
1554	6.35	120	6.57	35.52	8.5	7.94	10.6	-353	22.31	
1559	6.83	120	6.58	34.65	8.4	8.56	10.6	-353	21.72	
1604	7.25	120	6.61	33.91	8.4	8.07	10.6	-353	21.21	
1609	7.62	120	6.62	33.97	9.4	8.00	10.5	-348	21.27	
1614	8.11	120	6.64	32.97	12	7.85	10.4	-351	20.55	
1619	8.60	120	6.65	32.56	13	7.90	10.4	-349	20.30	
1624	9.12	120	6.68	32.44	16	7.71	10.4	-350	20.21	
1629	9.60	120	6.68	32.25	16	8.45	10.3	-349	20.08	
1634	10.18	120	6.67	32.31	19	8.04	10.1	-348	20.11	
1639	10.78	120	6.65	32.50	18	8.31	10.2	-351	20.26	
1644	11.37	120	6.62	32.93	20	8.23	10.0	-352	20.53	
1649	11.97	120	6.60	33.15	28	9.51	10.2	-352	20.70	
1654	12.70	120	6.56	33.81	40	9.68	10.3	-353	21.15	
659 (SV) ~~1659~~	13.12	120	6.55	34.42	53	9.28	10.2	-355	21.56	
1704	13.77	120	6.52	35.13	87	10.75	10.4	-355	22.06	
1709	14.48	120	6.48	36.80	129	11.69	10.6	-356	23.24	
1714	14.91	120	6.46	38.31	133	11.76	10.6	-355	24.31	End purging. Purged dry to the pump inlet.

SIGNATURE(S): Scott W. Neil

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW44DS-03
Sample Location: 2WMW44DS
Sampled By: S. NEIL
C.O.C. No.: 040900-03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 4/9/00								
Time: 1000								
Method: Peristaltic Pump	GRAY	6.85	20.49	11.8	238	1.52	-329	12.26

PURGE DATA:

Date: 4/8/00
Method: Peristaltic Pump
Monitor Reading (ppm): 12
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.77'
Static Water Level (WL): 1.65'
One Casing Volume(gal): 2.5
Start Purge (hrs): 0958
End Purge (hrs): 1228
Total Purge Time (min): 150
Total Vol. Purged (gal): 4.8

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) L PE	✓

OBSERVATIONS / NOTES:

Light rain during sampling. Water level prior to sampling on 4/9/00 = 0.8 FT.
water has a strong sulphur odor.
water effervesces in VOAs.
Well pad is completely submerged in water.
Sample field parameters are final purge parameters from 4/8/00.

Circle if Applicable:

MS/MSD
Duplicate ID No.:

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW440S
DATE: 4/8/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. PPT.	Comments
0958	1.65								→	Begin purging
1003	2.54	150	7.02	44.29	78	10.35	11.7	-359	28.52	Reduce flow. 750
1008	3.46	125	6.86	43.67	66	2.94	11.5	-363	28.11	
1013	4.10	125	6.83	43.52	51	3.08	11.6	-363	27.98	
1018	4.91	125	6.82	43.40	35	5.56	11.5	-363	27.93	
1023	5.34	125	6.80	42.34	29	8.29	11.8	-363	27.10	Reduce flow. 850
1028	5.69	100	6.79	41.42	33	5.13	12.1	-366	26.55	
1033	6.00	100	6.78	40.45	34	4.17	12.1	-365	25.76	
1038	6.32	100	6.76	38.89	47	3.91	12.1	-365	24.66	
1043	6.63	100	6.74	36.92	46	3.62	12.1	-361	23.32	
1048	6.91	100	6.74	33.38	51	3.67	12.2	-358	20.87	
1053	7.12	100	6.72	32.65	55	3.39	12.0	-357	20.42	
1058	7.31	100	6.75	30.56	66	3.65	12.2	-355	18.91	
1103	7.53	100	6.77	23.43	75	3.50	12.3	-346	14.16	
1108	7.76	100	6.80	17.84	73	3.14	12.5	-345	10.53	
1113	8.05	100	6.80	13.60	77	2.74	12.4	-342	7.85	
1118	8.34	100	6.76	13.03	69	2.49	12.0	-338	7.52	
1123	8.67	100	6.73	13.39	70	2.27	11.8	-336	7.75	
1128	8.98	100	6.71	13.90	75	2.18	12.0	-336	8.07	
1133	9.37	100	6.71	14.43	76	2.07	11.7	-336	8.40	
1138	9.58	100	6.71	14.79	73	2.10	11.8	-336	8.63	
1143	9.89	100	6.71	15.17	71	2.07	11.7	-336	8.86	
1148	10.23	100	6.71	15.82	65	2.01	11.8	-335	9.28	Increase flow - water 850
1153	10.96	160	6.71	16.04	76	2.14	11.2	-335	9.41	level not stabilizing
1158	11.44	160	6.71	16.08	78	2.22	11.2	-333	9.43	will dewater and
1203	12.13	160	6.72	16.17	83	2.11	11.2	-333	9.49	sample within 24 HRS.
1208	12.77	160	6.76	16.52	114	1.30	11.2	-324	9.72	
1213	13.36	160	6.79	17.59	157	1.08	11.3	-325	10.40	
1218	14.10	160	6.80	19.02	212	1.49	11.5	-327	11.33	
1223	14.72	160	6.82	20.07	210	1.62	11.6	-330	12.00	5600

SIGNATURE(S): Scott M. Neal

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW44DS
DATE: 2/8/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. PPT.	Comments
1228	15.38	160	6.85	20.49	238	1.52	11.8	-329	12.26	End purging - well purged dry to pump inlet.

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2WMW45DS-03 (GW)
Sample Location: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 040700 -03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA: 4.6.00

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh ORP mV	Salinity ppt
Date: 4.8.00								
Time: 0740								
Method: Peristaltic Pump		6.91	36.19	9.7	12.5	0.95	-350	22.49

PURGE DATA:

Date: 4.6.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.4
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.75
Static Water Level (WL): 1.94
One Casing Volume(gal):
Start Purge (hrs): 0936
End Purge (hrs): 1106
Total Purge Time (min): 90
Total Vol. Purged (gal): 3.7

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

4.8.00 @ 0735 WL = 2.13 PUMP RATE = 120 ML/MIN
LITE SULFUR ODOR, GRAY/BLACK COLOR
24 / 66 / 90
END SAMPLING @ 0839 WL = 9.43

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	—
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	—
TCL PEST/PCBs	4° C	Qt. Amber Glass	—
TCL PAH	4° C	Qt. Amber Glass	—
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	—
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	—
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	—
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	—

OBSERVATIONS / NOTES:

PUMP INLET (TUBING) SET 1'± OFF BTM.

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): K. E. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW45DS
DATE: 4.6.00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. PPT.	Comments
0935	1.94	150								START PURGE
0942	3.46		7.06	40.27	2.1	0	8.7	-349	25.50	BLACK FINES IN PURGE WATER
0950	4.41		6.90	40.09	2.4	0.18	8.6	-357	25.44	W/SULFUR ODOR
1000	5.95		6.91	37.58	2.5	0.48	8.6	-358	23.71	
1010	7.13		6.91	34.72	4.9	1.07	8.5	-356	21.71	
1020	8.62		6.89	26.03	5.5	0.65	8.7	-349	15.98	
1030	10.20	160	6.85	18.19	11.9	0.55	8.6	-333	10.71	
1040	11.95		6.88	23.27	10.4	0.63	8.8	-340	14.01	
1050	13.28		6.91	28.66	12.9	1.08	9.0	-348	17.52	
1055	13.95		6.92	31.52	12.7	0.86	9.1	-352	19.45	
1100	14.73		6.87	37.38	12.5	1.30	9.7	-355	23.49	
1105	15.70		6.91	36.19	12.5	0.95	9.7	-350	22.49	DRY TO INLET
										LOWERED TUBING TO BTM & PUMPED DRY

SIGNATURE(S): [illegible]

BTM = 16.75

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW46DS-03
Sample Location: 2WMW46DS
Sampled By: J. NEIL
C.O.C. No.: 040700 -03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 4/7/00								
Time: 1010								
Method: Peristaltic Pump	YELLOW	6.82	42.15	9.2	71	6.94	-366	26.89

PURGE DATA:

Date: 4/6/00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 17.32'
Static Water Level (WL): 1.24'
One Casing Volume(gal): 2.6
Start Purge (hrs): 0900
End Purge (hrs): 1042
Total Purge Time (min): 102
Total Vol. Purged (gal): 3.0

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	3 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2 Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2 Qt. Amber Glass	✓
TCL PAH	4° C	2 Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1 L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1 L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	1 L PE	✓

OBSERVATIONS / NOTES:

* Field parameters for sampling data are the final purge field parameters.
well purged dry.
water level prior to sampling on 4/7/00 = ~~6.37~~ 6.37 FT.
Sample effervesces in VOA vials.

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW46DS
DATE: 4/6/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. PPT.	Comments
0900	1.24								→	BEGIN PURGING-
0905	2.12	120	6.97	43.54	7.7	6.04	7.7	-336	27.76	Water is very light
0910	2.87	120	6.88	43.25	7.2	8.16	7.8	-350	27.56	brown w/ sulphur.
0915	3.77	120	6.85	43.16	4.9	3.32	8.0	-350	27.51	odor.
0920	4.56	120	6.84	43.13	5.8	4.37	8.0	-350	27.50	Reduce flow. 1420
0925	5.10	95	6.82	43.25	5.4	3.67	7.8	-350	27.57	
0930	5.71	95	6.81	43.11	5.6	4.21	8.0	-348	27.48	
0935	6.23	95	6.81	43.09	5.3	3.73	8.1	-352	27.48	INCREASE FLOW → 1425
0940	6.72	115	6.81	43.10	6.1	3.90	8.3	-353	27.50	water level not
0945	7.47	115	6.79	43.18	5.8	4.51	8.5	-354	27.57	stabilizing @ 95mL.
0950	8.08	115	6.78	43.23	5.6	4.69	8.6	-353	27.61	Suspended black fine
0955	8.72	115	6.78	43.17	6.5	5.04	8.7	-355	27.58	
1000	9.35	115	6.79	42.47	9.4	5.44	8.7	-354	27.43	
1005	9.98	115	6.82	41.67	25	5.68	8.6	-354	26.51	
1010	10.73	115	6.86	41.64	41	5.37	8.5	-355	26.52	
1015	11.57	115	6.87	41.57	47	5.06	8.7	-354	26.45	
1020	12.24	115	6.86	41.60	56	5.93	8.7	-359	26.48	
1025	13.08	115	6.86	41.76	61	5.69	8.8	-360	26.59	
1030	13.92	115	6.85	41.82	64	6.69	8.9	-362	26.64	
1035	14.85	115	6.85	41.94	69	6.71	9.0	-364	26.73	
1040	15.67	115	6.84	42.13	73	6.79	9.1	-366	26.87	
1042	15.90	115	6.82	42.15	71	6.94	9.2	-366	26.89	END PURGING, well
										purged dry to tubing
										inlet (set ≈ 1.5 feet
										from bottom).

SIGNATURE(S): Scott W. Neil

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2WGW47DS-03
Sample Location: AREA A
Sampled By: R. SIMPSON
C.O.C. No.: 040500-03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 4.6.00	RS							
Time: 1530								
Method: Peristaltic Pump	~~OTHER~~	6.76	6.147	10.0	46	0.22	-230	3.31

PURGE DATA:

Date: 4.6.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.20
Static Water Level (WL): 1.37
One Casing Volume(gal): 2.4
Start Purge (hrs): 1331
End Purge (hrs): 1521
Total Purge Time (min): 110
Total Vol. Purged (gal): 2.4

→ CLEAR

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

END SAMPLING 1640 WL = 5.61'

SAMPLE CLEARING AT START
TURB DROPPED TO 20 NTU @ 1535

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	✓

OBSERVATIONS / NOTES:

PUMP INLET (TUBING) SET 1'± OFF BTM.

Circle if Applicable:

MS/MSD —

Duplicate ID No.: —

Signature(s): R. S. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW470S
DATE: 4.6.0

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	~~Eh~~ ORP mV	Sal. PPT.	Comments
1330	1.62	110								START PURGE
1337	2.50	↓	7.26	36.07	9.4	0.35	9.5	-343	22.62	
1345	3.11	↓	7.03	31.96	5.4	0	9.7	-349	19.99	SULFUR ODOR /
1355	3.61	100	6.89	25.98	3.0	1.50	9.1	-327	15.83	SWAMP ODOR
1405	3.96	↓	6.79	22.20	2.9	0.46	9.0	-319	13.33	
1415	4.15	↓	6.62	18.44	26	0.81	9.0	-314	10.86	TURNING BLACK IN COLOR
1420	4.43	150	6.50	16.12	62	0.68	9.0	-322	9.48	CAN NOT STABLIZE DRAWDOWN
1430	4.88	↓	6.51	9.134	92	0.56	8.9	-317	5.20	TURN-UP FLOW TO PUMP DRY
1440	4.87	100	6.69	7.939	94	0.50	9.1	-258	4.42	*BACK TO W/L STABLIZATION
1450	4.90		6.71	7.316	71	0.31	9.3	-252	4.05	
1455	4.95		6.70	7.080	73	0.33	9.5	-234	3.91	
1500	4.95		6.73	6.775	72	0.34	10.0	-248	3.74	
1505	5.01		6.73	6.573	54	0.29	10.0	-224	3.62	
1510	5.08		6.75	6.309	54	0.16	10.0	-229	3.46	
1515	5.09		6.76	6.172	50	0.20	10.0	-232	3.37	
1520	5.10	↓	6.76	6.147	46	0.22	10.0	-230	3.31	END PURGE
										START SAMPLING

SIGNATURE(S): K-1 S. Sampi

TD=16.2'

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type: _____
[ ] QA Sample Type: _____

Sample ID No.: 2LGW20S-03
Sample Location: AREA A
Sampled By: R. SIMPSON
C.O.C. No.: 040700-03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh ORP mV	Salinity ppt
Date: 4.8.00								
Time: 1030								
Method: Peristaltic Pump	CLEAR	6.31	0.439	12.3	3.1	0.02	29	0.21

PURGE DATA:

Date: 4.9.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.1
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 18.85
Static Water Level (WL): 13.45
One Casing Volume(gal): 0.9
Start Purge (hrs): 0922
End Purge (hrs): 1026
Total Purge Time (min): 64
Total Vol. Purged (gal): 1.8

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

START SAMPLING @ 1027
END SAMPLING @ 1151 WL = 13.70

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	✓

OBSERVATIONS / NOTES:

PUMP INLET SET 1'± OFF BTM.

Circle if Applicable:

MS/MSD — Duplicate ID No.: ____

Signature(s): R. J. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2LMW20S
DATE: 4.8.00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. ~~ORP~~ PPT.	Comments
0920	13.45	130	—	—	—	—	—	—	—	START PURGE
0927	13.57	↓	6.27	1.343	600	0.04	12.6	43	0.73	LT. RUST COLOR
0935	13.62	↓	6.15	0.603	95	0.02	12.1	49	0.30	CLEARING
0940	13.64	100	6.21	0.445	38	0.03	12.1	41	0.22	
0945	13.65	110	6.25	0.421	17	0.03	12.2	33	0.20	
0950	13.66	↓	6.26	0.421	9.6	0.02	12.1	32	0.20	
0955	13.69	100	6.27	0.425	4.8	0.02	12.1	30	0.21	
1000	13.69	↓	6.28	0.427	4.5	0.02	12.2	30	0.21	
1005	↓	↓	6.28	0.433	4.3	0.03	12.3	28	0.21	
1010	↓	↓	6.30	0.435	4.1	0.02	12.3	28	0.21	
1015	↓	↓	6.30	0.438	3.8	0.02	12.3	28	0.21	
1020	↓	↓	6.31	0.440	3.5	0.02	12.3	28	0.21	
1025	↓	↓	6.31	0.439	3.1	0.02	12.3	28	0.21	END PURGE

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 3GW12D -03
Sample Location: AREA A
Sampled By: R. SIMPSON
C.O.C. No.: 040700 -03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh ORP mV	Salinity ppt
Date: 4.7.00								
Time: 1430								
Method: Peristaltic Pump	CLEAR	6.77	3.499	10.8	2.6	0.03	-137	1.85

PURGE DATA:

Date: 4.7.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.0
Well Casing Diameter & Material
Type: ~~2" PVC~~ 4" STEEL
Total Well Depth (TD): 27.50
Static Water Level (WL): 0.33
One Casing Volume(gal): 17.7
Start Purge (hrs): 1323
End Purge (hrs): 1421
Total Purge Time (min): 58
Total Vol. Purged (gal): 1.9

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

END SAMPLING 1635 WL = 0.42

2X VOL. FOR DUP.

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	—
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	—
TCL PEST/PCBs	4° C	Qt. Amber Glass	—
TCL PAH	4° C	Qt. Amber Glass	—
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	—
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	—
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	—
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	—

OBSERVATIONS / NOTES:

4" STEEL RISER, EXISTING WELL, STICK-UP

4" = .653 GAL/FT

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	GWFD040700-01

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 3MW12D
DATE: 4-7-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. PPT.	Comments
1318	0.33	125								START PURGE
1328	0.42		6.68	3.483	3.8	0.08	12.3	-110	1.84	CLEAR, NO ODOR
1335	0.42		6.70	3.485	1.7	0.05	11.8	-121	1.84	
1340	0.42		6.71	3.482	2.0	0.04	11.5	-126	1.84	
1345	0.42		6.72	3.480	2.3	0.02	11.4	-129	1.84	
1350	0.42		6.73	3.484	2.5	0.03	11.2	-131	1.84	
1355	0.42		6.74	3.490	2.7	0.02	11.1	-133	1.84	
1400			6.75	3.492	3.1	0.02	11.0	-134	1.84	
1405			6.75	3.492	3.0	0.02	11.0	-135	1.84	
1410			6.76	3.488	2.9	0.02	11.1	-135	1.84	
1415			6.76	3.498	2.6	0.03	10.9	-136	1.85	
1420			6.77	3.499	2.6	0.03	10.8	-137	1.85	END PURGE

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW21S-03
Sample Location: 2WMW21S
Sampled By: S. NEIL
C.O.C. No.: 040700-03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 4/8/00								
Time: 1620								
Method: Peristaltic Pump	Yellow	6.62	34.20	12.1	41	4.49	-366	21.46

PURGE DATA:

Date: 4/8/00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.3
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 17.30'
Static Water Level (WL): 4.31'
One Casing Volume(gal): 2.1
Start Purge (hrs): 1430
End Purge (hrs): 1615
Total Purge Time (min): 105
Total Vol. Purged (gal): 2.7

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) L PE	✓

OBSERVATIONS / NOTES:

Samples have sulphur odor. Fine black suspended solids in samples. Strong effervescence in VOAs. Sample turned black due to increasing black fines.

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW21S
DATE: 4/8/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. PPT.	Comments
1430	4.31									Begin purging.
1435	4.90	135	6.91	43.63	15	3.59	12.9	-367	28.12	Decrease flow. 675
1440	5.26	110	6.85	43.21	2.8	2.98	13.6	-362	27.82	Decrease flow. 550
1445	5.49	100	6.83	42.76	4.4	3.24	13.6	-360	27.51	
1450	5.59	100	6.81	41.99	3.1	2.99	13.7	-359	26.98	
1455	5.70	100	6.80	41.65	1.3	6.35	13.4	-358	26.66	Decrease flow 1500
1500	5.78	95	6.80	41.23	1.3	2.99	13.2	-359	26.41	
1505	5.84	95	6.79	40.83	1.1	3.41	13.0	-356	26.11	
1510	5.90	95	6.77	40.15	1.0	2.96	12.9	-352	25.62	
1515	5.97	95	6.76	39.09	1.2	2.81	12.7	-352	24.87	
1520	6.01	95	6.75	38.51	1.5	2.74	12.7	-351	24.48	
1525	6.04	95	6.73	37.89	3.7	3.18	12.1	-350	24.02	
1530	6.06	95	6.71	37.01	2.3	3.07	12.7	-348	23.41	
1535	6.07	95	6.70	36.49	1.3	3.09	12.3	-348	23.07	
1540	6.09	95	6.68	35.90	2.5	3.18	12.3	-349	22.67	
1545	6.10	95	6.67	35.28	5.9	3.19	12.2	-351	22.21	Black suspended fines.
1550	6.11	95	6.65	34.41	22	3.55	12.3	-353	21.62	
1555	6.13	95	6.63	34.02	21	3.88	12.2	-356	21.35	
1600	6.16	95	6.63	33.97	40	4.01	12.1	-357	21.30	
1605	6.16	95	6.63	34.26	43	4.16	12.2	-361	21.49	
1610	6.17	95	6.63	34.29	44	4.39	12.1	-362	21.54	
1615	6.18	95	6.62	34.20	41	4.49	12.1	-366	21.46	End purging.

