FINAL
Preliminary Assessment Report Lincoln Army Aviation Support Facility #1 Lincoln, Nebraska

Perfluorooctane-Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

September 2020

Prepared for:

Army National Guard Bureau
111 S. George Mason Drive
Arlington, VA 22204

UNCLASSIFIED

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
ANG	Air National Guard
AOI	area of interest
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	conceptual site model
DLA	Defense Logistics Agency
EDR™	Environmental Data Resource, Inc.™
FTA	fire training area
NEANG	Nebraska Air National Guard
NEARNG	Nebraska Army National Guard
ng/L	nanograms per liter
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
SI	Site inspection
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WWTP	waste water treatment plant

Executive Summary

The Army National Guard (ARNG) is performing Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide. A PA for per- and polyfluoroalkyl substances (PFAS)-containing materials was completed for Lincoln Army Aviation Support Facility (AASF; also referred to as the "facility") #1 in Lincoln, Nebraska, to assess potential PFAS release areas and exposure pathways to receptors. The AASF #1 is constructed on a parcel of land owned by the City of Lincoln and leased to the State of Nebraska for the use by the Nebraska ARNG (NEARNG) for an indefinite term that began in 2006. The performance of this PA included the following tasks:

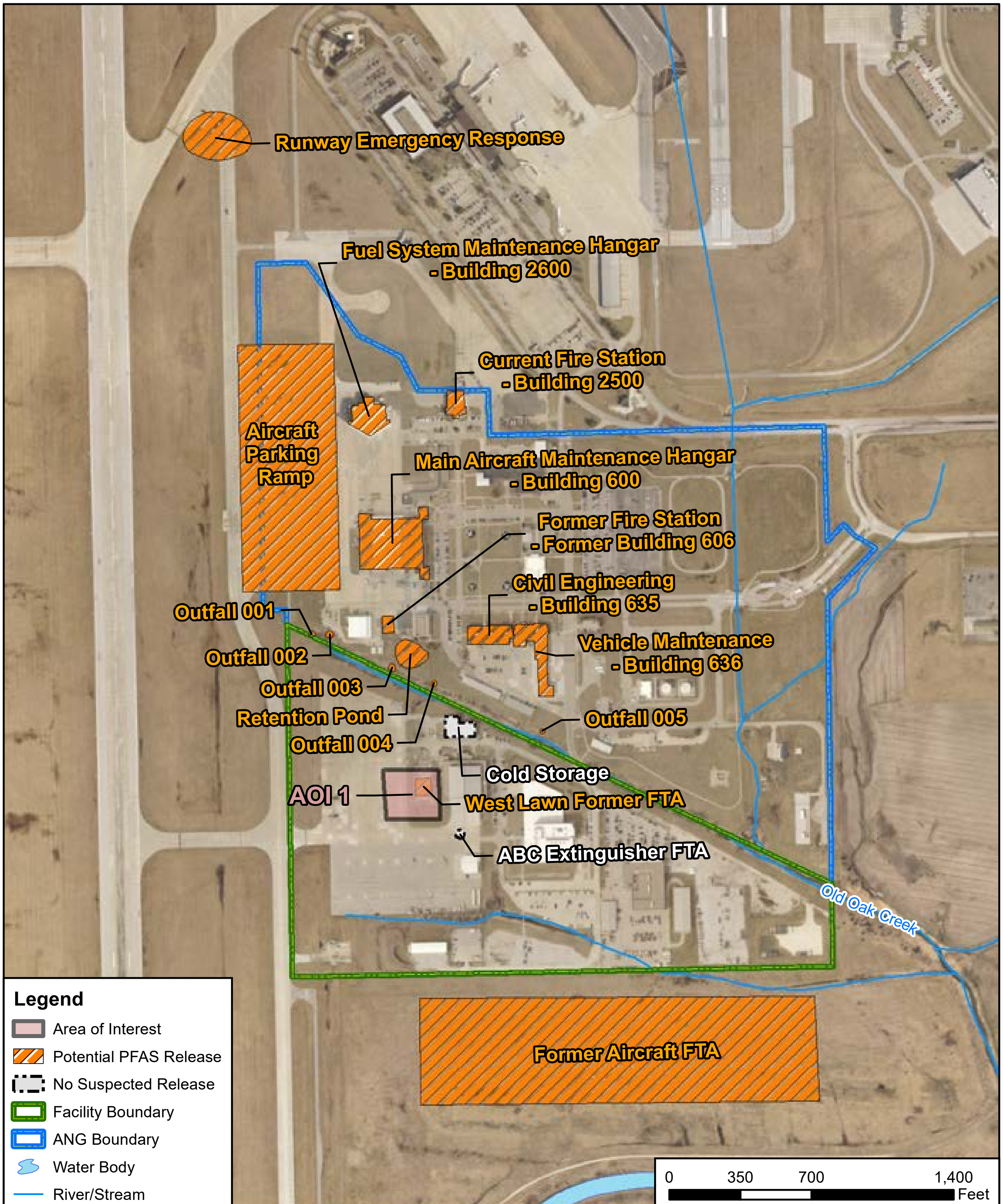
- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- Conducted a site visit on 23 October 2019 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current NEARNG personnel, NEARNG environmental managers, operations staff, and Nebraska Air National Guard (NEANG) personnel;
- Identified Area(s) of Interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment for each AOI.

One AOI related to potential PFAS releases was identified at the AASF #1 during the PA. The AOI is shown on **Figure ES-1** and described below:

Table ES-1: AOI at Lincoln AASF #1

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	West Lawn Former FTA	NEARNG	1990s

Based on potential PFAS release at this AOI, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for the AASF #1 is shown on **Figure ES-2**, which presents the potential receptors and media impacted. Based on the United States Environmental Protection Agency (USEPA) Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS were detected in a public water system above the USEPA lifetime Health Advisory (HA) within 20 miles of the facility. The HA is 70 parts per trillion for PFOS and PFOA, individually or combined. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Lincoln AASF #1, NE			
REVISED	2/18/2020	GIS BY	MS	2/18/2020
SCALE	1:8,400	CHK BY	JW	2/18/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	2/18/2020

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Summary of Findings

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure ES-1

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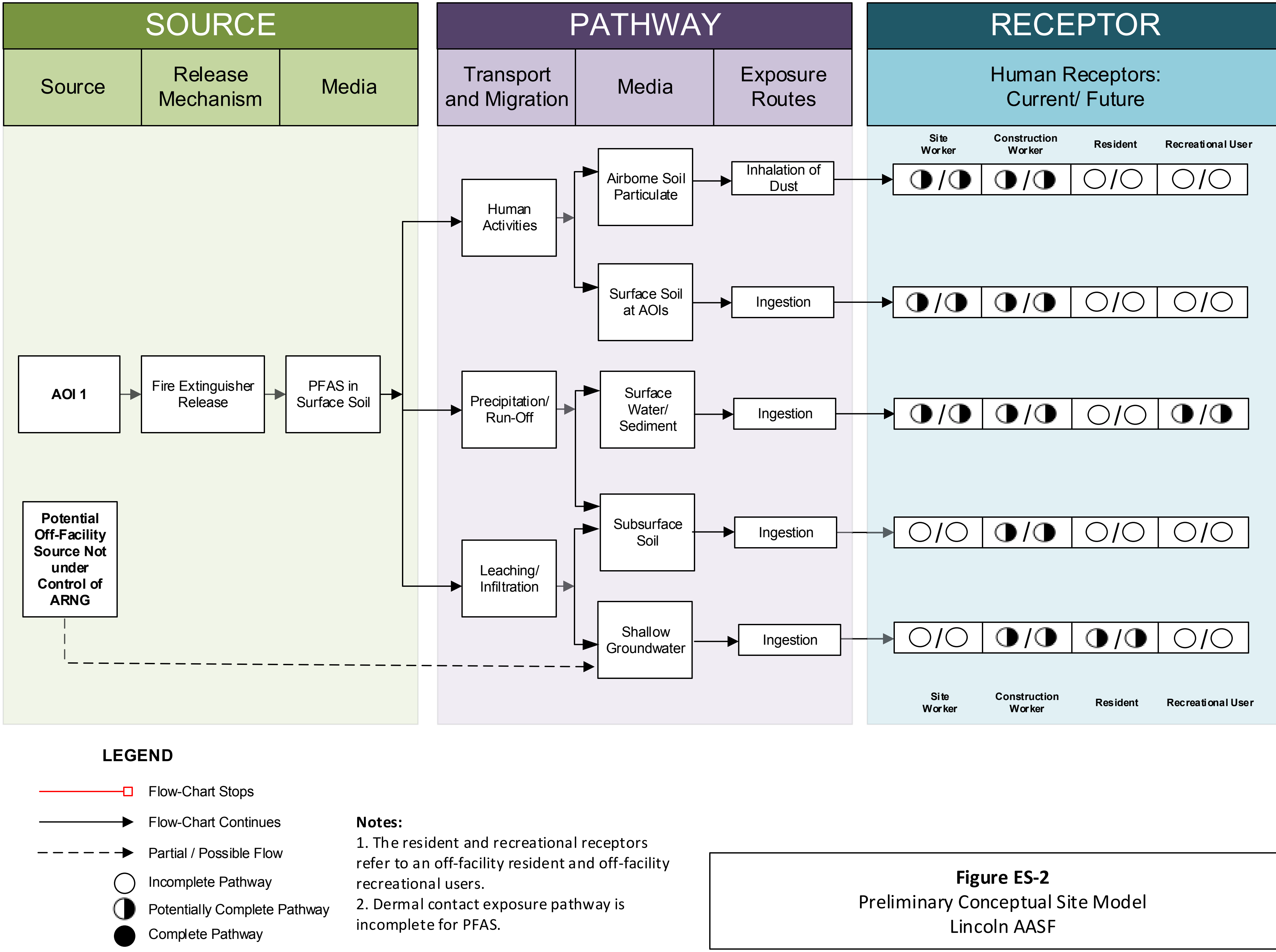


Notes:
1. The resident and recreational receptors refer to an off-facility resident and off-facility recreational users.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure ES-2
Preliminary Conceptual Site Model
Lincoln AASF

1. Introduction

1.1 Authority and Purpose

The Army National Guard (ARNG) G9 is the lead agency in performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites at ARNG Facilities Nationwide*. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor AECOM Technical Services, Inc. (AECOM) under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017.

The ARNG is assessing potential effects on human health related to processes at their facilities that used per- and poly-fluoroalkyl substances (PFAS), primarily releases of aqueous film forming foam (AFFF) although other sources of PFAS are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. PFAS formulations contain highly diverse mixtures of compounds. Thus, the fate of these PFAS compounds in the environment will vary. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued Drinking Water Lifetime Health Advisories (HAs) for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water. The HA is 70 parts per trillion for PFOS and PFOA, individually or combined.

This report presents findings of a PA for PFAS containing materials at Lincoln Army Aviation Support Facility (AASF; also referred to as the "facility") #1 in Lincoln, Nebraska in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300), and Army requirements and guidance.

This PA documents the known fire training areas (FTAs) as well as additional locations where PFAS may have been released into the environment at the AASF #1. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components of AFFF.

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- Conducted a site visit on 23 October 2019 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current Nebraska Army National Guard (NEARNG) personnel, NEARNG environmental managers, operations staff, and Nebraska Air National Guard (NEANG) personnel;

- Identified Area(s) of Interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment for each AOI.

1.3 Report Organization

This report has been prepared in accordance with the USEPA *Guidance for Performing Preliminary Assessments under CERCLA* (USEPA, 1991). The report sections and descriptions of each are:

- **Section 1 – Introduction:** identifies the project purpose and authority and describes the facility location, environmental setting, and methods used to complete the PA.
- **Section 2 – Fire Training Areas:** describes the FTAs at the facility identified during the site visit.
- **Section 3 – Non-Fire Training Areas:** describes other locations of potential PFAS releases at the facility identified during the site visit.
- **Section 4 – Emergency Response Areas:** describes areas of potential PFAS release at the facility, specifically in response to emergency situations.
- **Section 5 – Adjacent Sources:** describes sources of potential PFAS release adjacent to the facility that are not under the control of ARNG.
- **Section 6 – Preliminary Conceptual Site Model:** describes the pathways of PFAS transport and receptors at each AOI.
- **Section 7 – Conclusions:** summarizes the data findings and presents the conclusions of the PA.
- **Section 8 – References:** provides the references used to develop this document.
- **Appendix A** – Data Resources
- **Appendix B** – Preliminary Assessment Documentation
- **Appendix C** – Photographic Log

1.4 Facility Location and Description

AASF #1 is in Lancaster County, Lincoln, Nebraska, just to the north of Oak Creek. The facility is a maintenance and repair facility that is accessible from the north via Northwest 24th Street and is adjacent to the Lincoln Municipal Airport. The AASF #1 is located directly south of a parcel of land occupied by the NEANG.

At present, AASF #1 is comprised of approximately 65.29 acres, and the facility is constructed on a parcel of land owned by the City of Lincoln; this parcel was leased in 2006 to the State of Nebraska for the use by the NEARNG for an indefinite term. The facility includes a Main Hangar, Cold Storage Building, NEARNG Headquarters building, a parking apron, flight ramp, wash rack, a fueling point, and taxiway connecting to the airport runway.

1.5 Facility Environmental Setting

Lancaster County is in the Great Plain of eastern Nebraska, a province characterized by a variety of landscapes created by a multitude of geological processes. The diversity of the landscape is varied by different subregions created by fluvial, eolian, volcanic, or glacial landforms that lead to the creation of the low relief part of central North America. The facility resides in a division of the Great Plains region known as the High Plains, which is geographically defined by west to east flowing rivers that cut through Tertiary cover (Blum, 2011).

1.5.1 Geology

AASF #1 lays within the eastern edge of the Great Plains. In the City of Lincoln, the bedrock comes from a Cretaceous-aged sandstone and shale, but in lower primary bedrock, the lower Cretaceous Dakota Group includes Lakota Formation and Fusion Shale (Science Applications International Corporation, 2014). The bedrock in Nebraska stretches from 350 to 400 feet and has been covered by an unconsolidated sediment from the Quaternary period that is viewed as two lithostratigraphic units. In the upper levels of the unconsolidated soil comes 10 to 22 feet of eolian silt and clay deposits. Lower unconsolidated units have roughly 15 feet of well-sorted fluvial sand and gravel and can be found thickest in the paleostream channels in the underlying Cretaceous bedrock (Leidos, 2019).

1.5.2 Hydrogeology

Two aquifers exist near the facility, a shallow unconfined aquifer and a deep confined aquifer. The shallow aquifer has a depth that extends down to 90 feet below ground surface (bgs) and consists of unconsolidated sands and clayey soil formed from the Quaternary age. The water table for the shallow aquifer ranges 8 to 12 feet bgs and flows south towards Oak Creek. Between the shallow and deep aquifer, there is a thick, silty, clay layer. This deep aquifer is the principal aquifer of the region and is found in the Cretaceous Dakota Formation, which is comprised of fine-to coarse-grained sandstone that is poorly consolidated with lenses of shale and Murdock; the deep aquifer begins at a depth of 125-150 feet bgs and can be found nearly 350 feet thick (BB&E Inc., 2016).

As indicated in the 2019 EDR™ report, there are several monitoring/observation wells located on the facility. There are additional commercial/industrial, irrigation, livestock, domestic, other/unknown, and monitoring/observation wells located within a 4-mile radius (**Figure 1-2**). Drinking water for the facility is supplied by the City of Lincoln Water System, which uses nearby river aquifers as its drinking water sources (City of Lincoln, 2019). Based on the USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR3) data, it was indicated that no PFAS were detected in a public water system above the USEPA HA within 20 miles of the facility. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.

1.5.3 Hydrology

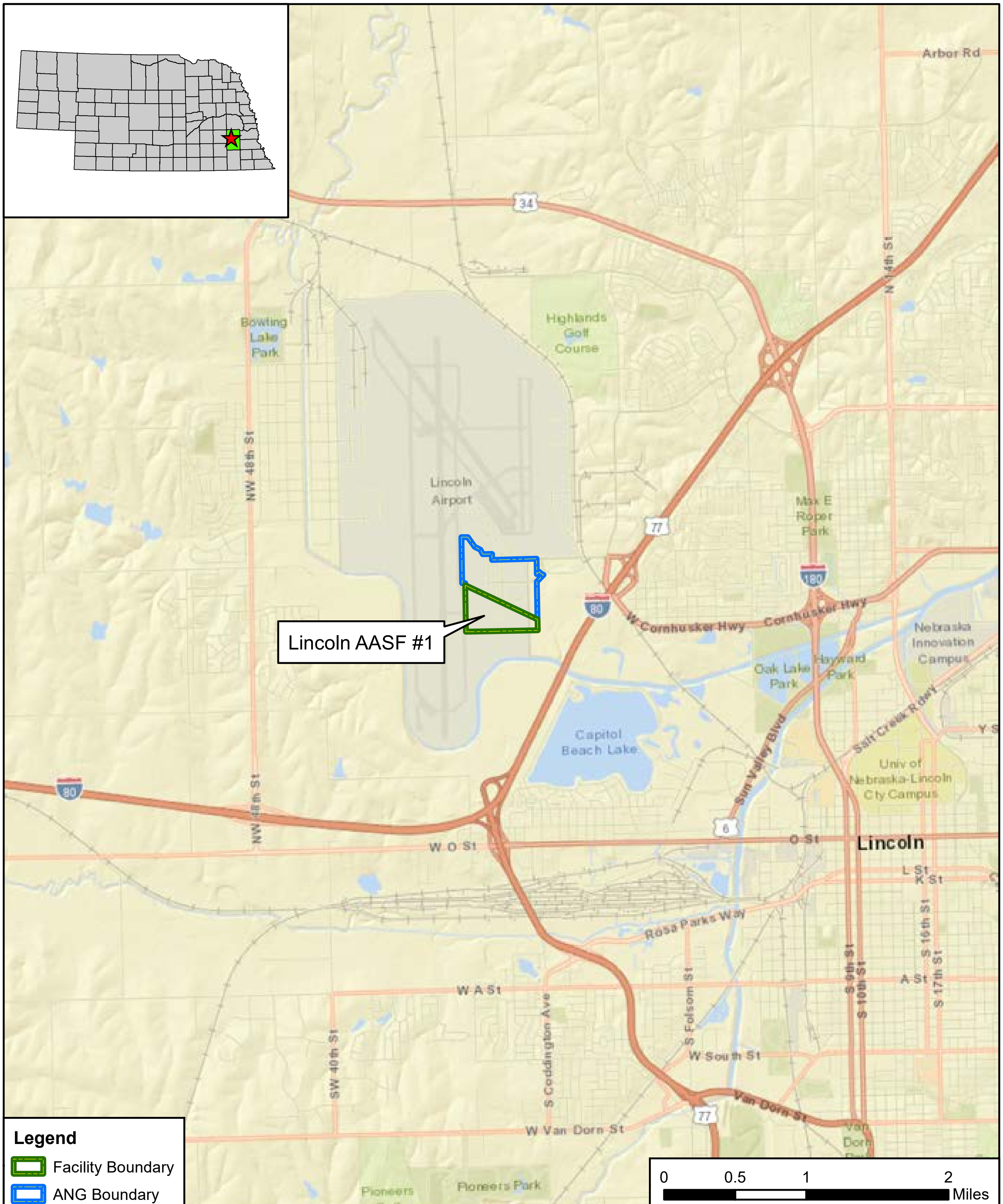
AASF #1 is located in the Salt Creek drainage area (**Figure 1-3**). Stormwater drains into the Old Oak Creek Channel, which eventually discharges to Oak Creek. The Old Oak Channel was rerouted and is typically empty except during periods of precipitation. Oak Creek flows eastward until it conjoins with the Salt Creek, approximately 3 miles east of the facility (Leidos, 2019).

1.5.4 Climate

The climate at the facility has four defined seasons in which summers are warm and humid, winters are typically dry with light snow, and spring months tend to produce high amounts of thunderstorms and even tornadoes. Temperatures at the facility vary from average highs of 63.1 degrees Fahrenheit (°F) to average lows of 39.9 °F. The average annual temperature is 51.5 °F, and the average annual precipitation is 28.94 inches of rain (World Climate, 2019).

1.5.5 Current and Future Land Use

The AASF #1 is a controlled access facility and is adjacent to the Lincoln Municipal Airport. Reasonably anticipated future land use is not expected to change from the current land use; however, future infrastructure improvements, land acquisitions, and land use controls at the Lincoln Municipal Airport and surrounding areas are unknown.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Lincoln AASF #1, NE			
REVISED	2/18/2020	GIS BY	MS	2/18/2020
SCALE	1:63,360	CHK BY	JW	2/18/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	2/18/2020

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Facility Location

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12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-1

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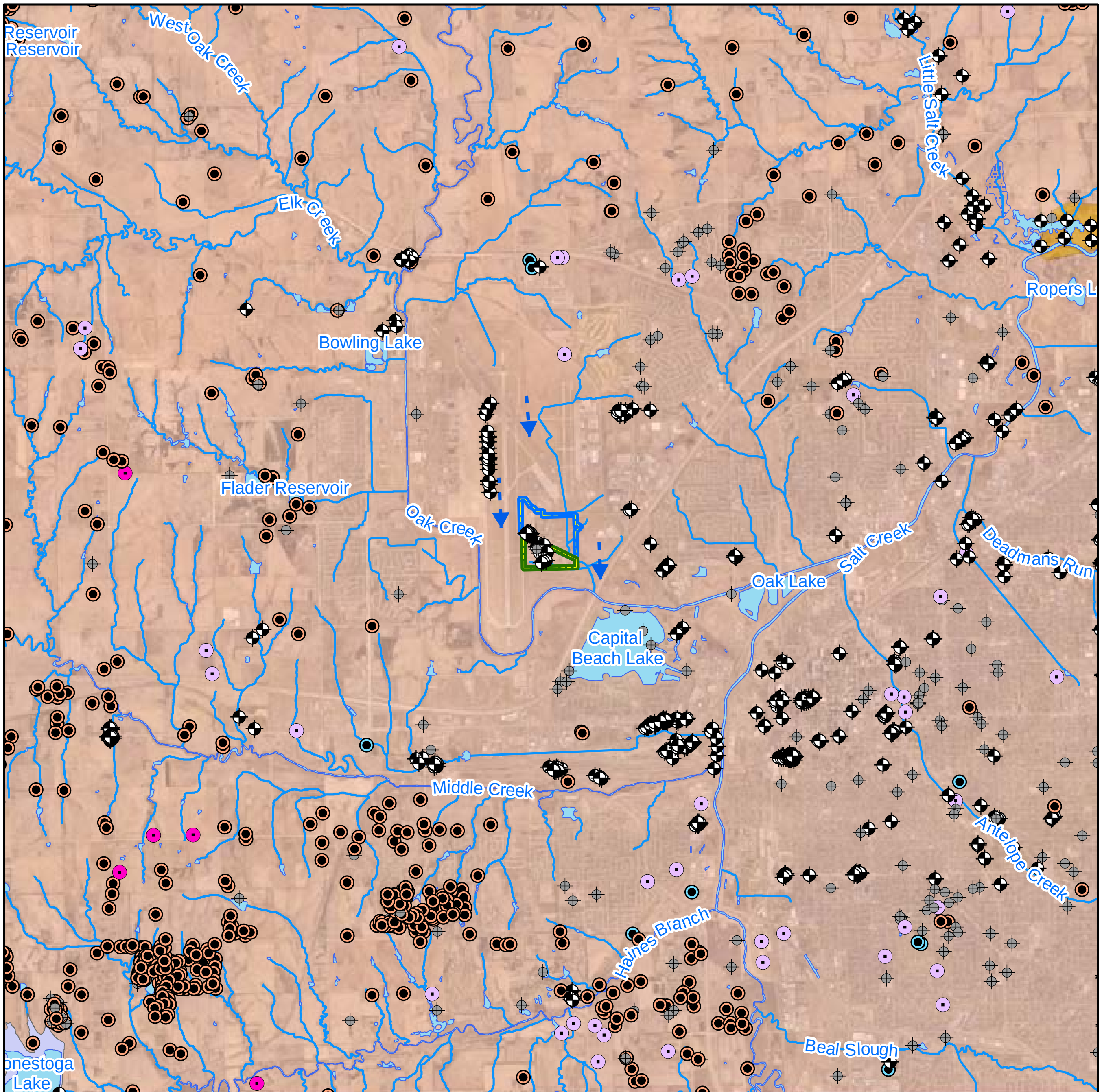

Facility Boundary
ANG Boundary
Water Body
Wetland
River/Stream
Inferred Groundwater Flow Direction

Geology
Early Cretaceous Sandstone/Shale
Late Pennsylvanian-Virgilian Shale/Limestone

0 0.75 1.5 3 Miles

Wells
Domestic Well
Commercial/Industrial Well
Irrigation Well
Livestock Well
Monitoring/Observation/Recovery Well
Other/Unknown Well

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Lincoln AASF #1, NE			
REVISED	7/15/2020	GIS BY	MS	7/15/2020
SCALE	1:95,040	CHK BY	JW	7/15/2020
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	7/15/2020

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Groundwater Features

AECOM
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Figure 1-2

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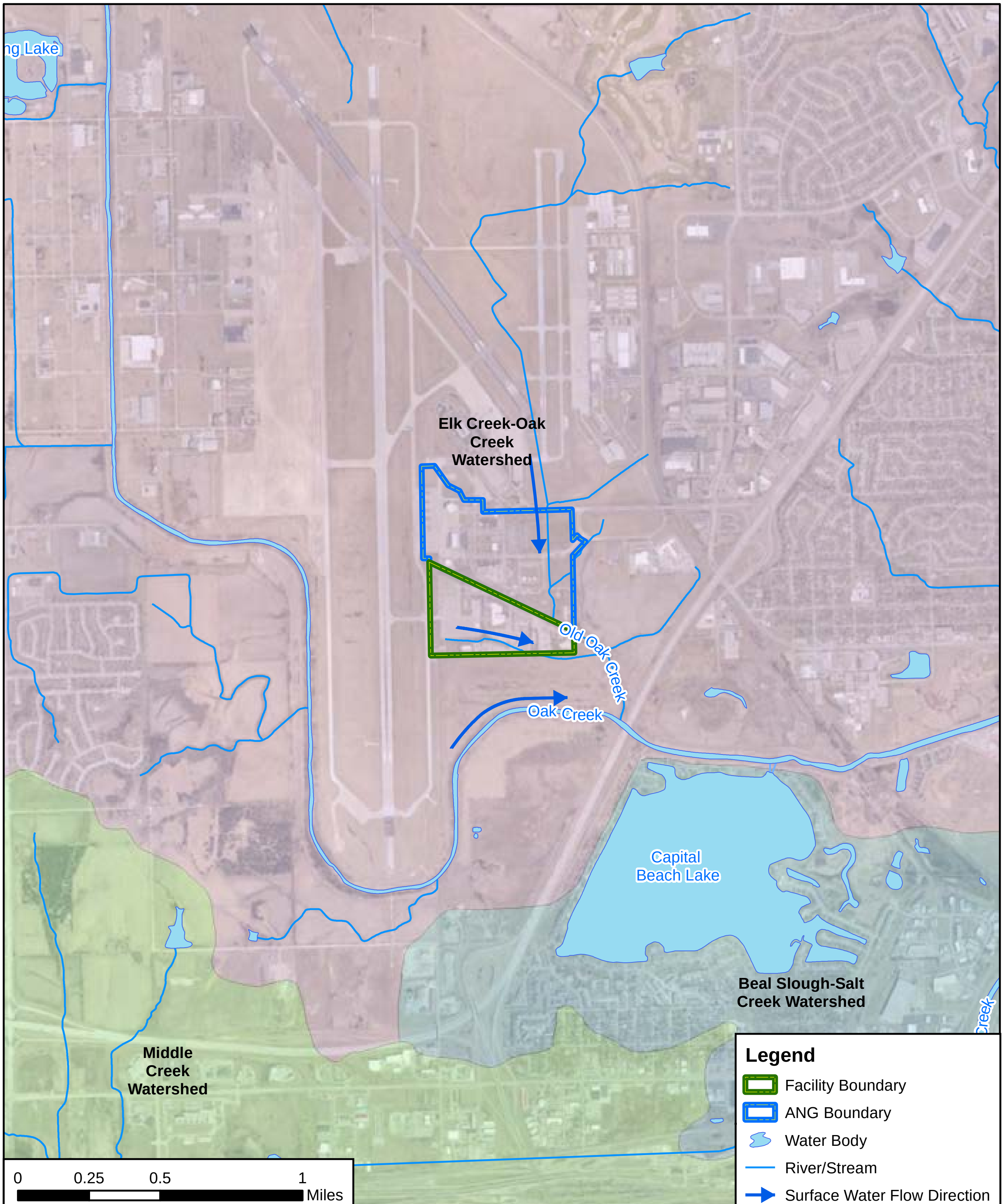

CLIENT	ARNG				
NOTES	Preliminary Assessment for PFAS at Lincoln AASF #1, NE				
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SCALE	1:31,680	CHK BY	JW	7/13/2020	
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	7/13/2020	

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Surface Water Features

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Figure 1-3

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2. Fire Training Areas

Two FTAs where PFAS were potentially released were identified during the PA. A description of the FTAs is presented below, and the locations of the FTAs are shown on **Figure 2-1**. Interview records and photographs are included in **Appendix B** and **Appendix C**, respectively.

2.1 West Lawn Former FTA

West Lawn Former FTA is located west of the Main Hangar and southwest of the Cold Storage Building (**Figure 2-1**); the geographic coordinates are 40°50'17.7"N and 96°45'23.1"W. In a written statement from a former NEARNG employee indicated that fire training exercises occurred on the West Lawn, and NEARNG dispensed “foam” on the grassy area sometime in the 1990s. Current NEARNG personnel could not verify whether the fire training exercises were conducted; however, it is unlikely that the type of fire extinguishers used during the training were AFFF fire extinguishers because Tri-Max™ 30 containers, which contain AFFF, were not stored at AASF #1 until 2005. Based on the uncertainty of which extinguishers were used during the training exercises, the West Lawn Former FTA is considered an AOI.

2.2 ABC Fire Extinguisher FTA

The ABC Fire Extinguisher FTA is located on the ramp area south of the Main Hangar and west of the NEARNG Headquarters building (**Figure 2-1**); the geographic coordinates are 40°50'15.3"N and 96°45'20.6"W. The NEARNG conducted fire training exercises on the concrete ramp area in which pan fires with jet fuel would be ignited and extinguished with ABC fire extinguishers. The fire training exercise is performed on an annual basis.

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Lincoln AASF #1, NE			
REVISED	2/18/2020	GIS BY	MS	2/18/2020
SCALE	1:6,000	CHK BY	JW	2/18/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	2/18/2020

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Fire Training Area

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Figure 2-1

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3. Non-Fire Training Areas

In addition to FTAs, the PA evaluated areas where PFAS-containing materials may have been broadly used, stored, or disposed. This may include buildings with fire suppression systems, paint booths, AFFF storage areas, and areas of compliance demonstrations. Information on these features obtained during the PA is included in **Appendices A** and **B**. One non-FTA where AFFF was stored and/or potentially released was identified during the PA. A description of the non-FTA is presented below, and the non-FTA is shown on **Figure 3-1**. The Main Hangar and Cold Storage Building were built in 1955 and 2012, respectively. Both buildings do not have fire suppression systems.

3.1 TriMax30™ Fire Extinguishers

Since 2005, the AASF #1 has had eight Tri-Max™ 30 fire extinguishers that were placed in various locations the ramp area in front of the Main Hangar, or stored in the Cold Storage Building. In September of 2019, half of the TriMax30™ fire extinguishers were emptied into a 275-gallon polyethylene tote in the Cold Storage Building, which has no drains. No spilling occurred during the emptying process. The empty Tri-Max™ 30 fire extinguishers were sent offsite to undergo hydrostatic testing by a contractor. The 275-gallon polyethylene tote is stored within the Cold Storage Building and is noted tpage13.pdfo be disposed of by the Defense Logistics Agency (DLA), who has contracted Tradebe Treatment and Recycling, LLC for disposal of the tote. When the Tri-Max™ 30 fire extinguishers are returned, the other half will undergo the same emptying and hydrostatic testing process.

After the Tri-Max™ 30 fire extinguishers undergo hydrostatic testing, they will be refilled with non-AFFF fire suppressants, Novacool® and EcoFreeze®. Novacool® will be used for months where the temperatures are above freezing, while the EcoFreeze® will be used for fire extinguishers on the ramp areas during the winter months to avoid freezing at lower temperatures.

CLIENT	ARNG				**Non-Fire Training Area**
NOTES	Preliminary Assessment for PFAS at Lincoln AASF #1, NE				
REVISED	2/18/2020	GIS BY	MS	2/18/2020	AECOM 12420 Milestone Center Drive Germantown, MD 20876 — **Figure 3-1**
SCALE	1:6,000	CHK BY	JW	2/18/2020	
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	2/18/2020	

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4. Emergency Response Areas

No emergency response areas or incidents were identified within the AASF #1 during the PA through interviews (**Appendix B**), historical document review, or the Environmental Data Resource Report. The NEANG responds to all emergency incidents at the airport and AASF #1.

5. Adjacent Sources

Fifteen potential off-facility source of PFAS adjacent to the AASF #1, not under the control of the NEARNG, were identified during the PA. Based on interviews with NEARNG personnel (**Appendix B**) and historical document review, the identified adjacent areas with potential AFFF releases are outside the AASF #1 boundaries. The description of the adjacent sources is presented below and, and the locations of the adjacent sources are shown on **Figure 5-1**.

5.1 Lincoln ANG

The NEANG completed an SI at the adjacent Lincoln ANG facility to determine where PFAS were used (Leidos, 2019) (**Appendix A**). **Table 5-1** summarizes the findings of the SI, and **Figure 5-1** presents the adjacent source areas.

Table 5-1: NEANG Adjacent Sources

Adjacent Source	Description	SI Findings
Aircraft Parking Ramp	The Aircraft Parking Ramp was identified due to the fueling and de-fueling, de-icing, maintenance and parking of aircraft on the ramp.	PFAS contamination levels in surface soil and groundwater did not exceed the EPA RSL/HA. Recommended to proceed to further investigations.
Fuel Systems Maintenance Hangar	The hangar has a 2,000-gallon AFFF tank fire suppression system. There are documented releases from annual testing and spills. When the system was discharged, the contents entered the floor drains and discharged into the retention pond.	PFAS contamination levels in groundwater exceeded the EPA HA 70 nanograms per liter (ng/L). Groundwater results for PFOS and PFOA (combined) was reported as 4,380 ng/L. Recommended to proceed to further investigations.
Current Fire Station	Current Fire Station since 1999. The fire station stores AFFF and had vehicles filled with AFFF that were washed at the location. The floor drains discharge to an oil/water separator and then to a sanitary sewer system. Nozzle testing occurred on the ramp located west of the station and stormwater flowed to Outfall 005.	PFAS contamination levels in groundwater exceeded the EPA HA (70 ng/L). Groundwater results for PFOS and PFOA (combined) was reported as 14,300 ng/L. Recommended to proceed to further investigations.

Adjacent Source	Description	SI Findings
Main Aircraft Maintenance Hangar	The hangar had a 2,000-gallon AFFF tank fire suppression system from 1997-2009. There are documented releases of AFFF from annual testing of the system and spills. When the system was discharged prior to 1999, the contents entered the floor drains and discharged into the storm sewer. After 1999, system discharges entered floor drains and flowed into the retention pond. In 2009, the hangar was retrofitted to have a high expansion foam fire suppression system. No AFFF is currently stored or used at the hangar.	PFAS contamination levels in groundwater exceeded the EPA HA (70 ng/L). Groundwater results for PFOS and PFOA were reported as 14,700 ng/L and 2,630 ng/L; respectively. Recommended to proceed to further investigations.
Outfall 001	Surface water runoff from the Aircraft Parking Ramp Area and the area southwest of the fuel systems maintenance hangar collects in this outfall.	PFAS contamination levels in surface soil and groundwater were not determined due to a lack of water flow.
Outfall 002	Surface water runoff from the Main Hangar on the west and south sides of the Ramp Area collects in this outfall.	PFAS contamination levels in surface water exceeded the project action levels. The surface water result for PFOS and PFOA (combined) was reported as 130 ng/L. Recommended to proceed to further investigations. PFAS contamination were detected in sediment but did not exceed the project action levels. Recommended to proceed to further investigations.
Former Fire Station	Former fire station from 1978 to 1995. This location stored AFFF in vehicles and washed them with AFFF.	PFAS contamination levels in groundwater exceeded the EPA HA (70 ng/L). Groundwater results for PFOS and PFOA (combined) was reported as 1,630 ng/L. Recommended to proceed to further investigations.

Adjacent Source	Description	SI Findings
Retention Pond	There is a known release of AFFF that occurred in the pond based on disposal of AFFF and releases from all the hangars.	PFAS contamination levels in surface soil and groundwater did not exceed the EPA RSL/HA. Recommended to proceed to further investigations.
Outfall 003	All surface water runoff from the former fire station collects in this outfall.	PFAS contamination levels in surface soil/sediment and groundwater were not determined due to a lack of water flow.
Outfall 004	All surface water runoff from the Main Aircraft Maintenance Hangar and the north and south portion of the ramp area for the Main Hangar collect in this outfall.	PFAS contamination levels in surface water exceeded the project action levels. Surface water results for PFOS and PFOA (combined) was reported as 34,800 ng/L. Recommended to proceed to further investigations. PFAS contamination were detected in sediment but did not exceed the project action levels. Recommended to proceed to further investigations.
Civil Engineering Building	There was a vehicle maintenance facility on the east end of the building from 1979 to 1999. The building had a pit that discharged PFAS-containing materials to a sanitary sewer on the north side of the building.	PFAS contamination levels in groundwater exceeded the EPA HA (70 ng/L). Groundwater results for PFOS and PFOA (combined) was reported as 1,290 ng/L. Recommended to proceed to further investigations.
Vehicle Maintenance	This building has been the vehicle maintenance building since 1999 and has been specifically used for vehicles that store AFFF. Floor drains discharge to a pit that is pumped to a sanitary sewer. Any spills or leaks were wiped up with rags and disposed of in the rag waste bin.	PFAS contamination levels in groundwater exceeded the EPA HA (70 ng/L). Groundwater results for PFOS and PFOA (combined) was reported as 780 ng/L. Recommended to proceed to further investigations.

Adjacent Source	Description	SI Findings
Outfall 005	All surface water runoff from the Fuel Systems Maintenance Hangar and a small portion of the Ramp Area on the south side of the Fuel Systems Maintenance Hangar collect in this outfall. Areas surrounding the Fire Station, Civil Engineering Building, and Vehicle Maintenance also collect in this outfall.	PFAS contamination levels in surface water exceeded the project action levels. Surface water results for PFOS and PFOA (combined) was reported as 1,080 ng/L. Recommended to proceed to further investigations. PFAS contamination were detected in sediment but did not exceed the project action levels. Recommended to proceed to further investigations.

5.2 Former Aircraft FTA

Personnel from the NEANG recalled seeing pictures of an old aircraft that was used for fire training activities and located south of the NEARNG boundary. Historically, the NEANG would light the plane on fire, and fire training exercises were conducted to extinguish the fire. These exercises reportedly occurred in the 1960s and the 1970s. It is not confirmed that AFFF was used at the Former Aircraft FTA; however, AFFF is considered likely since the NEANG started using AFFF in the 1970s. The Former Aircraft FTA is located on property owned by the City of Lincoln and is identified as an adjacent source due to the potential use of AFFF.

5.3 Runway Emergency Response

The NEANG responded to an emergency on the main runway located north of the NEANG facility. Details to the extent of the emergency are unknown; however, NEANG personnel reported 1500-gallons of 3 percent AFFF were released onto the runway. The runway was then flushed with water, which then flowed to the west along a swale. The swale that drains to the Old Oak Creek Channel and then to Oak Creek, which ultimately discharges to Salt Creek.

CLIENT	ARNG				N	Adjacent Sources
NOTES	Preliminary Assessment for PFAS at Lincoln AASF #1, NE					
REVISED	2/18/2020	GIS BY	MS	2/18/2020		AECOM 12420 Milestone Center Drive Germantown, MD 20876 / Figure 5-1
SCALE	1:8,400	CHK BY	JW	2/18/2020		
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	2/18/2020		

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6. Preliminary Conceptual Site Model

Based on the PA findings, one AOI was identified at the AASF #1: AOI 1 West Lawn Former FTA. The location of the AOI is shown on **Figure 6-1**. The following sections describe the CSM components and the specific preliminary CSM developed for the AOI. The CSM identifies the three components necessary for a potentially complete exposure pathway: (1) source, (2) pathway, (3) receptor. If any of these elements are missing, the pathway is considered incomplete.

6.1 Pathways

In general, the potential PFAS exposure pathways are ingestion and inhalation. Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways are sparse and continue to be the subject of PFAS toxicological study (National Ground Water Association, 2018).

AFFF releases identified at the AASF #1 occurred on surface soil. Ground-disturbing activities in these grassy areas may result in potential exposure to surface soils via ingestion and inhalation of dust particles. Ground-disturbing activities may result in potential exposure to subsurface soils and groundwater via ingestion.

PFAS are water soluble and can migrate readily from soil to groundwater via leaching; however, drinking water at AASF #1 is sourced from the City of Lincoln. Therefore, PFAS contamination in drinking water at the AASF #1 is unlikely. There are several monitoring/observation wells located within the boundary of the facility; however, there are also numerous registered domestic, irrigation, commercial/industrial, monitoring, and unknown wells that exist within 4 miles of the facility (USGS, 2019). Additionally, it is possible that unregistered private drinking water wells and domestic exist with 4 miles downgradient of the facility. The downgradient registered and unregistered domestic and private drinking wells may result in potential exposure via ingestion of groundwater.

Based on the inferred surface water flow direction, potential releases may have ultimately drained to the Old Oak Creek Channel. The Old Oak Creek Channel discharges to the south into Oak Creek. As a result, it is possible PFAS migrated to Oak Creek, which may result in potential exposure via ingestion of surface water and sediment.

6.2 Receptors

Receptors include site workers, construction workers, trespassers, off-facility recreational users, and off-facility residents. These receptors as they pertain to the facility are described below:

- Site workers typically work at or use the site and may come into contact with the surface soils. Site workers may also come into contact with surface water and sediment in the Old Oak Creek Channel.
- Construction workers are considered workers who represent a utility worker or other worker who would be exposed to surface and/or subsurface conditions through ground-disturbing activities.
- Off-facility recreational users typically identify a person who may recreationally use an off-facility area that may be affected by a PFAS release from the facility. Off-facility recreational users could be exposed to sediment and surface water during recreational use.

- Off-facility residents identify receptors who occupy properties outside of the AASF #1. Off-facility residents may come into contact with groundwater using unregistered, private, domestic wells.

The preliminary CSM for AASF #1 indicates which specific receptors could potentially be exposed to PFAS. The preliminary CSM for all AOIs at AASF #1 is shown on **Figure 6-2**.

6.3 AOI 1 West Lawn Former FTA

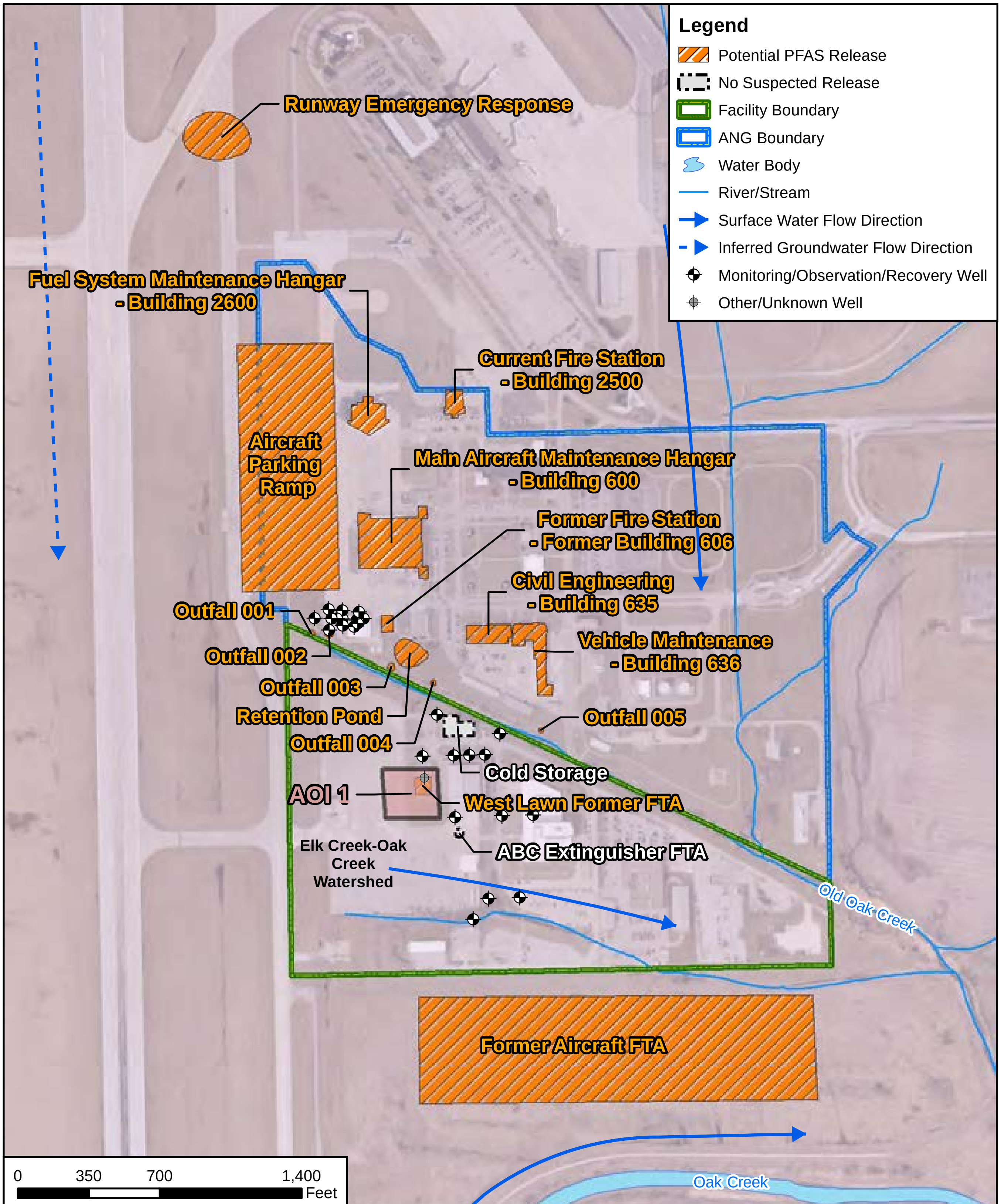
West Lawn Former FTA is located west of the Main Hangar and southwest of the Cold Storage Building (**Figure 2-1**). In a written statement from a former NEARNG employee indicated that fire training exercises occurred on the West Lawn, and NEARNG dispensed "foam" on the grassy area sometime in the 1990s. Current NEARNG personnel could not verify whether the fire training exercises were conducted; however, it is unlikely that the type of fire extinguishers used during the training were AFFF fire extinguishers because Tri-Max™ 30 containers, which contain AFFF, were not stored at AASF #1 until 2005. Based on the uncertainty of which extinguishers were used during the training exercises, the West Lawn Former FTA is considered an AOI.

The AFFF releases at AOI 1 may have occurred directly onto surface soil at the West Lawn FTA. PFAS are water soluble and can migrate readily from soil to surface water. Based on the inferred surface water flow direction, surface water around West Lawn FTA flows onto the adjacent grass area, then north to the Old Oak Channel Creek. There are unknown wells and several domestic wells downgradient of AOI 1.

Potential PFAS exposure pathways resulting from releases at AOI 1 are described in **Table 6-1**:

Table 6-1 Exposure Pathways at AOI 1

Pathway	Receptor
Surface Soil	Considered a potentially complete pathway to site workers and construction workers via ingestion or inhalation of dust
Subsurface Soil	Considered a potentially complete pathway to construction workers via ingestion or inhalation of dust
Surface Water and Sediment	Considered a potentially complete pathway to site workers, construction workers, and off-facility recreational users via ingestion
Groundwater	Considered a potentially complete pathway to construction workers and off-facility residents via ingestion



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Lincoln AASF #1, NE			
REVISED	7/15/2020	GIS BY	MS	7/15/2020
SCALE	1:8,400	CHK BY	JW	7/15/2020
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	7/15/2020

Area of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1

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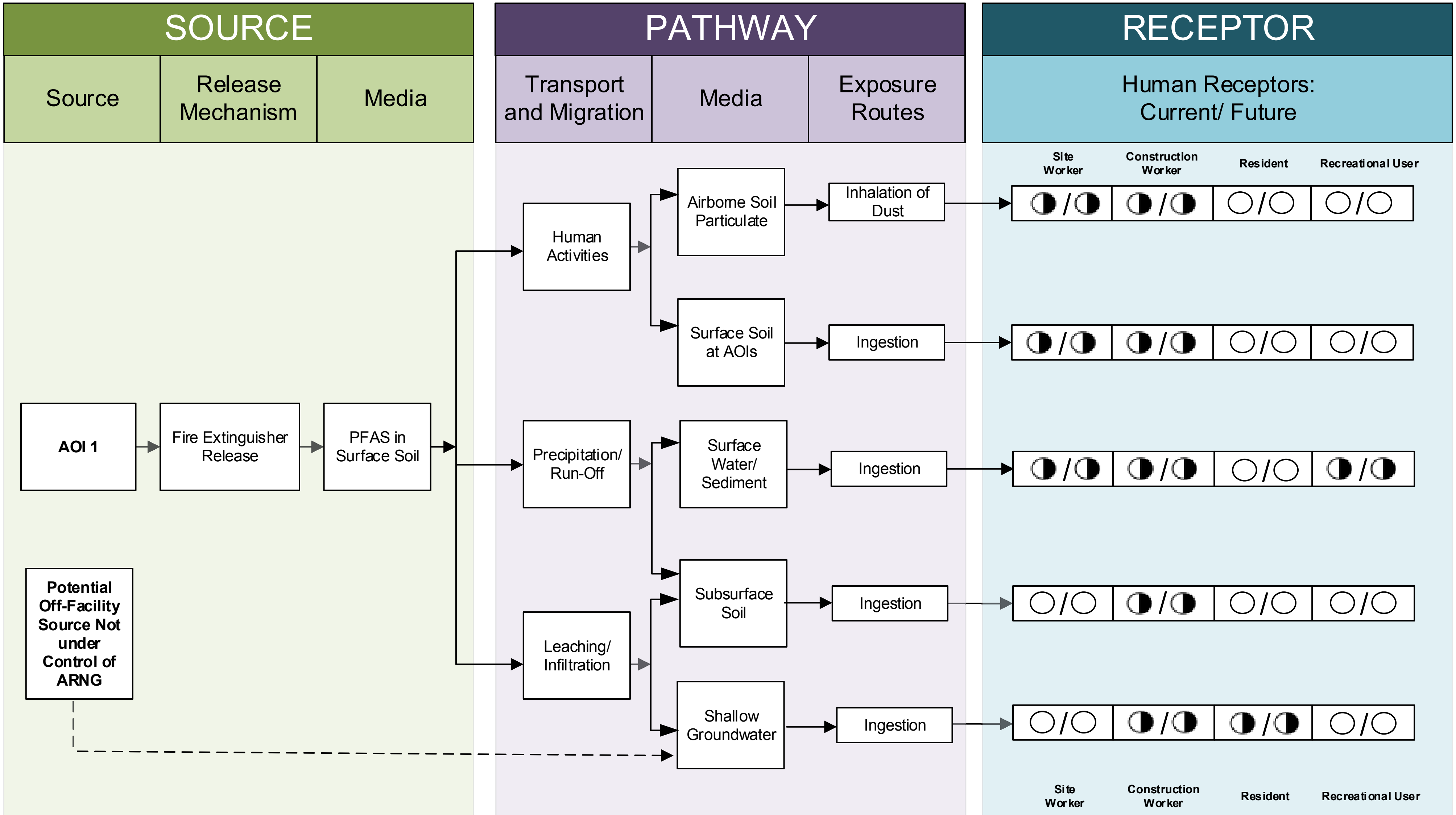


LEGEND

Flow-Chart Stops

Flow-Chart Continues

Partial / Possible Flow

Incomplete Pathway

Potentially Complete Pathway

Complete Pathway

Notes:

1. The resident and recreational receptors refer to an off-facility resident and off-facility recreational users.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure ES-2
Preliminary Conceptual Site Model
AOI 1 West Lawn FTA

7. Conclusions

This report presents a summary of available information gathered during the PA on the use and storage of AFFF and other PFAS-related activities at AASF #1. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

One AOI related to potential PFAS releases was identified (**Table 7-1**) at the AASF #1 during the PA (**Figure 7-1**).

Table 7-1: AOIs at Lincoln AASF #1

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	West Lawn Former FTA	NEARNG	1990s

Based on potential PFAS release at this AOI, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for the AASF #1 is shown on **Figure 6-2**, which presents the potential receptors and media impacted.

The following areas discussed in **Section 2** through **Section 5** were determined to have no suspected PFAS releases (**Table 7-2**).

Table 7-2: No Suspected Release Areas

No Suspected Release Area	Used by	Rationale for No Suspected Release Determination
Cold Storage Building	NEARNG	There is no fire suppression system located inside the building. When the TriMax30™ fire extinguishers were emptied there were no documented spill. Additionally, there are no drains within the building.
ABC Fire Extinguisher FTA	NEARNG	The ABC Fire Extinguishers were only used during training exercises.

7.2 Uncertainties

A number of information sources were investigated during this PA to determine the potential for PFAS-containing materials to have been present, used, or released at the facility. Historically, documentation of PFAS use was not required because PFAS were considered benign. Therefore, records were not typically kept by the facility or available during the PA on the use of PFAS in training, firefighting, or other non-traditional activities, or on its disposition.

The conclusions of this PA are based on all available information, including: previous environmental reports, EDRs™, observations made during the VSI, and interviews. Interviews of personnel with direct knowledge of a facility generally provided the most useful insights regarding a facility's historical and current PFAS-containing materials. Sometimes, the provided information was vague or conflicted with other sources. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge due to staffing changes, the time passed since PFAS were first used (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS release locations, dates of release, volume of releases, and the concentration of AFFF used. There is also a possibility the PA has missed a source of PFAS, as the science of how PFAS may enter the environment continually evolves.

In order to minimize the level of uncertainty, readily available data regarding the use and storage of PFAS were reviewed, retired and current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected. **Table 7-3** summarizes the uncertainties associated with the PA.

Table 7-3: Uncertainties

Area of Interest	Source of Uncertainty
AOI 1	The type and volume of “foam” used during fire training at the West Lawn is unknown.

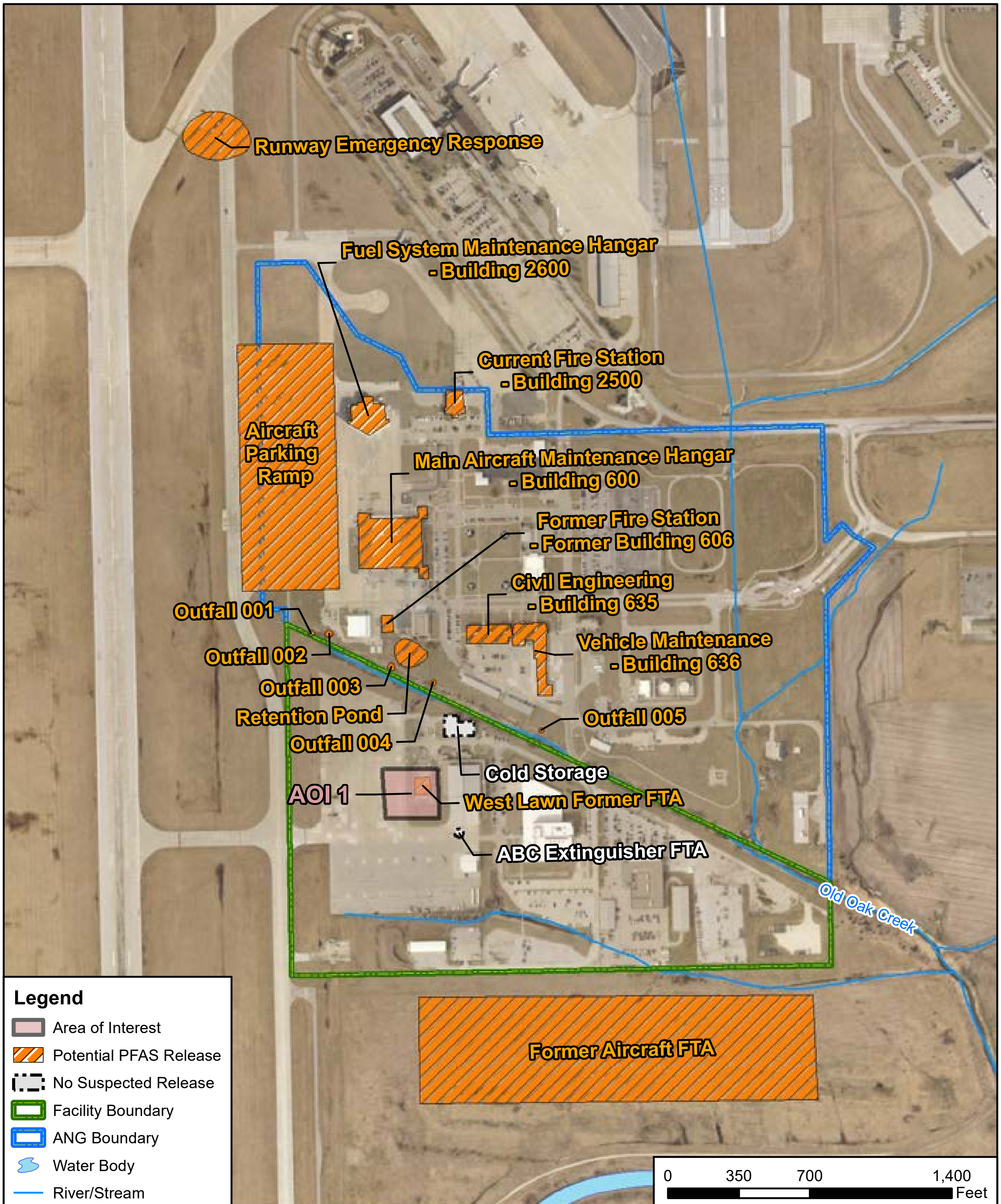
7.3 Potential Future Actions

Interviews and records (covering 2003 to present) indicate that current or former ARNG activities may have resulted in potential PFAS releases at the one AOI identified during the PA. Based on the preliminary CSM developed for the AOI, there is potential for receptors to be exposed to PFAS contamination in soil, groundwater, surface water, and sediment at AASF #1. The following table (**Table 7-4**) summarizes the rationale used to determine if the AOI should be considered for further investigation under the CERCLA process and undergo a, SI.

ARNG evaluates the need for an SI at AASF #1 based on the potential receptors, the potential migration of PFAS contamination off the facility, and the availability of resources.

Table 7-4: PA Findings Summary

Area of Interest	AOI Location	Rationale	Potential Future Action
AOI 1 West Lawn Former FTA	40°50'17.7"N 96°45'23.1"W	The west lawn area of the AASF #1 may have been used for fire training exercises. AFFF may have been used during the training events.	Proceed to an SI, focus on soil, groundwater, surface water, and sediment



CLIENT	ARNG				N	Summary of Findings
NOTES	Preliminary Assessment for PFAS at Lincoln AASF #1, NE					
REVISED	2/18/2020	GIS BY	MS	2/18/2020		AECOM 12420 Milestone Center Drive Germantown, MD 20876 / Figure 7-1
SCALE	1:8,400	CHK BY	JW	2/18/2020		
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	2/18/2020		

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8. References

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Blum, Michael D. 2011. *Physiography.* Encyclopedia of the Great Plains.

City of Lincoln Water System. 2019. *2018 Annual Drinking Water Quality Report.* Accessed December 2019.

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National Ground Water Association. 2018. Groundwater and PFAS: State of Knowledge *and Practice*. December.

Science Applications International Corporation. 2014. *Final Preliminary Assessment/ Site Investigation for Seven Areas of Concern at Nebraska Air National Guard, Lincoln, Nebraska.* December.

United States Environmental Protection Agency (USEPA). 1991. *Guidance for Performing Preliminary Assessments under CERCLA.* December.

United States Geological Survey (USGS). 2019. *https://waterdata.usgs.gov/nwis/gw.* Accessed December 2019.

World Climate. 2019*.* Available at http://www.worldclimate.com/climate/us/nebraska/lincoln (Accessed December 17, 2019).

Appendix A
Data Resources

Data Resources will be provided separately on CD. Data Resources for Lincoln AASF #1, Nebraska.

Lincoln AASF #1 Leases, Licenses, and Permits

- 2006 NEARNG Lincoln Municipal Airport Site Lease

Lincoln AASF #1 Documentation

- 2014 Lincoln Municipal Airport Nebraska Air National Guard PA/SI
- 2015 Lincoln Municipal Airport Nebraska Air National Guard PA/SI
- 2019 Lincoln Municipal Airport Nebraska Air National Guard SI
- EcoFreeze Safety Data Sheet

EDR Report

- 2019 Lincoln AASF #1 EDR Report

NO. DACA45-3-07-6031

DEPARTMENT OF THE ARMY

LICENSE FOR
NATIONAL GUARD PURPOSES

NEBRASKA ARMY NATIONAL GUARD
LINCOLN MUNICIPAL AIRPORT
LANCASTER COUNTY, NEBRASKA

THE SECRETARY OF THE ARMY, hereinafter referred to as the Secretary, under the authority of Title 32, United States Code, Section 503, hereby grants to the State of Nebraska, hereinafter referred to as the grantee, a license to use and occupy for training and support of the Nebraska Army National Guard certain land, hereinafter referred to as the premises, at the location identified in **Exhibits "A" and "B,"** attached hereto and made a part hereof, together with all improvements located thereon.

THIS LICENSE is granted subject to the following conditions.

1. TERM

This license is granted for an indefinite term, beginning 29 September 2006, but revocable at will by the Secretary.

2. SUPERVISION BY THE DISTRICT ENGINEER

The use and occupancy of the premises shall be without cost to the regular establishment of the military departments of the Department of Defense and shall be under the general supervision of the District Engineer, hereinafter referred to as said officer, and subject to such rules and regulations as may be prescribed from time to time by said officer.

3. APPLICABLE LAWS AND REGULATIONS

The grantee shall comply with all applicable Federal, state, county, and municipal laws, ordinances, and regulations wherein the premises are located.

4. FACILITY MAINTENANCE

The grantee shall maintain and keep the premises in good repair and condition and all costs of operation, maintenance, and restoration shall be paid for from funds available to the grantee, or from funds other than those appropriated for the regular establishment of the military departments.

Encl / 2

11. RESTORATION

On or before the expiration of this license or its termination by the grantee, the grantee shall vacate the premises, remove its property (except those permanent additions, alterations, and improvements which have become property of the Government under provision of the condition on **IMPROVEMENTS AND ALTERATIONS**) and restore the premises to a condition satisfactory to said officer, ordinary wear and tear and damage beyond the control of the grantee excepted. If, however, this license is revoked, the grantee shall vacate the premises, remove said property and restore the premises within such time as the District Engineer may designate. In either event, if the grantee fails to remove said property and restore the premises, then, at the option of said officer, the property shall either become the property of the Government without compensation therefor, or said officer may cause the property to be removed at the expense of the grantee, and no claim for damages against the Government shall be created on account of such action.

12. USE BY OTHERS

The grantee shall not transfer or assign this license, or any interest in the premises, however, upon concurrence of the Director, Army National Guard, National Guard Bureau, the grantee may: (1) permit the temporary or intermittent use of the premises by elements of the Department of Defense for joint use or individual training purposes, provided such use will not interfere with the National Guard use; or (2) issue licenses for nonprofit, community service-type activities under the same conditions as those allowed by active installation commanders by existing Army regulations.

13. PROTECTION OF PROPERTY

a. The grantee shall keep the premises in good order and in a clean, safe condition by and at the expense of the grantee. The grantee shall be responsible for any damage that may be caused to property of the United States by the activities of the grantee under this license, and shall exercise due diligence in the protection of all property located on the premises against fire or damage from any and all other causes. Any property of the United States damaged or destroyed by the grantee incident to the exercise of the privileges herein granted shall be promptly repaired or replaced by the grantee to a condition satisfactory to said officer, or at the election of said officer, reimbursement made therefor by the grantee in an amount necessary to restore or replace the property to a condition satisfactory to said officer, in both instances taking into account the prior condition of the property.

b. Upon termination of the grantee's requirement for the premises, the grantee shall remain responsible to protect and maintain the premises until transfer to and acceptance by another accountability officer is accomplished or in accordance with applicable laws, rules and regulations.

17. NON-DISCRIMINATION

The grantee shall not discriminate against any person or persons or exclude them from participation in the grantee's operations, programs or activities conducted on the licensed premises because of race, color, religion, sex, age, handicap or national origin. The grantee by acceptance of this license, hereby gives assurance that it will comply with the provisions of Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. § 2000d); the Age Discrimination Act of 1975 (42 U.S.C § 6102); the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794); and all requirements imposed by or pursuant to the Department of Defense Directive 5500.11 (32 CFR Part 300) issued on 28 December 1964.

18. NOTICE OF THE PRESENCE OF ASBESTOS AND COVENANT

a. The grantee is hereby informed and does acknowledge that Buildings 620, 624, 640, 644, 648 and 660, are reported as containing Asbestos-Containing Materials (ACM). The Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency have determined that unprotected or unregulated exposure to airborne asbestos fibers increases the risk of asbestos-related diseases, including certain cancers that can result in disability or death.

b. The grantee covenants and agrees that its use and occupancy of the Property will be in compliance with all applicable laws relating to asbestos. The grantee agrees to be responsible for any remediation or abatement of asbestos found to be necessary on the Property to include ACM in or on buried pipelines that may be required under applicable law or regulation.

c. The grantee acknowledges that it has inspected or has had the opportunity to inspect the Property as to its asbestos and ACM condition and any hazardous or environmental conditions relating thereto. The grantee shall be deemed to have relied solely on its own judgment in assessing the overall condition of all or any portion of the Property, including, without limitation, any asbestos or ACM hazards or concerns.

19. NOTICE OF THE PRESENCE OF LEAD-BASED PAINT (LBP) AND COVENANT AGAINST THE USE OF THE PROPERTY FOR RESIDENTIAL PURPOSE

a. The grantee is hereby informed and does acknowledge that the following buildings were constructed prior to 1979, and therefore are considered highly likely to contain lead-based paint: Buildings 624 (Army Aviation Support Facility), 640 (former Army Maintenance Facility), 644 (Medical Clinic), 648 (Base Exchange), 660 (BIO/Center Drug) and 666 (former CE Storage). Lead from paint, paint chips, and dust can pose health hazards if not managed properly.

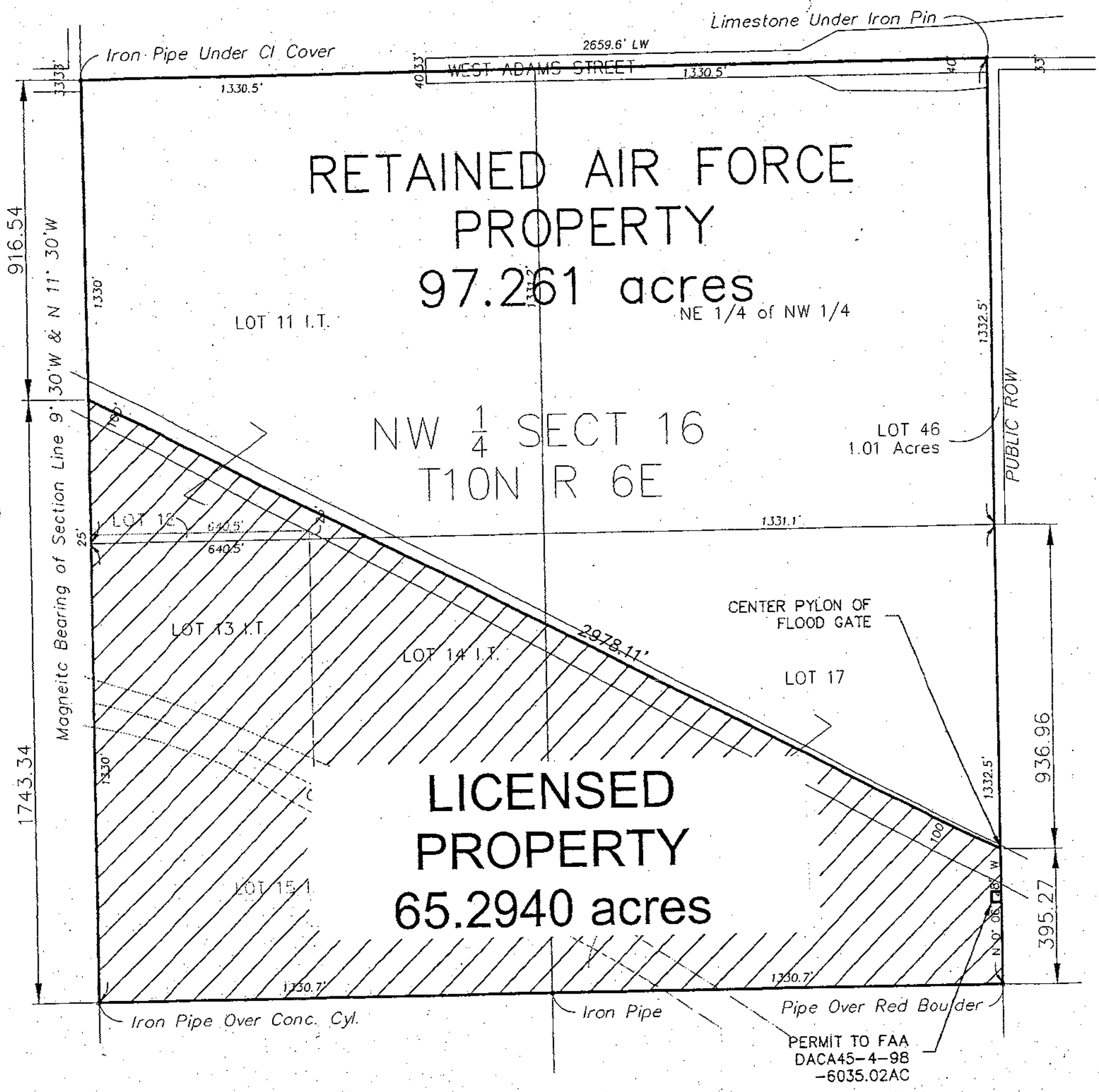
NO. DACA45-3-07-6031

THIS LICENSE is executed by the grantee this 9 day of April, 2007.

STATE OF NEBRASKA

By: Roger P Lempke

Title: Adjutant General



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C1 1/1	W. O. # n/a DRAWN BY: djm PLOTTED : Jan 16, 2003 BY: mccaughertyd	NORTH	**Excess A.F. Property** Nebraska Air National Guard SCALE: none	155 CES	**155th Civil Engineering** 2445 W Furnas Ave. Lincoln, NE 68524-1888

EXHIBIT "A" ATTACHED TO AND MADE A PART OF DACA45-3-07-6031

LICENSED PROPERTY

A tract of land being the Northwest Quarter of Section 16, Township 10 North, Range 6 East of the Sixth Principal Meridian, Lancaster County, Nebraska, described as follows:

A tract of land in the Northwest Quarter of Section 16: Beginning at the Southeast corner of the quarter section, thence Northerly an approximate distance of 395 feet along the East boundary of the Northwest Quarter of Section 16; deflecting 63° 15' 09" to the left Westerly for an approximate distance of 2,978 feet; thence Southerly along the West boundary of the Northwest Quarter of Section 16 for an approximate distance of 1,743 feet; thence Easterly along the South boundary of the Northwest Quarter of Section 16 for an approximate distance of 2,660 feet to the point of beginning.

The above described area containing 65.294 acres of land more or less, all located in Lancaster County, Nebraska.

FINAL

PRELIMINARY ASSESSMENT/SITE INVESTIGATION FOR SEVEN AREAS OF CONCERN AT NEBRASKA AIR NATIONAL GUARD, LINCOLN, NEBRASKA

Compliance Restoration Program
155th Air Refueling Wing
Nebraska Air National Guard
Lincoln, Nebraska

March 2014

Disclaimer: All references to Science Applications International Corporation (SAIC) within this document now refer to Leidos, which was formerly a part of SAIC.

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FINAL

PRELIMINARY ASSESSMENT/SITE INVESTIGATION FOR SEVEN AREAS OF CONCERN AT NEBRASKA AIR NATIONAL GUARD, LINCOLN, NEBRASKA

Compliance Restoration Program
155th Air Refueling Wing
Nebraska Air National Guard
Lincoln, Nebraska

March 2014

Contract Number DAHA92-01-D-0008
Delivery Order Number 0197

Air National Guard
Restoration Branch
NGB/A7OR
3501 Fetchet Avenue
Joint Base Andrews, Maryland 20762

Prepared by
Science Applications International Corporation
Oak Ridge, Tennessee

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APPROVALS

This document has been technically reviewed for accuracy and completeness in accordance with Science Applications International Corporation (SAIC) Procedure 3.1, Document Review. All comments received from this review have been addressed and incorporated through document revision as appropriate.

Mark E. Kidder

Mark E. Kidder, SAIC Program Manager | March 27, 2014
Date

Matthew B. Vest

Matthew B. Vest, SAIC Peer Reviewer | March 27, 2014
Date

Jill M. Kovalchik

Jill M. Kovalchik, Lead Document Preparer | March 27, 2014
Date

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CONTENTS

TABLES

FIGURES

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ACRONYMS

ANG	Air National Guard
ANGB	Air National Guard Base
AOC	area of concern
BGS	below ground surface
CRP	Compliance Restoration Program
DQO	data quality objective
DRO	diesel-range organics
EOD	explosive ordnance disposal
EPA	U. S. Environmental Protection Agency
GRO	gasoline-range organics
HRS	Hazard Ranking System
IRP	Installation Restoration Program
JP	jet propellant
LOD	limit of detection
LOQ	level of quantitation
MCL	maximum contaminant level
MDC	maximum detected concentration
NDEC	Nebraska Department of Environmental Control
NDEQ	Nebraska Department of Environmental Quality
NDNR	Nebraska Department of Natural Resources
NFA	no further action
NGB	National Guard Bureau
OWS	oil/water separator
PA	preliminary assessment
PVC	polyvinyl chloride
RG	remediation goal
RI	remedial investigation
RSL	regional screening level
SAIC	Science Applications International Corporation
SI	site investigation
SSL	soil screening level
SVOC	semivolatile organic compound
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
TWP	temporary well point
UST	underground storage tank
VOC	volatile organic compound
WP	work plan
XRF	x-ray fluorescence

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EXECUTIVE SUMMARY

Science Applications International Corporation has prepared this Preliminary Assessment/Site Investigation (PA/SI) Report on behalf of the Air National Guard to document the results of PA/SI activities conducted at seven areas of concern (AOCs) at the Lincoln ANG Base (ANGB), Lincoln, Nebraska. Seven AOCs were selected for PA/SI activities under the Compliance Restoration Program (CRP) at Lincoln ANGB based upon preliminary records reviews and a site reconnaissance visit conducted in September 2012. These seven AOCs were assigned alphanumeric identifiers, comprised of two letters and three digits, for tracking purposes. The two letters indicate the type of area under investigation, while the numerical portion of the identifier is assigned sequentially at each Installation without regard for the type of AOC. At Lincoln ANGB, AOC identifiers include the following two letter combinations: TU (for an underground storage tank [UST]), SA (for a storage area), and OW (for an oil/water separator [OWS]). The seven AOCs are the Former Vehicle Service Pit in Building 635 (TU014), Former Vehicle Service Pit in Building 608 (TU015), Battery Acid Neutralization Pit in Building 635 (TU016), Battery Acid Neutralization Pit in Building 636 (TU017), Former Detergent and/or Waste Oil USTs at Building 608 (TU018), Former Drop Tank Storage Area at Building 608 (SA019), and Former OWS at Building 605 (OW020).

ES.1 INVESTIGATIVE ACTIVITIES

On-site PA activities were conducted in conjunction with an Installation-specific kickoff meeting at Lincoln ANGB the week of September 5, 2012. SI field activities, which included soil sampling at five of the seven AOCs and groundwater sampling at four of the seven AOCs, were conducted from May 6 through 10, 2013. Geophysical surveying was conducted at the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) on May 6 and 7, 2013, to confirm the presence/absence of remaining subsurface infrastructure.

Building 635. Two AOCs are located within the Former Vehicle Maintenance Shop, which was remodeled in the mid-1990s: the Former Vehicle Service Pit in Building 635 (TU014) and the Battery Acid Neutralization Pit in Building 635 (TU016). The two AOCs are located in adjacent bays in the southeast corner of the building.

The Former Vehicle Service Pit in Building 635 (TU014) is located within what is now a storage room (Room 118C) for Base Civil Engineering. Although the pit has been filled in, and a new concrete floor was poured, no historical environmental sampling is believed to have been conducted. During SI field activities, a total of three soil samples and one groundwater sample were collected from two boring locations and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and total petroleum hydrocarbons (TPH).

The Battery Acid Neutralization Pit in Building 635 (TU016) was reportedly located in what is now an equipment storage room for explosive ordnance disposal personnel. During SI field activities, three soil borings were advanced to approximately 5 ft below ground surface (BGS) in the area of the former pit. Field x-ray fluorescence (XRF) screening for lead was conducted on the retrieved soil cores, and one soil sample for off-site analysis of lead was collected from each soil boring from the interval with the highest lead concentration based on the XRF screening.

Building 608. Three AOCs at or near Building 608 were identified for PA/SI activities: the Former Vehicle Service Pit in Building 608 (TU015), the Former Detergent and/or Waste Oil USTs at Building 608 (TU018), and the Former Drop Tank Storage Area at Building 608 (SA019). The three AOCs at Building 608 lie in close proximity to one another. The Former Vehicle Service Pit in

Building 608 (TU015) is located within the building, the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) is located adjacent to its northwest corner, and the Former Drop Tank Storage Area at Building 608 (SA019) is located west of the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) on the apron.

The Former Vehicle Service Pit in Building 608 (TU015), presumably used for F4 wing tanks, was a concrete sump reported to be approximately 4 ft wide, 4 ft long, and 5 to 6 ft deep. During SI field activities, a total of four soil samples and two groundwater samples were collected from two boring locations and analyzed for VOCs, SVOCs, and TPH.

The Former Detergent and/or Waste Oil USTs at Building 608 (TU018) AOC includes UST Tank #608-1, a 500-gal steel UST used to store waste oil from a nearby OWS, and UST Tank #608-2, a 2,000-gal fiberglass UST used to store "detergent." UST Tank #608-1 was removed in 1995 as part of a Base-wide UST removal project; however, no documentation confirming the removal of UST Tank #608-2 was located during the PA. During SI field activities, a geophysical survey, using electromagnetic and ground-penetrating radar technologies, was conducted to confirm the presence or absence of former detergent Tank #608-2. No UST was substantiated within the survey area. Subsequently, a total of six soil and three groundwater samples were collected from three boring locations and analyzed for VOCs, SVOCs, and TPH.

The Former Drop Tank Storage Area at Building 608 (SA019) was located west of Building 608. A concrete pad built for drop tank storage reportedly sloped away from Building 608 and onto a grassy area to the west (BB&E 2011b). During SI field activities, a total of six soil samples and three groundwater samples were collected from three boring locations and analyzed for VOCs, SVOCs, and TPH.

Building 636. The Battery Acid Neutralization Pit in Building 636 (TU017) was constructed outside of the battery room during building construction in 1992. According to shop personnel, very little battery acid was discharged to the floor drain. During the September 5, 2012, Installation-specific kickoff meeting, Mr. Wade Gregson and Mr. Ed Southwick of the Nebraska Department of Environmental Quality (NDEQ) indicated agreement with the assumption that, due to the 1992 installation date for this battery neutralization pit, it was likely that little to no battery acid was discharged to the battery room floor drain (most of the vehicle batteries after 1992 were sealed and did not require filling). NDEQ indicated that sampling would not be necessary at this location if the neutralization pit was found to be intact and structurally sound. A photograph of the pit taken on September 5, 2012, illustrates that the pit is intact and structurally sound and, thus, no sampling was conducted at the Battery Acid Neutralization Pit in Building 636 (TU017). Further investigation of this AOC is not warranted.

Building 605. The Former OWS at Building 605 (OW020) (also known as Tank #6055-1) was a 500-gal concrete structure installed in 1973. The OWS received used solvents and oils via the Building 605 shop floor and trench drains, as well as from the parts cleaning room in the Former Jet Engine Shop. In 1996, NDEQ issued a letter stating that no further action (NFA) was required at Tank #605-1 based upon a Closure Assessment Report (NDEQ 1996). Subsequently, monitoring wells in the Building 605 area were abandoned under NDEQ oversight. Based upon review of these historical records, no sampling was conducted at the Former OWS at Building 605 (OW020). Further investigation of this AOC is not warranted.

ES.2 RESULTS

Based upon the results of PA activities, the Battery Acid Neutralization Pit in Building 636 (TU017) was determined not to warrant further investigation, and the Former OWS at Building 605 (OW020) was determined to have been granted NFA by NDEQ in 1996. Therefore, sampling was only conducted at five

AOCs during the SI phase. Results of soil analyses were compared to May 2013 U. S. Environmental Protection Agency (EPA) regional screening levels (RSLs) under a residential scenario, soil to groundwater leaching criteria (as appropriate), and September 2012 NDEQ Voluntary Cleanup Program (VCP) remediation goals (RGs) for direct contact and protection of groundwater. Groundwater results were compared to the federal maximum contaminant level (MCL) and the NDEQ VCP groundwater criteria; if no MCL exists for a given constituent, the EPA RSL for tap water was used instead.

Former Vehicle Service Pit in Building 635 (TU014). One SVOC (naphthalene) was detected in soil at concentrations greater than screening criteria. Naphthalene was detected in one soil sample at sample location TU014-SB2 in the 8.7- to 9.5-ft BGS interval at a concentration of 21.7J µg/kg. Naphthalene was not detected in the shallower interval (6.4 to 7.5 ft BGS) of this soil boring. While the detected concentration does not exceed the EPA RSL (3,600 µg/kg) or the NDEQ direct contact RG (4,300 µg/kg), the detection exceeded the EPA soil screening level of 0.47 µg/kg and the NDEQ migration to groundwater RG (9.4 µg/kg). All other VOCs and SVOCs were not detected in soil or were detected at concentrations less than their respective screening criteria. TPH was not detected in soil. No VOCs, SVOCs, or TPH were detected in groundwater.

Former Vehicle Service Pit in Building 608 (TU015). Four VOCs (cyclohexane, ethylbenzene, isopropylbenzene, and xylene [both m,p-xylene and o-xylene isomers]) and four SVOCs (benz[a]anthracene, bis[2-ethylhexyl]phthalate, 2-methylnaphthalene, and naphthalene) were detected in one or more subsurface soil samples at the Former Vehicle Service Pit in Building 608 (TU015) above one or more soil screening criteria for the protection of groundwater; no constituents detected in soil exceeded residential direct contact criteria. All other VOCs and SVOCs were not detected in soil or were detected at concentrations less than their respective screening criteria. TPH was detected in three of four soil samples, with a maximum detected TPH-diesel-range organics (DRO) concentration of 120 mg/kg in TU015-SB1 in the 8.3- to 10.0-ft BGS interval and a maximum detected TPH-gasoline-range organics (GRO) concentration of 810J mg/kg in TU015-SB2. Soil boring TU015-SB2 demonstrated the highest concentrations of VOCs and TPH-GRO in soil, while TU015-SB1 yielded the highest concentrations of SVOCs and TPH-DRO in soil.

TPH and all eight constituents detected in soil above screening criteria for the protection of groundwater were also detected in groundwater; although, only one (naphthalene) was detected in groundwater above screening criteria. Naphthalene was detected at 2.46 µg/L in TU015-SB1 and at 2.08 µg/L in TU015-SB2; both detections exceeded the EPA RSL and equivalent NDEQ RG (0.14 µg/L) for groundwater. Benzene was also detected in both groundwater samples at 2.89 µg/L in TU015-SB1 and at 1.55 µg/L in TU015-SB2. The only detected concentration of benzene that exceeded the MCL and equivalent NDEQ RG (5 µg/L) for groundwater came from the field duplicate sample (14.8 µg/L).

Battery Acid Neutralization Pit in Building 635 (TU016). Field XRF screening for lead was conducted on all three retrieved soil cores, with results ranging from below the limit of detection to 11±5 mg/kg. The highest lead concentrations, based on the XRF screening, were detected within the 0.5- to 2.5-ft BGS interval. Lead was detected in all three samples analyzed by the off-site laboratory at concentrations ranging from 11.7 to 14.6 mg/kg. None of the detected concentrations exceed the EPA RSL and equivalent NDEQ VCP RG for lead of 400 mg/kg.

Former Detergent and/or Waste Oil USTs at Building 608 (TU018). Methylene chloride was the only detected constituent in soil to exceed soil screening criteria; however, all methylene chloride results were rejected due to probable laboratory contamination. All other VOCs and SVOCs were not detected in soil or were detected at concentrations less than their respective screening criteria. TPH was not detected in soil. Four SVOCs (benz[a]anthracene, benzo[b]fluoranthene, indeno[1,2,3-cd]pyrene, and naphthalene) were detected in groundwater at concentrations greater than one or more screening criteria.

Benz(a)anthracene, benzo(a)fluoranthene, and indeno(1,2,3-cd)pyrene were detected in groundwater at concentrations less than 0.1 µg/L, while naphthalene was detected at a maximum detected concentration (MDC) of 10.0 µg/L. All other VOCs and SVOCs were not detected in groundwater or were detected at concentrations less than their respective screening criteria. TPH-DRO was detected in two groundwater samples with an MDC of 0.657 mg/L, and TPH-GRO was detected in one of three groundwater samples at a concentration of 0.363 mg/L.

Former Drop Tank Storage Area at Building 608 (SA019). Methylene chloride was the only constituent in soil to exceed soil screening criteria; however, all methylene chloride results were rejected due to probable laboratory contamination. All other VOCs and SVOCs were not detected in soil or were detected at concentrations less than their respective screening criteria. TPH was detected in two soil samples, with the MDCs of TPH-DRO (228J mg/kg) and TPH-GRO (65.2 mg/kg) both detected in the 1.9- to 3.3-ft BGS interval of SA019-SB3. Three SVOCs (benz[a]anthracene, benzo[b]fluoranthene, and indeno[1,2,3-cd]pyrene) were detected in groundwater at concentrations greater than one or more screening criteria. All three polycyclic aromatic hydrocarbons were detected in groundwater at concentrations below 0.2 µg/L; the MDC for all three occurred at SA019-SB3. All other VOCs and SVOCs were not detected in groundwater or were detected at concentrations less than their respective screening criteria. TPH was not detected in groundwater.

ES.3 HAZARD RANKING SYSTEM SCORING

Due to no evidence of contamination above screening levels at several AOCs and a lack of receptors and/or exposure pathways at the remaining AOCs, no Hazard Ranking System scoring was conducted.

ES.4 RECOMMENDATIONS

Based upon the results of PA activities, two AOCs were determined not to warrant field investigation: the Battery Acid Neutralization Pit in Building 636 (TU017) and the Former OWS at Building 605 (OW020). Administrative closure of these two AOCs within the CRP is recommended.

Lead was not detected in soil above screening criteria at the Battery Acid Neutralization Pit in Building 635 (TU016), and the only constituent detected above screening criteria t at the Former Vehicle Service Pit in Building 635 (TU014) was naphthalene. The detected concentration does not warrant further investigation or remedial action. NFA is recommended for the following:

- the Former Vehicle Service Pit in Building 635 (TU014), and
- the Battery Acid Neutralization Pit in Building 635 (TU016).

Analytical results of groundwater sampling at all three Building 608 AOCs (the Former Vehicle Service Pit in Building 608 [TU015], the Former Detergent and/or Waste Oil USTs at Building 608 [TU018], and the Former Drop Tank Storage Area at Building 608 [SA019]) are consistent with historical petroleum groundwater impacts in the Building 608 area (e.g., Installation Restoration Program Site 10, which was granted NFA in 2013) and are not necessarily indicative of new source(s). However, the consistency among individual contaminants detected in both soil and groundwater beneath Building 608 and the significant soil contaminant concentrations identified in the SI indicate that a remedial investigation at the Former Vehicle Service Pit in Building 608 (TU015) is warranted. As petroleum impacts to groundwater are evident throughout the vicinity, additional investigation is recommended at the Building 608 AOCs:

- the Former Vehicle Service Pit in Building 608 (TU015),
- the Former Detergent and/or Waste Oil USTs at Building 608 (TU018), and
- the Former Drop Tank Storage Area at Building 608 (SA019).

Table ES-1 summarizes information relevant to the ongoing data quality objective process for each of the three AOCs recommended for further investigation. Completed Remedial Action Cost Engineering Requirements worksheets are included as Appendix E for National Guard Bureau programming purposes.

Table ES-1. Information Relevant to the DQO Process

AOC	Constituents Detected Above Screening Criteria	Sampling Recommendation(s)	Objectives
Former Vehicle Service Pit in Building 608 (TU015)	Soil: cyclohexane, ethylbenzene, isopropylbenzene, xylene (both m,p-xylene and o-xylene isomers), benz(a)anthracene, bis(2-ethylhexyl)phthalate, 2-methylnaphthalene, and naphthalene Groundwater: naphthalene and benzene	Soil: 12 soil samples Groundwater: 3 wells (9 total at Building 608)	Determine the nature and extent of contaminated media. Evaluate the risk posed by current concentrations in soil and groundwater, including vapor intrusion at Building 608
Former Detergent and/or Waste Oil USTs at Building 608 (TU018)	Soil: none Groundwater: benz(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and naphthalene	Soil: none Groundwater: 3 wells (9 total at Building 608)	Determine the nature and extent of contaminated media. Evaluate the risk posed by current concentrations in groundwater, including vapor intrusion at Building 608
Former Drop Tank Storage Area at Building 608 (SA019)	Soil: none Groundwater: benz(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene	Soil: none Groundwater: 3 wells (9 total at Building 608)	Determine the nature and extent of contaminated media. Evaluate the risk posed by current concentrations in groundwater, including vapor intrusion at Building 608

AOC = Area of concern.
DQO = Data quality objective.
UST = Underground storage tank.

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1.0 INTRODUCTION

Science Applications International Corporation (SAIC) has prepared this Preliminary Assessment/Site Investigation (PA/SI) Report on behalf of the Air National Guard (ANG) to document the results of PA/SI activities conducted at seven areas of concern (AOCs) at the Lincoln ANG Base (ANGB), Lincoln, Nebraska (Figure 1-1). PA/SI activities were performed within the Compliance Restoration Program (CRP) under National Guard Bureau (NGB) Contract Number DAHA92-01-D-0008, Delivery Order Number 0197. All field activities were conducted in accordance with the *Work Plan for Preliminary Assessment/Site Investigation, Compliance Restoration Program, 155th Air Refueling Wing, Nebraska Air National Guard, Lincoln, Nebraska* (ANG 2013).

1.1 PROJECT OBJECTIVES AND SCOPE

The primary objective of the PA/SI is to determine the presence or absence of contamination at each identified AOC and to either

- obtain a no further action (NFA) decision with regulatory concurrence for qualifying AOCs, or
- identify the data quality objectives (DQOs) for conducting follow-on remedial investigations (RIs) at AOCs that do not meet the criteria for NFA.

PA/SIs are used to evaluate one or more known or potential releases of hazardous substances at a site. The PA is a limited-scope compilation of readily available information about a site and its surroundings. Information is gathered through visual site surveys, document reviews, and interviews; a PA does not typically include sampling. The main purpose of the PA is to distinguish sites that pose little or no threat to human health and the environment from those that may pose a threat. If the PA determines that further investigation is warranted, an SI is conducted.

The main purpose of the SI is to collect and analyze environmental samples to determine what chemicals, if any, are present at the site; provide information required to determine the Hazard Ranking System (HRS) score for the site; and determine if response actions may be needed. Analytical data are compared to appropriate risk-based screening criteria, background data, and/or established regulatory criteria to determine whether further investigation is required. Following an SI, additional investigation may occur in an RI; response actions may be conducted at any point in the process.

Seven AOCs, as listed in Table 1-1 and depicted in Figure 1-2, were selected for PA/SI activities based upon preliminary records reviews and a site reconnaissance visit conducted in May 2011 under the One Clean initiative. These seven AOCs were assigned alphanumeric identifiers, comprised of two letters and three digits, for tracking purposes. The two letters indicate the type of area under investigation, while the numerical portion of the identifier is assigned sequentially at each Installation without regard for the type of AOC. At Lincoln ANGB, AOC identifiers include the following two letter combinations: TU (for an underground storage tank [UST]), SA (for a storage area), and OW (for the location of an oil/water separator [OWS]). The seven AOCs are formally known as the Former Vehicle Service Pit in Building 635 (TU014), Former Vehicle Service Pit in Building 608 (TU015), Battery Acid Neutralization Pit in Building 635 (TU016), Battery Acid Neutralization Pit in Building 636 (TU017), Former Detergent and/or USTs at Building 608 (TU018), Former Drop Tank Storage Area at Building 608 (SA019), and Former OWS at Building 605 (OW020).

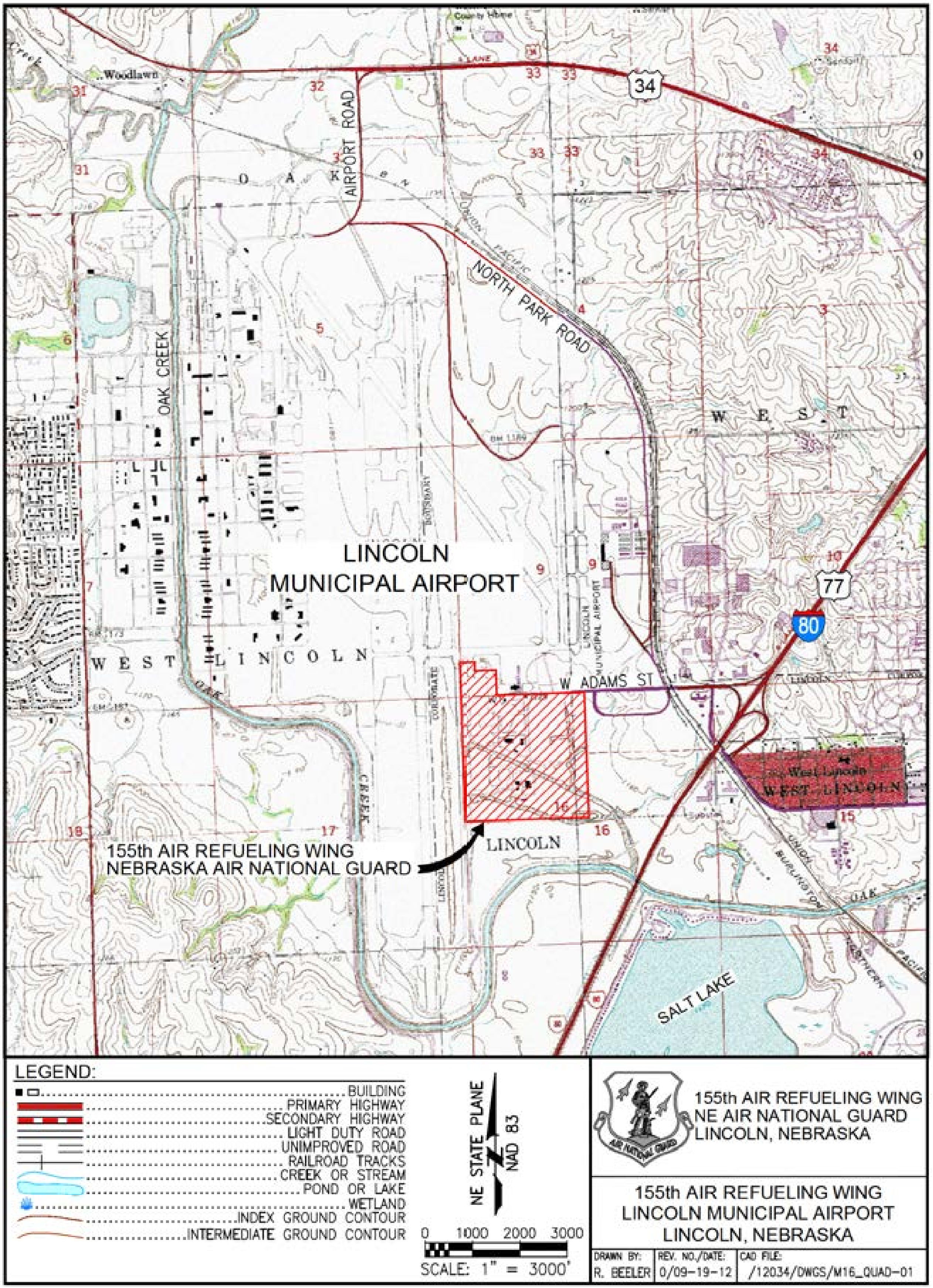

Figure 1-1. Location Map for the 155th Air Refueling Wing, Lincoln Municipal Airport, Lincoln, Nebraska

Table 1-1. AOCs Identified for PA/SI Activities at Lincoln ANGB

AOC ID	AOC Name
TU014	Former Vehicle Service Pit in Building 635
TU015	Former Vehicle Service Pit in Building 608
TU016	Battery Acid Neutralization Pit in Building 635
TU017	Battery Acid Neutralization Pit in Building 636
TU018	Former Detergent and/or Waste Oil USTs at Building 608
SA019	Former Drop Tank Storage Area at Building 608
OW020	Former OWS at Building 605

ANGB = Air National Guard Base.
AOC = Area of concern.
ID = Identifier.
OWS = Oil/water separator.
PA = Preliminary assessment.
SI = Site investigation.
UST = Underground storage tank.

On-site PA activities were conducted in conjunction with an Installation-specific kickoff meeting at Lincoln ANGB the week of September 5, 2012. SI field activities, which included soil sampling at four of the seven AOCs and groundwater sampling at three of the AOCs, were conducted from May 6 through May 10, 2013. In addition, geophysical surveying was conducted at the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) on May 6 and 7, 2013, to verify the presence/absence of subsurface infrastructure. This PA/SI Report summarizes the results of the PA, describes SI field activities, presents analytical results of environmental sampling and geophysical survey, and provides recommendations for each AOC.

1.2 REPORT ORGANIZATION

Following the outline established in the PA/SI Work Plan (WP; ANG 2013), this report is divided into the following chapters:

Chapter 1.0. ***Introduction***—Summarizes the purpose and scope of this PA/SI Report.

Chapter 2.0. ***Installation Description***—Presents the description and history of the Base.

Chapter 3.0. ***Environmental Setting***—Describes the geographic and environmental setting of the Base. Information on the regional and local climate, topography, geology, hydrogeology, hydrology, and soil is provided.

Chapter 4.0. ***Preliminary Assessments***—Presents the history and background of each AOC and provides the results of the AOC site visits.

Chapter 5.0. ***Site Investigation Field Program***—Details the AOC-specific field investigation activities and methods and summarizes the results.

Chapter 6.0. ***Inventory of Water Supply and Monitoring Wells***—If applicable, provides an inventory of water supply and monitoring wells in the vicinity of each AOC.

Chapter 7.0. ***Area of Concern Pathway and Environmental Hazard Assessments***—Describes the potential exposure pathways and provides the U. S. Environmental Protection Agency (EPA) HRS QuickScore for each AOC, if applicable.

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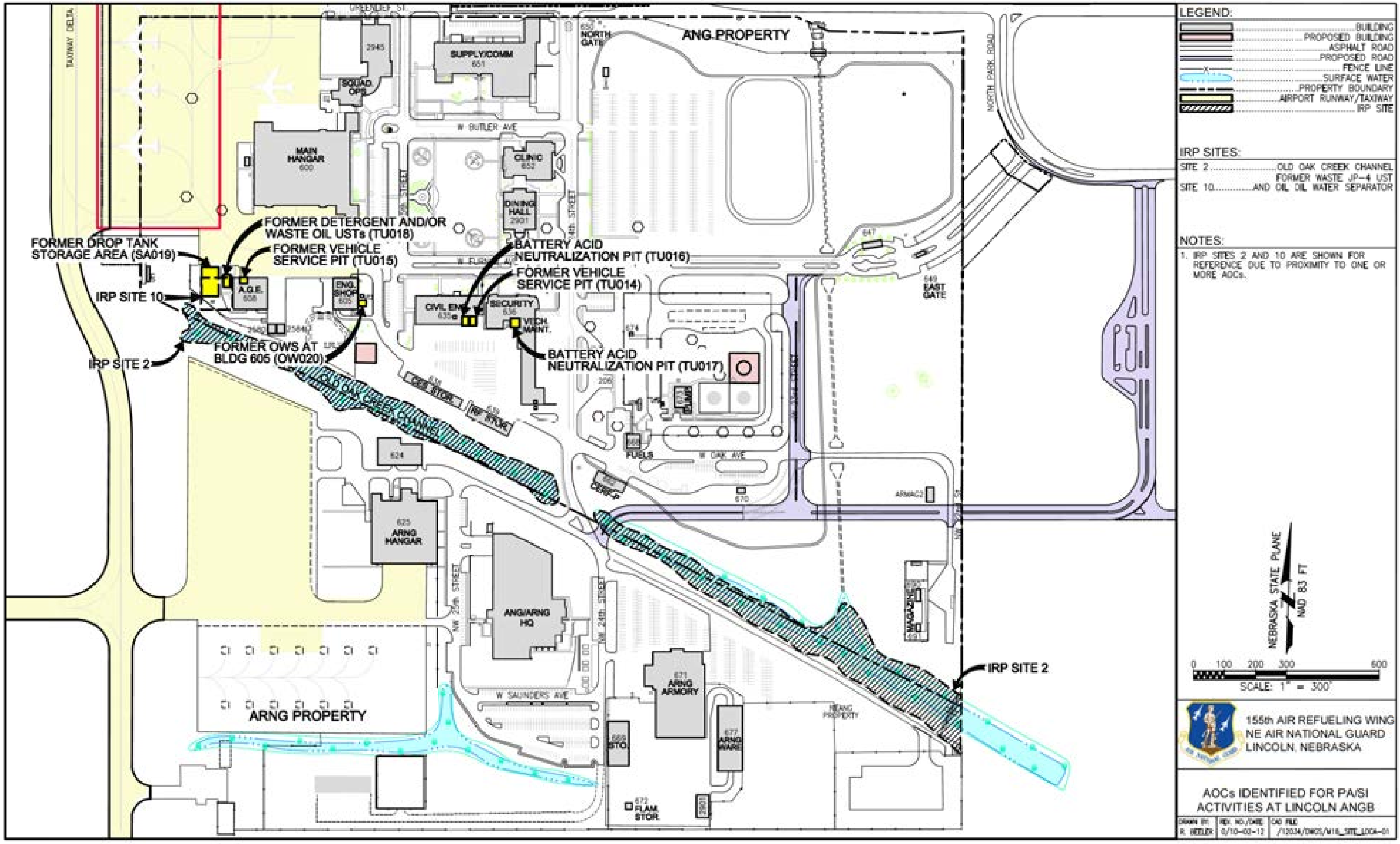

Figure 1-2. AOCs Investigated Under CRP at Lincoln ANGB

Chapter 8.0. ***Conclusions and Recommendations***—Summarizes the PA/SI conclusions and recommendations for either NFA or additional investigation of each AOC.

Chapter 9.0. ***References***—Lists the references that were used in preparing this PA/SI Report.

Appendices—The following appendices are included in this PA/SI Report:

Appendix A. Historical Documents
Appendix B. Boring Logs
Appendix C. Analytical Results (includes a discussion of methylene chloride and acetone results)
Appendix D. Geophysical Report
Appendix E. Remedial Action Cost Engineering Requirements Worksheets

2.0 INSTALLATION DESCRIPTION

This chapter summarizes available background information on the Nebraska ANG 155th Air Refueling Wing at Lincoln ANGB and the seven subject AOCs.

2.1 INSTALLATION SETTING

The Lincoln Airport is located in Lancaster County and is approximately 5 miles northwest of the capital city of Lincoln in southeast Nebraska (Figure 1-1). Lincoln ANGB consists of approximately 180 acres, of which the majority is owned by the U.S. Air Force and leased to Nebraska ANG. Another 38.5 acres is leased to the Nebraska Army National Guard, which occupies the southern end of the site.

2.2 HISTORY AND CURRENT OPERATIONS

Lincoln Airport was originally established as the Lincoln Army Airfield in 1942 as a combat crew processing center and Airplane Mechanics School during World War II where it operated until 1946. At this time, Nebraska ANG was activated and occupied several buildings along the western side of the airfield until it was returned to the city of Lincoln in 1948. It was later reactivated in 1952 and renamed the Lincoln Air Force Base where it operated until 1968 when it was returned to the city of Lincoln for the second time.

The southeastern portion of the airport was divided into thirds, with the U.S. Navy acquiring the northern two thirds in 1953 and the U.S. Air Force acquiring the southern third in 1954. The U.S. Navy operated a Naval Air Station from approximately 1954 to 1959 prior to being acquired by the U.S. Air Force. At this time, ANG operations moved north to the former U.S. Navy facilities, where they have remained. With the exception of several new structures, the general layout of the Installation has not changed significantly since 1966.

2.3 LAND USE

A 2012 zoning map provided by the Lancaster County Planning Department (Figure 2-1) indicates that the immediate area surrounding Lincoln Airport is primarily agricultural land with some residential and business districts to the west (Lancaster County Planning Department 2012).

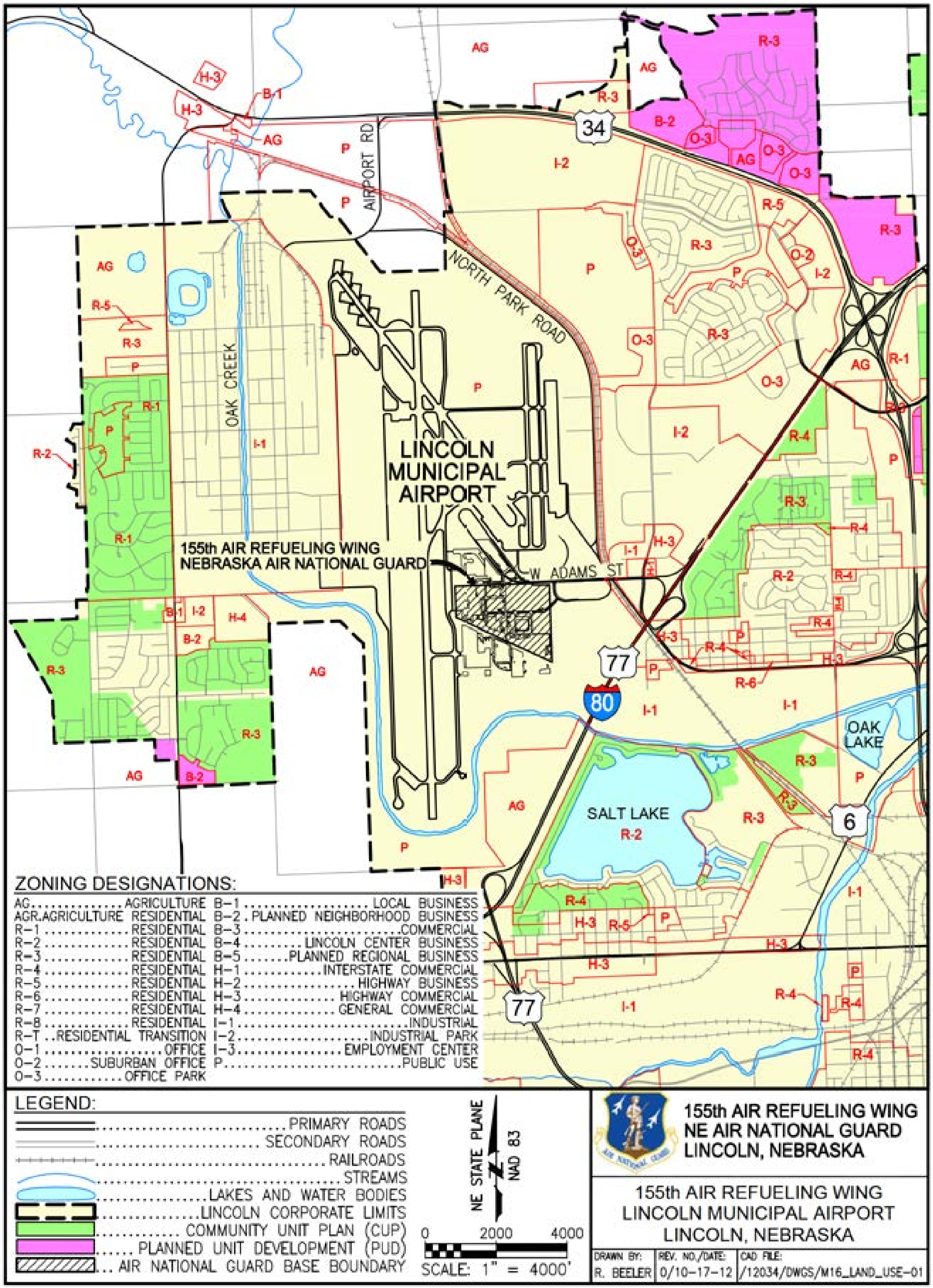

Figure 2-1. Land Use in the Vicinity of Lincoln Municipal Airport

3.0 ENVIRONMENTAL SETTING

This chapter summarizes the Lincoln ANGB environmental setting.

3.1 LOCATION AND TOPOGRAPHY

Lincoln ANGB is located near Salt Creek and the adjoining saline wetlands of northern Lancaster County. The topography consists of gently rolling hills, and the average surface elevation in the area is 1,167 ft above mean sea level.

3.2 ENVIRONMENTAL SETTING

The following subsections describe the environmental setting at Lincoln ANGB. Much of the information presented below was originally presented in the *Preliminary Assessment for the 155th Tactical Reconnaissance Group, Nebraska Air National Guard, Lincoln Municipal Airport, Lincoln, Nebraska* (HTRC 1987).

3.2.1 Climate

The climate in Lincoln is defined as humid continental and is characterized by four highly variable seasons. The average winter temperature is 27°F and summer is 76°F. The average annual precipitation is 27.77 in. and is more prevalent in the warmer months when thunderstorms commonly produce tornadoes. Snow is generally light with an average annual snow fall of 28 in., but there is the potential for blizzards, although not often with the dry conditions and frequent thaws.

3.2.2 Geology

The Base, located in the southeastern part of Nebraska, is situated on the eastern edge of the Great Plains. Bedrock in the Lincoln area is comprised of Cretaceous-aged sandstone and shale. The primary bedrock unit encountered in this area is the lower Cretaceous Dakota Group, which includes the Lakota Formation and Fuson Shale. The Dakota group, whose thickness averages 350 to 400 ft, underlies most of Nebraska and extends into the northern Great Plains, eventually outcropping in the foothills of the Rocky Mountains, the Laramie Range, and the Black Hills. In Lancaster County, Nebraska, bedrock is overlain by unconsolidated sediment of the Quaternary period, which can be characterized by two lithostratigraphic units. The upper unconsolidated unit is approximately 10 to 22 ft of eolian silt and clay deposits; the lower unconsolidated unit is comprised of approximately 15 ft of well-sorted fluvial sand and gravel and is thickest in paleostream channels in the underlying Cretaceous bedrock.

3.2.3 Soil

According to the U. S. Department of Agriculture Soil Conservation Service, the upper 5 ft of native soil at Lincoln ANGB belongs to the Sharpsburg-Judson, Kennebec-Nodaway-Zook, or Crete-Sharpsburg Associations.

Kennebec-Nodaway-Zook soil is characterized as deep, nearly level to very gently sloping, and moderately well-drained to poorly drained silty soil. It is found on the southern and western portions of Lincoln ANGB. The Crete-Sharpsburg soil, found in the central and eastern portions of the Base, is characterized as deep, nearly level to gently sloping, moderately well-drained silty soil formed on stream terraces. The Sharpsburg-Judson soil is classified as deep, nearly level to moderately steep, and moderately well-drained; this silty soil is found in the northeast corner of the Base, where it formed in loess and colluvium on uplands and foot slopes.

3.2.4 Groundwater

Groundwater occurs in two aquifers at Lincoln ANGB: a shallow unconfined aquifer and a deep confined aquifer. The unconfined aquifer is found within the unconsolidated sands and clayey soil formed during the Quaternary age that extend to a depth of 90 ft below ground surface (BGS) in some places. The shallow aquifer is generally encountered at approximately 12 ft BGS with a saturated thickness of approximately 40 ft and flows southwest towards Oak Creek. The unconfined and confined aquifers are separated by a thick silty clay layer.

The deep confined aquifer occurs within the Cretaceous Dakota Formation and serves as the principal aquifer in the area, although not the primary source of drinking water due to its variable quality and transmissivity. This formation is characterized by fine- to coarse-grained sandstone that is poorly consolidated with lenses of shale and mudrock. The aquifer begins at depths between 125 and 150 ft BGS and ranges in thickness from 0 to 350 ft. Regional flow is generally southwest to south, and average transmissivity is estimated at 4,000 gal per day foot but can be as high as 50,000 gal per day foot.

No registered water wells are found within a 1-mile radius of Lincoln ANGB. There are 10 groundwater monitoring wells located on-site associated with historical investigations; abandonment of these wells is planned within the near future. As of August 2012, no drinking water wells were identified within a 4-mile radius of the Base.

3.2.5 Surface Water Hydrology

Lincoln ANGB is located within the Salt Creek drainage area. The Base stormwater collection system drains to the Old Oak Creek Channel, a semi-stagnant channel abandoned during runway construction when Oak Creek was rerouted. The Old Oak Creek Channel extends from within the western Base boundary adjacent to Building 608 to the southeast corner of the Base, with flow only during periods of precipitation. The channel drains to Oak Creek, which runs along the west, south, and southeast sides of the Lincoln Airport. Oak Creek is a highly channelized stream that converges with Salt Creek approximately 3 miles east of the Base.

The *Installation Restoration Program, Site Investigation Report Volume 1: Sections 1 Through 6, Appendix A, 155th Air Refueling Group, Nebraska ANG, Lincoln Municipal Airport, Lincoln, Nebraska*, reported approximately 1 mile of wetlands on Base, occurring in narrow bands along two intermittent streams (one of them, the Old Oak Creek Channel). Salt marshes occur in several places along Salt Creek downstream of the Base.

3.2.6 Critical Habitats/Threatened or Endangered Species

According to the U. S. Fish and Wildlife Service, as of February 2012, three proposed or listed threatened or endangered species are reasonably expected to occur in Lancaster County (USFWS 2012)

- *Canis lupus* (Gray wolf) – threatened,
- *Platanthera praeclara* (Western Prairie Fringed Orchid) – threatened, and
- *Cicindela nevadica lincolniana* (Salt Creek Tiger beetle) – endangered.

One designated critical habitat was identified within Lancaster County as of September 2012 (USFWS 2012). This area occurs north of the airport (approximately 3 miles) and is the habitat of the Salt Creek Tiger beetle.

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4.0 PRELIMINARY ASSESSMENTS

The PA includes on-site interviews with active and former personnel from the ANG Installations and other parties with relevant historical site knowledge and includes a visual survey to characterize the current site conditions, to better delineate the nature and location of potential contamination, and to help identify sample locations for the SI sample collection activities. Interviews, records searches, and visual surveys were conducted during the PA to define current environmental conditions specific to each AOC. On-site PA activities were conducted in conjunction with an Installation-specific kickoff meeting at Lincoln ANGB the week of September 5, 2012. Documents reviewed during the PA include

- *Preliminary Assessment for the 155th Tactical Reconnaissance Group, Nebraska Air National Guard, Lincoln Municipal Airport, Lincoln, Nebraska* (HTRC 1987).
- *Installation Restoration Program, Site Investigation Report Volume 1: Sections 1 Through 6, Appendix A, 155th Air Refueling Group, Nebraska ANG, Lincoln Municipal Airport, Lincoln, Nebraska* (ANG 1995).
- *Environmental Restoration Program, Site 13, Memorandum No. 1, Quarterly Groundwater Sampling Activities, 155th Air Refueling Wing, Lincoln Municipal Airport, Nebraska Air National Guard, Lincoln, Nebraska* (ANG 2006).
- *Environmental Restoration Program, Project Closeout Activities at ERP Sites 10 and 13, 155th Air Refueling Wing, Lincoln Municipal Airport, Nebraska Air National Guard, Lincoln, Nebraska* (ANG 2008).
- *Proposed Plan for Installation Restoration Program Sites 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 13, 155th Air Refueling Wing, Nebraska Air National Guard, Lincoln Municipal Airport, Lincoln, Nebraska* (ANG 2011a).
- *Environmental Baseline Survey, Proposed Lease Acquisition Areas and EOD Easement Area, 155th Air Refueling Wing, Lincoln Municipal Airport, Nebraska* (ANG 2011b).
- *PA/SI Trip Report Memorandum – 155th Air Refueling Wing, Lincoln, Nebraska* (BB&E 2011b).
- *Review of Environmental Baseline Surveys – 155th Air Refueling Wing, Nebraska Air National Guard, Lincoln Municipal Airport, Lincoln, Nebraska* (BB&E 2011a). This letter summarized results from a review of several historical documents, including the following documents not already listed above:
    - *Environmental Baseline Survey, 155th Air Refueling Wing, Nebraska Air National Guard Base, Lincoln Air National Guard* (ERM 2001).
    - *Environmental Baseline Survey, Explosive Ordnance Disposal Training Facility, 155th Air Refueling Wing, Nebraska Air National Guard, Lincoln Airport, Lincoln, Nebraska* (ERM 2005).

    The seven AOCs discussed in this report were selected for investigation based upon the document reviews completed by BB&E.

Results of PA activities conducted at each AOC are provided below. Appendix A presents historical documentation relevant to one or more AOCs, including photographs of Lincoln ANGB.

4.1 BUILDING 635 AREAS OF CONCERN (TU014 AND TU016)

Two AOCs are located within the Former Vehicle Maintenance Shop, which was remodeled in the mid-1990s: the former Vehicle Service Pit in Building 635 (TU014) and the Battery Acid Neutralization Pit in Building 635 (TU016). The two AOCs are located in adjacent bays in the southeast corner of the building.

4.1.1 Former Vehicle Service Pit in Building 635 (TU014)

The Former Vehicle Service Pit in Building 635 (TU014) is located within what is now a storage room (Room 118C) for Base Civil Engineering. The pit has been filled in, and a new concrete floor was poured; but because this was not a regulated site, no historical environmental sampling is believed to have been conducted.

According to facility personnel, the bottom of the vehicle service pit is estimated to have been at approximately 6 to 8 ft BGS. Potential releases include oils and solvents from vehicle maintenance activities conducted in the former pit and resultant migration through former cracks in the concrete walls and flooring to the surrounding soil. Therefore, the Final WP (ANG 2013) recommended the collection of four soil samples and up to two groundwater samples from two locations: ideally, one at the end closest to the bay door, and one at the opposite end of the former pit. Both soil and groundwater samples would be analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and total petroleum hydrocarbons (TPH). The proposed sampling activities were conducted on May 6 and -7, 2013, and are detailed in Chapter 5.0.

4.1.2 Battery Acid Neutralization Pit in Building 635 (TU016)

The Battery Acid Neutralization Pit in Building 635 (TU016) was reportedly located in what is now an equipment storage room for explosive ordnance disposal (EOD) personnel. According to facility personnel, the former battery room covered a 10- by 15-ft area. Although the room has been demolished, piping and a floor drain remain. Visual indications of corrosion are evident in the concrete floor.

No subsurface battery neutralization pit was evident based on visual observations during the September 2012 site visit. Long-time Base personnel recalled only a drain in the former battery room. The floor drain appears to discharge directly to the sanitary sewer with no visible access points for a potential neutralization pit. No plumbing map for Building 635 could be located to confirm the former presence of a neutralization pit.

Due to the lack of evidence supporting the former presence of a battery acid neutralization pit in Building 635, the Final WP (ANG 2013) recommended the collection of soil samples from three locations within the vicinity of the existing floor drain for analysis of lead, a key indicator to battery acid contamination. The proposed sampling activities were conducted on May 7, 2013, and are detailed in Chapter 5.0.

4.2 BUILDING 608 AREAS OF CONCERN (TU015, TU018, AND SA019)

Three AOCs at or near Building 608 were identified for PA/SI activities: the Former Vehicle Service Pit in Building 608 (TU015), the Former Detergent and/or Waste Oil USTs at Building 608 (TU018), and the Former Drop Tank Storage Area at Building 608 (SA019). The three AOCs at Building 608 lie in close proximity to one another. The Former Vehicle Service Pit in Building 608 (TU015) is located within the building; the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) is located adjacent to its northwest corner; and the Former Drop Tank Storage Area at Building 608 (SA019) is located west of the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) on the apron.

Several former USTs and OWSs were located in the vicinity of these three AOCs, including the UST and AOC previously investigated as Installation Restoration Program (IRP) Site 10. These former tanks were identified as follows:

- #608-1, a 265-gal single-wall, steel UST installed in 1975 that was associated with a nearby OWS. This UST was removed and backfilled in October 1995. Upon excavation, the tank was noted to be in poor condition due to numerous holes caused by heavy corrosion; however, the associated piping was observed to be in good condition with no visible signs of leakage. Observation of contamination during excavation included soil discoloration along with a strong petroleum odor (Nebraska State Fire Marshall 1996a). Two soil samples were collected and analyzed for total recoverable petroleum hydrocarbons (TRPH). TRPH was detected at concentrations of 48 and 740 mg/kg. Groundwater was not encountered.

  The historical excavation footprint and former tank location shown on figures within this report are taken from the Final Proposed Plan for IRP Sites 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 13 (ANG 2011a).

- #608-2, a 2,000-gal fiberglass UST installed in 1976 and used to store "detergent." The tank's exact former location remains unknown. No documentation has been located recording its removal. However, the tank was included in 1992 UST Removal Program planning documents as a UST scheduled for removal.

- #608-3, a 1,000-gal welded steel UST installed in 1975 and used to store waste jet propellant (JP)-4. This UST and an associated OWS were removed in April 1991, and significant contamination was noted. A total of approximately 350 yd^3 of soil were excavated and stockpiled, and an estimated 250,000 gal of groundwater were also removed and disposed. The Nebraska Department of Environmental Control (NDEC), now the Nebraska Department of Environmental Quality (NDEQ), assigned file number UG 073191-RF-1200 to the release, while ANG identified it as IRP Site 10. In December 1992, NDEC issued a letter stating "no further remedial actions will be required at this time. However, if a problem arises in the future as a result of this release, Nebraska Air National Guard will be held responsible for further remedial action."

  Monitoring wells at the site were closed in 2008, and project closeout activities were conducted in 2011. NDEQ approved NFA at Site 10 in February 2013 (NDEQ 2013).

- #608-4, a 250-gal welded steel oil interceptor installed in 1975 in the western end of an approximately 5-ft-wide and 13-ft-long (depth unknown) concrete containment pit. This tank was removed in October 1995, and the concrete pit was backfilled with sand and then capped with concrete in November 1995. No soil samples were collected during removal activities; however, following tank removal, holes were punched through the containment pit floor. One sample was collected from groundwater that infiltrated through these holes. TRPH was detected at 1.1 mg/L (Nebraska State Fire Marshall 1996b).

- #608-5, an approximately 3,800-gal concrete emergency spill pit measuring approximately 5 ft wide, 12 ft long, and 8 ½ ft deep. This concrete pit was located approximately 10 ft southeast of the concrete containment pit associated with #608-4. The pit was emptied and steam cleaned in October 1995. Two soil samples were collected from beneath the pit floor and analyzed for TRPH; detected concentrations were 33 and 68 mg/kg. Influent and effluent lines were plugged with non-shrink grout, and the pit was backfilled with a sand/gravel mixture and then capped with concrete in November 1995 (Nebraska State Fire Marshall 1996c).

Key historical documents for the Building 608 area, including those with analytical results of soil and groundwater samples, are included in Appendix A.

4.2.1 Former Vehicle Service Pit in Building 608 (TU015)

The Former Vehicle Service Pit in Building 608 (TU015), presumably used for F4 wing tanks, was reported to be a concrete sump approximately 4 ft wide, 4 ft long, and 5 to 6 ft deep. During the September 2012 site visit, Base personnel indicated that, at the time of its abandonment approximately 10 to 15 years prior, the interior of the sump looked good and no obvious cracks were seen. Multiple subsurface pipes from other parts of the building reportedly drained to this sump. This piping was "blown out" to remove residual petroleum, and then both piping and the former sump were filled with concrete. No sampling was known to have been conducted at the former sump location.

It was believed that releases of JP-4 during servicing of the F4 wing tanks could have entered this area and been released to the subsurface soil and/or groundwater if any breaks were present in the concrete walls or flooring. Therefore, the Final WP (ANG 2013) recommended the collection of four soil samples and up to two groundwater samples from two locations along the outside edges of the former sump walls for analysis of VOCs, SVOCs, and TPH. The proposed sampling activities were conducted on May 8, 2013, and are detailed in Chapter 5.0.

In the winter of 2013/2014, Leidos (formerly a part of SAIC) requested additional records from the State of Nebraska pertaining to historical groundwater sampling at IRP Site 10. Included in the records provided by the State were the 1996 Site Assessment Closure Reports for #608-4 and #608-5 (Nebraska State Fire Marshall 1996b, 1996c, respectively). Prior to receipt of these reports, it was believed that the Former Vehicle Service Pit in Building 608 (TU015) might be the same pit as the Emergency Spill Pit #608-5; however, minimal details had been located for #608-5 and, most importantly, no records of sampling/analytical results for the former pit had been located. Thus, field sampling activities were conducted in 2013 under a conservative approach.

4.2.2 Former Detergent and/or Waste Oil Underground Storage Tanks at Building 608 (TU018)

The AOC titled Former Detergent and/or Waste Oil USTs at Building 608 (TU018) includes UST Tank #608-1, a 500-gal steel UST used to store waste oil from a nearby OWS, and UST Tank #608-2, a 2,000-gal fiberglass UST used to store "detergent." These two USTs were installed in 1975 and 1976, respectively.

UST Tank #608-1 was removed in 1995 as part of a Base-wide UST removal project; a memorandum dated November 6, 1995, states that UST Tank #608-1 "has been backfilled. There was contamination" (NGB 1995). No mention is made of UST #608-2. Similarly, the 1995 Closure Assessment Report for #608-1 makes no mention of tank #608-2 (Nebraska State Fire Marshall 1996a). As of September 2012, facility personnel were uncertain if UST #608-2 had been removed.

The Final WP (ANG 2013) recommended a geophysical survey be performed within the grassed area adjacent to the northwest corner of Building 608 to determine whether UST #608-2 remains in place. Once the UST's presence or absence was verified, the Final WP recommended the collection of six soil samples and up to three groundwater samples from three locations either in close proximity to the estimated tank walls or within the approximate footprint of the former UST locations for analysis of

VOCs, SVOCs, and TPH. The proposed sampling activities were conducted on May 9, 2013, and are detailed in Chapter 5.0.

4.2.3 Former Drop Tank Storage Area at Building 608 (SA019)

The Former Drop Tank Storage Area at Building 608 (SA019) was located west of Building 608. A concrete pad built for drop tank storage reportedly sloped away from Building 608 and onto a grassy area to the west (BB&E 2011b). The former drop tank storage area was used to store and potentially drain/maintain wing tanks from F4 fighters at Lincoln ANGB.

During the September 5, 2012, site visit, shop personnel indicated that any releases from the former drop tank storage area would have been directed into a 1,000-gal JP-4 waste tank (Tank #608-3) located to the southwest prior to its removal. Current runoff flows toward the southwest corner of the apron area; flow becomes concentrated as it leaves the pavement and enters the vegetated area adjacent to the perimeter fence.

Based upon information collected during the PA, the Final WP (ANG 2013) stated that the direction of water runoff would be confirmed by pouring a small amount of clean water on the ground surface and watching its flow. Once determined, the collection of six soil samples and up to three groundwater samples from three locations were recommended within the footprint of the former drop tank storage area for analysis of VOCs, SVOCs, TPH. The proposed sampling activities were conducted on May 8 and 9, 2013, and are detailed in Chapter 5.0.

4.3 BATTERY ACID NEUTRALIZATION PIT IN BUILDING 636 (TU017)

The Battery Acid Neutralization Pit in Building 636 (TU017) is still present but is no longer in use. It was constructed outside of the battery room during building construction in 1992. According to shop personnel, very little battery acid was discharged to the floor drain. This drain is located within the battery room and connects to the battery neutralization pit, which eventually connects to the sanitary sewer. A manhole 2 ft in diameter can be observed on the floor outside of the battery room (Room 116). Facility personnel were able to open this manhole and determine that the neutralization pit is made of polyvinyl chloride (PVC) and is only 2 ft deep with a diameter of 1.5 ft; no limestone was evident in the neutralization pit during the September 2012 site visit.

During the September 5, 2012, Installation-specific kickoff meeting, Mr. Wade Gregson and Mr. Ed Southwick of NDEQ indicated agreement with the assumption that, due to the 1992 installation date for this battery neutralization pit, it was likely that little to no battery acid was discharged to the battery room floor drain (most of the vehicle batteries after 1992 were sealed and did not require filling). NDEQ indicated that sampling would not be necessary at this location if the neutralization pit was found to be intact and structurally sound.

Figure 4-1 illustrates the current condition of the battery acid neutralization pit as observed by SAIC personnel on the afternoon of September 5, 2012. Based upon the kickoff discussion and the appearance of the former pit (intact and structurally sound), the Final WP (ANG 2013) recommended no sampling at this AOC.

Figure 4-1. Photograph of Battery Acid Neutralization Pit in Building 636 (TU017)

4.4 FORMER OIL/WATER SEPARATOR AT BUILDING 605 (OW020)

The Former OWS, a 500-gal concrete structure, was located east of Building 605. Following installation in 1973, the OWS received used solvents and oils via the Building 605 shop floor and trench drains, as well as the parts cleaning room in the Former Jet Engine Shop. This OWS, identified as Tank #605-1, was scheduled for removal in 1991 as part of MILCON 909559.

A 1,000-gal JP-4 waste UST was installed adjacent to this tank in 1973 and removed in approximately 1992. According to the Base Environmental Manager, this regulated UST was granted NFA by NDEQ.

A Closure Assessment Report for the OWS (Tank #605-1) was submitted to NDEQ following its removal in 1996. A copy of this report has not been located; however, NDEQ issued a letter stating that NFA was required at Tank #605-1 based upon the information provided in the Closure Assessment Report (NDEQ 1996).

Based upon the 1996 NFA letter from NDEQ and subsequent abandonment of site monitoring wells under NDEQ oversight, as documented in a letter dated October 30, 2003, the Final WP (ANG 2013) proposed no sampling at this location.

5.0 SITE INVESTIGATION FIELD PROGRAM

This chapter summarizes the SI field activities at Lincoln ANGB and the analytical results. All sampling and analytical activities were conducted in accordance with the procedures specified in the Final WP (ANG 2013), unless otherwise specified below. All boring logs are provided in Appendix B, and analytical data packages for soil and groundwater samples collected during the SI are presented in Appendix C. Geophysical results at the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) are summarized below with further details provided in Appendix D.

5.1 GENERAL APPROACH

5.1.1 Soil Sampling

Proposed soil sampling locations were based on historical data, potential source areas, and site conditions as observed during the PA. All soil samples were collected for lithologic description, field screening, and chemical analysis. With the exception of the Battery Acid Neutralization Pit in Building 635 (TU016), two soil samples per boring were planned. Sample intervals were based on the approximate interval potential leaks may have occurred (generally 6 to 10 ft BGS for most USTs/service pits) and/or visual/olfactory signs of contamination and/or photoionization detector readings. As planned, two soil samples were collected per soil boring at the Building 608 AOCs (TU015, TU018, and SA019). At the Former Vehicle Service Pit in Building 635 (TU014), only one soil sample was collected from one of the soil borings due to poor soil recovery and a shallow water table. At the Battery Acid Neutralization Pit in Building 635 (TU016), one soil sample was collected per soil boring as planned based on x-ray fluorescence (XRF) analysis of the soil core.

Borehole abandonment was performed by backfilling with a minimum 2-ft thickness of bentonite chips and hydrating the bentonite chips with clean water. The remainder of the borehole was backfilled with native soil. The concrete floor at the Former Vehicle Service Pit in Building 635 (TU014), the Former Vehicle Service Pit in Building 608 (TU015), and the Battery Acid Neutralization Pit in Building 635 (TU016) was restored to pre-existing conditions immediately following borehole abandonment. All boring logs are provided in Appendix B.

5.1.2 Groundwater Sampling

Temporary well points (TWPs) were installed in each soil boring to collect groundwater samples. Each TWP was constructed using 1-in.-diameter, schedule 40 PVC casing and 1-in.-diameter, machine-slotted, 0.010-in. slotted PVC screens. Each well screen was 10 ft in length. Groundwater samples were collected using new, disposable, polyethylene bailers. A groundwater sample was not collected from one of the soil borings at the Former Vehicle Service Pit in Building 635 (TU014) due to limited recharge. As planned, no groundwater samples were collected from soil borings at the Former Battery Acid Neutralization Pit in Building 635 (TU016).

5.1.3 Data Analysis

5.1.3.1 Risk-based screening criteria

All analytical data are compared to appropriate risk-based screening criteria and/or established regulatory criteria to determine whether further investigation is required. In general, soil concentrations are screened against May 2013 EPA regional screening levels (EPA RSLs) and soil screening levels (SSLs). For some constituents, there are two available EPA SSLs; EPA SSLs calculated based on the federal maximum contaminant level (MCL) in groundwater and EPA SSLs calculated based on the EPA tap water RSLs. The MCL-based EPA SSLs were the primary EPA SSL used in this screening; if no MCL-based EPA SSL exists, then the risk-based EPA SSL was used.

Analytical soil data are also compared to the NDEQ residential direct contact and migration to groundwater remediation goals (RGs) under the Voluntary Cleanup Program, which were established in September 2012 (NDEQ 2012). NDEQ migration to groundwater RGs are based upon the NDEQ groundwater RGs for direct contact (NDEQ 2012) and take into account a dilution factor of 20, the state-specific dilution attenuation factor.

Groundwater concentrations were screened against federal MCLs; if no MCL exists, the May 2013 EPA tap water RSL was used. In addition, groundwater was screened against the NDEQ groundwater RGs for direct contact.

5.1.3.2 Background data

No background soil data were collected because the majority of the potential constituents of concern (VOCs, SVOCs, and TPH) are not naturally occurring.

5.1.3.3 Data validation

Analytical data were validated following receipt to ensure that the precision and accuracy of the data were adequate for their intended use. All data, with the exception of reported results for methylene chloride and acetone, as described below, were determined to be appropriate for their intended use.

Detected concentrations below the level of quantitation (LOQ) are shown with a 'J' flag. The LOQ is the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias. Measurements between the detection limit and the LOQ assure the presence of the analyte with confidence, but their numeric values are estimates (DoD 2009).

Non-detects are reported as the limit of detection (LOD) followed by a 'U' flag. The LOD is the smallest amount or concentration of a substance that must be present in a sample to be detected at a 99% confidence level. The failure to obtain a detection is reported as "<LOD" because the false-negative rate at the LOD is 1% (DoD 2009).

Both volatile and semivolatile organic analyses were performed using methods selected to provide the lowest reasonable detection limits in soil and groundwater. In some instances, due to required sample dilutions or low screening criteria, desired detection limits in one or more samples for a particular analyte were not achievable. In the majority of instances, the achieved detection limit remains within an order of magnitude of the lowest screening criteria (e.g., the EPA SSL in soil) and one or more orders of magnitude below criteria for direct contact. In general, the achieved detection limits are considered acceptable for the purposes of this SI, which is to identify significant contamination that may pose a threat to human health and/or the environment.

Quality Control

One trip blank was collected and analyzed for VOCs. No VOCs were detected in the trip blank sample.

Two equipment rinsate samples were collected. One was analyzed for lead and the other for VOCs, SVOCs, and TPH. Acetone and toluene were detected in one of the rinsate samples at low estimated concentrations. One field blank sample was collected and analyzed for VOCs, SVOCs, TPH, and lead. Toluene and naphthalene were detected in the field blank sample at low estimated concentrations.

Laboratory Contaminants

Methylene chloride was detected in 17 of 21 soil samples collected at Lincoln ANGB during the SI, with reported concentrations ranging from 34.3 to 490 μg/kg. Acetone was detected in 10 soil samples with reported concentrations ranging from 13.0 to 187 μg/kg.

Methylene chloride and acetone are known potential laboratory contaminants. Neither acetone nor methylene chloride were anticipated to be detected in soil samples; in addition, samples from field efforts in two another states processed by the same off-site laboratory during the timeframe as the Lincoln ANGB samples were also reported to contain methylene chloride and acetone. An investigation conducted by the analytical laboratory confirmed that contamination may have occurred during sample preparation. Therefore, all methylene chloride and acetone results in soil were rejected. Further discussion on the rationale for this decision is presented in Appendix C.

The probable laboratory contamination of the soil samples is not considered to invalidate results for other constituents; therefore, re-sampling for re-analysis of acetone and methylene chloride is not warranted.

5.2 FORMER VEHICLE SERVICE PIT IN BUILDING 635 (TU014)

5.2.1 Field Activities

Soil and groundwater samples at the Former Vehicle Service Pit in Building 635 (TU014) were collected at the following locations (Figure 5-1):

- midway between the northern and southern perimeter of the bay, east of the suspected former vehicle service pit (TU014-SB1); and
- the interior side of the bay door, south of the suspected former vehicle service pit (TU014-SB2).

A total of three soil samples and one groundwater sample were collected from two boring locations. One soil sample was collected from TU014-SB1 from the 10- to 11-ft BGS interval, slightly deeper than the targeted depth corresponding to the bottom of the former pit, due to lack of recovery at 8 to 10 ft BGS. A second soil sample was not collected from this soil boring because of poor soil recovery and wet soil conditions indicating a shallow water table starting at 6.3 ft BGS. Falling water levels were observed during subsequent installation of the TWP, thus indicating that the wet soil conditions observed in the soil core may have been the result of a perched zone. Two soil samples were collected from TU014-SB2, one from the targeted depth (8.7 to 9.5 ft BGS) and one from a shallower interval (6.4 to 7.5 ft BGS).

A groundwater sample was not collected at TWP TU014-SB1. By the time the TWP was in place, the water level had fallen to approximately 18.5 ft BGS and there was insufficient volume to collect a groundwater sample. The following day, the water level in TWP TU014-SB1 had risen only slightly to 18.15 ft BGS; approximately 50 mL of groundwater was retrieved before the temporary well went dry. The static water level in TU014-SB2 was 9.66 ft BGS. One groundwater sample was collected from TU014-SB2.

Soil and groundwater samples were analyzed for VOCs, SVOCs, and TPH.

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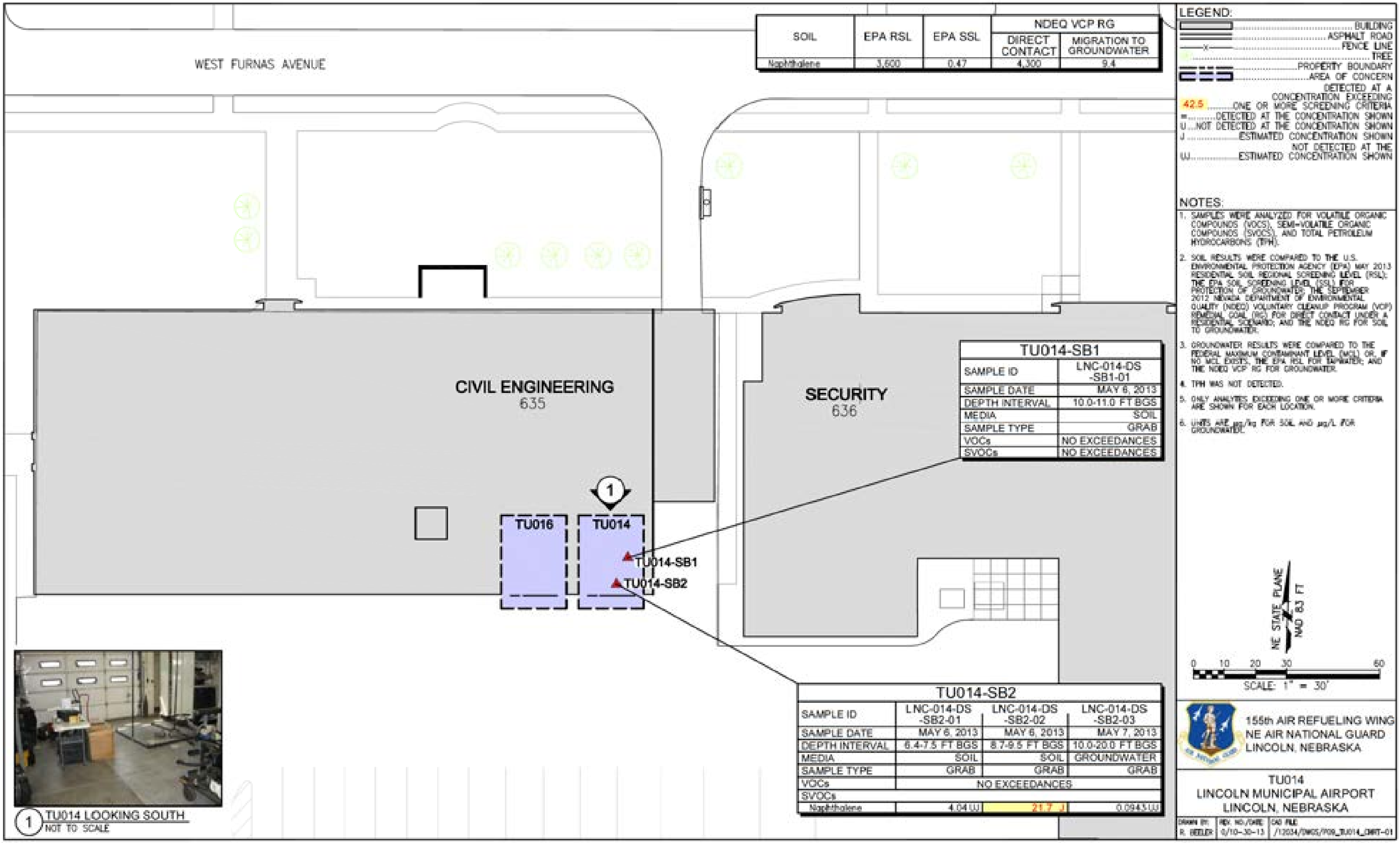


Figure 5-1. Constituents Detected Above Screening Criteria at the Former Vehicle Service Pit in Building 635 (TU014)

5.2.2 Results

Three soil samples and one groundwater sample were collected from the Former Vehicle Service Pit in Building 635 (TU014) during the SI. Table 5-1 summarizes the results and analysis of the soil and groundwater sampling.

5.2.2.1 Soil

One SVOC (naphthalene) was detected in soil at concentrations greater than screening criteria. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria. TPH was not detected.

Naphthalene was detected in one soil sample at the Former Vehicle Service Pit in Building 635 (TU014) at sample location TU014-SB2 in the 8.7- to 9.5-ft BGS interval (Figure 5-1). Naphthalene was not detected in the shallower interval (6.4 to 7.5 ft BGS) of this soil boring. While the detected concentration does not exceed the EPA RSL (3,600 µg/kg) or the NDEQ direct contact RG (4,300 µg/kg), the detection exceeded the EPA SSL of 0.47 µg/kg and the NDEQ migration to groundwater RG (9.4 µg/kg).

5.2.2.2 Groundwater

No VOCs, SVOCs, or TPH were detected in groundwater collected at the Former Vehicle Service Pit in Building 635 (TU014).

5.2.3 Conclusions

In summary, one SVOC (naphthalene) was detected above one or more screening criteria in subsurface soil at the Former Vehicle Service Pit in Building 635 (TU014). TPH was not detected in soil or groundwater, and no VOCs or SVOCs were detected in groundwater.

5.3 BATTERY ACID NEUTRALIZATION PIT IN BUILDING 635 (TU016)

5.3.1 Field Activities

Soil samples at the Battery Acid Neutralization Pit in Building 635 (TU016) were collected at the following locations (Figure 5-2):

- approximately 6 ft west and 15 ft north of the east side of the western bay door, inside the building and north of the floor drain (TU016-SB1);

- approximately 9 ft west and 2 ft south of the east side of the western bay door, outside the building (TU016-SB2); and

- approximately 2 ft west and 2 ft south of the east side of the western bay door, outside the building (TU016-SB3).

Table 5-1. Detected Analytes in Soil and Groundwater at the Former Vehicle Service Pit in Building 635 (TU014)

Location					TU014-SB1		TU014-SB2		TU014-SB2				TU014-SB2	
Sample ID					LNC-014-DS-SB1-01		LNC-014-DS-SB2-01		LNC-014-DS-SB2-02				LNC-014-DP-SB2-01	
Sample Date					05/06/13		05/06/13		05/06/13				05/07/13	
Depth Interval (ft BGS)			NDEQ VCP RG		10.0 to 11.0		6.4 to 7.5		8.7 to 9.5				10.0 to 20.0	
Media	EPA	EPA	Direct	Migration to	Soil		Soil		Soil			NDEQ VCP	Groundwater	
Sample Type	RSL	SSL	Contact	Groundwater	Grab		Grab		Grab		MCL	RG	Grab	
VOCs	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*		*(µg/kg)*		*(µg/kg)*		*(µg/L)*	*(µg/L)*	*(µg/L)*	
Acetone	61,000,000	2,400	16,000,000	22,000	33.4	R	187	R	99.6	R	12,000	5,400	25.0	U
2-Butanone	28,000,000	1,000	7,500,000	7,400	14.8	J	42.5	J	23.2	J	4,900	1,800	25.0	U
Methylene Chloride	56,000	1.3	12,000	26	**306**	**R**	**416**	**R**	**215**	**R**	5	5	5.00	U
SVOCs	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*		*(µg/kg)*		*(µg/kg)*		*(µg/L)*	*(µg/L)*	*(µg/L)*	
Acenaphthene	3,400,000	4,100	1,200,000	110,000	71.4	=	4.04	UJ	4.47	UJ	400	550	0.0943	UJ
Anthracene	17,000,000	42,000	5,900,000	1,800,000	14	=	4.04	UJ	4.47	UJ	1,300	43	0.0943	UJ
Benz(a)anthracene	150	10	150	110	3.33	J	4.04	UJ	5.94	J	0.029	0.016	0.0943	UJ
Benzo(a)pyrene	15	240	15	4,700	3.96	U	4.04	UJ	4.49	J	0.2	0.2	0.0943	UJ
Benzo(b)fluoranthene	150	35	150	280	2.48	J	4.04	UJ	8.09	J	0.029	0.012	0.0943	UJ
Benzo(g,h,i)perylene	NA	NA	NA	NA	3.96	U	4.04	UJ	4.67	J	NA	NA	0.0943	UJ
Benzo(k)fluoranthene	1,500	350	1,5 00	6,900	3.96	U	4.04	UJ	4.55	J	0.29	0.29	0.0943	UJ
Chrysene	15,000	1,100	15,000	11,000	2.22	J	4.04	UJ	10.7	J	2.9	1.6	0.0943	UJ
Fluoranthene	2,300,000	70,000	570,000	130,000	8.02	=	4.04	UJ	22	J	260	60	0.0943	UJ
Fluorene	2,300,000	220,000	780,000	140,000	47.4	=	4.04	UJ	4.47	UJ	200	370	0.0943	UJ
Indeno(1,2,3-cd)pyrene	150	200	150	890	3.96	U	4.04	UJ	5.35	J	0.029	0.011	0.0943	UJ
2-Methylnaphthalene	230,000	140	NA	NA	3.96	U	4.04	UJ	4.81	J	27	NA	0.0943	UJ
Naphthalene	3,600	0.47	4,300	9.4	3.96	U	4.04	UJ	**21.7**	**J**	0.14	0.14	0.0943	UJ
Phenanthrene	NA	NA	NA	NA	53.5	=	4.04	UJ	17.9	J	NA	NA	0.189	UJ
Pyrene	1,700,000	9,500	430,000	600,000	6.01	J	4.04	UJ	12.6	J	87	140	0.0943	UJ
TPH	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/L)*	*(mg/L)*	*(mg/L)*	
TPH-DRO	NA	NA	NA	NA	7.88	U	8.30	U	9.15	U	NA	NA	0.0962	UJ
TPH-GRO	NA	NA	NA	NA	6.54	U	7.39	U	6.79	U	NA	NA	0.100	U

Bold text denotes concentration shown exceeds criteria but data were rejected during validation.
Bold/highlighted text denotes detected at a concentration exceeding one or more screening criteria.
BGS = Below ground surface.
DRO = Diesel-range organics.
EPA = U. S. Environmental Protection Agency.
GRO = Gasoline-range organics.
ID = Identifier.
MCL = Maximum contaminant level (federal); if no MCL exists, the EPA RSL for tap water is shown.
NA = Not applicable.
NDEQ = Nebraska Department of Environmental Quality.
RSL = Regional screening level for residential scenario (May 2013; TR = 1E-06 and THQ = 1.0).
SSL = Soil screening level for migration to groundwater (MCL based; if no MCL-based SSL exists, then the RSL-based SSL is shown).
SVOC = Semivolatile organic compound.
TPH = Total petroleum hydrocarbon.
VCP RG = Voluntary Cleanup Program remediation goal (September 2012).
VOC = Volatile organic compound.
Data Qualifier
J = Estimated concentration.
R = Rejected during validation.
U = Not detected at the concentration shown.
UJ = Not detected at the estimated concentration shown.
'=' = Detected at the concentration shown.

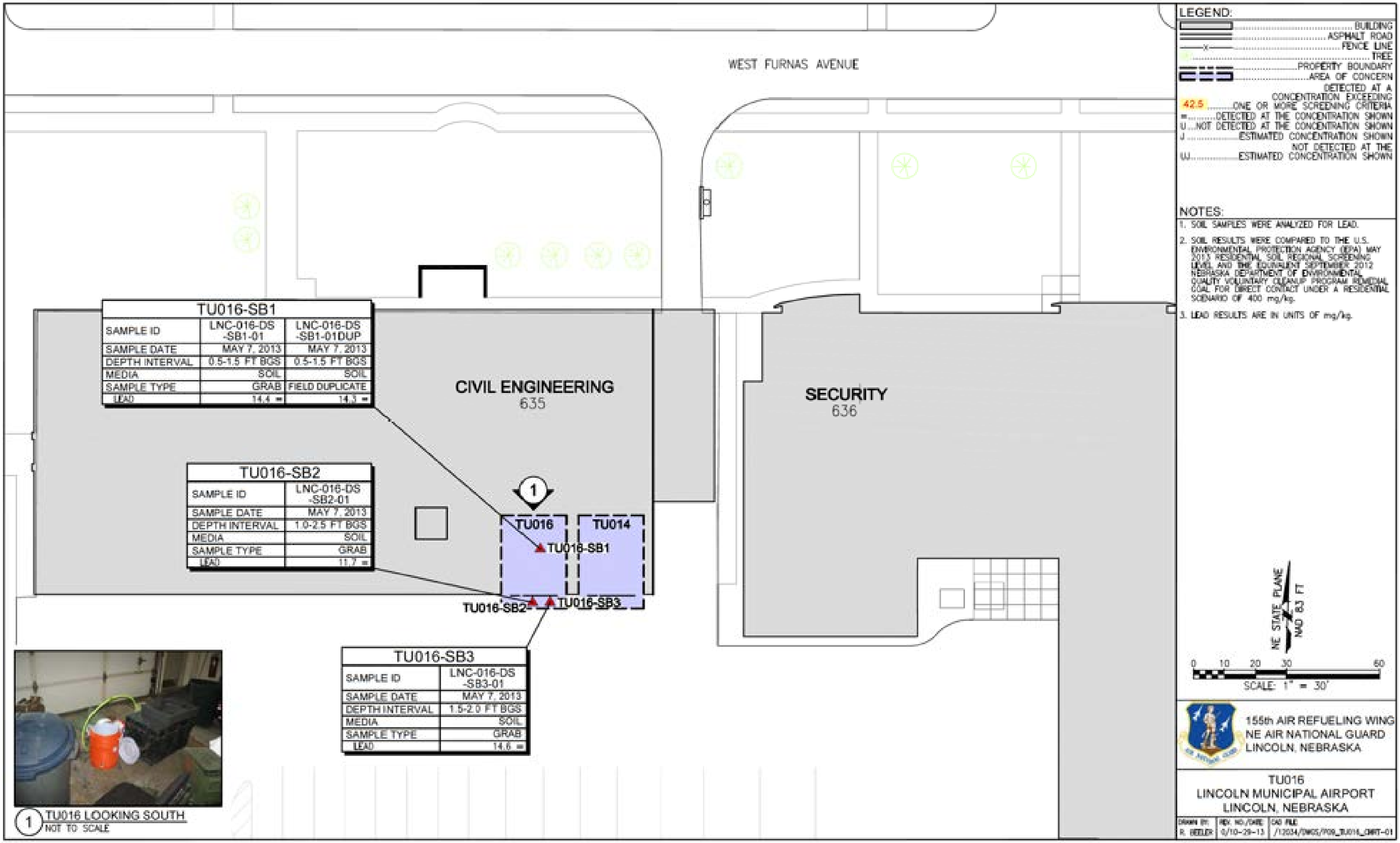


Figure 5-2. Constituents Detected Above Screening Criteria at the Battery Acid Neutralization Pit in Building 635 (TU016)

As described in the Final WP (ANG 2013), each soil boring was advanced to approximately 5 ft BGS. Field XRF screening for lead was conducted on the retrieved soil cores, with results ranging from below the LOD to 11±5 mg/kg. One soil sample for off-site analysis of lead was collected from each soil boring from the interval with the highest lead concentration based on the XRF screening: 0.5 to 1.5 ft BGS in TU016-SB1, 1.0 to 2.5 ft BGS in TU016-SB2, and 1.5 to 2.0 in TU016-SB3.

No groundwater samples were collected at the Former Battery Acid Neutralization Pit in Building 635 (TU016).

5.3.2 Results

Three soil samples were collected from the Battery Acid Neutralization Pit in Building 635 (TU016) during the SI. Table 5-2 summarizes the results and analysis of the soil sampling.

5.3.2.1 Soil

Lead was detected in all three soil samples at the Battery Acid Neutralization Pit in Building 635 (TU016) at concentrations ranging from 11.7 to 14.6 mg/kg. The maximum detected concentration (MDC) of 14.6 mg/kg was detected at sample location LNC016-SB3 in the 1.5- to 2.0-ft BGS interval (Figure 5-2). None of the detected concentrations exceed the EPA RSL and equivalent NDEQ VCP RG for lead of 400 mg/kg.

5.3.2.2 Groundwater

As planned, no groundwater samples were collected from soil borings at the Former Battery Acid Neutralization Pit in Building 635 (TU016).

5.3.3 Conclusions

In summary, lead was not detected in soil samples at the Former Battery Acid Neutralization Pit in Building 635 (TU016) at concentrations exceeding screening criteria.

5.4 FORMER VEHICLE SERVICE PIT IN BUILDING 608 (TU015)

5.4.1 Field Activities

Soil samples at the Former Vehicle Service Pit in Building 608 (TU015) were collected at the following locations (Figure 5-3):

- approximately 34 ft east and 3 ft south of the northwest corner of Building 608 along the northern edge of the former sump wall and adjacent to the bay door (TU015-SB1), and
- approximately 34 ft east and 13 ft south of the northwest corner of Building 608 along the southern edge of the former sump wall (TU015-SB2).

Two soil samples were collected at each soil boring: from 2.5 to 4.7 ft BGS and 8.3 to 10.0 ft BGS at soil boring TU015-SB1 and from 7.3 to 8.1 ft BGS and 8.5 to 9.3 ft BGS at soil boring TU015-SB2. Each of the soil borings was terminated at 20 ft BGS.