SIGNATURE(S): Scott W. Steil

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 3-GW125-03
Sample Location: 3MW125
Sampled By: S. NEIL
C.O.C. No.: 040700-03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Date: 4/7/00	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Time: 1430								
Method: Peristaltic Pump	CLEAR	5.96	3.620	10.2	2.4	2.54	-16	1.92

PURGE DATA:

Date: 4/7/00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 15.11'
Static Water Level (WL): 2.56'
One Casing Volume(gal): 2.0
Start Purge (hrs): 1325
End Purge (hrs): 1425
Total Purge Time (min): 60
Total Vol. Purged (gal): 2.1

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(6) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(4) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(4) Qt. Amber Glass	✓
TCL PAH	4° C	(4) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(2) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(2) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(2) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(2) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(2) L PE	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD

Duplicate ID No.: GWFD040700-02

Signature(s): Scott W. Neil

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 3MW125
DATE: 4/7/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. PPT.	Comments
1325	2.56								→	Begin purging.
1330	2.73	125	6.29	3.718	73	5.09	10.9	-43	1.97	
1335	2.75	125	6.14	3.691	27	3.31	10.8	-37	1.96	
1340	2.74	125	6.06	3.676	10	2.57	10.7	-32	1.95	
1345	2.74	125	6.03	3.666	4.3	3.62	10.4	-26	1.94	Increase flow. 200
1350	2.79	135	6.01	3.647	4.1	3.40	10.3	-23	1.93	
1355	2.79	135	5.98	3.637	3.1	3.59	10.2	-20	1.93	
1400	2.79	135	5.97	3.633	2.7	3.44	10.1	-19	1.92	
1405	2.78	135	5.96	3.628	2.6	3.61	10.2	-17	1.92	
1410	2.78	135	5.96	3.626	2.4	2.71	10.2	-16	1.92	
1415	2.79	135	5.96	3.631	2.7	2.87	10.1	-17	1.92	
1420	2.79	135	5.96	3.626	2.4	2.90	10.1	-16	1.92	
1425	2.79	135	5.96	3.620	2.4	2.84	10.2	-16	1.92	End purging

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 4GW01S -03
Sample Location: 4MW01
Sampled By: R. SIMPSON
C.O.C. No.: 040700 -03
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	ORP mV	Salinity ppt
Date: 4.8.00								
Time: 1440								
Method: Peristaltic Pump	CLEAR	5.65	0.418	10.2	0	0.06	180	0.20

PURGE DATA:

Date: 4.8.00
Method: Peristaltic Pump
Monitor Reading (ppm): 1.1
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 20.30
Static Water Level (WL): 6.34
One Casing Volume(gal): 2.3
Start Purge (hrs): 1320
End Purge (hrs): 1431
Total Purge Time (min): 71
Total Vol. Purged (gal): 2.1

ROUND 3

See Attached Low Flow Purge Data Sheet for Purge Data

START SAMPLING 1431
END SAMPLING 1743 WL = 6.48'

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	—
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	—
TCL PEST/PCBs	4° C	Qt. Amber Glass	—
TCL PAH	4° C	Qt. Amber Glass	—
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	—
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	—
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	—
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	—

OBSERVATIONS / NOTES:

3 X VOL. FOR MS/MSD

Circle if Applicable:

MS/MSD: YES
Duplicate ID No.:

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 3
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 4MW01S
DATE: 4.8.00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. PPT.	Comments
1320	6.34	130								START PURGE
1325	6.35		5.75	0.404	3.9	0.05	10.5	123	0.19	CLEAR, NO ODOR
1330	6.36		5.68	0.416	2.0	0.05	10.7	136	0.20	
1335	6.39		5.65	0.414	1.2	0.06	10.5	151		
1340		110	5.65	0.414	0.7	0.06	10.3	156		
1345			5.65	0.423	0.3	0.07	10.4	163		
1350			5.64	0.422	0.2	0.07	10.3	163		
1355	6.40		5.64	0.424	0.1	0.07	10.2	169	0.21	
1400			5.65	0.421	0.1	0.06	10.3	171	0.20	
1405			5.65	0.420	0	0.06	10.1	171		
1410	6.41		5.64	0.419	0	0.06	10.2	170		
1415			5.64	0.417		0.07	10.3	176		
1420			5.64	0.420		0.06	10.2	179		
1425	6.42		5.65	0.419		0.06	10.1	181		
1430	6.42		5.65	0.418		0.06	10.2	180		END PURGE
										START SAMPLING

SIGNATURE(S): [illegible]

ROUND 4

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 3GW37S 04
Sample Location: 3MW37S
Sampled By: KS / FW
C.O.C. No.: 072000 04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~ %
Date: 7.20.00 Time: 1510 Method: Peristaltic Pump	CLEAR	6.12	0.664	16.5	1.9	1.19	50	0

PURGE DATA:

Date: 7.20.00	ROUND 4
Method: Peristaltic Pump	
Monitor Reading (ppm): 0	
Well Casing Diameter & Material Type: 2" PVC	See Attached Low Flow Purge Data Sheet for Purge Data
Total Well Depth (TD): 8.45	
Static Water Level (WL): 4.40	
One Casing Volume(gal): 0.7	
Start Purge (hrs): 1400	
End Purge (hrs): 1500	
Total Purge Time (min): 60	
Total Vol. Purged (gal): 1.4	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	L PE	✓

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 3MW375
DATE: 7.20.00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1405	4.68	90	6.13	0.621	19	4.69	17.7	60	0	
1413	4.69		6.10	0.664	11	1.90	16.6	53		
1420			6.11	0.668	6.9	1.55	16.5	52		
1425			6.13	0.672	5.0	1.65	16.7	47		
1430	4.68		6.13	0.674	4.1	1.64	16.5	54		
1435	4.69		6.12	0.667	2.6	1.32	16.5	51		
1440			6.13	0.665	1.3	1.20	16.5	53		
1445			6.12	0.662	1.2	1.23	16.3	56		
1450			6.12	0.663	1.7	1.16	16.5	54		
1455	4.68		6.12	0.665	2.2	1.18	16.5	51		
1500	4.68		6.12	0.664	1.9	1.19	16.5	50		

SIGNATURE(S): K. S. Simp

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2WGW38DS-04
Sample Location: 2WMW38DS
Sampled By: DW - RS
C.O.C. No.: 072100 04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 7.20/21/23.00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time:	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	CLEAR	6.80	1.29	14.7	1.27	2.14	-126	0.1

PURGE DATA:

Round 4

Date: 7-18-00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 12.51
Static Water Level (WL): 6.63
One Casing Volume(gal): 0.95
Start Purge (hrs): 0820
End Purge (hrs): 0858
Total Purge Time (min): 38
Total Vol. Purged (gal): ~1.5

See Attached Low Flow Purge Data Sheet for Purge Data

7-20-00 W.L. = 9.58 @ 0725
7-21-00 W.L. = 10.35 @ 1105
7.23.00 WL = 9.78 @ 1800 RES

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial 0730	7-20-00
TCL SEMIVOLATILES	4° C	Qt. Amber Glass 0730	7-20-00
TCL PEST/PCBs	4° C	Qt. Amber Glass 1115	7-21-00
TCL PAH	4° C	Qt. Amber Glass 0730	7-20-00
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	7-20-00
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	7-20-00
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	L PE 1800	7.23.00

OBSERVATIONS / NOTES:

Start purging with tubing ~1' above bottom
then lower to purge dry

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [signature] 7.23.00

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW38DS
DATE: 7-18-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. %	Comments
0820	7.46	250	6.85	1.00		2.53	14.60	-41	0.0	stop at 0825, attempt to decrease flow
0837	8.49	240	7.03	1.03	1.44	8.34	14.60	-54	0	0832 - resume pursing
8.42	9.05	200	~~[illegible]~~ 6.74	1.06	1.26	2.06	14.95	-56	0	
0847	10.10	200	6.74	1.13	1.17	1.47	14.73	-68	0.1	
0852	10.83	200	6.76	1.18	1.34	1.39	14.67	-82	0.1	
0857	11.70	180	6.80	1.29	1.27	2.14	14.65	-126	0.1	0854 moved inlet to bottom
										0858 - pursed Dry
										END PURGE

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW3905-04
Sample Location: AREA A
Sampled By: FCW
C.O.C. No.: 071800-04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 7-19-00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 0742	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	Clear	6.85	4.69	13.1	11.5	0.70	-133	0.2

PURGE DATA:

Date: 7-18-00	See Attached Low Flow Purge Data Sheet for Purge Data
Method: Peristaltic Pump	
Monitor Reading (ppm):	
Well Casing Diameter & Material Type: 2" PVC	
Total Well Depth (TD): 16.70	
Static Water Level (WL): 3.36	
One Casing Volume(gal): 2.17	
Start Purge (hrs): 0736	
End Purge (hrs): 0943	
Total Purge Time (min): 127	
Total Vol. Purged (gal): 3.9	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	3 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2 Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2 Qt. Amber Glass	✓
TCL PAH	4° C	2 Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1 L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1 L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	1 L PE	✓

OBSERVATIONS / NOTES:

Pump well DRY will sample on 7-19-00 if well has recharged enough

WL = 4.31' on 7-19-00

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW3905
DATE: 7-18-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
0736	3.36				4.92					START PURGING
0742	4.46	120	6.97	5.71	~~9.79~~ (FCU)	1.75	13.4	-144	0.3	
0750	5.44	↓	6.92	5.09	6.72	1.14	13.8	-139	0.3	
0758	6.26		6.84	4.72	4.49	0.94	13.7	-139	0.2	
0806	6.59		6.77	3.65	4.96	0.89	13.6	-140	0.2	
0814	7.26		6.71	2.94	3.82	0.86	13.5	-136	0.1	
0821	7.92	100	6.65	2.37	3.74	0.75	13.5	-132	0.1	
0829	8.60	100	6.64	2.06	2.14	0.70	13.5	-127	0.1	Pump slowing down
0839	9.32	↓	6.65	1.92	2.93	0.67	13.8	-120	0.1	battery going dead
0848	9.88	↓	6.63	1.96	2.40	0.95	13.8	-115	0.1	had to change battery
0857	10.67	120	6.65	2.14	2.91	0.78	13.2	-118	0.1	
0906	11.57		6.66	2.33	2.60	0.81	13.1	-119	0.1	
0916	12.43		6.69	2.75	2.78	0.83	13.2	-123	0.1	
0925	13.55		6.73	3.23	3.44	0.75	13.0	-126	0.2	
0934	14.52		6.76	3.90	4.11	0.81	13.1	-129	0.2	
0943	15.82	↓	6.85	4.69	11.5	0.70	13.1	-133	0.2	well dry
0742	4.31									START sampling
1-00 0914										End sampling

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2WGW40DS-04
Sample Location: Area A
Sampled By: D. Whalen
C.O.C. No.: 072000 04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA: 7/18/00

Date: 7-20-00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 1245	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	ppt
Method: Peristaltic Pump	Clear	7.13	35.5	13.86	10.66	0.64	-324	2.3

PURGE DATA:

Date: 7/18/00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 17.38
Static Water Level (WL): 3.41
One Casing Volume(gal): 2.3
Start Purge (hrs): 1006
End Purge (hrs): 1130
Total Purge Time (min): 84
Total Vol. Purged (gal): ~2.5

ROUND 4

See Attached Low Flow Purge Data Sheet for Purge Data

Purged Dry on 7-18-00

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	3 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2 Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2 Qt. Amber Glass	✓
TCL PAH	4° C	2 Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1 L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1 L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	1 L PE	✓

OBSERVATIONS / NOTES:

7/19/00 1450 wl = 9.74 toc
7/20/00 1225 wl = 7.43 (prior to sampling)
black fines increased as w.l. dropped during sampling.

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Donald Whalen.

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW40DS-04
DATE: 7-18-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. %	Comments
1010	3.45	150	7.08	38.8	6.86	4.34	15.41	-320	2.5	sulfur odor
1015	5.25	130	6.95	38.7	4.70	1.02	13.98	-339	2.4	
1020	5.80	150	6.97	38.1	5.91	0.88	14.04	-341	2.4	
1025	6.62	150	6.98	37.3	7.14	0.84	14.01	-341	2.3	
1030	7.48	150	7.01	35.1	4.11	0.70	13.68	-339	2.2	
1035	8.15	150	7.00	33.1	1.87	0.70	14.29	-336	2.0	
1040	8.58	150	7.00	30.8	1.81	0.61	14.27	-332	1.9	
1045	9.45	150	7.00	28.3	1.74	0.62	14.11	-331	1.7	
1050	10.10	150	7.01	24.1	2.10	0.53	14.03	-331	1.4	
1055	10.65	↓	6.97	21.6	4.51	0.56	14.07	-335	1.3	
1100	11.36	↓	7.02	19.7	6.57	0.54	14.17	-333	1.2	
1105	12.11	↓	7.13	21.3		0.46	13.21	-333	1.3	
1110	12.88	↓	7.14	22.2	5.29	0.45	13.15	-334	1.3	
1115	13.92	↓	7.07	23.5	7.09	0.51	13.51	-336	1.4	
1120	14.81	↓	7.07	25.2	9.77	0.53	13.72	-337	1.5	
1125	15.44	↓	7.06	26.7	14.80	0.46	13.28	-337	1.6	
1130	16.10	↓	7.13	35.5	10.66	0.64	13.86	-324	2.3	DRY; End Purge

SIGNATURE(S): Donald Vlaber

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W'-GW41D5-04
Sample Location: AREA A
Sampled By: FCW'
C.O.C. No.: 072000-04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

Date: 7-20-00	Color	pH	S.C.	Temp.	Turbidity	DO	Eh	Salinity
Time: 0925	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	mV	~~ppt~~ %
Method: Peristaltic Pump	Clear	6.93	27.4	13.4	6.4	0.24	-349	1.7

PURGE DATA:

Date: 7-18-00	See Attached Low Flow Purge Data Sheet for Purge Data
Method: Peristaltic Pump	
Monitor Reading (ppm):	
Well Casing Diameter & Material Type: 2" PVC	
Total Well Depth (TD): 16.65	
Static Water Level (WL): 2.59	
One Casing Volume(gal): ~~3.7~~ 2.3	
Start Purge (hrs): 1006	
End Purge (hrs): 1147	
Total Purge Time (min): 101	
Total Vol. Purged (gal): 3.7	

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	3 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2 Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2 Qt. Amber Glass	✓
TCL PAH	4° C	2 Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1 L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1 L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	1 L PE	✓

OBSERVATIONS / NOTES:

Well DRY will sample on 7-19-00

WL = 9.60' on 7-19-00 @ 0922 not enough water to collect sample
will sample on 7-20-00
WL = 6.50' on 7-20-00 @ 920

Circle if Applicable:

MS/MSD	Duplicate ID No.:
✓	

Signature(s): [signature]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 24MW141DS
DATE: 7-18-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1006	2.59									START PURGING
1017	4.60	150	6.95	33.3	4.85	0.70	13.5	-328	2.1	
1025	5.93	↓	6.93	30.7	5.37	0.49	13.3	-332	1.9	
1034	7.21		6.89	27.2	3.70	0.65	13.6	-327	1.7	
1044	8.25	125	6.88	23.1	3.57	0.38	13.6	-329	1.4	
1053	9.22	140	6.80	19.4	~~3.95~~	0.38	13.9	-348	1.1	
1103	10.18	130	6.89	17.2	23.2/12.2	0.30	13.3	-358	1.0	
1112	11.16	140	6.89	18.1	14.0	0.25	13.0	-356	1.1	
1122	12.25	↓	6.89	20.0	8.44	0.25	13.0	-349	1.2	
1131	13.55		6.94	22.5	6.44	0.22	13.0	-349	1.3	
1139	14.61		6.93	24.4	7.25	0.25	13.1	-349	1.5	
1147	15.45	130	6.93	27.4	6.43	0.24	13.4	-349	1.7	well dry
19-00 0922	9.60									START Sampling
0925	6.50									End sampling
0-00 1102										

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW42DS-04
Sample Location: AREA A
Sampled By: FCW
C.O.C. No.: 072000-04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~ %
Date: 0725 Time: ✓ 7-20-00								
Method: Peristaltic Pump	grey	7.09	31.3	12.2	20	0.31	-351	1.9

PURGE DATA:

Date: 7-19-00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.91
Static Water Level (WL): 2.29
One Casing Volume(gal): 2.4
Start Purge (hrs): 0958
End Purge (hrs): 1153
Total Purge Time (min): 115
Total Vol. Purged (gal): 3.5

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	3 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2 Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2 Qt. Amber Glass	✓
TCL PAH	4° C	2 Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1 L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1 L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	1 L PE	✓

OBSERVATIONS / NOTES:

Well dry will sample on on 7-19-00
WL = 4.36' on 7-20-00

Circle if Applicable:

MS/MSD — Duplicate ID No.:

Signature(s): FCW

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW4205
DATE: 7-19-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
0958	2.29									START PURGING
1005	3.32	150	7.06	41.1	8.2	1.27	12.8	-366	2.6	
1015	5.21	130	7.02	38.0	10	0.61	13.1	-366	2.4	
1025	6.60	110	7.02	35.4	6.3	0.51	13.3	-364	2.2	
1035	7.73	110	6.95	27.1	3.0	0.43	13.3	-357	1.6	
1045	8.96	110	6.89	22.9	21	0.35	13.2	-355	1.4	
1055	9.80	110	6.87	21.0	63	0.30	12.9	-366	1.2	
1105	10.60	110	6.94	17.8	54	0.30	12.9	-372	1.0	
1115	11.54	125	7.07	17.1	45	0.36	12.5	-359	1.0	
1125	12.57	110	7.06	18.4	23	0.30	12.3	-356	1.1	
1135	13.64	110	7.05	22.5	18	0.33	12.1	-355	1.3	
1144	14.65	110	7.07	26.1	15.3	0.31	12.1	-356	1.6	
1153	15.40	110	7.09	31.3	20	0.31	12.2	-351	1.9	well dry
20-00 0725	4.36									START Sampling
0855										End Sampling

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W GW 43 DS-04
Sample Location: 2W MW 43DS
Sampled By: D. Whalen
C.O.C. No.: 072100 4
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA: 7/19/00 070

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~
Date: 7-21-00								
Time: 0750								
Method: Peristaltic Pump	Clear to Gray	6.85	40.6	11.7	50.2	0.28	-371	2.6

PURGE DATA:

Date: 7-19-00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 15.67
Static Water Level (WL): 2.77
One Casing Volume(gal): 2.1
Start Purge (hrs): 1107
End Purge (hrs): 1310
Total Purge Time (min): 123
Total Vol. Purged (gal): ~3.5

ROUND 4

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
TCL VOLATILES	HCL / 4° C	3	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2	Qt. Amber Glass	✓
TCL PAH	4° C	2	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	1	L PE	✓

OBSERVATIONS / NOTES:

Purged Dry on 7-19-00
7-20-00 @ 1448 WL = 6.83' TOC
7-21-00 @ 0725 WL = 4.79' (prior to sampling)
sample effervesced in VOA vials

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Donald Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW43DS
DATE: 7-19-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1110	2.77	120	6.88	46.1		8.96	14.6	-335	2.9	sulfur odor
1115	3.82		6.77	45.0	5.05	1.01	15.0	-361	2.9	
1120		120	6.78	43.8	4.87	1.19	15.2	-360	2.8	
1125	4.94		6.79	42.7	4.46	1.07	15.0	-365	2.7	
1130		120	6.81	41.8	3.44	0.83	14.7	-367	2.7	
1135	5.91		6.81	40.8	3.58	0.67	14.3	-369	2.6	
1140			6.82	40.5	3.77	0.46	14.5	-375	2.6	
1145	6.40		6.83	40.3	3.50	0.28	15.5	-390	2.6	
1150			6.84	39.5	3.58	0.65	14.7	-369	2.5	
1155	6.98		6.86	38.4	3.86	0.56	14.1	-369	2.4	
1200			6.91	36.2	3.23	0.61	13.7	-366	2.3	
1205	7.77	140	6.94	35.3	3.74	0.56	13.3	-366	2.2	pump stalls - increased pump rate
1210			6.98	34.7	3.61	0.51	13.1	-364	2.2	
1215	8.80		7.01	33.9	3.44	0.38	13.0	-366	2.1	
1220			7.03	33.8	4.07	0.35	12.9	-366	2.1	
1225	9.52		6.97	33.6	5.18	0.27	12.9	-362	2.1	
1230			7.01	33.6	5.81	0.21	12.9	-363	2.1	
1235	10.64		6.95	34.8	6.42	0.32	12.8	-367	2.2	
1240			6.99	34.3	6.91	0.33	12.5	-369	2.1	
1245	11.62		6.99	34.1	7.52	0.35	12.2	-364	2.1	
1250			6.97	34.5	10.91	0.27	12.0	-366	2.1	
1255	13.02		6.96	34.9	17.10	0.30	11.9	-368	2.2	
1300			6.94	35.8	28.2	0.30	11.8	-371	2.2	
1305	14.33		6.85	37.6	41.7	0.33	11.7	-370	2.4	
1310	14.98		6.85	40.6	50.2	0.28	11.7	-371	2.6	Stop Purging - Purged Dry to pump inlet
1315										