Table 5-2. Detected Analytes in Soil at the Battery Acid Neutralization Pit in Building 635 (TU016)

Location		TU016-SB1	TU016-SB1	TU016-SB2	TU016-SB3
Sample ID		LNC-016-DS-SB1-01	LNC-016-DS-SB1-01DUP	LNC-016-DS-SB2-01	LNC-016-DS-SB3-01
Sample Date		5/7/13	05/07/13	05/07/13	05/07/13
Depth Interval (ft BGS)		0.5 to 1.5	0.5 to 1.5	1.0 to 2.5	1.5 to 2.0
Media	Screening Level[a]	Soil	Soil	Soil	Soil
Sample Type		Grab	Field Duplicate	Grab	Grab
Lead (mg/kg)	400	14.4 =	14.3 =	11.7 =	14.6 =

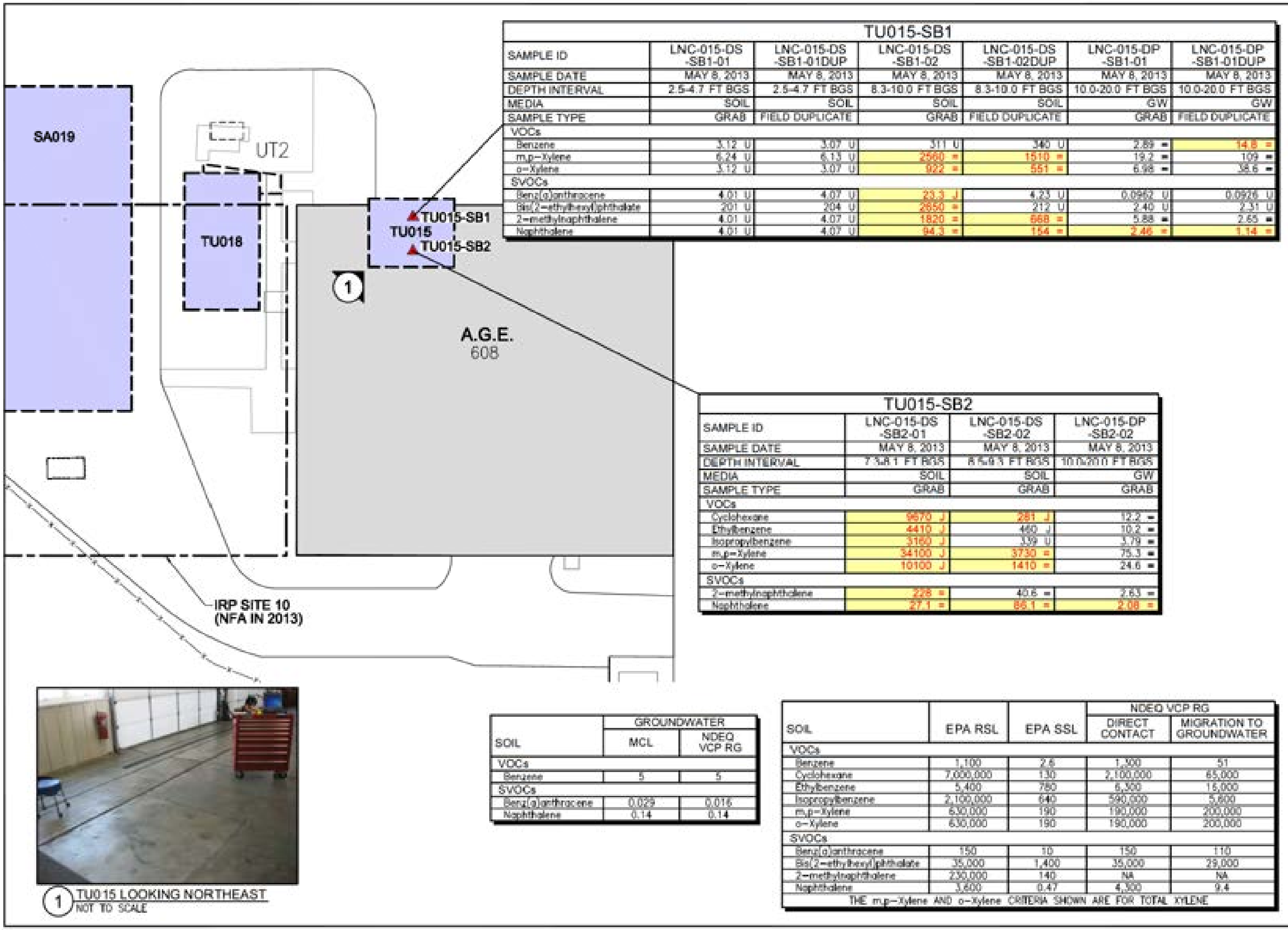
[a] Results are compared to the U. S. Environmental Protection Agency regional screening level and the equivalent Nebraska Department of Environmental Quality Voluntary Cleanup Program remediation goal for direct contact under a residential scenario of 400 mg/kg.

BGS = Below ground surface.

ID = Identifier.

Data Qualifier

'=' = Detected at the concentration shown.



TU015-SB1						
SAMPLE ID	LNC-015-DS -SB1-01	LNC-015-DS -SB1-01DUP	LNC-015-DS -SB1-02	LNC-015-DS -SB1-02DUP	LNC-015-DP -SB1-01	LNC-015-DP -SB1-01DUP
SAMPLE DATE	MAY 8, 2013	MAY 8, 2013	MAY 8, 2013	MAY 8, 2013	MAY 8, 2013	MAY 8, 2013
DEPTH INTERVAL	2.5-4.7 FT BGS	2.5-4.7 FT BGS	8.3-10.0 FT BGS	8.3-10.0 FT BGS	10.0-20.0 FT BGS	10.0-20.0 FT BGS
MEDIA	SOIL	SOIL	SOIL	SOIL	GW	GW
SAMPLE TYPE	GRAB	FIELD DUPLICATE	GRAB	FIELD DUPLICATE	GRAB	FIELD DUPLICATE
VOCs						
Benzene	3.12 U	3.07 U	311 U	340 U	2.89 =	14.8 =
m,p-Xylene	6.24 U	6.13 U	2560 =	1510 =	19.2 =	109 =
o-Xylene	3.12 U	3.07 U	922 =	551 =	6.98 =	38.6 =
SVOCs						
Benz(a)anthracene	4.01 U	4.07 U	23.3 J	4.23 U	0.0962 U	0.0926 U
Bis(2-ethylhexyl)phthalate	201 U	204 U	2650 =	212 U	2.40 U	2.31 U
2-methylnaphthalene	4.01 U	4.07 U	1820 =	668 =	5.88 =	2.65 =
Naphthalene	4.01 U	4.07 U	94.3 =	154 =	2.46 =	1.14 =

TU015-SB2			
SAMPLE ID	LNC-015-DS -SB2-01	LNC-015-DS -SB2-02	LNC-015-DP -SB2-02
SAMPLE DATE	MAY 8, 2013	MAY 8, 2013	MAY 8, 2013
DEPTH INTERVAL	7.3-8.1 FT BGS	8.5-9.3 FT BGS	10.0-20.0 FT BGS
MEDIA	SOIL	SOIL	GW
SAMPLE TYPE	GRAB	GRAB	GRAB
VOCs			
Cyclohexane	9670 J	281 J	12.2 =
Ethylbenzene	4410 J	460 J	10.2 =
Isopropylbenzene	3160 J	339 U	3.79 =
m,p-Xylene	34100 J	3730 =	75.3 =
o-Xylene	10100 J	1410 =	24.6 =
SVOCs			
2-methylnaphthalene	228 =	40.6 =	2.63 =
Naphthalene	27.1 =	86.1 =	2.08 =

SOIL	GROUNDWATER	
	MCL	NDEQ VCP RG
VOCs		
Benzene	5	5
SVOCs		
Benz(a)anthracene	0.029	0.016
Naphthalene	0.14	0.14

SOIL	EPA RSL	EPA SSL	NDEQ VCP RG	
			DIRECT CONTACT	MIGRATION TO GROUNDWATER
VOCs				
Benzene	1,100	2.6	1,300	51
Cyclohexane	7,000,000	130	2,100,000	65,000
Ethylbenzene	5,400	780	6,300	16,000
Isopropylbenzene	2,100,000	640	590,000	5,600
m,p-Xylene	630,000	190	190,000	200,000
o-Xylene	630,000	190	190,000	200,000
SVOCs				
Benz(a)anthracene	150	10	150	110
Bis(2-ethylhexyl)phthalate	35,000	1,400	35,000	29,000
2-methylnaphthalene	230,000	140	NA	NA
Naphthalene	3,600	0.47	4,300	9.4
THE m,p-Xylene AND o-Xylene CRITERIA SHOWN ARE FOR TOTAL XYLENE				

LEGEND:

- BUILDING
- ASPHALT ROAD
- FENCE LINE
- SURFACE WATER
- PROPERTY BOUNDARY
- AREA OF CONCERN
- IRP SITE 10 (NFA IN 2013)
- 14.2 ... DETECTED CONCENTRATION EXCEEDING ONE OR MORE SCREENING CRITERIA
- = ... DETECTED AT THE CONCENTRATION SHOWN
- U ... NOT DETECTED AT THE CONCENTRATION SHOWN
- J ... ESTIMATED CONCENTRATION SHOWN

NOTES:

1. SAMPLES WERE ANALYZED FOR VOLATILE ORGANIC COMPOUNDS (VOCS), SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS), AND TOTAL PETROLEUM HYDROCARBONS (TPH).
2. SOIL RESULTS WERE COMPARED TO THE MAY 2013 U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) RESIDENTIAL SOIL REGIONAL SCREENING LEVEL (RSL); THE EPA SOIL SCREENING LEVEL (SSL) FOR PROTECTION OF GROUNDWATER; THE SEPTEMBER 2012 NEVADA DEPARTMENT OF ENVIRONMENTAL QUALITY (NDEQ) VOLUNTARY CLEANUP PROGRAM (VCP) REMEDIAL GOAL (RG) FOR DIRECT CONTACT UNDER A RESIDENTIAL SCENARIO; AND THE NDEQ VCP RG FOR SOIL TO GROUNDWATER.
3. GROUNDWATER RESULTS WERE COMPARED TO THE FEDERAL MAXIMUM CONTAMINANT LEVEL (MCL) OR, IF NO MCL EXISTS, THE EPA RSL FOR TAPWATER; AND THE NDEQ VCP RG FOR GROUNDWATER.
4. TPH WAS DETECTED IN SOIL AND GROUNDWATER BUT THERE ARE NO EPA OR NDEQ VCP CRITERION FOR TPH.
5. ONLY ANALYTES EXCEEDING ONE OR MORE CRITERIA ARE SHOWN FOR EACH LOCATION.
6. UNITS ARE IN µg/kg FOR SOIL AND µg/L FOR GROUNDWATER.

NE STATE PLANE NAD 83 FT

0 10 20 30 60
SCALE: 1" = 30'

155th AIR REFUELING WING
NE AIR NATIONAL GUARD
LINCOLN, NEBRASKA

TU015
LINCOLN MUNICIPAL AIRPORT
LINCOLN, NEBRASKA

DRAWN BY:	REV. NO./DATE	CAD FILE
R. BEELER	0/10-29-13	/12034/DWGS/P09_TU015_CHRT-01

Figure 5-3. Constituents Detected Above Screening Criteria at the Former Vehicle Service Pit in Building 608 (TU015)

Static water levels in the two TWPs were recorded as follows: 12.42 ft BGS in TU015-SB1 and 10.72 ft BGS in TU015-SB2. One groundwater sample was collected from each TWP.

Soil and groundwater samples were analyzed for VOCs, SVOCs, and TPH.

5.4.2 Results

Four soil samples and two groundwater samples were collected from the Former Vehicle Service Pit in Building 608 (TU015) during the SI. Table 5-3 summarizes the results and analysis of the soil and groundwater sampling.

5.4.2.1 Soil

Four VOCs (cyclohexane, ethylbenzene, isopropylbenzene, and xylene [both m,p-xylene and o-xylene isomers]) and four SVOCs (benz[a]anthracene, bis[2-ethylhexyl]phthalate, 2-methylnaphthalene, and naphthalene) were detected in soil at the Former Vehicle Service Pit in Building 608 (TU015) at concentrations greater than one or more screening criteria. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria.

VOCs

Cyclohexane was detected in two of four soil samples with both detections in soil boring TU015-SB2. Detected concentrations in TU015-SB2 were 9,670J µg/kg in the 7.3- to 8.1-ft BGS interval and 281J µg/kg in the 8.5- to 9.3-ft BGS interval (Figure 5-3). While the detected concentrations do not exceed the EPA RSL (7,000,000 µg/kg), the NDEQ direct contact RG (2,100,000 µg/kg), or the NDEQ migration to groundwater RG (65,000 µg/kg), both detections exceed the EPA SSL of 130 µg/kg.

Ethylbenzene was detected in three of four soil samples at concentrations ranging from 192J to 4,410J µg/kg. The MDC was detected at sample location TU-015-SB2 in the 7.3- to 8.1-ft BGS interval (Figure 5-3). Ethylbenzene was detected in the deeper interval (8.5 to 9.3 ft BGS) of this soil boring at a concentration of 460J µg/kg. Only the MDC exceeds the EPA SSL (780 µg/kg); however, none of the detections exceed the EPA RSL (5,400 µg/kg), the NDEQ direct contact RG (6,300 µg/kg), or the NDEQ migration to groundwater RG (16,000 µg/kg).

Isopropylbenzene was detected in one soil sample at sample location TU015-SB2 in the 7.3- to 8.1-ft BGS interval (Figure 5-3). Isopropylbenzene was not detected in the deeper interval (8.5 to 9.3 ft BGS) of this soil boring. While the detected concentration (3,160J µg/kg) does not exceed the EPA RSL (2,100,000 µg/kg), the NDEQ direct contact RG (590,000 µg/kg), or the NDEQ migration to groundwater RG (5,600 µg/kg), it does exceed the EPA SSL (640 µg/kg).

Xylenes (m,p-xylene and o-xylene) were detected in three of four soil samples. The mixed isomer m,p-xylene was detected at concentrations ranging from 1,510 to 34,100 µg/kg, while the isomer o-xylene was detected at concentrations ranging from 551J to 10,100 µg/kg. The MDC for both xylene isomers was detected at sample location TU-015-SB2 in the 7.3- to 8.1-ft BGS interval (Figure 5-3). Both m,p-xylene and o-xylene were detected in the deeper interval (8.5 to 9.3 ft BGS) of this soil boring at concentrations of 3,730 and 1,410 µg/kg, respectively. While the detected concentrations do not exceed the EPA RSL (630,000 µg/kg), the NDEQ direct contact RG (190,000 µg/kg), or the NDEQ migration to groundwater RG (200,000 µg/kg), all detections exceed the EPA SSL of 190 µg/kg.

Table 5-3. Detected Analytes in Soil and Groundwater at the Former Vehicle Service Pit in Building 608 (TU015)

Location					TU015-SB1		TU015-SB1		TU015-SB1		TU015-SB1		TU015-SB2	
Sample ID					LNC-015-DS-SB1-01		LNC-015-DS-SB1-01DUP		LNC-015-DS-SB1-02		LNC-015-DS-SB1-02DUP		LNC-015-DS-SB2-01	
Sample Date					05/08/13		05/08/13		05/08/13		05/08/13		05/08/13	
Depth Interval (ft BGS)			NDEQ VCP RG		2.5 to 4.7		2.5 to 4.7		8.3 to 10.0		8.3 to 10.0		7.3 to 8.1	
Media	EPA	EPA		Migration to	Soil		Soil		Soil		Soil		Soil	
Sample Type	RSL	SSL	Direct Contact	Groundwater	Grab		Field Duplicate		Grab		Field Duplicate		Grab	
VOCs	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*		*(µg/kg)*		*(µg/kg)*		*(µg/kg)*		*(µg/kg)*	
Acetone	61,000,000	2,400	16,000,000	22,000	26.4	R	36.5	R	1,240	U	1,360	U	1,290	U
Benzene	1,100	2.6	1,300	51	3.12	U	3.07	U	311	U	340	U	323	U
cis-1,2-Dichloroethene	160,000	21	200,000	410	3.12	U	3.07	U	311	U	340	U	323	U
Cyclohexane	7,000,000	130	2,100,000	65,000	3.12	U	3.07	U	311	U	340	U	**9,670**	**J**
Ethylbenzene	5,400	780	6,300	16,000	3.12	U	3.07	U	312	J	192	J	**4,410**	**J**
Isopropylbenzene	2,100,000	640	590,000	5,600	3.12	U	3.07	U	311	U	340	U	**3,160**	**J**
m,p-Xylene[a]	630,000	190	190,000	200,000	6.24	U	6.13	U	**2,560**	**=**	**1,510**	**=**	**34,100**	**J**
Methylcyclohexane	NA	NA	NA	NA	3.12	U	3.07	U	315	J	378	J	29,800	J
Methylene Chloride	56,000	1.3	12,000	26	**290**	**R**	**450**	**R**	**378**	**R**	681	U	645	U
o-Xylene[a]	630,000	190	190,000	200,000	3.12	U	3.07	U	**922**	**=**	**551**	**J**	**10,100**	**J**
Toluene	5,000,000	690	1,300,000	14,000	3.12	U	3.07	U	311	U	340	U	315	J
SVOCs	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*		*(µg/kg)*		*(µg/kg)*		*(µg/kg)*		*(µg/kg)*	
Acenaphthene	3,400,000	400,000	1,200,000	110,000	4.01	U	4.07	U	29.3	=	2.76	J	8.21	J
Acenaphthylene	NA	NA	NA	NA	4.01	U	4.07	U	21.7	=	4.23	U	6.74	J
Anthracene	17,000,000	42,000	5,900,000	1,800,000	4.01	U	4.07	U	26.1	=	4.23	U	6.42	J
Benz(a)anthracene	150	10	150	110	4.01	U	4.07	U	**23.3**	**J**	4.23	U	3.57	J
Benzo(a)pyrene	15	240	15	4,700	4.01	U	4.07	U	4.09	U	4.23	U	4.20	U
Benzo(b)fluoranthene	150	35	150	280	4.01	U	4.07	U	4.09	U	4.23	U	4.20	U
Benzo(g,h,i)perylene	NA	NA	NA	NA	4.01	U	4.07	U	4.09	U	4.23	U	4.20	U
Benzo(k)fluoranthene	1,500	350	1,500	6,900	4.01	U	4.07	U	3.08	J	4.23	U	4.20	U
Bis(2-ethylhexyl)phthalate	35,000	1,400	35,000	29,000	201	U	204	U	**2,650**	**=**	212	U	770	=
Chrysene	15,000	3,500	15,000	11,000	4.01	U	4.07	U	22.6	J	4.23	U	2.75	J
Di-n-octylphthalate	610,000	44,000	NA	NA	201	U	204	U	328	J	212	U	306	J
Fluoranthene	2,300,000	630,000	570,000	130,000	4.01	U	4.07	U	18.4	=	4.23	U	3.64	J
Fluorene	2,300,000	70,000	780,000	140,000	4.01	U	4.07	U	4.09	U	4.23	U	18.3	=
Indeno(1,2,3-cd)pyrene	150	200	150	890	4.01	U	4.07	U	2.26	J	4.23	U	4.20	U
2-Methylnaphthalene	230,000	140	NA	NA	4.01	U	4.07	U	**1,820**	**=**	**668**	**=**	**228**	**=**
Naphthalene	3,600	0.47	4,300	9.4	4.01	U	4.07	U	**94.3**	**=**	**154**	**=**	**27.1**	**=**
Phenanthrene	NA	NA	NA	NA	4.01	U	4.07	U	94.3	=	3.32	J	24.7	=
Pyrene	1,700,000	9,500	430,000	600,000	4.01	U	4.07	U	41.1	=	4.23	U	6.07	J
TPH	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*		*(mg/kg)*	
TPH-DRO	NA	NA	NA	NA	8.28	U	8.40	U	120	=	9.48	J	115	=
TPH-GRO	NA	NA	NA	NA	6.31	U	6.06	U	19.3	=	13.7	=	810	J

Table 5-3. Detected Analytes in Soil and Groundwater at the Former Vehicle Service Pit in Building 608 (TU015) (continued)

Location					TU015-SB2				TU015-SB1		TU015-SB1		TU015-SB2	
Sample ID					LNC-015-DS-SB2-02				LNC-015-DP-SB1-01		LNC-015-DP-SB1-01DUP		LNC-015-DP-SB2-01	
Sample Date					05/08/13				05/08/13		05/08/13		05/08/13	
Depth Interval (ft BGS)			NDEQ VCP RG		8.5 to 9.3			NDEQ VCP RG	10.0 to 20.0		10.0 to 20.0		10.0 to 20.0	
Media	EPA RSL	EPA SSL	Direct Contact	Migration to Groundwater	Soil				Groundwater		Groundwater		Groundwater	
Sample Type					Grab		MCL		Grab		Field Duplicate		Grab	
VOCs	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*		*(µg/L)*	*(µg/L)*	*(µg/L)*		*(µg/L)*		*(µg/L)*	
Acetone	61,000,000	2,400	16,000,000	22,000	1360	U	12,000	5,400	5.00	U	4.57	J	5.37	J
Benzene	1,100	2.6	1,300	51	339	U	5	5	2.89	=	**14.8**	=	1.55	=
cis-1,2-Dichloroethene	160,000	21	200,000	410	339	U	70	70	0.500	U	0.500	U	0.34	J
Cyclohexane	7,000,000	130	2,100,000	65,000	**281**	**J**	13,000	3,100	4.6	=	23.4	=	12.2	=
Ethylbenzene	5,400	780	6,300	16,000	460	J	700	700	2.73	=	15.6	=	10.2	=
Isopropylbenzene	2,100,000	640	590,000	5,600	339	U	390	170	0.71	J	3.67	=	3.79	=
m,p-Xylene[a]	630,000	190	190,000	200,000	**3730**	=	1,000	10,000	19.2	=	109	=	75.3	=
Methylcyclohexane	NA	NA	NA	NA	718	=	NA	NA	4.82	=	25.8	=	21.8	=
Methylene Chloride	56,000	1.3	12,000	26	678	U	5	5	1.00	U	1.00	U	1.00	U
o-Xylene[a]	630,000	190	190,000	200,000	**1410**	=	1,000	10,000	6.98	=	38.6	=	24.6	=
Toluene	5,000,000	690	1,300,000	14,000	201	J	1,000	1,000	3.5	=	20.1	=	2.07	U
SVOCs	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*	*(µg/kg)*		*(µg/L)*	*(µg/L)*	*(µg/L)*		*(µg/L)*		*(µg/L)*	
Acenaphthene	3,400,000	400,000	1,200,000	110,000	3.95	U	400	550	0.0962	U	0.0926	U	0.0943	U
Acenaphthylene	NA	NA	NA	NA	3.95	U	NA	NA	0.0962	U	0.0926	U	0.0943	U
Anthracene	17,000,000	42,000	5,900,000	1,800,000	3.95	U	1,300	43	0.0962	U	0.0926	U	0.0943	U
Benz(a)anthracene	150	10	150	110	3.63	J	0.029	0.016	0.0962	U	0.0926	U	0.0943	U
Benzo(a)pyrene	15	240	15	4,700	2.67	J	0.2	0.2	0.0962	U	0.0926	U	0.0943	U
Benzo(b)fluoranthene	150	35	150	280	3.00	J	0.029	0.012	0.0962	U	0.0926	U	0.0943	U
Benzo(g,h,i)perylene	NA	NA	NA	NA	2.13	J	NA	NA	0.0962	U	0.0926	U	0.0943	U
Benzo(k)fluoranthene	1,500	350	1,500	6,900	3.08	J	0.29	0.29	0.0962	U	0.0926	U	0.0943	U
Bis(2-ethylhexyl)phthalate	35,000	1,400	35,000	29,000	198	U	6	6	2.40	U	2.31	U	2.36	U
Chrysene	15,000	3,500	15,000	11,000	4.96	J	2.9	1.6	0.0962	U	0.0926	U	0.0943	U
Di-n-octylphthalate	610,000	44,000	NA	NA	198	U	160	NA	2.40	U	2.31	U	2.36	U
Fluoranthene	2,300,000	630,000	570,000	130,000	7.06	J	630	60	0.0962	U	0.0926	U	0.0943	U
Fluorene	2,300,000	70,000	780,000	140,000	3.95	U	200	370	0.0962	U	0.0926	U	0.0943	U
Indeno(1,2,3-cd)pyrene	150	200	150	890	2.17	J	0.029	0.011	0.0962	U	0.0926	U	0.0943	U
2-Methylnaphthalene	230,000	140	NA	NA	40.6	=	27	NA	5.88	=	2.65	=	2.63	=
Naphthalene	3,600	0.47	4,300	9.4	**86.1**	=	0.14	0.14	**2.46**	=	**1.14**	=	**2.08**	=
Phenanthrene	NA	NA	NA	NA	4.86	J	NA	NA	0.192	U	0.185	U	0.189	U
Pyrene	1,700,000	9,500	430,000	600,000	5.52	J	87	140	0.0962	U	0.0472	J	0.0943	U
TPH	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*		*(mg/L)*	*(mg/L)*	*(mg/L)*		*(mg/L)*		*(mg/L)*	
TPH-DRO	NA	NA	NA	NA	17.1	=	NA	NA	0.0962	U	0.142	J	0.159	J
TPH-GRO	NA	NA	NA	NA	15	J	NA	NA	0.196	=	0.122	J	0.499	=

[a] Criterion shown is for total xylenes.
Bold text denotes concentration shown exceeds criteria but data were rejected during validation.
Bold/highlighted text denotes detected at a concentration exceeding one or more screening criteria.
BGS = Below ground surface.
DRO = Diesel-range organics.
EPA = U. S. Environmental Protection Agency.
GRO = Gasoline-range organics.
ID = Identifier.
MCL = Maximum contaminant level (federal); if no MCL exists, the EPA RSL for tap water is shown.

NA = Not applicable.
NDEQ = Nebraska Department of Environmental Quality.
RSL = Regional screening level for residential scenario (May 2013; TR = 1E-06 and THQ = 1.0).
SSL = Soil screening level for migration to groundwater (MCL based; if no MCL-based SSL exists, then the RSL-based SSL is shown).
SVOC = Semivolatile organic compound.
TPH = Total petroleum hydrocarbon.
VCP RG = Voluntary Cleanup Program remediation goal (September 2012).
VOC = Volatile organic compound.

Data Qualifier
J = Estimated concentration.
R = Rejected during validation.
U = Not detected at the concentration shown.
"=" = Detected at the concentration shown.

SVOCs

Benz(a)anthracene was detected in three of four soil samples at concentrations ranging from 3.57J to 23.3J µg/kg. The MDC was detected at sample location TU-015-SB1 in the 8.3- to 10-ft BGS interval (Figure 5-3).

Benz(a)anthracene was not detected in the shallower interval (2.5 to 4.7 ft BGS) of this soil boring. Only the MDC exceeds the EPA SSL (10 µg/kg); however, none of the detections exceed the EPA RSL (150 µg/kg) and equivalent NDEQ direct contact RG (150 µg/kg) or the NDEQ migration to groundwater RG (110 µg/kg).

Bis(2-ethylhexyl)phthalate was detected in two of four soil samples. Detected concentrations were 2,650 µg/kg in TU015-SB1 in the 8.3- to 10.0-ft BGS interval and 770 µg/kg in TU015-SB2 in the 7.3- to 8.1-ft BGS interval (Figure 5-3). Bis(2-ethylhexyl)phthalate was not detected in the other sample intervals of these two soil borings. Only the MDC exceeds the EPA SSL (1,400 µg/kg); however, none of the detections exceed the EPA RSL and equivalent NDEQ direct contact RG (35,000 µg/kg) or the NDEQ migration to groundwater RG (29,000 µg/kg).

2-Methylnaphthalene was detected in three of four soil samples at concentrations ranging from 40.6 to 1,820 µg/kg. The MDC was detected at sample location TU-015-SB1 in the 8.3- to 10-ft BGS interval (Figure 5-3). 2-Methylnaphthalene was not detected in the shallower interval (2.5 to 4.7 ft BGS) of this soil boring. Two of the three detections exceed the EPA SSL (140 µg/kg); however, none of the detections exceed the EPA RSL of 230,000 µg/kg. There are no NDEQ soil screening criteria for 2-methylnaphthalene.

Naphthalene was detected in three of four soil samples at concentrations ranging from 27.1 to 94.3 µg/kg. The MDC was detected at sample location TU-015-SB1 in the 8.3- to 10.0-ft BGS interval (Figure 5-3). Naphthalene was not detected in the shallower interval (2.5 to 4.7 ft BGS) of this soil boring. While the detected concentrations do not exceed the EPA RSL (3,600 µg/kg) or the NDEQ direct contact RG (4,300 µg/kg), all detections exceed the EPA SSL (0.47 µg/kg) and the NDEQ migration to groundwater RG (9.4 µg/kg).

TPH

TPH-diesel-range organics (DRO) was detected in three of four soil samples at concentrations ranging from 17.1 to 120 mg/kg. The MDC was detected at sample location TU-015-SB1 in the 8.3- to 10-ft BGS interval (Figure 5-3). TPH-DRO was not detected in the shallower interval (2.5 to 4.7 ft BGS) of this soil boring. There are no EPA RSL, EPA SSL, or NDEQ RG criteria for TPH-DRO.

TPH-gasoline-range organics (GRO) was detected in three of four soil samples at concentrations ranging from 15J to 810J mg/kg. The MDC was detected at sample location TU-015-SB2 in the 7.3- to 8.1-ft BGS interval (Figure 5-3). TPH-GRO was detected in the deeper interval (8.5 to 9.3 ft BGS) of this soil boring. There are no EPA RSL, EPA SSL, or NDEQ RG criteria for TPH-GRO.

5.4.2.2 Groundwater

One VOC (benzene) and one SVOC (naphthalene) were detected in groundwater at the Former Vehicle Service Pit in Building 608 (TU015) at concentrations greater than one or more screening criteria. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria.

Benzene was detected in both groundwater samples. Detected concentrations were 2.89 μg/L in TU015-SB1 and 1.55 μg/L in TU015-SB2 (Figure 5-3). In addition, benzene was detected in the field duplicate sample collected from TU015-SB1 at a concentration of 14.8 μg/L. The only detected concentration of benzene that exceeded the MCL (5 μg/L) and NDEQ RG (5 μg/L) for groundwater was collected from the field duplicate sample.

Naphthalene was detected in both groundwater samples. Detected concentrations were 2.46 μg/L in TU015-SB1 and 2.08 μg/L in TU015-SB2 (Figure 5-3). Both detections exceeded the EPA RSL and equivalent NDEQ RG (0.14 μg/L) for groundwater.

TPH-DRO was detected in one of two groundwater samples at a concentration of 0.159J mg/L in TU015-SB2. TPH-GRO was detected in both groundwater samples at concentrations of 0.196 mg/L in TU015-SB1 and 0.499 mg/L in TU015-SB2. There is no MCL, EPA RSL, or NDEQ RG for TPH in groundwater.

5.4.3 Conclusions

In summary, four VOCs (cyclohexane, ethylbenzene, isopropylbenzene, and xylene [both m,p-xylene and o-xylene isomers]) and four SVOCs (benz[a]anthracene, bis[2-ethylhexyl]phthalate, 2-methylnaphthalene, and naphthalene) were detected in one or more subsurface soil samples at the Former Vehicle Service Pit in Building 608 (TU015) above one or more screening criteria for the protection of groundwater; no constituents detected in soil exceeded residential direct contact criteria. All eight constituents detected in soil above screening criteria for the protection of groundwater were also detected in groundwater; although, only one (naphthalene) was detected in groundwater above screening criteria. Benzene was also detected in groundwater above screening criteria in a field duplicate sample.

Soil boring TU015-SB2 demonstrated the highest concentrations of VOCs and TPH-GRO in soil, while TU015-SB1 yielded the highest concentrations of SVOCs and TPH-DRO in soil.

5.5 FORMER DETERGENT AND/OR WASTE OIL UNDERGROUND STORAGE TANKS AT BUILDING 608 (TU018)

5.5.1 Field Activities

Soil samples at the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) were collected at the following locations (Figure 5-4):

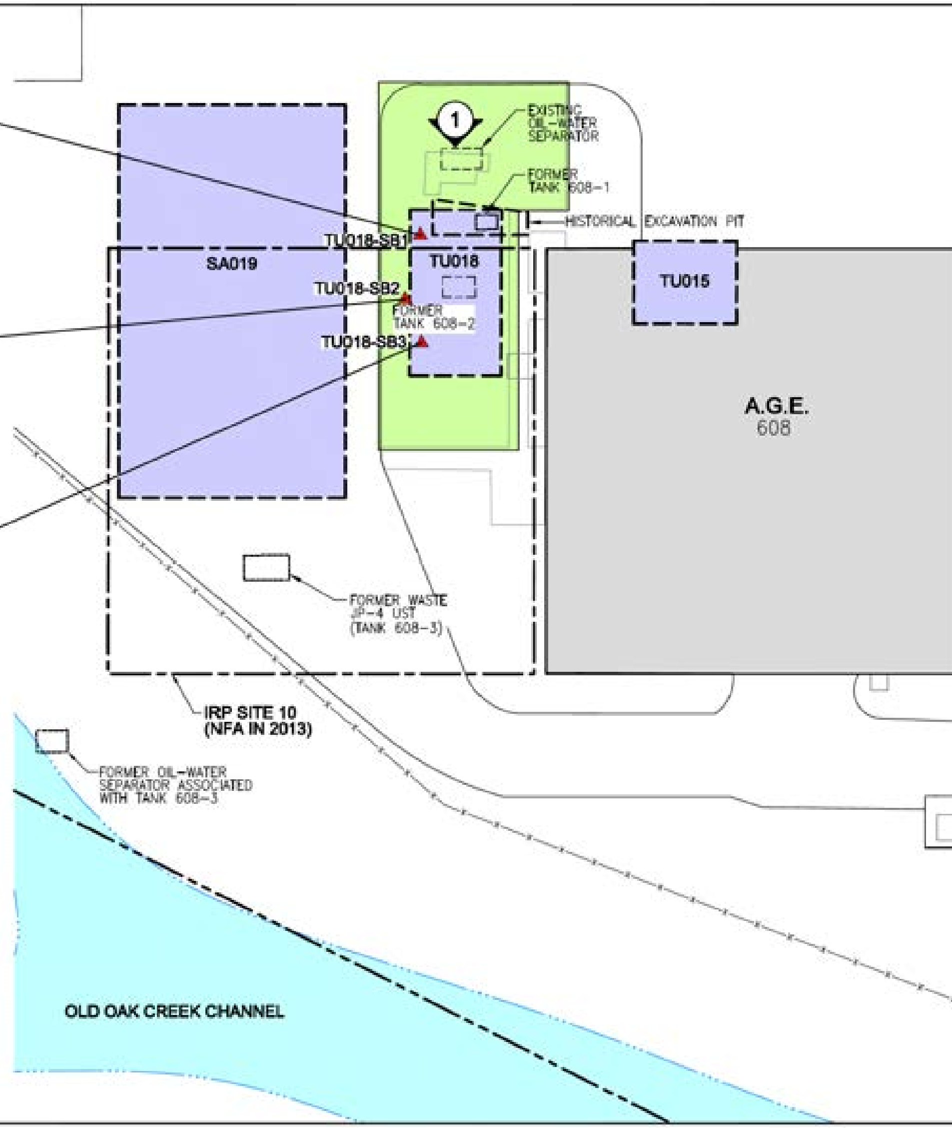
- approximately 4 ft west and 3 ft north of the northwest corner of Building 608, in the grassy area southwest of former tank #608-1 (TU018-SB1);
- approximately 12 ft west and 3 ft south of the northwest corner of Building 608, in the grassy area west of unknown tank #608-2 (TU018-SB2); and
- approximately 22 ft west and 3 ft south of the northwest corner of Building 608, in the grassy area southwest of unknown tank #608-2 (TU018-SB3).

Prior to sample collection, a geophysical survey was conducted to confirm the presence or absence of former detergent tank #608-2, as described in Section 5.5.1.2.

TU018-SB1			
SAMPLE ID	LNC-018-DS -SB1-01	LNC-018-DS -SB1-02	LNC-018-DP -SB1-01
SAMPLE DATE	MAY 9, 2013	MAY 9, 2013	MAY 9, 2013
DEPTH INTERVAL	5.3-6.0 FT BGS	11.0-12.0 FT BGS	6.5-16.5 FT BGS
MEDIA	SOIL	SOIL	GW
SAMPLE TYPE	GRAB	GRAB	GRAB
Benz(a)anthracene	3.89 U	3.82 U	0.0841 J
Benzo(b)fluoranthene	3.89 U	3.82 U	0.0739 J
Indeno(1,2,3-cd)pyrene	3.89 U	3.82 U	0.0611 J
Naphthalene	3.89 U	3.82 U	0.100 U

TU018-SB2			
SAMPLE ID	LNC-018-DS -SB2-01	LNC-018-DS -SB2-02	LNC-018-DP -SB2-01
SAMPLE DATE	MAY 9, 2013	MAY 9, 2013	MAY 9, 2013
DEPTH INTERVAL	5.0-6.0 FT BGS	11.6-12.5 FT BGS	6.0-16.0 FT BGS
MEDIA	SOIL	SOIL	GW
SAMPLE TYPE	GRAB	GRAB	GRAB
Naphthalene	4.09 U	3.96 U	8.8 =

TU018-SB3			
SAMPLE ID	LNC-018-DS -SB3-01	LNC-018-DS -SB3-02	LNC-018-DP -SB3-01
SAMPLE DATE	MAY 9, 2013	MAY 9, 2013	MAY 9, 2013
DEPTH INTERVAL	5.0-6.0 FT BGS	11.0-11.9 FT BGS	7.0-17.0 FT BGS
MEDIA	SOIL	SOIL	GW
SAMPLE TYPE	GRAB	GRAB	GRAB
Naphthalene	3.96 U	4.01 U	10.0 =



LEGEND:

BUILDING
ASPHALT ROAD
FENCE LINE
SURFACE WATER
PROPERTY BOUNDARY
AREA OF CONCERN
GEOPHYSICAL SURVEY AREA
IRP SITE 10 (NFA IN 2013)
142 ... DETECTED CONCENTRATION EXCEEDING ONE OR MORE SCREENING CRITERIA
= ... DETECTED AT THE CONCENTRATION SHOWN
U ... NOT DETECTED AT THE CONCENTRATION SHOWN
J ... ESTIMATED CONCENTRATION SHOWN

NOTES:

1. SAMPLES WERE ANALYZED FOR VOLATILE ORGANIC COMPOUNDS (VOCS), SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCS), AND TOTAL PETROLEUM HYDROCARBONS (TPH).
2. SOIL RESULTS WERE COMPARED TO THE MAY 2013 U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) RESIDENTIAL SOIL REGIONAL SCREENING LEVEL (RSL); THE EPA SOIL SCREENING LEVEL (SSL) FOR PROTECTION OF GROUNDWATER; THE SEPTEMBER 2012 NEVADA DEPARTMENT OF ENVIRONMENTAL QUALITY (NDEQ) VOLUNTARY CLEANUP PROGRAM (VCP) REMEDIAL GOAL (RG) FOR DIRECT CONTACT UNDER A RESIDENTIAL SCENARIO; AND THE NDEQ VCP RG FOR SOIL TO GROUNDWATER.
3. GROUNDWATER RESULTS WERE COMPARED TO THE FEDERAL MAXIMUM CONTAMINANT LEVEL (MCL) OR, IF NO MCL EXISTS, THE EPA RSL FOR TAPWATER; AND THE NDEQ VCP RG FOR GROUNDWATER.
4. NO VOCS WERE DETECTED ABOVE SCREENING CRITERIA.
5. TPH WAS NOT DETECTED IN SOIL. TPH WAS DETECTED IN GROUNDWATER BUT THERE ARE NO EPA OR NDEQ VCP CRITERIA FOR TPH.
6. ONLY ANALYTES EXCEEDING ONE OR MORE CRITERIA ARE SHOWN FOR EACH LOCATION.
7. UNITS ARE IN μg/kg FOR SOIL AND μg/L FOR GROUNDWATER.
8. HISTORICAL EXCAVATION PIT BOUNDARY FROM 2011 IRP SITE 10 PROPOSED PLAN.

GROUNDWATER	MCL	NDEQ VCP RG
Benz(a)anthracene	0.029	0.016
Benzo(b)fluoranthene	0.029	0.012
Indeno(1,2,3-cd)pyrene	0.029	0.011
Naphthalene	0.14	0.14

NE STATE PLANE NAD 83 FT

0 10 20 30 60
SCALE: 1" = 30'

155th AIR REFUELING WING
NE AIR NATIONAL GUARD
LINCOLN, NEBRASKA

TU018
LINCOLN MUNICIPAL AIRPORT
LINCOLN, NEBRASKA

DRAWN BY:	REV. NO./DATE:	CAD FILE:
R. BEELER	0/10-30-13	/12034/DWGS/F09_TU018_CHRT-01

Figure 5-4. Constituents Detected Above Screening Criteria at the Former Detergent and/or Waste Oil USTs at Building 608 (TU018)

Two soil samples were collected at each soil boring: from 5.3 to 6.0 ft BGS and 11.0 to 12.0 ft BGS at soil boring TU018-SB1, from 5.0 to 6.0 ft BGS and 11.6 to 12.5 ft BGS at soil boring TU018-SB2, and from 5.0 to 6.0 ft BGS and 11.0 to 11.9 ft BGS at soil boring TU018-SB3. Each of the soil borings was terminated at 20 ft.

Static water levels in the three TWPs were recorded as follows: 13.74 ft BGS in TU018-SB1, 13.76 ft BGS in TU018-SB2, and 13.72 ft BGS in TU018-SB8. One groundwater sample was collected from each TWP.

Soil and groundwater samples were analyzed for VOCs, SVOCs, and TPH.

5.5.2 Results

Six soil samples and three groundwater samples were collected from the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) during the SI. Table 5-4 summarizes the results and analysis of the soil and groundwater sampling.

5.5.2.1 Geophysical survey

The primary objective of the geophysical survey effort was to acquire sufficient data to determine whether UST #608-2 remains in place. No UST was substantiated within the survey area. The complete geophysical survey report is included as Appendix D.

5.5.2.2 Soil

Methylene chloride is the only constituent in soil to exceed soil screening criteria; however, as described in Section 5.1.3.3, all methylene chloride results were rejected. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria. TPH was not detected in soil.

5.5.2.3 Groundwater

Four SVOCs (benz[a]anthracene, benzo[b]fluoranthene, indeno[1,2,3-cd]pyrene, and naphthalene) were detected in groundwater at the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) at concentrations greater than one or more screening criteria. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria.

SVOCs

Benz(a)anthracene was detected in one groundwater sample at TWP TU018-SB1 at a concentration of 0.0841J µg/L (Figure 5-4). This detection exceeded the EPA RSL (0.029 µg/L) and the NDEQ RG (0.016 µg/L).

Benzo(a)fluoranthene was detected in one groundwater sample at TWP TU018-SB1 at a concentration of 0.0739J µg/L. This detection exceeded the EPA RSL (0.029 µg/L) and the NDEQ RG (0.012 µg/L).

Indeno(1,2,3-cd)pyrene was detected in one groundwater sample at TWP TU018-SB1 at a concentration of 0.0611J µg/L. This detection exceeded the EPA RSL (0.029 µg/L) and the NDEQ RG (0.011 µg/L).

Table 5-4. Detected Analytes in Soil and Groundwater at Former Detergent and/or Waste Oil USTs at Building 608 (TU018)

Location					TU018-SB1	TU018-SB1	TU018-SB2	TU018-SB2	TU018-SB3	TU018-SB3
Sample ID					LNC-018-DS-SB1-01	LNC-018-DS-SB1-02	LNC-018-DS-SB2-01	LNC-018-DS-SB2-02	LNC-018-DS-SB3-01	LNC-018-DS-SB3-02
Sample Date					05/09/13	05/09/13	05/09/13	05/09/13	05/09/13	05/09/13
Depth Interval (ft BGS)			NDEQ VCP RG		5.3 to 6.0	11.0 to 12.0	5.0 to 6.0	11.6 to 12.5	5.0 to 6.0	11.0 to 11.9
Media	EPA RSL	EPA SSL	Direct Contact	Migration to Groundwater	Soil	Soil	Soil	Soil	Soil	Soil
Sample Type					Grab	Grab	Grab	Grab	Grab	Grab
VOCs	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*
Acetone	61,000,000	2,400	16,000,000	22,000	13 R	11.8 U	13.3 U	40.4 R	13.7 U	33.3 R
2-Butanone	28,000,000	1,000	7,500,000	7,400	6.65 U	5.88 U	6.63 U	5.34 J	6.84 U	11.7 U
Carbon Disulfide	820,000	210	240,000	1,500	3.32 U	2.94 U	3.32 U	3.34 U	3.42 U	2.92 U
Cyclohexane	7,000,000	130	2,100,000	65,000	3.32 U	2.94 U	3.32 U	3.34 U	3.42 U	2.92 U
Ethylbenzene	5,400	780	6,300	16,000	3.32 U	2.94 U	3.32 U	3.34 U	3.42 U	2.92 U
Isopropylbenzene	2,100,000	640	590,000	5,600	3.32 U	2.94 U	3.32 U	3.34 U	3.42 U	2.92 U
m,p-Xylene	630,000	190	190,000	200,000	6.65 U	5.88 U	6.63 U	6.68 U	6.84 U	11.7 U
Methylene Chloride	56,000	1.3	12,000	26	**315** R	**219** R	**34.3** R	**324** R	**245** R	**206** R
SVOCs	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*
Acenaphthene	3,400,000	4,100	1,200,000	110,000	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Benz(a)anthracene	150	10	150	110	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Benzo(a)pyrene	15	240	15	4,700	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Benzo(b)fluoranthene	150	35	150	280	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Benzo(k)fluoranthene	1,500	350	1,500	6,900	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Chrysene	15,000	1,100	15,000	11,000	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Fluoranthene	2,300,000	70,000	570,000	130,000	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Fluorene	2,300,000	220,000	780,000	140,000	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Indeno(1,2,3-cd)pyrene	150	200	150	890	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
2-Methylnaphthalene	230,000	140	NA	NA	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Naphthalene	3,600	0.47	4,300	9.4	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Phenanthrene	NA	NA	NA	NA	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
Pyrene	1,700,000	9,500	430,000	600,000	3.89 U	3.82 U	4.09 U	3.96 U	3.96 U	4.01 U
TPH	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*
TPH-DRO	NA	NA	NA	NA	8.14 U	8.0 U	8.20 U	8.07 U	8.13 U	8.01 U
TPH-GRO	NA	NA	NA	NA	6.14 U	6.19 U	6.61 U	6.06 U	6.56 U	5.79 U

Table 5-4. Detected Analytes in Soil and Groundwater at Former Detergent and/or Waste Oil USTs at Building 608 (TU018) (continued)

Sample ID	MCL	NDEQ VCP RG	TU018-SB1		TU018-SB2		TU018-SB3	
Sample ID			LNC-018-DP-SB1-01		LNC-018-DP-SB2-01		LNC-018-DP-SB3-01	
Sample Date			05/09/13		05/09/13		05/09/13	
Depth Interval (ft BGS)			6.5 to 16.5		6.0 to 16.0		7.0 to 17.0	
Media			Groundwater		Groundwater		Groundwater	
Sample Type			Grab		Grab		Grab	
VOCs	*(µg/L)*	*(µg/L)*	*(µg/L)*		*(µg/L)*		*(µg/L)*	
Acetone	12,000	5,400	9.95	J	3.12	J	4.30	J
2-Butanone	4,900	1,800	5.00	U	5.00	U	5.00	U
Carbon Disulfide	720	250	0.500	U	5.88	=	3.00	=
Cyclohexane	13,000	3,100	0.500	U	0.570	J	0.500	U
Ethylbenzene	700	700	0.500	U	42.3	=	2.37	=
Isopropylbenzene	390	170	0.500	U	13.0	=	0.840	J
m,p-Xylene	1,000	10,000	1.00	U	15.0	=	0.810	J
Methylene Chloride	5	5	1.00	U	1.00	U	1.00	U
SVOCs	*(µg/L)*	*(µg/L)*	*(µg/L)*		*(µg/L)*		*(µg/L)*	
Acenaphthene	400	550	0.100	U	0.0758	J	0.0512	J
Benz(a)anthracene	0.029	0.016	**0.0841**	**J**	0.100	U	0.100	U
Benzo(a)pyrene	0.2	0.2	0.0648	J	0.100	U	0.100	U
Benzo(b)fluoranthene	0.029	0.012	**0.0739**	**J**	0.100	U	0.100	U
Benzo(k)fluoranthene	0.29	0.29	0.0812	J	0.100	U	0.100	U
Chrysene	2.9	1.6	0.116	J	0.100	U	0.100	U
Fluoranthene	630	60	0.245	=	0.0516	J	0.0698	J
Fluorene	200	370	0.100	U	0.0544	J	0.0563	J
Indeno(1,2,3-cd)pyrene	0.029	0.011	**0.0611**	**J**	0.100	U	0.100	U
2-Methylnaphthalene	27	NA	0.100	U	1.89	=	1.44	=
Naphthalene	0.14	0.14	0.100	U	**8.88**	**=**	**10.0**	**=**
Phenanthrene	NA	NA	0.179	J	0.099	J	0.119	J
Pyrene	87	140	0.189	J	0.100	U	0.0720	J
TPH	*(mg/L)*	*(mg/L)*	*(mg/L)*		*(mg/L)*		*(mg/L)*	
TPH-DRO	NA	NA	0.100	UJ	0.657	=	0.211	J
TPH-GRO	NA	NA	0.100	U	0.363	=	0.100	U

Bold text denotes concentration shown exceeds criteria but data were rejected during validation.
Bold/highlighted text denotes detected at a concentration exceeding one or more screening criteria.
BGS = Below ground surface.
DRO = Diesel-range organics.
EPA = U. S. Environmental Protection Agency.
GRO = Gasoline-range organics.
ID = Identifier.
MCL = Maximum contaminant level (federal); if no MCL exists, the EPA RSL for tap water is shown.
NA = Not applicable.
NDEQ = Nebraska Department of Environmental Quality.
RSL = Regional screening level for residential scenario (May 2013; TR = 1E-06 and THQ = 1.0).
SSL = Soil screening level for migration to groundwater (MCL based; if no MCL-based SSL exists, then the RSL-based SSL is shown).
SVOC = Semivolatile organic compound.
TPH = Total petroleum hydrocarbon.
UST = Underground storage tank.
VCP RG = Voluntary Cleanup Program remediation goal (September 2012).
VOC = Volatile organic compound.

Data Qualifier
J = Estimated concentration.
R = Rejected during validation.
U = Not detected at the concentration shown.
UJ = Not detected at the estimated concentration shown.
'=' = Detected at the concentration shown.

Naphthalene was detected in two of three groundwater samples. Detected concentrations were 8.88 μg/L in TU018-SB2 and 10.0 μg/L in TU018-SB3 (Figure 5-4). Both detections exceeded the EPA RSL and equivalent NDEQ RG (0.14 μg/L) for groundwater.

TPH

TPH-DRO was detected in two of three groundwater samples at concentrations of 0.657 mg/L in TU018-SB2 and 0.211J mg/L in TU018-SB3. TPH-GRO was detected in one of three groundwater samples at a concentration of 0.363 mg/L in TU018-SB2. There is no MCL, EPA RSL, or NDEQ RG for TPH in groundwater.

5.5.3 Conclusions

Four SVOCs were detected at concentrations exceeding one or more screening criteria in groundwater at the Former Detergent and/or Waste Oil USTs at Building 608 (TU018). TPH was also detected in groundwater. No VOCs or SVOCs were detected above screening criteria in soil samples, and no TPH was detected in soil.

5.6 FORMER DROP TANK STORAGE AREA AT BUILDING 608 (SA019)

5.6.1 Field Activities

Soil samples at the Former Drop Tank Storage Area at Building 608 (SA019) were collected at the following locations (Figure 5-5):

- within the concrete pad approximately 50 ft west of the northwest corner of Building 608 (SA019-SB1),
- within the concrete pad approximately 80 ft west of the northwest corner of Building 608 (SA019-SB2), and
- in a grassy area approximately 110 ft west and 16 ft south of the northwest corner of Building 608 (SA019-SB3). This location was selected following field confirmation of surface flow to the southwest. The boring was placed adjacent to the fence in a shallow channel created by concentrated flow during precipitation events.

Two soil samples were collected at each soil boring: from 7.2 to 7.9 ft BGS and 8.5 to 9.2 ft BGS at soil boring SA019-SB1, from 6.0 to 7.0 ft BGS and 8.0 to 9.0 ft BGS at soil boring SA019-SB2, and from 1.9 to 3.3 ft BGS and 6.6 to 7.7 ft BGS at soil boring SA019-SB3. Each of the soil borings was terminated at 20 ft BGS.

Static water levels in the three TWPs were recorded as follows: 10.70 ft BGS in SA019-SB1, 12.24 ft BGS in SA019-SB2, and 14.28 ft BGS in SA019-SB3. One groundwater sample was collected from each TWP.

Soil and groundwater samples were analyzed for VOCs, SVOCs, and TPH.

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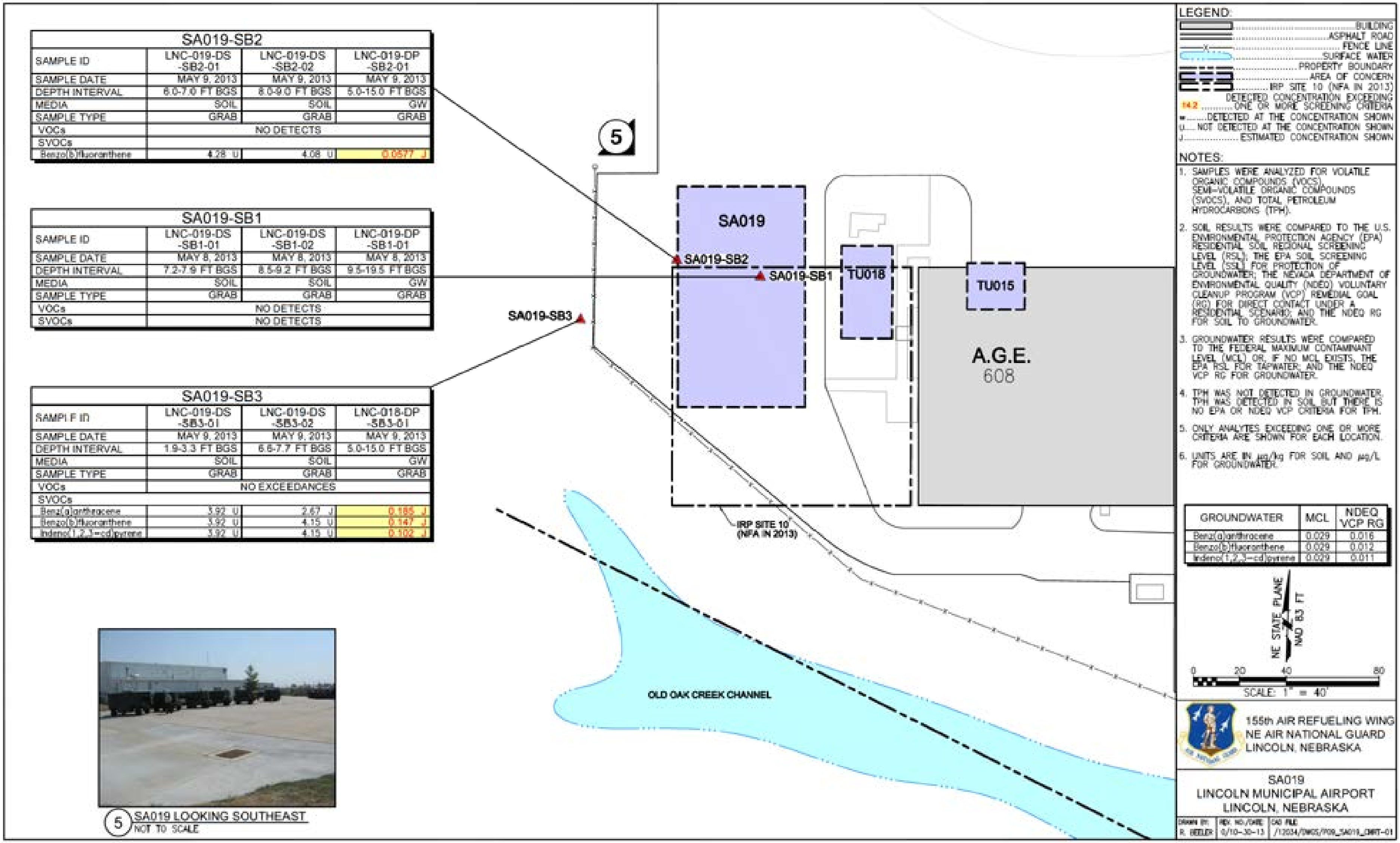

Figure 5-5. Constituents Detected Above Screening Criteria at the Former Drop Tank Storage Area at Building 608 (SA019)

5.6.2 Results

Six soil samples and three groundwater samples were collected from the Former Drop Tank Storage Area at Building 608 (SA019) during the SI. Table 5-5 summarizes the results and analysis of the soil and groundwater sampling.

5.6.2.1 Soil

Methylene chloride is the only constituent in soil to exceed soil screening criteria; however, as described in Section 5.1.3.3, all methylene chloride results were rejected. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria.

TPH-DRO was detected in one of six soil samples at a concentration of 228J mg/kg in SA019-SB3 from the 1.9- to 3.3-ft BGS interval. TPH-DRO was detected in two of six soil samples at concentrations of 4.08J mg/kg in SA019-SB1 from the 7.2- to 7.9-ft BGS interval and a concentration of 65.2 mg/kg in SA019-SB3 from the 1.9- to 3.3-ft BGS interval. There are no EPA RSL, EPA SSL, or NDEQ RG criteria for TPH-GRO.

5.6.2.2 Groundwater

Three SVOCs (benz[a]anthracene, benzo[b]fluoranthene, and indeno[1,2,3-cd]pyrene) were detected in groundwater at the Former Drop Tank Storage Area at Building 608 (SA019) at concentrations greater than one or more screening criteria. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria. TPH was not detected.

Benz(a)anthracene was detected in one groundwater sample at SA019-SB3 at a concentration of 0.185J µg/L (Figure 5-5). This detection exceeded the EPA RSL (0.029 µg/L) and the NDEQ RG (0.016 µg/L).

Benzo(a)fluoranthene was detected in two of three groundwater samples. Detected concentrations were 0.0577J µg/L in SA019-SB2 and 0.147J µg/L in SA019-SB3 (Figure 5-5). Both detections exceeded the EPA RSL (0.029 µg/L) and the NDEQ RG (0.012 µg/L).

Indeno(1,2,3-cd)pyrene was detected in one groundwater sample at SA019-SB3 at a concentration of 0.102J µg/L. This detection exceeded the EPA RSL (0.029 µg/L) and the NDEQ RG (0.011 µg/L).

5.6.3 Conclusions

Three SVOCs (benz[a]anthracene, benzo[b]fluoranthene, and indeno[1,2,3-cd]pyrene) were detected in groundwater above one or more screening criteria at the Former Drop Tank Storage Area at Building 608 (SA019). All three constituents exceeded criteria in the groundwater sample collected from SA019-SB3. Benzo(a)fluoranthene also exceeded screening criteria in groundwater collected from SA019-SB2.

No VOCs or SVOCs were detected above screening criteria in soil; however, TPH was detected at concentrations of 228J mg/kg (TPH-DRO) and 65.2 mg/kg (TPH-GRO) in the 1.9- to 3.3-ft BGS interval of SA019-SB3. TPH-GRO was also detected in SA019-SB1 at a concentration of 4.08J mg/kg.

Table 5-5. Detected Analytes in Soil and Groundwater at the Former Drop Tank Storage Area at Building 608 (SA019)

Location					SA019-SB1	SA019-SB1	SA019-SB2	SA019-SB2	SA019-SB3	SA019-SB3
Sample ID					LNC-019-DS-SB1-01	LNC-019-DS-SB1-02	LNC-019-DS-SB2-01	LNC-019-DS-SB2-02	LNC-019-DS-SB3-01	LNC-019-DS-SB3-02
Sample Date					05/08/13	05/08/13	05/09/13	05/09/13	05/09/13	05/09/13
Depth Interval (ft BGS)			NDEQ VCP RG		7.2 to 7.9	8.5. to 9.2	6.0 to 7.0	8.0 to 9.0	1.9 to 3.3	6.6 to 7.7
Media	EPA RSL	EPA SSL		Migration to Groundwater	Soil	Soil	Soil	Soil	Soil	Soil
Sample Type			Direct Contact		Grab	Grab	Grab	Grab	Grab	Grab
VOCs	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*
Acetone	61,000,000	2,400	16,000,000	22,000	42.6 R	14.9 U	13.1 U	13.7 U	177 R	14.0 U
2-Butanone	28,000,000	1,000	7,500,000	7,400	6.39 U	7.43 U	6.55 U	6.84 U	45.4 J	7.01 U
Carbon Disulfide	820,000	210	240,000	1,500	3.19 U	3.71 U	3.27 U	3.42 U	1.73 J	3.51 U
Chloromethane	120,000	49	36,000	240	6.39 U	7.43 U	6.55 U	6.84 U	6.19 U	7.01 U
Methylene Chloride	56,000	1.3	12,000	26	**122** R	**152** R	6.55 U	**302** R	**490** R	**218** R
SVOCs	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*	*(μg/kg)*
Acenaphthene	3,400,000	4,100	1,200,000	110,000	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	4.15 U
Anthracene	17,000,000	42,000	5,900,000	1,800,000	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	4.15 U
Benz(a)anthracene	150	10	150	110	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	2.67 J
Benzo(a)pyrene	15	240	15	4,700	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	4.15 U
Benzo(b)fluoranthene	150	35	150	280	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	4.15 U
Benzo(g,h,i)perylene	NA	NA	NA	NA	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	4.15 U
Benzo(k)fluoranthene	1,500	350	1,500	6,900	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	4.15 U
Chrysene	15,000	1,100	15,000	11,000	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	4.15 U
Fluoranthene	2,300,000	70,000	570,000	130,000	3.98 U	4.09 U	4.28 U	4.08 U	2.25 J	2.29 J
Indeno(1,2,3-cd)pyrene	150	35	150	890	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	4.15 U
Phenanthrene	NA	NA	NA	NA	3.98 U	4.09 U	4.28 U	4.08 U	2.77 J	2.72 J
Pyrene	1,700,000	9,500	430,000	600,000	3.98 U	4.09 U	4.28 U	4.08 U	3.92 U	4.15 U
TPH	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*
TPH-DRO	NA	NA	NA	NA	7.97 U	8.02 U	8.24 U	8.45 U	228 J	8.42 U
TPH-GRO	NA	NA	NA	NA	4.08 J	7.22 U	6.97 U	6.83 U	65.2 =	6.15 U

Table 5-5. Detected Analytes in Soil and Groundwater at the Former Drop Tank Storage Area at Building 608 (SA019) (continued)

Location			SA019-SB1		SA019-SB2		SA019-SB3	
Sample ID			LNC-019-DP-SB1-01		LNC-019-DP-SB2-01		LNC-019-DP-SB3-01	
Sample Date			05/08/13		05/09/13		05/09/13	
Depth Interval (ft BGS)			9.5 to 19.5		5.0 to 15.0		5.0 to 15.0	
Media		NDEP VCP	Groundwater		Groundwater		Groundwater	
Sample Type	MCL	RG	Grab		Grab		Grab	
VOCs			*(µg/L)*		*(µg/L)*		*(µg/L)*	
Acetone	12,000	5,400	4.36	J	4.00	J	5.00	U
2-Butanone	4,900	1,800	5.00	U	5.00	U	5.00	U
Carbon Disulfide	720	250	0.400	J	0.270	J	0.500	U
Chloromethane	190	47	0.440	J	0.500	U	0.500	U
Methylene Chloride	5	5	1.00	U	1.00	U	1.00	U
SVOCs	*(µg/L)*	*(µg/L)*	*(µg/L)*		*(µg/L)*		*(µg/L)*	
Acenaphthene	400	550	0.100	U	0.0926	U	0.0653	J
Anthracene	1,300	43	0.100	U	0.0926	U	0.0600	J
Benz(a)anthracene	0.029	0.016	0.100	U	0.0926	U	**0.185**	**J**
Benzo(a)pyrene	0.2	0.2	0.100	U	0.0926	U	0.151	J
Benzo(b)fluoranthene	0.029	0.012	0.100	U	**0.0577**	**J**	**0.147**	**J**
Benzo(g,h,i)perylene	NA	NA	0.100	U	0.00926	U	0.101	J
Benzo(k)fluoranthene	0.29	0.29	0.100	U	0.0926	U	0.166	J
Chrysene	2.9	1.6	0.100	U	0.0649	J	0.259	=
Fluoranthene	260	60	0.100	U	0.108	J	0.548	=
Indeno(1,2,3-cd)pyrene	0.029	0.011	0.100	U	0.0926	U	**0.102**	**J**
Phenanthrene	NA	NA	0.0574	J	0.0940	J	0.329	J
Pyrene	87	140	0.100	U	0.108	J	0.468	=
TPH	*(mg/L)*	*(mg/L)*	*(mg/L)*		*(mg/L)*		*(mg/L)*	
TPH-DRO	NA	NA	0.100	U	0.0962	UJ	0.0926	U
TPH-GRO	NA	NA	0.100	U	0.100	U	0.100	U

Bold text denotes concentration shown exceeds criteria but data were rejected during validation.
Bold/highlighted text denotes detected at a concentration exceeding one or more screening criteria.
BGS = Below ground surface.
DRO = Diesel-range organics.
EPA = U. S. Environmental Protection Agency.
GRO = Gasoline-range organics.
ID = Identifier.
MCL = Maximum contaminant level (federal); if no MCL exists, the EPA RSL for tap water is shown.
NA = Not applicable.
NDEQ = Nebraska Department of Environmental Quality.
RSL = Regional screening level for residential scenario (May 2013; TR = 1E-06 and THQ = 1.0).
SSL = Soil screening level for migration to groundwater (MCL based; if no MCL-based SSL exists, then the RSL-based SSL is shown).
SVOC = Semivolatile organic compound.
TPH = Total petroleum hydrocarbon.
VCP RG = Voluntary Cleanup Program remediation goal (September 2012).
VOC = Volatile organic compound.
Data Qualifier
J = Estimated concentration.
R = Rejected during validation.
U = Not detected at the concentration shown.
UJ = Not detected at the estimated concentration shown.
'=' = Detected at the concentration shown.

6.0 INVENTORY OF WATER SUPPLY AND MONITORING WELLS

At the time of the 1995 SI (ANG 1995), the closest irrigation and commercial wells were located more than 2.5 miles away from the Base. The closest municipal well was located more than 4.25 miles away from the Base. In August 2013, a review of the Nebraska Department of Natural Resources (NDNR) registered groundwater wells database was conducted to determine whether any additional wells have been installed within a 1-mile radius of the Base (NDNR 2013). NDNR was also contacted directly to confirm that there are not any public water supply wells in the area. With the exception of 10 on-Base monitoring wells associated with historical investigations, there are no wells within a 1-mile radius of the Lincoln ANGB.

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7.0 AREA OF CONCERN PATHWAY AND ENVIRONMENTAL HAZARD ASSESSMENTS

HRS is the primary tool used by EPA to determine whether a site is placed on the National Priorities List. This numerically based screening system assigns numeric values to factors related to risk conditions at a site

- Likelihood that a site has released or has the potential to release hazardous substances into the environment.

- Characteristics of the waste.

- People or sensitive environments (targets) affected by the waste.

HRS evaluates four pathways of exposure (i.e., routes through which humans and the environment can be impacted by site contamination)

- groundwater migration (drinking water),
- surface water migration (drinking water, human food chain, and sensitive environments),
- soil exposure (resident population, nearby population, and sensitive environments), and
- air migration (population and sensitive environmental).

Exposure pathways describe the course a chemical or physical agent takes from the source to the exposed receptor. The following five components comprise an exposure pathway:

- source (facility operations, spill, etc.),
- exposure media (concrete, soil, groundwater, etc.),
- exposure point (slab surface, drinking water well, etc.),
- exposure route (ingestion, inhalation, and external exposure), and
- receptor (industrial worker, resident, and wildlife).

If any of these elements is missing, the pathway is incomplete and is not considered further in the HRS assessment. A pathway is considered complete when all five components are present to permit potential exposure of a receptor to a source of contamination. It is important to note that the HRS guidance defines a source as "any area where a hazardous substance has been deposited, stored, disposed, or placed, plus those soils that may have become contaminated from hazardous substance migration." Also, an area of observed contamination "covered by a permanent, or otherwise maintained, essentially impenetrable material (e.g., asphalt)" is excluded from the area of observed contamination for the purposes of HRS scoring (EPA 1995).

In 2012, seven AOCs were identified for PA/SI activities at the Lincoln ANGB under the CRP. Based upon the results of historical records reviews during the PA phase, two AOCs were determined not to warrant field investigation: the Battery Neutralization Pit in Building 636 (TU017) and the Former OWS in Building 605 (OW020). No HRS scoring was conducted for these two AOCs.

Soil and groundwater sampling were conducted at the remaining five AOCs in May 2013: the Former Vehicle Service Pit in Building 635 (TU014), the Battery Acid Neutralization Pit in Building 635 (TU016) – soil sampling only, the Former Vehicle Service Pit in Building 608 (TU015), the Former

Detergent and/or Waste Oil USTs at Building 608 (TU018), and the Former Drop Tank Storage Area at Building 608 (SA019).

Three of the sampled AOCs (the Former Vehicle Service Pit in Building 635 [TU014], the Former Vehicle Service Pit in Building 608 [TU015], and the Battery Acid Neutralization Pit in Building 635 [TU016]) are covered by "essentially impenetrable material." Thus, no complete exposure pathway exists. HRS scoring was not conducted for these AOCs.

Four SVOCs were detected at concentrations exceeding one or more screening criteria in groundwater at the Former Detergent and/or Waste Oil USTs at Building 608 (TU018); TPH was also detected in groundwater at this AOC. However, no drinking water receptors were identified within a 4-mile radius. Thus, no HRS scoring was conducted for the Former Detergent and/or Waste Oil USTs at Building 608 (TU018).

Similarly, three SVOCs were detected in groundwater at the Former Drop Tank Storage Area at Building 608 (SA019). However, no drinking water receptors were identified within a 4-mile radius. TPH was detected in soil at the Former Drop Tank Storage Area at Building 608 (SA019); however, HRS does not consider TPH a specific contaminant. Thus, no HRS scoring was conducted for the Former Drop Tank Storage Area at Building 608 (SA019).

8.0 CONCLUSIONS AND RECOMMENDATIONS

On-site PA activities were conducted in conjunction with an Installation-specific kickoff meeting at Lincoln ANGB the week of September 5, 2012. SI field activities, which included soil sampling at five of the seven AOCs and groundwater sampling at four of the seven AOCs, were conducted from May 6 through May 10, 2013. Geophysical surveying was conducted at the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) on May 6 and 7, 2013, to confirm the presence or absence of remaining subsurface infrastructure.

8.1 CONCLUSIONS

8.1.1 Former Vehicle Service Pit in Building 635 (TU014)

The Former Vehicle Service Pit in Building 635 (TU014) is located within what is now a storage room (Room 118C) for Base Civil Engineering. Although the pit has been filled in, and a new concrete floor was poured, no historical environmental sampling is believed to have been conducted. During SI field activities, a total of three soil samples and one groundwater sample were collected from two boring locations and analyzed for VOCs, SVOCs, and TPH.

Soil. One SVOC (naphthalene) was detected in soil at concentrations greater than one or more screening criteria.

Naphthalene was detected in one soil sample at sample location TU014-SB2 in the 8.7- to 9.5-ft BGS interval at a concentration of 21.7J µg/kg. Naphthalene was not detected in the shallower interval (6.4 to 7.5 ft BGS) of this soil boring. While the detected concentration does not exceed the EPA RSL (3,600 µg/kg) or the NDEQ direct contact RG (4,300 µg/kg), the detection exceeded the EPA SSL of 0.47 µg/kg and the NDEQ migration to groundwater RG (9.4 µg/kg).

All other VOCs and SVOCs were not detected in soil or were detected at concentrations less than their respective screening criteria. TPH was not detected in soil.

Groundwater. No VOCs, SVOCs, or TPH were detected in groundwater.

No HRS scoring was conducted for the Former Vehicle Service Pit in Building 635 (TU014) as a single naphthalene exceedance of the EPA SSL is not considered an observable contaminant source. Furthermore, no impacts to groundwater were noted in the groundwater sample collected from the same boring as the naphthalene soil exceedance. Impacted soil lies beneath a concrete floor, and there are no current plans to alter site conditions in the foreseeable future.

8.1.2 Battery Acid Neutralization Pit in Building 635 (TU016)

The Battery Acid Neutralization Pit in Building 635 (TU016) was reportedly located in what is now an equipment storage room for EOD personnel. No subsurface battery neutralization pit was evident based on visual observations during the September 2012 site visit, and no plumbing map for Building 635 could be located to confirm the former presence of a neutralization pit. During SI field activities, three soil borings were advanced to approximately 5 ft BGS. Field XRF screening for lead was conducted on the retrieved soil cores, with results ranging from below the LOD to 11±5 mg/kg. One soil sample for off-site analysis of lead was collected from each soil boring from the interval with the highest lead concentration based on the XRF screening; these intervals ranged from 0.5 to 2.5 ft BGS.

Lead was detected in all three samples analyzed by the off-site laboratory at concentrations ranging from 11.7 to 14.6 mg/kg. None of the detected concentrations exceed the EPA RSL and equivalent NDEQ VCP RG for lead of 400 mg/kg.

No HRS scoring was conducted for the Battery Acid Neutralization Pit in Building 635 (TU016) as there is no complete exposure pathway and concentrations of lead, which may or may not represent impacts to soil, do not exceed screening criteria.

8.1.3 Former Vehicle Service Pit in Building 608 (TU015)

The Former Vehicle Service Pit in Building 608 (TU015), presumably used for F4 wing tanks, was reported to be a concrete sump approximately 4 ft wide, 4 ft long, and 5 to 6 ft deep. Multiple subsurface pipes from other parts of the building reportedly drained to this sump before its abandonment in 1995. At that time, the piping was "blown out" to remove residual petroleum and then filled with concrete. The former sump was filled with sand prior to being capped with concrete. One groundwater sample and two soil samples were collected prior to abandonment of the former concrete sump and analyzed for TPH; however, these data were not located prior to SI field activities. In 2013, a total of four soil samples and two groundwater samples were collected from two boring locations and analyzed for VOCs, SVOCs, and TPH.

Soil. Four VOCs (cyclohexane, ethylbenzene, isopropylbenzene, and xylene [both m,p-xylene and o-xylene isomers]) and four SVOCs (benz[a]anthracene, bis[2-ethylhexyl]phthalate, 2-methylnaphthalene, and naphthalene) were detected in one or more subsurface soil samples at the Former Vehicle Service Pit in Building 608 (TU015) above one or more screening criteria for the protection of groundwater; no constituents detected in soil exceeded residential direct contact criteria. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria.

TPH was detected in three of four soil samples, with a maximum detected TPH-DRO concentration of 120 mg/kg in TU015-SB1 in the 8.3- to 10.0-ft BGS interval and a maximum detected TPH-GRO concentration of 810J mg/kg in TU015-SB2. Soil boring TU015-SB2 demonstrated the highest concentrations of VOCs and TPH-GRO in soil, while TU015-SB1 yielded the highest concentrations of SVOCs and TPH-DRO in soil.

Groundwater. TPH and all eight constituents detected in soil above screening criteria for the protection of groundwater were also detected in groundwater; although, only one (naphthalene) was detected in groundwater above screening criteria. Naphthalene was detected at 2.46 μg/L in TU015-SB1 and at 2.08 μg/L in TU015-SB2; both detections exceeded the EPA RSL and equivalent NDEQ RG (0.14 μg/L) for groundwater. Benzene was also detected in both groundwater samples at 2.89 μg/L in TU015-SB1 and at 1.55 μg/L in TU015-SB2. The only detected concentration of benzene that exceeded the MCL and equivalent NDEQ RG (5 μg/L) for groundwater came from the field duplicate sample (14.8 μg/L).

Groundwater results are consistent with historical petroleum groundwater impacts in the Building 608 area (e.g., IRP Site 10, which was granted NFA in 2013) and are not necessarily indicative of a new source. However, the consistency among individual contaminants detected in soil and groundwater at this AOC indicate that soil contamination may be serving as a secondary contaminant source for local groundwater.

No HRS scoring was conducted for the Former Vehicle Service Pit in Building 608 (TU015) as there is no complete exposure pathway. Impacted soil lies beneath a concrete floor, and there are no current plans to alter site conditions in the foreseeable future.

8.1.4 Former Detergent and/or Waste Oil Underground Storage Tanks at Building 608 (TU018)

The Former Detergent and/or Waste Oil USTs at Building 608 (TU018) AOC includes UST Tank #608-1, a 500-gal steel UST used to store waste oil from a nearby OWS, and UST Tank #602-8, a 2,000-gal fiberglass UST used to store "detergent." These two USTs were installed in 1975 and 1976, respectively. UST Tank #608-1 was removed in 1995 as part of a Base-wide UST removal project; a memorandum dated November 6, 1995, states that UST Tank #608-1 "has been backfilled. There was contamination" (NGB 1995). No mention is made of UST #608-2. As of September 2012, facility personnel were uncertain if UST #608-2 had been removed.

During SI field activities, a geophysical survey, using electromagnetic and ground-penetrating radar technologies, was conducted to confirm the presence or absence of former detergent Tank #608-2. No UST was substantiated within the survey area. Subsequently, a total of six soil and three groundwater samples were collected from three boring locations and analyzed for VOCs, SVOCs, and TPH.

Soil. Methylene chloride was the only detected constituent in soil to exceed soil screening criteria; however, all methylene chloride results were rejected due to probable laboratory contamination. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria. TPH was not detected in soil.

Groundwater. Four SVOCs (benz[a]anthracene, benzo[b]fluoranthene, indeno(1,2,3-cd)pyrene, and naphthalene) were detected in groundwater at concentrations greater than one or more screening criteria. Benz(a)anthracene, benzo(a)fluoranthene, and indeno(1,2,3-cd)pyrene were detected at concentrations less than 0.1 µg/L, while naphthalene was detected at an MDC of 10.0 µg/L. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria. TPH-DRO was detected in two samples with an MDC of 0.657 mg/L, and TPH-GRO was detected in one of three groundwater samples at a concentration of 0.363 mg/L.

These results are consistent with historical groundwater impacts in the Building 608 area (e.g., IRP Site 10, which was granted NFA in 2013) and are not necessarily indicative of a new source. No HRS scoring was conducted for the Former Detergent and/or Waste Oil USTs at Building 608 (TU018) as there is no complete exposure pathway and no source was identified specific to the former USTs.

8.1.5 Former Drop Tank Storage Area at Building 608 (SA019)

The Former Drop Tank Storage Area at Building 608 (SA019), located west of the building, was used to store and potentially drain/maintain wing tanks from F4 fighters at Lincoln ANGB. During the September 5, 2012, site visit, shop personnel indicated that any releases from the former drop tank storage area would have been directed into a 1,000-gal JP-4 waste tank (Tank #608-3) located to the southwest prior to its removal. Current runoff flows toward the southwest corner of the apron area; flow becomes concentrated as it leaves the pavement and enters the vegetated area adjacent to the perimeter fence. During SI field activities, a total of six soil samples and three groundwater samples were collected from three boring locations and analyzed for VOCs, SVOCs, and TPH.

Soil. Methylene chloride was the only constituent in soil to exceed soil screening criteria; however, all methylene chloride results were rejected due to probable laboratory contamination. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria. TPH was detected in two soil samples, with the MDC of TPH-DRO (228J mg/kg) and TPH-GRO (65.2 mg/kg) both detected in the 1.9- to 3.3-ft BGS interval of SA019-SB3.

Groundwater. Three SVOCs (benz[a]anthracene, benzo[b]fluoranthene, and indeno[1,2,3-cd]pyrene) were detected in groundwater at concentrations greater than one or more screening criteria. All three polycyclic aromatic hydrocarbons were detected at concentrations below 0.2 µg/L; the MDC for all three occurred at SA019-SB3. All other VOCs and SVOCs were not detected or were detected at concentrations less than their respective screening criteria. TPH was not detected.

Groundwater results are consistent with known historical petroleum impacts in the Building 608 area (e.g., IRP Site 10, which was granted NFA in 2013) and are not necessarily indicative of a new source. No HRS scoring was conducted for the Former Drop Tank Storage Area at Building 608 (TU018) as there is no complete exposure pathway.

8.1.6 Battery Acid Neutralization Pit in Building 636 (TU017)

The Battery Acid Neutralization Pit in Building 635 (TU017) was constructed outside of the battery room during building construction in 1992. According to shop personnel, very little battery acid was discharged to the floor drain. During the September 5, 2012, Installation-specific kickoff meeting, Mr. Wade Gregson and Mr. Ed Southwick of NDEQ indicated agreement with the assumption that, due to the 1992 installation date for this battery neutralization pit, it was likely that little to no battery acid was discharged to the battery room floor drain (most of the vehicle batteries after 1992 were sealed and did not require filling). NDEQ indicated that sampling would not be necessary at this location if the neutralization pit was found to be intact and structurally sound. A photograph of the pit taken on September 5, 2012, illustrates that the pit is intact and structurally sound and, thus, no sampling was conducted at the Battery Acid Neutralization Pit in Building 635 (TU017). Further investigation of this AOC is not warranted.

8.1.7 Former Oil/Water Separator at Building 605 (OW020)

The Former OWS at Building 605 (OW020) (also known as Tank #6055-1) was a 500-gal concrete structure installed in 1973. The OWS received used solvents and oils via the Building 605 shop floor and trench drains, as well as from the parts cleaning room in the Former Jet Engine Shop. In 1996, NDEQ issued a letter stating that NFA was required at Tank #605-1 based upon a Closure Assessment Report (NDEQ 1996). Subsequently, monitoring wells in the Building 605 area were abandoned under NDEQ oversight. Based upon review of these historical records, no sampling was conducted at the Former OWS at Building 605 (OW020). Further investigation of this AOC is not warranted.

8.2 RECOMMENDATIONS

Based upon the results of PA activities, the Battery Acid Neutralization Pit in Building 636 (TU017) was determined not to warrant further investigation. The Former OWS at Building 605 (OW020) was determined to have been granted NFA by NDEQ in 1996. Administrative closure of these two AOCs within the CRP is recommended.Lead was not detected in soil above screening criteria at the Battery Acid Neutralization Pit in Building 635 (TU016), and the only constituent detected above screening criteria at the Former Vehicle Service Pit in Building 635 (TU014) was naphthalene. The detected concentration does not warrant further investigation or remedial action. NFA is recommended for the following:

- the Former Vehicle Service Pit in Building 635 (TU014), and
- the Battery Acid Neutralization Pit in Building 635 (TU016).

Analytical results of groundwater sampling at all three Building 608 AOCs (the Former Vehicle Service Pit in Building 608 [TU015], the Former Detergent and/or Waste Oil USTs at Building 608 [TU018], and the Former Drop Tank Storage Area at Building 608 [SA019]) are consistent with historical petroleum groundwater impacts in the Building 608 area (e.g., IRP Site 10, which was granted NFA in 2013) and are not necessarily indicative of new source(s). However, the consistency among individual contaminants detected in both soil and groundwater beneath Building 608 and the significant soil contaminant concentrations identified in the SI indicate that a remedial investigation at the Former Vehicle Service Pit at Building 608 (TU015) is warranted. As petroleum impacts to groundwater are evident throughout the vicinity (see Figure 8-1), additional investigation is recommended at the Building 608 AOCs:

- the Former Vehicle Service Pit in Building 608 (TU015),
- the Former Detergent and/or Waste Oil USTs at Building 608 (TU018), and
- the Former Drop Tank Storage Area at Building 608 (SA019).

Table 8-1 summarizes information relevant to the ongoing DQO process for each of the three AOCs recommended for further investigation. Completed Remedial Action Cost Engineering Requirements worksheets are included as Appendix E for NGB programming purposes.

Table 8-1. Information Relevant to the DQO Process

AOC	Constituents Detected Above Screening Criteria	Sampling Recommendation(s)	Objectives
Former Vehicle Service Pit in Building 608 (TU015)	Soil: cyclohexane, ethylbenzene, isopropylbenzene, xylene (both m,p-xylene and o-xylene isomers), benz(a)anthracene, bis(2-ethylhexyl)phthalate, 2-methylnaphthalene, and naphthalene Groundwater: naphthalene and benzene	Soil: 12 soil samples Groundwater: 3 wells (9 total at Building 608)	Determine the nature and extent of contaminated media. Evaluate the risk posed by current concentrations in soil and groundwater, including vapor intrusion at Building 608
Former Detergent and/or Waste Oil USTs at Building 608 (TU018)	Soil: none Groundwater: benz(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and naphthalene	Soil: none Groundwater: 3 wells (9 total at Building 608)	Determine the nature and extent of contaminated media. Evaluate the risk posed by current concentrations in groundwater, including vapor intrusion at Building 608
Former Drop Tank Storage Area at Building 608 (SA019)	Soil: none Groundwater: benz(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene	Soil: none Groundwater: 3 wells (9 total at Building 608)	Determine the nature and extent of contaminated media. Evaluate the risk posed by current concentrations in groundwater, including vapor intrusion at Building 608

AOC = Area of concern.
DQO = Data quality objective.
UST = Underground storage tank.

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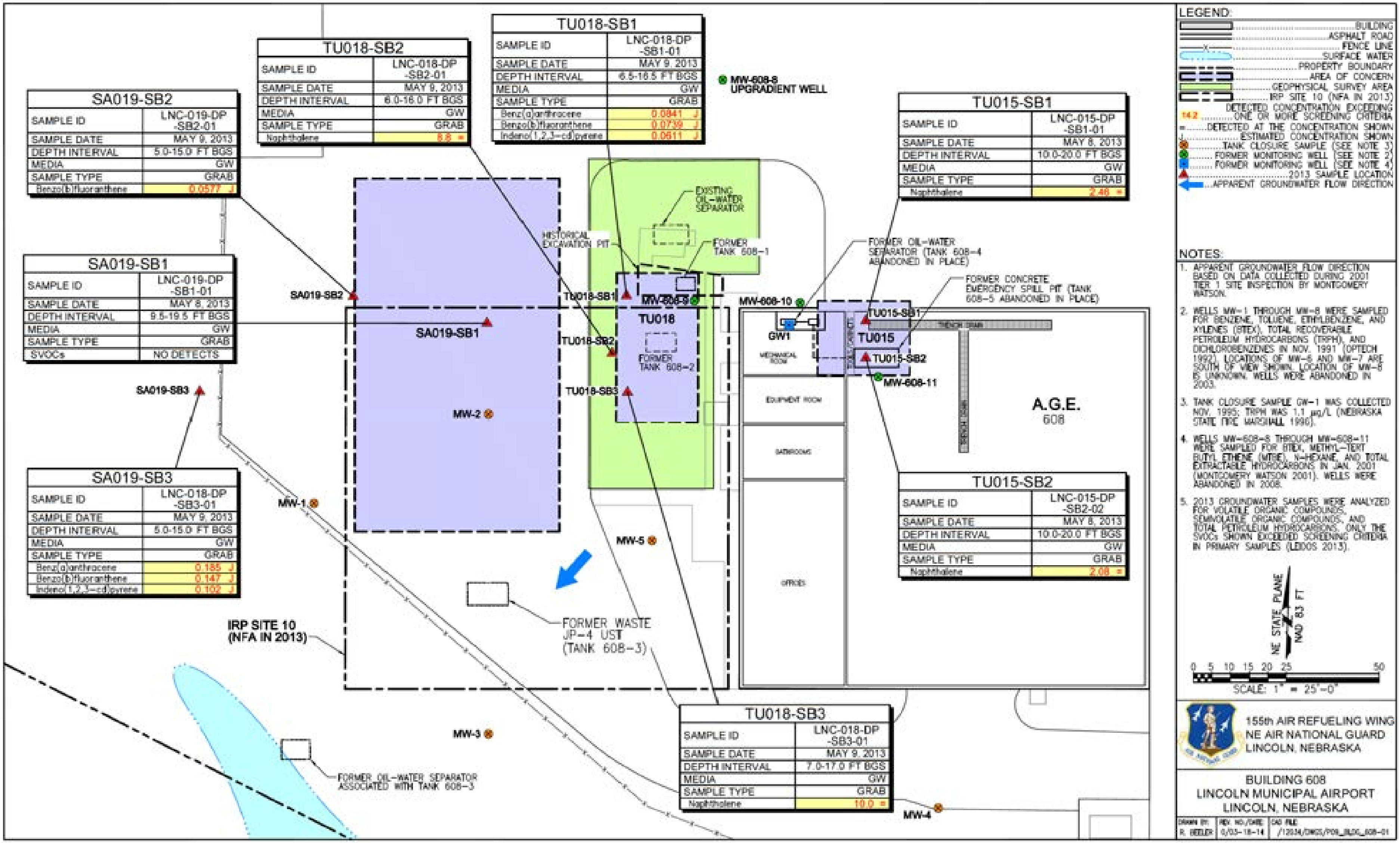

Figure 8-1. Detected SVOCs in Groundwater Near Building 608

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9.0 REFERENCES

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APPENDIX A
HISTORICAL DOCUMENTS

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TABLE OF CONTENTS

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GENERAL BASE DOCUMENTS

1991_USTs

1992_Bldg 635 USTs

1992_LUST Report

1992_UST Removal Program Plans

1993_UST Status

1999_Spills Status

2000_USTs Removal Status

2009_Bldgs 635 636 UST Closure

2011_IRP Sites and Status per EBS

Lincoln Appx C from 2011 EBS

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FILE 31K

STATE	BASE	KEY FIELD	TANK ID	CAP	YR INST	PROD	USE STAT	EMPTY	CT	BLDG	PROJECT	MILCONYR
NEBRASKA	LINCOLN	NGCB45	637	6,000	55	10	5	Y	1	(abandoned) Waste JP-4 @ 637 (G.A.P.)	NGCB 909559 R/UG	Fuel Storage Tanks FY 95
NEBRASKA	LINCOLN	NGCB50	POL-1	105,000	59	10	1	N	1	JP-4 @ fuel farm	? 909793 ?	
NEBRASKA	LINCOLN	NGCB51	POL-2	210,000	59	10	1	N	1	JP-4 @ fuel farm	? ?	
NEBRASKA	LINCOLN	NGCB52	POL-3	210,000	59	10	1	N	1	JP-4 @ fuel farm	? ?	
NEBRASKA	LINCOLN	NGCB42	635-2	2,000	55	30	3	N	1	Diesel @ 635 (Motor pool)	NGCB 909793	
NEBRASKA	LINCOLN	NGCB48	640-1	2,000	72	30	1	N	1	Diesel @ 640 (Army Motor pool)	ARMY REMOVES	
NEBRASKA	LINCOLN	NGCB46	655	26,000	55	31	1	N	1	Fuel oil @ 655 (Heating plant)	909559	
NEBRASKA	LINCOLN	NGCB47	624-2	10,000	56	31	1	N	1	Fuel oil @ (Army Hangar: 624)	909559	
NEBRASKA	LINCOLN	NGCB43	635-3	10,000	79	40	1	N	1	Unl. Gas @ 635 (Motor Pool)	909793	
NEBRASKA	LINCOLN	NGCB49	640-3	2,000	85	40	1	N	1	Unl. Gas @ 640 (Army Motor pool)	ARMY REMOVES	
NEBRASKA	LINCOLN	NGCB30	600-1	500	65	60	5	Y	1	Waste oil @ 600 (Hangar)	909559	
NEBRASKA	LINCOLN	NGCB32	605-2	1,000	73	50	1	Y	1	Waste JP-4 @ 605 (Engine Shop)	909559	
NEBRASKA	LINCOLN	NGCB33	608-1	500	75	60	1	N	1	Separator overflow @ 608 (Fuel Cell R)	"	
~~NEBRASKA~~	~~LINCOLN~~	~~NGCB35~~	~~608-3~~	~~1,000~~	~~75~~	~~60~~	~~4~~	~~N~~	~~1~~			Removed MAR
NEBRASKA	LINCOLN	NGCB31	605-1	500	73	51	1	Y	1	O/W Sep @ 605 (Engine Shop)	909559	
NEBRASKA	LINCOLN	NGCB36	608-4	250	75	51	1	Y	1	Oil Interceptor @ 608 (Fuel Cell R.)	ALREADY ABOVE GROUND	
NEBRASKA	LINCOLN	NGCB40	633-2	100	75	61	1	Y	1	Oil Interceptor @ 633 (AGE)	919614	
NEBRASKA	LINCOLN	NGCB41	635-1	500	79	51	1	Y	1	O/W Sep @ 635 (Motor pool)	909559	
NEBRASKA	LINCOLN	NGCB55	203-2	200	72	51	1	Y	1	O/W Sep @ 203 (Wash House)	"	
NEBRASKA	LINCOLN	NGCB37	608-5	2,600	75	63	1	Y	1	Emergency Spillpit @ 608 (Fuel Cell)	"	
NEBRASKA	LINCOLN	NGCB39	633-1	300	75	63	1	Y	1	" " " @ 633 (AGE)	919614	
NEBRASKA	LINCOLN	NGCB53	POL-4	3,000	57	53	1	N	1	Waste JP-4 @ Fuel Farm	909793 ?	
NEBRASKA	LINCOLN	NGCB34	608-2	2,000	75	90	1	N	1	Detergent (Ab...) @ Fuel Cell	909559	
NEBRASKA	LINCOLN	NGCB44	635-4	130	79	90	1	N	1	Wash Bay Pit @ 635 (motor pool)	"	
NEBRASKA	LINCOLN	NGCB38	632	550	75	92	5	Y	1	Waste oil @ 632 (AGE)	919614	
NEBRASKA	LINCOLN	NGCB54	203-1	100	72	92	1	Y	1	Sep overflow @ 203 (Wash House)	909559	

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Steve Freeze working ?

MEMO FOR RECORD

Response to State Fire Marshall Orders per 28 April Inspection

1. Tanks 635-2 and 635-3.

   a. Inventory will now be monitored daily.

   b. Measurements of water level will be measured and recorded.

   c. Warning and operations signs are posted.

   d. Annual tank tightness testing was performed in Nov 91 and is currently being contracted to occur in June or July 93.

2. Tanks 624-2 and 655.

   a. Inventory measurements will be performed Apr - Nov.

3. Tanks 203-2, 605-1, 608-1, 632, and 635-1. All expeditiously emptied and all are to dropped from SFM Order.

4. Tanks 640-1 and 640-2. ARNG FMO is handling these tanks.

DEE/CPT Krajnik/19 May 92/1251/tp

Report Date 2/20/92

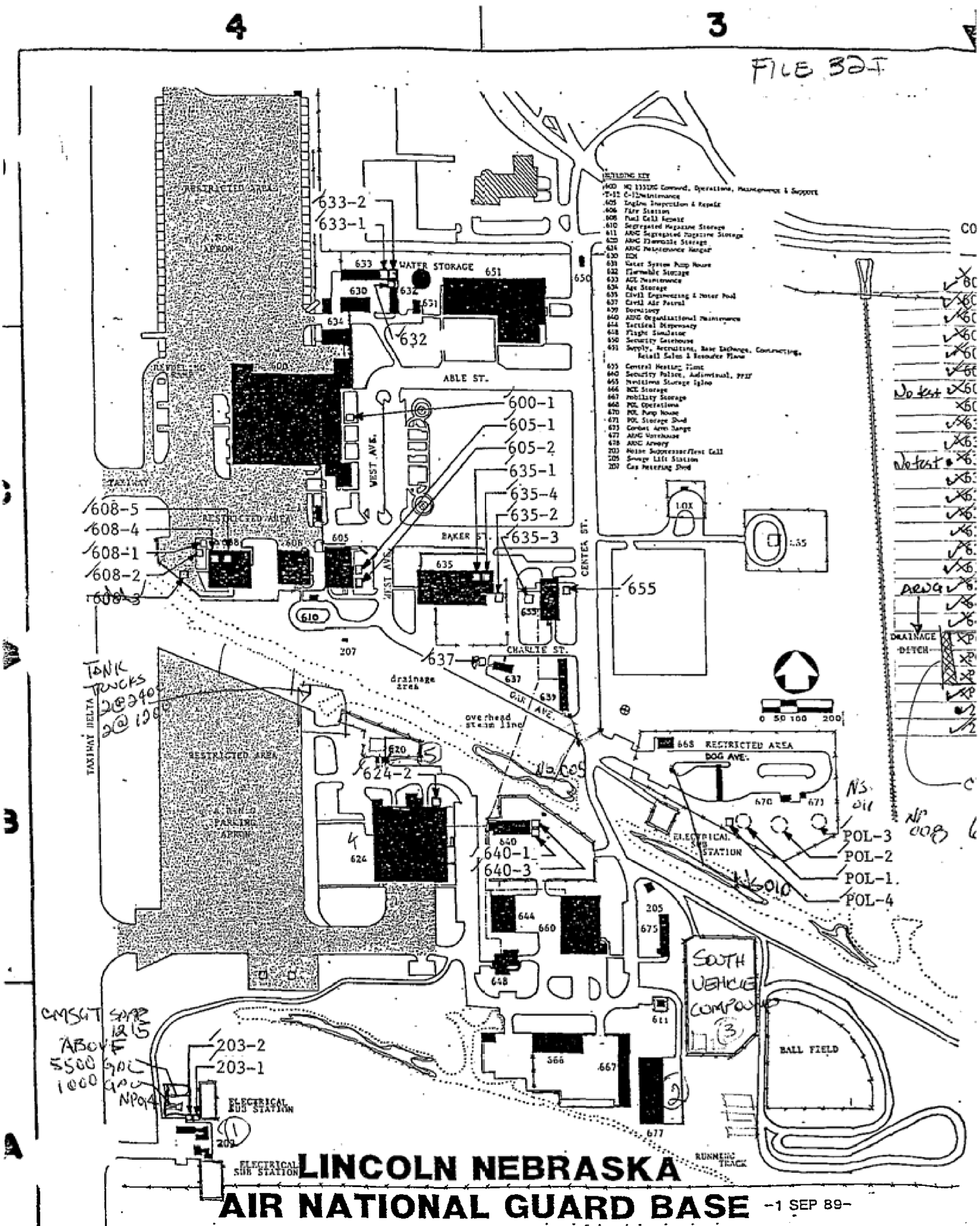
Underground Storage Tank Leak Detection
Compliance for Lincoln ANG Base

State	Base	Key Field	Tank ID	Cap	Yr Inst	Prod	Reg	Last Test	Annual Tk Tightness Test Date	Type Test
Nebraska	Lincoln	NGCB42	635-2	2,000	55	30	R	23 Nov 91	11/23/91	Float/helium gas
		Remarks-Diesel								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB46	655	26,000	55	31	R	26 Nov 91	11/26/91	Float/helium gas
		Remarks-Fuel Oil								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB47	624-2	10,000	56	31	R	23 Nov 91	11/23/91	Float/helium gas
		Remarks-Fuel Oil								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB53	POL-4	3,000	59	10	R	20 Nov 91	11/20/91	Float/helium gas
		Remarks-Waste JP-4								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB31	605-1	500	73	61	R	25 Nov 91	11/25/91	Float/helium gas
		Remarks-Oil/water separator								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no

State	Base	Key Field	Tank ID	Cap	Yr Inst	Prod	Reg	Last Test	Annual Tk Tightness Test Date	Type Test
Nebraska	Lincoln	NGCB32	605-2	1,000	73	60	R	25 Nov 91	11/25/91	Float/helium gas
		Remarks·Waste Oil								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB48	640-1	2,000	72	30	R	22 Nov 91	11/22/91	Float/helium gas
		Remarks·Diesel								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB55	203-2	200	72	61	R	21 Nov 91	11/21/91	Float/helium gas
		Remarks·Oil/water separator								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB33	608-1	500	75	60	R	25 Nov 91	11/25/91	Float/helium gas
		Remarks·Waste oil/separator overflow (expeditiously emptied)								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB36	608-4	250	75	61	R	25 Nov 91	11/25/91	Float/helium gas
		Remarks·Suspended tank/not underground/oil interceptor								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB41	635-1	500	79	61	R	26 Nov 91	11/26/91	Float/helium gas
		Remarks·Oil/water separator								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no

State	Base	Key Field	Tank ID	Cap	Yr Inst	Prod	Reg	Last Test	Annual Tk Tightness Test Date	Type Test
Nebraska	Lincoln	NGCB43	635-3	10,000	79	40	R	23 Nov 91	11/23/91	Float/helium gas
		Remarks-Unleaded gas								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB44	635-4	180	79	90	R	26 Nov 91	11/26/91	Float/helium gas
		Remarks. Wash Bay Pit								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB49	640-3	2,000	85	40	R	22 Nov 91	11/22/91	Float/helium gas
		Remarks-Unleaded gas								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB30	600-1	500	65	60	R	26 Nov 91	11/26/91	Float/helium gas
		Remarks-Working closure with state/Waste Oil								Status Fail
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB34	608-2	2,000	76	90	NR	25 Nov 91	11/25/91	Float/helium gas
		Remarks-Detergent/working closure with state								Status Fail
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB35	608-3	1,000	75	60	NR			
		Remarks-Removed April 91								Status
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no

State	Base	Key Field	Tank ID	Cap	Yr Inst	Prod	Reg	Last Test	Annual Tk Tightness Test Date	Type Test
Nebraska	Lincoln	NGCB37	608-5	2,600	75	90	NR	25 Nov 91	11/25/91	Float/helium gas
		Remarks·Emergency spill pit								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB38	632	550	75	60	R	25 Nov 91	11/25/91	Float/helium gas
		Remarks·Waste Oil								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB39	633-1	300	75	90	NR	25 Nov 91	11/25/91	Float/helium gas
		Remarks·Emergency spill pit								Status Pass
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no
Nebraska	Lincoln	NGCB45	637	8,000	55	30	NR	25 Nov 91	11/25/91	Float/helium gas
		Remarks·Working closure with state								Status Fail
		Circle 1 abandond tank=perm/temp/remvd								Empty=yes/no



4
3
FILE 32-I
RESTRICTED AREA
APRON
633-2
633-1
WATER STORAGE
651
650
632
ABLE ST.
600-1
605-1
605-2
635-1
635-4
635-2
635-3
WEST AVE.
BAKER ST.
CENTER ST.
608-5
608-4
608-1
608-2
608-3
605
635
655
LOX
610
207
637
CHARLIE ST.
TANK TRUCKS
2@2400
2@1200
TAXIWAY DELTA
drainage area
overhead steam line
RESTRICTED AREA
PARKING APRON
624-2
624
640
640-1
640-3
668 RESTRICTED AREA
DOG AVE.
670
671
ELECTRICAL SUB STATION
POL-3
POL-2
POL-1
POL-4
DRAINAGE DITCH
ARNG
No test
644
660
205
675
648
SOUTH VEHICLE COMPOUND
611
666
667
677
BALL FIELD
RUNNING TRACK
CMSGT SAPP
ABOVE
5500 GAL
1000 GAL
203-2
203-1
ELECTRICAL SUB STATION
202
LINCOLN NEBRASKA
AIR NATIONAL GUARD BASE
-1 SEP 89-

AF FORM 1653

Upgrade/cleanup

TEST OR REMOVE BY 22 DEC 19__ / Then annually afterwards.

NER	USE	SIZE	TYPE	INSTALLED		YEAR REGISTERED	TIGHTNESS TEST?	REMARKS
*	Waste Oil	500 gal	Welded Steel	1965	90	May 1986		
	Oil/Water Sep	500 gal	Concrete	1973	~~91~~	May 1986	Exempt	
*	Waste JP-4	1,000 gal	Welded Steel	1973	~~91~~	May 1986		
	Sep Overflow	500 gal	Welded Steel	1975	92	May 1986		
*	Detergent	2,000 gal	Fiberglass	1976	92	May 1986		Not In Use
~~*~~	~~Waste JP-4~~	~~1,000 gal~~	~~Welded Steel~~	~~1975~~		~~May 1986~~	~~Removed Apr 91~~	
	Oil Interceptor	250 gal	Welded Steel	1975	~~91~~		Exempt	Suspended, Not Buried
	Emer Spill Pit	2,600 gal	Concrete	1975			Exempt	
*	Waste Oil	550 gal	Fiberglass	1975	92	May 1986		
	Emer Spill Pit	300 gal	Concrete	1975			Exempt	
	Oil Interceptor	100 gal	Cast Iron	1975			Exempt	Suspended, Not Buried
	Oil/Water Sep	500 gal	Concrete	1979		May 1986	Exempt	Maintenance Bay
	Diesel	2,000 gal	Welded Steel	1955	89	May 1986	12 Jan 90	
	Unleaded Gas	10,000 gal	Welded Steel	1979	92	May 1986	19 Jan 90	
	Wash Bay Pit	180 gal	Concrete	1979			Exempt	Not listed w/ SFM
*	Waste JP-4	8,000 gal	Welded Steel	1955	89	May 1986		
	Fuel Oil	26,000 gal	Welded Steel	1955	~~89~~	May 1986	~~Exempt~~	Deferred from release detection/ manual tank gauging monthly
	Fuel Oil	10,000 gal	Welded Steel	1956	~~89~~	May 1986	~~Exempt~~	
	Diesel	2,000 gal	Welded Steel	1972	91	May 1986		ARNG
	Unleaded Gas	2,000 gal	Welded Steel	1985	93	May 1986		ARNG
	JP-4	2,500 BBL	Welded Steel	1959	89	May 1986	2 Feb 90	
	JP-4	5,000 BBL	Welded Steel	1959	89	May 1986	19 Jan 90	
	JP-4	5,000 BBL	Welded Steel	1959	89	May 1986	12 Jan 90	
	Waste JP-4	3,000 gal	Concrete	1959		May 1986	Exempt	
*	Sep Overflow	100 gal	Welded Steel	1973	91	May 1986	Exempt	
	Oil/Water Sep	200 gal	Concrete	1973	91	May 1986	Exempt	

—As by call to State Fire Marshall (Fred — 471-2027) 1 May 91

...ed & tested summer 1991

-4 Oil/water separator wash rack to sanitary 1991 concrete

U.S. AIR FORCE

LINCOLN NE. AIR NATIONAL GUARD BASE

TITLE

UST PROFILE PLAN

SIZE	A.F. CODE IDENT NO.	DRAWING NO
B		MAJOR SNOBERGER 21 FEB 1990

SCALE | SHEET 1 OF

file 31K

UST Removal - Proposed Schedule Oct 90

Tank #	Location	Use	Size/type	Removal Date Proposed	Removal Date Requireme
637	Motor Pool	Waste JP-4	8,000/steel	ASAP-FY91	CY 8
601-1	Tire Shop	" ,oil,...	500/steel	ASAP-FY91	CY 9
605-2	Engine Shop	"	1,000/steel	FY91	CY 9
*608-2	So. Apron	Detergent	fiberglass/2,000	FY 92	CY 9
608-3	Pod Strg. Area	Waste JP4	1000 gal/steel	"	"
632-	AGE	Waste Oil	550 / fiberglass	"	"
203-1	Sound Supr.	Sep. Overflow	100 / steel	"	"

Proposal: Olsson Associates to write specs. (& drawings (?)) for removal of these seven tanks. Remove the first 3 UST's at the earliest possible date; remove the remainder by 22 Dec 92.

Scott

NGB UST experts: *Mike Minior / DEV 858-8155
Joy Hoyle / DEV -8141
Bill Morrison / DEU -8077

MEMO FOR RECORD

Underground Storage Tank Management Program

USTs listed below with related information concerning testing, removal, monitoring, etc.

Tank ID	CAP	Removal Project	(Apr - Nov) Monthly Monitoring	Daily Monitoring	Required Date of Testing	Remarks
637	8,000	Remove USTs			N/A	Abandoned
POL-1	110,000	Apron/POL		**X	*Nov 92	
POL-2	220,000	Apron/POL		**X	*Nov 92	
POL-3	220,000	Apron/POL		**X	*Nov 92	
POL-4	3,000	Apron/POL			*Nov 92	
635-1	500	Remove USTs			N/A	
635-2	2,000	Apron/POL		X	Nov 92	3714-State ID #
635-3	10,000	Apron/POL		X	Nov 92	3714-State ID #
635-4	180	Remove USTs			N/A	
655	26,000	Replace Heating Plants	X		*Nov 92	HO-0843-State I
624-2	10,000	Replace Heating Plants	X		N/A	HO-0843-State II
600-1	500	Remove USTs			N/A	Abandoned
605-1	500	Remove USTs			N/A	
605-2	1,000	Remove USTs			N/A	Abandoned
608-1	500	Remove USTs			N/A	
608-4	250	Remove USTs			N/A	
608-5	2,600	Remove USTs			N/A	
633-1	300	Fuel Systems Maint Dock			N/A	
633-2	100	Fuel Systems Maint Dock			N/A	
203-1	100	Remove USTs			N/A	
203-2	200	Remove USTs			N/A	
632	550	Fuel Systems Maint Dock			N/A	

Total tanks--22

* Required by DEQ, <u>not</u> Title 159.

** AF Requirement/<u>not</u> Title 159.

DEE/CPT KRAJNIK/19 May 93/1251\tp

SPILLNO	STF	SPST	OWNCO	SPLOC	SPCITY
24023-S-0940	SS	?	AIR NAT'L GUARD	AIR GUARD BASE	LINCOLN
100692-JB-1345	SS	1	AIR NATIONAL GUARD	N END MAIN TERMINAL RAMP	LINCOLN
090996-GW-1520	PB	8	AIR NATIONAL GUARD	LANG BASE #640-1 & #640-3	LINCOLN
041694-JB-1155	SS	5	AIR NATIONAL GUARD	AIR GUARD FUEL FARM	LINCOLN
073191-RF-1200	14	5	AIR NATIONAL GUARD	SITE 10 2301 W. ADAMS	LINCOLN
071196-NM-1115	SS	5	AIR NATIONAL GUARD	NW BLDG 608,SE CRNR OF APRON	LINCOLN
081591-RF-1200	14	9	AIR NATIONAL GUARD	2301 WESR ADAMS NO OF CREEK	LINCOLN
030696-AP-0000	AP	5	NE AIR NATIONAL GUARD	NEANG #605-2	LINCOLN
022996-GW-1335	14	5	NEBR AIR NAT GUARD	NEBR ANG BASE BLDG 600	LINCOLN
AP5070	AP	5	NEBRASKA AIR NAT GUARD	#624-3, #624-4	LINCOLN
010896-NH-1530	SS	5	NEBRASKA AIR NATL GUARD	FUEL CELL MAINTENANCE HANGER	LINCOLN
102595-NH-1600	SS	5	NEBRASKA AIR NATL GUARD	FUEL CELL MAINT HANGAR	LINCOLN
040996-GW-0935	PB	8	USP & FO/NE AIR NAT GUARD	NEBR ANG BASE BLDG 608	LINCOLN
022996-GW-1420	14	5	USP&FO/NE AIR NAT GUARD	LINCOLN AIR GRD BASE BLDG 637	LINCOLN
071796-AP-0004	AP	5	USP&FO/NE AIR NAT GUARD	NE ANG BASE BLDG 605	LINCOLN
112295-NH-1300	14	5	USP&FO/NE AIR NAT GUARD	LINCOLN AIR GRD BASE BLDG 655	LINCOLN
091896-99-0000	AP	5	USP&FO/NE AIR NAT GUARD	NEBR ANG BASE #624-2	LINCOLN

5 = closed
9 = active
8 = back logged

A-17

155TH AIR REFUELING WING
UST REMOVAL PROGRAM

CONTAINER ID	USE	SIZE	TYPE	INSTALLED	RPM	MILCON	ANALYTICALS
600-1	Waste Oil	500 gal	Welded Steel	1965		NGCB 909559A	
606-1	Oil/Water Sep	500 gal	Concrete	1973		909559	
605-2	Waste JP-4	1,000 gal	Welded Steel	1973		909559	
608-1	Sep Overflow	500 gal	Welded Steel	1975		909559 A	
608-2 Rogge	Detergent	2,000 gal	Fiberglass	1976	X		
608-3	Waste JP-4	1,000 gal	Welded Steel	1975	X		
608-4	Oil Interceptor	250 gal	Welded Steel	1975		909559A	
608-5 milvor talk to Dennis	Emer Spill Pit	2,600 gal/1,800 gal	Concrete	1975		909559A	
632	Waste Oil	550 gal	Fiberglass	1975		NGCB 919614	
633-1	Emer Spill Pit	300 gal	Concrete	1975		" "	
633-2 Fuel cell Hangar project	Oil Interceptor	100 gal	Cast Iron	1975		" "	
635-1	Oil/Water Sep	500 gal	Concrete	1979		929826A	
635-2 fuel ops	Diesel	2,000 gal	Welded Steel	1955		" "	
635-3	Unleaded Gas	10,000 gal	Welded Steel	1979		" "	
635-4	Wash Bay Pit	180 gal	Concrete	1979		" "	
637	Waste JP-4	8,000 gal	Welded Steel	1955		909559 A	
655	Fuel Oil	26,000 gal	Welded Steel	1955		NGCB 929723	
624-2 (AASF)	Fuel Oil	10,000 gal	Welded Steel	1956	—	—	—
640-1 ARMY	Diesel	2,000 gal	Welded Steel	1972	—	—	—
640-3 ARMY	Unleaded Gas	2,000 gal	Welded Steel	1985	—	—	—
POL-1	JP-4	2,500 bbl	Welded Steel	1959	IRP		
POL-2	JP-4	5,000 bbl	Welded Steel	1959	IRP		
POL-3	JP-4	5,000 bbl	Welded Steel	1959	IRP		
POL-4	Waste JP-4	3,000 gal	Concrete	1959	IRP		
203-1	Sep Overflow	100 gal	Welded Steel	1973	NGCB 909559	NGCB 909559	
203-2	Oil/Water Sep	200 gal	Concrete	1973	"	" "	

03/30/2000 Captain John Buhrmann/EM

STATE OF NEBRASKA

Dave Heineman
Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY
Michael J. Linder
Director
Suite 400, The Atrium
1200 'N' Street
P.O. Box 98922
Lincoln, Nebraska 68509-8922
Phone (402) 471-2186
FAX (402) 471-2909
website: www.deq.state.ne.us

MAY 27 2009

FILE COPY

Lt Col Jay Rutten
NEANG
2411 W Butler Avenue
Lincoln NE 68524

RE:	Soil Sampling Report
Facility Name:	Base Security
Address:	Buildings 635 & 636, 2420 W Butler Ave
City:	Lincoln
DEQ Incident Number:	UG# 072996-GW-1450
IIS#:	59696

Dear Lt. Col. Rutten:

We have received the Soil Sample Results Report for the boring drilled on October 22, 2008, at the above referenced facility location. The report indicated soil contamination near and at the water table. The boring was located near the area where two underground storage tanks (USTs) along with associated lines and a dispenser were removed on June 16, 1997. On December 29, 2000, the NEANG installed three monitor wells in accordance with the Department's Risk-Based Corrective Action (RBCA) Tier 1 investigation guidance. Based on the information provided in the Tier 1 report, the release was closed on October 30, 2003. After reviewing the 2003 Tier 1 report again, it appears the contamination detected on October 22, 2008, is related to the release from the former UST system. The new field information does not indicate the file should be re-opened. As such, the Department will be combining this information with the previous incident and the release file will remain closed. No further remedial actions will be required at this time. However, if a problem arises in the future as a result of this release, Nebraska Air National Guard will remain responsible for further remedial actions.

If you have any questions, please feel free to contact me at (402) 471-3378. Also, it is important that you contact me if your address or phone number changes. Thank you for your cooperation.

Sincerely,

Nancy Mann

Nancy Mann
Petroleum Remediation Section
Water Quality Division

2009130967

Table 4-1. Results from State and Federal Database Search
Lincoln ANGB, Nebraska

Map ID*	Site Name and Address	Distance/ Direction	Databases Reporting Site Information	Additional Details from Databases
A	Nebraska ANG 2420 W. Butler Ave Lincoln, NE 68524	Adjacent Property	AST HIST AST SHWS NPDES AIRS RCRA-TSDF RCRA-SQG FINDS MANIFEST UST	SQG with violations found. One 3,000-gallon AST in service.
7	Nebraska ANG – IRP Site 10 2301 W. Adams Street Lincoln, NE 68524	Adjacent Property	LUST	None
E25	Army Aviation Support Facility 624 Municipal Airport Lincoln, NE 68524	Adjacent Property	CERC-NFRAP RCRA-CESQG	None
B8/B9	Lincoln AFB 2400 W. Adams Street Lincoln, NE 68524	Adjacent Property	SHWS UIC NE Tier 2	None
D17	JP-4 Fuel Farm 2301 W. Adams Ave Lincoln, NE 68524	Adjacent Property	LUST	High-risk site, current active investigation or remediation
C11/C12	Duncan Aviation Hangar Municipal Airport 2400 W. Adams Street Lincoln, NE 68524	⅛ mile E	UST LUST	None
C13	Lincoln Airport Authority Airline Terminal Bldg 2400 W. Adams Street Lincoln, NE 68524	⅛ mile E	UST LUST	None
C15	Federal Aviation Admin. Radio Tower Site 2400 W. Adams Street Lincoln, NE 68524	⅛ mile E	UST	None
16	Nebraska Army National Guard 2950 N. Park Road Lincoln, NE 68524	⅛ mile E	RCRA-SQG FINDS MANIFEST	SQG
F	Molex Incorporated 1400 W. Bond Circle Lincoln, NE 68521	½ mile E	RCRA-SQG FINDS LUST	None
30	Airport Plaza 66 2925 NW 12th Street Lincoln, NE 68521	½ mile E	LUST	None
31	Airport AMOCO 3100 NW 12th Street Lincoln, NE 68521	½ mile E	FINDS LUST UST HIST UST	None

*From Radius Map Report in Appendix D.

Table 4-2. IRP Sites in Surrounding Adjacent Property
Lincoln ANGB, Nebraska

Site Number	Site Name	Disposed Material	Operation Date	Date Identified	Status
1	POL Storage Area	Aviation gasoline, JP-4	1950s-1999	1987	Removed free product, removed contaminated soil, and treated soil and groundwater from 1983 to 2009; DEQ approved closure on 2 Feb 2010
2	West End of Old Oak Creek	Motor oils, JP-4, heavy metals, hydraulic oils, PD-680, paint remover	1952-1986	1987	DEQ approved closure on 2 Feb 2010
3	Former Tank Cleaning Area	Waste oil, JP-4, paint thinners, solvents, acids	1970s-1982	1987	DEQ approved closure on 9 Aug 2006
4	Road Area Where Dust Control Occurred	Waste oils, paint thinners, diesel fuel	1958-1972	1987	DEQ approved closure on 7 May 2006
5	Army National Guard Oil Storage Area	Waste oil	1950s-1997	1987	Removed UST, DEQ approved closure on 7 Dec 2000
6	Hydraulic Fluid Spill Area	Hydraulic fluid	1950s-1997	1987	DEQ approved closure on 7 May 2007
7	Army National Guard Fence, North of Building 640	Sterilizing agents	Mid-1970s	1987	DEQ approved closure on 7 May 2007
8	Hazardous Waste Storage Area South of Building 666	Hazardous waste	1960-1985	1987	DEQ approved closure on 7 May 2007
9	F-86 Crash Site	JP-4	1960	1987	Removed contaminated soils, DEQ approved closure on 21 Apr 2000
10	1,000-gallon JP-4 UST and OWS	Oil, JP-4	1991	1992	Removed UST, DEQ approved closure on 1 Dec 1992
13	Heating Oil Spill	Oil	1956-2001	1992	Removed UST, DEQ approved closure on 24 Sept 2008

Source: MWH 2011

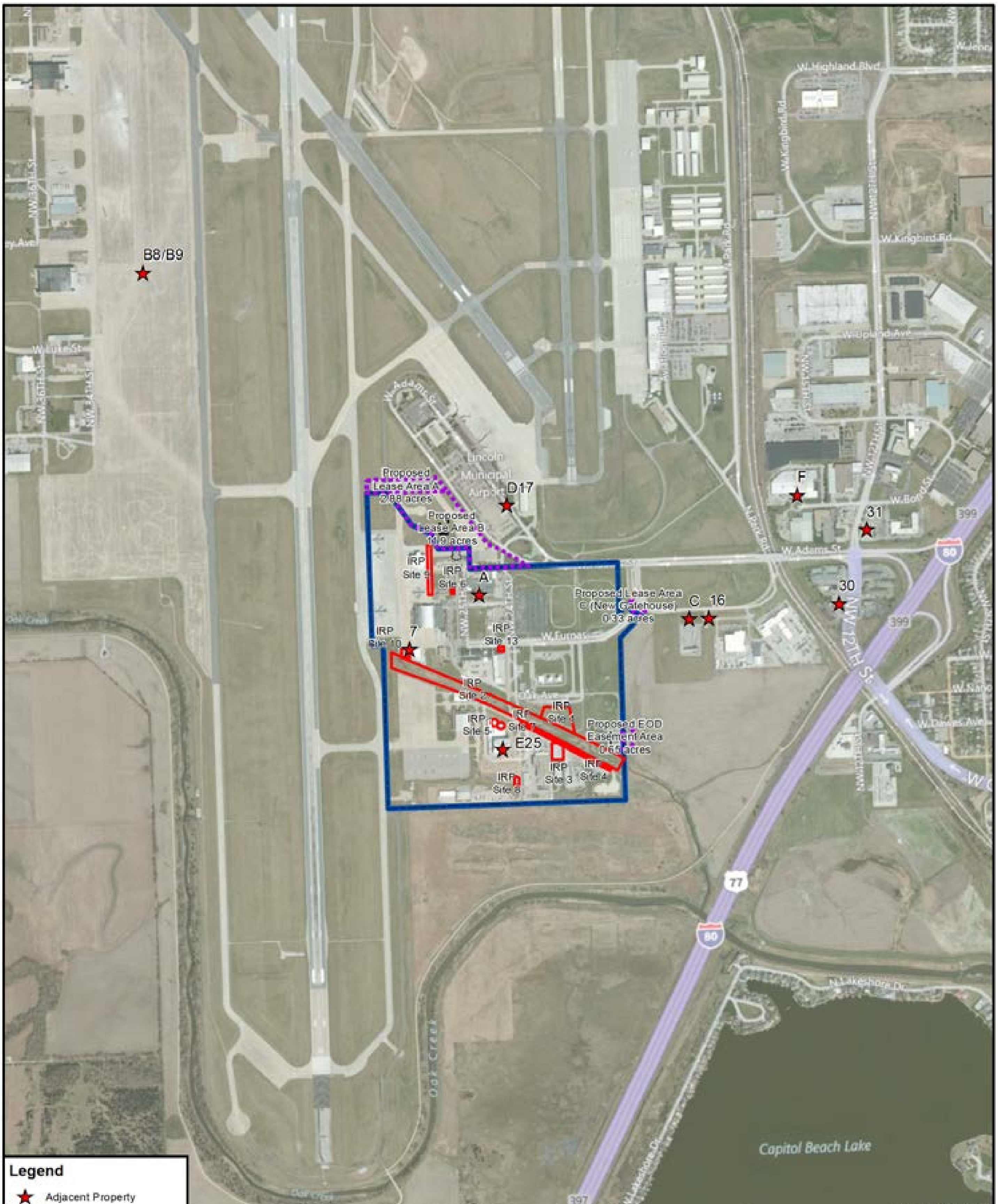


Figure 4-1 Adjacent Properties

HISTORICAL AERIAL PHOTOGRAPHS AND TOPOGRAPHS

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Aerial Photographs 1953 to 2005

Lincoln Air National Guard Base
2420 West Butler Avenue
Lincoln, NE 68524

Inquiry Number: 3143112.5
August 09, 2011

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

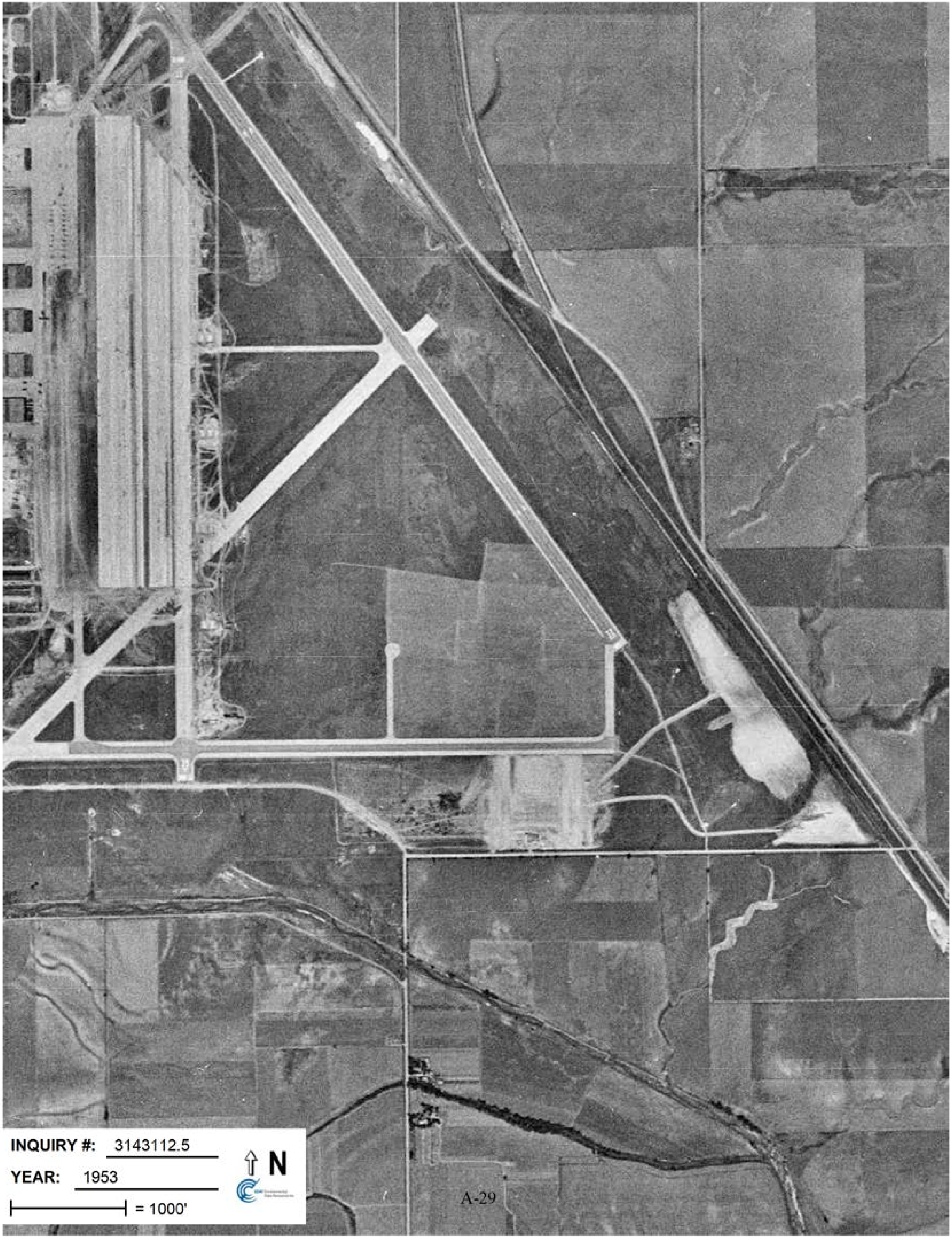
Date EDR Searched Historical Sources:

Aerial Photography August 09, 2011

Target Property:

2420 West Butler Avenue
Lincoln, NE 68524

Year	***Scale***	***Details***	***Source***
1953	Aerial Photograph. Scale: 1"=1000'	Panel #: 40096-G7, Emerald, NE;/Flight Date: September 12, 1953	EDR
1961	Aerial Photograph. Scale: 1"=500'	Panel #: 40096-G7, Emerald, NE;/Flight Date: April 13, 1961	EDR
1972	Aerial Photograph. Scale: 1"=750'	Panel #: 40096-G7, Emerald, NE;/Flight Date: May 18, 1972	EDR
1978	Aerial Photograph. Scale: 1"=1000'	Panel #: 40096-G7, Emerald, NE;/Flight Date: May 10, 1978	EDR
1981	Aerial Photograph. Scale: 1"=1000'	Panel #: 40096-G7, Emerald, NE;/Flight Date: September 20, 1981	EDR
1987	Aerial Photograph. Scale: 1"=1000'	Panel #: 40096-G7, Emerald, NE;/Flight Date: August 29, 1987	EDR
1994	Aerial Photograph. Scale: 1"=750'	Panel #: 40096-G7, Emerald, NE;/Flight Date: March 18, 1994	EDR
1999	Aerial Photograph. Scale: 1"=604'	Panel #: 40096-G7, Emerald, NE;/Composite DOQQ - acquisition dates: April 06, 1999	EDR
2005	Aerial Photograph. Scale: 1"=604'	Panel #: 40096-G7, Emerald, NE;/Flight Year: 2005	EDR
2006	Aerial Photograph. Scale: 1"=604'	Panel #: 40096-G7, Emerald, NE;/Flight Year: 2006	EDR
2007	Aerial Photograph. Scale: 1"=604'	Panel #: 40096-G7, Emerald, NE;/Flight Year: 2007	EDR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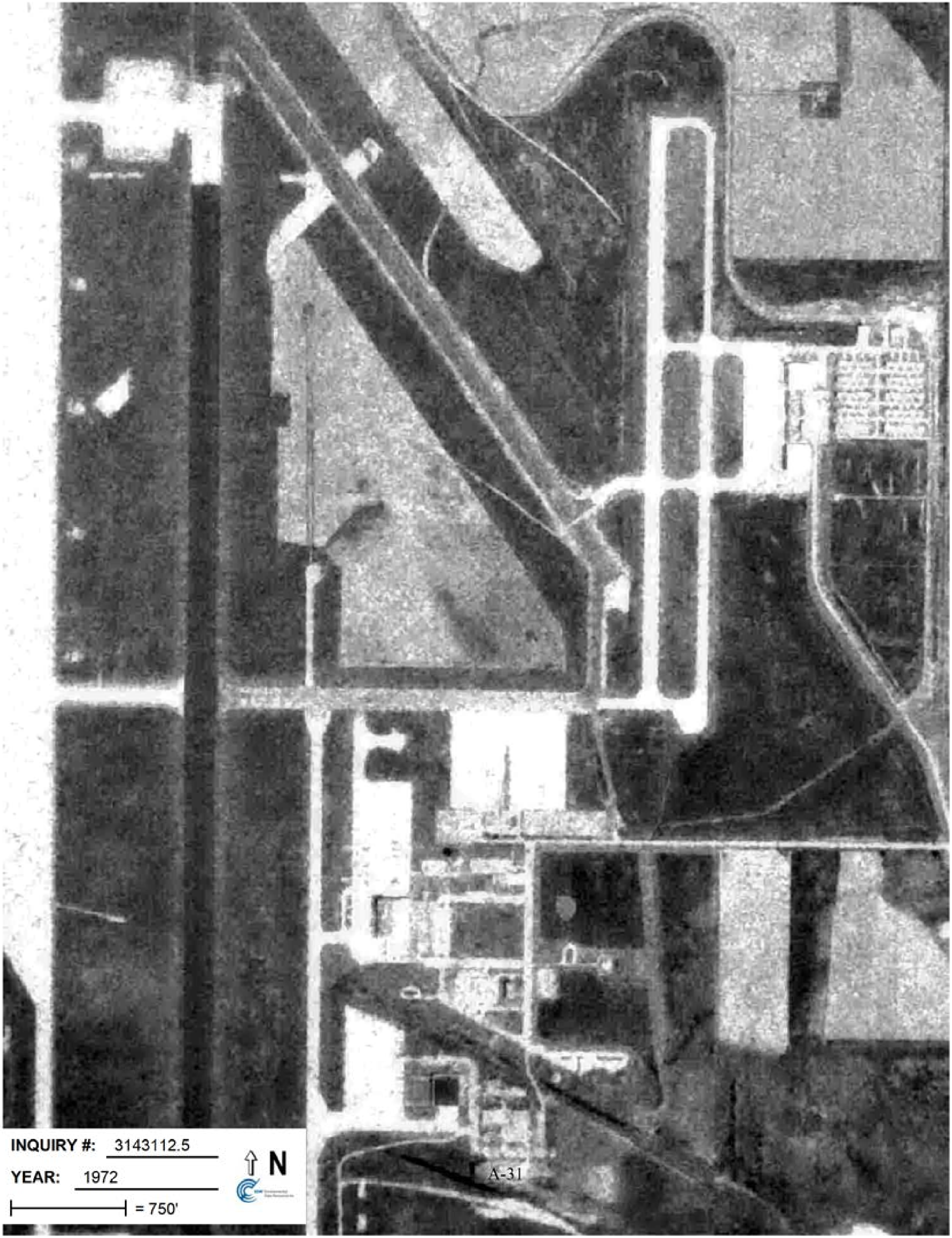
YEAR: 1953
N
= 1000'


INQUIRY #: 3143112.5
YEAR: 1961
N
= 500'


A-31
INQUIRY #: 3143112.5
YEAR: 1972
N
= 750'


INQUIRY #: 3143112.5
YEAR: 1978
N
= 1000'


INQUIRY #: 3143112.5
YEAR: 1981
= 1000'
N
A-33


INQUIRY #: 3143112.5
YEAR: 1987
= 1000'
N


INQUIRY #: 3143112.5
YEAR: 1994
N
= 750'


INQUIRY #: 3143112.5
YEAR: 1999
N
= 604'


INQUIRY #: 3143112.5
YEAR: 2005
N
= 604'

Aerial Photographs 2006 to 2007

35
INQUIRY #: 3143112.5
YEAR: 2006
N
= 604'


32
35
INQUIRY #: 3143112.5
YEAR: 2007
= 604'
N

Historical Topographic Map Report

Lincoln Air National Guard Base
2420 West Butler Avenue
Lincoln, NE 68524

Inquiry Number: 3143112.4
August 08, 2011

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

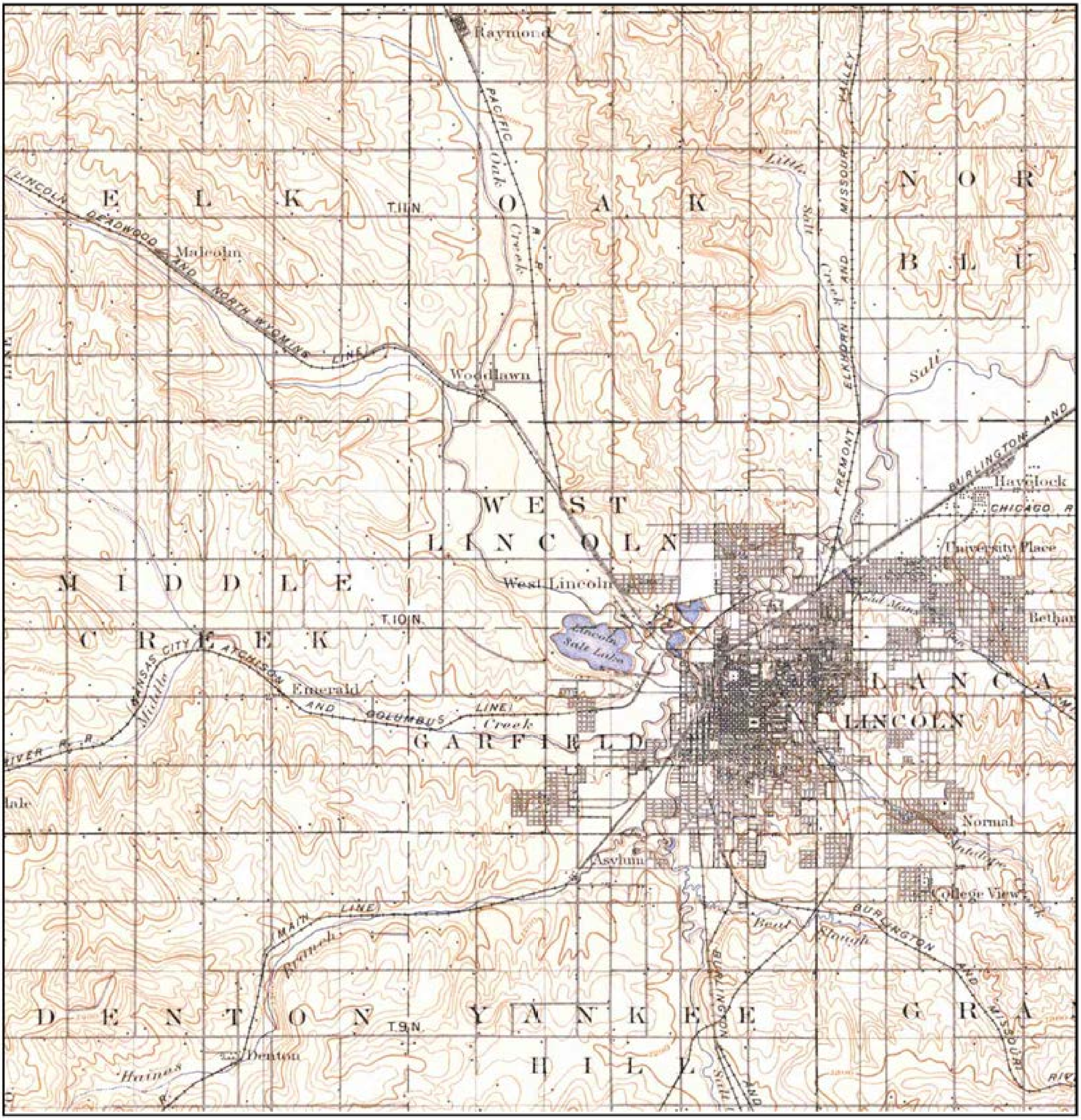
440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

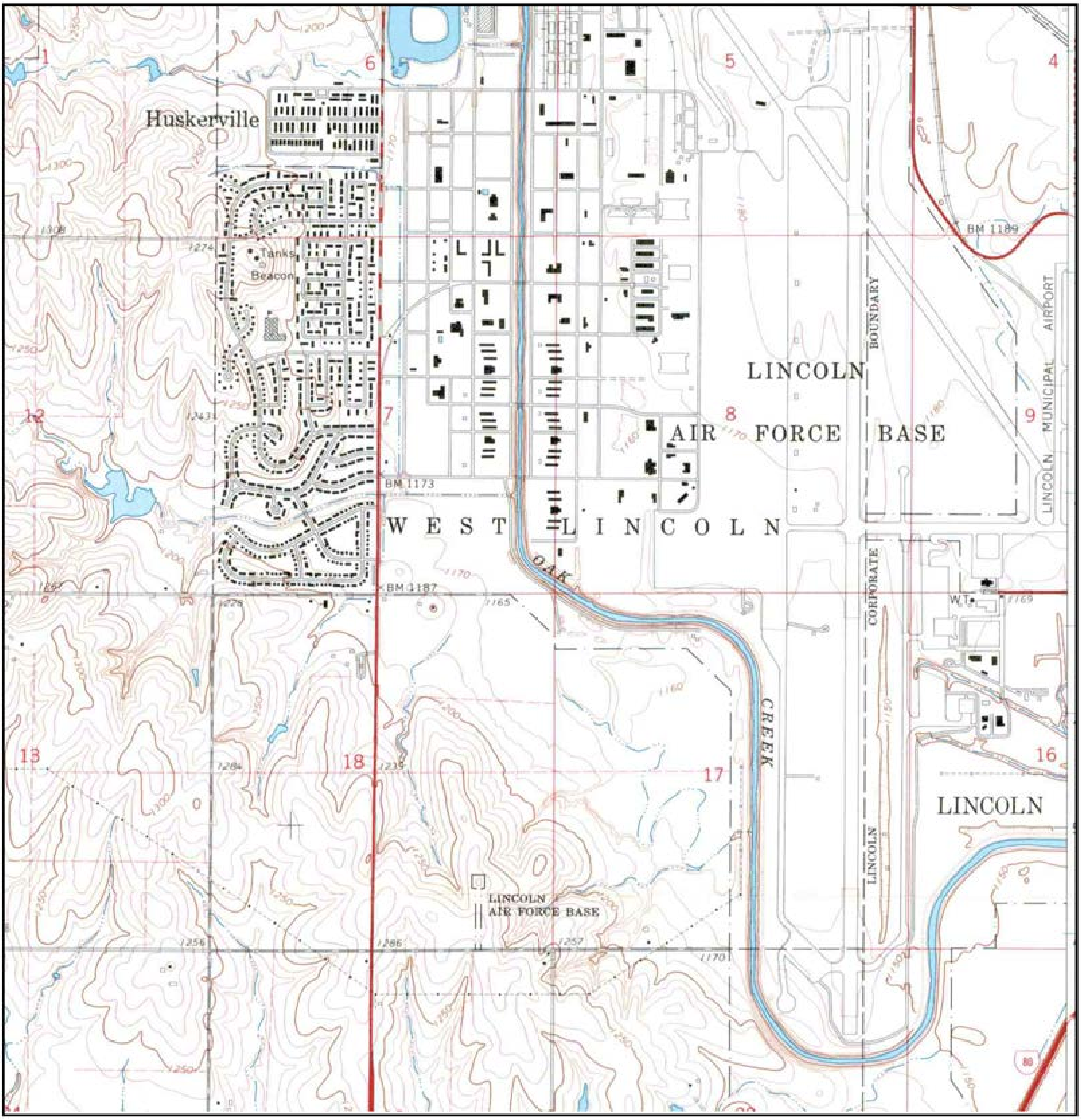
Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Historical Topographic Map



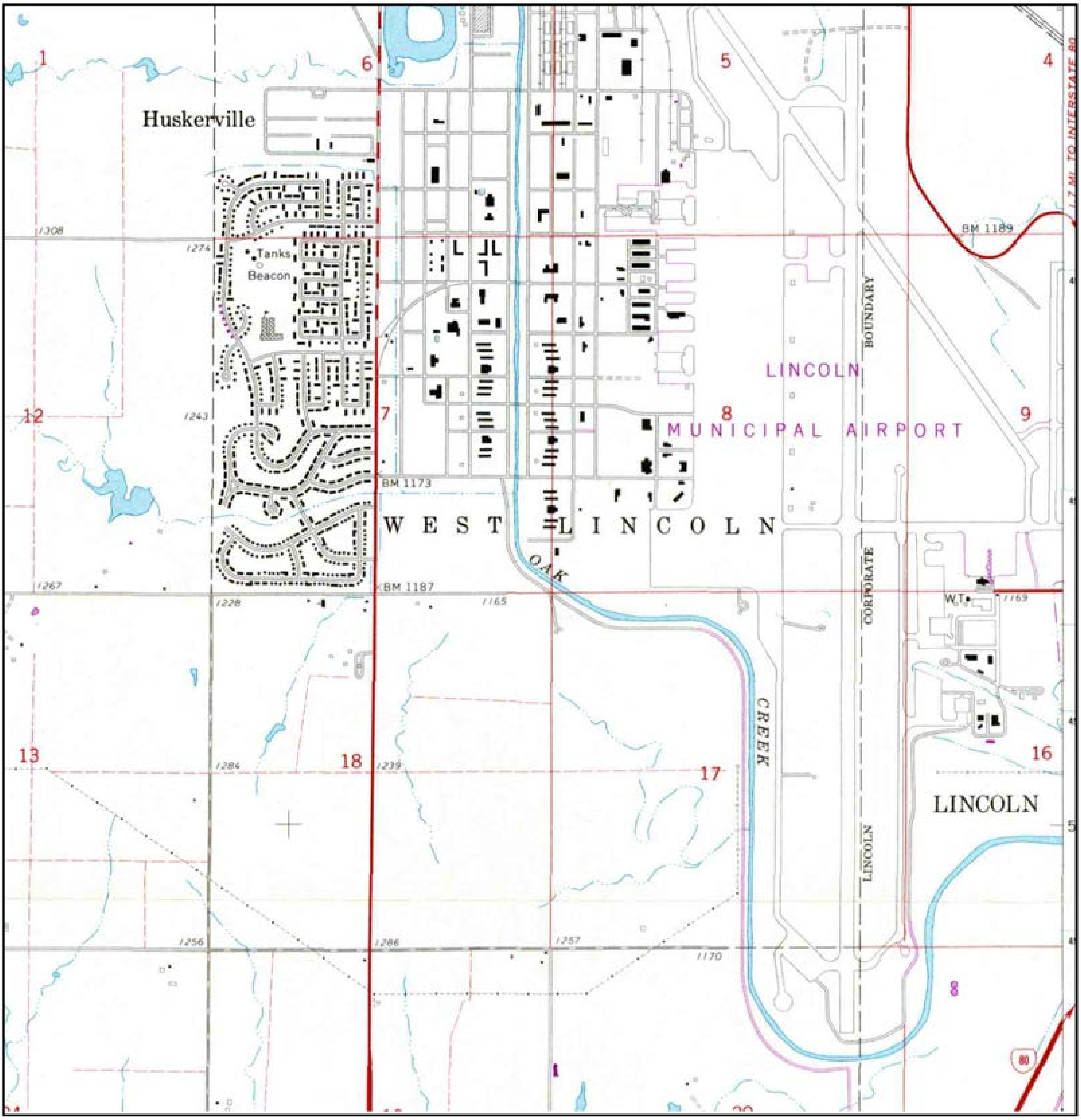
N TARGET QUAD NAME: LINCOLN MAP YEAR: 1897 SERIES: 30 SCALE: 1:125000	SITE NAME: Lincoln Air National Guard Base ADDRESS: 2420 West Butler Avenue Lincoln, NE 68524 LAT/LONG: 40.8442 / -96.7564	CLIENT: SAIC CONTACT: John Whelpley INQUIRY#: 3143112.4 RESEARCH DATE: 08/08/2011

Historical Topographic Map



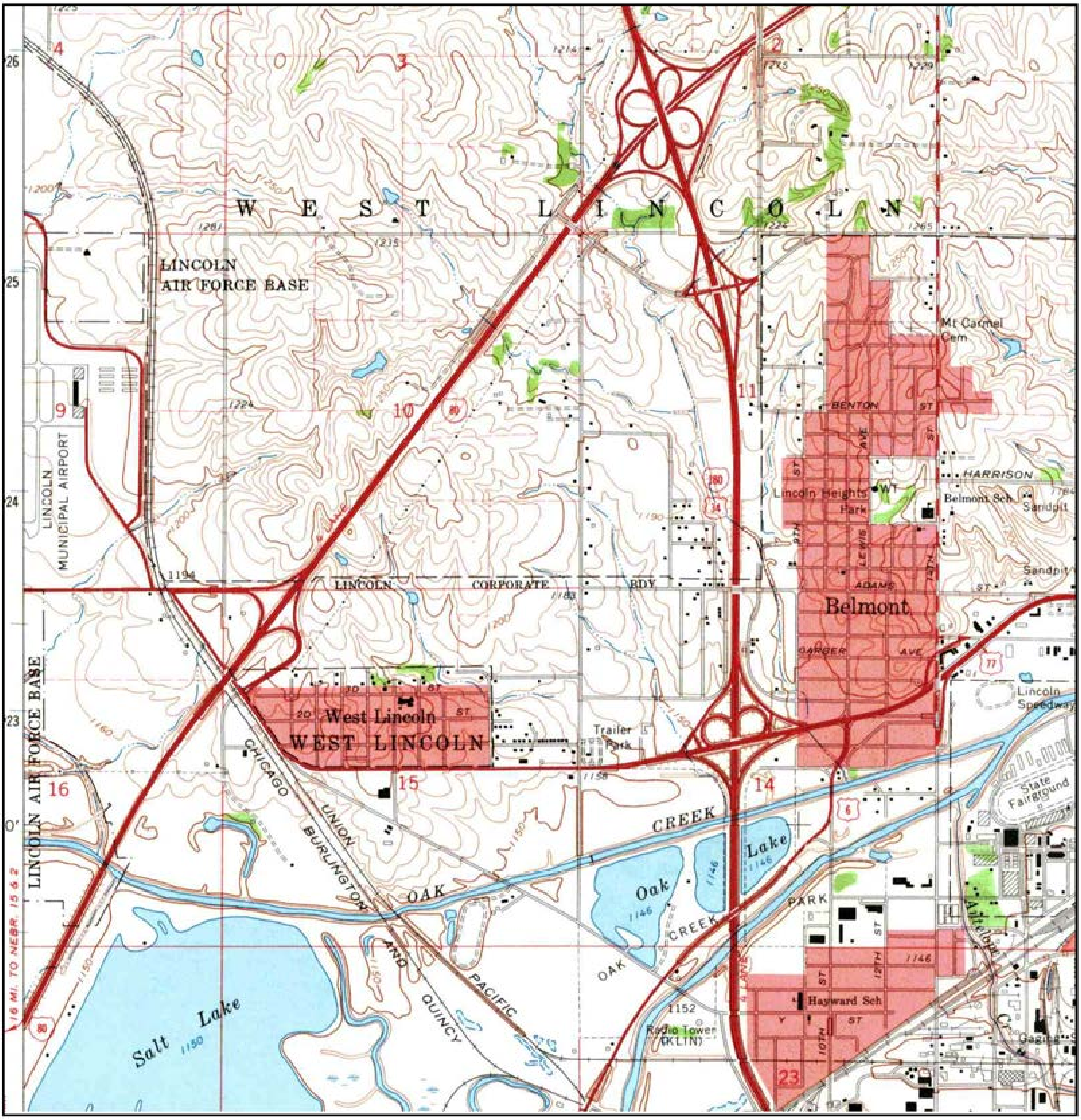
N	TARGET QUAD NAME: EMERALD MAP YEAR: 1964 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Lincoln Air National Guard Base ADDRESS: 2420 West Butler Avenue Lincoln, NE 68524 LAT/LONG: 40.8442 / -96.7564	CLIENT: SAIC CONTACT: John Whelpley INQUIRY#: 3143112.4 RESEARCH DATE: 08/08/2011

Historical Topographic Map



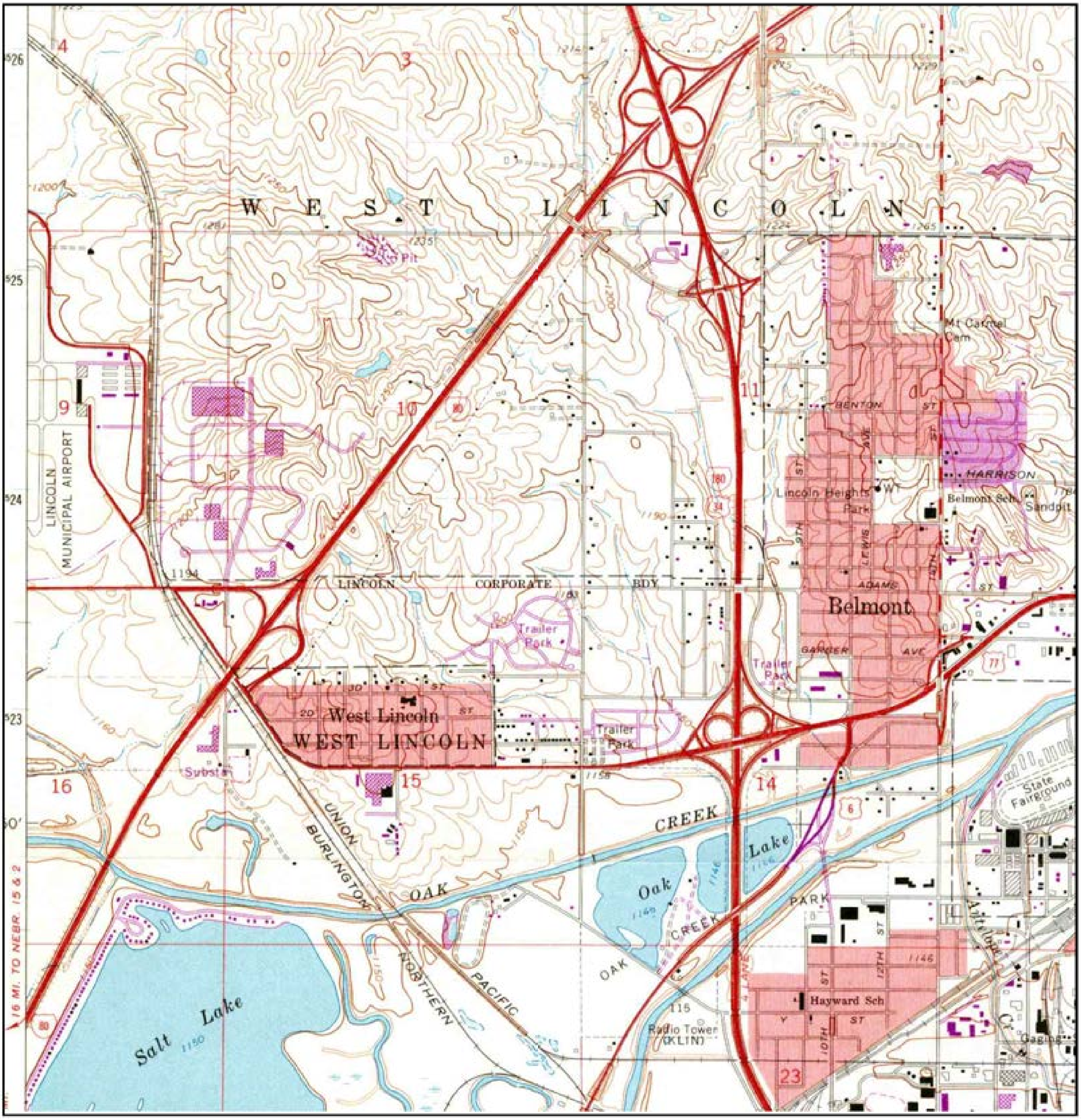
N ↑	TARGET QUAD NAME: EMERALD MAP YEAR: 1972 PHOTOREVISED:1964 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Lincoln Air National Guard Base ADDRESS: 2420 West Butler Avenue Lincoln, NE 68524 LAT/LONG: 40.8442 / -96.7564	CLIENT: SAIC CONTACT: John Whelpley INQUIRY#: 3143112.4 RESEARCH DATE: 08/08/2011

Historical Topographic Map



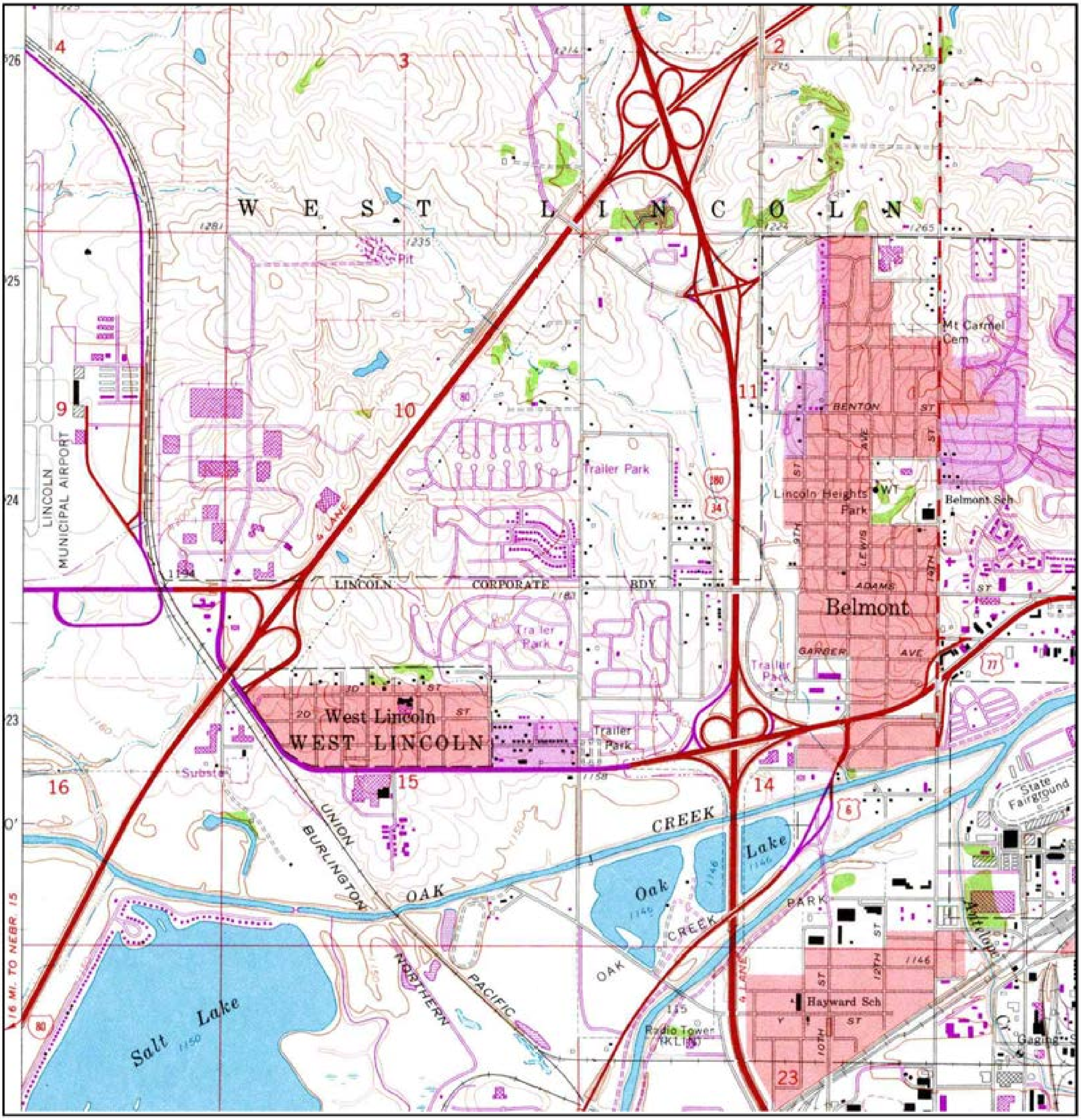
N ↑	ADJOINING QUAD NAME: LINCOLN MAP YEAR: 1964 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Lincoln Air National Guard Base ADDRESS: 2420 West Butler Avenue Lincoln, NE 68524 LAT/LONG: 40.8442 / -96.7564	CLIENT: SAIC CONTACT: John Whelpley INQUIRY#: 3143112.4 RESEARCH DATE: 08/08/2011

Historical Topographic Map



N ↑	ADJOINING QUAD NAME: LINCOLN MAP YEAR: 1972 PHOTOREVISED:1964 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Lincoln Air National Guard Base ADDRESS: 2420 West Butler Avenue Lincoln, NE 68524 LAT/LONG: 40.8442 / -96.7564	CLIENT: SAIC CONTACT: John Whelpley INQUIRY#: 3143112.4 RESEARCH DATE: 08/08/2011

Historical Topographic Map



ADJOINING QUAD NAME: LINCOLN MAP YEAR: 1980 PHOTOREVISED: 1964 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Lincoln Air National Guard Base ADDRESS: 2420 West Butler Avenue Lincoln, NE 68524 LAT/LONG: 40.8442 / -96.7564	CLIENT: SAIC CONTACT: John Whelpley INQUIRY#: 3143112.4 RESEARCH DATE: 08/08/2011

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BUILDING 608 AREA (TU015, TU018, AND SA019)

1992 Site Assessment by OpTech_NE ANG at Lincoln

1995 CAR Tank 608-1_NE ANG at Lincoln

1995 CAR Tank 608-4_NE ANG at Lincoln

1885 CAR Tank 608-5_NE ANG at Lincoln

2001 Tier 1 Site Investigation by MW_NE ANG at Lincoln

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SITE ASSESSMENT

LINCOLN AIR NATIONAL GUARD BASE
LINCOLN, NEBRASKA

National Guard Bureau
Contract No. DAHA90-91-C-0003

OPERATIONAL TECHNOLOGIES
CORPORATION
4100 N.W. Loop 410, Suite 230
San Antonio, Texas 78229-4253
Telephone: (512) 731-0000

March 1992

SITE ASSESSMENT

IN SUPPORT OF THE

155TH TACTICAL RECONNAISSANCE GROUP
NEBRASKA AIR NATIONAL GUARD
LINCOLN AIR NATIONAL GUARD BASE
LINCOLN, NEBRASKA

ENVIRONMENTAL SERVICES DIVISION

OPERATIONAL TECHNOLOGIES CORPORATION

4100 N.W. LOOP 410, SUITE 230

SAN ANTONIO, TEXAS 78229

MARCH 1992

SUBMITTED FOR OPTECH BY:

JOHN MORRIS, GEOLOGIST
PROJECT MANAGER

APPROVED FOR SUBMISSION BY:

CB Harrah

C.B. HARRAH, Ph.D., P.E., CIH
PROGRAM DIRECTOR

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155th Tactical Reconnaissance Group (155 TRG)

Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)

Bio-Environmental Engineering Services (BEES)

Centimeters per second (cm/s)

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Engineering Science Corporation (ES)

Farenheit (F)

Feet per foot (ft/ft)

Feet per year (ft/yr)

Field Inspection (FI)

Installation Restoration Program (IRP)

Lincoln Air National Guard Base (LANGB)

Maximum Contaminant Limit (MCL)

Microgram per Liter (ug/L)

Micromhos per centimeter (umhos/cm)

Milligram per Liter (mg/L)

Nebraska Department of Environmental Control (NDEC)

Operational Technologies Corporation (OpTech)

Parts per million (ppm)

Photoionization detector (PID)

Preliminary Assessment (PA)

Remedial Action (RA)

Remedial Design (RD)

Remedial Action Class (RAC)

Remedial Investigation/Feasibility Study (RI/FS)

Site Inspection (SI)

Specific conductance (SC)

Total Petroleum Hydrocarbons (TPH)

Total Recoverable Petroleum Hydrocarbons (TRPH)

United States Environmental Protection Agency (USEPA or EPA)

United States Air Force (USAF)

EXECUTIVE SUMMARY

The assessment at the 155th TRG, LANGB, Lincoln, Nebraska, was conducted to determine if contamination of ground water was likely or had occurred at Site 2. Sources of potential contamination, a waste JP-4 tank and an oil/water separator, were removed from Site 2 during 1991 in preparation of construction of a new sanitary sewer line at the site. This assessment was designed to provide information to satisfy the NDEC Procedures for Determining Needed Action for Point Source Ground Water Pollution Occurrences Part 2, Steps 6 and 7 requirements.