SIGNATURE(S): Donald Nhalen

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW44DS-04
Sample Location: AREA A
Sampled By: FCW
C.O.C. No.: 072000-04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~ %
Date: 7-20-00								
Time: 1215								
Method: Peristaltic Pump	DRK gry	7.15	22.2	12.2	49	0.80	-325	1.3

PURGE DATA:

Date: 7-19-00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.77
Static Water Level (WL): 2.02
One Casing Volume(gal): 2.4
Start Purge (hrs): 1324
End Purge (hrs): 1542
Total Purge Time (min): 138
Total Vol. Purged (gal): 4.0

ROUND 4

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	3 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2 Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2 Qt. Amber Glass	✓
TCL PAH	4° C	2 Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1 L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1 L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	1 L PE	✓

OBSERVATIONS / NOTES:

Purged dry on 7-19-00, will sample on 7-20-00
WL = 2.07' on 7-20-00 @ 1215

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): FCW

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW440S
DATE: 7-19-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1324	2.02									START PURGING
1332	3.06	125	7.05	45.9	11	1.64	13.24	-365	2.9	
1342	4.66	↓	7.07	45.6	8.2	0.60	13.2	-367	2.9	
1352	5.93	120	7.07	44.8	9.5	0.46	13.1	-372	2.9	
1402	6.77	↓	7.08	43.9	11	0.38	13.3	-376	2.8	
1412	7.38	100	7.08	41.9	23	0.35	13.3	-374	2.7	
1422	7.88	115	7.07	37.5	31	0.36	13.2	-373	2.3	
1432	8.46	100	7.08	20.5	55	0.39	13.1	-363	1.2	change battery
1442	9.35	130	7.06	18.5	57	0.43	12.9	-360	1.1	
1452	10.37	125	7.06	20.0	46	0.38	12.5	-357	1.2	
1502	11.31	120	7.07	21.2	46	0.39	12.5	-351	1.3	
1512	12.21	120	7.09	22.1	49	~~0.63~~ (0)	12.5	-343	1.3	
1522	13.05		7.12	22.7	51	0.36/0.36	12.4	-340	1.4	
1532	13.80		7.13	22.9	57	0.35	12.3	-336	1.4	
1542	14.92	↓	7.15	22.2	49	0.80	12.2	-325	1.3	well going dry
20-00 1215	2.07							~~323~~		start sampling
1346										End sampling

SIGNATURE(S): [illegible]

PAGE 2 OF 2

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: ~~MW~~ (GW) 45DS-04
Sample Location: Area A
Sampled By: D. Whalen
C.O.C. No.: 0720004
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA: 7/19/00 %

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~
Date: 7-20-00								
Time: 1540								
Method: Peristaltic Pump	clear	7.03	37.5	11.3	25.7	0.26	-382	2.3

PURGE DATA:

Date: 7-19-00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.75
Static Water Level (WL): 2.28
One Casing Volume(gal): 2.4
Start Purge (hrs): 1600
End Purge (hrs): 1745
Total Purge Time (min): 105
Total Vol. Purged (gal): ~3.5

ROUND 4

See Attached Low Flow Purge Data Sheet for Purge Data

7-20-00 @ 1520 WL = 2.72' toc (prior to sampling)
During sampling, black fines increased as w.l. dropped.

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
TCL VOLATILES	HCL / 4° C	3	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2	Qt. Amber Glass	✓
TCL PAH	4° C	2	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	1	L PE	✓

OBSERVATIONS / NOTES:

Purged Dry on 7-19-00

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Donald Whalen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW45DS
DATE: 7-19-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1600	2.28	150								Sulfur ODOR
1605			6.98	44.6		4.07	13.9	-373	2.9	
1610	3.78		6.95	45.3	20.7	1.21	12.7	-371	2.9	
1615	4.55		6.96	45.1	3.54	0.87	12.6	-372	2.9	
1620	~~4.55~~ 5.13		6.96	44.4		0.75	12.9	-377	2.8	
1625			6.99	43.1	1.51	0.64	12.7	-381	2.8	
1630	6.72	140	7.01	42.4		0.58	12.5	-383	2.7	
1635		140	7.04	41.1	3.70	0.45	12.4	-385	2.6	
1640	7.81	140	6.97	40.4		0.48	12.3	-380	2.5	
1645			6.98	39.2	2.99	0.46	12.2	-382	2.5	
1650	9.18		7.03	37.6		0.39	12.3	-383	2.3	
1655			7.00	30.4	4.61	0.47	12.3	-377	1.7	
1700	10.35	150	7.06	23.5	4.48	0.43	12.3	-373	1.4	
1705			7.08	21.9		0.36	12.5	-368	1.3	
1710	11.02	150	7.08	23.4	4.82	0.42	12.4	-368	1.4	
1715			7.08	24.9		0.41	12.2	-370	1.5	
1720	12.70		7.08	26.3	6.29	0.37	12.0	-372	1.6	
1725			7.08	28.1	5.28	0.35	11.9	-374	1.7	
1730	13.92		7.08	30.6	5.31	0.32	11.7	-377	1.9	
1735			7.03	33.4	5.55	0.37	11.5	-378	2.1	
1740	15.32		7.04	35.5	10.80	0.29	11.5	-381	2.2	
1745	15.99		7.03	37.5	25.7	0.26	11.3	-382	2.3	DRY; End Purge

SIGNATURE(S): Donald Whalen

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW46DS-04
Sample Location: 2MW46DS
Sampled By: D. Wahlen
C.O.C. No.:
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA: 7/18/00

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ppt
Date: 7-20-00								
Time: 0915								
Method: Peristaltic Pump	pale yellow	7.28	44.5	15.1	42.4	0.20	-363	2.8

PURGE DATA:

Date: 7/18/00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 17.32
Static Water Level (WL): 1.45
One Casing Volume(gal): 2.6
Start Purge (hrs): 1353
End Purge (hrs): 1522
Total Purge Time (min): 89
Total Vol. Purged (gal): 3

ROUND 4

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
TCL VOLATILES	HCL / 4° C	3	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2	Qt. Amber Glass	✓
TCL PAH	4° C	2	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	1	L PE	✓

OBSERVATIONS / NOTES:

7/19/00 0740 wl = 7.79 toc
7/19/00 1500 wl = 6.14
7/20/00 0830 wl = 3.62 prior to sampling

Well purged Dry on 7-18-00

Sample effervesced in VOA vials

Circle if Applicable:

MS/MSD
Duplicate ID No.:

Signature(s): Donald Wahlen

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW46DS
DATE: 7/18/00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh ORP mV	Sal. %	Comments
1353		130	7.33	50.3		7.96	17.30	-367	3.2	sulfur odor
1358	3.10		7.13	47.1	11.6	0.68	16.83	-366	3.1	
1403			7.14	47.5		0.42	16.33	-369	3.1	
1408	4.25		7.14	47.1	3.97	0.34	16.41	-367	3.1	
1413	5.80	130	7.15	47.5	2.80	0.28	15.83	-369	3.1	
1418			7.15	47.2		0.26	15.33	-371	3.1	
1423			7.15	46.9	2.40	0.24	15.69	-375	3.1	
1428	7.95		7.11	47.0		0.26	15.86	-387	3.1	
1432	~~9.04~~ DW		7.12	47.0		0.25	16.07	-387	3.1	
1437	9.04		7.12	44.8	6.50	0.21	17.15	-386	2.9	
1442			7.11	44.6		0.22	17.28	-382	2.9	
1447	10.50		7.14	42.9	9.91	0.21	17.61	-381	2.8	
1452			7.22	40.4		0.19	17.93	-391	2.6	
1457	12.45		7.29	41.7	30.5	0.27	16.99	-361	2.7	
1502			7.33	42.1		0.20	16.86	-363	2.7	
1507	13.60		7.33	43.3	35.3	0.19	15.68	-364	2.8	
1512			7.33	43.3	34.8	0.18	15.59	-368	2.8	
1517	15.28		7.32	43.3	37.8	0.18	15.48	-367	2.8	
1522	15.90		7.28	44.5	42.4	0.20	15.10	-363	2.8	DRY - End purge

SIGNATURE(S): David W Kolm

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2W-GW47DS-04
Sample Location: AREA A
Sampled By: FCW
C.O.C. No.: 071800-04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~ %
Date: 7-18-00								
Time: 1600								
Method: Peristaltic Pump	Black	6.60	11.6	17.7	101	0.24	-451	0.7

PURGE DATA:

Date: 7-18-00
Method: Peristaltic Pump
Monitor Reading (ppm):
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 16.20
Static Water Level (WL): 1.75
One Casing Volume(gal): 2.3
Start Purge (hrs): 1330
End Purge (hrs): 1600
Total Purge Time (min): 150
Total Vol. Purged (gal): 3.3

See Attached Low Flow Purge Data Sheet for Purge Data

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	3X 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2 X Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2X Qt. Amber Glass	✓
TCL PAH	4° C	2 X Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1 L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1 L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	1 L PE	✓
		2X VOL COLLECTED	
		FOR DUP	

OBSERVATIONS / NOTES:

Turbidity 69 @ 1800

Circle if Applicable:

MS/MSD —

Duplicate ID No.: GWFD071800-01

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW 47DS
DATE: 7-18-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1330	1.75									START PURGING
1337	2.90	125	7.11	42.3	103	1.00	19.8	-369	2.7	
1346	3.21	115	7.08	41.4	12.2	0.55	20.1	-369	2.7	
1356	3.66	110	7.03	39.3	6.65	0.59	20.1	-372	2.5	
1405	3.94	110	7.01	36.4	5.04	0.57	19.9	-367	2.3	
1414	4.11	120	6.99	33.8	4.55	0.37	19.7	-366	2.1	
1423	4.35	110	6.95	31.8	4.70	0.35	19.0	-360	2.0	
1433	4.45	110	6.90	29.2	4.80	0.35	19.0	-363	1.8	
1443	4.59	115	6.82	25.6	50	0.32	18.8	-381	1.6	
1452	4.67	115	6.73	22.3	133	0.28	18.9	-437	1.3	
1502	4.80	100	6.68	18.5	131	0.29	18.8	-461	1.1	
1512	4.92	100	6.70	15.2	115	0.24	18.6	-468	0.9	
1523	5.04	90	6.66	14.0	101	0.23	18.5	-475	0.8	
1532	5.09	100	6.66	13.2	112	0.24	18.4	-475	0.8	
1542	5.14	100	6.64	12.7	123	0.23	17.9	-468	0.7	10 gal
1552	5.17	100	6.60	12.0	100	0.24	17.8	-459	0.7	
1600	5.20	100	6.60	11.6	101	0.24	17.7	-451	0.7	START sampling
1907										End sampling

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 3GW12D-04
Sample Location: AREA A
Sampled By: FCW/KGS
C.O.C. No.: 072000 4
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~ %
Date: 7.20.00								
Time: 1810								
Method: Peristaltic Pump	CLEAR	6.57	3.38	14.2	0	0.68	-160	0.2

PURGE DATA:

Date: 7-20-00
Method: Peristaltic Pump
Monitor Reading (ppm): 0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 27.50
Static Water Level (WL): 0.60
One Casing Volume(gal): 17.5
Start Purge (hrs): 1700
End Purge (hrs): 1805
Total Purge Time (min): 65
Total Vol. Purged (gal): 1.7

ROUND 4

See Attached Low Flow Purge Data Sheet for Purge Data

FOSTER WHEELER WORKING IN AREA
WELL 12S DESTROYED AND SURFACE REGRADED
(≈3' ABOVE TOP OF STICK-UP)

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	L PE	✓

OBSERVATIONS / NOTES:

4" STEEL RISER

CLEAR SAMPLE WITH A TRACE BLACK FINES, 0 TURB.

4" = .653 GAL/FT

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 3GW120-04
DATE: 7-20-00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1709	0.70	100	6.59	3.38	2.1	3.16	15.7	-155	0.2	
1717	↓	↓	6.59	3.40	0.3	1.73	14.4	-156	↓	
1723	↓	↓	6.61	3.39	0.1	1.55	14.4	-158	↓	
1729	↓	↓	6.60	3.39	↓	1.40	14.4	-160	↓	
1735	↓	↓	6.61	3.39	↓	1.27	14.4	-161	↓	
1741	↓	↓	6.60	3.39	0	1.10	14.4	-160	↓	
1748	↓	↓	6.58	3.39	↓	0.92	14.2	-157	↓	
1754	↓	↓	6.58	3.39	↓	0.80	14.2	-157	↓	
1800	↓	↓	6.58	3.38	↓	0.70	14.2	-159	↓	
1805	↓	↓	6.57	3.38	↓	0.68	14.2	-160	↓	
						0.70	14.2			

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2WGW21S 04
Sample Location: 2WMW21S
Sampled By: R. SIMPSON
C.O.C. No.: 070500-04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~ %
Date: 7.5.00								
Time: 1800								
Method: Peristaltic Pump	TR. BLACK	6.91	32.3	15.4	40	0.26	-404	2.0

PURGE DATA:

Date: 7.5.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 17.30
Static Water Level (WL): 4.41
One Casing Volume(gal): 2.1
Start Purge (hrs): 1614
End Purge (hrs): 1757
Total Purge Time (min): 103
Total Vol. Purged (gal): 2.6

ROUND 4

See Attached Low Flow Purge Data Sheet for Purge Data

END SAMPLING @ 1920 WL = 6.55

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	L PE	✓

OBSERVATIONS / NOTES:

SAMPLED FOR BOTH CTO 203 & 312

SAMPLES HAD SULPHUR ODOR. BLACK FINES (TSS) IN SAMPLE
SOME EFFERVESCENCE IN HCL

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): R. Simpson

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2WMW21S
DATE: 7.5.00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1620	5.22	95	7.06	46.3	1.7	1.90	16.1	-350	3.0	HIGH SOLIDS BLACK
1625	5.43		7.09	45.5	4.5	1.42	15.9	-345	2.9	FINES IN PURGE WATER
1630	5.95		7.07	44.8	2.1	1.23	16.0	-347	2.9	SULFUR ODOR
1640	6.26		7.04	43.9	0.9	1.07	16.0	-349	2.8	
1645	6.40		7.06	43.1	1.0	0.75	16.0	-352	2.8	
1650	6.53		7.07	42.2	1.0	0.90	15.9	-353	2.7	
1655	6.55		7.02	41.5	0.9	0.70	15.8	-354	2.6	
1700	6.58		7.01	40.8	1.0	0.68	15.8	-355	2.6	
1705	6.57		7.01	39.8	1.1	0.59	15.7	-354	2.5	
1710	6.56		6.97	38.8	12	0.64	15.7	-355	2.5	
1715	6.54		6.97	38.0	14	0.47	15.7	-356	2.4	
1720	KS ~~6.96~~ 6.55		6.96	37.6	21	0.41	15.7	-360	2.4	
1725	6.55		6.98	37.3	26	0.37	15.7	-367	2.4	
1730	6.55		6.98	36.7	32	0.31	15.7	-374	2.3	
1740	6.56		6.98	35.0	40	0.26	15.5	-381	2.2	
1745	6.55		6.96	33.5	39	0.23	15.4	-398	2.1	
1750	6.55		6.89	32.8	40	0.30	15.5	-402	2.0	
1755	6.54		6.91	32.3	40	0.26	15.4	-404	2.0	START SAMPLING

SIGNATURE(S): [illegible]

BTM 17.30

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 4GW01S-04
Sample Location: 4MW01
Sampled By: K. SIMPSON
C.O.C. No.: 070500-04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~ %
Date: 7.6.00 Time: 1105 Method: Peristaltic Pump	CLEAR	5.53	0.350	14.0	0	6.17	214	0

PURGE DATA:

Date: 7.6.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0.6
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 20.30
Static Water Level (WL): 8.50
One Casing Volume(gal): 1.9
Start Purge (hrs): 1015
End Purge (hrs): 1105
Total Purge Time (min): 50
Total Vol. Purged (gal): 1.4

ROUND 4

See Attached Low Flow Purge Data Sheet for Purge Data

END SAMPLING @1110 WL = 8.63

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	—
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	—
TCL PEST/PCBs	4° C	Qt. Amber Glass	—
TCL PAH	4° C	Qt. Amber Glass	—
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	—
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	—
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	—
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	L PE	—

OBSERVATIONS / NOTES:

SAMPLED FOR BOTH CTO 203 & 312

PUMP INLET TUBING SET 1' OFF BTM
CLEAR, NO ODOR

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [illegible]

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 Job# 5082

WELL ID.: 4MW01
DATE: 7.6.00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1012	8.50	—	—	—	—	—	—	—	—	START PURGE
1019	8.55	150	5.58	0.386	1.1	6.91	13.9	197	0	CLEAR, NO ODOR
1025	↓	100	5.57	0.360	0.5	6.74	14.2	200	↓	
1030	↓	↓	5.56	0.361	0	7.24	13.9	208	↓	
1040	↓	110	5.55	0.359	0	6.26	14.0	209	↓	
1045	↓	↓	5.54	0.354	↓	6.90	13.8	213	↓	
1050	↓	↓	5.54	0.352	↓	6.38	13.9	217	↓	
1055	8.56	↓	5.53	0.354	↓	6.14	13.8	215	↓	
1100	8.57	↓	5.53	0.351	↓	6.18	13.9	216	↓	
1105	8.57	↓	5.53	0.350	↓	6.17	14.0	214	↓	END PURGE
										CELL IN SUN, TEMP. ELEVATED

SIGNATURE(S): [illegible]

Tetra Tech NUS, Inc.

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: NSB-NLON / AREA A
Project No.: CTO 203 5082

[ ] Domestic Well Data
[x] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: 2LGW205-04
Sample Location: 2LMW205
Sampled By: K. SIMPSON
C.O.C. No.: 070500-04
Type of Sample:
[X] Low Concentration
[ ] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Eh mV	Salinity ~~ppt~~ %
Date: ~~7.5.00~~ 7.6.00								
Time: 1530								
Method: Peristaltic Pump	CLEAR	6.16	0.503	16.0	2.2	0.99	-18	0

PURGE DATA:

Date: 7.6.00
Method: Peristaltic Pump
Monitor Reading (ppm): 0
Well Casing Diameter & Material
Type: 2" PVC
Total Well Depth (TD): 18.95
Static Water Level (WL): 14.69
One Casing Volume(gal): 0.7
Start Purge (hrs): 1428
End Purge (hrs): 1523
Total Purge Time (min): 55
Total Vol. Purged (gal): 1.5

ROUND 4

See Attached Low Flow Purge Data Sheet for Purge Data

END SAMPLING @ 1643 WL = 15.05

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	—
TCL PEST/PCBs	4° C	Qt. Amber Glass	—
TCL PAH	4° C	Qt. Amber Glass	—
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	—
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	—
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	—
Alkalinity, Chloride, Sulfate, TDS, TSS	4° C	L PE	—

OBSERVATIONS / NOTES:

SAMPLED FOR BOTH CTO 312 & 203

FLUSH MT. IN BAD SHAPE, CRACKED PAD LOOSE VAULT & WATER IN VAULT.