Soil contamination at the depths near and below the water table was detected at Site 2. PID readings greater than background were detected in soil test borings BH-1 and BH-2, and monitoring wells MW-1 and MW-2. The soil sample collected from test boring BH-2 at a depth of 15 to 15.5 feet below land surface had total BTEX of 186 mg/kg. 1,2, 1,3, and 1,4 dichlorobenzenes were also detected in BH-2 at a depth of 15.0 to 15.5 feet below land surface at concentrations of 16, 9.5, and 11 mg/kg. respectively. Toluene, ethyl benzene, xylenes, 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene were detected in soil test boring BH-4 in the sample collected at a depth of 10.5 to 11.0 feet below land surface at concentrations marginally above the analytical method detection limit. Benzene was also detected at concentrations marginally above the analytical method detection limit at depths of 10.0 to 10.5 and 15.0 and 15.5 feet below land surface in the soil samples collected from monitoring well MW-5. TRPH was not detected in the soil samples analyzed. The state of Nebraska has not set MCL's for soil.

Toluene, xylene, and 1,3 and 1,4 dichlorobenzenes were detected in ground water samples at concentrations only marginally greater than the analytical method detection levels of 2 ug/L and USEPA MCL's were not exceeded. All analytical parameters detected were significantly below the USEPA MCL's. Toluene was detected in monitoring well MW-5 at a concentration of 2.1 ug/L. Xylenes were detected in samples collected from monitoring wells MW-1, MW-2 and MW-4 at concentrations of 3.6, 3.7 and 2.6 ug/L, respectively. 1,3 and 1,4 dichlorobenzenes were detected in a sample collected from MW-2 at concentrations of 2.5 and 5.9 ug/L, respectively. Free phase hydrocarbons were not detected at the LANGB.

Assessment results indicate that contaminates detected at Site 2 in soil and ground water are confined to the area of the former waste JP-5 tank. The upgradient boundary, northwest of the former location of the waste JP-4 tank, is in the immediate area of the MW-1. The downgradient extent, to the south-southeast, has not been specifically determined, but due to the extremely low contaminant concentrations detected, is located in the area immediately south and southeast of monitoring well MW-4, and north and northeast of MW-7. It is possible contaminants migrated into the Old Oak Creek Channel due to the elevation of the creek being lower than the elevation of ground water at the site.

Remediation as a result of removal of the two potential sources, and installation of the sanitary sewer line has significantly reduced the potential threat to ground water at Site 2. Approximately 350 cubic yards of soil were removed and stockpiled, and ground water (estimated to range from 250,000 to 750,000 gallons) was removed from the shallow aquifer.

According to the NDEC, Site 2 has been identified as RAC-2. Occurrences of point source contamination that involve ground water not now directly used as drinking water, but that have a reasonable potential to be used in the future, are identified as RAC-2. At RAC-2 sites, cleanup of readily removable contaminants (e.g., free product) is required. Due to the limited areal extent of soil contamination detected, the location of contamination in low permeability soil, the presence of a concrete surface cap over the majority of the area contaminated, and minimal contamination of ground water, additional soil and ground water remediation is not recommended at Site 2. If additional cleanup is not required by the NDEC, ground water should be monitored.

A potential threat to ground water exists at Site ~~2~~ 10. Based on this potential threat, it is recommended that: the waste JP-4 and oil/water excavations be backfilled and compacted to limit surface water infiltration to the aquifer; stockpiled soil be characterized for disposal and be removed to prevent potential soil and ground water contaminant migration; and periodic ground water monitoring be conducted to determine if contaminants are deadsorbing from soil to ground water.

SITE ASSESSMENT

1.1 PURPOSE AND SCOPE

The assessment was conducted at the 155th TRG, LANGB, Lincoln, Nebraska, by OpTech. The primary purpose of the assessment was to determine if contamination of ground water was likely or had occurred at Site 2. This assessment was conducted to provide information to satisfy the NDEC Procedures for Determining Needed Action for Point Source Ground Water Pollution Occurrences, Part 2, Steps 6 and 7 requirements at Site 2.

The results of the assessment determined the approximate horizontal and vertical extent of migration of hydrocarbon contaminants. Regional and local soil, hydrologic, contaminant and site characteristics, and water and soil quality and use were evaluated to determine the extent of ground water contamination and remedial actions necessary at Site 2. The assessment was conducted in accordance with NDEC Title 118 Ground Water Remedial Action Protocol and Procedures for Determining Needed Action for Point Source Ground Water Pollution Occurrences (Title 118).

The waste JP-4 tank and oil/water separator were previously investigated as Site 2 of a FI conducted as part of an IRP. Portions of that inspection are included or referenced in this report.

This report is organized into one volume. The text is organized into five sections including the Executive Summary and Introduction as Section 1. Section 2 describes the environmental setting of the LANGB, including regional and local soil, hydrologic, contaminant and site characteristics, and background water and soil quality and use. Section 3 describes the investigative program consisting of the installation of soil test borings and ground water monitoring wells, and the collection of soil and ground water samples for field screening and laboratory analysis. Assessment findings are presented in Section 4. Recommendations and conclusions are presented in Section 5. Appendix A includes well construction data and boring logs. Appendix B includes quality control data and Appendix C includes all analytical results. A reference section follows the text.

1.2 NEBRASKA DEPARTMENT OF ENVIRONMENTAL CONTROL PROCEDURES

The NDEC is the state agency regulating Procedures for Determining Needed Action for Point Source Ground Water Pollution Occurrences. These procedures, as defined in Title 118, are a two-part, eleven-step process used to determine the assessment and remediation requirements of a potential release from a point source.

Part One, Steps 1 through 4, is for immediate action based on the following two factors:

1. Existence or likelihood of an imminent and substantial threat to the public health and welfare or the environment.

2. Significantly increasing difficulty of cleanup if action is delayed.

During removal of the waste JP-4 tank and oil/water separator, the NDEC determined that immediate action was not required at Site 2. Representatives of the NDEC inspected the site during removal operations to determine the status of the site conditions.

Part Two, including Steps 5 through 11, is to evaluate the possible treat of contamination to ground water and to design and conduct final remedial action. The following is a summary of Steps 5 through 11.

Step 5-Preliminary Assessment

A preliminary assessment to evaluate the possible treat of contamination to ground water. This assessment is to involve a review of existing information and require the collection of minimal or no field data. If ground water contamination is possible or likely, proceed to Step 6.

Step 6-Initial Site Assessment

This may involve test holes to determine if contaminants have reached ground water or, if not, how close they are. If this initial assessment reveals that there is no threat of ground water contamination, proceed to Step 11; otherwise proceed to Step 7.

Step 7-Detailed Site Assessment

A detailed site assessment will be performed through examination of all pertinent factors.

Step 8-Define Preliminary Cleanup Levels and Review Proposed Remedial Actions

A RAC is defined for pollution occurrences in three types (RAC-1, RAC-2 and RAC-3) of ground water (or overlying soils) depending on the degree (or potential) of use of the ground water as drinking water. The extent of remedial action will differ depending on the RAC of the contaminated (or likely to be contaminated) ground water.

Step 9-Implementation and Review of Remedial Action

Step 10-Final Review

Step 11-Situation of No Threat to Ground Water Quality

The preliminary assessment determining the potential threat of contamination to ground water (Step 5) was conducted during removal of the waste JP-4 tank and the oil/water separator. Soil contamination at depths near the water table and a hydrocarbon sheen on water were documented. Soil contamination was detected by LANGB BEES personnel. According to a verbal communication with Rosemary J. Fenton, Ground Water Geologist with the NDEC, she visually detected a hydrocarbon sheen on water in the waste JP-4 tank excavation.

OpTech's assessment was designed to provide information to satisfy the NDEC Part 2, Steps 6 and 7 requirements. The results of the assessment will aid in determining the extent of remedial action necessary at Site 2 in accordance with the NDEC.

According to the NDEC, Site 2 has been identified as RAC-2. Occurrences of point source contamination that involve ground water not now directly used as drinking water but that have a reasonable potential to be used in the future are identified as RAC-2. The potential for use exists if the ground water is located in a highly populated area, such as Lincoln, is part of a regional, high-yielding aquifer, or if otherwise justified. The RAC-2 category also includes ground water with prior contamination that may be easily or cost-effectively treated to drinking water quality. In RAC-2, cleanup of readily removable contaminants (e.g., free product) will be required. If additional cleanup is not required, the remaining contaminated ground water will be managed and monitored to prevent any further damage.

1.3 BACKGROUND INFORMATION

The LANGB is located at Lincoln Municipal Airport in Lancaster County in southeastern Nebraska, approximately 3 miles northwest of the City of Lincoln as shown on Figure 1.1. The LANGB encompasses 171 acres of generally level terrain with poorly developed drainage. The base has been actively operated since 1942. Various types of military aircraft have been based and serviced there, with current flying operations involving RF-4C aircraft. Base operations have involved the use and disposal of materials and wastes which are classified as either regulated or hazardous. In 1986, the USAF initiated a series of investigations to determine the environmental compliance status of the LANGB.

1.3.1 Engineering Science Site Investigation

To ensure USAF compliance with environmental regulations, the Department of Defense developed the IRP. The IRP is the basis for response action at Air Force installations under the provisions of the CERCLA. The IRP now consists of six stages which, listed in order of occurrence are; PA, SI, RI/FS, RD, and RA. The PA at the LANGB was initiated during 1986 and 1987. The work plans for the SI, RI/FS and RD/RA were finalized in May, 1989. The SI was completed by ES during November, 1989.

Six sites at the LANGB were investigated by ES as part of the SI as shown on Figure 1.2. A waste JP-4 tank and oil/water separator, located west of Building 608 (Fuel Cell Repair) were identified at Site 2 as potential sources of regulated or hazardous materials. The area comprising Site 2 is shown in Figure 1.3. The assessment findings presented in this OpTech report are specifically for Site 2. In this report the area of assessment comprising the waste JP-4 tank and oil/water separator will be referred to as Site 2. Figure 1.4 is an aerial photograph of Site 2 illustrating significant surface features.

Possible contaminants reported by ES from the waste JP-4 tank and the oil/water separator are motor oils, JP-4 fuel, heavy metals, hydraulic oils, and various solvents. As part of the ES investigation, samples of surface water and sediment were collected from several sites along the Old Oak Creek Channel, and ground water monitoring wells and soil test borings were installed to determine if contaminants were present in soil and ground water samples.

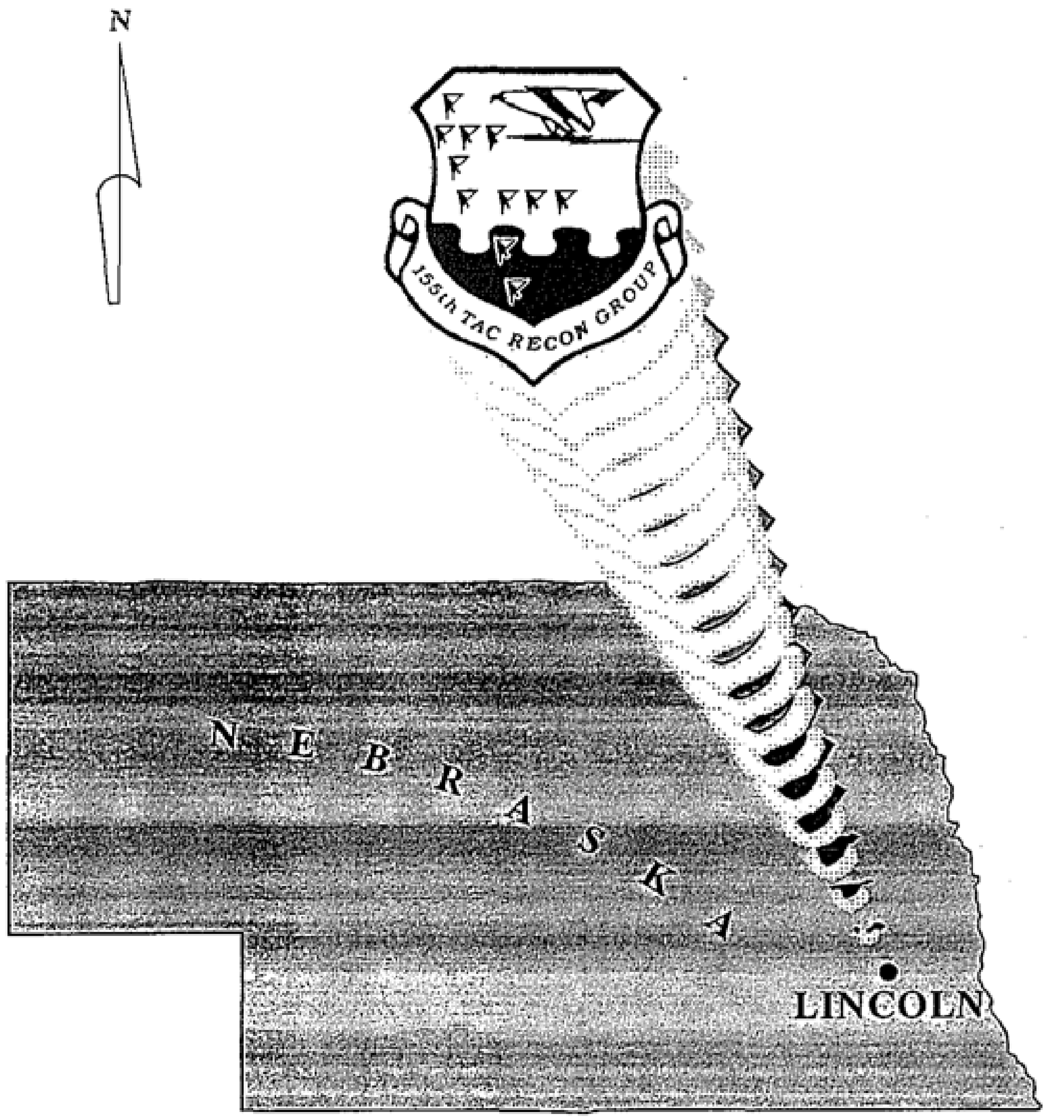


Figure 1.1	**Location of Lincoln, Nebraska Headquarters of the 155th Tactical Reconnaissance Group Lincoln Air National Guard Base**	OPTECH Operational Technologies Corporation

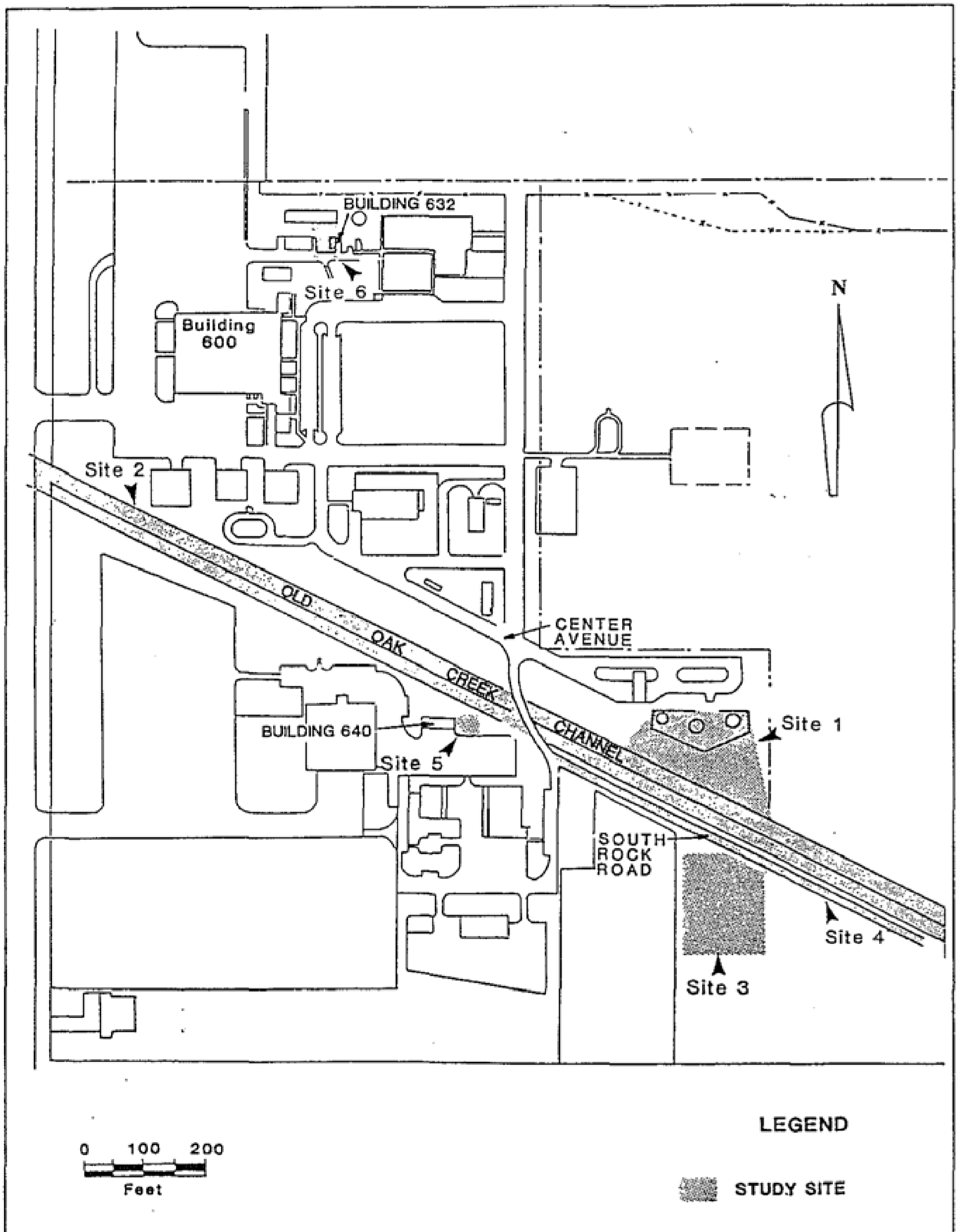
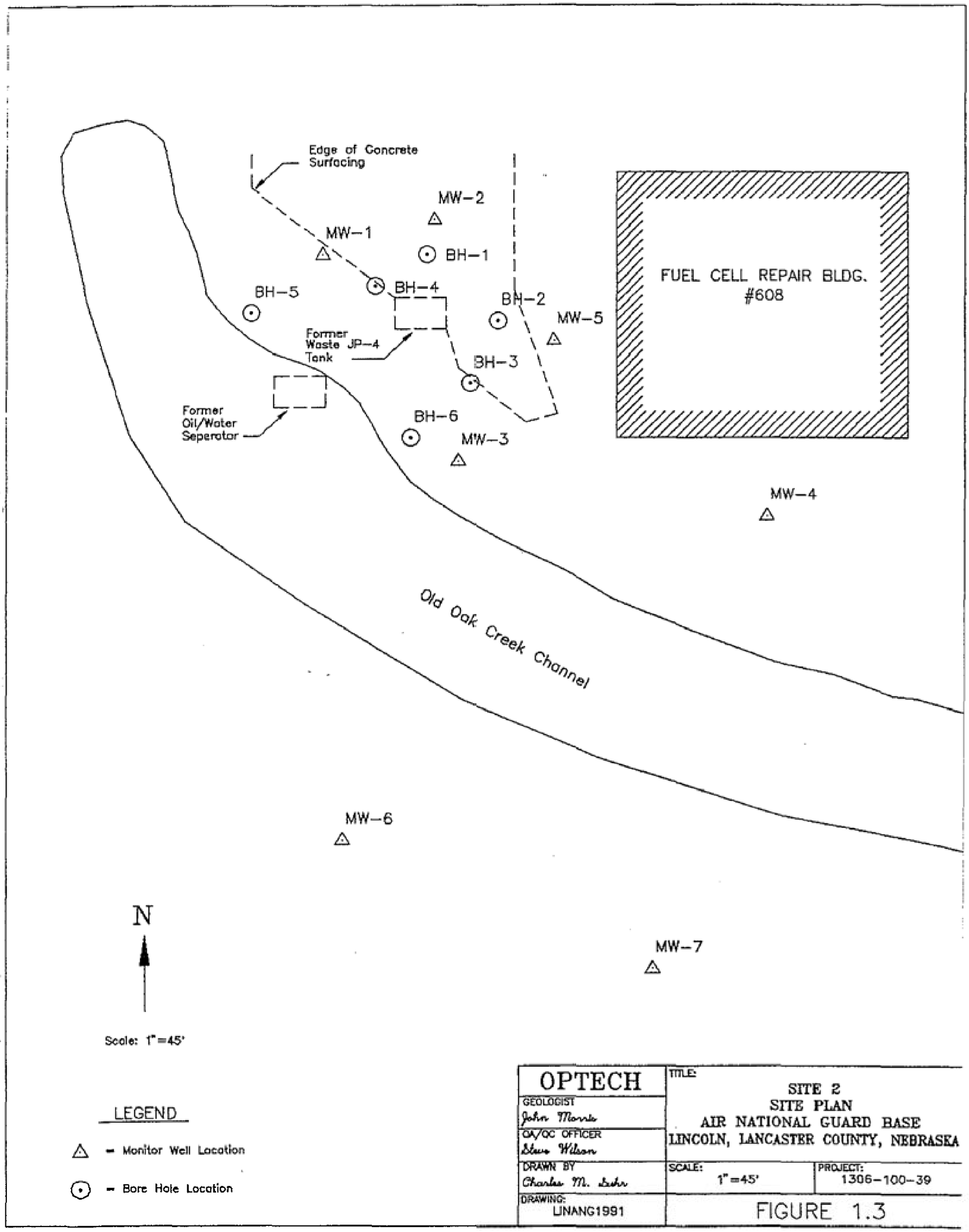


Figure 1.2	Six Sites Investigated By Engineering Science Site Investigation Source: Engineering Science (Modified) 155th Tactical Reconnaissance Group Lincoln Air National Guard Base Lincoln, Nebraska	OPTECH Operational Technologies Corporation


Edge of Concrete Surfacing
MW-2
MW-1
BH-1
BH-4
BH-5
BH-2
MW-5
FUEL CELL REPAIR BLDG. #608
Former Waste JP-4 Tank
BH-3
Former Oil/Water Seperator
BH-6
MW-3
MW-4
Old Oak Creek Channel
MW-6
N
MW-7
Scale: 1"=45'
LEGEND
- Monitor Well Location
- Bore Hole Location
OPTECH
GEOLOGIST
John Morris
QA/QC OFFICER
Steve Wilson
DRAWN BY
Charles M. Lehr
DRAWING:
LINANG1991
TITLE:
SITE 2
SITE PLAN
AIR NATIONAL GUARD BASE
LINCOLN, LANCASTER COUNTY, NEBRASKA
SCALE:
1"=45'
PROJECT:
1306-100-39
FIGURE 1.3

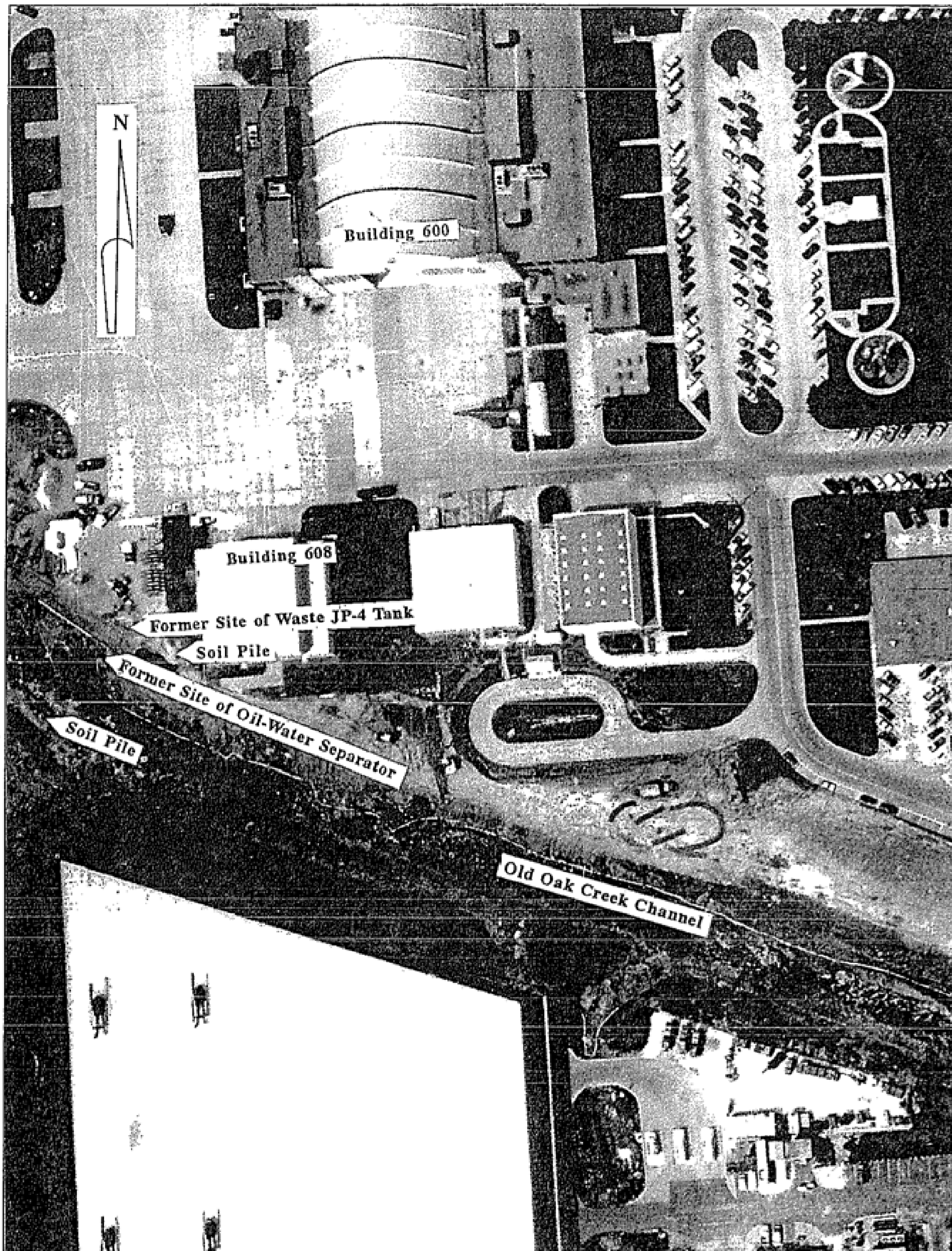


Figure 1.4	Lincoln Air National Guard Base Aerial Photograph Indicating Significant Site Features Source: 155th Tactical Reconnaissance Group, LANGB, Lincoln, NE	OPTECH Operational Technologies Corporation

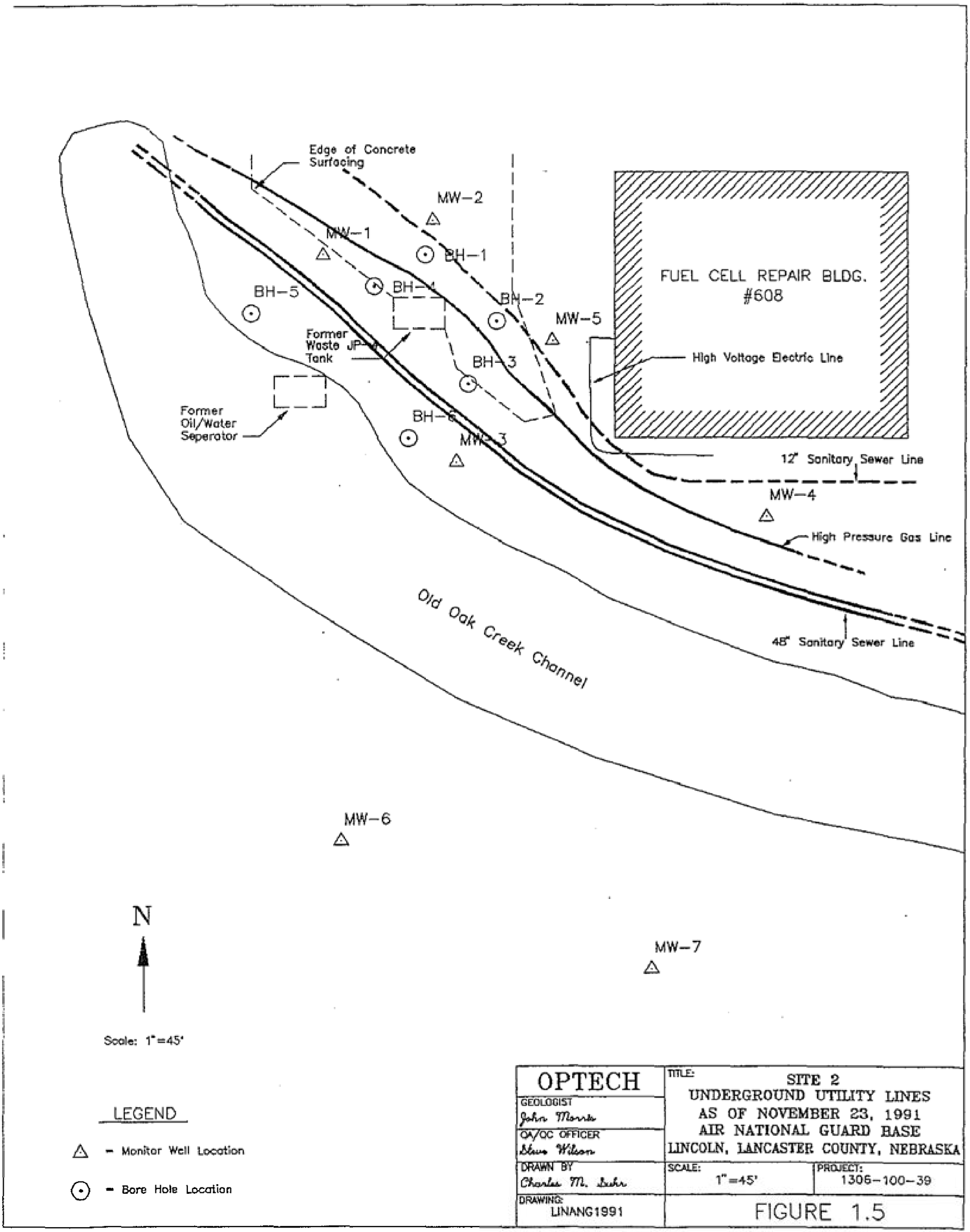
The results of the ES sampling program indicated that volatile and semivolatile organic compounds were not detected in water samples collected from Old Oak Creek Channel. TPH were not detected in the immediate area of Site 2 but were detected at levels slightly above the detection limit of 1.0 mg/L in two samples collected downstream from Site 2. TPH was detected in sediment samples collected from the Old Oak Creek Channel slightly downstream from the oil/water separator at Site 2. One ground water monitoring well was installed by ES at Site 2 immediately upgradient (northwest) of the oil\water separator. This well was destroyed during installation of the sanitary sewer line discussed in Section 1.3.2. ES reported that volatile and semivolatile organic compounds were not detected, although TPH was detected at a concentration of 1.8 mg/L from ground water collected from the monitoring well.

1.3.2 Construction Activities at Site 2

On 29-30 March 1991, the underground waste JP-4 tank and underground oil/water separator were removed from Site 2. During removal operations, technicians from the BEES conducted on-site monitoring, and soil and ground water sampling. Monitoring with a PID of soil and backfill material removed from the waste JP-4 tank and oil/water separator excavations indicated a release of photoionizable compounds. Photoionizable compounds include most volatile organic compounds commonly present in petroleum hydrocarbons. Soil and ground water samples were submitted for laboratory analysis to the USAF Occupational and Environmental Health Laboratory. Approximately 100 cubic yards of potentially contaminated soil and backfill material were removed and stockpiled on site. This material will be discussed in detail in Sections 3.2.3 and 4.1.4.

Between 9-19 April 1991, an underground 48-inch diameter sanitary sewer was installed in the area of Site 2 at the location identified on Figure 1.5. The sanitary sewer was installed immediately between the former locations of the waste JP-4 tank and oil/water separator and included portions of the excavations of the former waste JP-4 tank and oil/water separator. Technicians from the BEES again conducted on-site monitoring, and soil and ground water sampling during installation of the sanitary sewer. Monitoring with a PID of soil from the excavation trench again indicated a release of photoionizable compounds at Site 2.

During installation of the sanitary sewer at Site 2, a large volume of soil and a significant volume of water was removed. Approximately 250 yards of potentially contaminated soil were excavated during construction and stockpiled west of Old Oak Creek Channel. The estimate of the volume of water removed during construction ranges from 250,000 to 750,000 gallons. Removal of soil and ground water from Site 2 potentially reduced the concentration of contaminants.


Edge of Concrete Surfacing
MW-2
MW-1
BH-1
BH-4
BH-5
BH-2
MW-5
FUEL CELL REPAIR BLDG. #608
Former Waste JP-4 Tank
BH-3
High Voltage Electric Line
Former Oil/Water Seperator
BH-6
MW-3
12" Sanitary Sewer Line
MW-4
High Pressure Gas Line
Old Oak Creek Channel
48" Sanitary Sewer Line
MW-6
N
MW-7
Scale: 1"=45'
LEGEND
Monitor Well Location
Bore Hole Location
OPTECH
GEOLOGIST
John Morris
QA/QC OFFICER
Steve Wilson
DRAWN BY
Charles M. Suhr
DRAWING:
LINANG1991
TITLE:
SITE 2
UNDERGROUND UTILITY LINES
AS OF NOVEMBER 23, 1991
AIR NATIONAL GUARD BASE
LINCOLN, LANCASTER COUNTY, NEBRASKA
SCALE:
1"=45'
PROJECT:
1306-100-39
FIGURE 1.5

2.1 ENVIRONMENTAL SETTING

The regional and site specific environmental setting of the LANGB will be presented under the following subheadings: Physiography, Cultural Geography, Climate, Ecology, Surface Water, Geology and Hydrogeology. Since the primary scope of the assessment is to determine if contamination of ground water is likely or has occurred at Site 2, a through understanding of regional and local soil hydrologic, contaminant and site characteristics, and background water and soil quality and use is necessary and will be discussed in this section.

2.1.1 Physiography

The LANGB is located in Lancaster County, Nebraska, near the eastern edge of the Great Plains physiographic province. The terrain throughout the county varies moderately from gently sloping to strongly sloping. Regional slope is to the east. The highest elevations (approximately 1,520 feet above sea level) are located in the northwest and southwest corners of the county. The lowest elevation is located in the northeastern section where Salt Creek exits the county (Soil Conservation Service, 1980).

The three main physiographic areas found in Lancaster County are uplands, stream terraces and bottom lands (Soil Conservation Service, 1980). The LANGB is located in the broad bottom lands adjacent to Oak Creek at an elevation of 1,160 feet. The area in the immediate area of the LANGB is relatively flat. Figure 2.1 is a topographic map of the LANGB. Elevations of approximately 1300 feet are located in upland area west, southwest and northeast of the LANGB.

2.1.2 Cultural Geography

The primary population center near the base is the City of Lincoln, estimated population of 189,620. A residential area northeast of the LANGB known as the Highlands, houses another 15,000 to 18,000 people as shown on Figure 2.2. Two small towns, Malcolm and Emerald, located northwest and southwest of the LANGB respectively, have populations of less than 500 people (Griffin, 1980). Land uses in the vicinity of the base include industrial, commercial, transportation, residential, agricultural, and recreational activities.

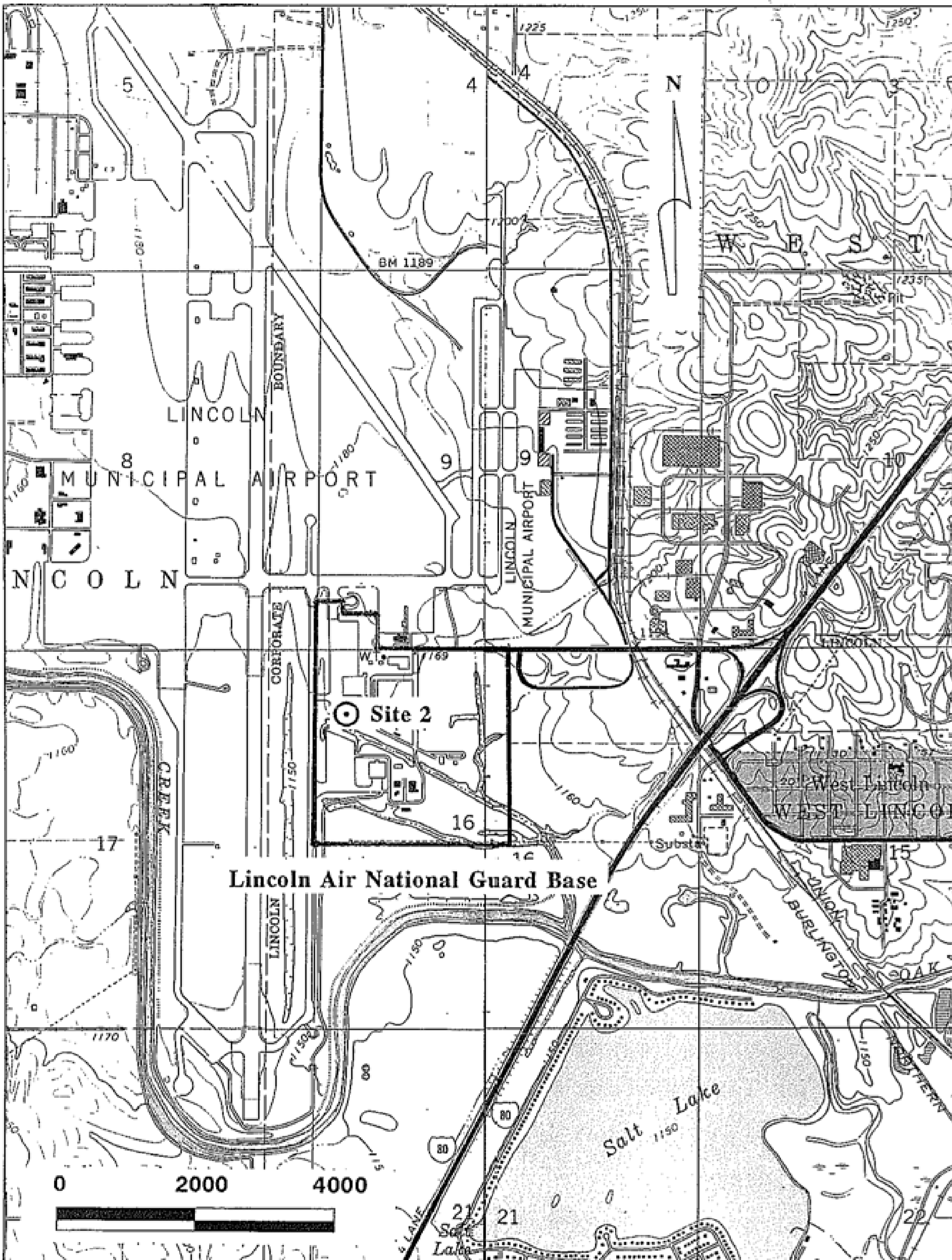


Figure 2.1	**Location of Air National Guard Base At Lincoln Municipal Airport, Lincoln, Nebraska**	OPTECH Operational Technologies Corporation

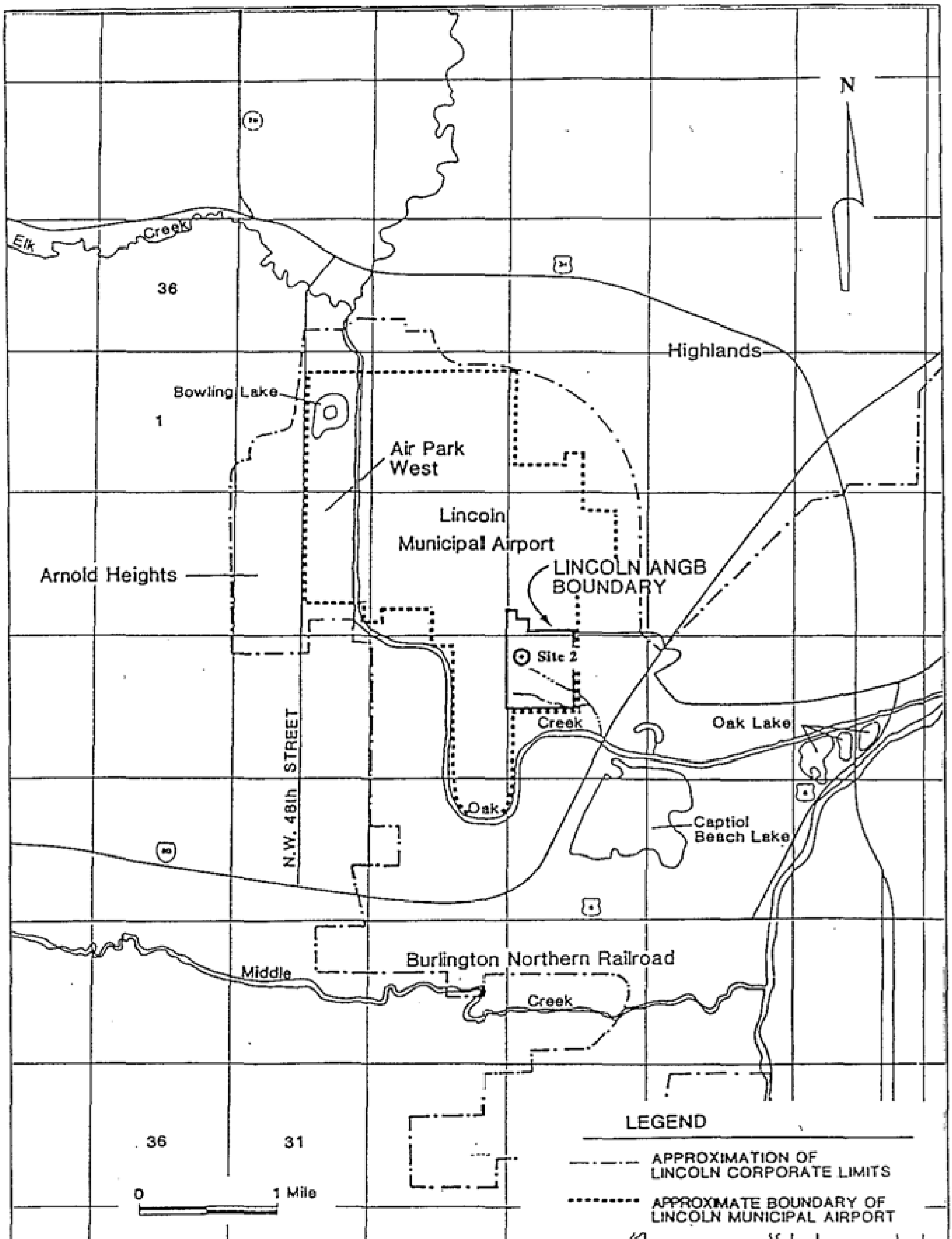


Figure 2.2	**Major Developments in Vicinity of Lincoln Air National Guard Base Lincoln, Nebraska** Source: Engineering Science (Modified)	OPTECH Operational Technologies Corporation

Cultivated lands, used for crops, are located north and northwest of the LANGB. Commercial/industrial activities such as the Air Park West development and the Burlington Northern railroad yards are located west and south, respectfully. Recreational developments offering picnicking and fishing activities are located at several lakes, all located more than one mile from the LANGB. These lakes include Bowling Lake, Capital Beach and Oak Lakes as shown on Figure 2.2.

2.2 CLIMATE

The climate in the area is continental with periods of moderate heat in the summer and cold in the winter. The average summer temperature is 76 degrees F. The highest recorded temperature of 107 degrees F occurred 2 August 1964. The average winter temperature is 27 degrees F. The lowest temperature on record at Lincoln is -18 degrees F occurring on 29 January 1966.

The average annual precipitation is 27.77 inches, with 70 percent of the yearly total occurring from April to September. The average annual snowfall is 28 inches, and the greatest snow depth recorded is 21 inches.

2.3 ECOLOGY

2.3.1 Regional Ecology

Habitat types in the vicinity of the LANGB include cropland, tall grass prairie, riparian woodland, wetlands and aquatic habitat. The majority of the area surrounding the LANGB is a former tallgrass prairie habitat type. Crop production and urbanization have replaced most of the native vegetation in the area. There are remnant areas of native tall grass prairie habitat up to 100 acres in area, interspersed with cropland and pasture.

Wildlife common to tall grass prairies includes mice, wolves, rabbits, badgers, foxes, coyotes, deer, pheasant, quail and hawks (Soil Conservation Service, 1980). Riparian woodland habitat occurs in scattered strips along perennial and intermittent streams in the vicinity of the LANGB. Riparian woodlands provide high-quality food, shelter, nesting habitat for a variety of wildlife. Vegetation in this habitat includes eastern cottonwood, willows, elm, green ash, burr oak, redosier dogwood, American plum bromegrass, Kentucky bluegrass, and reed canary grass.

Both freshwater and saltwater wetlands are found in the vicinity of the LANGB as shown on Figure 2.3. The saltwater wetland receives heavier use by migrating shore birds, wading birds, and waterfowl than the freshwater wetland. The areas to the east and west of Capital Beach Lake, south of the LANGB, support a salt marsh of approximately 275 acres that is on the Heritage List of rare and unique habitats. Recently, the Corps of Engineers designated the Old Oak Creek Channel as a protected wetlands.

Permanent aquatic life populations are found in five perennial streams and three permanent lakes in the vicinity of the LANGB. Fish are the primary aquatic life species of concern due to recreational fishing activities. Fish species found in the water bodies include crappie, walleye, channel catfish, common carp, gold eye, bullhead, green sunfish, flathead minnow, red shinner and sand shiner (Tunink, 1989; Bliss and Schainost, 1973).

2.3.2 Site Ecology

The LANGB is located on a former tall grass prairie, but is now approximately 60 percent mowed grass. Two intermittent streams flow southeasterly across the base. Approximately one acre of wetland habitat occurs as narrow bands along these two water courses as shown on Figure 2.3. No threatened, endangered, or special-interest wildlife species are known to occur or rely on the base for critical habitat (Lock, 1989).

2.4 SURFACE WATER

2.4.1 Drainage Basins

The LANGB is located in the Salt Creek drainage area, a tributary to the South Platte River. Five perennial tributary streams of the South Platte River drainage occur within a three mile radius. Oak Creek is a highly channelized stream flowing southward along the west side of the Lincoln Municipal Airport for approximately 1.5 miles, and then flows east to its confluence with Salt Creek, approximately 3 miles east of the base. Salt Creek flows in a northeasterly direction through the LANGB vicinity from Sawyer Snell Park to its confluence with Oak Creek. Antelope Creek flows north to Salt Creek approximately 0.25 miles south of its confluence with Oak Creek, Middle Creek flows east along the Burlington Northern right-of-way to Salt Creek, approximately 2.5 miles southeast of the LANGB, and Elm Creek flows southeast to join Oak Creek near Woodlawn, approximately 2.5 miles northwest of the LANGB.

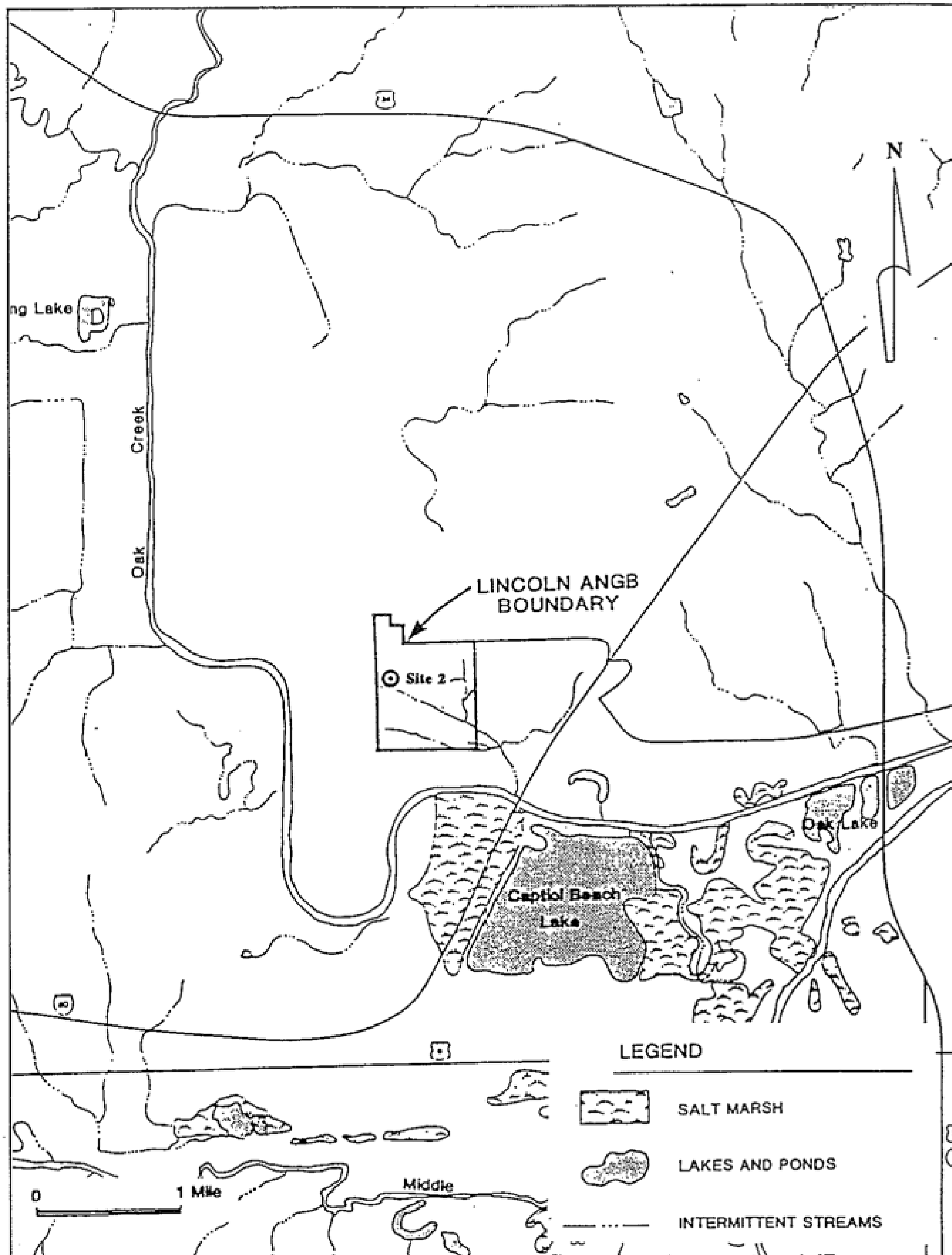


Figure 2.3	Ecological Features of Lincoln Air National Guard Base Lincoln, Nebraska Source: Engineering Sciences (Modified)	OPTECH Operational Technologies Corporation

The major surface water body occurring on the base is Old Oak Creek Channel. During runway construction at the Lincoln Municipal Airport, Oak Creek was rerouted off base, south of the runway as shown on Figure 2.4. The abandoned portion of the channel, now known as Old Oak Creek Channel, is located on the base and contains a semi-stagnant body of water. There are four outfalls to Old Oak Creek Channel from the LANGB. The eastern most is an open concrete channel receiving drainage from the Lincoln Municipal Airport. The western-most outfall is a culvert which drains areas of the Lincoln Municipal Airport. Two other outfalls are connected to the storm sewer system of the base.

2.4.2 Water Quality

Historic water quality is not available for Old Oak Creek Channel. During the SI, ES collected surface water from four sampling stations on Old Oak Creek Channel. The samples were analyzed for volatile and semivolatile organic, TPH, common anions and heavy metals. Volatile and semivolatile organic were not detected in any of the samples. TPH were detected at two sample stations at levels slightly above the detection limit of 1.0 mg/L. TPH were not detected in water samples from the three stations immediately downstream from Building 608.

Concentrations of four common anions were detected at the sampling station adjacent to Building 608. Arsenic and barium were detected at all four sampling stations. Cadmium, chromium, lead and mercury were not detected at any of the stations. Selenium was detected in water samples at three stations. Historical practice at the base was to direct any spills occurring in Building 600 to the outfall adjacent to Building 608 as illustrated on Figure 2.5.

2.4.3 Surface Water Rights

The nearest Surface water appropriations in the vicinity of the base are plotted on Figure 2.6 and listed in Table 2.1. Storage, irrigation, and maintenance of fish and wildlife are included in surface water rights. The only appropriations of surface water downstream of the base are Oak Lake and Capitol Beach Lake.

2.5 GEOLOGY

2.5.1 Regional Geology

Geologic deposits exposed in this region of Nebraska are alluvial, eolian, and glacial deposits of Quaternary age, and sandstone and shale of Cretaceous age. West of Lincoln, alluvial and Pleistocene sands and gravels overlie sandstones and shales of the Lower Cretaceous Dakota Group

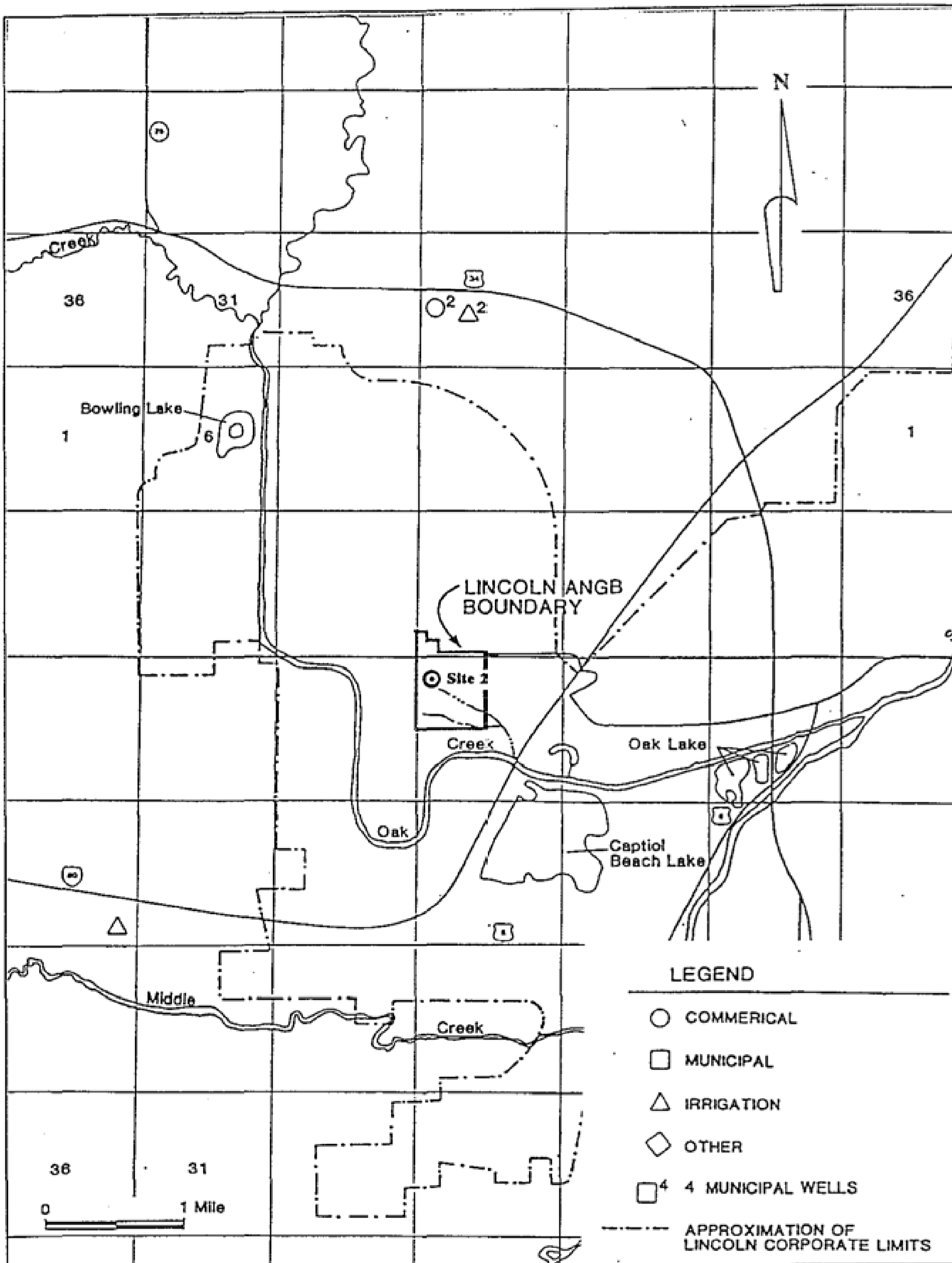


Figure 2.4	**Well Locations in Vicinity of Lincoln Air National Guard Base Lincoln, Nebraska** **Source: Engineering Sciences (Modified)**	OPTECH OPERATIONAL TECHNOLOGIES CORPORATION

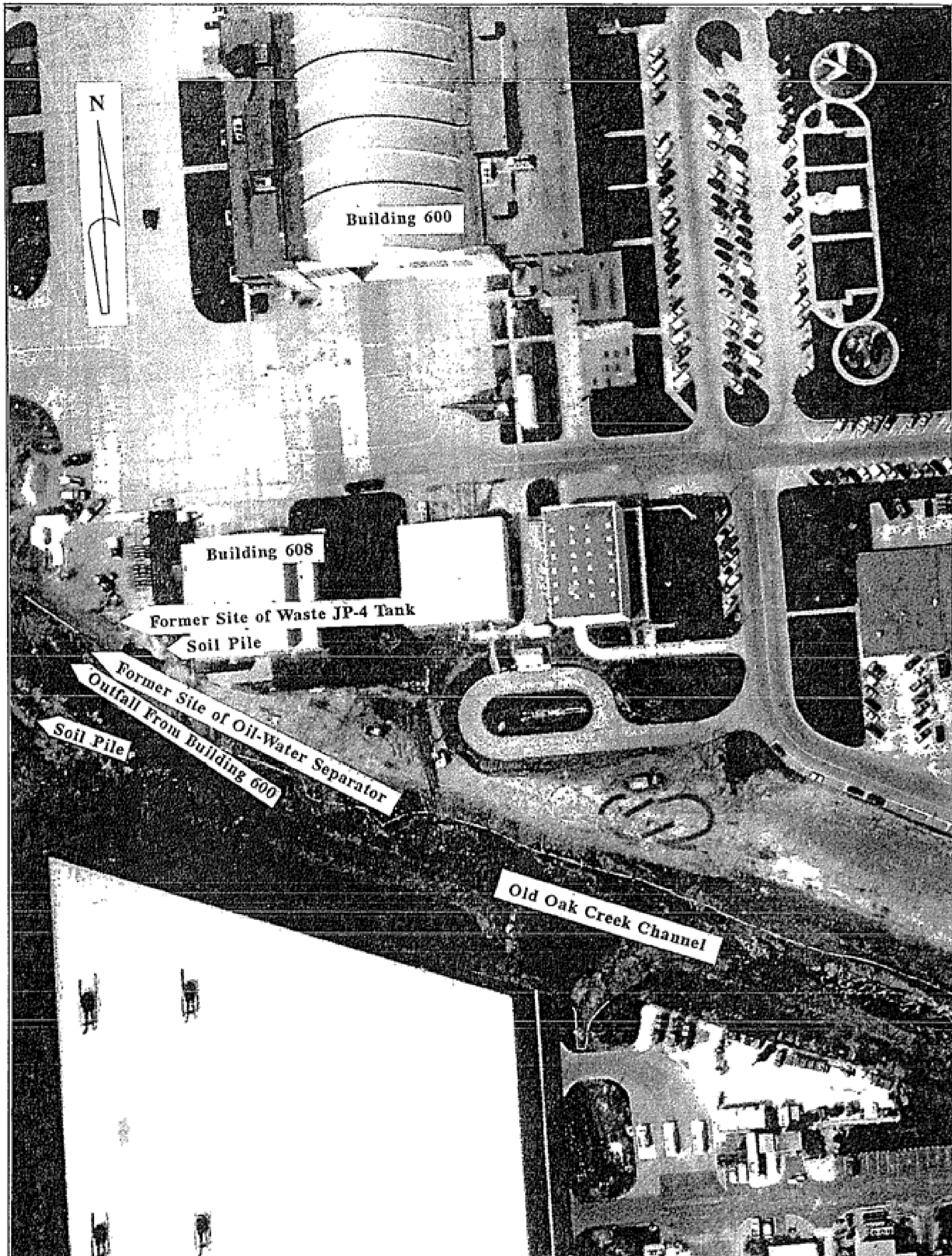


Figure 2.5	**Lincoln Air National Guard Base Aerial Photograph Showing Facility Investigation Sites** 155th Tactical Reconnaissance Group, LANGB, Lincoln, NE	OPTECH Operational Technologies Corporation

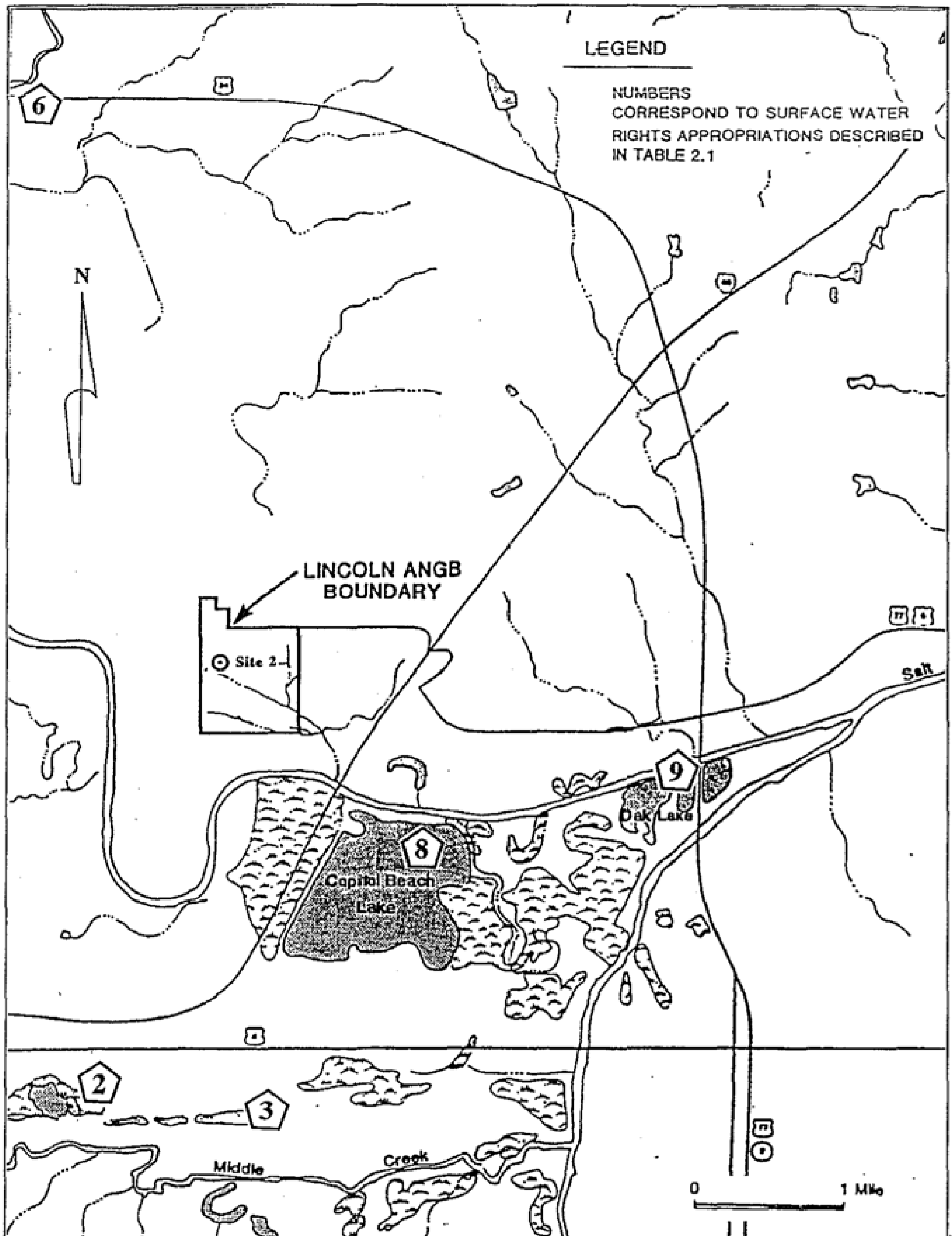


Figure 2.6	**Surface Water Rights in Vicinity of Lincoln Air National Guard Base Lincoln, Nebraska** **Source: Engineering Science (Modified)**	OPTECH Operational Technologies Corporation

TABLE 2.1
SURFACE WATER RIGHTS IN PROJECT VICINITY
LISTED IN DOWNSTREAM ORDER
LINCOLN ANGB

Source Location, and Appropriator	Carrier	Use[a]	Grant[b]	Date of Priority	Docket/ App. Number
1. Middle Creek Sect. 22, T10N, R5E Lancaster County Harrey Deinea	pump	IR	1.56 cfs	4/21/1977	A14915
2. Middle Creek Sect. 29, T10N, R6E Lancaster County Board of Education Lands & funds	pump	IR	0.03 cfs	1/18/1967	A11021
Board of Education Lands & funds	pump	IR	0.4 cfs	1/8/1976	A14541
3. Middle Creek Sect. 28, T10N, R5E Lancaster County Jose Sanchez et al	pump	IR	0.13 cfs	1/17/1938	A2823
4. Antelope Creek Sect. 31, T10N, R7E Lancaster County Michael D. Coon	pump	IR	0.01 cfs	3/29/1976	A14126
5. Oak Creek Sect. 29, T11N, R6E Lancaster County Lillian Carlisle	pump	IR	0.76 cfs	4/3/1969	A11682
6. Oak Creek Sect. 32, T11N, R6E Lancaster County John R. Bennett Trust	pump	IR	5.36 cfs	9/16/1971	A12381
7. Oak Creek Sect. 6, T10N, R6E Lancaster County City of Lincoln	Bowling Lake	ST	176.01 af	4/11/1957	A9442

TABLE 2.1 (Continued)
SURFACE WATER RIGHTS IN PROJECT VICINITY
LISTED IN DOWNSTREAM ORDER
LINCOLN ANGB

Source Location, and Appropriator	Carrier	Use[a]	Grant[b]	Date of Priority	Docket/ App. Number
8. Oak Creek Sect. 15, T10N, R6E Lancaster County Capitol Beach Community Association	Capitol Beach Lake	ST	1430.0 af	6/7/1961	A9944
9. Oak Creek Sect. 14, T10N, R6E Lancaster County City of Lincoln	Oak Lake	ST	222.89 af	9/13/1982	A16147

[a] IR - Irrigation from natural stream.
ST - Storage.
SI - Supplemental irrigation - irrigation from reservoir on lands also covered by Natural Flow Appropriation.
FW - Fish and wildlife.

[b] cfs - cubic feet per second
af - acre-feet.

Source: State of Nebraska, Department of Water Resources, 1987-1988.

(Condra and Reed, 1939). Unconsolidated and poorly-consolidated soil and subsoil, Peoria Loess, alluvial sands, gravels and clays unconformably overlie the Lakota Formation of the Dakota Group. The predominantly sandstone Lakota Formation is the lower most unit within the Dakota Group. The entire section is about 170 feet thick, although erosion has removed the upper portion in many areas. In some areas, the middle member of the Dakota Group, the Fusion Shale, remains between the Quaternary sediments and the Lakota Formation. This shale is a sandy shale, ranging from varicolored in the upper part to gray in the lower.

The Dakota Group overlies rocks of Permian and Pennsylvanian age. These rocks are principally limestone and shales. Basement rocks are Precambrian igneous and metamorphic complexes, presumably granite and gneiss, although little specific information is known about these units because very few wells have been have been drilled to depths sufficent to penetrate these units. Depth to Precambrian rocks has been reported at 1,805 below the surface east of Lincoln and at about 2,193 feet west of Lincoln.

There are no major structural features in Lancaster County, although there are several small anticlines and synclines to the east and southeast. What structure does exist appears to be reflected principally in Pennsylvanian and older rocks. Structural features nearest to Lincoln are the north/south-trending Nehawka-Richfield Arch in Sarph and Cass Counties, and the northeast-trending Redfield Arch in Cass and Otoe Counties.

2.5.2 Facility Geology

The LANGB is underlain by unconsolidated Quaternary deposits overlying the Lakota Formation and Fusion Shale of the Dakota Group. The unconsolidated deposits are characterized by two lithostratigraphic units which consists of approximately 10 to 22 feet of fine-grained eolian silt and clay deposits (Peoria Loess) overlying a unit of well-sorted fluvial sand and gravel over 15 feet thick. The thickest unconsolidated deposits are located in the paleostream channels eroded into the underlying Lakota Formation and Fusion Shale.

2.6 HYDROGEOLOGY

Characteristics of aquifers and aquitards are controlled by the lithology, stratigraphy, and structure of the geologic deposits and formations. Hydrogeologic characteristics of the LANGB are described from both a regional and site-specific perspective.

2.6.1 Regional Hydrogeology

Three Dakota Group formations of hydrogeologic importance in the region are the upper sandstone, a middle fusion shale and a lower sandstone. The upper sandstone generally contains water of good quality, while that of the lower sandstone is generally of poor quality. Keech (1962) reported similar characteristics of groundwater between the Quaternary deposits and the lower sandstone (Lakota Formation), and hydraulic communication between the Lakota Formation and the Quaternary deposits in the area of the Hallam Nuclear Power Facility, located southeast of Lincoln. The water in the area of the Hallam Nuclear Power Facility was found to be highly mineralized. Where present, the Fuson Shale may provide a low-permeability barrier to vertical infiltration between the Quaternary sediments and the Lakota Formation. The Permian and Pennsylvanian limestone and shales are not sufficiently permeable to serve as ground water aquifers (Keech, 1962).

The principal zones of saturation for the area are the unconsolidated sands and gravel below the regional water table. They may be considered a single aquifer because the units are generally interconnected and all may contribute water to a well. Ground water depth generally ranges from 10 to 40 feet below the ground surface, but the saturated thickness may be influenced by the depth of buried valleys eroded into the underlying bedrock surface. Perched zones of saturation may exist in sands and gravels within or between glacial tills or alluvial clays having relatively lower permeabilities.

Major water production for the area has come from alluvium underlying stream terraces and within the larger stream valley bottom lands and some buried alluvial valleys. The sand and gravel alluvium of the lower Salt Creek Valley has produced sufficient water for irrigation. Sand and gravelly-sand within the glacial deposits have produced small quantities of water for domestic and stockwatering purposes. Water quality is generally hard, with sulfate and iron concentration exceeding recommended limits for some uses. Since 1933, the City of Lincoln has been supplied primarily with water from a well field in the Platte River Basin near Ashland, Nebraska (Marivosky, 1991).

Records available from the State of Nebraska Department of Water Resources indicated that there are four irrigation wells and two commercial wells in the area of the LANGB. All of the wells are located upgradient from the base at distances of more than two miles from the base. Seven municipal wells for the City of Lincoln are located between 4.25 and 6.5 miles southeast of the LANGB. The municipal wells range in depth between 158 and 169 feet (Cotton, 1989). Well locations, owners, and distance from the LANGB are listed in Table 2.2 for each of the wells plotted on Figure 2.4.

TABLE 2.2
GROUND WATER WELLS IN THE VICINITY OF LINCOLN ANGB

Location	Use	Owner	Approximate Distance from Base (Miles)
T9N, R6E, Sec. 3, SE¼SW¼ (5 wells)	Other	Lincoln Regional Center	4.5
T9N, R6E, Sec. 4, SE¼SW¼	Irrigation	Adolph Priess	4.5
T9N, R6E, Sec. 8, SE¼NE¼	Irrigation	Adolph Priess	5.0
T9N, R6E, Sec. 4, SW¼SE¼	Irrigation	Robert S. Little	4.5
T9N, R6E, Sec. 12, SE¼NW¼	Commercial	Pegler Sysco Food	5.75
T9N, R7E, Sec. 4, NW¼NW¼	Irrigation	Lloyd Duckett	6.75
T10N, R5E, Sec. 21, SW¼SW¼	Irrigation	Burdette Piening	6.0
T10N, R5E, Sec. 23, NE¼NE¼	Irrigation	Gary Hellerich	3.25
T10N, R5E, Sec. 24, SE¼SE¼	Irrigation	George D. Hellerich	2.5
T10N, R5E, Sec. 28, SW¼NW¼	Irrigation	Adolph Piening	6.0
T10N, R7E, Sec. 9, NE¼NE¼	Municipal	City of Lincoln	6.5
T10N, R7E, Sec. 17, NW¼SE¼ (4 wells)	Municipal	City of Lincoln	5.5
T10N, R7E, Sec. 21, SW¼SW¼ (2 wells)	Irrigation	Bankers Life of Lincoln	5.75
T10N, R7E, Sec. 21, SE¼SW¼	Irrigation	Bankers Life of Lincoln	6.0
T10N, R7E, Sec. 30, NW¼SW¼	Commercial	Paramount Laundry & Cleaners, Inc.	4.5
T10N, R7E, Sec. 30, SW¼SW¼ (2 wells)	Municipal	City of Lincoln	4.5
T11N, R5E, Sec. 21, SE¼NW¼ (2 wells)	Municipal	Village of Malcolm	7.0
T11N, R6E, Sec. 33, NE¼SW¼ (2 wells)	Irrigation	George Cook	2.5
T11N, R6E, Sec. 33, NW¼SW¼ (2 wells)	Commercial	Kawasaki Motors Corporation	2.5

Source: Cotton, 1989. (modified)

2.6.2 Local Hydrogeology

Ground water depth under Site 2 varies from 5.46 to 14.90 feet below ground surface, flows in an southerly direction and exists under semiconfined conditions. The aquifer, which consists of sand, silty sand, and sandy silt of glacial origin, is overlain by relatively low permeability clay and silty clay of eolian origin.

Water levels in the seven existing monitoring wells at Site 2 varied from 1145.98 to 1147.90 feet above mean sea level. The distribution of potentiometric surface contours indicates that the ground water gradient is generally to the south. The presence of buried structures (a high pressure gas line and a sanitary sewer line) near the center of Site 2 may locally modify ground water depths and flow in this area.

The hydraulic conductivity of the silty clay and sand units encountered is estimated to be on the order of 10^{-8} to 10^{-4} cm/s and 10^{-4} to 10^{-2} cm/s, respectively (Freeze and Cherry, 1979). Average values for effective porosity are estimated to be 0.05 for the silty clay and up to .25 for the sand (Johnson, 1967). Based on these values, the average linear velocity of ground water movement beneath the facility in the silty clay may range up to 8 ft/yr. The average linear velocity of ground water movement beneath the facility in the sand may range up to 150 ft/yr.

Water surface elevations in the Old Oak Creek Channel are approximately equal to the estimated potentiometric surface elevations in the vicinity of the creek. Jeager-Porter and Associates Surveying, surveyed the elevation of the creek on 27 January 1992. The elevation of the bottom of the creek was 1144.80. The elevation of ground water in monitoring well MW-3 was 1147.52 on 21 November 1991. The interaction between the creek and groundwater may be seasonably variable.

3.1 FIELD ASSESSMENT PROGRAM

The OpTech assessment was conducted to determine the horizontal and vertical extent of migration of contaminants from a waste JP-4 storage tank and an oil/water separator located near Building 608. The field assessment program to meet this objective included:

- soil test boring and monitoring well installation;
- ground water sampling and analysis; and
- soil sampling and analysis.

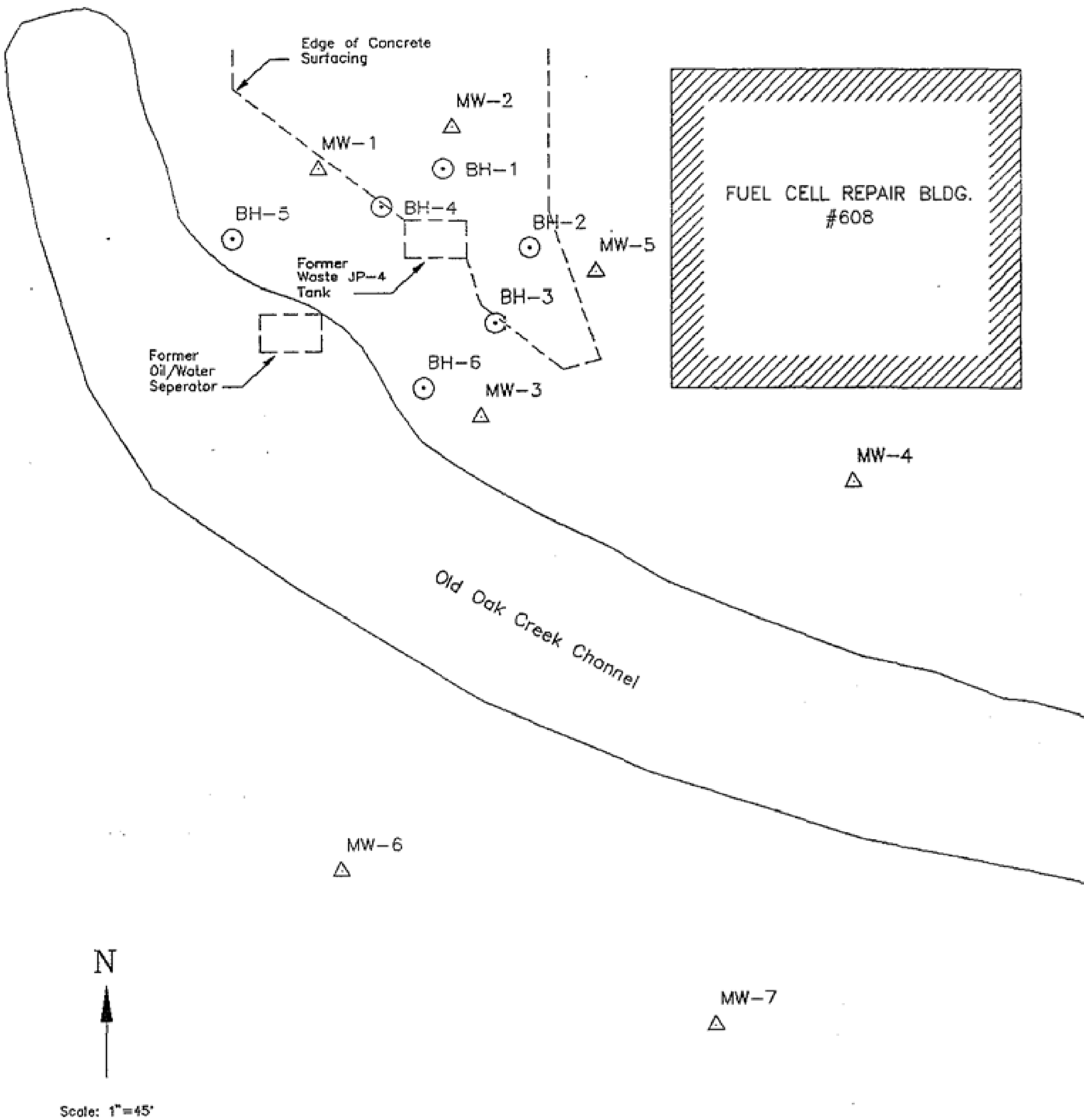
Site-specific field investigation procedures were designed to follow the OpTech Site Assessment Work Plan for all phases of the field and analytical programs. Details of the field assessment methods used and description of the analytical and field quality control programs are discussed in Section 3.2. The Quality Assurance/Quality Control Plan is included in Appendix B.

From 14 to 23 November 1991, the field assessment was conducted. OpTech personnel supervised the assessment, logged soil test borings and ground water monitoring wells, collected subsurface soil and ground water samples, and collected soil samples from soil stockpiles. Layne-Western Corporation, Omaha, Nebraska, a licensed well installation firm in Nebraska, installed the soil test borings and ground water monitoring wells. The location and elevation of the soil test borings and ground water monitoring wells were surveyed by Jeager-Porter and Associates Surveying, Lincoln, Nebraska, a licensed surveying company in Nebraska. Soil and ground water samples were analyzed for BTEX, TRPH and 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene by HWS Technologies, Inc., Lincoln, Nebraska.

3.2 FIELD INVESTIGATION METHODS

3.2.1 Drilling Soil Sampling, and Well Construction Activities

Six soil test borings and seven ground water monitoring wells were installed at Site 2. The soil test borings were backfilled with bentonite chips immediately upon completion of sampling. Locations of the soil test borings and ground water monitoring wells are shown on Figure 3.1.



LEGEND

△ = Monitor Well Location

⊙ = Bore Hole Location

OPTECH	TITLE: SITE 2 LOCATIONS OF MONITORING WELLS AND SOIL TEST BORINGS AIR NATIONAL GUARD BASE LINCOLN, LANCASTER COUNTY, NEBRASKA
GEOLOGIST John Morris	
QA/QC OFFICER Steve Wilson	
DRAWN BY Charles M. Suhr	SCALE: 1"=45' / PROJECT: 1306-100-39
DRAWING: LINANG1991	FIGURE 3.1

3.2.1.2 ANGRC Policy For The Selection of Soil Samples and Monitoring Well Locations

The ANGRC has a policy that soil samples are to be collected only from soil test borings and ground water monitoring wells are only to be installed in areas where soil contamination is not detected. This ANGRC policy is designed to prevent ground water monitoring wells from being conduits for contaminants. Based on this policy, ground water monitoring wells were not installed where contaminants were detected in soil samples by field screening methods or in areas with a high probability of soil contamination.

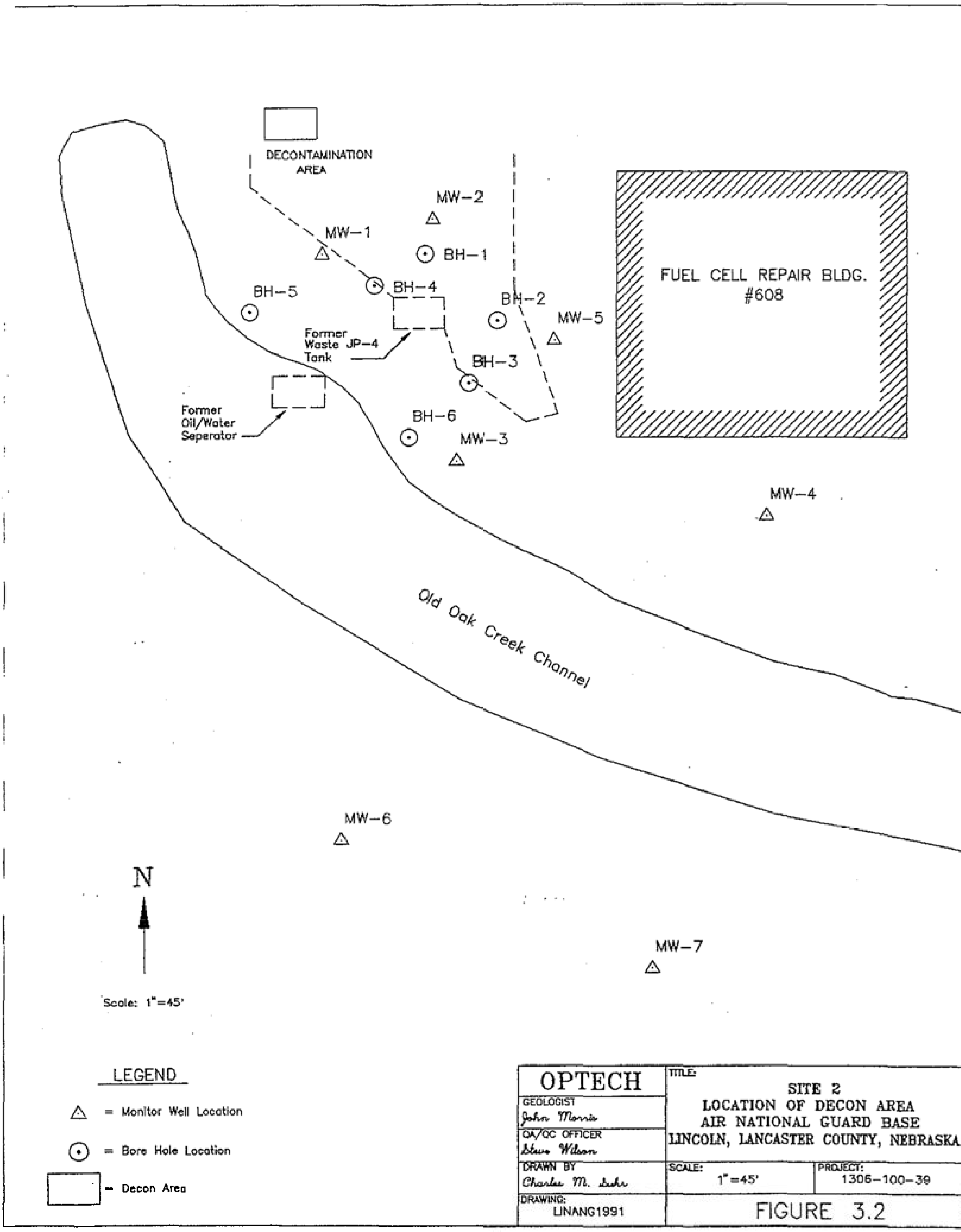
Soil samples were only collected from soil test borings with the exception of two samples collected from monitoring well MW-5. Soil samples were collected from MW-5 to delineate the boundary of contaminants detected in soil test boring BH-2. Monitoring well MW-5 was installed after contaminants were not detected by field screening and the distal location of the monitoring well from potential sources.

3.2.1.3 Drilling Procedures

The six borings, BH-1, BH-2, BH-3, BH-4, BH-5 and BH-6, were drilled with a hollow-stem auger drilling rig on 14, 15, and 16 November 1991. The borings were advanced using a Mobil B-57 drill rig equipped with nominal 6.125-inch external diameter, continuous flight hollow-stem augers to depths between 16.0 and 18.0 feet below land surface.

Two soil samples were collected from borings BH-1 and BH-2 and one soil sample was collected from borings BH-3, BH-4, BH-5 and BH-6. Each boring penetrated approximately five feet into the saturated zone.

All drilling equipment was decontaminated prior to arrival at the site and again prior to initial use at the site, between each borehole, and prior to leaving the site. Decontamination procedures involved thoroughly steam-cleaning the drilling equipment. Decontamination activities were performed at the site decontamination pad located west of Building 608 as shown on Figure 3.2.


DECONTAMINATION AREA
MW-2
MW-1
BH-1
BH-4
BH-5
BH-2
MW-5
FUEL CELL REPAIR BLDG. #608
Former Waste JP-4 Tank
BH-3
Former Oil/Water Seperator
BH-6
MW-3
MW-4
Old Oak Creek Channel
MW-6
N
MW-7
Scale: 1"=45'
LEGEND
= Monitor Well Location
= Bore Hole Location
= Decon Area
OPTECH
GEOLOGIST
John Morris
QA/QC OFFICER
Steve Wilson
DRAWN BY
Charles M. Suhr
DRAWING:
LINANG1991
TITLE:
SITE 2
LOCATION OF DECON AREA
AIR NATIONAL GUARD BASE
LINCOLN, LANCASTER COUNTY, NEBRASKA
SCALE:
1"=45'
PROJECT:
1306-100-39
FIGURE 3.2

3.2.1.4 Soil Sampling Procedures

A log of each boring, noting lithologies encountered and other pertinent information, was prepared by an onsite geologist. A boring log for each soil test boring is included in Appendix A. Soil samples for physical descriptive purposes were collected at each five-foot interval with a split-spoon sampler. The geologic boring log included the following information:

- depth;
- profile;
- Unified Soil Classification System;
- geologic description;
- sample number (if applicable);
- blow counts; and
- photoionization detector measurements and any pertinent comments regarding drilling.

Soil samples from the borings were collected to determine the presence of soil contamination and, if present, to quantify the concentration of specific contaminants. Sampling intervals were dependent on the depth and location of the borehole. A total of thirteen soil samples were collected and analyzed. All soil samples were analyzed for BTEX, TRPH, and 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene.

All soil samples were collected directly in brass liners to avoid loss of volatile constituents. The exposed ends of the liners were covered with aluminum foil and capped with plastic caps taped in place. The soil in the liners was extruded at the laboratory prior to analysis. Each sample was assigned a sample number and pertinent information was recorded in the field book. All soil samples, accompanied by a chain-of-custody form were hand carried in a chilled container to the analytical laboratory on the day of collection.

All equipment used for soil sampling, including the split-spoon sampler were thoroughly decontaminated between each sample collection. The decontamination procedure included a detergent wash, tap water rinse, a second rinse with deionized water, and a final methanol rinse. Sufficient time was allowed following the final rinse to permit complete drying of the equipment.

3.2.1.5 Monitoring Well Construction and Completion

Monitoring wells were constructed of 2-inch-diameter, schedule 40, flush-coupled and threaded PVC casing and screen. The screen slot size was 0.010 inch. All monitoring well materials were decontaminated by steam cleaning before installation in the borehole.

The annular space between the well casing and the borehole was backfilled during removal of the augers and after the well casing was set in the borehole. The well annulus in each well was sandpacked from the bottom of the borehole to two feet above the screen using graded, washed, and bagged Colorado 20-40 silica sand. A minimum 1 to 2 foot-thick bentonite pellet seal was placed over the sand pack. A neat concrete grout was placed above the bentonite seal to the land surface. A construction log is included in Appendix A for each monitoring well.

All monitoring wells were completed approximately 2-1/2 feet above the top of the borehole with the exception of MW-2. A protective steel 4-inch diameter steel riser pipe with a locking cap was set in the neat concrete grout. A three-foot square concrete pad was installed around each riser pipe. All risers were locked with keyed-alike brass locks. The keys were given to the LANGB representative.

Three four-inch diameter steel guard posts filed with cement were placed around the concrete pad and protective steel riser. All guard posts were painted to increase visibility. The bases for the guard posts were set into concrete to a depth sufficient to prevent frost heave.

Monitoring well MW-2 was flush mounted with the concrete surface. The well casing was cut 4 inches below ground surface and capped with a locking cap to prevent tampering and infiltration of surface water. A protective lid was cemented in place around the casing top. The protective lid is comprised of a cast-iron valve-box assembly centered in a 1-foot square concrete pad.

The monitoring wells were developed by removing approximately twenty to forty well volumes using a Grunfos Rediflow 2 pump and PVC bailers. The temperature, pH, and specific conductance of the development water were monitored and recorded during development. These parameters stabilized within 10 percent before completion of development. The water removed during development was retained in labeled and sealed 55-gallon drums. Prior to development, water levels in each well were measured using an electric water-level indicator accurate to 0.01 feet. All equipment used for well development was decontaminated prior to and after each well in accordance with standard site procedures.

3.2.1.6 Surveying

All monitoring wells and soil test borings were surveyed to defined their locations and elevation for future reference. They were located within ±1.0 foot horizontally and ± 0.01 foot vertically. The surveying was performed by Jaeger-Porter and Associates of Lincoln, Nebraska, a registered land surveyor.

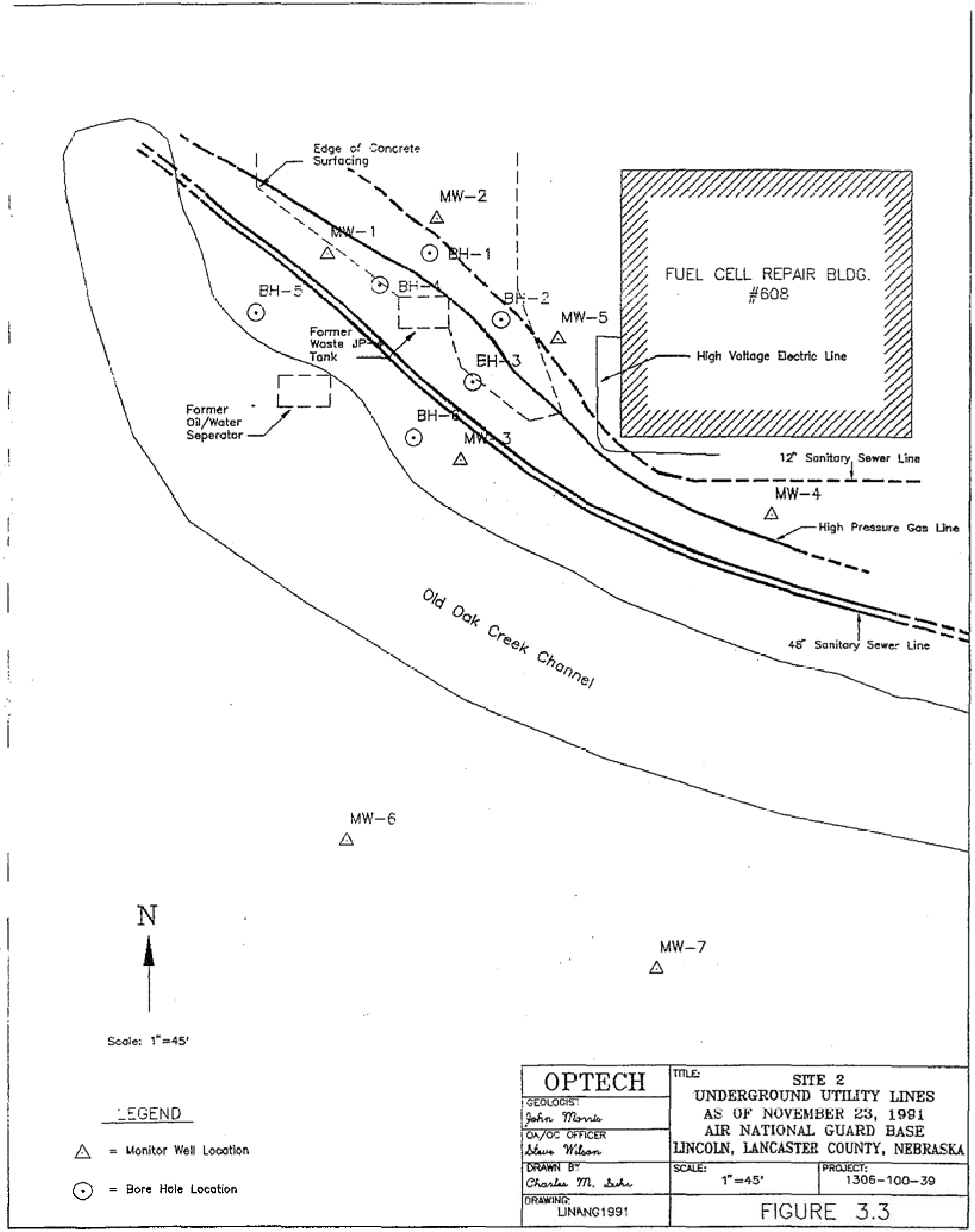
3.2.2 Ground Water Field Measurements and Sampling

Ground water samples were collected from each well following development and stabilizing for two days. Prior to sampling each well a minimum of three well volumes was purged. A total of seven samples of ground water were collected, along with one duplicate, one field blank, and one rinseate blank. Additionally, a laboratory-prepared trip blank was included for analysis. Each sample was analyzed for BTEX, TRPH and 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene. A detailed description of the analyses performed is included in Section 3.3.

Field measurements taken at the time of sample collection included temperature, pH, and SC. An electronic thermometer calibrated in degrees Celsius to the nearest 0.1° was used to record temperature. The water temperature measurements were used to calibrate the pH meter before testing and to determine the correction factor applied to the conductivity meter readings. The pH of the water was measured with a portable pH meter during sampling. The meter was calibrated during sampling using two buffer solutions, pH 4 and pH 7. The SC of the water was measured with a portable SC meter. Each reading was corrected for temperature. A standard potassium chloride solution having a SC of 1,000 umhos/cm was measured during sampling to detect variabilities in instrument readings. A record of each ground water sample was made in a bound, sequentially paginated field book. Samples delivered to the analytical laboratory were recorded on a chain-of-custody form.

3.2.3 Soil Stockpile Sampling

Soil samples were collected from three soil stockpiles. This material was excavated during removal of the waste JP-4 tank and oil/water separator, and installation of the sanitary sewer line indicated on Figure 3.3. The purpose of obtaining these samples was to aid in determining if the material was contaminated. A total of five composite samples, SP-1, SP-2, SP-3, SP-4 and SP-5, were analyzed for BTEX, TRPH and 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene.



Edge of Concrete Surfacing
MW-2
MW-1
BH-1
BH-4
BH-5
BH-2
MW-5
FUEL CELL REPAIR BLDG. #608
High Voltage Electric Line
Former Waste JP
Tank
BH-3
Former Oil/Water Seperator
BH-6
MW-3
12" Sanitary Sewer Line
MW-4
High Pressure Gas Line
Old Oak Creek Channel
48" Sanitary Sewer Line
MW-6
N
MW-7
Scale: 1"=45'
LEGEND
= Monitor Well Location
= Bore Hole Location
OPTECH
GEOLOGIST
John Morris
QA/QC OFFICER
Steve Wilson
DRAWN BY
Charles M. Sehr
DRAWING:
LINANG1991
TITLE:
SITE 2
UNDERGROUND UTILITY LINES
AS OF NOVEMBER 23, 1991
AIR NATIONAL GUARD BASE
LINCOLN, LANCASTER COUNTY, NEBRASKA
SCALE:
1"=45'
PROJECT:
1306-100-39
FIGURE 3.3

The samples were collected using a decontaminated stainless steel scoop. Samples were collected from a total of fourteen locations as shown on Figure 3.4. Soil samples for volatile organics analysis were transferred directly from the sampling scoop to the sample container to minimize the loss of volatile compounds. A record of the sampling of the stockpiled soil piles was made in a bound, sequentially paginated field book. Each sample was recorded on the chain-of-custody form prior to relinquishing it to the analytical laboratory.

3.3 ANALYTICAL PROGRAM

3.3.1 Detection Limits

Detection limits for each parameter and corresponding analytical method are shown in Table 3.1. The detection limit for TRPH varies due to dilution of the samples. Specific chemical parameters for the sampling programs discussed above were selected based on contaminants suspected to have been possibly released from the former waste JP-4 tank and oil/water separator. The analytical program involved analyzing samples by the methods specified in Table 3.1.

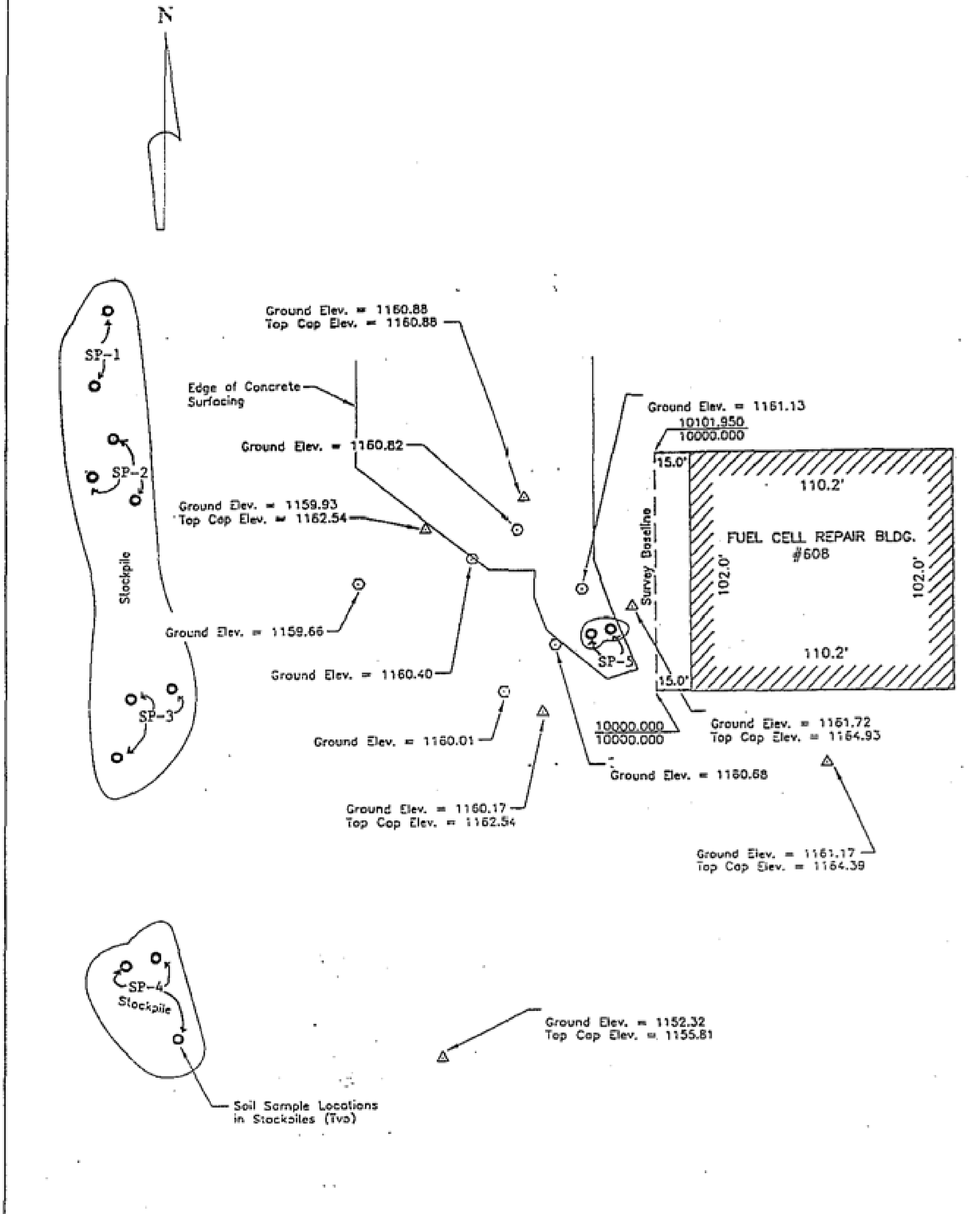


Figure 3.4 | **Location of Soil Stockpile Samples**
Lincoln Air National Guard Base
Lincoln, Nebraska
Source: Jaeger Porter & Associates, Inc.

OPTECH
Operational Technologies Corporation

		ANALYSIS METHOD			
SITE	ANALYTES	SOIL	DETECTION LIMITS (mg/kg)[a]	WATER	DETECTION LIMITS (μg/L)[b]
Site 2	Volatile Organics (BTEX)	SW602[c]	.25	SW602	2
	Total Recoverable Petroleum Hydrocarbons	EPA 418.1	Variable[d]	EPA418.1	Variable[d]
	1,2 Dichlorobenzene	SW8010A	.25	SW8010A	2
	1,3 Dichlorobenzene	SW8010A	.25	SW8010A	2
	1,4 Dichlorobenzene	SW8010A	.25	SW8010A	2

[a] mg/kg = milligrams per kilogram

[b] μg/L = micrograms per liter

[c] Analytical protocols are defined in Environmental Protection Agency Manual SW-846, Test Methods for Evaluating Solid Waste, 3rd edition.

[d] Detection limit variable depending upon dilution of sample by analytical laboratory.

Table 3.1 Summary of Analytical Methods and Detection Limits

4.1 ASSESSMENT RESULTS

Summarized in this section are facility geology and hydrogeology, ground water quality and soil quality. The findings presented in this section are the result of the assessment activities presented in Section 3.

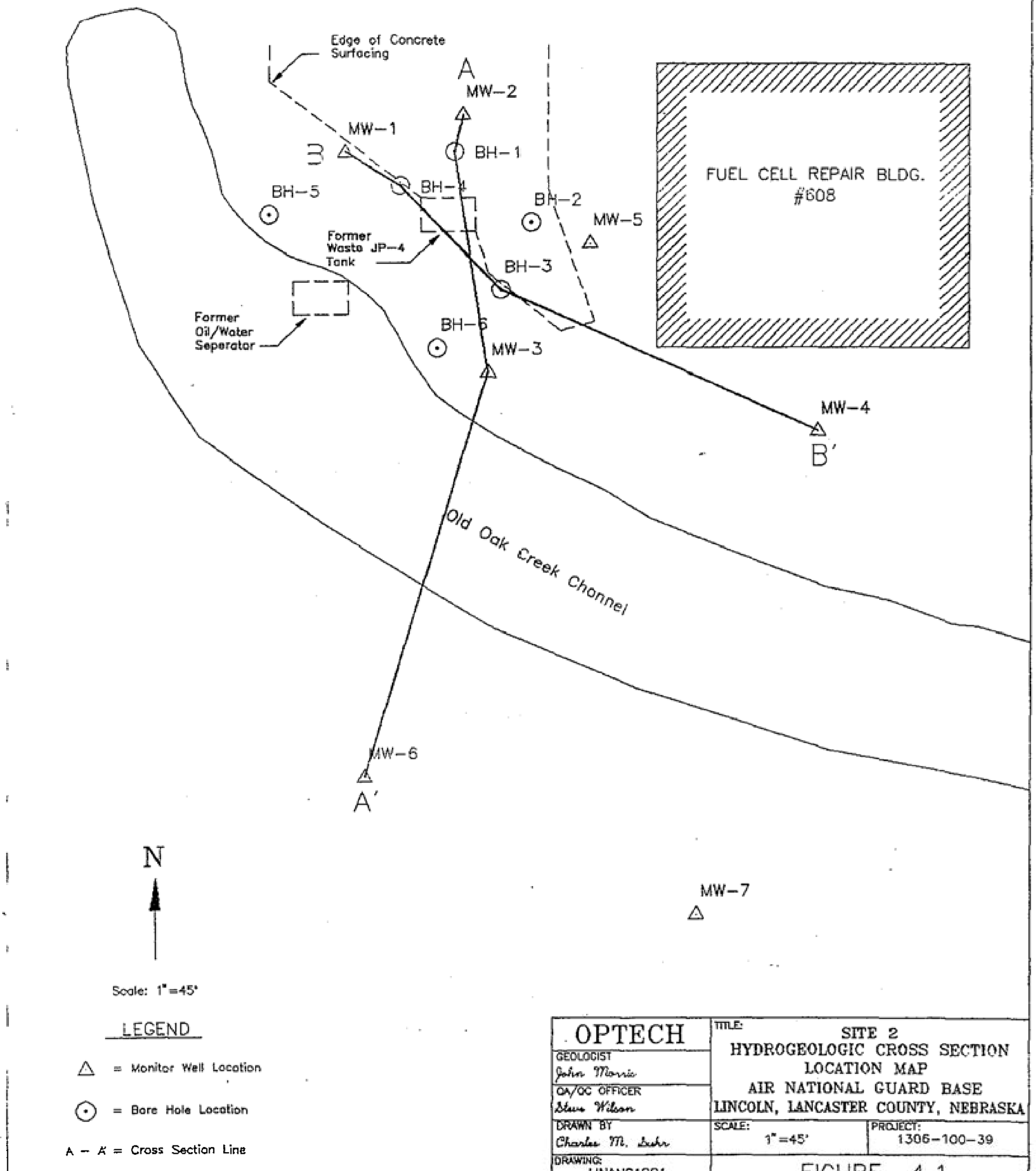
4.1.1 Facility Geology and Hydrogeology

Generalized hydrogeologic cross-sections A-A' and B-B' were constructed across Site 2 to illustrate subsurface conditions. The locations of the cross sections are shown on Figure 4.1. Cross-section A-A' is oriented north to south as presented in Figure 4.2 and cross-section B-B' is oriented northwest to southeast as presented in Figure 4.3. The potentiometric surface illustrated in these cross-sections were constructed from field data collected during the November 1991 field investigation.

A total of approximately 10 to 20 feet of fine-grained eolian silty clay overlays a moderately to poorly sorted fluvial sand and gravel. Thickness of the fluvial sand and gravel was not determined because it was not completely penetrated during the assessment. Both the silt and clay unit and fluvial sand and gravel unit are continuous across the site. The upper unit appears to increase in thickness toward the east.

Depths to the top of the saturated zone ranged from 5.46 to 14.90 feet below ground surface. The range of depths to the saturated zone are dependent on surface elevation. The average surface elevations on the south and north sides of Old Oak Creek Channel were 1,160 and 1,151 feet above sea level, respectively. The elevation of Old Oak Creek Channel bottom is 1144.80 feet above sea level. Water levels in the monitoring wells at the site approximately corresponded to the depth of the saturated zones. The saturated zone at Site 2 exceeds 15 feet. A potentiometric map was constructed using 21 and 23 November 1991 water level data as shown on Figures 4.4 and 4.5, respectively. The ground water level data is summarized in Tables 4.1 and 4.2. The distribution of potentiometric contours indicates the direction of the ground water gradient is generally to the south. The hydraulic gradient ranges from 0.04 ft/ft to 0.001 ft/ft.

The hydraulic conductivity of the silty clay and sandy units is estimated to be on the order of 10^{-8} to 10^{-4} cm/s and 10^{-4} to 10^{-2} cm/s, respectively (Freeze and Cherry, 1979). Average values for effective porosity are estimated to be 0.05 for the silty clay unit and 0.25 for the sandy unit (Johnson, 1967). Based on these values, the linear velocity of ground water movement beneath the facility in the silty clay unit may range up to 8 ft/yr. Ground water flow velocities in the sandy unit may range from 2 ft/yr to in excess of 150 ft/yr.



OPTECH	TITLE: SITE 2 HYDROGEOLOGIC CROSS SECTION LOCATION MAP AIR NATIONAL GUARD BASE LINCOLN, LANCASTER COUNTY, NEBRASKA	
GEOLOGIST John Morris		
QA/QC OFFICER Steve Wilson		
DRAWN BY Charles M. Suhr	SCALE: 1"=45'	PROJECT: 1306-100-39
DRAWING: LINANG1991	FIGURE 4.1	

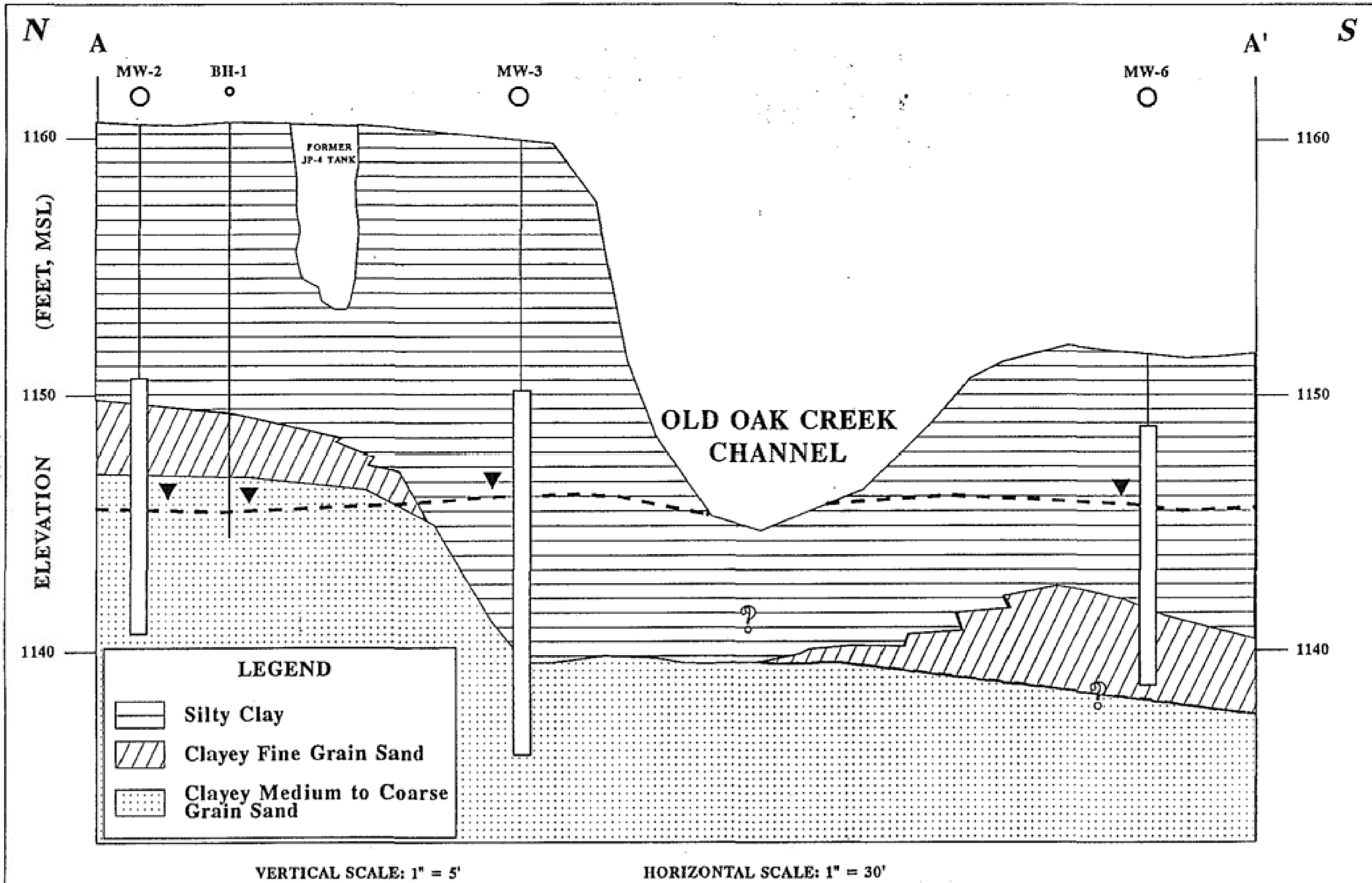


Figure 4.2

Hydrogeologic Cross-Section A to A'

155th Tactical Reconnaissance Group
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION

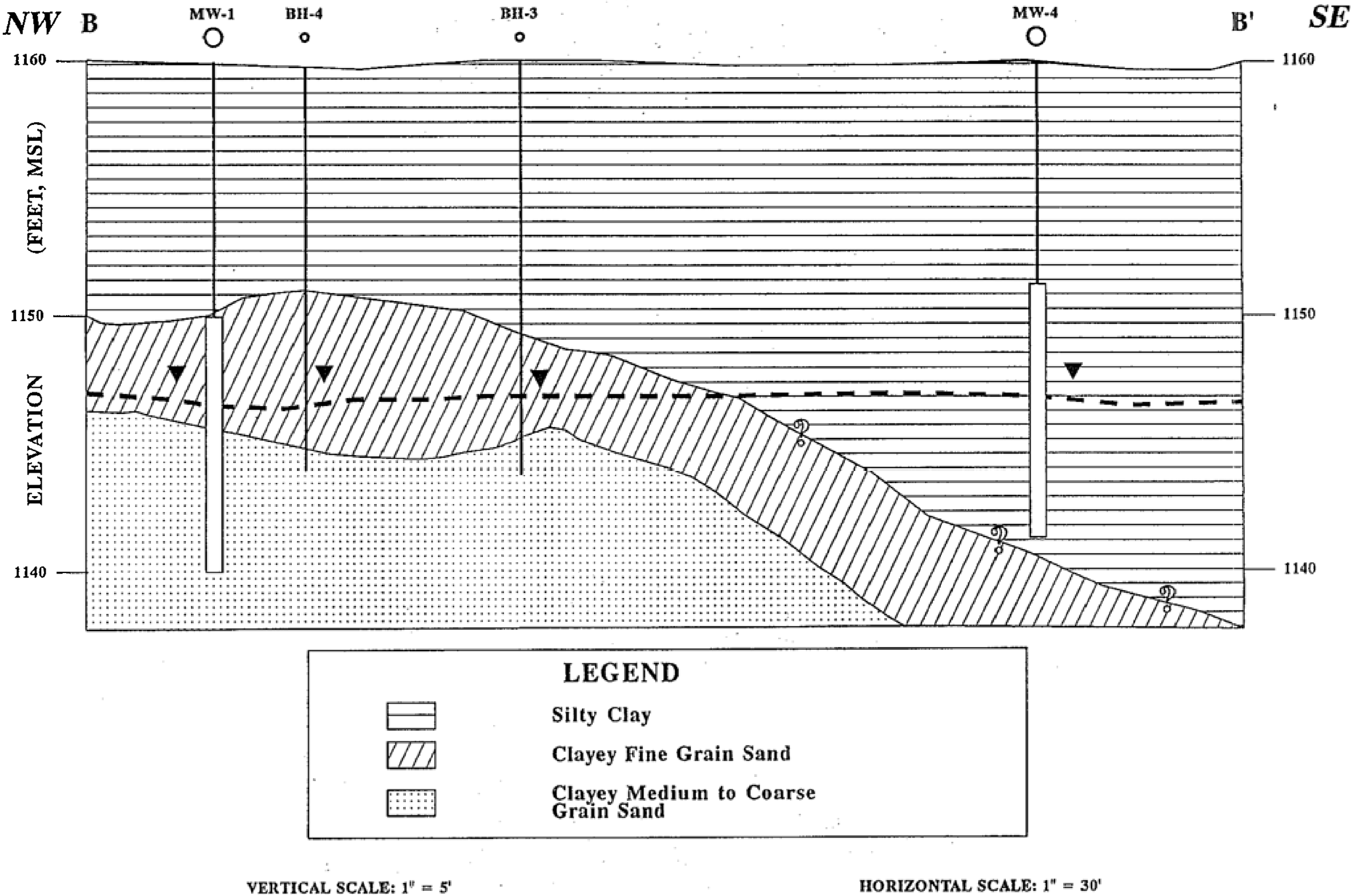
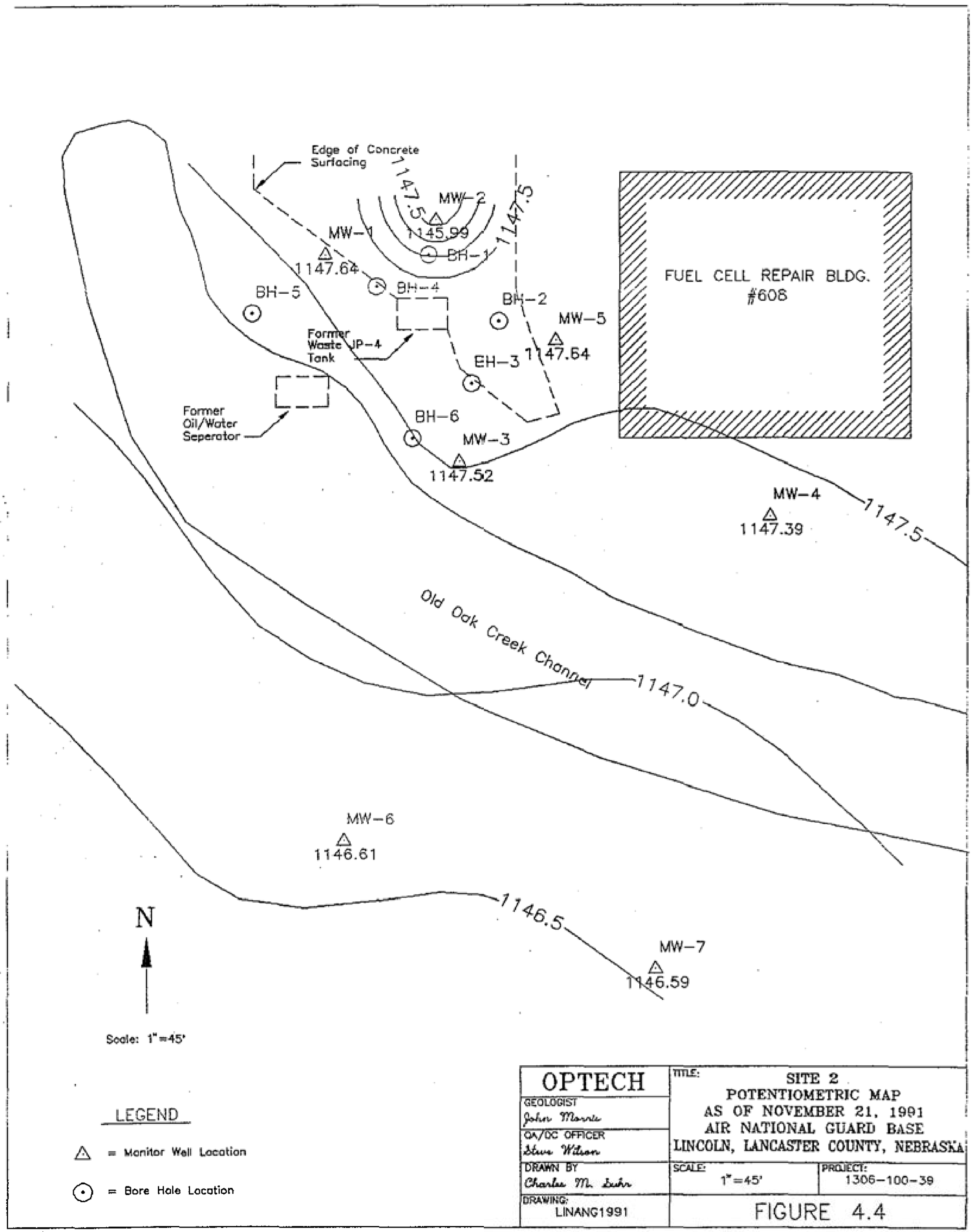
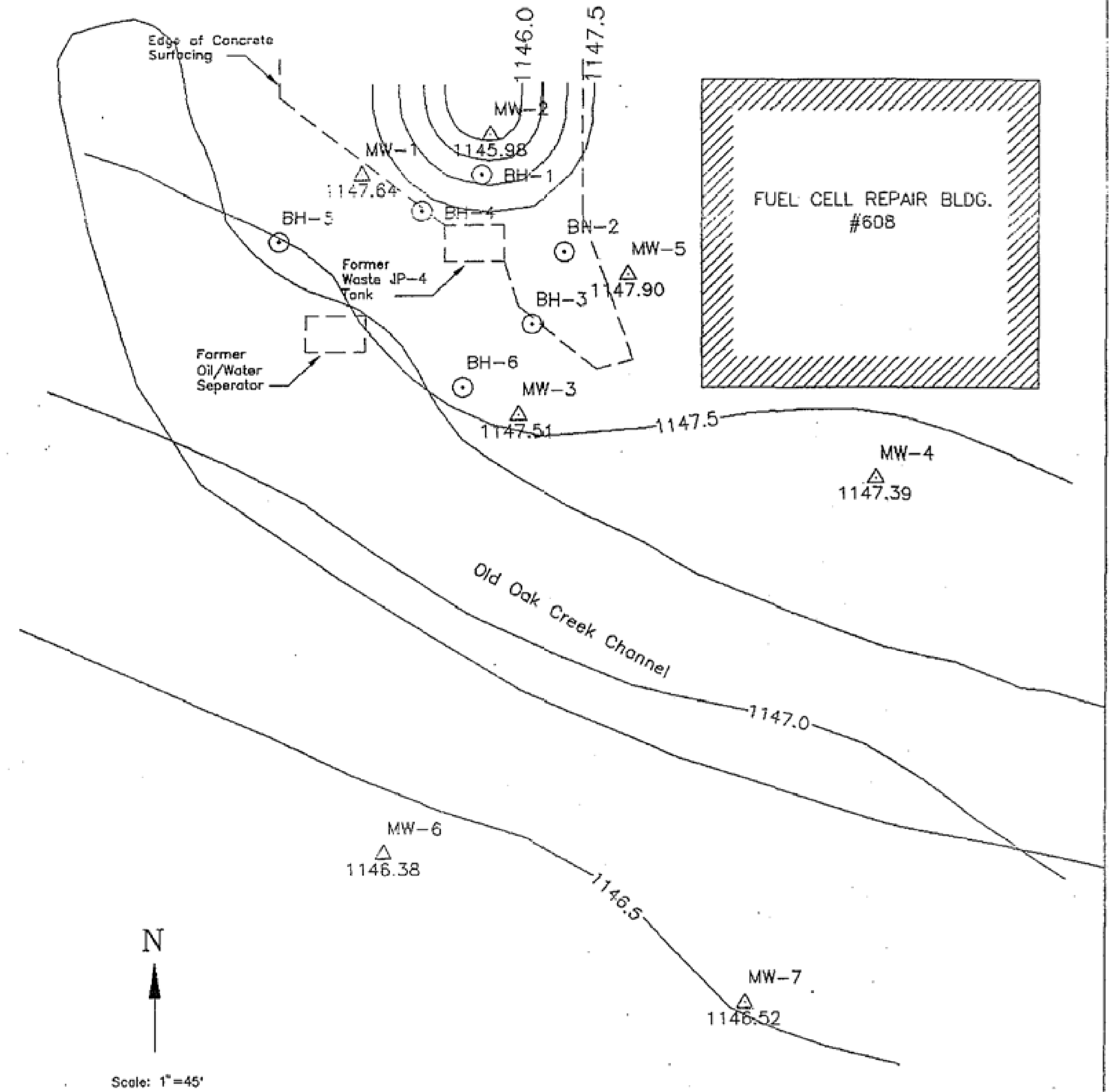


Figure 4.3

Hydrogeologic Cross-Section B to B'
155th Tactical Reconnaissance Group
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION


Edge of Concrete Surfacing
1147.5
MW-2
1145.99
1147.5
MW-1
1147.64
BH-1
BH-4
BH-5
BH-2
MW-5
1147.64
FUEL CELL REPAIR BLDG. #608
Former Waste JP-4 Tank
EH-3
Former Oil/Water Seperator
BH-6
MW-3
1147.52
MW-4
1147.39
1147.5
Old Oak Creek Channel
1147.0
MW-6
1146.61
1146.5
MW-7
1146.59
N
Scale: 1"=45'
LEGEND
= Monitor Well Location
= Bore Hole Location
OPTECH
GEOLOGIST
John Morris
QA/QC OFFICER
Steve Wilson
DRAWN BY
Charles M. Suhr
DRAWING:
LINANG1991
TITLE:
SITE 2
POTENTIOMETRIC MAP
AS OF NOVEMBER 21, 1991
AIR NATIONAL GUARD BASE
LINCOLN, LANCASTER COUNTY, NEBRASKA
SCALE:
1"=45'
PROJECT:
1306-100-39
FIGURE 4.4



OPTECH	TITLE: SITE 2 POTENTIOMETRIC MAP AS OF NOVEMBER 23, 1991 AIR NATIONAL GUARD BASE LINCOLN, LANCASTER COUNTY, NEBRASKA	
GEOLOGIST John Morris		
QA/QC OFFICER Steve Wilson		
DRAWN BY Charles M. Lehr	SCALE: 1"=45'	PROJECT: 1306-100-39
DRAWING: LINANG1991	FIGURE 4.5	

Table 4.1 Water Measurements, 155 Tactical Reconnaissance Group, Lincoln Municipal Airport, Lincoln, Nebraska

Well #	Date	Time	Measuring Point Elevation & Depth to Water			Surface Elevation & Depth to Water			Measured By
			Measuring Point	Measuring Point Elevation	Depth to Water (Feet)	Land Surface Elevation (asl)	Depth to Water (Feet)	Elevation	
MW-1	21 Nov 91	08:10	TOSC	1162.51	14.90	1159.93	12.29	1147.64	JM
MW-2	21-Nov-91	08:12	TOWV	1160.88	14.89	1160.88	14.89	1145.99	JM
MW-3	21-Nov-91	08:16	TOSC	1162.54	15.02	1160.17	12.65	1147.52	JM
MW-4	21-Nov-91	08:20	TOSC	1164.39	17.00	1161.17	13.78	1147.39	JM
MW-5	21-Nov-91	08:24	TOSC	1164.93	17.29	1161.72	14.08	1147.64	JM
MW-6	21-Nov-91	08:45	TOSC	1155.81	9.20	1152.32	5.71	1146.61	JM
MW-7	21-Nov-91	08:49	TOSC	1154.92	8.33	1151.98	5.39	1146.59	JM

TOSC = Top of Steel Casing
TOWV = Top of Well Vault
SW = Steve Wilson
JM = John Morris

Table 4.2 Water Measurements, 155 Tactical Reconnaissance Group, Lincoln Municipal Airport, Lincoln, Nebraska

Well #	Date	Time	Measuring Point Elevation & Depth to Water			Surface Elevation & Depth to Water			Measured By
			Measuring Point	Measuring Point Elevation	Depth to Water (Feet)	Land Surface Elevation (asl)	Depth to Water (Feet)	Elevation	
MW-1	23 Nov 91	08:20	TOSC	1162.54	14.90	1159.93	12.29	1147.64	SW
MW-2	23-Nov-91	08:23	TOWV	1160.88	14.90	1160.88	14.90	1145.98	SW
MW-3	23-Nov-91	08:27	TOSC	1162.54	15.03	1160.17	12.66	1147.51	SW
MW-4	23-Nov-91	08:45	TOSC	1164.39	17.00	1161.17	13.78	1147.39	SW
MW-5	23-Nov-91	08:55	TOSC	1164.93	17.03	1161.72	13.82	1147.90	SW
MW-6	23-Nov-91	08:36	TOSC	1155.81	9.43	1152.32	5.94	1146.38	SW
MW-7	23-Nov-91	09:39	TOSC	1154.92	8.40	1151.98	5.46	1146.52	SW

TOSC = Top of Steel Casing
TOWV = Top of Well Vault
SW = Steve Wilson
JM = John Morris

Based on the location of the two potential sources of contaminants, adjacent to Old Oak Creek Channel and the elevation of the creek relative to ground water, it is possible contaminants seeped into the creek as opposed to migrating a significant distance underground. The former waste JP-4 tank was located only approximately 40 feet north of the creek and the oil/water separator was located immediately north of the creek. Since the ground water gradient is to the south, contaminant migration from the waste JP-4 tank or the oil/water separator could seep into Old Oak Creek Channel.

4.1.2 Soil Test Borings

The locations of the soil test borings were selected to determine the aerial extent of soil contamination from the former waste JP-4 tank and oil/water separator. The specific locations were selected to be as near as possible to the potential sources. Subsurface structures, a high pressure gas pipeline, a high-voltage electrical line and two sanitary sewer lines, and Old Oak Creek Channel as indicated on Figure 4.6, required locating the borings distances of up to 25 feet from the potential sources.

The collection depth of samples from the soil test borings were primarily selected based on the ground water depth. These soil samples were selected to determine if contaminants were transported by ground water. The soil sample from BH-2 at a depth of 15.0 to 15.5 feet below land surface was selected based on PID readings, and visual and olfactory examination indicating contaminants. The soil sample collected from monitoring well MW-5 at a depth of 15.0 to 15.5 feet below land surface was selected to determine the down gradient extent of contamination detected in BH-2.

4.1.2.1 Soil Field Measurements

Soil field measurement of photoionizable compounds were obtained at the time of sampling. Measured values are listed in Table 4.3. Photoionizable compound values ranged from 0.0 to 750 parts per million (ppm). PID readings greater than background were detected in soil test borings BH-1 and BH-2, and monitoring wells MW-1 and MW-2. PID readings recorded from BH-1 at depths from 9.0 to 11.0 feet below land surface marginally exceeded background readings. The highest reading, 750 ppm, was obtained from soil test boring BH-2 at a depth of 15 to 16 feet below land surface. PID readings recorded from MW-1 at depths from 9.0 to 20.0 feet below land surface also marginally exceeded background readings.

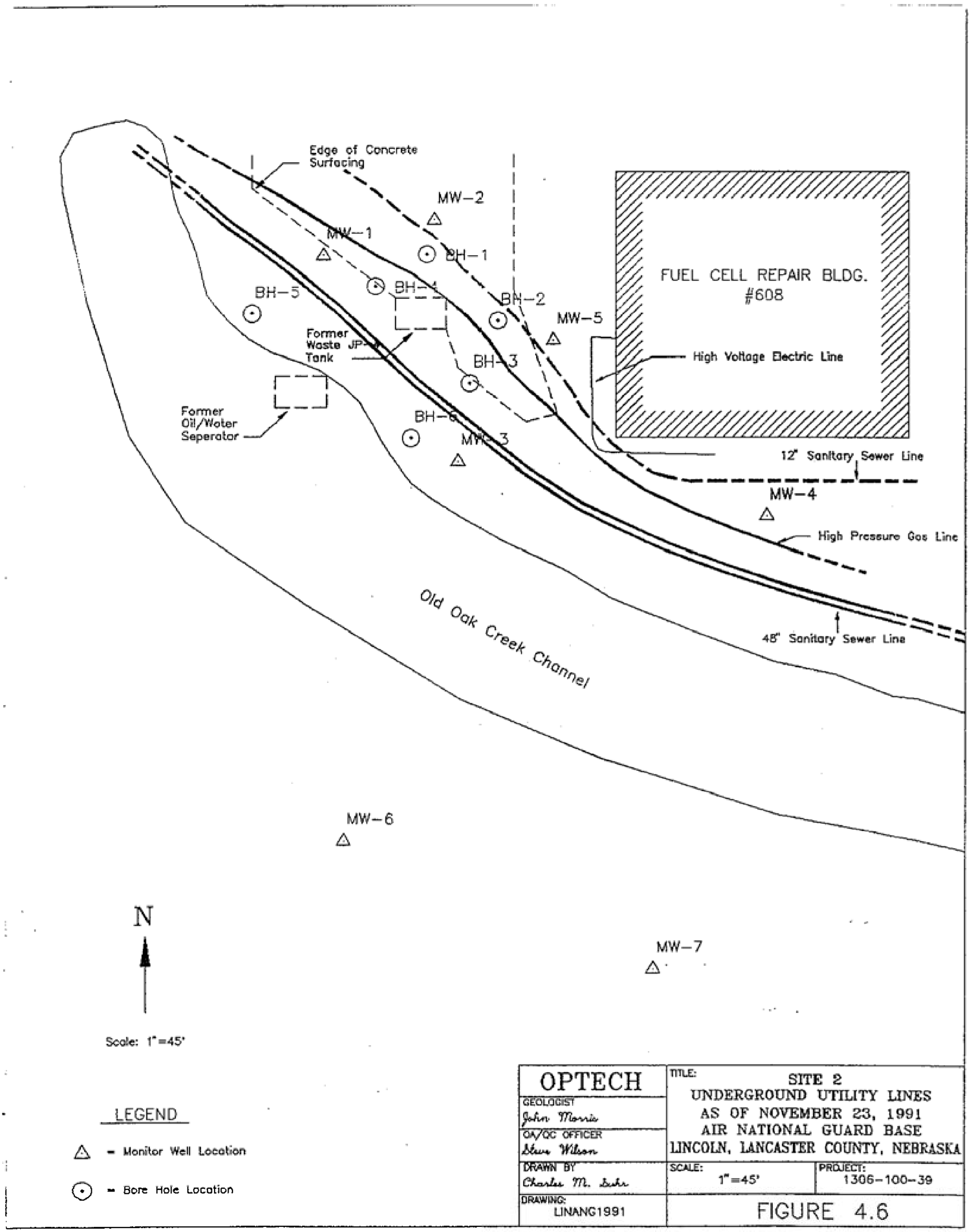

Edge of Concrete Surfacing
MW-2
MW-1
BH-1
BH-4
BH-5
BH-2
MW-5
FUEL CELL REPAIR BLDG. #608
High Voltage Electric Line
Former Waste JP-4 Tank
BH-3
Former Oil/Water Seperator
BH-6
MW-3
12" Sanitary Sewer Line
MW-4
High Pressure Gas Line
Old Oak Creek Channel
48" Sanitary Sewer Line
MW-6
N
MW-7
Scale: 1"=45'
LEGEND
- Monitor Well Location
- Bore Hole Location
OPTECH
GEOLOGIST John Morris
QA/QC OFFICER Steve Wilson
DRAWN BY Charles M. Suhr
DRAWING: LINANG1991
TITLE: SITE 2 UNDERGROUND UTILITY LINES AS OF NOVEMBER 23, 1991 AIR NATIONAL GUARD BASE LINCOLN, LANCASTER COUNTY, NEBRASKA
SCALE: 1"=45'
PROJECT: 1306-100-39
FIGURE 4.6

Table 4.3 Summary of PID Ambient Temperature Headspace Analysis, 155 Tactical Reconnaissance Group, Lincoln Municipal Airport, Lincoln, Nebraska

Sample Boring ID	Location Depth (Feet)	Photoionization Reading (ppm)	Corrected Reading*	Notes
BH1	4-5	11.2	1.6	Ambient Air 9.6
	5-6	11.2	1.6	Ambient Air 9.6
	9-10	23.0	13.4	Ambient Air 9.6
	10-11	19.3	9.7	Ambient Air 9.6
	15-16	10.5	.9	Ambient Air 9.6
	16-17	13.3	3.7	Lab Samples 16-16.5' & 16.5-17.0'
BH2	4-5	NR		
	5-6	3.2		
	9-10	3.3		Lab Sample 9.5-10.0'
	10-11	4.5		
	14-15	400		
	15-16	750		Lab Sample 15-15.5
BH3	4-5	3.2		
	5-6	3.2		
	9-10	NR		
	10-11	NR		Lab Sample 10-10.5'
	14-15	2.6		
	15-16	2.6		
BH4	4-5	4.6		
	5-6	4.6		
	9-10	3.2		
	10-11	3.2		Lab Sample 10.5-11'
	14-15	2.2		
	15-16	2.4		
BH5	4-5	3.1		
	5-6	3.1		
	9-10	3.2		
	10-11	3.2		Lab Sample 10.0-10.5'
	14-15	2.1		
	15-16	2.2		
BH6	4-5	3.2		
	5-6	4.1		
	9-10	0.1		
	10-11	0.1		Lab Sample 10.5-11'
	14-15	2.1		
	15-16	2.4		
MW1	4-5	13.8	3.9	Ambient Air 9.9
	5-6	14.5	4.6	Ambient Air 9.9
	9-10	21.3	11.4	Ambient Air 9.9
	10-11	23.3	13.4	Ambient Air 9.9
	14-15	21.3	11.4	Ambient Air 9.9
	15-16	21.8	11.9	Ambient Air 9.9
	19-20	17.4	7.5	Ambient Air 9.9
	24-25	13.3	3.4	Ambient Air 9.9
	25-26	12.9	3.0	Ambient Air 9.9

Table 4.3 Summary of Ambient Temperature Headspace Analysis (Continued)

Sample Boring ID	Location Depth (Feet)	Photoionization Reading (ppm)	Corrected Reading*	Notes
MW2	4-5	10.1	.2	Ambient Air 9.9
	5-6	10.1	.2	Ambient Air 9.9
	9-10	20.2	10.3	Ambient Air 9.9
	10-11	20.2	10.3	Ambient Air 9.9
	14-15	16.6	6.7	Ambient Air 9.9
	15-16	20.2	10.3	
MW3	4-5	1.7		
	5-6	1.7		
	9-10	1.9		
	10-11	1.9		
	14-15	2.1		
	15-16	2.3		
MW4	4-5	6.0		
	5-6	6.1		
	9-10	2.7		
	10-11	2.7		
	14-15	3.6		
	15-16	3.7		
	19-20	3.7		
	20-21	3.9		
MW5	4-5	2.0		
	5-6	2.0		
	9-10	2.0		
	10-11	2.1		
	14-15	3.3		
	15-16	3.2		
	19-20	1.9		
	20-21	1.8		
MW6	5-6	0.0		
	6-7	0.0		
	10-11	0.0		
	11-12	0.0		
	15-16	0.0		
	16-17	0.0		
MW7	5-6	6.5		
	6-7	6.5		
	10-11	6.4		
	11-12	6.4		
	15-16	3.7		
	16-17	3.7		

NR = No Recovery for Headspace Analysis
ppm = Parts per million
* = Corrected PID Reading for Malfunction of Instrument

PID readings for soil test boring BH-1, and monitoring wells MW-1 and MW-2 were affected by a malfunctioning PID battery resulting in abnormally high calibrated ambient air readings. Ambient air photoionization reading were 9.9 ppm after the morning calibration, and 9.6 ppm after the afternoon calibration of the PID. All PID readings for BH-1, MW-1 and MW-2 required correction for the calibrated ambient air readings. The malfunction was immediately corrected by obtaining a replacement battery from the BEES representative.

4.1.2.2 Analytic Results For Soil

BTEX, TRPH and 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene analytic results for soil samples from soil test borings BH-1, BH-2, BH-3, BH-4, BH-5, BH-6 and monitoring well MW-5 are presented in Table 4.4. HWS Technologies, Inc. analytical laboratory reports are included in Appendix C. Total BTEX concentrations in soil samples at depths of 9.5 to 11.0 and 15.0 to 17.0 feet below land surface are illustrated in Figures 4.7 and 4.8, respectively. BTEX compounds were detected only in soil samples collected from test borings BH-2 and BH-4, and monitoring well MW-5. BTEX compounds were detected in BH-2 at a depth of 15.0 to 15.5 feet below land surface at concentrations of 76, 21, 13 and 76 mg/kg, respectively. 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene were also detected at a depth of 15.0 to 15.6 feet below land surface in BH-2 at concentrations of 16, 9.5 and 11 mg/kg. 1,4 dichlorobenzene was detected in BH-2 at a depth of 9.5 to 10.0 feet below land surface at a concentration of 1.3 mg/kg.

Toluene, ethyl benzene and xylenes were detected in soil test boring BH-4 at a depth of 10.5 to 11.0 feet below land surface at concentrations of .80 ,1.6, and 2.7 mg/kg, respectively. 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene were also detected at this depth in BH-4 at concentrations of .82, 1.1 and .47 mg/kg, respectively. Of the parameters analyzed, only benzene was detected in MW-5. In MW-5 at depths of 10.0 to 10.5 and 15.0 to 15.5 feet below land surface, benzene was detected at concentrations of .37 and .31 mg/kg, respectively. TRPH was not detected in the soil samples analyzed. The state of Nebraska has not set regulatory MCL's for BTEX, TRPH, 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene in soil.

Table 4.4--- Analytic Results For Soil -155th Tactical Reconnaissance Group, Lincoln Municipal Airport, Lincoln Nebraska.

Sample ID	Depth (Feet)	Sample Date	Analytic Lab	Anayltic Method	B	T	E	X	TRPH	1,2	1,3	1,4
										Dichlorobenzenes		
					<-------				(mg/kg)			------->
LANGB BH1	16.0-16.5	14-Nov-91	HWS	418.1/602/8010A	<.25	<.25	<.25	<.25	<25	<.25	<.25	<.25
LANGB BH1	16.5-17.0	14-Nov-91	HWS	418.1/602/8010A	<.25	<.25	<.25	<.25	<22	<.25	<.25	<.25
LANGB BH2	9.5-10.0	15-Nov-91	HWS	418.1/602/8010A	<.25	<.25	<.25	<.25	<22	1.3	<.25	<.25
LANGB BH2	15.0-15.5	15-Nov-91	HWS	418.1/602/8010A	76	21	13	76	<23	11	16	9.5
LANGB BH3	10.0-10.5	17-Nov-91	HWS	418.1/602/8010A	<.25	<.25	<.25	<.25	<22	<.25	<.25	<.25
LANGB BH4	10.5-11.0	17-Nov-91	HWS	418.1/602/8010A	<.25	.80	1.6	2.7	<22	.82	1.1	.47
LANGB BH5	10.0-10.5	17-Nov-91	HWS	418.1/602/8010A	<.25	<.25	<.25	<.25	<20	<.25	<.25	<.25
LANGB BH6	10.5-11.0	17-Nov-91	HWS	418.1/602/8010A	<.25	<.25	<.25	<.25	<25	<.25	<.25	<.25
LANGB MW5	10.0-10.5	18-Nov-91	HWS	418.1/602/8010A	.37	<.25	<.25	<.25	<25	<.25	<.25	<.25
LANGB MW5	15.0-15.5	18-Nov-91	HWS	418.1/602/8010A	.31	<.25	<.25	<.25	<25	<.25	<.25	<.25
MCL					NA	NA	NA	NA	NA	NA	NA	NA

EXPLANATION:

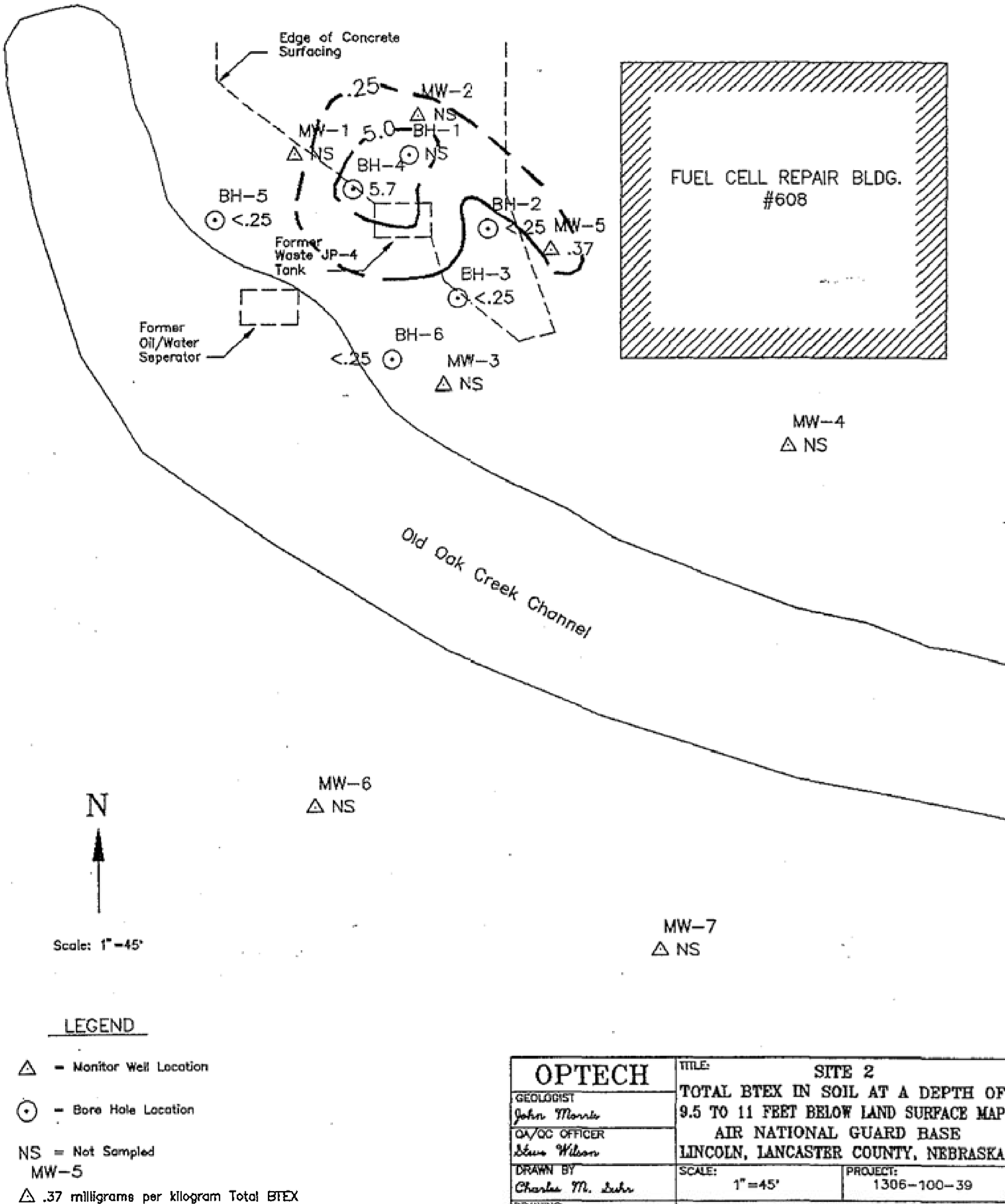
TRPH = Total Recoverable Petroleum Hydrocarbons
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
--- = Not analyzed\Not applicable
LANGB = Lincoln Air National Guard Base
mg/kg = milligrams per kilogram
MCL = Maximum Contaminant Level
NA = Not Applicable

ANALYTIC METHODS:

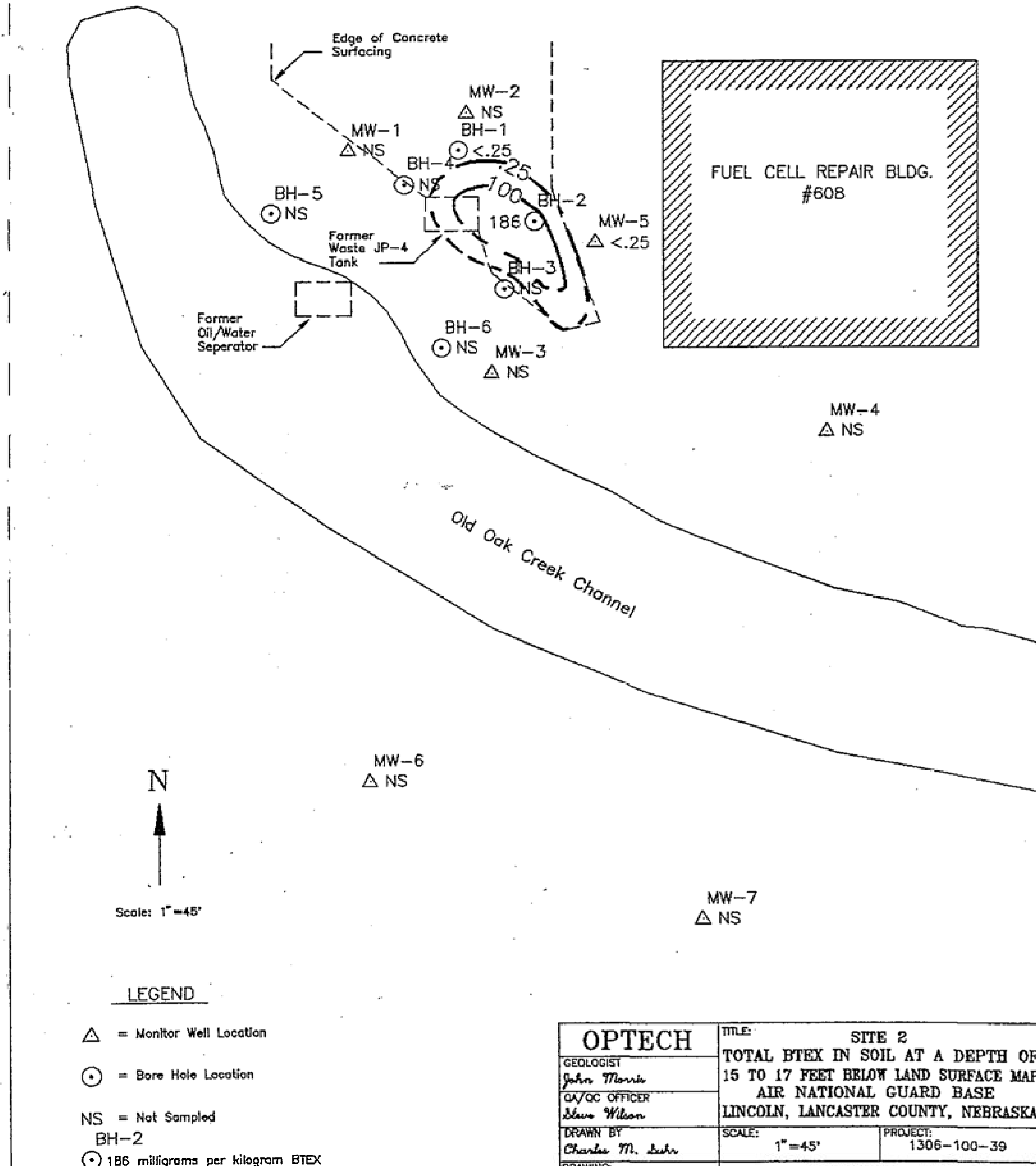
418.1 = EPA Method 418.1 for TRPH
602 = EPA Method 602 for BTEX
8010A = EPA Method 8010A for 1,2, 1,3, 1,4 Dichlorobenzenes

ANALYTIC LAB:

HWS = HWS Technologics, Inc.
Lincoln, Nebraska



OPTECH	TITLE: SITE 2 TOTAL BTEX IN SOIL AT A DEPTH OF 9.5 TO 11 FEET BELOW LAND SURFACE MAP AIR NATIONAL GUARD BASE LINCOLN, LANCASTER COUNTY, NEBRASKA	
GEOLOGIST: John Morris		
QA/QC OFFICER: Steve Wilson		
DRAWN BY: Charles M. Suhr	SCALE: 1"=45'	PROJECT: 1306-100-39
DRAWING: LINANG1991	FIGURE 4.7	



OPTECH	TITLE: SITE 2 TOTAL BTEX IN SOIL AT A DEPTH OF 15 TO 17 FEET BELOW LAND SURFACE MAP AIR NATIONAL GUARD BASE LINCOLN, LANCASTER COUNTY, NEBRASKA
GEOLOGIST John Morris	
QA/QC OFFICER Steve Wilson	
DRAWN BY Charles M. Lehr	SCALE: 1"=45' / PROJECT: 1306-100-39
DRAWING: LINANG1991	FIGURE 4.8

4.1.3 Ground Water Results

4.1.3.1 Ground Water Monitoring Wells

The locations of the ground water monitoring wells were selected to determine the areal extent of ground water contamination from the former waste JP-4 tank and oil/water separator. The specific locations were selected as near as possible to the potential sources but beyond the area of potential soil contamination. As with the soil test borings, the location of the monitoring wells was partially determined by subsurface structures and Old Oak Creek Channel as indicated on Figure 4.6. As a result the monitoring wells were located up to 300 feet from the potential sources.