PUMP INLET TUBING SET 1' OFF BTM

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s):

LOW FLOW PURGE DATA SHEET

PROJECT SITE NAME: NSB-NLON / AREA A - ROUND 4
PROJECT NUMBER: CTO 203 job# 5082

WELL ID.: 2LMW20S
DATE: 7.6.00

Time (Hrs.)	Water Level (Ft. below TOC)	Flow (mL/Min.)	pH (S.U.)	S. Cond. (mS/cm)	Turb. (NTU)	DO (mg/L)	Temp. (Celcius)	Eh mV	Sal. %	Comments
1427	14.69	—	—	—	—	—	—	—	—	START PURGE
1433	14.77	150	6.33	0.709	280	1.06	15.3	-37	0	CLOUDY, NO ODOR
1440	14.85	100	6.29	0.605	85	1.96	16.1	-38		CLEARING
1445	14.89		6.25	0.589	40	1.51	16.5	-33		
1450	14.90		6.25	0.555	30	1.16	16.1	-32		
1455	14.93		6.24	0.536	14	0.70	16.2	-29		
1500	14.95		6.21	0.523	11	1.26	15.9	-23		
1505	14.97		6.20	0.509	8.3	1.03	15.8	-22		
1510	14.99		6.18	0.502	3.2	1.00	15.8	-19		
1515	14.99		6.18	0.500	1.8	0.96	15.9	-19		
1520	14.99	↓	6.16	0.503	2.2	0.99	16.0	-18	↓	END PURGE

SIGNATURE(S): [illegible]

BTM = 18.85'

SURFACE WATER SAMPLE LOGSHEETS

ROUND 1

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 103

[] Stream
[] Spring
[] Pond
[] Lake
[x] Other: SEEP
[] QA Sample Type:

Sample ID No.: 3MSP01-01
Sample Location: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 102399-01

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other Eh NA
Date: 10.24.99								
Time: 1145								
Depth: 0 - 10"								
Method: DIRECT FILL	CLEAR	6.57	0.371	14.0	12.5	7.25	0.18	184

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	✓
TAL Metals (Total) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene	✓
TAL Metals (Dissolved)	HNO_3/4°C	(1) 1L Polyethylene	✓
Total Organic Carbon (TOC) vs HCL	~~H_2SO_4~~/4°C	(1) 1L Polyethylene	✓
~~Total Dissolved Solids (TDS)~~	~~4°C~~	~~(1) 250mL Polyethylene~~	
Chemical Oxygen Demand (COD) vs	H_2SO_4 ~~HCl~~/4°C	(1) 1L Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	✓
Hardness w/T. TAL METALS	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	

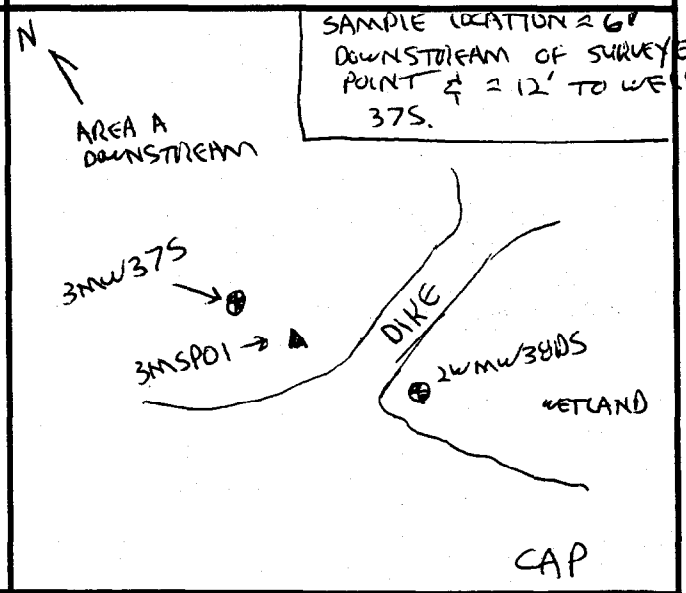
OBSERVATIONS / NOTES:

FLOW EST. 0.5 GPM

TRACE SOLIDS (FINES) WERE STIRRED-UP DURING SAMPLING.

DUG A AREA ≈ 18" DIA. & 10" DEEP @ 0815 TO CREATE A PONDED AREA FOR SAMPLING.

MAP:



Circle if Applicable:

MS/MSD | Duplicate ID No.:

Signature(s): K. S. Simpson

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 203

[] Stream
[] Spring
[] Pond
[] Lake
[x] Other:
[] QA Sample Type:

Sample ID No.: SWSG-18-01
Sample Location: AREA A - WELL 41
Sampled By: K. SIMPSON
C.O.C. No.: 102799-01

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other Eh NA
Date: 10.27.99								
Time: 1752								
Depth: 0 - 10"	LT. TEA TO CLEAR	6.45	0.639	10.1	6.1	3.81	0.31	-24
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	
TCL PAH	4°C	(2) 1L Amber Glass	
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	
TAL Metals (Total) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene	
TAL Metals (Dissolved)	HNO_3/4°C	(1) 1L Polyethylene	
Total Organic Carbon (TOC) HCL	~~H_2SO_4~~/4°C	(1) 1L Polyethylene	
~~Total Dissolved Solids (TDS)~~	~~4°C~~	~~(1) 250mL Polyethylene~~	—
Chemical Oxygen Demand (COD) H_2SO_4	~~HCl~~/4°C	(1) 1L Polyethylene	
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	—

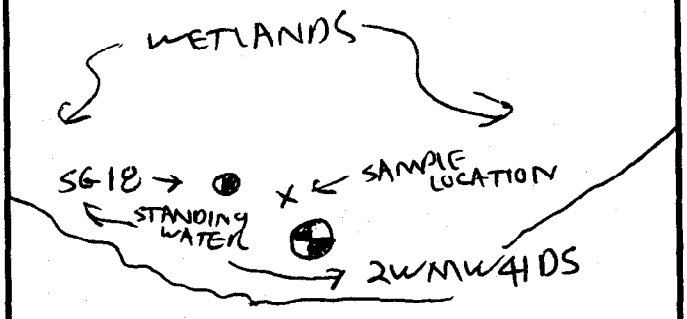
OBSERVATIONS / NOTES:

CLEARED & DUG A 18" Ø X 10" DEEP SAMPLE AREA

STANDING WATER, NO FLOW

SOME PLANT MATERIAL IN SAMPLE

MAP:



GABION BASKETS

RIPRAP

ASPHALT

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): K. S. Simpson

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 103

[] Stream
[] Spring
[] Pond
[] Lake
[x] Other:
[] QA Sample Type:

Sample ID No.: SWSG19-01
Sample Location: AREA A - WELL 42
Sampled By: K. SIMPSON
C.O.C. No.: 102799-01

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA (Eh)
Date: 10-27-99 Time: 1731 Depth: 0 - 10" Method: DIRECT FILL	CLEAR	6.62	0.628	10.5	6.2	5.05	0.31	23.3

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	
TCL PAH	4°C	(2) 1L Amber Glass	
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	
TAL Metals (Total) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene	
TAL Metals (Dissolved)	HNO_3/4°C	(1) 1L Polyethylene	
Total Organic Carbon (TOC) HCL	~~H_2SO_4~~/4°C	(1) 1L Polyethylene	
~~Total Dissolved Solids (TDS)~~	~~4°C~~	~~(1) 250mL Polyethylene~~	—
Chemical Oxygen Demand (COD) H_2SO_4	~~HCl~~/4°C	(1) 1L Polyethylene	
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	—

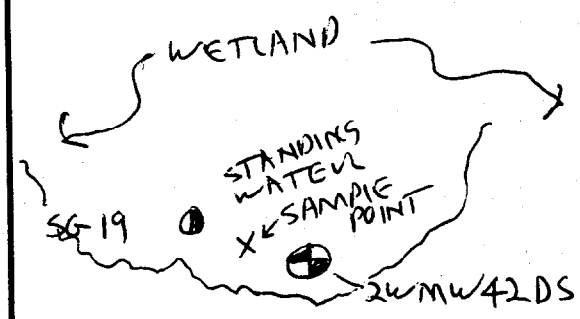
OBSERVATIONS / NOTES:

CLEAR & DUG 14" Ø X 10" DEEP SAMPLE AREA

STANDING WATER, NO FLOW

SOME PLANT MATERIAL IN SAMPLE

MAP:



GABION BASKETS

RIPRAP

ASPHALT

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): K. S. Simpson

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 103

[] Stream
[] Spring
[] Pond
[] Lake
[x] Other:
[] QA Sample Type:

Sample ID No.: SW SG-20-01
Sample Location: AREA A - WELL 43
Sampled By: K. SIMPSON
C.O.C. No.: 102799-01

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other NA (Eh)
Date: 10.27.99								
Time: 1710								
Depth: 0 - 10"	CLEAR TO	6.63	0.624	11.0	6.3	4.95	0.31	7.4
Method: DIRECT FILL	LT. TEA							

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	
TCL PAH	4°C	(2) 1L Amber Glass	
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	
TAL Metals (Total)	HNO_3/4°C	(1) 1L Polyethylene	
TAL Metals (Dissolved) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene	
Total Organic Carbon (TOC) HCL	~~H_2SO_4~~/4°C	(1) 1L Polyethylene	
~~Total Dissolved Solids (TDS)~~	~~4°C~~	~~(1) 250mL Polyethylene~~	—
Chemical Oxygen Demand (COD) H_2SO_4	~~HCl~~/4°C	(1) 1L Polyethylene	
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	—

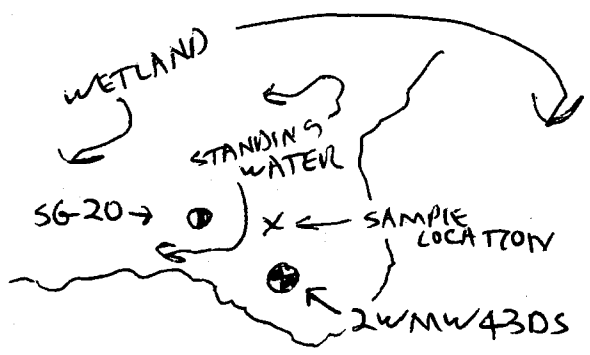
OBSERVATIONS / NOTES:

SAMPLE AREA 10" ± DEEP

STANDING WATER, NO FLOW

SOME ORGANIC (PLANT MATERIAL) IN SAMPLE

MAP:



GABION BASKETS

RIPRAP

ASPHALT

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s): K. S. Simpson

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 103

[] Stream
[] Spring
[] Pond
[] Lake
[x] Other: SURFACE WATER
[] QA Sample Type:

Sample ID No.: SW/SG21-01
Sample Location: SURFACE WATER
Sampled By: R. SIMPSON
C.O.C. No.: 102399-01
AREA A

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other ORP/EH Na
Date: 10.24.99 Time: 0915 Depth: 14" Method: DIRECT FILL	VERY LT YELLOW	6.68	0.568	9.4	6.3	1.80	0.28	46

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	✓
TAL Metals (Total)	HNO_3/4°C	(1) 1L Polyethylene	✓
TAL Metals (Dissolved)	HNO_3/4°C	(1) 1L Polyethylene	✓
Total Organic Carbon (TOC) KS	HCl ~~H_2SO_4~~/4°C	(1) 1L Polyethylene	✓
Total Dissolved Solids (TDS)	4°C	~~(1) 250mL Polyethylene~~	
Chemical Oxygen Demand (COD) KS	H_2SO_4 ~~HCl~~/4°C	(1) 1L Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	✓
Hardness W/ T. TAL METALS	HNO_3/4°C	~~(1) 250mL Polyethylene~~	

OBSERVATIONS / NOTES:

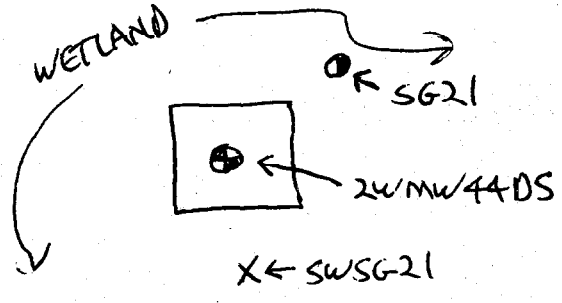
2X VOL. FOR DUP.

"GOOD" SAMPLE VERY FEW FINES STIRRED-UP DURING SAMPLING
TRACE ORGANIC MATERIAL IN SAMPLE. (PLANT MAT.).

NO FLOW NOTED, STANDING WATER

MAP:

SEE ALSO FIG. 3-1 FSP



GABION BASKETS

RIPRAP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	SWFD-102499-01

Signature(s): R. E. Simpson

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 103

[] Stream
[] Spring
[] Pond
[] Lake
[x] Other:
[] QA Sample Type:

Sample ID No.: SWSG-22-01
Sample Location: AREA A WELL 45
Sampled By: K. SIMPSON
C.O.C. No.: 102799-01

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other EA NA
Date: 10-27-99								
Time: 1610								
Depth: 0 - 10"	LT TEA COLOR	6.39	0.559	14.0	30.2	4.35	0.27	-50
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements		Collected
TCL Volatile Organic Compounds	HCl/4°C	9	(3) 40mL Vials	
TCL Semivolatile Organic Compounds	4°C	6	(2) 1L Amber Glass	
TCL PAH	4°C	6	(2) 1L Amber Glass	
TCL Pesticides/PCB	4°C	6	(2) 1L Amber Glass	
TAL Metals (Total) + HARDNESS	HNO_3/4°C	3	(1) 1L Polyethylene	
TAL Metals (Dissolved)	HNO_3/4°C	3	(1) 1L Polyethylene	
Total Organic Carbon (TOC)	H_2SO_4/4°C	3	(1) 1L Polyethylene	
~~Total Dissolved Solids (TDS)~~	~~4°C~~		~~(1) 250mL Polyethylene~~	—
Chemical Oxygen Demand (COD)	HCl/4°C	3	(1) 1L Polyethylene	
Alkalinity, Chloride, Sulfate, TDS	4°C	3	(1) 1L Polyethylene	
~~Hardness~~	~~HNO_3/4°C~~		~~(1) 250mL Polyethylene~~	—

OBSERVATIONS / NOTES:

DUG A 18" Ø X 10" DEEP SAMPLE PIT 10.26.99

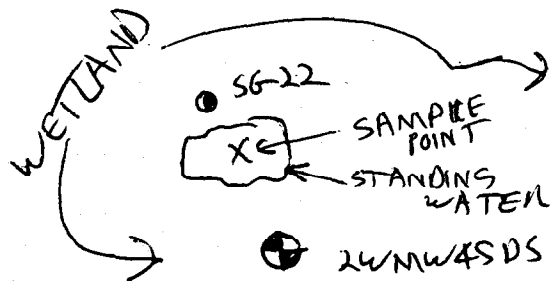
STANDING WATER, NO FLOW

TRACE PLANT MATERIAL IN SAMPLE

"PUDDLE" LIKE SAMPLE SOME SOLIDS WERE STIRRED-UP DRYING SAMPLING

3 X VOL COLLECTED FOR MS/MSD

MAP:



GABION BASKETS

RIPRAP

DEPLOYED PARKING

Circle if Applicable:

MS/MSD YES

Duplicate ID No.:

Signature(s): K. E. Simpson

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 203
WELL 46

[] Stream
[] Spring
[] Pond
[] Lake
[x] Other:
[] QA Sample Type:

Sample ID No.: SW SG-23-01
Sample Location: AREA A
Sampled By: K SIMPSON
C.O.C. No.: 102799-01

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other ORP NA
Date: 10-27-99 Time: 1540 Depth: 0 TO 10" Method: DIRECT FILL	LT TEA TO CLEAR	6.16	0.500	11.0	6.8	4.01	0.24	-19

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	✓
TAL Metals (Total) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene	✓
TAL Metals (Dissolved)	HNO_3/4°C	(1) 1L Polyethylene	✓
Total Organic Carbon (TOC) HCL	~~H_2SO_4~~/4°C	(1) 1L Polyethylene	✓
~~Total Dissolved Solids (TDS)~~	~~4°C~~	~~(1) 250mL Polyethylene~~	—
Chemical Oxygen Demand (COD) H_2SO_4	~~HCl~~/4°C	(1) 1L Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	✓
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	—

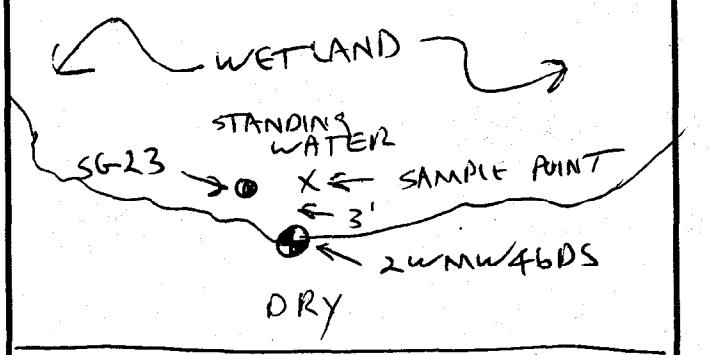
OBSERVATIONS / NOTES:

DUG A SAMPLE PIT 14" Ø
X 10" DEEP 10.26.99

STANDING WATER, NO FLOW

TRACE PLANT MATERIAL IN SAMPLE

MAP:



GABION BASKETS

RIPRAP

DEPLOYED PARKING

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): KS / S. Simpson

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB - NLON / AREA A
Project No.: JOB # 5082 CTO 203

[] Stream
[] Spring
[] Pond
[] Lake
[x] Other: SURFACE WATER
[] QA Sample Type:

Sample ID No.: SWSG24-01
Sample Location: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 102799-01

Type of Sample:
[x] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Other Eh NA
Date: 10.27.99 Time: 1430								
Depth: 10" (0-10") Method: DIRECT FILL	LT. TEA TO CLEAR	7.32	0.403	12.7	3.9	6.46	0.19	-29

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL Volatile Organic Compounds	HCl/4°C	(3) 40mL Vials	✓
TCL Semivolatile Organic Compounds	4°C	(2) 1L Amber Glass	✓
TCL PAH	4°C	(2) 1L Amber Glass	✓
TCL Pesticides/PCB	4°C	(2) 1L Amber Glass	✓
TAL Metals (Total) + HARDNESS	HNO_3/4°C	(1) 1L Polyethylene	✓
TAL Metals (Dissolved)	HNO_3/4°C	(1) 1L Polyethylene	✓
Total Organic Carbon (TOC) HCL	vs ~~H_2SO_4~~/4°C	(1) 1L Polyethylene	✓
~~Total Dissolved Solids (TDS)~~	~~4°C~~	~~(1) 250mL Polyethylene~~	—
Chemical Oxygen Demand (COD)	H_2SO_4 ~~HCl~~/4°C	(1) 1L Polyethylene	✓
Alkalinity, Chloride, Sulfate, TDS	4°C	(1) 1L Polyethylene	✓
~~Hardness~~	~~HNO_3/4°C~~	~~(1) 250mL Polyethylene~~	—

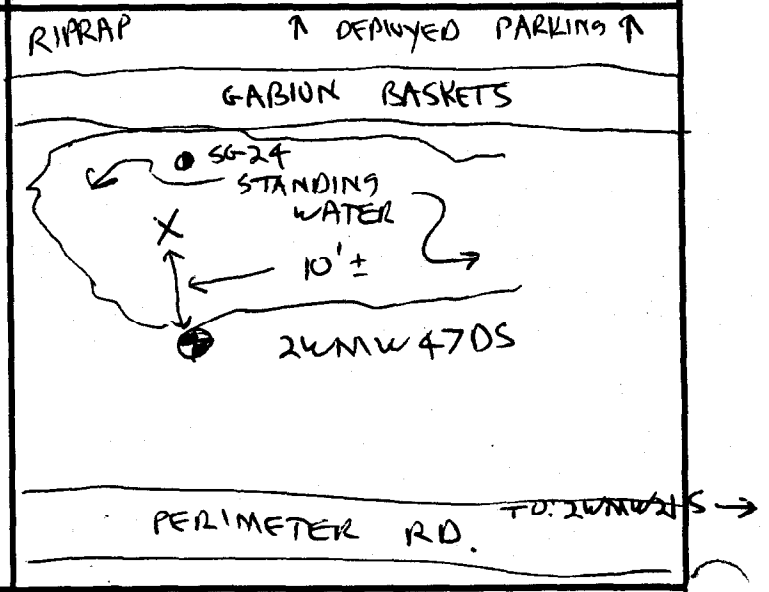
OBSERVATIONS / NOTES:

DUG A SAMPLE AREA 14" Ø X 10" DEEP ON 10.26.99

NO FLOW, STANDING WATER

SOME ORGANIC MATERIAL IN SAMPLE (PLANT MATERIAL)

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): K. E. Simpson

ROUND 3

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NION/AREA A
Project No.: CTO 203 5082

Sample ID No.: SWSG18-03
Sample Location: SG18/2WMW41DS
Sampled By: S. NEIL
C.O.C. No.: 040500-03

- [ ] Stream
- [ ] Spring
- [ ] Pond
- [ ] Lake
- [x] Other:
- [ ] QA Sample Type:

Type of Sample:
- [x] Low Concentration
- [ ] High Concentration

SAMPLING DATA:

Date: 4/5/00	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity PPT	Eh mV
Time: 1120								
Depth: ≈ 10 INCHES	V. LGT BRWN	7.70	0.442	9.0	5.3	1.89	0.21	-221
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) L PE	✓

OBSERVATIONS / NOTES:

Weather: Partly sunny, windy, temperature: low 50's.

Some organic/plant material in samples.

MAP:

Gabion Baskets

Rip-Rap

Asphalt

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): Scott Neil

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NION/AREA A
Project No.: CTO 203 5082

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other:
[] QA Sample Type:

Sample ID No.: SWSG19-03
Sample Location: 2WMW42DS
Sampled By: S. NEIL
C.O.C. No.: 040500-03

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity PPT	Eh mV
Date: 4/5/00								
Time: 1630								
Depth: ≈8 INCHES	V. LGT							
Method: DIRECT FILL	BROWN	8.11	0.536	9.7	22	2.04	0.26	-219

SAMPLE COLLECTION INFORMATION:

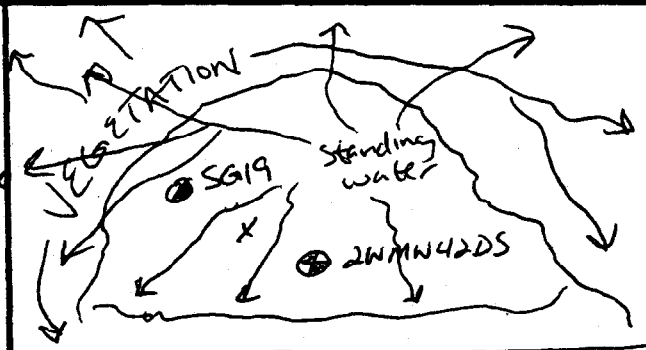
Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) L PE	✓

OBSERVATIONS / NOTES:

WEATHER: Mostly sunny, windy, Temperature = upper 40's.

Sheen on water surface with suspended orange "flock".

MAP:



Gabion Baskets

Rip-Rap

Asphalt

Circle if Applicable:

MS/MSD ✓

Duplicate ID No.:

Signature(s): Scott W. Neil

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NION/AREA A
Project No.: CTO 203 5082

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: SURFACE WATER
[] QA Sample Type:

Sample ID No.: SWSG-20-03
Sample Location: AREA A - WELL 43
Sampled By: NEIL/SIMPSON
C.O.C. No.: 040400 -03

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity PPT	Eh mV
Date: 04.04.00								
Time: 1740								
Depth: 0-10"	CLEAR TO LT. TEA	6.96	0.360	11.8	7.1	6.61	0.17	163
Method: DIRECT FILL								

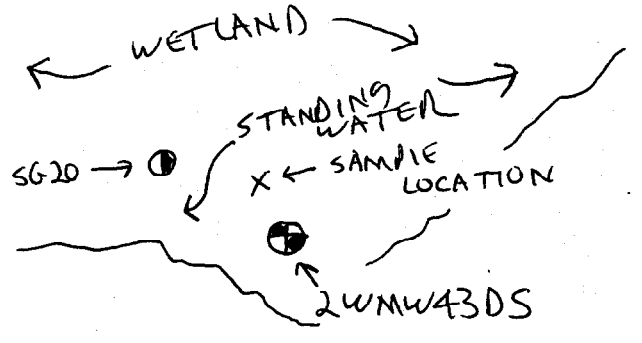
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	✓

OBSERVATIONS / NOTES:

2 X VOL. FOR DUP.
STANDING WATER, NO FLOW
RAIN DURING SAMPLING
SOME ORGANIC MATERIAL (PLANT) IN SAMPLE

MAP:



GABION BASKETS
RIPRAP
ASPHALT CAP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	SWFD 040400-03

Signature(s): K. / S. Simp

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NION/AREA A
Project No.: CTO 203 5082

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: SURFACE WATER
[] QA Sample Type:

Sample ID No.: SWSG-21 -03
Sample Location: AREA A - 2WMW44DS
Sampled By: NEIL/SIMPSON
C.O.C. No.: 040400 -03

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity PPT	Eh mV
Date: 4.4.00								
Time: 1720								
Depth: 0-14"	CLEAR TO LT YELLOW	7.74	0.401	12.1	7.0	7.68	0.19	145
Method: DIRECT FILL								

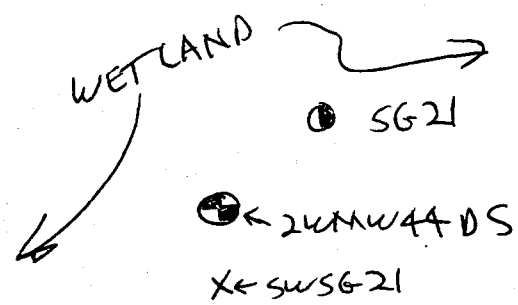
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	✓

OBSERVATIONS / NOTES:

3X VOL FOR MS/MSD
TRACE ORGANIC MATERIAL IN SAMPLE.
RAIN DURING SAMPLING
NO FLOW, STANDING WATER

MAP:



GABION BASKETS

RIP RAP

Circle if Applicable:

MS/MSD: YES

Duplicate ID No.:

Signature(s): Neil E. Simpson

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NION/AREA A
Project No.: CTO 203 5082

Sample ID No.: SW/SG-22-03
Sample Location: AREA A
Sampled By: R. SIMPSON
C.O.C. No.: 04C400 -03

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity PPT	Eh ORP mV
Date: 4.5.00								
Time: 1800								
Depth: 0-10"	LT. TAN	6.90	0.360	8.6	10.3	0.65	0.17	-57
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	✓

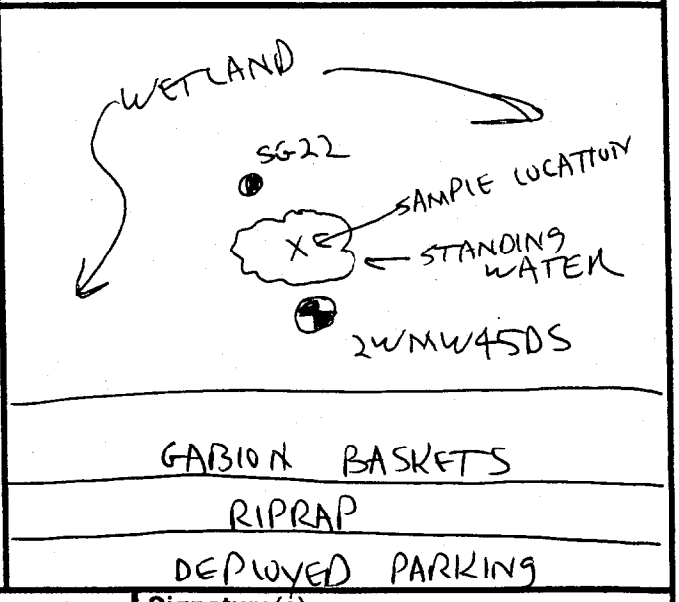
OBSERVATIONS / NOTES:

"CLEANED" SAMPLE LOCATION ON 4.4.00

STANDING WATER NO FLOW

TRACE PLANT MATERIAL IN SAMPLE

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): R. S. Simpson

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NION/AREA A
Project No.: CTO 203 5082

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Sample ID No.: SWSG23-03
Sample Location: SG23
Sampled By: S. NEIL
C.O.C. No.: 040500-03

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity PPT	Eh mV
Date: 4/6/00								
Time: 1105								
Depth: ≈ 11 INCHES								
Method: DIRECT FILL	YELLOW	7.84	0.617	6.0	6.3	5.61	0.30	-246

SAMPLE COLLECTION INFORMATION:

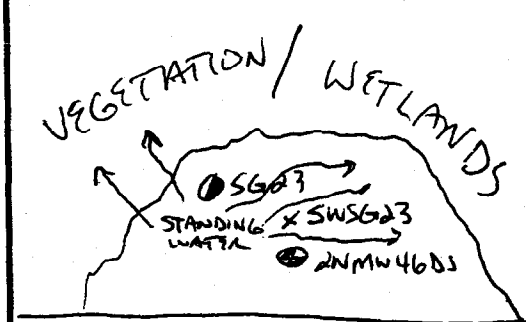
Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	(3) 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	(2) Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	(2) Qt. Amber Glass	✓
TCL PAH	4° C	(2) Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	(1) L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	(1) L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	(1) 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	(1) 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	(1) L PE	✓

OBSERVATIONS / NOTES:

WEATHER: Overcast, breezy, upper 30's.

Some plant material in samples.

MAP:



Gabion Baskets

Rip - Rap

Deployed Parking

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NION/AREA A
Project No.: CTO 203 5082

Sample ID No.: SW/SG24-03
Sample Location: AREA A
Sampled By: K. SIMPSON
C.O.C. No.: 040500-03

[] Stream
[] Spring
[] Pond
[] Lake
[] Other:
[] QA Sample Type:

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity PPT	Eh ORP mV
Date: 4.5.00								
Time: 1550								
Depth: 0-10"	LT. TEA	6.80	4.501	13.7	10.1	1.12	2.54	-176
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	✓

OBSERVATIONS / NOTES:

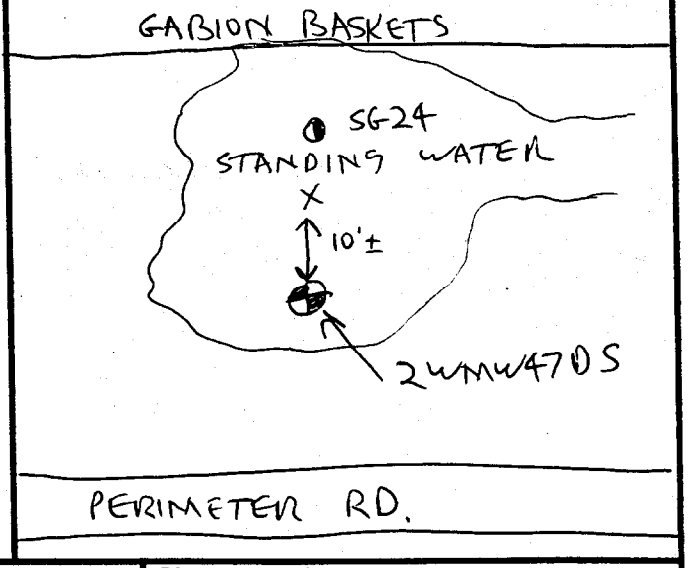
CLEARED SAMPLE AREA ON 4.4.00

NO FLOW STANDING WATER

SOME ORGANIC MATERIAL IN SAMPLE

X = SAMPLE LOCATION

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): K. S. Simpson

ROUND 4

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB NLON - AREA A
Project No.: CTO 203 5092

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: SW
[] QA Sample Type:

Sample ID No.: SWSG-18-04
Sample Location: AREA A - 2WMW4IDS
Sampled By: KS / DW
C.O.C. No.: 071900-04

Type of Sample:
[X] Low Concentration
[] High Concentration

ROUND 4

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Eh mV
Date: 7.18.00 Time: 1705 Depth: 0 - 8" Method: DIRECT FILL	LT TEA TO CLEAR	6.64	0.734	19.0	18	1.18	0	-161

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	✓
		4X VOC DUP + MS/MSD	

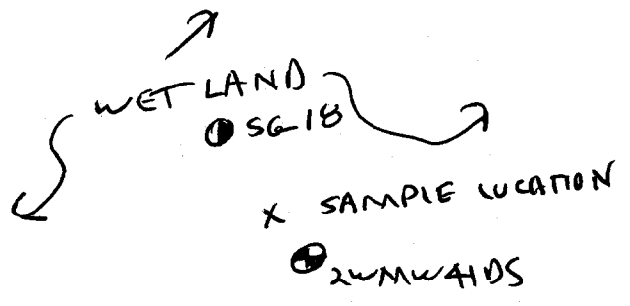
OBSERVATIONS / NOTES:

SOME ORGANIC/PLANT MATERIAL IN SAMPLE

DUG SAMPLE "PIT", 18" Ø X 10" DEEP 7.18.00 AM

RAIN 1600 → 1630, NO CHANGE IN SW LEVEL

MAP:



GABION BASKETS

RIP - RAP

ASPHALT

Circle if Applicable:

MS/MSD	Duplicate ID No.:
YES	SWFD 071800 04

Signature(s): [illegible]

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB NION - AREA A
Project No.:

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: SW
[] QA Sample Type:

Sample ID No.: SWSG19-04
Sample Location: AREA A - 42DS
Sampled By: R.S. / D.W.
C.O.C. No.: 071900-09

Type of Sample:
[X] Low Concentration
[] High Concentration

ROUND 4

SAMPLING DATA:

Date: 7.19.00	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Eh mV
Time: 1010								
Depth: 0 - 8"								
Method: DIRECT FILL	CLEAR	6.56	1.26	18.5	6.6	0.70	0.1	-192

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	—
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	—
TCL PEST/PCBs	4° C	Qt. Amber Glass	—
TCL PAH	4° C	Qt. Amber Glass	—
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	—
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	—
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	—
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	—

OBSERVATIONS / NOTES:

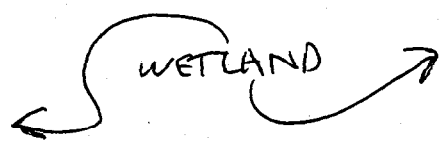
SOME ORGANIC MATERIAL IN SAMPLE

DUG A SAMPLE PIT ≈ 18" Ø X 10" DEEP 7.19.00

SHEEN (BRN) ON WATER SURFACE

STANDING WATER, NO FLOW

MAP:



● SG-19
X SAMPLE LOCATION
● 2WMW42DS

GABION BASKETS
RIP-RAP
ASPHALT

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): [illegible]

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB NION - AREA A
Project No.: CTO 203 5082

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: SW
[] QA Sample Type:

Sample ID No.: SWSG20-04
Sample Location: AREA A - WELL 43
Sampled By: R. SIMPSON
C.O.C. No.: 071904-04

Type of Sample:
[X] Low Concentration
[] High Concentration

ROUND 4

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Eh mV
Date: 7-19-00								
Time: 0945								
Depth: 0-8"	LT. TEA TO CLEAR	6.28	0.422	18.0	6.3	0.57	0	-101
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	—
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	—
TCL PEST/PCBs	4° C	Qt. Amber Glass	—
TCL PAH	4° C	Qt. Amber Glass	—
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	—
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	—
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	—
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	—

OBSERVATIONS / NOTES:

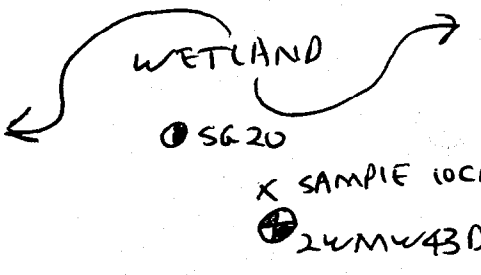
SOME ORGANIC MATERIAL IN SAMPLE

DUG A SAMPLE PIT ≈ 18" Ø X 10" DEEP ON 7-18-00

SHEEN (SILVER) ON WATER SURFACE

STANDING WATER, NO FLOW

MAP:



GABION BASKETS

RIP-RAP

ASPHALT CAP

Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): R. S. Simpson

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NWN - AREA A
Project No.: CTO 203 5082

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: SW
[] QA Sample Type:

Sample ID No.: SWSG-21 04
Sample Location: 2WMW44DS
Sampled By: R.S. / D.W.
C.O.C. No.: 071900 04

Type of Sample:
[X] Low Concentration
[] High Concentration

ROUND 4

SAMPLING DATA:

Date: 7.19.00	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Eh mV
Time: 0915								
Depth: 0-10"	LT TEA TO CLEAR	6.65	0.599	17.9	14.9	0.43	0	-172
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	—
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	—
TCL PEST/PCBs	4° C	Qt. Amber Glass	—
TCL PAH	4° C	Qt. Amber Glass	—
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	—
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	—
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	—
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	—
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	—

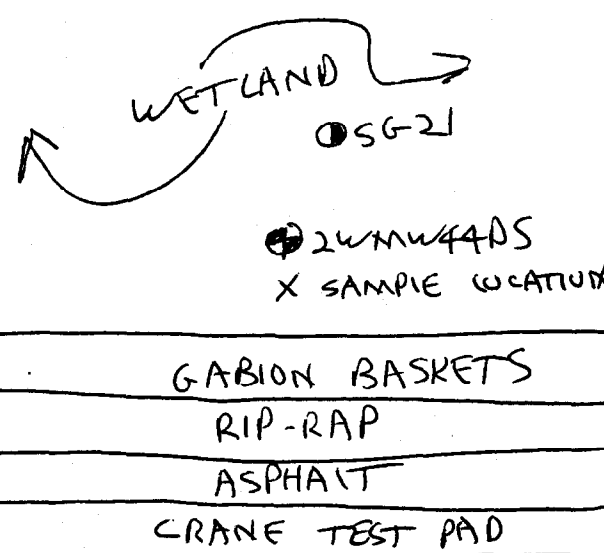
OBSERVATIONS / NOTES:

AREA OF "PONDED" WATER
NO DIGGING REQUIRED.

TRACE ORGANIC MATERIAL IN SAMPLE.

NO FLOW, STANDING WATER

MAP:



Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NION-AREA A
Project No.: CTO 203 5082

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: SW
[] QA Sample Type:

Sample ID No.: SWSG23 04
Sample Location: 2WMW46DS
Sampled By: R. SIMPSON
C.O.C. No.: 071900-04

Type of Sample:
[X] Low Concentration
[] High Concentration

ROUND 4

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Eh mV
Date: 7.18.00								
Time: 0810								
Depth: 0-10"	LT. TEA CLEAR	6.12	0.650	16.7	13.2	0.79	0	-82
Method: DIRECT FILL								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	40 ml Vial	✓
TCL SEMIVOLATILES	4° C	Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	Qt. Amber Glass	✓
TCL PAH	4° C	Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	L PE	✓

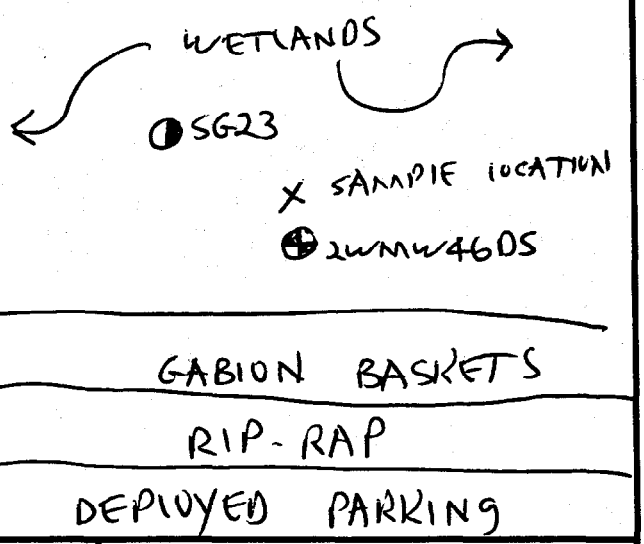
OBSERVATIONS / NOTES:

DUG SAMPLE PIT ≈ 18" Ø X 10" DEEP ON 7.18.00

TRACE ORGANIC MATERIAL IN SAMPLE

STANDING WATER, NO FLOW

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
—	—

Signature(s): R. S. Simpson

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: NSB-NION/AREA A
Project No.: CTO 203 5082

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: SEEP
[] QA Sample Type:

Sample ID No.: 3MSP01-04
Sample Location: AREA A
Sampled By: FCW/DW
C.O.C. No.: 072100-04

Type of Sample:
[X] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color Visual	pH Standard	S.C. mS/cm	Temp. Degrees C	Turbidity NTU	DO mg/l	Salinity %	Eh mV
Date: 7-22-00 Time: 0800 Depth: Seep Method: DIRECT FILL	clear	6.12	1.04	12.5	4.9	6.88	0.0	-53