4.1.3.2 Ground Water Field Measurements

Ground water field measurements of electrical conductivity, pH and temperature were obtained at the time of sampling. Measured values are listed in Table 4.5. Additionally, the presence of free phase hydrocarbons was tested. Electrical conductivity values ranged from 650 to 3,980 micromhos per centimeter umhos/cm. The lowest conductivity value was obtained from monitoring well MW-2. Ground water pH values ranged from 7.10 to 9.02. The highest pH value of 9.02 was obtained from MW-2. Temperatures of ground water varied from 60.8 to 65.6° F. Free phase hydrocarbons were not detected at Site 2.

4.1.3.3 Analytic Results For Ground Water

BTEX, TRPH and 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene analytic results for ground water samples collected from monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5 and MW-6 and MW-7 are presented in Table 4.6. Total BTEX concentrations in ground water are illustrated in Figure 4.9. The only BTEX compounds detected were toluene and xylenes. Toluene was detected at a concentration of 2.1 ug/L in monitoring well MW-5. Xylenes were detected in monitoring wells MW-1, MW-2 and MW-4 at concentrations of 3.6, 3.7 and 2.6 ug/L respectively. TRPH was not detected in the ground water samples collected. In MW-2, 1,3 and 1,4 dichlorobenzene were detected at concentrations of 2.5 and 5.9 ug\L, respectively. USEPA MCL's were not exceeded in the ground water samples analyzed.

Analytic results indicate that BTEX, and 1,3 dichlorobenzene, and 1,4 dichlorobenzene in ground water is confined to a plume oriented northwest to southeast in the area of the former waste JP-4 tank. The concentrations of the compounds were only marginally above the detection limit of 2 ug/L. The highest concentration of these compounds was from the ground water sample collected from MW-2, located north and crossgradient from the former waste JP-4 tank.

Table 4.5 Ground Water Field Measurements, 155 Tactical Reconnaissance Group, Lincoln Municipal Airport, Lincoln, Nebraska

Well ID	Sample Date	Electrical Conductivity (umhos/cm)	pH	Temperature (°F)
MW-1	23-Nov-91	1.07	7.64	64.7
MW-2	23-Nov-91	0.65	7.12	65.6
MW-3	23-Nov-91	1.18	7.56	62.5
MW-4	23-Nov-91	3.98	7.10	64.3
MW-5	23-Nov-91	2.28	7.17	63.9
MW-6	23-Nov-91	3.25	7.12	60.8
MW-7	23-Nov-91	2.66	7.62	61.4

uhmos/cm = micromhos per centimeter
°F = degrees Fahrenheit

Table 4.6- Analytic Results For Ground Water -155th Tactical Reconnaissance Group, Lincoln Municipal Airport, Lincoln Nebraska.

Well ID	Sample Date	Analytic Lab	Anayltic Method	B	T	E	X	TRPH	1,2	1,3	1,4
									Dichlorobenzenes		
				<---------------(ug/L)--------------->				(mg/L)	<----------(ug/L)----------->		
LANGB MW1	18-Nov-91	HWS	418.1/602/8010A	<2	<2	<2	3.6	<1.6	<2	<2	<2
LANGB MW2	18-Nov-91	HWS	418.1/602/8010A	<2	<2	<2	3.7	<1.3	<2	2.5	5.9
LANGB MW3	18-Nov-91	HWS	418.1/602/8010A	<2	<2	<2	<2	<1.2	<2	<2	<2
LANGB MW4	18-Nov-91	HWS	418.1/602/8010A	<2	<2	<2	2.6	<1.0	<2	<2	<2
LANGB MW5	18-Nov-91	HWS	418.1/602/8010A	<2	2.1	<2	<2	<1.6	<2	<2	<2
LANGB MW6	18-Nov-91	HWS	418.1/602/8010A	<2	<2	<2	<2	<1.0	<2	<2	<2
LANGB MW7	18-Nov-91	HWS	418.1/602/8010A	<2	<2	<2	<2	<1.4	<2	<2	<2
LANGB MW8*	18-Nov-91	HWS	418.1/602/8010A	<2	2.0	<2	<2	<.9	<2	<2	<2
Trip	18-Nov-91	HWS	418.1/602/8010A	<2	<2	<2	<2	NA	<2	<2	<2
Rinsate	18-Nov-91	HWS	418.1/602/8010A	<2	<2	<2	<2	NA	<2	<2	<2
MCL	--	--	--	5	1,000*	700*	10,000*	NA	600*	NA	75

EXPLANATION:

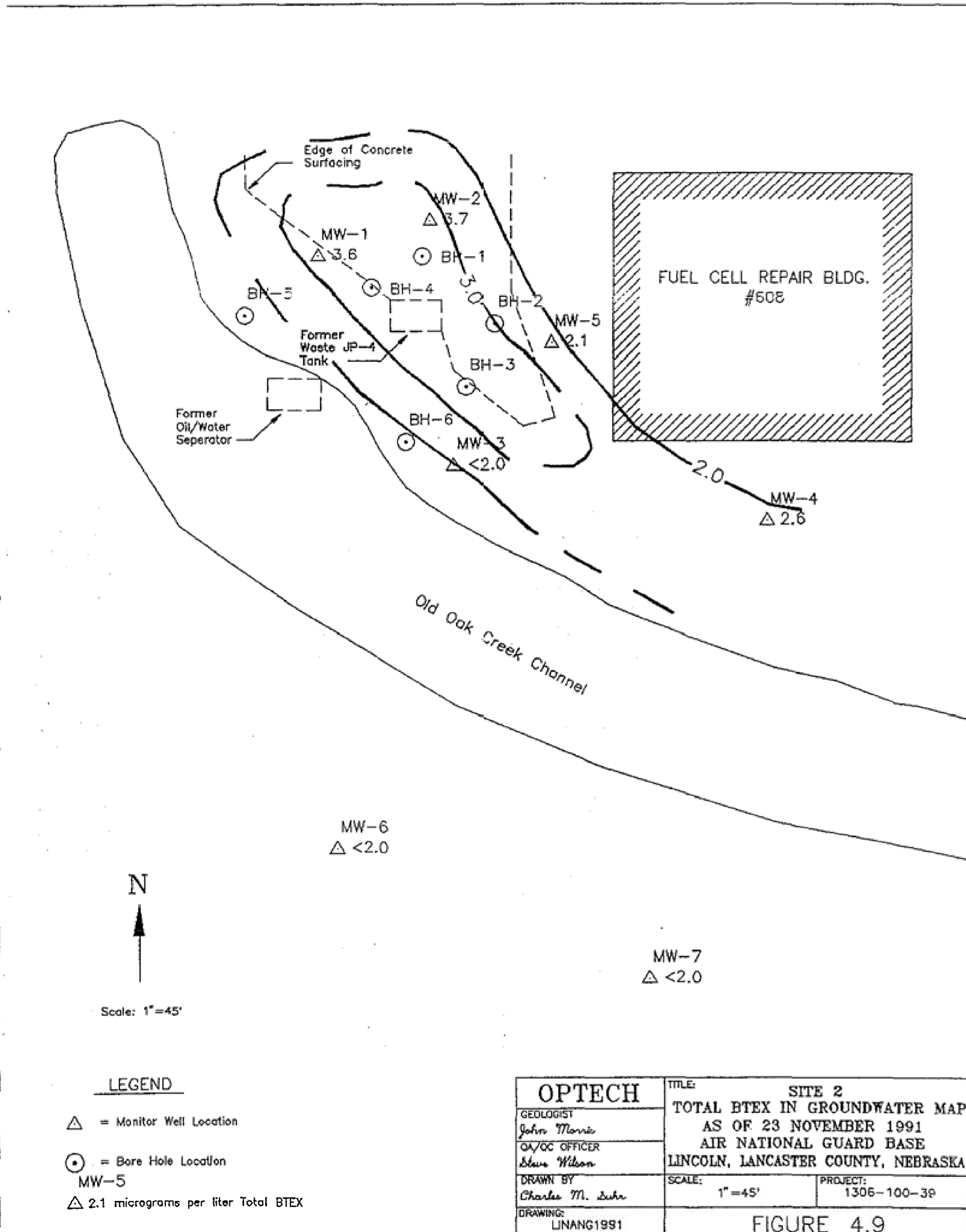
TRPH = Total Recoverable Petroleum Hydrocarbons
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
--- = Not analyzed\Not applicable
LANGB = Lincoln Air National Guard Base
mg/kg = Milligrams per kilogram
MCL = Current or Final Standard Maximum Contaminant Level
* = Final Standard as of July 30, 1992
NA = Not Applicable or Not Available

ANALYTIC METHODS:

418.1 = EPA Method 418.1 for TRPH
602 = EPA Method 602 for BTEX
8010A = EPA Method 8010A for 1,2, 1,3, 1,4 Dichlorobenzenes

ANALYTIC LABS:

HWS = HWS Technologics, Inc.
Lincoln, Nebraska



OPTECH	TITLE: SITE 2 TOTAL BTEX IN GROUNDWATER MAP AS OF 23 NOVEMBER 1991 AIR NATIONAL GUARD BASE LINCOLN, LANCASTER COUNTY, NEBRASKA	
GEOLOGIST John Morris		
QA/QC OFFICER Steve Wilson		
DRAWN BY Charles M. Suhr	SCALE: 1"=45'	PROJECT: 1306-100-39
DRAWING: LINANG1991	FIGURE 4.9	

4.1.4. Soil Stockpiled Analytic Results

Soil samples were collected from three soil stockpiles as indicated on Figure 3.4. This material was excavated during the March 1991 removal of the waste JP-4 tank and oil/water separator, and the April 1991 installation the sanitary sewer line indicated on Figure 4.6. The purpose of obtaining these samples was to aid in determining if the material was contaminated. A total of five composite samples, SP-1, SP-2, SP-3, SP-4 and SP-5, were analyzed for BTEX, TRPH and 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene. All samples were collected from a depth of 1.5 feet below the surface.

BTEX, TRPH, 1,2 dichlorobenzene, 1,3 dichlorobenzene and 1,4 dichlorobenzene analytic results for soil samples from soil samples SP-1, SP-2, SP-3, SP-4 and SP-5 in Table 4.7. Benzene was detected in SP-1, SP-2, SP-3 and SP-4 at concentrations of .33, .30, .34 and .28 mg/kg, respectively. Xylene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene were also detected at SP-1. TRPH, toluene, ethylbenzene and 1,2 dichlorobenzene were not detected in the soil samples collected. All parameters detected were only marginally greater than the detection limit. The state of Nebraska has not set regulatory MCL's for BTEX, TRPH, 1,2 dichlorobenzene, 1,3 dichlorobenzene, or 1,4 dichlorobenzene in soil.

Table 4.7 --- Analytic Results For Soil Stockpiles -155th Tactical Reconnaissance Group, Lincoln Municipal Airport, Lincoln Nebraska.

Sample ID	Depth (Feet)	Sample Date	Analytic Lab	Anayltic Method	B	T	E	X	TRPH	1,2 Dichlorobenzenes	1,3 Dichlorobenzenes	1,4 Dichlorobenzenes
					<---				(mg/kg)			--->
LANGB SP1	1.50	15-Nov-91	HWS	418.1/602/8010A	.33	<.25	<.25	.87	<25	<.25	.41	.99
LANGB SP2	1.50	15-Nov-91	HWS	418.1/602/8010A	.30	<.25	<.25	<.25	<25	<.25	<.25	<.25
LANGB SP3	1.50	15-Nov-91	HWS	418.1/602/8010A	.34	<.25	<.25	<.25	<25	<.25	<.25	<.25
LANGB SP4	1.50	15-Nov-91	HWS	418.1/602/8010A	.28	<.25	<.25	<.85	<25	<.25	<.25	<.78
LANGB SP5	1.50	15-Nov-91	HWS	418.1/602/8010A	<.25	<.25	<.25	<.25	<25	<.25	<.25	<.25
MCL					NA	NA	NA	NA	NA	NA	NA	NA

EXPLANATION:

TRPH = Total Recoverable Petroleum Hydrocarbons
B = Benzene
T = Toluene
E = Ethylbenzene
X = Xylenes
--- = Not analyzed\Not applicable
LANGB = Lincoln Air National Guard Base
mg/kg = Milligrams per kilogram
MCL = Maximum Contaminant Level
NA = Not Applicable

ANALYTIC METHODS:

418.1 = EPA Method 418.1 for TRPH
602 = EPA Method 602 for BTEX
8010A = EPA Method 8010A for 1,2, 1,3, 1,4 Dichlorobenzenes

ANALYTIC LABS:

HWS = HWS Technologies, Inc.
Lincoln, Nebraska

5.1 CONCLUSIONS

PID readings greater than background were detected in soil test borings BH-1 and BH-2, and monitoring wells MW-1 and MW-2. Elevated concentrations of BTEX, and 1,2, 1,3 and 1,4 dichlorobenzene compounds were detected in one soil sample collected from test boring BH-2. Toluene, xylene, and 1,3 and 1,4 dichlorobenzenes were detected in ground water at concentrations only marginally greater than the analytical method detection levels of 2 ug/L and below USEPA MCLs. Free phase hydrocarbons were not detected at the LANGB. Based on field screening of soil samples and laboratory analysis results the total areal extent of contamination in soil has been determined. The highest concentration of these compounds is located in the immediate area and extending approximately 40 feet east of the former waste JP-4 tank.

The soil sample collected from test boring BH-2 at a depth of 15 to 15.5 feet below land surface had total BTEX of 186 mg/kg. The BTEX compounds were detected at concentrations of 76, 21, 13 and 76 mg/kg, respectively. 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene were also detected in BH-2 at a depth of 15.0 to 15.5 feet below land surface at concentrations of 16, 9.5 and 11 mg/kg. Toluene, ethyl benzene, xylenes, 1,2 dichlorobenzene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene were detected in soil test boring BH-4, 10.5 to 11.0 feet below land surface, at concentrations marginally above the analytical method detection limit. In MW-5, benzene was also detected at concentrations marginally above the analytical method detection limit, at depths of 10.0 to 10.5 and 15.0 to 15.5 feet below land surface. TRPH was not detected in the soil samples collected. MCL's have not been set for soil by the state of Nebraska.

All analytes detected in ground water were only marginally greater than the analytical method detection limit and USEPA MCL's were not exceeded. Of the compounds analyzed for, only toluene, xylenes, 1,3 and 1,4 dichlorobenzene were detected. Benzene, ethylbenzene and TRPH were not detected in the ground water samples analyzed. Results indicate that compounds detected at Site 2 in ground water are confined to an area oriented northwest to southeast of the former waste JP-4 tank. The northwest boundary of the area is upgradient from the former locations of the waste JP-4 tank and oil/water separator. The downgradient extent, to the southeast, has not been specifically determined, but due to the extremely low concentrations, is assumed to be immediately south and southeast of monitoring well MW-4, and north and northeast of MW-7.

The northwest boundary of the area of ground water contamination is upgradient from the former locations of the waste JP-4 tank and oil/water separator. The downgradient extent, to the southeast, has not been specifically determined. However, due to the extremely low concentrations it is assumed to be immediately south and southeast of monitoring well MW-4 and north and northeast of MW-7. It is possible contaminants migrated into the Old Oak Creek Channel due to the elevation of the creek being lower than the elevation of the ground water. Based on hydraulic conductivity and average values for effective porosity, the linear velocity of ground water movement beneath the facility in the clayey unit may range up to 8 ft/yr and to in excess of 150 ft/yr in the sandy unit.

Significant remediation as a result of removal of the waste JP-4 tank and oil/water separator, and installation of the sanitary sewer line had occurred at Site 2 prior to this assessment. During removal of the waste JP-4 tank and oil/water separator, and installation of the sanitary sewer line approximately 350 cubic yards of potentially contaminated soil were removed and stockpiled. Soil removed from the area directly adjacent to the two potential sources typically has the highest concentration of contaminants. To dewater the sanitary sewer line trench, a significant volume of potentially contaminated ground water (estimated to range from 250,000 to 750,000 gallons) was removed. Removal of the primary contaminant sources, the waste JP-4 tank and oil\water separator, and then the removal of major portions of potentially contaminated soil and ground water from the site had reduced the potential threat to ground water at Site 2.

Very low concentrations of benzene, xylene, 1,3 dichlorobenzene, and 1,4 dichlorobenzene were detected in samples collected from the stockpiled soil. Benzene TRPH, toluene, ethylbenzene and 1,2 dichlorobenzene were not detected in the soil samples collected. Analytical results for the soil stockpiles may not be representative of all stockpiled material. Additional sampling of the stockpiles could be required to characterize the material completely for disposal.

5.2 RECOMMENDATIONS

The following recommendations are based on the results of the site assessment of Site 2 on the LANGB.

1. Backfill and compact the waste JP-4 and oil/water excavations to limit surface water infiltration to the aquifer.

2. Conduct additional sampling of stockpiled soil and submit for laboratory analysis to complete characterization for disposal.

3. Remove stockpiled soil to prevent potential soil and ground water contaminant migration.

4. Conduct periodic ground water monitoring to determine if contaminants are deadsorbing from soil.

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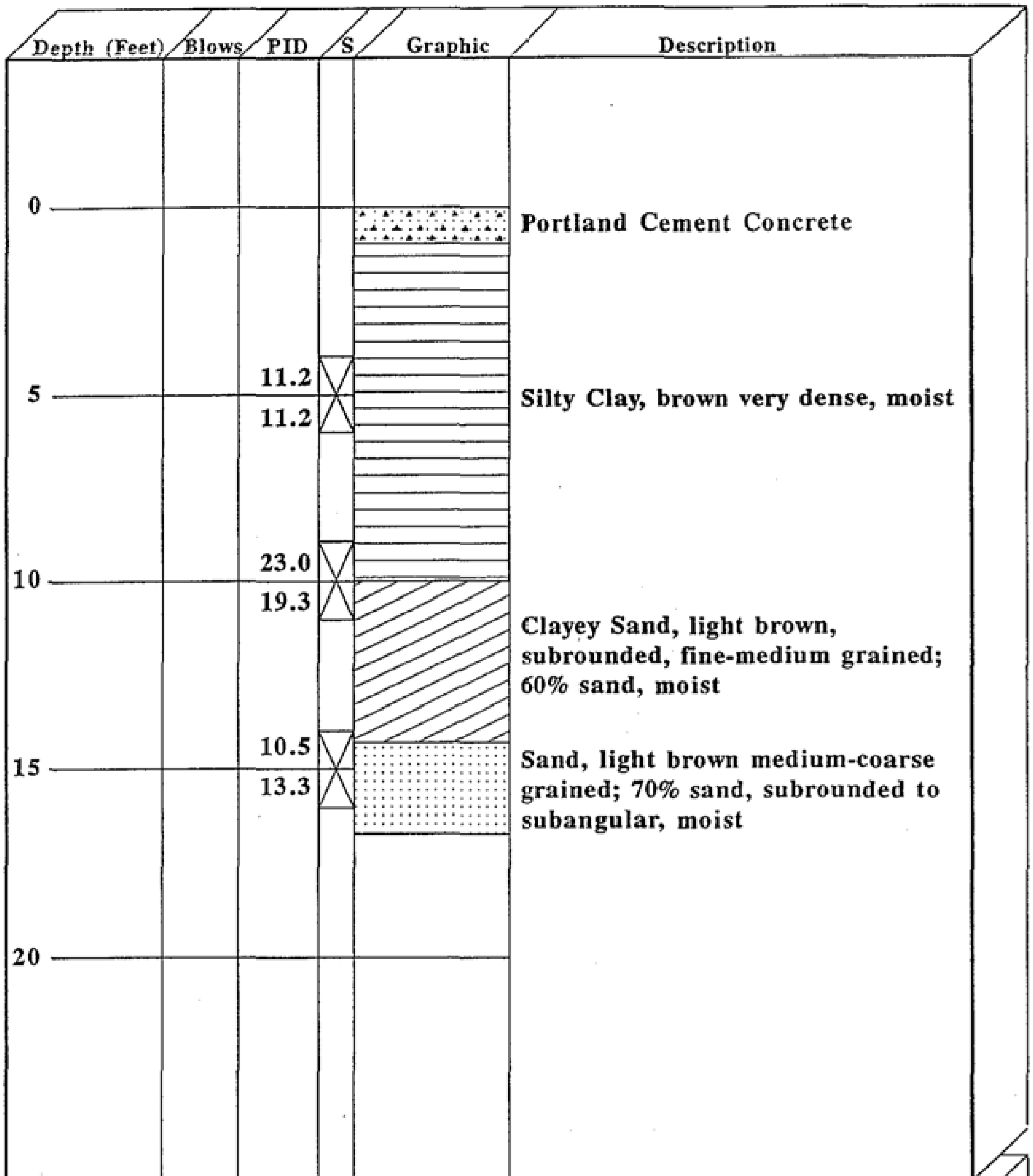
APPENDIX A

LOGS OF SOIL TEST BORINGS AND MONITORING WELL CONSTRUCTION LOGS



Logged By: JHM

Drilling Co.: Layne-Western

Date Drilled: 14 Nov 91

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Boring BH-1
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES
CORPORATION

Depth (Feet)	Blows	PID	S	Graphic	Description
0					
		N/A			
5		3.2			Silty Clay, brown very dense, moist
		3.3			
10		4.5			
					Clayey Sand, light brown, subrounded, fine-medium grained; 60% sand, moist
		400			
15		750			
20					

Logged By: JHM

Date Drilled: 15 Nov 91

Drilling Co.: Layne-Western

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Boring BH-2
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
Operational Technologies
Corporation

Depth (Feet)	Blows	PID	S	Graphic	Description
0					
5		3.2 3.2			Silty Clay, brown very dense, moist
10		NR NR			Clayey Sand, light brown, subrounded, fine-medium grained; 60% sand, moist
15		2.6 2.6			Sand, light brown medium-coarse grained; 70% sand, subrounded to subangular, moist
20					

Logged By: JHM

Date Drilled: 16 Nov 91

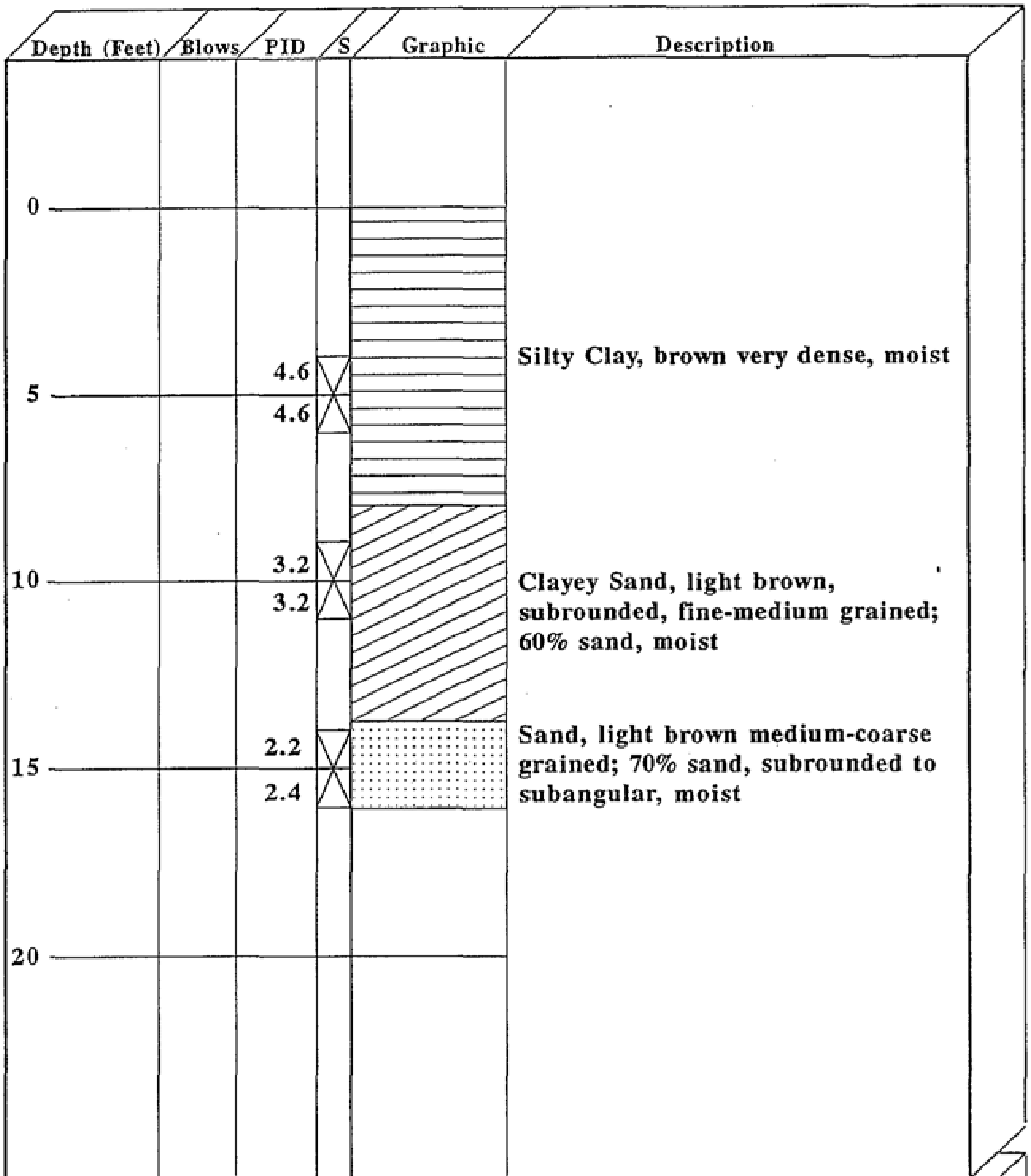
Drilling Co.: Layne-Western

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Boring BH-3
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
Operational Technologies Corporation



Logged By: JHM

Date Drilled: 16 Nov 91

Drilling Co.: Layne-Western

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Boring BH-4
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
Operational Technologies Corporation

Depth (Feet)	Blows	PID	S	Graphic	Description
0					
		3.1			Silty Clay, brown very dense, moist
5		3.1			
		3.2			
10		3.2			
					Clayey Sand, light brown, subrounded, fine-medium grained; 60% sand, moist
		2.1			
15		2.2			
20					

Logged By: JHM

Drilling Co.: Layne-Western

Date Drilled: 16 Nov 91

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Boring BH-5
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION

Depth (Feet)	Blows	PID	S	Graphic	Description
0					
5		3.2 4.1			Silty Clay, brown very dense, moist
10		0.1 0.1			
15		2.1 2.4			Sand, light brown medium-coarse grained; 70% sand, subrounded to subangular, moist
20					

Logged By: JHM

Drilling Co.: Layne-Western

Date Drilled: 16 Nov 91

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Boring BH-6
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION

Depth (Feet)	Blows	PID	S	Graphic	Description
0					
5		13.8			Silty Clay, brown very dense, moist
		14.5			
10		21.3			
		23.3			Clayey Sand, light brown, subrounded, fine-medium grained; 60% sand, moist
15		21.3			
		21.8			
20		17.4			Sand, light brown medium-coarse grained; 70% sand, subrounded to subangular, moist
25		13.3			
		12.9			

Logged By: JHM
Drilling Co.: Layne-Western

Date Drilled: 14 Nov 91
Drilling Method: Hollow-Stem Auger
Sampling Method: 2" Split Spoon

Log of Monitor Well MW-1
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES
CORPORATION

Depth (Feet)	Blows	PID	S	Graphic	Description
0					Portland Cement Concrete
		10.1			
5		10.1			Silty Clay, brown very dense, moist
		20.2			
10		20.2			Clayey Sand, light brown, subrounded, fine-medium grained; 60% sand, moist
		16.6			
15		20.2			Sand, light brown medium-coarse grained; 70% sand, subrounded to subangular, moist
20					

Logged By: JHM

Date Drilled: 14 Nov 91

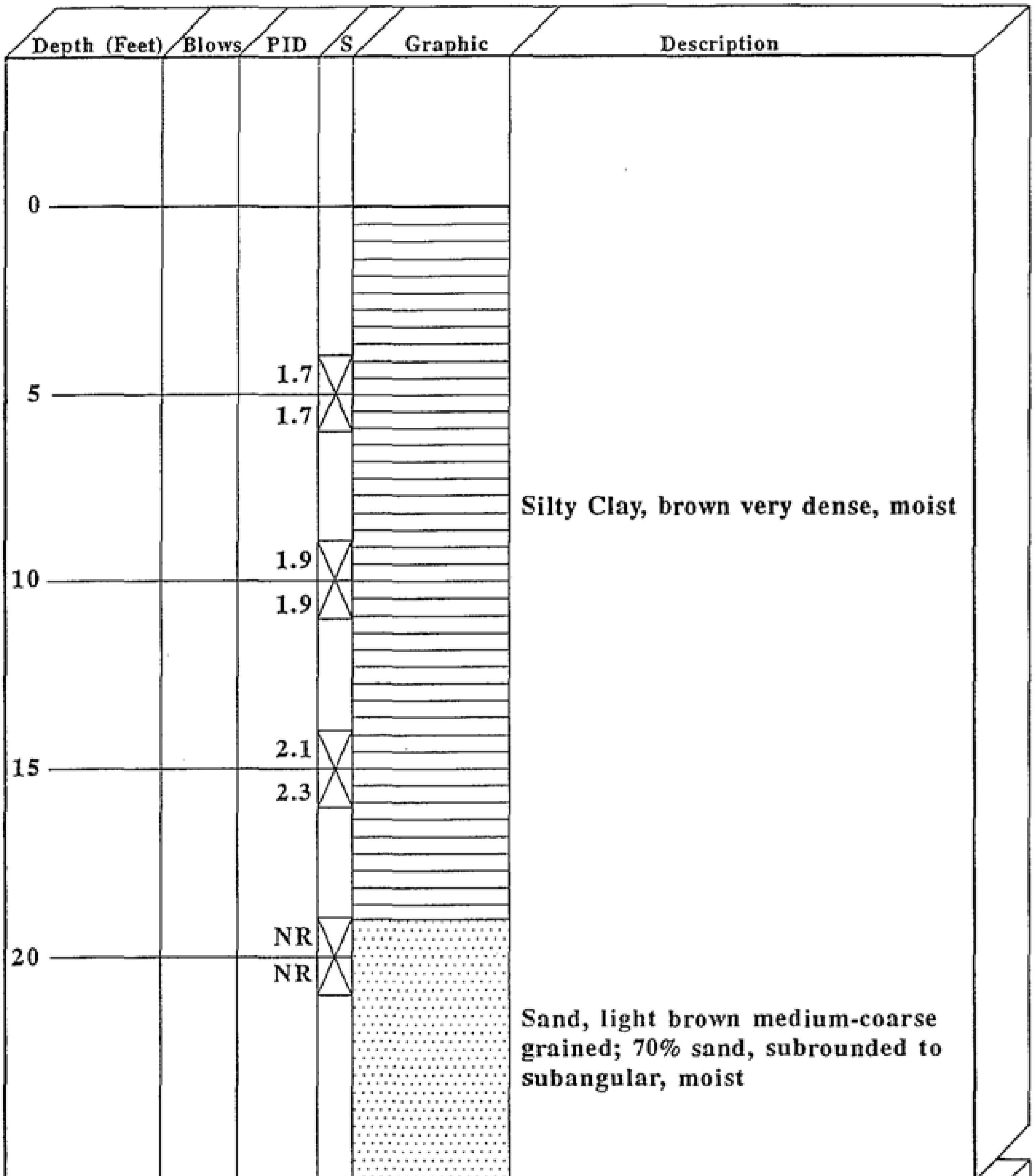
Drilling Co.: Layne-Western

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Monitor Well MW-2
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION



Logged By: JHM

Drilling Co.: Layne-Western

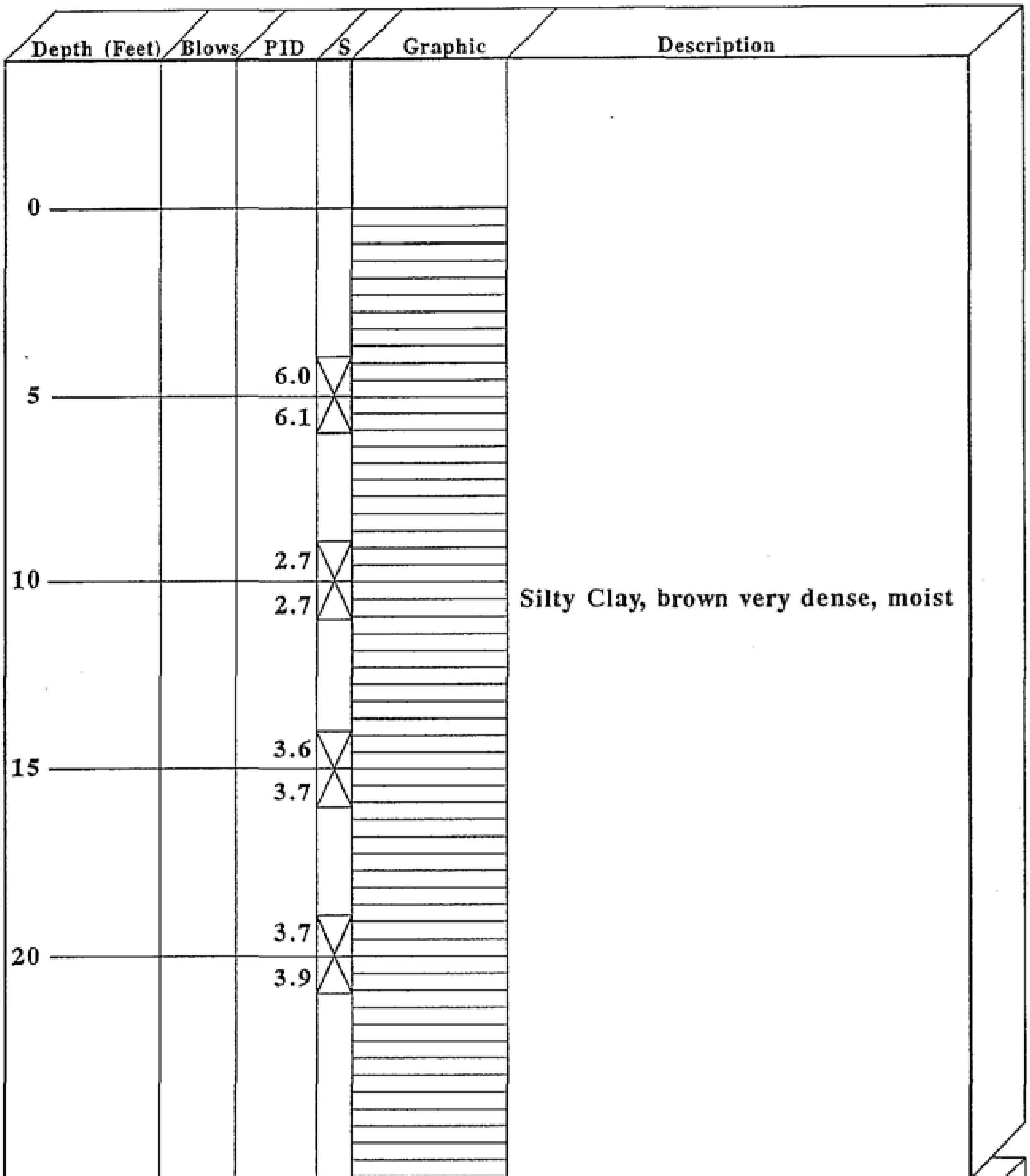
Date Drilled: 15 Nov 91

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Monitor Well MW-3
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION



Logged By: JHM

Drilling Co.: Layne-Western

Date Drilled: 17 Nov 91

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Monitor Well MW-4
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION

Depth (Feet)	Blows	PID	S	Graphic	Description
0					
		2.0			
5					
		2.0			
					Silty Clay, brown very dense, moist
		2.0			
10					
		2.1			
		3.3			
15					
		3.2			
					Clayey Sand, light brown, subrounded, fine-medium grained; 60% sand, moist
		1.9			
20					
		1.8			

Logged By: JHM

Drilling Co.: Layne-Western

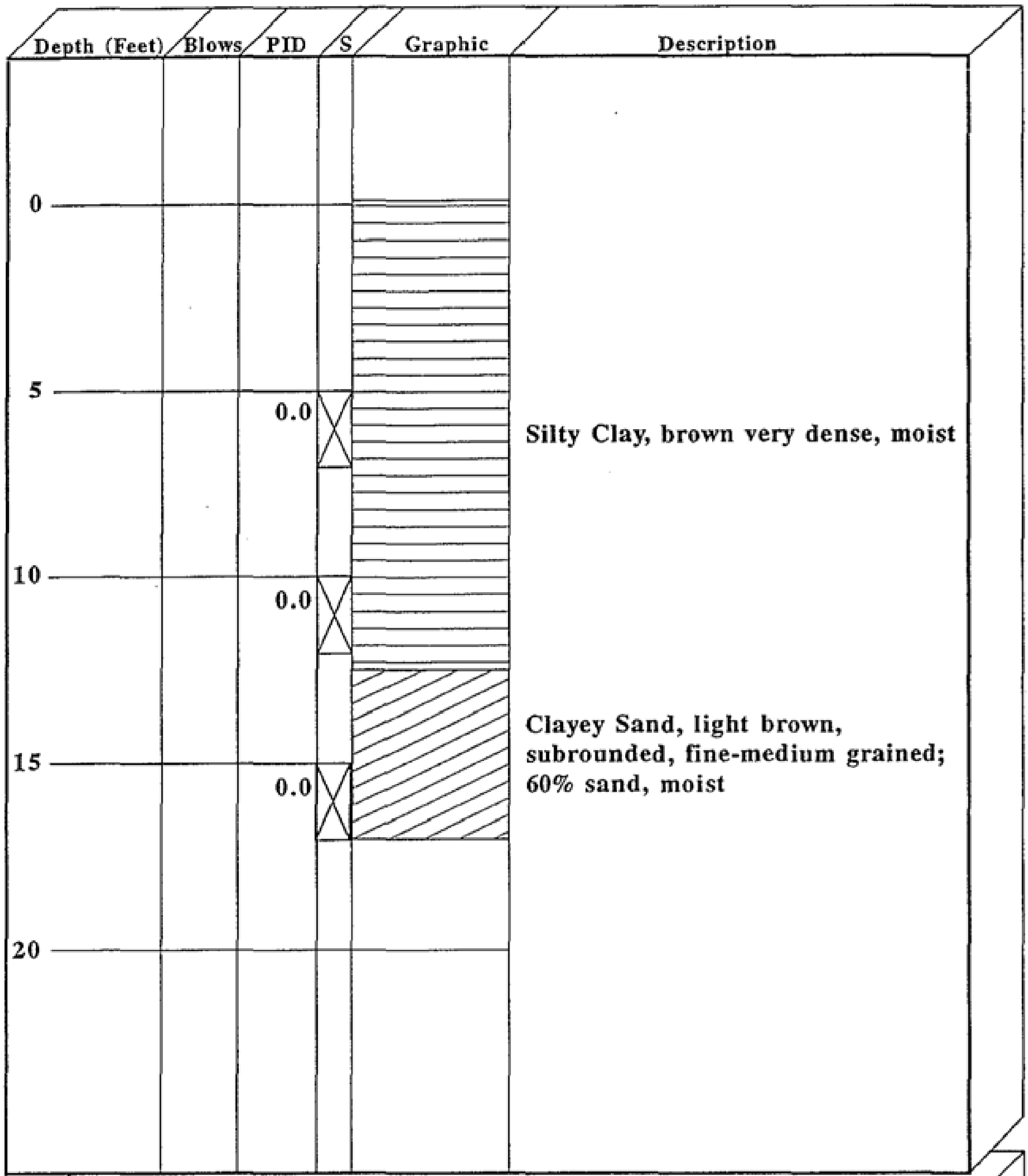
Date Drilled: 18 Nov 91

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Monitor Well MW-5
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
Operational Technologies Corporation



Logged By: JHM

Drilling Co.: Layne-Western

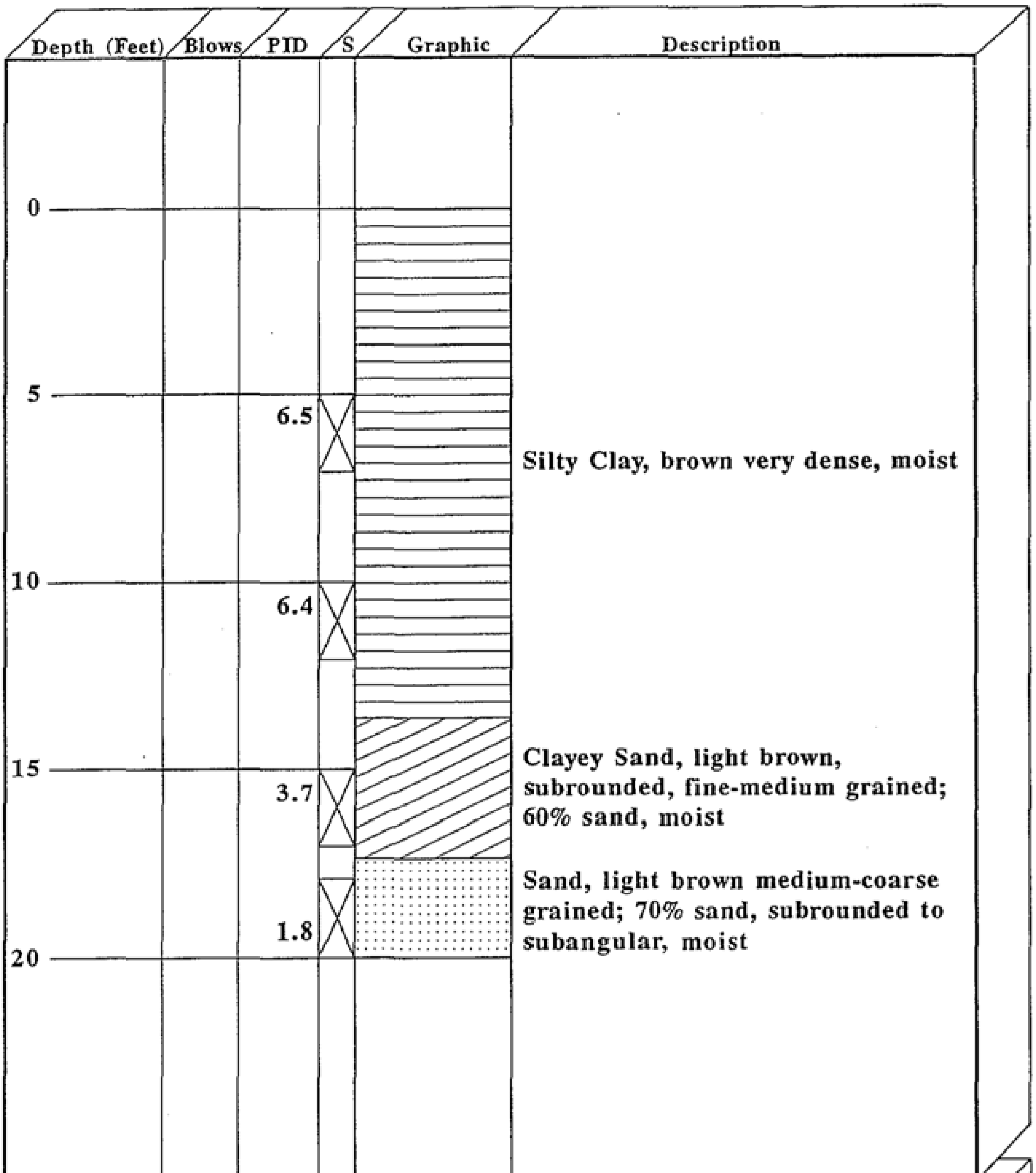
Date Drilled: 19 Nov 91

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Monitor Well MW-6
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
Operational Technologies Corporation



Logged By: JHM

Date Drilled: 19 Nov 91

Drilling Co.: Layne-Western

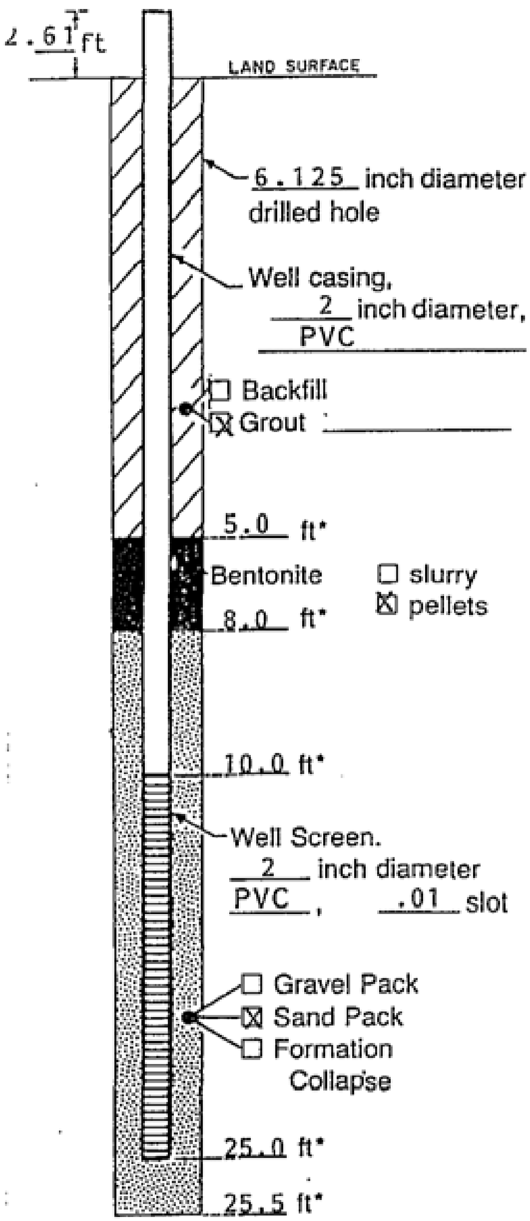
Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Monitor Well MW-7
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
Operational Technologies Corporation

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRG Lincoln, NE   Well LANGB-MW 1

Town/City Lincoln

County Lancaster   State Nebraska

Permit No. N/A

Land-Surface Elevation and Datum 1162.54 feet ASL   ☒ surveyed ☐ estimated

Installation Dates(s) 14 Nov 91

Drilling Method Hollow Stem Auger

Drilling Contractor Layne-Western Company, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)

Bailer & Rediflow 2 pump

Fluid Loss During Drilling None gallons

Water Removed During Development 39 gallons

Static Depth to Water 14.90 feet below M.P.

Pumping Depth to Water ______ feet below M.P.

Pumping Duration 2.0 hours

Yield ______ gpm   Date 20 Nov 91

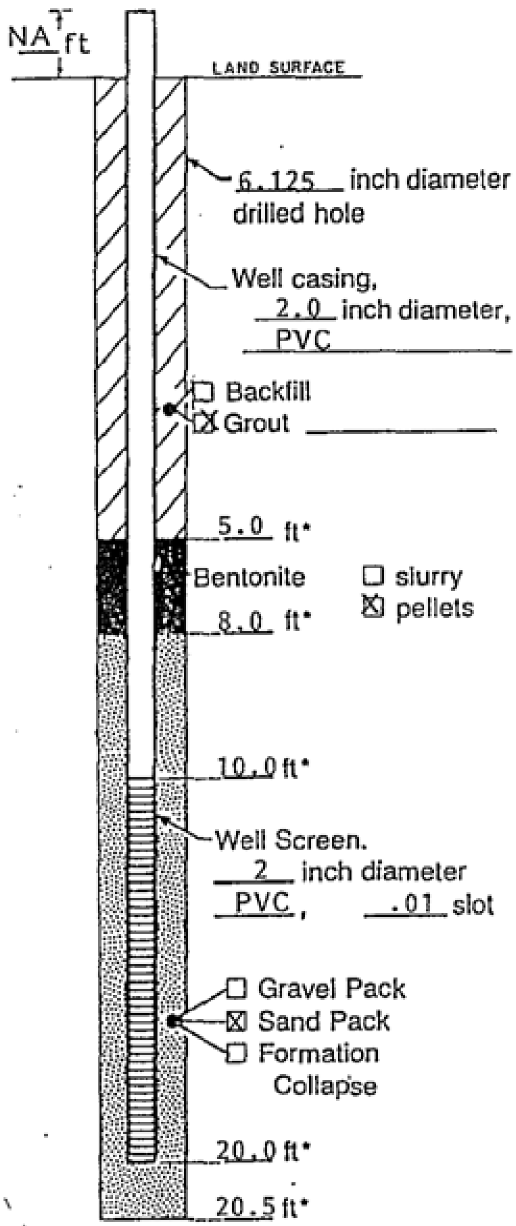
Specific Capacity ______ gpm/ft

Well Purpose Ground Water Monitoring

Remarks

Prepared by

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRG Lincoln, NE Well LANCB MW-2

Town/City Lincoln

County Lancaster State Nebraska

Permit No. NA

Land-Surface Elevation and Datum 1160.88 feet ASL ☒ surveyed ☐ estimated

Installation Dates(s) 14 Nov 91

Drilling Method Hollow Stem Auger

Drilling Contractor Lanyne-Western

Drilling Fluid None

Development Techniques(s) and Date(s)
Bailer & Rediflow 2 pump & surge block

Fluid Loss During Drilling None gallons

Water Removed During Development 17 gallons

Static Depth to Water 14.89 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration 3.5 hours

Yield NA gpm Date 20 Nov 91

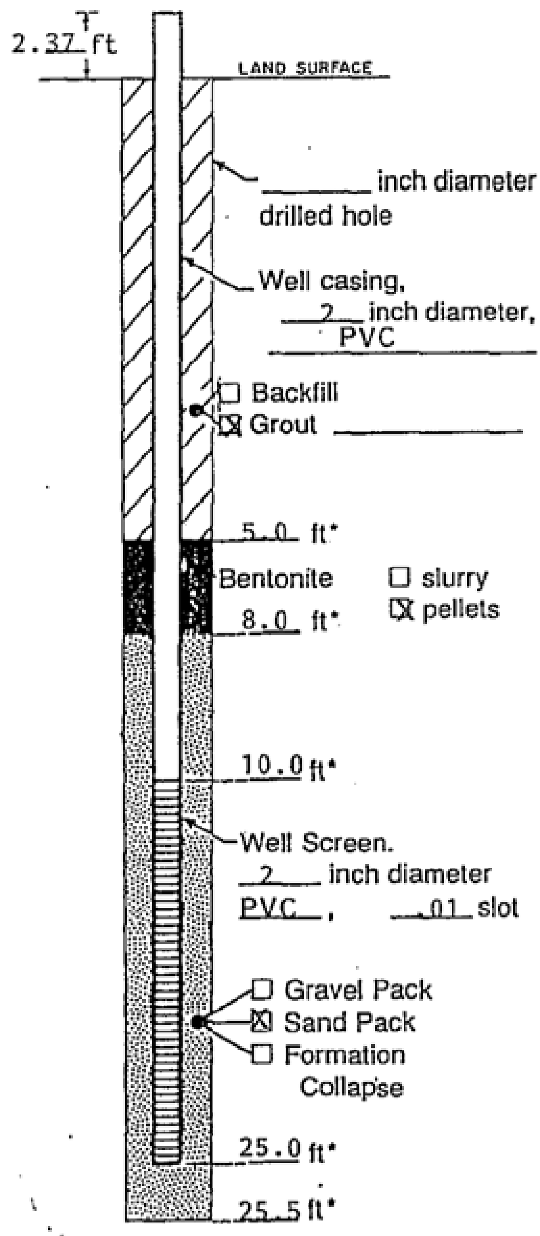
Specific Capacity NA gpm/ft

Well Purpose Ground Water Monitoring Well

Remarks Well recovered very slowly

Prepared by

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRC Lincoln, NE Well MW-3

Town/City Lincoln

County Lancaster State Nebraska

Permit No. NA

Land-Surface Elevation and Datum 1162.54 feet ☒ surveyed

ASL ☐ estimated

Installation Dates(s) 15 Nov 91

Drilling Method Hollow Stem Auger

Drilling Contractor Layne-Western

Drilling Fluid None

Development Techniques(s) and Date(s)

Rediflow 2 pump

Fluid Loss During Drilling None gallons

Water Removed During Development 42 gallons

Static Depth to Water 15.00 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration 2.0 hours

Yield NA gpm Date 20 Nov 91

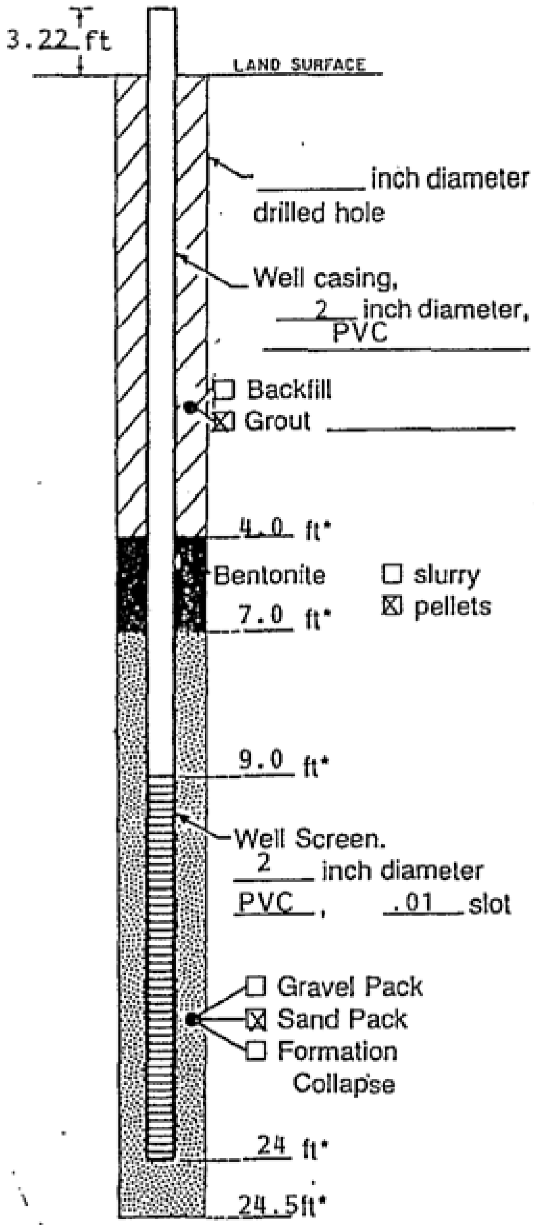
Specific Capacity NA gpm/ft

Well Purpose Ground Water Monitoring Well

Remarks

Prepared by

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRG Lincoln, NE Well LANGB MW-4

Town/City Lincoln

County Lancaster State Nebraska

Permit No. NA

Land-Surface Elevation and Datum 1164.39 feet ASL

☒ surveyed

☐ estimated

Installation Dates(s) 17 Nov 91

Drilling Method Hollow stem Auger

Drilling Contractor Layne-Western

Drilling Fluid None

Development Techniques(s) and Date(s)

Rediflow 2 pump

Fluid Loss During Drilling ______ gallons

Water Removed During Development 47 gallons

Static Depth to Water 17.00 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration 2.0 hours

Yield NA gpm Date 20 Nov 91

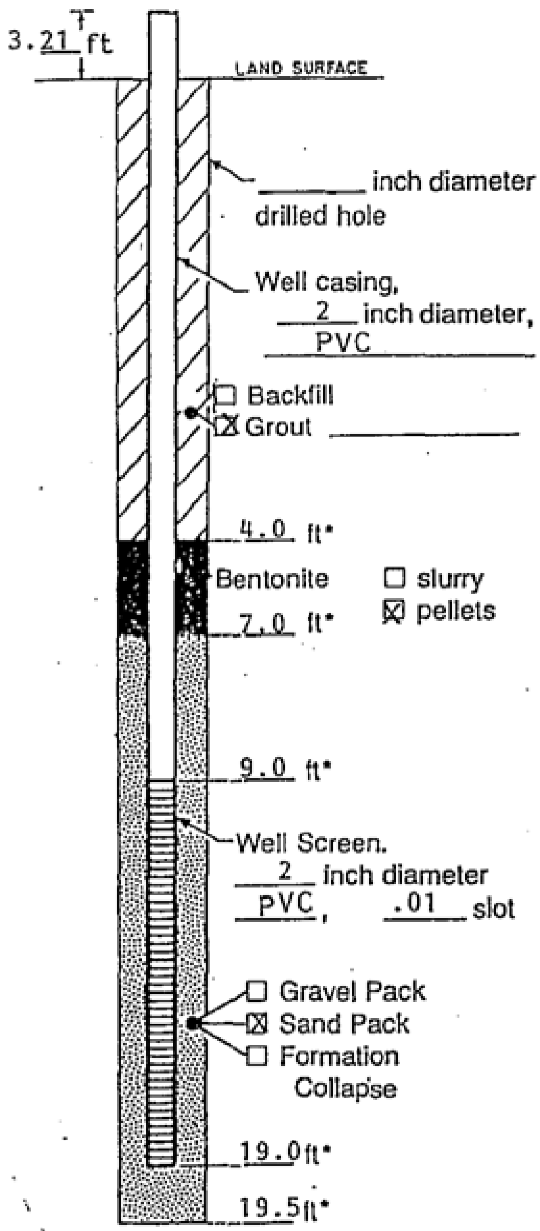
Specific Capacity NA gpm/ft

Well Purpose Ground Water Monitoring Well

Remarks ______

Prepared by ______

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRG Lincoln, NE Well LANGB MW-5

Town/City Lincoln

County Lancaster State Nebraska

Permit No. NA

Land-Surface Elevation and Datum 1164.93 feet ☒ surveyed ☐ estimated

Installation Dates(s) 18 Nov 91

Drilling Method Hollow Stem Auger

Drilling Contractor Layne-Western

Drilling Fluid None

Development Techniques(s) and Date(s)

Rediflow 2 pump

Fluid Loss During Drilling None gallons

Water Removed During Development 42 gallons

Static Depth to Water 17.29 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration 1.5 hours

Yield NA gpm Date 20 Nov 91

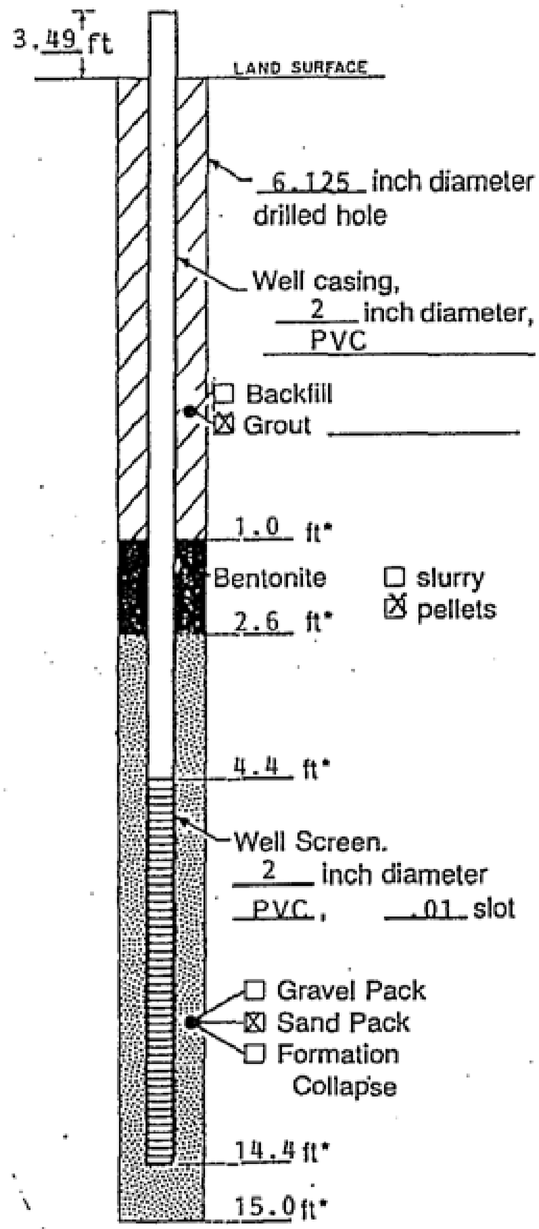
Specific Capacity NA gpm/ft

Well Purpose Ground Water Monitoring Well

Remarks

Prepared by

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRG Lincoln, NE Well LANGB MW-6

Town/City Lincoln

County Lancaster State Nebraska

Permit No. NA

Land-Surface Elevation and Datum 1155.81 feet ASL

☒ surveyed
☐ estimated

Installation Dates(s) 19 Nov 91

Drilling Method Hollow Stem Auger

Drilling Contractor Layne-Western

Drilling Fluid None

Development Techniques(s) and Date(s)
Rediflow 2 Pump & Bailer

Fluid Loss During Drilling NA gallons

Water Removed During Development 40 gallons

Static Depth to Water 9.20 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration 1.0 hours

Yield NA gpm Date 20 Nov 91

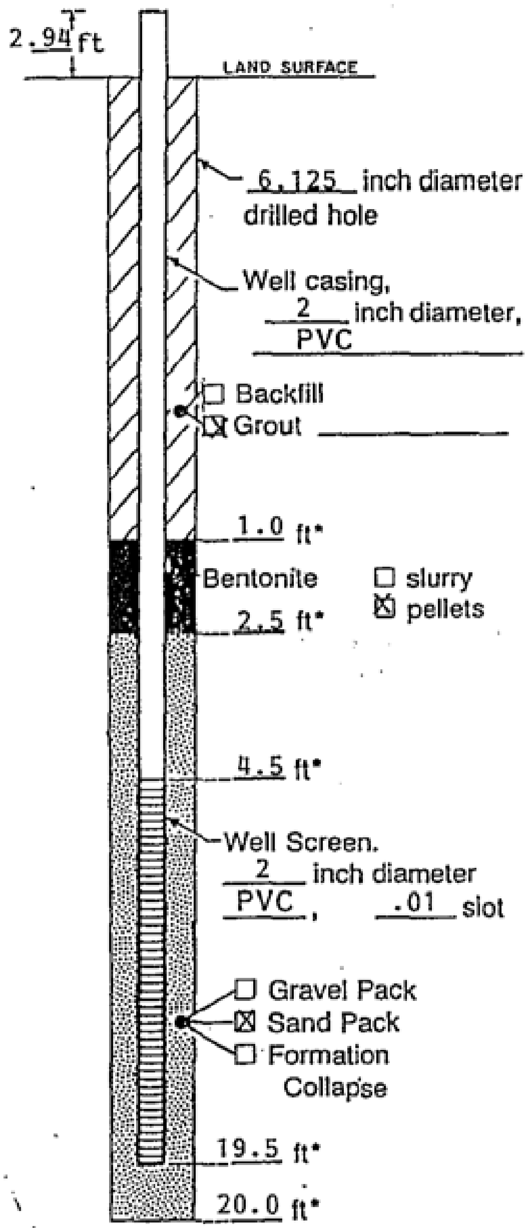
Specific Capacity NA gpm/ft

Well Purpose Ground Water Monitoring Well

Remarks

Prepared by

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRG Lincoln, NE Well LANGB MW-7

Town/City Lincoln

County Lancaster State Nebraska

Permit No. NA

Land-Surface Elevation and Datum 1154.92 feet ASL ☒ surveyed ☐ estimated

Installation Dates(s) 19 Nov 91

Drilling Method Hollow Stem Auger

Drilling Contractor Layne-Western

Drilling Fluid None

Development Techniques(s) and Date(s)

Rediflow 2 pump & bailer

Fluid Loss During Drilling None gallons

Water Removed During Development 40 gallons

Static Depth to Water 8.33 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration 1.5 hours

Yield NA gpm Date 20 Nov 91

Specific Capacity NA gpm/ft

Well Purpose Ground Water Monitoring Well

Remarks

Prepared by

APPENDIX B

QUALITY CONTROL AND QUALITY ASSURANCE

Operational Technologies Corporation
QUALITY ASSURANCE/QUALITY CONTROL PLAN FOR AN ENVIRONMENTAL SITE ASSESSMENT

SECTION 1: BACKGROUND INFORMATION

Site Name:	Lincoln ANG Base, Nebraska	**Task No.:** N/A
Site Location:	Lincoln, Nebraska	
Contractor Name:	Operational Technologies Corporation 4100 N.W. Loop 410, Suite 230 San Antonio, Texas 78229	**Contract No.:** 130610039
Date:	December 2, 1991	

Key Contract Personnel:

Name	Discipline
John Morris	Project/Site Manager
Richardo Saucedo	Environmental Engineer
Steve Wilson	QA/OC

Key Base Points of Contact:

Name	Organization 155th TRGp
TSgt T. W. Ennis	Bioenvironmental Office
Major Carl Willart	Environmental Office
Scott Sandquist	BCE

Approvals:

Title	Signature	Date
Project QA Manager	[signature]	4 Dec 91
QA Technician	N/A	N/A
Site Manager	[signature]	2 Dec 91
Project Manager	[signature]	2 Dec 91

Name & Type of Laboratory Performing Analysis:

Name: HWS Technologies, Inc., 825 T Street, Lincoln, NE 68501
Type: Full Service

Drillers: Land-Western Company, Inc., 1900 Shawnee Mission Parkway, Shawnee Mission, KS 66201

Background:

Survey: Jagger Porter Surveyors, Lincoln, NE

Brief description of events or occurrences leading to initiation of sampling activity:

Oil-Gas Separator excess to ANG needs; Base pulled tanks. Subsequent city trenching for new sewer line revealed suspected contaminated dirt. May have been from former site.

List of chemicals that may have contributed to contamination:

White Oil
TP-4

Suspected range of contamination (if known): N/A

Sampling area size: 200 Ft X 500 Ft Nearest residence: 1 mile

Nearest well(s):

Private:	2 + miles North and 2 + miles S.W. of site - rural wells only
Industrial:	Kawasaki Plant 2 + miles North of site
Municipal:	None
Irrigation:	None
Other:	None
Sources:	City Water Dept. (John Marinsky/471-7571) County Health Dept (Jerry Hood/471-8029)

Subsurface structures near site (basements, utility lines, etc.):

Gas Note: Lines clearly marked with flags and paint prior to drilling operations
Sewer
Telephone
Electricity

Description of local water table: Approximately 12 ft. from surface.

Distance to surface water: Old Oak Creek channel adjacent to site contains surface water.

Owner Name: 155th TAC RECCE Group Phone:________________
Address: Lincoln ANG Base, NE

Operator Name: Same as above Phone: ________________
Address: Same as above

Is site active? _____ Yes __X__ No _____ Unknown

Actual site inactive, but located adjacent to active fuel tank storage and aircraft parking ramps.

Do you have a site access agreement? __X__ Yes _____ No

Site access part of contractural agreement with National Guard Bureau.

Have you acquired all required permits to conduct sampling/drilling?

__X__ Yes _____ No

Do any wells need to be relocated to accommodate nearby subsurface obstructions?

__X__ Yes _____ No

MW-5 relocated to accommodate gas line.

Are there any workers onsite? If yes, approximate # _____ Yes __X__ No

Information from previous investigations:

Engineering Science report used as background for site work plan.

Analytical Data (from previous investigations):

Engineering Science Report used as background for site work plan.

Has a release of hazardous substances into the air, water, or ground been previously documented at the site? (If yes, describe):

Yes - evidence of discolored soil during city sewer trenching.

Have odors been reported?

Yes - during tank removal and sewer line installation.

Are there any reports of adverse health effects (e.g., headaches, nausea, dizziness) potentially resulting from migration of hazardous substances through the air?

None reported

Has foul-tasting or foul-smelling water been reported by any nearby drinking water users?

No.

DATA QUALITY OBJECTIVES:

The levels of quality required for the data will be established to answer these project assessment goals:

1. To determine whether or not an underground storage tank or its associated piping has leaked.
2. To determine the nature and the extent of soil and groundwater contamination as related to spills.
3. To determine the existence of floating product and the extent of contamination through the use of field screening methods.
4. To verify the severity of contamination through the laboratory analysis of samples taken from the site.
5. To provide the ANG with a recommended course of action based on the analyses of valid data.

DATA USE OBJECTIVES:

Are these data intended for use in litigation?	____ Yes	X No
Are these data intended for use in site characterization?	X Yes	____ No
Are these data intended for use in risk assessments?	X Yes	____ No
Are these data intended for use in monitoring purposes?	X Yes	____ No
Are these data intended for use in PRP determination?	____ Yes	X No

Please indicate below any other intended uses of project data.
N/A

SECTION 2: PROJECT METHODOLOGIES

SAMPLE REQUIREMENTS:

SITE SAMPLING ACTIVITY		REQUIRED	NOT REQUIRED
Vapor Monitoring		X	
Surface Soil Sampling	0 - 1 foot depth	X	
Subsurface Soil Sampling	>1 foot depth	X	
Surface Water Sampling			X
Monitoring Well Installation		X	
Well Development & Purging		X	
Groundwater Sampling With Bailers		X	
Wipe Sampling			X
Field Equipment Decontamination		X	

REQUIRED EQUIPMENT:

Is all required equipment on site and serviceable? __X__ Yes _____ No

Are operators thoroughly familiar with proper equipment operation?

Yes.

Are all necessary pieces of equipment available throughout the planned task period?

Yes - all equipment OpTech supplied.

If the assessment period is extended, is necessary equipment fully available?

Yes.

In accordance with work plan, list required equipment: (List of equipment)

PID	Bailers (Teflon)	Camera & Film	Knife
Ph/Conducting/Temp Meter	Plastic rope	Plastic bottles	Tool Kit
?	Decon tubs	First Aid Kit	Site Boundary Marker
Hard Hats	Brushes	Sample bottles	Spray Paint
Boots	Alconox	Duct Tape	Sponge
Rubber Gloves	Methanol	Plastic bags	Stencils
Rubber Gloves (Disposable)	Two Pump Sprayers	Plastic sheets	Waterproof boots
Bailers (PVS)	Split Spoon Samplers	Aluminum Foil	Indelible pens

[Use Continuation Sheet If Necessary]

Are new latex gloves available in sufficient quantity for all site personnel?

Yes - multiple boxes available.

Are all personnel aware that new gloves must be used to collect samples where cross-contamination of samples may be a problem?

Yes - Procedures for glove exchange at time of decontamination established.

Have all sampling personnel passed the 40-hour SARA/OSHA training program for work at hazardous materials sites?

Yes.

Have all sampling personnel been trained on the specific site plan and the contaminating materials expected to be encountered on the site?

Yes - through plan reivew and objectives briefings by Site Manager.

VAPOR MONITORING:

Once the UST and associated piping were removed, was approximately 2 feet of soil excavated from below the tank?

N/A - tank already removed.

Was exposed soil tested for the presence of volatile organic compounds using a portable photo ionization detector (PID) or an Organic Vapor Detector (OVA)?

If initial PID readings were >100 parts per million (ppm), was the soil excavation continued until PID readings were <100 ppm or until 5 feet of soil was excavated?

N/A - no soil excavation - only soil borings.

Once the final boring depth was reached, were soil samples taken for lab analysis?

Yes - soil samples taken every 5 ft. until reaching top of water table.

SURFACE SOIL SAMPLING:

Were soil samples taken from each side wall of the excavation?

N/A - surface samples taken from suspected contaminated soil from city work and tank removal.

Are hydraulic seals and locking well covers properly used to reduce the potential for cross-contamination of monitoring wells?

Yes - well covers individually stenciled with florescent spray paint to ensure ID.

Is the borehole at least 2 inches in diameter larger than the casing diameter to permit the insertion of the tremie pipe?

Yes.

Was the hole drilled slightly deeper than the required depth to allow for the combined length of casing and screen?

Yes.

Was the final completion depth sounded with a decontaminated, weighted tape before continuance of well placement?

Yes.

With the auger flights in place, was the surface properly prepared for the wellhead pad?

Yes - forms placed for pad pouring - escess dirt removed.

Were the casing and screen properly decontaminated before makeup?

Yes.

When the drill rods and bit or the auger flights were withdrawn (NOT APPLICABLE FOR HOLLOW-STEM AUGERS), was the depth of the hole checked with a decontaminated, weighted surveyor's tape?

N/A.

Was the casing string, screen down, hung over or in the top of the borehole? Was the casing string then lowered into the well? Was care taken to not bump the sides of the borehole to prevent unnecessary sloughing?

Yes.

Was the filter pack properly installed through the tremie? Were at least 6 inches of filter pack spotted at the bottom of the hole, under the screen? Was the tremie slowly withdrawn so that the filter pack was placed evenly around the screen without bridging? Was the filter pack installed at least 2 - 3 feet above the screen? Was a minimum of 2 - 3 feet of bentonite used above the screen?

Yes - no theme used. Filter pack poured with care to prevent bridging.

If >35 feet deep, were proper procedures used to tremie onto the top of the filter pack? If <35 feet, were bentonite pellets or chips (not powder) gravity fed onto the top of the filter pack?

Yes.

If below the water table, were bentonite chips used, rather than granular, flake, or slurried bentonite?

Yes. no granular/flake/slvary on site.

If a tremie pipe was used, was it slowly withdrawn as bentonite was added to ensure an evenly distributed seal around the annulus? Was the depth checked with a decontaminated, weighted surveyor's tape?

N/A.

If the bentonite seal was installed above the water table line, was it properly hydrated according to manufacturer's instructions? Was proper hydration time allowed before proceeding?

Yes.

Was the concete used for the wellhead pad properly mixed and placed? Was the well cover locked?

Yes. locked by OpTech personnel - keys given to Bioenvironmental Office.

Was the well identification stamped in the protective casing?

All covers stenciled with flourescent orange paint. All drums stenciled with well ID, Non-Potable Water and OpTech name and telephone number.

WELL DEVELOPMENT AND PURGING:

If a cement bentonite grout was used to seal the annular space, were at least 24 hours allowed after completion?

Yes.

Were wells purged of stagnant water immediately before groundwater sampling?

Yes. Amounts dependent on water levels and development history.

Was each well sampled within 3 hours of purging? If in a low recharge area, was each well sampled within the maximum time of 24 hours from purging?

Yes.

Were wells purged in accordance with protective clothing required in the site Health and Safety Plan?

Yes.

After opening, were the condition of the wellhead, cover, and surveyed reference mark noted and logged?

Yes - during development and sampling wells surveyed during development operations.

Was the well volume (volume of water within the well bore) calculated using the casing diameter or borehole diameter in feet and the distance from the well bottom to the static water level in feet?

Yes.

Was the well volume logged properly?

Yes.

Was the pump and tubing or the bailer prepared properly and lowered into the casing?

Yes.

Were the proper number of well volumes required in the project plan removed (generally, 3 - 5; less in low-recharge aquifers)? Was all pertinent data logged in the field logbook?

Yes. Amounts based on bailer volume and well volume. Varied by well.

Were pump assemblies or bailers properly removed and decontaminated?

Yes - strict decontamination procedures used.

Was the well site cleaned? Was the well cover locked?

Yes - end of each day.

Was produced water properly disposed of according to the project work plan?

Yes - drummed pending lab results.

GROUNDWATER SAMPLING WITH BAILERS:

After preparing the well site, was the well opened and the condition of the casing and cap noted and logged?

Yes.

Were vapors checked for using vapor analyzing equipment?

Yes-PID

Was the depth to well bottom and static water level measured and recorded?

Yes - decontaminated weighted electronic tape.

Were at lease 3 volumes removed from the well using decontaminated bailers attached to a secured line?

Yes - teflon bailer used only for sampling. PVC bailers used during well development.

Were the bailers lowered carefully so as not to touch the casing or the bottom of the well?

Yes.

Was the bailer allowed to enter the water slowly to prevent aeration (particularly when VOA and SVOA samples were taken)?

Yes.

Was the first bailer of water used as a rinse and then discarded?

Yes.

When brought back to the top of the well, was care taken so that the attached line did not touch the ground?

Yes - hand over hand technique used.

Was the bailer hung on a bailer stand, other support, or by an assistant to keep it off the ground?

Hand held at all times.

When removing water, was the well allowed to recover sufficiently to allow the bailer to be completely submerged without hitting the well bottom?

Yes.

Was the bailer decontaminated after purging?

Yes - rope replaced between wells. Ropes never allowed to touch ground.

Were volatile organic analyte (VOA) samples obtained first from the well? Were semivolatiles (SVOA) obtained second? Were other samples obtained third?

Yes - BTEX obtained afterVOA/SVOS.

When obtaining the VOA and SVOA samples, was the bailer release valve used to carefully transfer water in to the sample bottle? Was the sample bottle tilted to prevent aeration?

Yes - sample bottles inverted to check for bubbles - no headspace allowed.

If sample filtration was required, was it done immediately after sample retrieval?

N/A.

Were samples placed in proper sample containers, preservative added (if needed) capped, sealed, labeled, and immediately placed in the chilled field cooler?

4 drops HCL in each sample bottle. Labels prefilled out. Chilled immediately and logged in C of C.

Was the well area cleaned up after sampling? Was the well cover closed and locked? Were field activities recorded in the field log book?

Yes. Site Managers directed site areas to be kept clean. Final cleaning on sampling day completed.

WIPE SAMPLING:

N/A.

FIELD EQUIPMENT DECONTAMINATION:

Have all decontamination supplies been brought to the work site?

Yes.

Is plastic sheeting placed on the ground to contain all equipment to be cleaned?

Yes - care taken to keep pump sprayer heads uncontaminated as well.

If exposed to contaminants, was field equipment properly decontaminated?