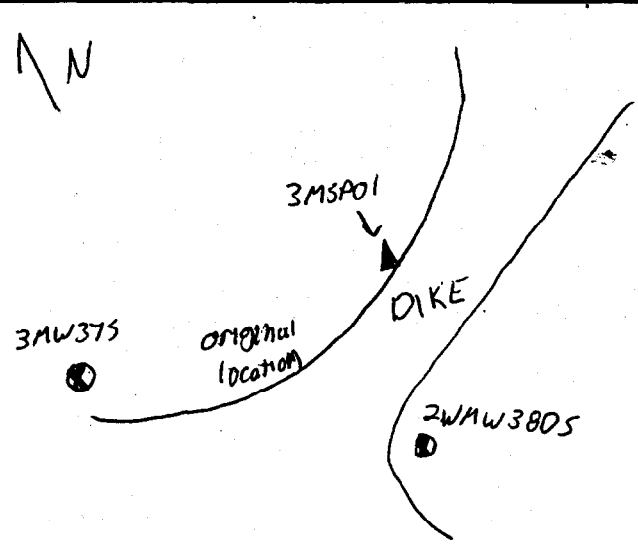
SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
TCL VOLATILES	HCL / 4° C	3 40 ml Vial	✓
TCL SEMIVOLATILES	4° C	2 Qt. Amber Glass	✓
TCL PEST/PCBs	4° C	2 Qt. Amber Glass	✓
TCL PAH	4° C	2 Qt. Amber Glass	✓
TAL METALS (TOTAL) + Hardness	HNO_3 / 4° C	1 L PE	✓
TAL METALS (DISSOLVED)	HNO_3 / 4° C	1 L PE	✓
Total Organic Carbon (TOC)	HCL / 4° C	1 60 mL Glass	✓
Chemical Oxygen Demand (COD)	H_2SO_4 / 4° C	1 250 mL PE	✓
Alkalinity, Chloride, Sulfate, TDS	4° C	1 L PE	✓

OBSERVATIONS / NOTES:

ORIGINAL Seep location dry
Location is approximately 50' east of original location
flow rate approximately ~~15-20~~ 10-15 gpm (Flow)

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): [illegible]

APPENDIX B

STATISTICS

TETRA TECH NUS, INC. **CALCULATION WORKSHEET**

CLIENT: NSB New London	JOB NUMBER: 5082
SUBJECT: Sample Calculation of Statistical Analyses	
BASED ON: GW Upgradient Total Arsenic	DRAWING NUMBER:
BY: MF / CHECKED BY: BEL	APPROVED BY: / DATE: 02/07/04

THE DATA USED FOR THE FOLLOWING SAMPLE CALCULATIONS ARE THE TOTAL ARSENIC RESULTS FROM UPGRADIENT GROUNDWATER SAMPLES. ALL RESULTS ARE IN UG/L

LOCATION	ROUND	RESULT	QUAL	VALUE	LOG VALUE
2LGW20S	1	3.8	U	1.9	0.6419
2LGW20S	3	3.5	U	1.75	0.5596
2LGW20S	4	2.7	U	1.35	0.3001
2WGW21S	1	8.8		8.8	2.1748
2WGW21S	2	2.6	UJ	1.3	0.2624
2WGW21S	3	4.2	U	2.1	0.7419
2WGW21S	4	3	J	3	1.0986
4GW01S	1	3.8	U	1.9	0.6419
4GW01S	2	2.6	U	1.3	0.2624
4GW01S	3	3.5	U	1.75	0.5596
4GW01S	4	2.7	U	1.35	0.3001

1. CALCULATE THE ARITHMETIC MEAN ($\bar{X}$)

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

$$\sum_{i=1}^{11} X_i = 1.9 + 1.75 + 1.35 + 8.8 + 1.3 + 2.1 + 3 + 1.9 + 1.3 + 1.75 + 1.35 =$$

$$\bar{X} = \frac{26.5}{11} = 2.40909$$

CLIENT: NSB New London	JOB NUMBER: 5082
SUBJECT: SAMPLE CALCULATION OF STATISTICAL ANALYSIS	
BASED ON: GW Upgradient total Arsenic	DRAWING NUMBER:
BY: MF / CHECKED BY: BEL	APPROVED BY: / DATE: 02/07/01

2. CALCULATE THE STANDARD DEVIATION (S_x):

$$S_x = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

$$\sum_{i=1}^{11} (x_i - \bar{x})^2 = (1.9 - 2.40909)^2 + (1.75 - 2.40909)^2 + (1.35 - 2.40909)^2 + (8.8 - 2.40909)^2 + (1.3 - 2.40909)^2 + (2.1 - 2.40909)^2 + (3 - 2.40909)^2 + (1.9 - 2.40909)^2 + (1.3 - 2.40909)^2 + (1.75 - 2.40909)^2 + (1.35 - 2.40909)^2$$

$$= (-.50909)^2 + (-.65909)^2 + (-1.05909)^2 + (6.39091)^2 + (-1.10909)^2 + (-.30909)^2 + (.59091)^2 + (-.50909)^2 + (-1.10909)^2 + (-.65909)^2 + (-1.05909)^2$$

$$= (.2592) + (.4344) + (1.1217) + (40.8437) + (1.2801) + (.0955) + (.3492) + (.2592) + (1.2301) + (.4344) + (1.1217)$$

$$\sum_{i=1}^{11} (x_i - \bar{x})^2 = 47.3792$$

$$S_x = \sqrt{\frac{47.3792}{11}} = \sqrt{4.3072} = 2.0754$$

CLIENT: NSB New London	JOB NUMBER: 5082
SUBJECT: Sample Calculation of Statistical Analysis	
BASED ON: GW Upgradient Total Arsenic	DRAWING NUMBER:
BY: Mf / CHECKED BY: BEL	APPROVED BY: / DATE: 02/07/01

3 CALCULATE THE SHAPIRO-WILK W STATISTIC (W_{CALC}):

$$W_{CALC} = \left(\frac{b}{S_x \sqrt{n-1}} \right)^2$$

CALCULATE b BY CREATING A TABLE WITH:

COLUMN 1 = RESULTS ORDERED FROM SMALLEST TO LARGEST (R_i)
COLUMN 2 = RESULTS ORDERED FROM LARGEST TO SMALLEST (R_{n-i+1})
COLUMN 3 = COLUMN 2 − COLUMN 1 ($R_{n-i+1} - R_i$)
COLUMN 4 = COEFFICIENT a_i FOUND IN TABLE 1
COLUMN 5 = COLUMN 3 × COLUMN 4 = $b_i = a_i (R_{n-i+1} - R_i)$

$$b = \sum_{i=1}^{K} b_i$$

WHERE K IS THE GREATEST INTEGER LESS THAN OR EQUAL TO n/2

R_i	R_{n-i+1}	$R_{n-i+1} - R_i$	a_i	b_i	i
1.3	8.8	7.5	0.5601	4.2008	1
1.3	3	1.7	0.3315	0.5636	2
1.35	2.1	0.75	0.2260	0.1695	3
1.36	1.9	0.55	0.1429	0.0786	4
1.75	1.9	0.15	0.0695	0.0104	5
1.75	1.75				6
1.9	1.75				7
1.9	1.35				8
2.1	1.35				9
3	1.3				10
8.8	1.3				11

b = 5.0229

CLIENT: NSB New London	JOB NUMBER: 5082
SUBJECT: SAMPLE CALCULATION OF STATISTICAL Analysis	
BASED ON: GW upgradient total Arsenic	DRAWING NUMBER:
BY: MJ / CHECKED BY: BEL	APPROVED BY: / DATE: 02/07/01

$$W_{calc} = \left(\frac{b}{S_x \sqrt{n-1}}\right)^2 = \left(\frac{5.0229}{2.0754\sqrt{10}}\right)^2 = \left(\frac{5.0229}{2.0754(3.1623)}\right)^2$$

$$= \left(\frac{5.0229}{6.56304}\right)^2 = (.76533)^2 = 0.5857$$

$W_{calc} = 0.5857$

DETERMINE W_{TEST} AT 5% LEVEL OF SIGNIFICANCE FROM TABLE 2:

$W_{TEST} = 0.850$

COMPARE W_{CALC} WITH W_{TEST}:

$W_{CALC} = 0.5857 < 0.850 = W_{TEST}$

SINCE $W_{CALC} < W_{TEST}$, WE REJECT THE HYPOTHESIS THAT THE DATA HAS A NORMAL DISTRIBUTION

4. CALCULATE THE 95% UPPER CONFIDENCE LIMIT ($UCL_{0.95}$):

$$UCL_{0.95} = \bar{x} + t_{0.95,n-1}\frac{S_x}{\sqrt{n}}$$

DETERMINE $t_{0.95,10}$ FROM TABLE 3:

$t_{0.95,10} = 1.812$

CLIENT: NSB NEW LONDON	JOB NUMBER: 5082
SUBJECT: SAMPLE CALCULATION OF STATISTICAL Analysis	
BASED ON: GW UPGRADIENT TOTAL Arsenic	DRAWING NUMBER:
BY: nlf / CHECKED BY: BEL	APPROVED BY: / DATE: 02/07/01

$$UCL_{0.95} = 2.40909 + \frac{(1.812)(2.0754)}{\sqrt{11}}$$

$$= 2.40909 + \frac{(1.812)(2.0754)}{(3.3166)}$$

$$= 2.40909 + 1.1339 = 3.54299$$

$$UCL_{0.95} = 3.543 \text{ ug/L}$$

5. CALCULATE 95% UPPER CONFIDENCE LIMIT (UCL) OF THE TRANSFORMED DATA FOR A SET OF LOGNORMALLY DISTRIBUTED DATA

RELEVANT EQUATION:

$$UCL = e^{\left(\bar{y} + 0.5S^2 + \frac{SH_{1-\alpha}}{\sqrt{n-1}}\right)} \quad \text{and} \quad S = \sqrt{\frac{\sum_{i=1}^{n} (\ln y_i - \bar{y})^2}{n-1}}$$

where: e = constant, base of natural log
$\bar{y}$ = mean of transformed data
$y_i = \ln(x_i)$
x_i = Individual Sample value
n = population of the data set
UCL = UPPER CONFIDENCE LIMIT OF TRANSFORMED DATA (95%)

S = Standard Deviation
$H_{1-\alpha}$ = H-Statistic for Computing one-sided confidence limit ($1-\alpha = 95\%$)

CLIENT: NSB New London	JOB NUMBER:
SUBJECT: Sample Calculation of Statistical Analysis	
BASED ON: GW Upgradient total Arsenic	DRAWING NUMBER:
BY: MP / CHECKED BY: BEL	APPROVED BY: / DATE: 02/07/01

SAMPLE CALCULATION:

FOR TOTAL ARSENIC IN GROUNDWATER FROM

$H_{0.95} = 2.2544$

SAMPLE	i	x_i (UG/L)	y_i	$(y_i-\bar{y})^2$	$(x_i-\bar{x})^2$
2LGW20S (1)	1	1.9	0.6419	0.0019	0.2592
2LGW20S (3)	2	1.75	0.5596	0.0159	0.4344
2LGW20S (4)	3	1.35	0.3001	0.1487	1.1217
2WGW21S (1)	4	8.8	2.1748	2.2173	40.8437
2WGW21S (2)	5	1.3	0.2624	0.1792	1.2301
2WGW21S (3)	6	2.1	0.7419	0.0032	0.0955
2WGW21S (4)	7	3	1.0986	0.1704	0.3492
4GW01S (1)	8	1.9	0.6419	0.0019	0.2592
4GW01S (2)	9	1.3	0.2624	0.1792	1.2301
4GW01S (3)	10	1.75	0.5596	0.0159	0.4344
4GW01S (4)	11	1.35	0.3001	0.1487	1.1217
	$\sum_{i=1}^{n}$	26.5	$\sum_{i=1}^{n} = 7.5433$	$\sum_{i=1}^{n} 3.0823$	$\sum_{i=1}^{n} 47.3792$

- CALCULATION OF THE MEAN

$\bar{y} = 7.5433 / 11 = 0.68575$ lognormal

- CALCULATION OF THE STANDARD DEVIATION

$$S_y = \sqrt{\frac{\sum_{i=1}^{n} (y_i - \bar{y})^2}{n-1}} = \sqrt{\frac{3.0823}{10}} = \sqrt{.30823} = 0.5551$$

$S_y = 0.5551$ lognormal

CLIENT: NSB New London	JOB NUMBER: 5082
SUBJECT: Sample Calculation of Statistical Analysis	
BASED ON: GW Upgradient total Arsenic	DRAWING NUMBER:
BY: Mf / CHECKED BY: BGL	APPROVED BY: / DATE: 02/07/01

- CALCULATION OF THE H-STATISTIC FOR COMPUTING ONE-SIDED CONFIDENCE LIMIT ($1-\alpha = 95\%$) FOR LOGNORMAL DISTRIBUTION

- RELEVANT EQUATION

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

WHERE

S_y = Standard deviation for lognormal data set = 0.5551

$x_1 = S_y < 0.551 = 0.50$ (TABLE A12)

$x_2 = S_y > 0.551 = 0.60$ (TABLE A12)

y_1 = Respective $H_{0.95}$ VALUE from TABLE A12

y_2 = Respective $H_{0.95}$ VALUE FROM TABLE A12

SAMPLE CALCULATION:

FOR $n = 10$ $y_1 = 2.220$ (FROM TABLE ~~AT2~~ A12)

$y_2 = 2.368$ (FROM TABLE ~~AT2~~ A12)

$$y - 2.220 = \frac{2.368 - 2.220}{0.60 - 0.50}(x - 0.50)$$

$$y - 2.220 = \frac{0.148}{0.1}(x - 0.50)$$

$$y - 2.220 = 1.48(x - 0.50)$$

$$y - 2.220 = 1.48x - 0.74$$

$$y - 1.48x = 1.48$$

$$y = 1.48x + 1.48$$

CLIENT NSB New London	JOB NUMBER
SUBJECT Sample calculation of Statistical analysis	
BASED ON GW Upgradient total Arsenic	DRAWING NUMBER
BY MF / CHECKED BY BEL	APPROVED BY / DATE 02/07/01

FOR $x = S_y = 0.5551$

$$y = 1.48(0.5551) + 1.48 = 2.3015$$
$$= \underline{2.3015} = H_{0.95} \text{ @ } n = 10 \text{ and } S_y = 0.5551$$

FOR $n = 12$ $\quad y_1 = 2.141$
$\quad y_2 = 2.271$

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

$$= y - 2.141 = \frac{2.271 - 2.141}{0.60 - 0.50}(x - 0.50)$$

$$= y - 2.141 = \frac{0.13}{0.1}(x - 0.50)$$

$$= y - 2.141 = 1.3(x - 0.50)$$
$$= y - 2.141 = 1.3x - 0.65$$
$$y = 1.3x + 1.491$$

FOR $x = S_y = 0.551$

$$y = 1.3(0.551) + 1.491$$
$$= 0.7163 + 1.491 = \underline{2.2073} = H_{0.95}$$
$$\text{@ } n = 12 \quad S_y = 0.551$$

FINALLY, FOR $x_1 = 10$ and $y_1 = 2.3015$
$x_2 = 12$ $\quad y_2 = 2.2073$

$$y - y_1 = \frac{y_2 - y_1}{x_2 - x_1}(x - x_1)$$

CLIENT	JOB NUMBER
NSB New London	5082
SUBJECT: Simple Calculations of Statistical Analysis	
BASED ON: GW Upgradient total Arsenic	DRAWING NUMBER
BY: MF / CHECKED BY: BZ	APPROVED BY / DATE: 02/07/01

$$y - 2.3015 = \frac{2.2073 - 2.3015}{12 - 10}(x - 10)$$

$$y - 2.3015 = \frac{-0.0942}{2}(x - 10)$$

$$y - 2.3015 = -0.0471(x - 10)$$

$$y - 2.3015 = -0.0471x + 0.471$$

$$y = -0.0471x + 2.7725$$

FOR $n = 11$ DATA POINTS AND $S_y = 0.5551$

$$y = -0.0471(11) + 2.7725$$

$$y = 2.2544 = H_{0.95}$$

CALCULATION OF THE 95% (UCL) UPPER CONFIDENCE LIMIT OF THE TRANSFORMED DATA FOR A SET OF LOGNORMALLY DISTRIBUTED DATA

$$UCL = e^{\left(\bar{y} + 0.5S^2 + S\frac{H_{1-\alpha}}{\sqrt{n-1}}\right)}$$ and

$$S = \sqrt{\frac{\sum_{i=1}^{n}(\ln y_i - \bar{y})^2}{n-1}}$$

$$UCL = e^{\left(0.6858 + 0.5(0.5551)^2 + \frac{(0.5551)(2.2544)}{\sqrt{10}}\right)}$$

$$= e^{(0.6858 + 0.1541 + 0.3957)}$$

$$= e^{(1.2356)} = 3.44 \text{ ug/L}$$

TETRA TECH NUS, INC. **CALCULATION WORKSHEET**

CLIENT	JOB NUMBER
NSB NEW LONDON	5082

SUBJECT: SAMPLE CALCULATION OF STATISTICAL ANALYSIS

BASED ON	DRAWING NUMBER
GW UPGRADIENT TOTAL ARSENIC	

BY	CHECKED BY	APPROVED BY	DATE
MF	BEL		02/07/01

PERFORM THE WILCOXON RANK-SUM NON PARAMETRIC ANOVA:
RANK FROM LOWEST TO HIGHEST

VALUE	GRADIENT	RANK	Adjusted RANK	VALUE	GRADIENT	RANK	Adjusted RANK
1.3	DOWN	1	4	3	DOWN	29	30
1.3	DOWN	2	4	3	DOWN	30	30
1.3	DOWN	3	4	3	UP	31	30
1.3	DOWN	4	4	3.5	DOWN	32	32
1.3	DOWN	5	4	5.05	DOWN	33	33
1.3	UP	6	4	5.15	DOWN	34	34
1.3	UP	7	4	5.4	DOWN	35	35
1.35	DOWN	8	10.5	5.5	DOWN	36	36
1.35	DOWN	9	10.5	6.2	DOWN	37	37
1.35	DOWN	10	10.5	6.5	DOWN	38	38
1.35	DOWN	11	10.5	8.4	DOWN	39	39
1.35	UP	12	10.5	8.8	UP	40	40
1.35	UP	13	10.5	9.4	DOWN	41	41
1.5	DOWN	14	14	10.4	DOWN	42	42
1.75	DOWN	15	16.5	10.8	DOWN	43	43
1.75	DOWN	16	16.5	11.8	DOWN	44	44
1.75	UP	17	16.5	12.2	DOWN	45	45
1.75	UP	18	16.5	16.1	DOWN	46	46
1.9	DOWN	19	21.5	16.5	DOWN	47	47
1.9	DOWN	20	21.5	18.4	DOWN	48	48
1.9	DOWN	21	21.5	20.5	DOWN	49	49
1.9	DOWN	22	21.5	21.8	DOWN	50	50
1.9	UP	23	21.5	24.4	DOWN	51	51
1.9	UP	24	21.5	25.9	DOWN	52	52
2.1	DOWN	25	25.5	26.6	DOWN	53	53
2.1	UP	26	25.5	28.4	DOWN	54	54
2.6	DOWN	27	27	33.4	DOWN	55	55
2.9	DOWN	28	28	36.3	DOWN	56	56

CLIENT	JOB NUMBER
NSB NEW LONDON	5082
SUBJECT: Sample Calculations for Statistical Analysis	
BASED ON: DOWN. UPGRADIENT TOTAL ARSENIC	DRAWING NUMBER
BY: MF / CHECKED BY: BEL	APPROVED BY / DATE: 02/07/01

SUM THE RANKS:

$$WRS = \sum_{DOWN} RANK = 5(4) + 4(10.5) + 1(14) + 2(16.5) + 4(21.5) + 1(25.5) + 1(27) + 1(28) + 2(30) + 1(32) + 1(33) + 1(34) + 1(35) + 1(36) + 1(37) + 1(38) + 1(39) + 1(41) + 1(42) + 1(43) + 1(44) + 1(45) + 1(46) + 1(47) + 1(48) + 1(49) + 1(50) + 1(51) + 1(52) + 1(53) + 1(54) + 1(55) + 1(56) = 1395.5$$

$$\sum_{UP} RANK = 2(4) + 2(10.5) + 2(16.5) + 2(21.5) + 25.5 + 30 + 40 = 200.5$$

CALCULATE THE Z SCORE (ZRS):

$$Z_{rs} = \frac{W_{rs} - \frac{n_1(m+1)}{2}}{\sqrt{\frac{n_1 n_2 (m+1)}{12}}}$$

$$Z_{rs} = \frac{1395.5 - \frac{45(57)}{2}}{\sqrt{\frac{45(11)(57)}{12}}} = \frac{113}{48.4896} = 2.3303$$

FROM TABLE 5 A Z SCORE OF 2.33 corresponds to A P-LEVEL OF 0.0198

SINCE 0.0198 < 0.05

THE DOWNGRADIENT ARSENIC CONCENTRATIONS ARE STATISTICALLY HIGHER THAN THE UPGRADIENT TOTAL ARSENIC CONCENTRATIONS AT A 95% LEVEL OF SIGNIFICANCE

Sample Calculations Table 1
COEFFICIENTS A_i FOR W TEST OF NORMALITY FOR N=2 to 50

i/n	2	3	4	5	6	7	8	9	10
1	0.7071	0.7071	0.6872	0.6646	0.6431	0.6233	0.6052	0.5888	0.5739
2			0.1677	0.2413	0.2806	0.3031	0.3164	0.3244	0.3291
3					0.0875	0.1401	0.1743	0.1976	0.2141
4							0.0561	0.0947	0.1224
5									0.0399

i/n	11	12	13	14	15	16	17	18	19	20
1	0.5601	0.5475	0.5359	0.5251	0.5150	0.5056	0.4968	0.4886	0.4808	0.4734
2	0.3315	0.3325	0.3325	0.3318	0.3306	0.3290	0.3273	0.3253	0.3232	0.3211
3	0.2260	0.2347	0.2412	0.2460	0.2495	0.2521	0.2540	0.2553	0.2561	0.2565
4	0.1429	0.1586	0.1707	0.1802	0.1878	0.1939	0.1988	0.2027	0.2059	0.2085
5	0.0695	0.0922	0.1099	0.1240	0.1353	0.1447	0.1524	0.1587	0.1641	0.1686
6		0.0303	0.0539	0.0727	0.0880	0.1005	0.1109	0.1197	0.1271	0.1334
7				0.0240	0.0433	0.0593	0.0725	0.0837	0.0932	0.1013
8						0.0196	0.0359	0.0496	0.0612	0.0711
9								0.0163	0.0303	0.0422
10										0.0140

i/n	21	22	23	24	25	26	27	28	29	30
1	0.4643	0.4590	0.4542	0.4493	0.4450	0.4407	0.4366	0.4328	0.4291	0.4254
2	0.3185	0.3156	0.3126	0.3098	0.3069	0.3043	0.3018	0.2992	0.2968	0.2944
3	0.2578	0.2571	0.2563	0.2554	0.2543	0.2533	0.2522	0.2510	0.2499	0.2487
4	0.2119	0.2131	0.2139	0.2145	0.2148	0.2151	0.2152	0.2151	0.2150	0.2148
5	0.1736	0.1764	0.1787	0.1807	0.1822	0.1836	0.1848	0.1857	0.1864	0.1870
6	0.1399	0.1443	0.1480	0.1512	0.1539	0.1563	0.1584	0.1601	0.1616	0.1630
7	0.1092	0.1150	0.1201	0.1245	0.1283	0.1316	0.1346	0.1372	0.1395	0.1415
8	0.0804	0.0878	0.0941	0.0997	0.1046	0.1089	0.1128	0.1162	0.1192	0.1219
9	0.0530	0.0618	0.0696	0.0764	0.0823	0.0876	0.0923	0.0965	0.1002	0.1036
10	0.0263	0.0368	0.0459	0.0539	0.0610	0.0672	0.0728	0.0778	0.0822	0.0862
11		0.0122	0.0228	0.0321	0.0403	0.0476	0.0540	0.0598	0.0650	0.0697
12				0.0107	0.0200	0.0284	0.0358	0.0424	0.0483	0.0537
13						0.0094	0.0178	0.0253	0.0320	0.0381
14								0.0084	0.0159	0.0227
15										0.0076

i/n	31	32	33	34	35	36	37	38	39	40
1	0.4220	0.4188	0.4156	0.4127	0.4096	0.4068	0.4040	0.4015	0.9689	0.3964
2	0.2921	0.2898	0.2876	0.2854	0.2834	0.2813	0.2794	0.2774	0.2755	0.2737
3	0.2475	0.2463	0.2451	0.2439	0.2427	0.2415	0.2403	0.2391	0.2380	0.2368
4	0.2145	0.2141	0.2137	0.2132	0.2127	0.2121	0.2116	0.2110	0.2104	0.2098
5	0.1874	0.1878	0.1880	0.1882	0.1883	0.1883	0.1883	0.1881	0.1880	0.1878
6	0.1641	0.1651	0.1660	0.1667	0.1673	0.1678	0.1683	0.1686	0.1689	0.1691
7	0.1433	0.1449	0.1463	0.1475	0.1487	0.1496	0.1503	0.1513	0.1520	0.1526
8	0.1243	0.1265	0.1284	0.1301	0.1317	0.1331	0.1344	0.1356	0.1366	0.1376
9	0.1066	0.1093	0.1118	0.1140	0.1160	0.1179	0.1196	0.1211	0.1225	0.1237
10	0.0899	0.0931	0.0961	0.0988	0.1013	0.1036	0.1056	0.1075	0.1092	0.1108
11	0.0739	0.0777	0.0821	0.0844	0.0873	0.0900	0.0924	0.0947	0.0967	0.0986
12	0.0585	0.0629	0.0669	0.0706	0.0739	0.0770	0.0798	0.0824	0.0848	0.0870
13	0.0435	0.0485	0.0530	0.0572	0.0610	0.0645	0.0677	0.0706	0.0733	0.0759
14	0.0289	0.0344	0.0395	0.0441	0.0484	0.0523	0.0559	0.0592	0.0622	0.0651
15	0.0144	0.0206	0.0262	0.0314	0.0361	0.0404	0.0444	0.0481	0.0515	0.0546
16		0.0068	0.0131	0.0187	0.0239	0.0287	0.0331	0.0372	0.0409	0.0444
17				0.0062	0.0119	0.0172	0.0220	0.0264	0.0305	0.0343
18						0.0057	0.0110	0.0158	0.0203	0.0244
19								0.0053	0.0101	0.0146
20										0.0049

i/n	41	42	43	44	45	46	47	48	49	50
1	0.3940	0.3917	0.3894	0.3872	0.3850	0.3830	0.3808	0.3789	0.3770	0.3751
2	0.2719	0.2701	0.2684	0.2667	0.2651	0.2635	0.2620	0.2604	0.2589	0.2574
3	0.2357	0.2345	0.2334	0.2323	0.2313	0.2302	0.2291	0.2281	0.2271	0.2260
4	0.2091	0.2085	0.2078	0.2072	0.2065	0.2058	0.2052	0.2045	0.2038	0.2032
5	0.1876	0.1874	0.1871	0.1868	0.1865	0.1862	0.1859	0.1855	0.1851	0.1847
6	0.1693	0.1694	0.1695	0.1695	0.1695	0.1695	0.1695	0.1693	0.1692	0.1691
7	0.1531	0.1535	0.1539	0.1542	0.1545	0.1548	0.1550	0.1551*	0.1553	0.1554
8	0.1384	0.1392	0.1398	0.1405	0.1410	0.1415	0.1420	0.1423	0.1427	0.1430
9	0.1249	0.1259	0.1269	0.1278	0.1286	0.1293	0.1300	0.1306	0.1312	0.1317
10	0.1123	0.1136	0.1149	0.1160	0.1170	0.1180	0.1189	0.1197	0.1205	0.1212
11	0.1004	0.1020	0.1035	0.1049	0.1062	0.1073	0.1085	0.1095	0.1105	0.1113
12	0.0891	0.0909	0.0927	0.0943	0.0959	0.0972	0.0986	0.0998	0.1010	0.1020
13	0.0782	0.0804	0.0824	0.0842	0.0860	0.0876	0.0892	0.0906	0.0919	0.0932
14	0.0677	0.0701	0.0724	0.0745	0.0775	0.0785	0.0801	0.0817	0.0832	0.0846
15	0.0575	0.0602	0.0628	0.0651	0.0673	0.0694	0.0713	0.0731	0.0748	0.0764
16	0.0476	0.0506	0.0534	0.0560	0.0584	0.0607	0.0628	0.0648	0.0667	0.0685
17	0.0379	0.0411	0.0442	0.0471	0.0497	0.0522	0.0546	0.0568	0.0588	0.0608
18	0.0283	0.0318	0.0352	0.0383	0.0412	0.0439	0.0465	0.0489	0.0511	0.0532
19	0.0188	0.0227	0.0263	0.0296	0.0328	0.0357	0.0385	0.0411	0.0436	0.0459
20	0.0094	0.0136	0.0175	0.0211	0.0245	0.0277	0.0307	0.0335	0.0361	0.0386
21		0.0045	0.0087	0.0126	0.0163	0.0197	0.0229	0.0259	0.0288	0.0314
22				0.0042	0.0081	0.0188	0.0153	0.0185	0.0215	0.0244
23						0.0039	0.0076	0.0111	0.0143	0.0174
24								0.0037	0.0071	0.0104
25										0.0350

Sample Calculation Table 2
PERCENTAGE POINTS OF THE W TEST FOR N=3 to 50

n	0.01	0.05
3	0.753	0.767
4	0.687	0.748
5	0.686	0.762
6	0.713	0.788
7	0.730	0.803
8	0.749	0.818
9	0.764	0.829
10	0.781	0.842
11	0.792	0.850
12	0.805	0.859
13	0.814	0.866
14	0.825	0.874
15	0.835	0.881
16	0.844	0.887
17	0.851	0.892
18	0.858	0.897
19	0.863	0.901
20	0.868	0.905
21	0.873	0.908
22	0.878	0.911
23	0.881	0.914
24	0.884	0.916
25	0.888	0.918
26	0.891	0.920
27	0.894	0.923
28	0.896	0.924
29	0.898	0.926
30	0.900	0.927

n	0.01	0.05
31	0.902	0.929
32	0.904	0.930
33	0.906	0.931
34	0.908	0.933
35	0.910	0.934
36	0.912	0.935
37	0.914	0.936
38	0.916	0.938
39	0.917	0.939
40	0.919	0.940
41	0.920	0.941
42	0.922	0.942
43	0.923	0.943
44	0.924	0.944
45	0.926	0.945
46	0.927	0.945
47	0.928	0.946
48	0.929	0.947
49	0.929	0.947
50	0.930	0.947

Sample Calculations Table 3

PERCENTILES OF STUDENT's t-DISTRIBUTION WITH n DEGREES OF FREEDOM

n\F	0.60	0.75	0.90	0.95	0.975	0.99	0.995	0.9995
1	0.325	1.000	3.078	6.314	12.706	31.821	63.656	636.578
2	0.289	0.816	1.886	2.920	4.303	6.965	9.925	31.600
3	0.277	0.765	1.638	2.353	3.182	4.541	5.841	12.924
4	0.271	0.741	1.533	2.132	2.776	3.747	4.604	8.610
5	0.267	0.727	1.476	2.015	2.571	3.365	4.032	6.869
6	0.265	0.718	1.440	1.943	2.447	3.143	3.707	5.959
7	0.263	0.711	1.415	1.895	2.365	2.998	3.499	5.408
8	0.262	0.706	1.397	1.860	2.306	2.896	3.355	5.041
9	0.261	0.703	1.383	1.833	2.262	2.821	3.250	4.781
10	0.260	0.700	1.372	1.812	2.228	2.764	3.169	4.587
11	0.260	0.697	1.363	1.796	2.201	2.718	3.106	4.437
12	0.259	0.695	1.356	1.782	2.179	2.681	3.055	4.318
13	0.259	0.694	1.350	1.771	2.160	2.650	3.012	4.221
14	0.258	0.692	1.345	1.761	2.145	2.624	2.977	4.140
15	0.258	0.691	1.341	1.753	2.131	2.602	2.947	4.073
16	0.258	0.690	1.337	1.746	2.120	2.583	2.921	4.015
17	0.257	0.689	1.333	1.740	2.110	2.567	2.898	3.965
18	0.257	0.688	1.330	1.734	2.101	2.552	2.878	3.922
19	0.257	0.688	1.328	1.729	2.093	2.539	2.861	3.883
20	0.257	0.687	1.325	1.725	2.086	2.528	2.845	3.850
21	0.257	0.686	1.323	1.721	2.080	2.518	2.831	3.819
22	0.256	0.686	1.321	1.717	2.074	2.508	2.819	3.792
23	0.256	0.685	1.319	1.714	2.069	2.500	2.807	3.768
24	0.256	0.685	1.318	1.711	2.064	2.492	2.797	3.745
25	0.256	0.684	1.316	1.708	2.060	2.485	2.787	3.725
26	0.256	0.684	1.315	1.706	2.056	2.479	2.779	3.707
27	0.256	0.684	1.314	1.703	2.052	2.473	2.771	3.689
28	0.256	0.683	1.313	1.701	2.048	2.467	2.763	3.674
29	0.256	0.683	1.311	1.699	2.045	2.462	2.756	3.660
30	0.256	0.683	1.310	1.697	2.042	2.457	2.750	3.646
40	0.255	0.681	1.303	1.684	2.021	2.423	2.704	3.551
60	0.254	0.679	1.296	1.671	2.000	2.390	2.660	3.460
120	0.254	0.677	1.289	1.658	1.980	2.358	2.617	3.373
1,000,000	0.253	0.674	1.282	1.645	1.960	2.326	2.576	3.290

$F = 1 - \alpha$

Sample calculation Table 4
VALUES OF $H_{0.95}$ FOR COMPUTING A ONE-SIDED UPPER 95% CONFIDENCE LIMIT ON A LOGNORMAL MEAN

Sy\n	3	5	7	10	12	15	21	31	51	101	201
0.10	2.750	2.035	1.886	1.802	1.775	1.749	1.722	1.701	1.684	1.670	1.652
0.20	3.295	2.198	1.992	1.881	1.843	1.809	1.771	1.742	1.718	1.697	1.676
0.30	4.109	2.402	2.125	1.977	1.927	1.882	1.833	1.793	1.761	1.733	1.705
0.40	5.220	2.651	2.282	2.089	2.026	1.968	1.905	1.856	1.813	1.777	1.727
0.50	6.495	2.947	2.465	2.220	2.141	2.068	1.989	1.928	1.876	1.830	1.784
0.60	7.807	3.287	2.673	2.368	2.271	2.181	2.085	2.010	1.946	1.891	1.836
0.70	9.120	3.662	2.904	2.532	2.414	2.306	2.191	2.102	2.025	1.960	1.895
0.80	10.43	4.062	3.155	2.710	2.570	2.443	2.307	2.202	2.112	2.035	1.958
0.90	11.74	4.478	3.420	2.902	2.738	2.589	2.432	2.310	2.206	2.117	2.028
1.00	13.05	4.905	3.698	3.103	2.915	2.744	2.564	2.423	2.306	2.205	2.104
1.25	16.33	6.001	4.426	3.639	3.389	3.163	2.923	2.737	2.580	2.447	2.314
1.50	19.6	7.120	5.184	4.207	3.896	3.612	3.311	3.077	2.881	2.713	2.545
1.75	22.87	8.250	5.960	4.795	4.422	4.081	3.719	3.437	3.200	2.997	2.794
2.00	26.14	9.387	6.747	5.396	4.962	4.564	4.141	3.812	3.533	3.295	3.057
2.50	32.69	11.67	8.339	6.621	6.067	5.557	5.013	4.588	4.228	3.92	3.612
3.00	39.23	13.97	9.945	7.864	7.191	6.57	5.907	5.388	4.947	4.569	4.191
3.50	45.77	16.27	11.56	9.118	8.326	7.596	6.815	6.201	5.681	5.233	4.758
4.00	52.31	18.58	13.18	10.38	9.469	8.63	7.731	7.024	6.424	5.908	5.392
4.50	58.85	20.88	14.8	11.64	10.62	9.669	8.652	7.854	7.174	6.59	6.006
5.00	65.39	23.19	16.43	12.91	11.77	10.71	9.579	8.688	7.929	7.277	6.625
6.00	78.47	27.81	19.68	15.45	14.08	12.81	11.44	10.36	9.449	8.661	7.873
7.00	91.55	32.43	22.94	18.00	16.39	14.9	13.31	12.05	10.98	10.05	9.12
8.00	104.6	37.06	26.2	20.55	18.71	17.01	15.18	13.74	12.51	11.45	10.39
9.00	117.7	41.68	29.46	23.1	21.03	19.11	17.05	15.43	14.05	12.85	11.65
10.00	130.8	46.31	32.73	25.66	23.35	21.22	18.93	17.13	15.59	14.26	12.93

Sample Calculation Table 5
p Levels from Z Scores for 2 Sided Tests

Z	p	Z	p	Z	p	Z	p	Z	p	Z	p	Z	p	Z	p
0.00	1.0000	0.50	0.6171	1.00	0.3173	1.50	0.1336	2.00	0.0455	2.50	0.0124	3.00	0.0027	3.50	0.0005
0.01	0.9920	0.51	0.6101	1.01	0.3125	1.51	0.1310	2.01	0.0444	2.51	0.0121	3.01	0.0026	3.51	0.0004
0.02	0.9840	0.52	0.6031	1.02	0.3077	1.52	0.1285	2.02	0.0434	2.52	0.0117	3.02	0.0025	3.52	0.0004
0.03	0.9761	0.53	0.5961	1.03	0.3030	1.53	0.1260	2.03	0.0424	2.53	0.0114	3.03	0.0024	3.53	0.0004
0.04	0.9681	0.54	0.5892	1.04	0.2983	1.54	0.1236	2.04	0.0414	2.54	0.0111	3.04	0.0024	3.54	0.0004
0.05	0.9601	0.55	0.5823	1.05	0.2937	1.55	0.1211	2.05	0.0404	2.55	0.0108	3.05	0.0023	3.55	0.0004
0.06	0.9522	0.56	0.5755	1.06	0.2891	1.56	0.1188	2.06	0.0394	2.56	0.0105	3.06	0.0022	3.56	0.0004
0.07	0.9442	0.57	0.5687	1.07	0.2846	1.57	0.1164	2.07	0.0385	2.57	0.0102	3.07	0.0021	3.57	0.0004
0.08	0.9362	0.58	0.5619	1.08	0.2801	1.58	0.1141	2.08	0.0375	2.58	0.0099	3.08	0.0021	3.58	0.0003
0.09	0.9283	0.59	0.5552	1.09	0.2757	1.59	0.1118	2.09	0.0366	2.59	0.0096	3.09	0.0020	3.59	0.0003
0.10	0.9203	0.60	0.5485	1.10	0.2713	1.60	0.1096	2.10	0.0357	2.60	0.0093	3.10	0.0019	3.60	0.0003
0.11	0.9124	0.61	0.5419	1.11	0.2670	1.61	0.1074	2.11	0.0349	2.61	0.0091	3.11	0.0019	3.61	0.0003
0.12	0.9045	0.62	0.5353	1.12	0.2627	1.62	0.1052	2.12	0.0340	2.62	0.0088	3.12	0.0018	3.62	0.0003
0.13	0.8966	0.63	0.5287	1.13	0.2585	1.63	0.1031	2.13	0.0332	2.63	0.0085	3.13	0.0017	3.63	0.0003
0.14	0.8887	0.64	0.5222	1.14	0.2543	1.64	0.1010	2.14	0.0324	2.64	0.0083	3.14	0.0017	3.64	0.0003
0.15	0.8808	0.65	0.5157	1.15	0.2501	1.65	0.0989	2.15	0.0316	2.65	0.0080	3.15	0.0016	3.65	0.0003
0.16	0.8729	0.66	0.5093	1.16	0.2460	1.66	0.0969	2.16	0.0308	2.66	0.0078	3.16	0.0016	3.66	0.0003
0.17	0.8650	0.67	0.5029	1.17	0.2420	1.67	0.0949	2.17	0.0300	2.67	0.0076	3.17	0.0015	3.67	0.0002
0.18	0.8572	0.68	0.4965	1.18	0.2380	1.68	0.0930	2.18	0.0293	2.68	0.0074	3.18	0.0015	3.68	0.0002
0.19	0.8493	0.69	0.4902	1.19	0.2340	1.69	0.0910	2.19	0.0285	2.69	0.0071	3.19	0.0014	3.69	0.0002
0.20	0.8415	0.70	0.4839	1.20	0.2301	1.70	0.0891	2.20	0.0278	2.70	0.0069	3.20	0.0014	3.70	0.0002
0.21	0.8337	0.71	0.4777	1.21	0.2263	1.71	0.0873	2.21	0.0271	2.71	0.0067	3.21	0.0013	3.71	0.0002
0.22	0.8259	0.72	0.4715	1.22	0.2225	1.72	0.0854	2.22	0.0264	2.72	0.0065	3.22	0.0013	3.72	0.0002
0.23	0.8181	0.73	0.4654	1.23	0.2187	1.73	0.0836	2.23	0.0257	2.73	0.0063	3.23	0.0012	3.73	0.0002
0.24	0.8103	0.74	0.4593	1.24	0.2150	1.74	0.0819	2.24	0.0251	2.74	0.0061	3.24	0.0012	3.74	0.0002
0.25	0.8026	0.75	0.4533	1.25	0.2113	1.75	0.0801	2.25	0.0244	2.75	0.0060	3.25	0.0012	3.75	0.0002
0.26	0.7949	0.76	0.4473	1.26	0.2077	1.76	0.0784	2.26	0.0238	2.76	0.0058	3.26	0.0011	3.76	0.0002
0.27	0.7872	0.77	0.4413	1.27	0.2041	1.77	0.0767	2.27	0.0232	2.77	0.0056	3.27	0.0011	3.77	0.0002
0.28	0.7795	0.78	0.4354	1.28	0.2005	1.78	0.0751	2.28	0.0226	2.78	0.0054	3.28	0.0010	3.78	0.0002
0.29	0.7718	0.79	0.4295	1.29	0.1971	1.79	0.0735	2.29	0.0220	2.79	0.0053	3.29	0.0010	3.79	0.0002
0.30	0.7642	0.80	0.4237	1.30	0.1936	1.80	0.0719	2.30	0.0214	2.80	0.0051	3.30	0.0010	3.80	0.0001
0.31	0.7566	0.81	0.4179	1.31	0.1902	1.81	0.0703	2.31	0.0209	2.81	0.0050	3.31	0.0009	3.81	0.0001
0.32	0.7490	0.82	0.4122	1.32	0.1868	1.82	0.0688	2.32	0.0203	2.82	0.0048	3.32	0.0009	3.82	0.0001
0.33	0.7414	0.83	0.4065	1.33	0.1835	1.83	0.0672	2.33	0.0198	2.83	0.0047	3.33	0.0009	3.83	0.0001
0.34	0.7339	0.84	0.4009	1.34	0.1802	1.84	0.0658	2.34	0.0193	2.84	0.0045	3.34	0.0008	3.84	0.0001
0.35	0.7263	0.85	0.3953	1.35	0.1770	1.85	0.0643	2.35	0.0188	2.85	0.0044	3.35	0.0008	3.85	0.0001
0.36	0.7188	0.86	0.3898	1.36	0.1738	1.86	0.0629	2.36	0.0183	2.86	0.0042	3.36	0.0008	3.86	0.0001
0.37	0.7114	0.87	0.3843	1.37	0.1707	1.87	0.0615	2.37	0.0178	2.87	0.0041	3.37	0.0008	3.87	0.0001
0.38	0.7039	0.88	0.3789	1.38	0.1676	1.88	0.0601	2.38	0.0173	2.88	0.0040	3.38	0.0007	3.88	0.0001
0.39	0.6965	0.89	0.3735	1.39	0.1645	1.89	0.0588	2.39	0.0168	2.89	0.0039	3.39	0.0007	3.89	0.0001
0.40	0.6892	0.90	0.3681	1.40	0.1615	1.90	0.0574	2.40	0.0164	2.90	0.0037	3.40	0.0007	3.90	0.0001
0.41	0.6818	0.91	0.3628	1.41	0.1585	1.91	0.0561	2.41	0.0160	2.91	0.0036	3.41	0.0006	3.91	0.0001
0.42	0.6745	0.92	0.3576	1.42	0.1556	1.92	0.0549	2.42	0.0155	2.92	0.0035	3.42	0.0006	3.92	0.0001
0.43	0.6672	0.93	0.3524	1.43	0.1527	1.93	0.0536	2.43	0.0151	2.93	0.0034	3.43	0.0006	3.93	0.0001
0.44	0.6599	0.94	0.3472	1.44	0.1499	1.94	0.0524	2.44	0.0147	2.94	0.0033	3.44	0.0006	3.94	0.0001
0.45	0.6527	0.95	0.3421	1.45	0.1471	1.95	0.0512	2.45	0.0143	2.95	0.0032	3.45	0.0006	3.95	0.0001
0.46	0.6455	0.96	0.3371	1.46	0.1443	1.96	0.0500	2.46	0.0139	2.96	0.0031	3.46	0.0005	3.96	0.0001
0.47	0.6384	0.97	0.3320	1.47	0.1416	1.97	0.0488	2.47	0.0135	2.97	0.0030	3.47	0.0005	3.97	0.0001
0.48	0.6312	0.98	0.3271	1.48	0.1389	1.98	0.0477	2.48	0.0131	2.98	0.0029	3.48	0.0005	3.98	0.0001
0.49	0.6241	0.99	0.3222	1.49	0.1362	1.99	0.0466	2.49	0.0128	2.99	0.0028	3.49	0.0005	3.99	0.0001

APPENDIX C

COMMENTS AND RESPONSES

GENERAL COMMENTS

Comment 1

I am concerned about the misapplication of the Shapiro-Wilk W-test for determining data distribution. The statistical evaluations are used to determine if contaminants associated with past activities at the Area A Landfill are impacting groundwater at the site. The determination statistically compares the chemical concentrations in upgradient wells with the chemical concentrations in downgradient wells. Therefore, it is critical that the statistical analyses are performed in accordance with the guidance (*see also* Attachment A). Once the appropriate nonparametric statistical comparison has been performed, the recommendations presented in Section 5.2 should be re-evaluated to determine if revisions are needed.

Response

In future reports, data sets that do not pass the Shapiro-Wilk W-test for either normal or lognormal distributions will be considered 'undetermined' distributions and non-parametric 95% UCL and ANOVA calculations will be performed on such data sets. It has been standard procedure in the past to assume a lognormal distribution for undetermined data sets since EPA guidance suggests that environmental data tend to be lognormally distributed.

Results for this report would have been the same if these changes had been implemented. In this report, all 95% UCLs were defaulted to the maximum positive detection and non-parametric ANOVAs were performed on all the data sets and gave the same results as the parametric ANOVAs performed.

Comment 2

The conclusions regarding groundwater flow at the site appear to be well founded and well supported by the data. The discussion is quite complete, integrating information on the stratigraphy, horizontal and vertical potential gradients, and hydraulic conductivities. The role of the dredge material as a confining layer is particularly significant, in that it affects whether upward flowing, bedrock groundwater interacts with the landfill materials. I note that no vertical cross-sections of the landfill are provided. It would assist greatly in the assessment of the monitoring data if maps showing the lateral extent of the three overburden units (landfill materials, dredge material, and alluvium) and vertical cross-sections showing their relative thickness, pinch-outs, *etc.*, were prepared. In addition, the well characteristics should be tabulated in more detail than that provided in Table 3-1. In particular, the table should include the elevations of the top and bottom of each well screen (*i.e.*, not just depth below ground surface), and the stratigraphic units across where each well is screened. This is essential to determine whether well-to-well comparisons are appropriate (*i.e.*, screens in the same hydrostratigraphic interval).

Response

Vertical cross-sections were prepared and included in the Groundwater Monitoring Plan for the Area A Landfill (TtNUS, 1999). Please refer to this document for the Cross-sections. A table will be prepared and incorporated into the Year 2 Annual report which details the monitoring well information for the wells sampled as part of the ongoing quarterly sampling at the Area A Landfill.

Comment 3

The trend analyses for arsenic (Figures 4-8 to 4-11) implies a conceptual model that involves a decrease in arsenic in groundwater over a relatively short time scale. While this is not made explicit, such an expectation would be consistent with a source of arsenic within the landfill material that has been diminished by the reduction of infiltration by the cap and/or continued depletion of a limited source mass by leaching. In this case, one would expect arsenic concentrations in groundwater to decrease over time, with significant changes being discernible within a few years of the cap construction. While this may be plausible, there are other scenarios that have very different implications for the evolution of arsenic in site groundwater. In particular, it seems entirely likely that the arsenic detected in downgradient groundwater is present within the overburden materials (*i.e.*, the alluvium and/or the dredge material). Arsenic is commonly sorbed onto ferric oxyhydroxide grain coatings. Reducing groundwater can mobilize this arsenic by dissolution of the coatings. Reducing conditions are present in the area of the landfill, as seen in the field data for ORP collected during purging of the wells. ORP clearly drops from the upgradient wells (4MW1S and 2LMW20S) to the downgradient wells (*e.g.*, 2WMW40DS, 2WMW46DS, etc.). This could be a natural change in ORP as water moves from the recharge area on the ridge to the southwest toward the discharge area in the wetland to the northeast. Alternatively, the change in ORP may be an impact of the landfill, or at least may be enhanced by the landfill leachate. Low ORP leachate is common in landfill settings, as microbial decomposition of organics within the fill consumes oxygen and anaerobic organisms flourish. In either case, the low-ORP groundwater can be expected to dissolve ferric oxyhyroxides and simultaneously liberate the associated arsenic. In order to develop and support a consistent, conceptual model for the elevated arsenic observed in downgradient wells, the program should consider several modifications for future sampling, analysis, and data evaluations, including the following:

- Analyze for reduced iron, Fe(II), in the field at the time of groundwater sampling (*e.g.*, with a Hach kit). Additional parameters should include nitrate/nitrite and dissolved manganese, as trends in these analytes may support or refute interpretations of redox-dependent transport processes.

- Perform the same statistical tests (*e.g.*, ANOVA) used to look for significant changes in As from upgradient to downgradient to look for significant changes in ORP and DO. This should also be extended to additional parameters already measured (*e.g.*, pH, conductivity, salinity, alkalinity, sulfate, Cu, Zn, *etc.*), as well as the additional parameters suggested in the foregoing item.

- Use available data to determine whether the observed reducing conditions represent a natural state of the hydrogeochemical system or a landfill impact or both. This might draw upon data from wells distant from the landfill, but still subject to similar transport pathways from recharge on the ridge to discharge to the wetland.

If a sound conceptual model for the elevated arsenic emerges from these efforts, it will help to condition expectations for the time scale for changes in arsenic in downgradient wells. For example, if landfill leachate is determined to be the direct cause of the low ORP water at the downgradient wells, one might expect that ORP will rise slowly as organics within the fill are degraded. Arsenic will correspondingly decrease, but this might be expected to occur over a time scale of decades. If the low ORP is simply the natural state of the hydrogeochemical system, one might expect that the elevated arsenic will persist indefinitely. These considerations may have significant implications

for the appropriate analytes, choice of wells, and frequency and duration of continued monitoring.

Response

It is possible that the elevated arsenic levels are due to a combination of varying conditions from both the landfill cap and the dredge spoils as stated in the comment. It is apparent that the groundwater near the landfill is influenced by reducing conditions which, as stated in the comment, will facilitate mobilization of any sorbed arsenic by dissolving iron oxyhydroxides. In addition, the released arsenic may be more mobile than anticipated because oxidized forms (arsenate) may be reduced to arsenite and travel through the groundwater as an uncharged solute. Regardless, collection of additional geochemical data will help define the environment associated with the landfill and dredge material and support evaluation of any arsenic concentration trends. Future consideration will be given to performing natural attenuation sampling (testing for Fe(II), nitrate, nitrite, and dissolved manganese) as well as the continued current fixed based analytical program requirements.

Comment 4

The rationale behind the choice, as well as the use, of the "upgradient" wells should be developed and presented in the document. Three wells are designated "upgradient" (p. 4-3, §4.3): 2LMW20S, 2WMW21S, and 4MW1S. Strictly speaking, well 2WMW21S is not "upgradient" of the landfill; rather, it is on flow paths from the east toward the Area A wetland. This well may serve a purpose as a "reference" well that is unlikely to be impacted by the landfill, but its designation as an "upgradient" well is somewhat misleading. Water at this location may have little relationship to water that passes through the landfill area, flowing from its recharge area southwest of the landfill toward the wetland to the northeast. Furthermore, some attention should be paid to the hydrostratigraphic locations of the reference wells and the wells they are compared with. In particular, it is noted that 2LMW20S appears to be screened in the fill and/or alluvium (*e.g.*, Table 2-2, Round 1 Groundwater Monitoring Report), 2WMW21S appears to be screened in the dredged material, and 4MW1S is screened in the bedrock. While it is attractive to monitor all three of these units in "reference" areas not directly impacted by the landfill, care should be taken in comparing these three "upgradient" wells as a group to the "downgradient" wells, which are screened predominantly in the dredged material (*e.g.*, Table 2-2, Round 1 GMR). The statistical analyses (§4.3.1) seek to identify significant differences between COC concentrations in upgradient and downgradient wells, as such differences may reflect landfill impacts. However, it is not clear that the three "upgradient" wells should be grouped, or that bedrock and alluvium groundwater should be compared to dredged material water. Differences in water chemistry because of the differences in hydrostratigraphy may obscure or dominate differences because of the impact of the landfill.

A particular concern is the inclusion of 2WMW21S as an "upgradient" well. In addition to the fact that groundwater from this location does not move through the landfill area toward the "downgradient" wells, the field parameters indicate that the groundwater at 2WMW21S is of a very different character than that in the other two designated upgradient wells. The following table shows mean values for the field parameters for upgradient wells 4MW1S and 2LMW20S (four rounds of data for each of the two wells, "lumped"), downgradient wells 2WMW40DS and 2WMW46DS (four rounds of data for each of the two wells, "lumped"), and well 2WMW21S (four rounds, "lumped"). Wells 2WMW40DS and 2WMW46DS are directly downgradient of well 4MW1S and 2LMW20S, respectively.

Wells	pH	DO (mg/L)	ORP (mV)	salinity (%)	spec. Cond. (mS/cm)	turbidity (NTU)
4MW1S, 2LMW20S	5.84	1.66	96.5	0.14	0.40	0.74
2WMW40DS, 2WMW46DS	7.01	2.24	-335	21.7	34.4	64.8
2WMW21S	6.76	3.50	-366	20.4	32.8	68.6

With respect to these water-quality parameters, it would appear that groundwater at 2WMW21S has a closer affinity with the downgradient wells (2WMW40DS and 2WMW46DS) than with the upgradient wells (4MW1S and 2LMW20S). In particular, 2WMW21S, 2WMW40DS, and 2WMW46DS are characterized by higher pH, higher DO, much lower ORP, higher salinity and specific conductivity, and higher turbidity. These may be characteristics of water in the dredged material. The difference in ORP is particularly significant, as it has a very strong influence on the mobility of arsenic, as discussed above. These data highlight the caution concerning what constitutes a meaningful "upgradient" well in attempting to identify landfill impacts.

It is interesting to note that classical indicators of landfill leachate include relatively low pH, while the table shows that the downgradient wells exhibit the highest pH among the groups considered. Low ORP is also often a good indicator of landfill leachate, yet 2WMW21S, which is clearly not impacted by the landfill, exhibits ORP very similar to the downgradient wells. It is possible that the reducing conditions may simply be characteristic of the dredged material (which has low hydraulic conductivity, high organic content, *etc.*), and not an impact of the landfill. The same observation can be made for the salinity and specific conductivity, which are often elevated in landfill leachates owing to high dissolved solids. These are elevated at 2WMW21S as well as at the downgradient wells, suggesting again that this may be characteristic of water in the dredged material, independent of any impact of the landfill.

Response

The rationale for the selection of monitoring wells to be considered for use as sources of upgradient and/or background locations was discussed during the development of the Groundwater Monitoring Plan (GMP) and was reviewed by all of the regulatory agencies. Data from well 2WMW21S clearly indicate that it is more like wells screened in dredge material. The data also are consistent with groundwater in contact with more marine influenced sediments (e.g., higher pH and higher specific conductivity). Further, the two upgradient wells, when separated from the influence of well 2WMW21S, more clearly represent water from a weathering source area with lower pH and relatively low specific conductivity. As discussed in the response to General Comment No. 3, reducing conditions within the dredge material will facilitate mobilization of iron oxyhydroxides and any sorbed metals, particularly arsenic. Additional geochemical data from these wells in future sampling rounds will help to clarify the source and magnitude of any arsenic concentration trends. The selection of well 2WMW21S as an upgradient well will be reconsidered by the Navy based on new information.

SPECIFIC COMMENTS

Comment 1

p. 4-2, §4.1 The last sentence in the first paragraph indicates that some positive results for chromium and copper were detected above the secondary screening criteria. Table 4-1 indicates that lead was also detected in two samples above the secondary screening criteria. Please include lead in the list of metals detected above secondary screening criteria.

Response

The reason for the omission of lead is because the text was written to discuss only exceedances in regards to total metals and not detections noted in the dissolved phase. The text will be revised to better clarify that detections noted were in samples collected for total metals.

Comment 2

p. 4-4, §4.3.2.1 This paragraph states that if the Shapiro-Wilk W-test is "inconclusive" then the data will be assumed to be lognormally distributed. This assumption is incorrect and has lead to errors in the "95% UCL" column (which itself is mislabeled) on Tables 4-4 and 4-5. If the W statistic for both the normal and lognormal data distributions do not exceed the W test value, then these data should be assumed to be distributed nonparametrically. The 95% UCL of the mean for nonparametrically distributed data should be calculated using equation 11.12 in Gilbert (1987).

Of greater concern, Table 4-6 summarizes the data distribution types and type of ANOVA used for comparing the downgradient and upgradient groups for each parameter. Where the distribution was listed as lognormal for both the downgradient group and the upgradient group, a parametric ANOVA was used. For most of the parameters in this table the distribution type of both the downgradient group and the upgradient group should have been listed as nonparametric rather than lognormal. The type of ANOVA selected should have been nonparametric. The ANOVA results of these comparisons as listed may not be correct since parametric tests were used to evaluate many data sets that were actually nonparametrically distributed. The actual results will not be known until the appropriate statistical analyses are performed. Once comparisons have been performed using the appropriate nonparametric statistic, the recommendations presented in Section 5.2 should be re-evaluated to determine if revisions are needed.

Response

As stated in the response to General Comment 1, data sets that do not pass the Shapiro-Wilk W-test for either normal or lognormal distributions will be considered 'undetermined' distributions and non-parametric 95% UCL and ANOVA calculations will be performed on such data sets. Nonparametric is not a distribution type, but rather a method of qualitatively dealing with data sets, which lack strong evidence of underlying distribution.

It is standard practice to default the 95% UCL to the maximum positive detection when the calculated 95% UCL exceeds the maximum positive detection. This is in order to be conservative, particularly because lognormal 95% UCL values can sometimes be unrealistic values (e.g., 1,500,000 ppm). This value is typically still called the 95% UCL. Exposure point concentration

(EPC) has been substituted for this term, but has been objected to on projects were no risk analysis is being performed.

Comment 3

p. 4-12, §4.3.3 This page includes a discussion of the comparison of arsenic concentrations to Surface Water Protection Criteria during the four rounds of sampling. This discussion should include a reference to Table 4-9, which presents the comparison.

Response

In future reports a reference to Table 4-9 will be added as necessary in the appropriate section.

Comment 4

p. 4-12, §4.3.3 The statistical analysis concludes that the only significant difference between upgradient and downgradient COC concentrations is for arsenic. This is apparent qualitatively, as well. However, it should be noted that, while the analysis is nominally intended to identify possible landfill impacts on groundwater chemistry, the conclusions are more ambiguous. In particular, the elevated arsenic in downgradient wells relative to upgradient wells is also correlated with a dramatic drop in ORP. In turn, it is not clear that the change in redox conditions from upgradient to downgradient is owing to the presence of the landfill or represents ambient conditions.

Response

Agree. See responses to General Comments 3 and 4.

Comment 5

p. 4-12, §4.3.3 The cautions with respect to the downward trend indicated by the regression analysis is well taken; the data are quite equivocal at this point. Please see the cover letter for further remarks on the time scale over which changes in arsenic might be expected.

Response

Agree. See responses to General Comments 3 and 4.

Comment 6

p. 5-2, §5.1 The text mentions pesticides and wood preservatives as potential sources of arsenic. While contributions to arsenic in groundwater at the site from such anthropogenic sources cannot be ruled out, natural sources should also be given full consideration. In particular, it is noted that arsenic is present at wells that are not downgradient of the landfill (*e.g.*, 8.8 µg/L total arsenic at 2WMW21S on 10/25/99). Furthermore, the elevated arsenic is strongly associated with reducing conditions that appear to be widespread in the dredged material. I note that a previous review of the *Round 1 Groundwater Monitoring Report* observed a very strong correlation of arsenic and iron concentrations in soils sampled during installation of the downgradient monitoring wells. The plot below shows all soil analyses from the downgradient well borings (filled squares), and a linear regression on these data. These samples were all from the upper 10 feet bgs. In addition, the open

circles are based on analyses from soil borings scattered across the Area A Wetland (2WTB3, 6, 7, and 8). (2WTB8 is more than 1000 feet from the landfill.) These, too, seem to be consistent with the results from the area immediately downgradient of the landfill. These data show that arsenic is present throughout the Area A Wetland, and that it is strongly associated with iron, consistent with its affinity for iron oxyhydroxide coatings on sediment particles.

Response

Agree. See response to General Comments 3 and 4.