+ Sprayed using steam or high-pressure sprayer with soapy water - hands scrubbed also using warm water
+ Rinsed using potable (tap) water. Yes.
+ Sprayed with distilled water with a manual pump sprayer; rinsed with methanol. Yes.
+ Removed from the area and allowed to air dry

Was sampling equipment:

+ Thoroughly washed in soapy water to remove all clinging dirt — Yes
+ Rinsed in clear tap water — Yes
+ Rinsed in distilled water — Yes
+ Rinsed with methanol — Yes
+ Rinsed in hexane if having come in contact with polar organic compounds such as pesticides, PCBs, or fuels — N/A

After drying, was decontaminated sampling equipment wrapped in aluminum foil and properly stored? Yes

Were all contaminated waters, used solvents and acids, plastic sheeting, disposable gloves, boots, and clothing placed in drums and properly labeled for disposal? Yes

Were liquids and solids drummed separately? Yes

FIELD LOG BOOKS:

Was each field employee keeping a field log book to record daily field activities? Yes

Was the log book written in indelible ink and did it contain, at a minimum:

+ Date, time, and type of activity — Yes
+ Names and organizations of persons on-site — Yes
+ Weather conditions — Yes
+ Sampling and preservation procedures — Yes
+ Sampling locations, depths, and conditions — Yes
+ Time of sampling and sample description — Yes
+ Tank removal details — N/A
+ Remarks — Yes
+ Signature of author — Yes
+ Well depts — Yes
+ Readings from equipment — Yes

SAMPLING DOCUMENTATION:

Were preprinted adhesive-backed labels affixed to sample jars and properly filled out using indelible ink with: Lab Labels Used

+ Project Number	
+ Sample ID Number	Yes
+ Date & Time of Sample Collection	Yes
+ Sample Location	Yes
+ Name of Sample	Yes
+ Sample Type	Yes
+ Sample Preservative (if any)	Yes

SAMPLE SEALS:

Were preprinted adhesive-backed paper seals placed over the lid of each sample jar at the time of collection?

No. Lab procedures did not require or provide - OpTech will supply in future.

Were paper seals placed on the ice chests to seal them at the time of transport to the laboratory?

No - ice chest kept under personal control of Site Manager.

Did the seals contain all of the following in indelible ink: N/A

+ Sample Number
+ Date of Sample Collection
+ Signature and Printed Name
+ Title of Sample

SECTION 3: CHAIN OF CUSTODY PROCEDURES

Were all personnel thoroughly familiar with procedures to ensure the possession and handling of samples was strictly controlled?

Yes.

Were all personnel familiar with the risk of invalidating samples if chain of custody procedures were broken?

Yes.

Were procedures in effect to ensure chain of custody forms were preserved and not discarded?

Yes.

Were all personnel familiar with procedures to make corrections on chain of custody forms?

+ All corrections initialed and dated	Yes
+ Entry errors lined out with a single line so that writing is still legible	Yes
+ No white out used to cover mistakes	Yes

Were chain of custody forms properly filled out in indelible ink to include:

+	Project name, number, and location	Project/Site Manager filled out at time of sampling.
+	Signature of collector	
+	Date and time of collection	
+	Sample identification numbers	
+	Number of containers in sample set	Yes
+	Description of samples and containers	Yes
+	Names (printed) and signatures of persons who assume custody of the samples	Yes
+	Requested analysis for each sample	Yes
+	Name of laboratory to receive samples	Yes
+	Name of person at OpTech to receive laboratory report	Yes
+	Laboratory turnaround time - Requested 48 hour turnaround.	

Were procedures in effect to ensure samples were in the positive control of personnel at all times?

+	In his or her physical possession	Yes
+	In his or her view	Yes
+	Secured by the person in an area restricted to authorized personnel	Yes

When transferring samples, did the responsible person require:

+	The name (printed) and signature of the transferee and the new custodian	Yes
+	The name and the company or agency that each signatory represents	Yes
+	The date and time of transfer	Yes

Were field sampling personnel aware of their responsibilities for the positive control of samples until formal chain of custody transfer to OpTech or laboratory personnel?

Yes.

Were samples kept in a secure area at all times or in a locked, refrigerated storage compartment which is secure from tampering?

Cooled under positive control - transferred directly to Lab.

Are laboratory couriers escorted to the locked storage area by the sample custodian and formal chain of custody procedures used to transfer custody?

Yes.

Is a photocopy of the chain of custody sheet made and placed in the project file?

Yes.

Does the original of the chain of custody sheet accompany the samples to the laboratory?

Yes.

When sample analysis has been completed, is the original of the chain of custody form returned to OpTech for filing in the project file?

Yes.

SECTION 4: CALIBRATION PROCEDURES

Were appropriate field site personnel familiar with calibration requirements specific to the project?

Yes.

Were effective calibration procedures in effect to ensure equipment worked properly and rendered valid measurements?

Yes.

Were EPA-approved calibration methods used?

Yes.

Was calibration required on a periodic basis depending on the requirements of each piece of equipment?

Yes. High reading in PH for one sample - recalibration - reading proved correct.

Were spare parts on hand to keep equipment operational?

N/A

Were preventive maintenance routines conducted on field equipment to ensure their availability?

N/A - equipment cleaned and stored in cases to prevent damage each day.

SECTION 5: DATA QUALITY ASSESSMENT

Were project plan data QA objectives met in terms of:

+	Precision:	From duplicate measurements, the Relative Percent Difference (RPD) met planned goals.	Yes.
+	Completeness:	The total number of measurements judged valid were accomplished to achieve a specified statistical level of confidence in decision making.	Yes.
+	Accuracy:	Where Standard Reference Material (SRM) was used to validate analytical processes, the percent recovery (the measured concentration of SRM divided by the actual concentraton of SRM times 100 percent) was within planned goals.	Yes.

Was each site worker equipped with all needed personal protective gear?

Yes. TYVEX worn - gloves - ear protection - hard hats.

Had site-specific emergency response procedures been developed?

Yes.

Were emergency response procedures briefed at the daily safety meetings?

Yes. coordinated with Base Clinic.

Were specific prohibited activities covered in the safety briefings?

Yes.

Were personal decontamination procedures in effect?

No. Durable gloves during sampling to ensure no cross-contamination.

Were any medical surveillance requirements in effect?

No.

Were all personnel familiar with the site safety record and "lessons learned" from any previous safety incidents?

N/A.

SECTION 8: DELIVERABLES

Were project personnel familiar with deliverable schedules?

Yes.

Were project managers thoroughly familiar with deliverable schedules?

Yes.

Were all deliverable schedules met?

Yes.

APPENDIX C

LABORATORY ANALYTICAL REPORTS

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION

DATA VALIDATION CHECKLIST

PROJECT NAME/NUMBER: LINCOLN AIR NATIONAL GUARD BASE
SAMPLE IDENTIFICATION: LANGB
SAMPLING TEAM: RICARDO SAUCEDO, STEVE WILSON AND JOHN MORRIS
ANALYSIS LABORATORY: HWS TECHNOLOGIES INC, LINCOLN, NEBRASKA
ANALYSIS PERFORMED: SW 846-602, 418.1, 8010A

OVERALL VALIDATION CLASSIFICATION

UNUSUABLE	LEVEL A	LEVEL B

DETERMINED BY/ NAME: STEVE WILSON DATE: 06 NOVEMBER 1991

Criteria	Category	Responsible Party/Source of Information	Reporting Requirements	Pass	Fail	Not Applic.	Exceptions	Initials
LEVEL A CRITERIA		SAMPLING TEAM/ WATER SAMPLING LOG (WSL)	• Sampling date	✓				
			• Sampler(s)	✓				
			• Sampling Site/Well No.	✓				
			• Sampling location description (well location, surface water station)	✓				
			• Sampling depth (for soils)	✓				
			• Collection technique (Bailer or pump type)	✓				
			• Field preparation techniques (sieving, compositing, etc.)	✓				
			• Preservation methods	✓				
			• Visual classification of sample (for soils)	✓				
			• WSLs completed and accounted for	✓				
		ANALYZING LABORATORY/ DATA SUMMARY	• Analysis date & preparation techniques	✓				
			• Analysis methods	✓				
			• Analysis detection limits	✓				
LEVEL B CRITERIA	QUANTITATIVE STATISTICAL SIGNIFICANCE	ANALYZING LABORATORY/ STANDARD OPERATING PROCEDURES	• Documentation of laboratory/field instrumentation calibration	✓				
			• Sampling bottle preparation description	✓				
			• Procedural reference and/or calibration data	✓				
			• Verification of standards (using EPA or NBS standards)	✓				
			• Analysis of laboratory (reagent) blanks	✓				
			• Analysis of laboratory replicates (duplicates and splits)	✓				
			• Analysis of laboratory spikes	✓				
			• Analysis of field replicates (duplicates and splits)	✓				
			• Presentation of tabulated QA data or QC charts/acceptance criteria	✓				
			• QA/QC certification (or Round-Robin testing)	✓				
			• QC limits consistent with EPA's Contract Laboratory Program			✓		
	CUSTODY AND DOCUMENT CONTROL	SAMPLING TEAM/ CHAIN OF CUSTODY FORM	• Chain-of-custody documentation	✓				
			• Documents secured	✓				
			• Form(s) completed	✓				
		ANALYZING LABORATORY/ STANDARD OPERATING PROCEDURES	• Transfer-of-custody documentation available	✓				
			• Laboratory custody documented	✓				
			• Laboratory sample custodian with secured sample storage area	✓				
			• Sampling designation number(s)	✓				
	SAMPLE REPRESENTATIVENESS	SAMPLING TEAM/ CONSISTENT WITH WORK PLAN	• Proper sample collection used	✓				
			• Sample site selection criteria provided representativeness	✓				
		ANALYZING LAB/ STANDARD OPERATING PROCEDURES	• Holding times not exceeded	✓				
			• Suitable sample storage (temperature, light, moisture, etc.)	✓				
			• Proper sample containers used (i.e., inert)	✓				

Comments:

NOTES:
• CHECKLIST SHOULD ACCOMPANY THE SAMPLES ALONG WITH THE CHAIN-OF-CUSTODY FORM
• ALL ENTRIES MUST BE INITIALED BY SAMPLING TEAM OR LABORATORY PERSONNEL

OPERATIONAL TECHNOLOGIES CORPORATION
4100 N.W. Loop 410, Suite 230
San Antonio, Texas 78229-4253
Phone: (512) 731-0000
Fax: (512) 731-0008

HWS TECHNOLOGIES INC.

825 J Street P.O. Box 80358 Lincoln, Nebraska 68501 Telephone (402) 479-2200

ANALYTICAL LABORATORY REPORT

CLIENT: Operational Technologies Inc.
ATTN: Mr. John Morris
4100 NW Loop 410
Suite 230
San Antonio, TX 78279

DATE COLLECTED: 11-14-91
DATE REPORTED: 11-19-91
DATE RECEIVED: 11-14-91
PURCHASE AUTHORIZATION:
JOB NO.: 72-81-8306.00
REPORT NO.: 91B80

CLIENT/FIELD IDENTIFICATION: BH1-SS 16-16.5'

LABORATORY IDENTIFICATION NO.: 37411

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/kg	ND (0.25)	173/91244	111591	RS
Toluene	mg/kg	ND (0.25)	173/91244	111591	RS
Ethylbenzene	mg/kg	ND (0.25)	173/91244	111591	RS
Xylenes (Dimetyhlbenzene)	mg/kg	ND (0.25)	173/91244	111591	RS
1,2-Dichlorobenzene	mg/kg	ND (0.25)	173/91244	111591	RS
1,3-Dichlorobenzene	mg/kg	ND (0.25)	173/91244	111591	RS
1,4-Dichlorobenzene	mg/kg	ND (0.25)	173/91244	111591	RS
Total Recoverable Petroleum Hydrocarbons in Soil	mg/kg	ND (25)	363/91104	111891	PH

End of Sample No. 37411.

CLIENT/FIELD IDENTIFICATION: BH1-SS 16.5-17'

LABORATORY IDENTIFICATION NO.: 37412

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/kg	ND (0.25)	173/91244	111591	RS
Toluene	mg/kg	ND (0.25)	173/91244	111591	RS
Ethylbenzene	mg/kg	ND (0.25)	173/91244	111591	RS
Xylenes (Dimetyhlbenzene)	mg/kg	ND (0.25)	173/91244	111591	RS
1,2-Dichlorobenzene	mg/kg	ND (0.25)	173/91244	111591	RS
1,3-Dichlorobenzene	mg/kg	ND (0.25)	173/91244	111591	RS
1,4-Dichlorobenzene	mg/kg	ND (0.25)	173/91244	111591	RS
Total Recoverable Petroleum Hydrocarbons in Soil	mg/kg	ND (25)	363/91104	111891	PH

End of Sample No. 37412. Report No. 91B80 Continued on Next Page.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: 37412 Matrix Spike (40 ug/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	% Recovery	106	173/91245	111891	RS
Toluene	% Recovery	106	173/91245	111891	RS
Ethylbenzene	% Recovery	107	173/91245	111891	RS
Xylenes (Dimethylbenzene)	% Recovery	107	173/91245	111891	RS
1,2-Dichlorobenzene	% Recovery	99	173/91244	111591	RS
1,3-Dichlorobenzene	% Recovery	91	173/91244	111591	RS
1,4-Dichlorobenzene	% Recovery	103	173/91244	111591	RS

End of Quality Contol Sample.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Inhouse (6.7 mg/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Total Recoverable Petroleum Hydrocarbons	% Recovery	102	363/91105	111891	PH

End of Quality Contol Sample.

Analysis	Detection Limit	Test Method	Description
Benzene	2.0 ug/L	602	Purge and Trap/ G.C.-F.I.D. or P.I.D.
Toluene	2.0 ug/L	602	
Ethylbenzene	2.0 ug/L	602	
Xylenes (Dimethylbenzene)	2.0 ug/L	602	
1,2-Dichlorobenzene	2.0 ug/L	8010A	Purge & Trap G.C.-F.I.D.
1,3-Dichlorobenzene	2.0 ug/L	8010A	
1,4-Dichlorobenzene	2.0 ug/L	8010A	
Total Recoverable Petroleum Hydrocarbons	0.5 mg/L	418.1	Infrared

End of Report No. 91B80.

Sample collection techniques, sample containers, sample sizes, sample preservation and physical/chemical analyses were performed in accordance with "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA 600/4-82-057, "Methods for Chemical Analysis of Water and Wastes," EPA 600/4-79-20, and "Test Methods for Evaluating Solid Waste," EPA SW-846.

ND ( ), where denoted, indicates none detected with the detection limit in parentheses.

By [signature]
Supervisor, Analytical Services Division

MISC

HWS Technologies Inc.
LINCOLN OFFICE
825 J St., Box 80358
Lincoln, NE 68501
402/479-2200

HAZARDOUS WASTE ANALYSIS REQUEST AND CHAIN OF CUSTODY SHEET

PROJECT MANAGER

PROJECT NO.

PROJECT NAME/COMPANY
AIR NATIONAL GUARD
LINCOLN AIRPORT

SAMPLER (Signature)

DATE/TIME
NOV-14-91 / 5:28PM

TESTS REQUESTED: BTEX, TPH, Chlorobenzene

LAB NO.	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NUM. OF CON-TAINERS	BTEX, TPH, Chlorobenzene	REMARKS
37411	11-14-91	5:30			LANGB-BH1-SS-16-16.5'	1	✓	
37412	11-14-91	5:30			LANGB-BH1-SS1-16.5-17'	1	✓	

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COLLABORATIVE LAB (IF REQUIRED)

COLL. LAB ID. NO.	LAB NO. FROM ABOVE	TO LAB NAME, LOCATION	DATE SHIPPED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	11-14-91	5:32	Nancy Brown	11/14/91	5:32						
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Preserved: Yes No Remarks:

HWS TECHNOLOGIES INC.

825 J Street P.O. Box 80358 Lincoln, Nebraska 68501 Telephone (402) 479-2200

ANALYTICAL LABORATORY REPORT

CLIENT: Operational Technologies Inc.
ATTN: John Morris
4100 N.W. Loop 410
San Antonio, TX 78279

DATE COLLECTED: 11-15-91
DATE REPORTED: 11-21-91
DATE RECEIVED: 11-15-91
PURCHASE AUTHORIZATION:
JOB NO.: 72-81-8306.00
REPORT NO.: 91B93

CLIENT/FIELD IDENTIFICATION: BH2-SS 9.5-10'

LABORATORY IDENTIFICATION NO.: 37450

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Toluene	mg/Kg	ND (0.25)	173/91245	111891	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Xylenes (Dimethyl Benzene)	mg/Kg	ND (0.25)	173/91245	111891	RS
1,2-Dichlorobenzene	mg/Kg	1.3	173/91245	111891	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
1,4-Dichlorobenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Total Recoverable Petroleums Hydrocarbon In Soil	mg/Kg	ND (22)	363/91107	111991	PH

End of Sample No. 37450.

CLIENT/FIELD IDENTIFICATION: BH2-SS 15-15.5

LABORATORY IDENTIFICATION NO.: 37451

Analysis	Units	Concentration	Book/Page	Date.	Analyst
Benzene	mg/Kg	76	173/91245	111891	RS
Toluene	mg/Kg	21	173/91245	111891	RS
Ethylbenzene	mg/Kg	13	173/91245	111891	RS
Xylenes (Dimethyl Benzene)	mg/Kg	76	173/91245	111891	RS
1,2-Dichlorobenzene	mg/Kg	11	173/91245	111891	RS
1,3-Dichlorobenzene	mg/Kg	16	173/91245	111891	RS
1,4-Dichlorobenzene	mg/Kg	9.5	173/91245	111891	RS
Total Recoverable Petroleums Hydrocarbon In Soil	mg/Kg	ND (23)	363/91107	111991	PH

End of Sample No. 37451. Report No. 91B93 Continued on Next Page.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Inhouse (336 mg/Kg)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Total Recoverable Petroleum Hydrocarbons	% Recovery	101	363/91107	111991	PH

End of Quality Control Sample.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: 37450 Matrix Spike (40 ug/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	% Recovery	99	173/91245	111891	RS
Toluene	% Recovery	103	173/91245	111891	RS
Ethylbenzene	% Recovery	103	173/91245	111891	RS
Xylenes (Dimethylbenzene)	% Recovery	95	173/91245	111891	RS
1,3-Dichlorobenzene	% Recovery	103	173/91245	111891	RS
1,4-Dichlorobenzene	% Recovery	101	173/91245	111891	RS
1,2-Dichlorobenzene	% Recovery	81	173/91245	111891	RS

End of Quality Control Sample.

Analysis	Detection Limit	Test Method	Description
Benzene	2.0 ug/L	602	Purge and Trap G.C.-F.I.D. or P.I.D.
Toluene	2.0 ug/L	602	
Ethylbenzene	2.0 ug/L	602	
Xylenes (Dimethylbenzene)	2.0 ug/L	602	
1,3-Dichlorobenzene	2.0 ug/L		Purge and Trap G.C.-F.I.D.
1,4-Dichlorobenzene	2.0 ug/L		
1,2-Dichlorobenzene	2.0 ug/L		
Total Recoverable Petroleum Hydrocarbons	25 mg/Kg	418.1	Infrared

End of Report No. 91B93.

Samples analyzed as received in accordance with "Test Methods for Evaluating Solid Waste," EPA SW-846.

ND ( ), where denoted, indicates none detected with the detection limit in parentheses.

OPERTECH

By R. Uzmiak
Supervisor, Analytical Services Division

HWS Technologies Inc.

LINCOLN OFFICE
825 J St., Box 80358
Lincoln, NE 68501
402/479-2200

HAZARDOUS WASTE ANALYSIS REQUEST AND CHAIN OF CUSTODY SHEET

PROJECT MANAGER: John Morris
PROJECT NO.:
PROJECT NAME/COMPANY: Lincoln Air National Guard Base
SAMPLER (Signature):
DATE/TIME: 15-11-91

TESTS REQUESTED: BTEX, TRPH, Chlorobenzenes

LAB NO.	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NUM. OF CONTAINERS	BTEX	TRPH	Chlorobenzenes	REMARKS
37450	15-11	10:20		✓	LANGB-BH2-SS 9.5-10'	1	X	X	X	Rush Turn Around
37451	15-11	10:30		✓	LANGB-BH2-SS 15-15.5'	3	X	X	X	Rush Turn Around

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COLLABORATIVE LAB (IF REQUIRED)

COLL. LAB ID. NO.	LAB NO. FROM ABOVE	TO LAB NAME, LOCATION	DATE SHIPPED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	15-11	5:50	Nancy Brown	11-15-91	17:25						

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Preserved: Yes No

Remarks:

HWS TECHNOLOGIES INC.

825 J Street P.O. Box 80358 Lincoln, Nebraska 68501 Telephone (402) 479-2200

ANALYTICAL LABORATORY REPORT

CLIENT: Operational Technologies Inc.
ATTN: John Morris
4100 N.W. Loop 410
San Antonio, TX 78279

DATE COLLECTED: 11-16-91
DATE REPORTED: 11-21-91
DATE RECEIVED: 11-18-91
PURCHASE AUTHORIZATION:
JOB NO.: 72-81-8306.00
REPORT NO.: 91B95

CLIENT/FIELD IDENTIFICATION: BH3-SS 10-10.5 Ft.

LABORATORY IDENTIFICATION NO.: 37456

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Toluene	mg/Kg	ND (0.25)	173/91246	112091	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Xylenes (Dimethyl Benzene)	mg/Kg	ND (0.25)	173/91246	112091	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,4-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Total Recoverable Petroleums Hydrocarbon In Soil	mg/Kg	ND (22)	363/91107	111991	PH

End of Sample No. 37456.

CLIENT/FIELD IDENTIFICATION: BH4-SS 10.5-11 Ft.

LABORATORY IDENTIFICATION NO.: 37457

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Toluene	mg/Kg	0.80	173/91245	111891	RS
Ethylbenzene	mg/Kg	1.6	173/91245	111891	RS
Xylenes (Dimethyl Benzene)	mg/Kg	2.7	173/91245	111891	RS
1,2-Dichlorobenzene	mg/Kg	0.82	173/91245	111891	RS
1,3-Dichlorobenzene	mg/Kg	1.1	173/91245	111891	RS
1,4-Dichlorobenzene	mg/Kg	0.47	173/91245	111891.	RS
Total Recoverable Petroleums Hydrocarbon In Soil	mg/Kg	ND (22)	363/91107	111991	PH

End of Sample No. 37457. Report No. 91B95 Continued on Next Page.

CLIENT/FIELD IDENTIFICATION: BH5-SS 10-10.5 Ft.

LABORATORY IDENTIFICATION NO.: 37458

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Toluene	mg/Kg	ND (0.25)	173/91245	111891	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Xylenes (Dimethyl Benzene)	mg/Kg	ND (0.25)	173/91245	111891	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
1,4-Dichlorobenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Total Recoverable Petroleums Hydrocarbon In Soil	mg/Kg	ND (20)	363/91107	111991	PH

End of Sample No. 37458.

CLIENT/FIELD IDENTIFICATION: BH6-SS 10.5-11 Ft.

LABORATORY IDENTIFICATION NO.: 37459

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Toluene	mg/Kg	ND (0.25)	173/91245	111891	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Xylenes (Dimethyl Benzene)	mg/Kg	ND (0.25)	173/91245	111891	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
1,4-Dichlorobenzene	mg/Kg	ND (0.25)	173/91245	111891	RS
Total Recoverable Petroleums Hydrocarbon In Soil	mg/Kg	ND (25)	363/91107	111991	PH

End of Sample No. 37459.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: 37450 Matrix Spike (40 ug/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	% Recovery	99	173/91245	111891	RS
Toluene	% Recovery	103	173/91245	111891	RS
Ethylbenzene	% Recovery	103	173/91245	111891	RS
Xylenes (Dimethylbenzene)	% Recovery	95	173/91245	111891	RS
1,3-Dichlorobenzene	% Recovery	103	173/91245	111891	RS
1,4-Dichlorobenzene	% Recovery	101	173/91245	111891	RS
1,2-Dichlorobenzene	% Recovery	81	173/91245	111891	RS

End of Quality Control Sample.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Inhouse (336 mg/Kg)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Total Recoverable Petroleum Hydrocarbons	% Recovery	101	363/91107	111991	PH

End of Quality Control Sample.

Analysis	Detection Limit	Test Method	Description
Benzene	2.0 ug/L	602	Purge and Trap G.C.-F.I.D. or P.I.D.
Toluene	2.0 ug/L	602	
Ethylbenzene	2.0 ug/L	602	
Xylenes (Dimethylbenzene)	2.0 ug/L	602	
1,3-Dichlorobenzene	2.0 ug/L		Purge and Trap G.C.-F.I.D.
1,4-Dichlorobenzene	2.0 ug/L		
1,2-Dichlorobenzene	2.0 ug/L		
Total Recoverable Petroleum Hydrocarbons	25 mg/Kg	418.1	Infrared

End of Report No. 91B95.

Samples analyzed as received in accordance with "Test Methods for Evaluating Solid Waste," EPA SW-846.

ND ( ), where denoted, indicates none detected with the detection limit in parentheses.

By R. Nowniak
Supervisor, Analytical Services Division

OPERTECH

HWS Technologies Inc.

LINCOLN OFFICE
825 J St., Box 80358
Lincoln, NE 68501
402/479-2200

HAZARDOUS WASTE ANALYSIS REQUEST AND CHAIN OF CUSTODY SHEET

PROJECT MANAGER: John Morris
PROJECT NO.:
PROJECT NAME/COMPANY: Lincoln Air National Guard Base
SAMPLER (Signature):
DATE/TIME: 16-11-91 16:45

TESTS REQUESTED: BTEX, TRPH, Chlorobenzenes

LAB NO.	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NUM. OF CONTAINERS	BTEX	TRPH	Chlorobenzenes							REMARKS
37456	16-11	10:15		✓	LANGB-BH3-SS 10-10.5'	1	X	X	X							Rush
37457	16-11	11:45		✓	-BH4-SS 10.5-11'	1	X	X	X							"
37458	16-11	14:55		✓	-BH5-SS 10-10.5'	1	X	X	X							"
37459	16-11	15:30		✓	-BH6-SS- 10.5-11'	1	X	X	X							"

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COLLABORATIVE LAB (IF REQUIRED)

COLL. LAB ID. NO.	LAB NO. FROM ABOVE	TO LAB NAME, LOCATION	DATE SHIPPED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
	11-17-91	10:42	Kim Beil	11-17-91	10:42						

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Preserved: Yes No

Remarks:

HWS TECHNOLOGIES INC.

825 J Street P.O. Box 80358 Lincoln, Nebraska 68501 Telephone (402) 479-2200

ANALYTICAL LABORATORY REPORT

CLIENT: Operational Technologies Inc.
ATTN: Mr. John Morris
4100 NW Loop 410
Suite 230
San Antonio, TX 78279

DATE COLLECTED: 11-18-91
DATE REPORTED: 11-22-91
DATE RECEIVED: 11-18-91
PURCHASE AUTHORIZATION:
JOB NO.: 72-81-8306.00
REPORT NO.: 91B98

CLIENT/FIELD IDENTIFICATION: MW5-SS 10-10.5 Ft.

LABORATORY IDENTIFICATION NO.: 37463

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	0.37	173/91246	112091	RS
Toluene	mg/Kg	ND (0.25)	173/91246	112091	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Xylenes (Dimetyhlbenzene)	mg/Kg	ND (0.25)	173/91246	112091	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,4-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Total Recoverable Petroleum Hydrocarbons in Soil	mg/Kg	ND (25)	363/91109	112291	PH

End of Sample No. 37463.

CLIENT/FIELD IDENTIFICATION: MW5-SS 15-15.5 Ft.

LABORATORY IDENTIFICATION NO.: 37464

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	0.31	173/91246	112091	RS
Toluene	mg/Kg	ND (0.25)	173/91246	112091	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Xylenes (Dimetyhlbenzene)	mg/Kg	ND (0.25)	173/91246	112091	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,4-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Total Recoverable Petroleum Hydrocarbons in Soil	mg/Kg	ND (25)	363/91109	112291	PH

End of Sample No. 37464. Report No. 91B98 Continued on Next Page.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Inhouse (6.7 mg/Kg)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Total Recoverable Petroleum Hydrocarbons	% Recovery	98	363/91109	112291	PH

End of Quality Contol Sample.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Batch Spike (40 ug/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
1,2 Dichlorobenzene	% Recovery	102	173/91246	112091	RS
1,3 Dichlorobenzene	% Recovery	102	173/91246	112091	RS
1,4 Dichlorobenzene	% Recovery	101	173/91246	112091	RS

End of Quality Contol Sample.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Batch Spike (40 ug/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	% Recovery	95	173/91246	112091	RS
Toluene	% Recovery	97	173/91246	112091	RS
Ethylbenzene	% Recovery	98	173/91246	112091	RS
Xylenes (Dimethylbenzene)	% Recovery	99	173/91246	112091	RS

End of Quality Contol Sample.

Analysis	Detection Limit	Test Method	Description
Benzene	0.25 mg/Kg	EPA 602/8020	Purge and Trap/ G.C.-F.I.D. or P.I.D.
Toluene	0.25 mg/Kg	EPA 602/8020	
Ethylbenzene	0.25 mg/Kg	EPA 602/8020	
Xylenes (Dimethylbenzene)	0.25 mg/Kg	EPA 602/8020	
1,2 Dichlorobenzene	0.25 mg/Kg	EPA 602/8020	
1,3-Dichlorobenzene	0.25 mg/Kg	EPA 602/8020	
1,4-Dichlorobenzene	0.25 mg/Kg	EPA 602/8020	
Total Recoverable Petroleum Hydrocarbons	25 mg/Kg	EPA 418.1	Infrared

End of Report No. 91B98.

Samples analyzed as received in accordance with "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA 600/4-82-057, "Test Methods for Evaluating Solid Waste," EPA SW-846, and "Methods for Chemical Analysis of Water and Wastes," EPA 600/4-79-20.

ND ( ), where denoted, indicates none detected with the detection limit in parentheses.

By R. Wozniak
Supervisor, Analytical Services Division

OPERTECH

HWS Technologies Inc.

LINCOLN OFFICE
825 J St., Box 80358
Lincoln, NE 68501
402/479-2200

HAZARDOUS WASTE ANALYSIS REQUEST AND CHAIN OF CUSTODY SHEET

PROJECT MANAGER: John Morris
PROJECT NAME/COMPANY: Lincoln Air National Guard Base
PROJECT NO.:

SAMPLER (Signature): [signature]
DATE/TIME: 18-11-91 16:50

TESTS REQUESTED: BTEX, Chlorobenzenes, TRPH

LAB NO.	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NUM. OF CONTAINERS	BTEX	Chlorobenzenes	TRPH							REMARKS
	18-11	1026		✓	LANGB-MW5-SS 10-10.5	1	X	X	X							Rush
	18-11	1040		✓	LANGB-MW5-SS 15-15.5	1	X	X	X							Rush

COLLABORATIVE LAB (IF REQUIRED)

COLL. LAB ID. NO.	LAB NO. FROM ABOVE	TO LAB NAME, LOCATION	DATE SHIPPED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	18-11	17:15	[signature]	11-18-91	1715						
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Preserved: Yes No

Remarks:

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HWS TECHNOLOGIES INC.

825 J Street P.O. Box 80358 Lincoln, Nebraska 68501 Telephone (402) 479-2200

ANALYTICAL LABORATORY REPORT

CLIENT: Operational Technologies Inc.
ATTN: Mr. John Morris
4100 NW Loop 410
Suite 230
San Antonio, TX 78279

DATE COLLECTED: 11-23-91
DATE REPORTED: 11-27-91
DATE RECEIVED: 11-25-91
PURCHASE AUTHORIZATION:
JOB NO.: 72-81-8306.00
REPORT NO.: 91C20

CLIENT/FIELD IDENTIFICATION: LANGB MW1-W

LABORATORY IDENTIFICATION NO.: 37516

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	ND (2.0)	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	3.6	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
Total Recoverable Petroleum Hydrocarbons	mg/L	ND (1.6)	363/91110	112691	PH

End of Sample No. 37516.

CLIENT/FIELD IDENTIFICATION: LANGB MW2-W

LABORATORY IDENTIFICATION NO.: 37517

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	ND (2.0)	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	3.7	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	2.5	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	5.9	173/91250	112591	RS
Total Recoverable Petroleum Hydrocarbons	mg/L	ND (1.3)	363/91110	112691	PH

End of Sample No. 37517. Report No. 91C20 Continued on Next Page.

CLIENT/FIELD IDENTIFICATION: LANGB MW3-W

LABORATORY IDENTIFICATION NO.: 37518

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	ND (2.0)	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	ND (2.0)	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
Total Recoverable Petroleum Hydrocarbons	mg/L	ND (1.2)	363/91110	112691	PH

End of Sample No. 37518.

CLIENT/FIELD IDENTIFICATION: LANGB MW4-W

LABORATORY IDENTIFICATION NO.: 37519

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	ND (2.0)	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	2.6	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
Total Recoverable Petroleum Hydrocarbons	mg/L	ND (1.0)	363/91110	112691	PH

End of Sample No. 37519.

CLIENT/FIELD IDENTIFICATION: LANGB MW5-W

LABORATORY IDENTIFICATION NO.: 37520

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	2.1	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	ND (2.0)	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
Total Recoverable Petroleum Hydrocarbons	mg/L	ND (1.6)	363/91110	112691	PH

End of Sample No. 37520. Report No. 91C20 Continued on Next Page.

CLIENT/FIELD IDENTIFICATION: LANGB MW6-W

LABORATORY IDENTIFICATION NO.: 37521

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	ND (2.0)	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	ND (2.0)	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
Total Recoverable Petroleum Hydrocarbons	mg/L	ND (1.0)	363/91110	112691	PH

End of Sample Number 37521.

CLIENT/FIELD IDENTIFICATION: LANGB MW7-W

LABORATORY IDENTIFICATION NO.: 37522

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	ND (2.0)	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	ND (2.0)	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
Total Recoverable Petroleum Hydrocarbons	mg/L	ND (1.4)	363/91110	112691	PH

End of Sample Number 37522.

CLIENT/FIELD IDENTIFICATION: LANGB MW8-W

LABORATORY IDENTIFICATION NO.: 37523

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	2.0	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	ND (2.0)	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
Total Recoverable Petroleum Hydrocarbons	mg/L	ND (0.9)	363/91110	112691	PH

End of Sample Number 37523. Report No. 91C20 Continued On Next Page.

CLIENT/FIELD IDENTIFICATION: Trip Blank

LABORATORY IDENTIFICATION NO.: 37524

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	ND (2.0)	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	ND (2.0)	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS

End of Sample Number 37524.

CLIENT/FIELD IDENTIFICATION: Rinsate

LABORATORY IDENTIFICATION NO.: 37525

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	ug/L	ND (2.0)	173/91250	112591	RS
Toluene	ug/L	ND (2.0)	173/91250	112591	RS
Ethylbenzene	ug/L	ND (2.0)	173/91250	112591	RS
Xylenes (Dimetyhlbenzene)	ug/L	ND (2.0)	173/91250	112591	RS
1,2-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,3-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS
1,4-Dichlorobenzene	ug/L	ND (2.0)	173/91250	112591	RS

End of Sample Number 37525.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Inhouse (6.7 mg/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Total Recoverable Petroleum Hydrocarbons	% Recovery	74	363/91110	112691	PH

End of Quality Control Sample.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Batch Matrix Spike (40 mg/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
1,2-Dichlorobenzene	% Recovery	97	173/91250	112591	RS
1,3-Dichlorobenzene	% Recovery	104	173/91250	112591	RS
1,4-Dichlorobenzene	% Recovery	103	173/91250	112591	RS

End of Quality Control Sample. Report No. 91C20 Continued Next Page.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Batch Matrix Spike

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	% Recovery	96	173/91250	112591	RS
Toluene	% Recovery	108	173/91250	112591	RS
Ethylbenzene	% Recovery	100	173/91250	112591	RS
Xylenes (Dimethylbenzene)	% Recovery	103	173/91250	112591	RS

End of Quality Control Sample.

Analysis	Detection Limit	Test Method	Description
Benzene	2.0 ug/L	EPA 602	Purge and Trap/ G.C.-F.I.D. or P.I.D.
Toluene	2.0 ug/L	EPA 602	
Ethylbenzene	2.0 ug/L	EPA 602	
Xylenes (Dimethylbenzene)	2.0 ug/L	EPA 602	
1,2 Dichlorobenzene	2.0 ug/L	EPA 602	
1,3-Dichlorobenzene	2.0 ug/L	EPA 602	
1,4-Dichlorobenzene	2.0 ug/L	EPA 602	
Total Recoverable Petroleum Hydrocarbons	0.5 mg/L	EPA 418.1	Infrared

End of Report No. 91C20.

Samples analyzed as received in accordance with "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA 600/4-82-057 and "Methods for Chemical Analysis of Water and Wastes," EPA 600/4-79-20.

ND ( ), where denoted, indicates none detected with the detection limit in parentheses.

By Paul Magnon
Supervisor, Analytical Services Division

OPERTECH

HWS Technologies Inc.

LINCOLN OFFICE
825 J St., Box 80358
Lincoln, NE 68501
402/479-2200

HAZARDOUS WASTE ANALYSIS REQUEST AND CHAIN OF CUSTODY SHEET

PROJECT MANAGER: John Morris
PROJECT NO.:
PROJECT NAME/COMPANY: Lincoln Air National Guard Base
SAMPLER (Signature): JM & SW
DATE/TIME: 23-Nov-91

TESTS REQUESTED: BTEX, TRPH, Chlorobenzene

LAB NO.	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NUM. OF CON-TAINERS	BTEX	TRPH	Chlorobenzene	REMARKS
37522	23 Nov	10:00			LANGB-MW7-W		X	X	X	Rush
37523	23 Nov	12:15		✓	-MW8-W		X	X	X	"
37524	23 Nov				-Trip		X	X	X	"
37525	23 Nov	0915			-Rinsate		X	X	X	"

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COLLABORATIVE LAB (IF REQUIRED)

COLL. LAB ID. NO.	LAB NO. FROM ABOVE	TO LAB NAME, LOCATION	DATE SHIPPED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	23 Nov	16:05	Robert Seelhoff	11/23	16:05						

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Preserved: Yes ✓ No

Remarks:

HWS Technologies Inc.

LINCOLN OFFICE
825 J St., Box 80358
Lincoln, NE 68501
402/479-2200

HAZARDOUS WASTE ANALYSIS REQUEST AND CHAIN OF CUSTODY SHEET

PROJECT MANAGER	PROJECT NAME/COMPANY
Jorn Morris	Lincoln Air National Guard Base
PROJECT NO.	

SAMPLER (Signature): JM + SW

DATE/TIME: 23-Nov-91

TESTS REQUESTED: BTEX, TRPH, Chlorobenzenes

LAB NO.	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NUM. OF CON-TAINERS	BTEX	TRPH	Chlorobenzenes								REMARKS
37516	23-Nov	10:45			LANGB-MW1-W		X	X	X								Rush
37517	23-Nov	10:50			-MW2-W		X	X	X								"
37518	23-Nov	11:20			-MW3-W		X	X	X								"
37519	23-Nov	11:05			-MW4-W		X	X	X								"
37520	23-Nov	11:40			-MW5-W		X	X	X								"
37521	23-Nov	9:30			-MW6-W		X	X	X								"

COLLABORATIVE LAB (IF REQUIRED)

COLL. LAB ID. NO.	LAB NO. FROM ABOVE	TO LAB NAME, LOCATION	DATE SHIPPED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	23 Nov	16:45	Robert Seehorn	11/23	16:25						
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Preserved: Yes ✓ No

Remarks:

HWS TECHNOLOGIES INC.

825 J Street P.O. Box 80358 Lincoln, Nebraska 68501 Telephone (402) 479-2200

ANALYTICAL LABORATORY REPORT

CLIENT: Operational Technologies Inc.
ATTN: Mr. John Morris
4100 NW Loop 410
Suite 230
San Antonio, TX 78279

DATE COLLECTED: 11-15-91
DATE REPORTED: 11-22-91
DATE RECEIVED: 11-15-91
PURCHASE AUTHORIZATION:
JOB NO.: 72-81-8306.00
REPORT NO.: 91B92

CLIENT/FIELD IDENTIFICATION: SP-1

LABORATORY IDENTIFICATION NO.: 37445

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	.33	173/91246	112091	RS
Toluene	mg/Kg	ND (0.25)	173/91246	112091	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Xylenes (Dimetyhlbenzene)	mg/Kg	0.87	173/91246	112091	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,3-Dichlorobenzene	mg/Kg	0.41	173/91246	112091	RS
1,4-Dichlorobenzene	mg/Kg	0.99	173/91246	112091	RS
Total Recoverable Petroleum Hydrocarbons in Soil	mg/Kg	ND (25)	363/91109	112291	PH

End of Sample No. 37445.

CLIENT/FIELD IDENTIFICATION: SP-2

LABORATORY IDENTIFICATION NO.: 37446

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	0.30	173/91246	112091	RS
Toluene	mg/Kg	ND (0.25)	173/91246	112091	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Xylenes (Dimetyhlbenzene)	mg/Kg	ND (0.25)	173/91246	112091	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,4-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Total Recoverable Petroleum Hydrocarbons in Soil	mg/Kg	ND (25)	363/91109	112291	PH

End of Sample No. 37446. Report No. 91B92 Continued on Next Page.

CLIENT/FIELD IDENTIFICATION: SP-3

LABORATORY IDENTIFICATION NO.: 37447

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	0.34	173/91246	112091	RS
Toluene	mg/Kg	ND (0.25)	173/91246	112091	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Xylenes (Dimetyhlbenzene)	mg/Kg	ND (0.25)	173/91246	112091	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
1,4-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	112091	RS
Total Recoverable Petroleum Hydrocarbons in Soil	mg/Kg	ND (25)	363/91109	112291	PH

End of Sample No. 37447.

CLIENT/FIELD IDENTIFICATION: SP-4

LABORATORY IDENTIFICATION NO.: 37448

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	0.28	173/91246	111891	RS
Toluene	mg/Kg	ND (0.25)	173/91246	111891	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91246	111891	RS
Xylenes (Dimetyhlbenzene)	mg/Kg	0.85	173/91246	111891	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	111891	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	111891	RS
1,4-Dichlorobenzene	mg/Kg	0.78	173/91246	111891	RS
Total Recoverable Petroleum Hydrocarbons in Soil	mg/Kg	ND (25)	363/91109	112291	PH

End of Sample No. 37448.

CLIENT/FIELD IDENTIFICATION: SP-5

LABORATORY IDENTIFICATION NO.: 37449

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	mg/Kg	ND (0.25)	173/91246	111891	RS
Toluene	mg/Kg	ND (0.25)	173/91246	111891	RS
Ethylbenzene	mg/Kg	ND (0.25)	173/91246	111891	RS
Xylenes (Dimetyhlbenzene)	mg/Kg	ND (0.25)	173/91246	111891	RS
1,2-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	111891	RS
1,3-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	111891	RS
1,4-Dichlorobenzene	mg/Kg	ND (0.25)	173/91246	111891	RS
Total Recoverable Petroleum Hydrocarbons in Soil	mg/Kg	ND (25)	363/91109	112291	PH

End of Sample No. 37449. Report No. 91B92 Continued on Next Page.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Inhouse (6.7 mg/Kg)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Total Recoverable Petroleum Hydrocarbons	% Recovery	98	363/91109	112291	PH

End of Quality Contol Sample.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: 37447 Matrix Spike (40 ug/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
1,2 Dichlorobenzene	% Recovery	102	173/91246	112091	RS
1,3 Dichlorobenzene	% Recovery	102	173/91246	112091	RS
1,4 Dichlorobenzene	% Recovery	101	173/91246	112091	RS

End of Quality Contol Sample.

CLIENT/FIELD IDENTIFICATION: Quality Control Sample

LABORATORY IDENTIFICATION NO.: Batch Spike (40 ug/L)

Analysis	Units	Concentration	Book/Page	Date	Analyst
Benzene	% Recovery	95	173/91246	112091	RS
Toluene	% Recovery	97	173/91246	112091	RS
Ethylbenzene	% Recovery	98	173/91246	112091	RS
Xylenes (Dimethylbenzene)	% Recovery	99	173/91246	112091	RS

End of Quality Contol Sample.

Analysis	Detection Limit	Test Method	Description
Benzene	0.25 mg/Kg	EPA 602/8020	Purge and Trap/ G.C.-F.I.D. or P.I.D.
Toluene	0.25 mg/Kg	EPA 602/8020	
Ethylbenzene	0.25 mg/Kg	EPA 602/8020	
Xylenes (Dimethylbenzene)	0.25 mg/Kg	EPA 602/8020	
1,2 Dichlorobenzene	0.25 mg/Kg	EPA 602/8020	
1,3-Dichlorobenzene	0.25 mg/Kg	EPA 602/8020	
1,4-Dichlorobenzene	0.25 mg/Kg	EPA 602/8020	
Total Recoverable Petroleum Hydrocarbons	25 mg/Kg	EPA 418.1	Infrared

End of Report No. 91B92.

Samples analyzed as received in accordance with "Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater", EPA 600/4-82-057, "Test Methods for Evaluating Solid Waste," EPA SW-846, and "Methods for Chemical Analysis of Water and Wastes," EPA 600/4-79-20.

ND ( ), where denoted, indicates none detected with the detection limit in parentheses.

By R. Nozniak
Supervisor, Analytical Services Division

OPERTECH

HWS Technologies Inc.

LINCOLN OFFICE
825 J St., Box 80358
Lincoln, NE 68501
402/479-2200

HAZARDOUS WASTE ANALYSIS REQUEST AND CHAIN OF CUSTODY SHEET

PROJECT MANAGER: John Morris

PROJECT NAME/COMPANY: Lincoln Air National Guard Base

PROJECT NO.:

SAMPLER (Signature): [signature]

DATE/TIME: 15-11-91

TESTS REQUESTED: BTEX, TRPH, Chlorobenzenes

LAB NO.	DATE	TIME	COMP.	GRAB	SAMPLE IDENTIFICATION	NUM. OF CONTAINERS	BTEX	TRPH	Chlorobenzenes							REMARKS
SP-1	15-11	08:30	✓		LANGB-SP1 37445	3	X	X	X							Standard Turn Around
SP-2	15-11	09:00	✓		LANGB-SP2 37446	3	X	X	X							"
SP-3	15-11	09:30	✓		LANGB-SP3 37447	3	X	X	X							"
SP-4	15-11	14:30	✓		LANGB-SP4 37448	3	X	X	X							"
SP-5	15-11	15:35	✓		LANGB-SP5 37449	3	X	X	X							"
	~~15-11~~	~~0440~~														

COLLABORATIVE LAB (IF REQUIRED)

COLL. LAB ID. NO.	LAB NO. FROM ABOVE	TO LAB NAME, LOCATION	DATE SHIPPED

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
[signature]	15-11	5:30	Nancy Brown	11-15-91	17:25						

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Tank 603-1

FACILITY ID# 11410

DATE OF CLOSURE 10-25-95

NEBRASKA STATE FIRE MARSHAL

FLAMMABLE LIQUID STORAGE DIVISION

CLOSURE ASSESSMENT REPORT

RECEIVED

FEB 05 1996

DEPARTMENT OF ENVIRONMENTAL QUALITY

CERTIFICATION OF COMPLIANCE

I CERTIFY THAT THIS CLOSURE WAS CONDUCTED IN ACCORDANCE WITH TITLE 159, RULES AND REGULATIONS FOR UNDERGROUND STORAGE TANKS, REGARDING PERMANENT CLOSURE AND CHANGE-IN-SERVICE AND THAT ALL THE INFORMATION PRESENTED HEREIN IS CORRECT AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

X CARL R. WILLERT, LTC, NEANG
BASE CIVIL ENGINEER
OWNER/OPERATOR

DATE: 26 Jan 96

X Deborah Myers
CERTIFIED CLOSURE INDIVIDUAL

DATE: 12-8-95

A-192

Ø409 96-(011)-Ø939

(REV 3/93)

TANK CLOSURE CHECKLIST

FACILITY ID#: 11410
FACILITY NAME: Lincoln Air Guard Base
ADDRESS: Bldg. 603
CITY: Lincoln, NE

OWNER NAME: Nebraska Air National Guard
ADDRESS: 2420 W. Butler Ave.
CITY/STATE: Lincoln, NE
PHONE #: (402) 458-1513

INSPECTOR: D. Myers
DATE: 10-25-95
CONTRACTOR LICENSE #: CL89074
DATE TANK(S) LAST USED: 10-24-95

PRODUCT STORED: TANK ID# (1) Waste Oil ( ) ______ ( ) ______ ( ) ______ ( ) ______
TANK DIMENSIONS: TANK ID# (1) 3'D x 5'L ( ) ______ ( ) ______ ( ) ______ ( ) ______

TYPE OF CLOSURE - (TANK) REMOVAL - IN PLACE
(PIPING) REMOVAL - IN PLACE (CIRCLE ONE)

MATERIAL USED TO FILL TANK IN PLACE: ______

		YES	NO	NM	NA
1.	PERMIT TO CLOSE ON SITE?				X
2.	CERTIFIED CLOSER ON SITE?	X			
3.	AREA SECURED FROM PUBLIC AND NO SMOKING SIGNS POSTED?	X			
4.	TANK INERTED / PURGED (CIRCLE ONE).	X			
5.	TANK ATMOSPHERE MONITORED BEFORE AND DURING CLOSURE?	X			
	a. Instrument(s) used: MSA Oxygen Meter				
6.	IS TANK ATMOSPHERE SAFE FOR CLOSURE?	X			
	a. Instrument(s) readings <8.0%				
7.	ANY PRODUCT SPILLED DURING EXCAVATION OF TANK / PIPING?		X		
	a. Approximate amount ______				
8.	ANY CORROSION HOLES PRESENT BEFORE OR AFTER SCRAPING?	X			
	a. Tank ID#'s 1				
	b. Piping ID#'s ______				
9.	GROUND WATER PRESENT IN EXCAVATION?		X		
	a. Approximate depth to groundwater ______				
10.	ANY DISCOLORED SOILS (GREEN-GRAY/BLACK) ENCOUNTERED?	X			
	a. Tank excavation (tank ID#) 1				
	b. Piping excavation (tank ID#) ______				
11.	ANY SIGNS OF CONTAMINATION?	X			
	a. Visible (Tank ID#'s) 1				
	b. Odor (Tank ID#'s) 1				
12.	WAS A SITE ASSESSMENT PERFORMED?	X			
	LABORATORY ANALYSIS OR FIELD ASSESSMENT? (CIRCLE TYPE DONE)				
	IF FIELD ANALYSIS, INSTRUMENT USED Photovac HL2000 Microtip PID				
13.	PHOTOS TAKEN?	X			
14.	WAS OVEREXCAVATION PERFORMED?		X		
15.	DESCRIBE HOW AND WHERE THE CONTAMINATED SOIL WAS DISPOSED OF: See additional closure comments.				

FACILITY ID # 11410

CONTRACTOR # CL89074

SAMPLING RESULTS

TANK: COLLECT AND ANALYZE TWO SAMPLES PER TANK. INDICATE THE LOCATIONS WHERE THE SAMPLES WERE COLLECTED AND THEIR RESPECTIVE IDENTIFICATION NUMBERS ON THE SITE PLAN. IN THE TABLE BELOW PLACE THE RESULTS OF SAMPLING IN THE TANK NUMBER COLUMNS. INDICATE THE DEPTH AT WHICH EACH SAMPLE WAS TAKEN IN THE DEPTH COLUMN.

Results are in parts per million (ppm)

TANK #	1		2		3		4		5		6		7		8	
SAMPLE	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH
1T HS-1	8.5	3'														
2T HS-2	34.7	4'														
3T HS-3	997	6.5'														
4T HS-4	>2500	7.5'														
HS-5	>2500	7.5'														
HS-6	>2500	7.5'														
7T HS-7	>2500	7.5'														
8T																
9T																
10T																

_____ *CHECK HERE IF DISPENSER IS DIRECTLY ABOVE TANK - NO ADDITIONAL SAMPLING IS REQUIRED FOR PRODUCT LINES*

LINES: INDICATE WHERE EACH SAMPLE WAS TAKEN AND THEIR RESPECTIVE IDENTIFICATION NUMBER ON THE SITE PLAN.

Results are in parts per million (ppm)

LINE #	1		2		3		4		5		6		7		8	
SAMPLE	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH
HS-8	11	2'														
2L HS-9	3.7	2'														
3L																
4L																
5L																
6L																
7L																
8L																

DISPENSER ISLANDS: INDICATE WHERE EACH SAMPLE WAS TAKEN AND THEIR RESPECTIVE IDENTIFICATION NUMBER ON THE SITE PLAN.

DISPENSER	1		2		3		4		5		6		7		8	
SAMPLE	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH
1D																
2D																
3D																
4D																

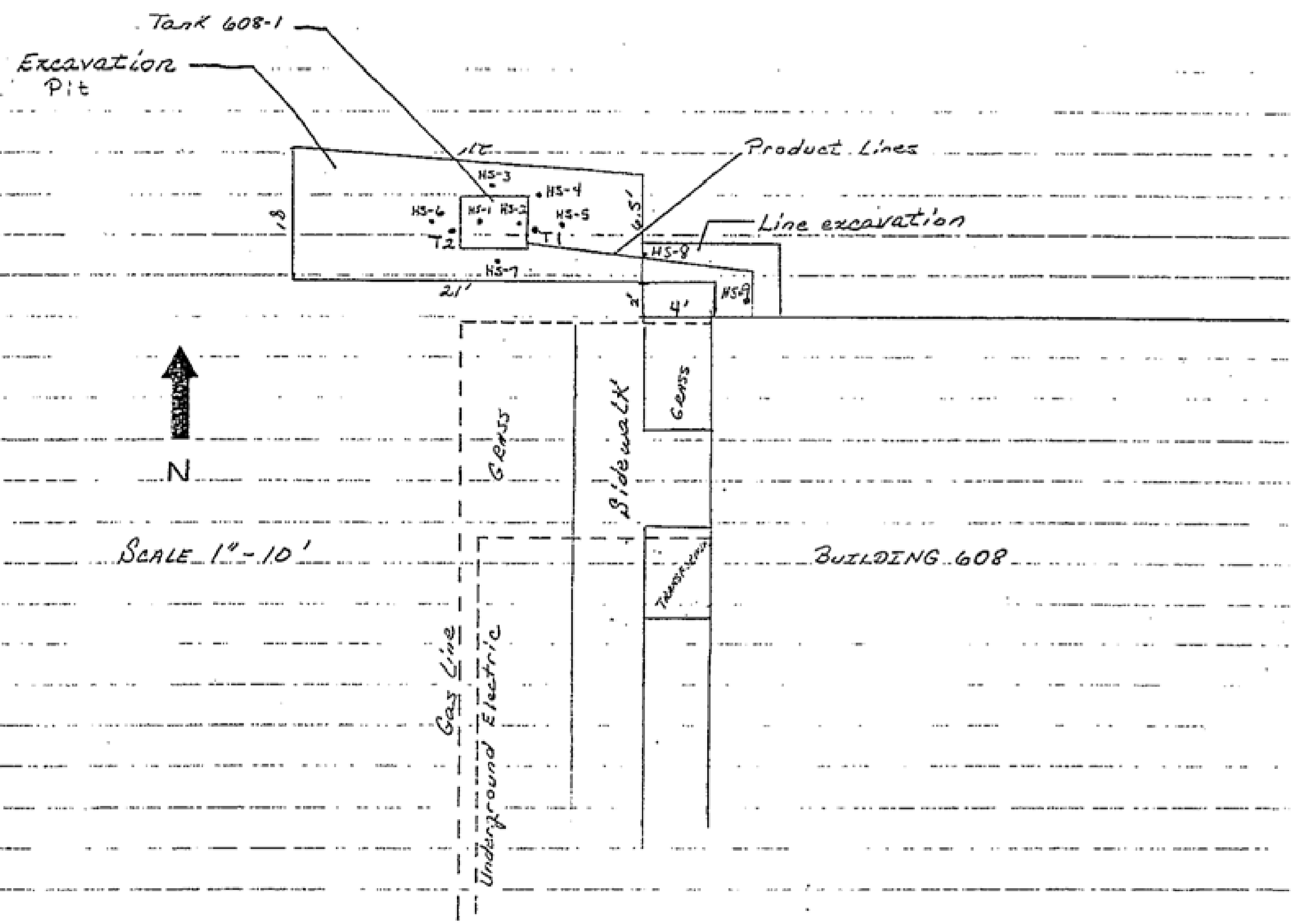
SITE PLAN

FACILITY ID# 11410 DATE OF CLOSURE: 10-25-95

CONTRACTOR # CL89074

LAYOUT OF THE TANK SYSTEM (TANK AND PRODUCT LINES) AND PLACEMENT OF EXCAVATION AND DISPENSER(S) LOCATION. THE SITE PLAN MUST BE APPROXIMATELY TO SCALE, INCLUDING DISTANCES AND THE NORTH ARROW. ALSO SHOW THE TANKS RELATIONSHIP TO PERMANENT OBJECTS.

INDICATE NORTH WITH AN ARROW



ADDITIONAL CLOSURE COMMENTS

FACILITY ID# 11410

DATE OF CLOSURE: 10-25-95

CONTRACTOR # CL89074

Tank 608-1 was part of an oil/water separator system. It was of single wall steel construction and had contained waste oil. The capacity of the tank was approximately 265 gallons. Prior to excavation approximately 260-270 gallons of pumpable liquids were removed from the tank. The liquids were drummed, labele and placed in a designated storage area on base.

Excavation of the tank took place on October 25, 1995. The line was removed October 26th. Soil in the tank excavation appeared to contaminated. Discoloration of the soil and a strong petroleum odor were observed during excavation activities. Impacted soil was stockpiled near the excavation. A berm was constructed and lined with polyethylene sheeting. The impacted soil was than placed in the berm and covered with additional polyethylene sheeting. Tony's Cement Works, Inc. is awaiting direction from the owner regarding disposal of the contaminated soil. A decision has not been reached concerning the final disposition of the soil.

The tank was in poor condition upon excavation. It was heavily corroded and numerous holes were observed. The holes ranged fro pinhole size to 1/4" in diameter. Piping to the tank was in good condition. No visible signs of leakage were observed in the piping excavation.

Soil samples collected beneath the ends of the tank were analyzed for TRPH. Sample T1 contained a concentration of 48 p The sample collected beneath the west end of the tank (T2) had a concentration of 740 ppm. Analytical reports are attached.

Groundwater was not encountered. The excavation was backfil by order of the Nebraska Air National Guard.

Evergreen Analytical Sample Log Sheet

Project # 95-3608

Date(s) Sampled: 10/24,25/95 COC

Date Due: 10/31/95

Date Received: 10/26/95 1000

Holding Time(s): 11/07/95-BTEX

Client Project I.D. 2302164

Rush STANDARD UST

Client: Geotechnical Services, Inc.

Address: 4817 N. 56th Street, Ste. A1
Lincoln, NE 68504

Contact: Jerrett Domling

Client P.O. 0201575

Phone #402-466-8154 Fax #402-466-8195

Shipping Charges N/A

E.A. Cooler # N/A

Airbill # FEDEX-7230703981

Custody Seal Intact? Y
Cooler X Bottles ___
COC Present Y
Sample Tags Present? Y
Sample Tags Listed? Y
Sample(s) Sealed? Y

Special Invoicing/Billing

Special Instructions

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X14850A	S-1-605-1	TRPH	S	4WM	C4
X14851A	S-2-605-1	TRPH	S	4WM	C4
.4852A	S-1-608-1 (T1)	TRPH	S	4WM	C4
X14853A	S-2-608-1 (T2)	TRPH	S	4WM	C4
X14850B	S-1-605-1	BTEX 8020	S	4WM	2
X14851B	S-2-605-1	BTEX 8020	S	4WM	2

R=Sample to be returned

Route To GC/MS ___ GC X Metals ___ Wet Chem X SxPrep ___ Acctg 1

SxRec C QA/QC C Sales C File Orig

Custodian/Date: MB 10/27

Page 1 of 1 Page(s)

WM

CHAIN OF CUSTODY RECORD / ANALYTICAL SERVICES REQUEST

Page 1 of 1

Evergreen Analytical Inc.
4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

MPANY Geotechnical Services Inc
DRESS 4817 N 56th
Y Lincoln STATE NE ZIP 68504
ONE# 402-466-8154 FAX # 402-466-5195 FAX RESULTS Y / N

CLIENT CONTACT (print) Jerett Dowling
PROJECT I.D. 2302164
EAL QUOTE # ____ P.O.# 0201575
TURNAROUND REQUIRED* std UST
*expedited turnaround subject to additional fee

mpler Name:
gnature) Jerett Dowling
int) Jerett Dowling
ergreen Analytical Cooler No. #27F
oler Received ____

Please **PRINT** all information:

A-198

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water-Drinking/Discharge/Ground (circle)	MATRIX: Soil	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 413.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)								EAL use only Do not write in shaded area EAL Project # Custodian EAL Sample No.
5-1-605-1	10-24	10:45	2		X									X	X												
5-2-605-1	10-24	10:45	2		X									X	X												
5-1-608-1	10-25	10:30	1		X										X												
-2-603-1	10-25	10:30	1		X										X												
HT:																											Location
DD:																											Container Size

Instructions: Please return cooler.
thanks Jerett

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

Evergree Analytical Sample Receipt heck-in Record

Date & Time Rec'd: 10/26/95 Shipped Via: FED.Exp. 723070399

(Airbill # if applicable)

Client : GeoTechnical Services

Client Project ID(s): 2302164

EAL Project #(s): 95- 3608 EAL Cooler(s): Y N

Cooler# Clients

Ice packs	Y N	Y N	Y N	Y N	Y N
Temperature °C	14°C				

	Y	N	N/A
1. Custody seal(s) present:	X		
Seals on cooler intact	X		
Seals on bottle intact			X
2. Chain of Custody present:	X		
3. Samples Radioactive: (Comment on COC if > 0.5mr/h)		X	
4. Containers broken or leaking: (Comment on COC if Y)		X	
5. Containers labeled:	X		
6. COC agrees w/ bottles received: (Comment on COC if N)	X		
7. COC agrees w/ labels: (Comment on COC if N)	X		
8. Headspace in vials-waters only: (Comment on COC if Y)			X
9. VOA samples preserved:			X
10. pH measured on metals, cyanide or phenolics*:			X

List discrepancies ______

*Non-EAL provided containers only, water samples only.

	Y	N
11. Metal samples present:		X
Total ____ , Dissolved ____ , TCLP ____		
D or PD to be filtered:		
T,TR,D,PD to be Preserved:		
12. Short holding times:		X
Specify parameters ______		
13. Multi-phase sample(s) present:		X
14. COC signed w/ date/time:	X	

Comments: ______

(Additional comments on back)

Custodian Signature/Date: C. Carlson 10/26/95 1150

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Date Sampled : 10/24,25/95
Date Received : 10/26/95
Date Prepared : 10/27/95
Date Analyzed : 10/27/95

Client Project ID: 2302164
Lab Project No. : 95-3608
Method : EPA 418.1

Evergreen Sample No.	Client Sample ID	Matrix	TRPH* (mg/Kg)
X14850	S-1-605-1	Soil	<3.3
X14851	S-2-605-1	Soil	<3.3
X14852	S-1-608-1 (T1)	Soil	48
X14853	S-2-608-1 (T2)	Soil	740

* Detection limit 3.33 mg/Kg for soils, 0.10 mg/L for waters.
Blank value subtracted.

Analyst

Approved

3608mkp.2

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS BY EPA METHOD 418.1

DATE	TIME
95/10/27	15:56

Project #
95-3608

Sample #
14852.000

Client sample #
S-1-608-1

Matrix : soil

Weight of soil (Kg) extracted
0.020

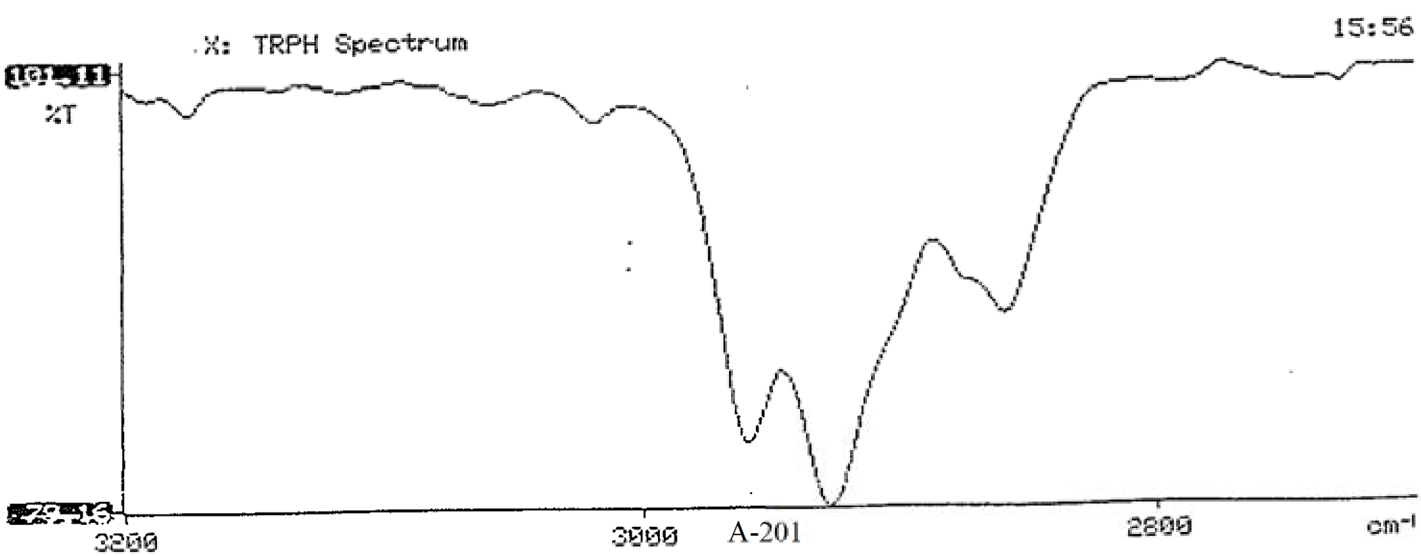
Detection limit in mg/Kg
5.000

Reagent blank
1.094

Dilution factor
1.000

TRPH mg/Kg

47.845



EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS
BY EPA METHOD 418.1

DATE TIME
95/10/27 16:03

Project #
95-3608

Sample #
14853.000

C .ent sample #
5-2-608-1

Matrix : soil

Weight of soil (Kg) extracted
0.020

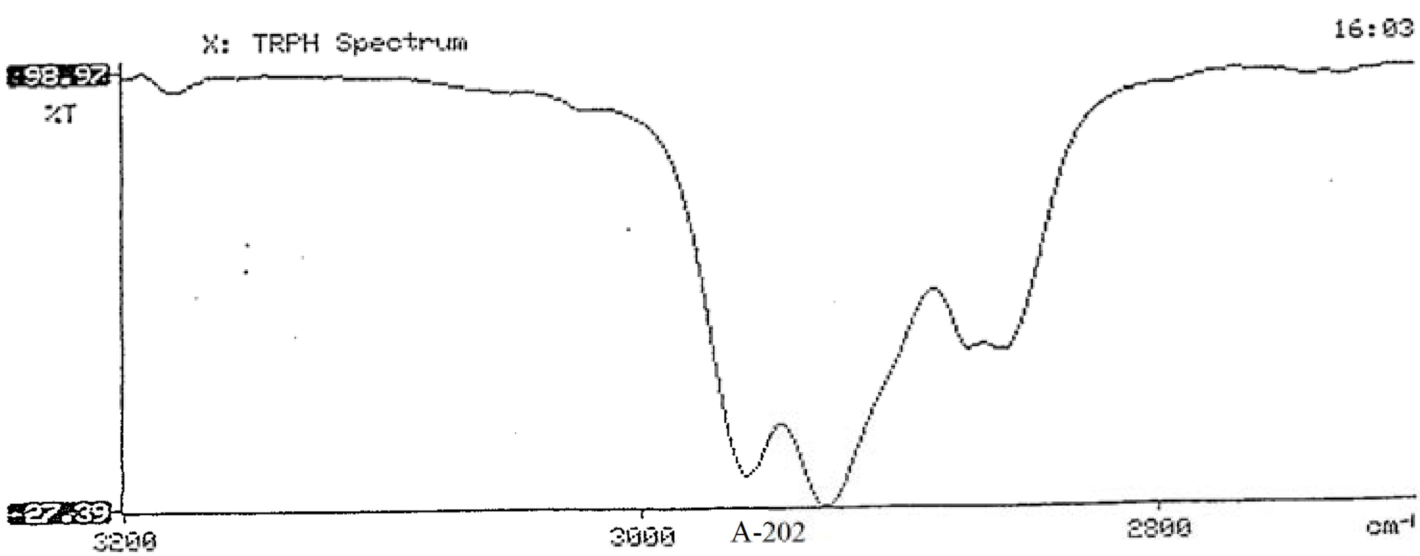
Detection limit in mg/Kg
5.000

Reagent blank
1.094

Dilution factor
2.500

TRPH mg/Kg

740.981



A-202

Tank 608-4
Oil/Water Separator

FACILITY ID# 11410

DATE OF CLOSURE 10-30-95 thru 11-2-95

NEBRASKA STATE FIRE MARSHAL

FLAMMABLE LIQUID STORAGE DIVISION

CLOSURE ASSESSMENT REPORT

RECEIVED
FEB 05 1996
DEPARTMENT OF ENVIRONMENTAL QUALITY

FIRE MARSHAL NEBRASKA

CERTIFICATION OF COMPLIANCE

I CERTIFY THAT THIS CLOSURE WAS CONDUCTED IN ACCORDANCE WITH TITLE 159, RULES AND REGULATIONS FOR UNDERGROUND STORAGE TANKS, REGARDING PERMANENT CLOSURE AND CHANGE-IN-SERVICE AND THAT ALL THE INFORMATION PRESENTED HEREIN IS CORRECT AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

X [signature]
CARL R. WILLERT, LTC, NEANG
BASE CIV[illegible]
OWNER/OPERATOR

DATE: 26 Jan 96

X Deborah Myers
CERTIFIED CLOSURE INDIVIDUAL

DATE: 12-13-95

A-203

(REV 3/93)

TANK CLOSURE CHECKLIST

FACILITY ID#: 11410
FACILITY NAME: Lincoln Air Guard Base
ADDRESS: Building 608
CITY: Lincoln, NE

OWNER NAME: Nebraska Air National Guard
ADDRESS: 2420 W. Butler Ave.
CITY/STATE: Lincoln, NE
PHONE #: (402)458-1513

INSPECTOR: ______
DATE: ______
CONTRACTOR LICENSE #: CL89074
DATE TANK(S) LAST USED: 10-95

PRODUCT STORED: TANK ID# (/) Waste OIL ( ) ______ ( ) ______ ( ) ______ (.) ______
TANK DIMENSIONS: TANK ID# (/) 4'L x 3'W x 4'D ( ) ______ ( ) ______ ( ) ______ (.) ______

TYPE OF CLOSURE - (TANK) REMOVAL - IN PLACE
(PIPING) REMOVAL - IN PLACE (CIRCLE ONE)

MATERIAL USED TO FILL TANK IN PLACE: ______

		YES	NO	NW	NA
1.	PERMIT TO CLOSE ON SITE?				X
2.	CERTIFIED CLOSER ON SITE?		X		
3.	AREA SECURED FROM PUBLIC AND NO SMOKING SIGNS POSTED?	X			
4.	TANK INERTED / PURGED (CIRCLE ONE).				X
5.	TANK ATMOSPHERE MONITORED BEFORE AND DURING CLOSURE?				X
	a. Instrument(s) used: ______ ______				
6.	IS TANK ATMOSPHERE SAFE FOR CLOSURE?				X
	a. Instrument(s) readings ____ ____ ____ ____				
7.	ANY PRODUCT SPILLED DURING EXCAVATION OF TANK / PIPING?		X		
	a. Approximate amount ______				
8.	ANY CORROSION HOLES PRESENT BEFORE OR AFTER SCRAPING?		X		
	a. Tank ID#'s ____ ____ ____ ____ b. Piping ID#'s ____ ____ ____ ____				
9.	GROUND WATER PRESENT IN EXCAVATION?	X			
	a. Approximate depth to groundwater 8'				
10.	ANY DISCOLORED SOILS (GREEN-GRAY/BLACK) ENCOUNTERED?				X
	a. Tank excavation (tank ID#) ____ ____ ____ ____ b. Piping excavation (tank ID#) ____ ____ ____ ____				
11.	ANY SIGNS OF CONTAMINATION?				X
	a. Visible (Tank ID#'s) ____ ____ ____ ____ ____ b. Odor (Tank ID#'s) ____ ____ ____ ____ ____				
12.	WAS A SITE ASSESSMENT PERFORMED?	X			
	LABORATORY ANALYSIS OR FIELD ASSESSMENT? (CIRCLE TYPE DONE) IF FIELD ANALYSIS, INSTRUMENT USED ______				
13.	PHOTOS TAKEN?	X			
14.	WAS OVEREXCAVATION PERFORMED?				X
15.	DESCRIBE HOW AND WHERE THE CONTAMINATED SOIL WAS DISPOSED OF: ______				

FACILITY ID # 11410

CONTRACTOR # CL89074

SAMPLING RESULTS

TANK: COLLECT AND ANALYZE TWO SAMPLES PER TANK. INDICATE THE LOCATIONS WHERE THE SAMPLES WERE COLLECTED AND THEIR RESPECTIVE IDENTIFICATION NUMBERS ON THE SITE PLAN. IN THE TABLE BELOW PLACE THE RESULTS OF SAMPLING IN THE TANK NUMBER COLUMNS. INDICATE THE DEPTH AT WHICH EACH SAMPLE WAS TAKEN IN THE DEPTH COLUMN.

Groundwater Sampling Results for TRPH (ppm)

TANK #	1		2		3		4		5		6		7		8	
SAMPLE	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH
1T	1.1	8'														
2T																
3T																
4T																
T																
6T																
7T																
8T																
9T																
10T																

_____ *CHECK HERE IF DISPENSER IS DIRECTLY ABOVE TANK - NO ADDITIONAL SAMPLING IS REQUIRED FOR PRODUCT LINES*

LINES: INDICATE WHERE EACH SAMPLE WAS TAKEN AND THEIR RESPECTIVE IDENTIFICATION NUMBER ON THE SITE PLAN.

LINE #	1		2		3		4		5		6		7		8	
SAMPLE	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH
1L																
2L																
3L																
4L																
5L																
6L																
7L																
8L																

DISPENSER ISLANDS: INDICATE WHERE EACH SAMPLE WAS TAKEN AND THEIR RESPECTIVE IDENTIFICATION NUMBER ON THE SITE PLAN.

DISPENSER	1		2		3		4		5		6		7		8	
SAMPLE	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH
1D																
2D																
3D																
4D																

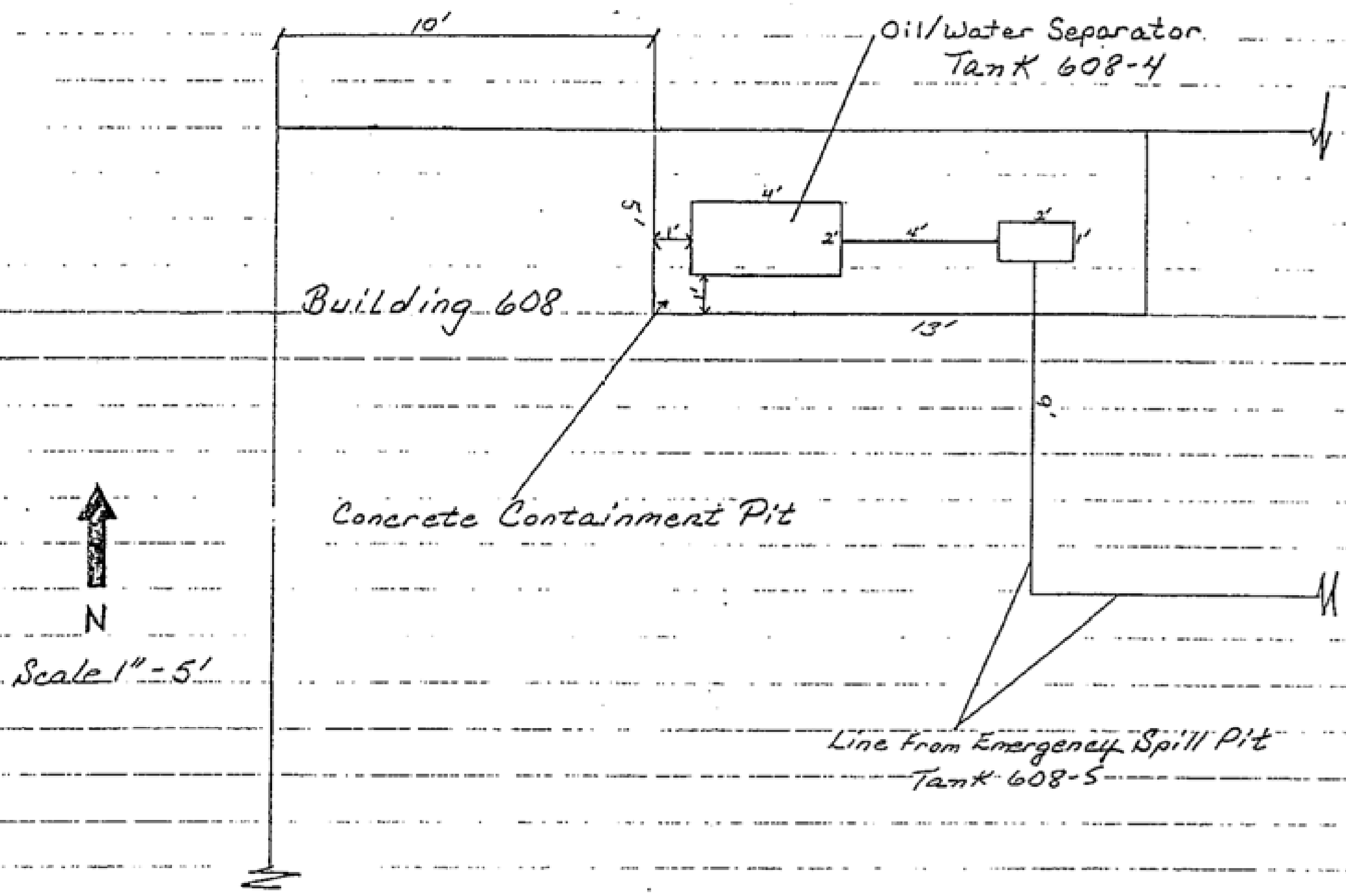
SITE PLAN

FACILITY ID# 11410
CONTRACTOR # CL89074

DATE OF CLOSURE: 10-30-95 th.
11-2-95

LAYOUT OF THE TANK SYSTEM (TANK AND PRODUCT LINES) AND PLACEMENT OF EXCAVATION AND DISPENSER(S) LOCATION. THE SITE PLAN MUST BE APPROXIMATELY TO SCALE, INCLUDING DISTANCES AND THE NORTH ARROW. ALSO SHOW THE TANKS RELATIONSHIP TO PERMANENT OBJECTS.

INDICATE NORTH WITH AN ARROW



ADDITIONAL CLOSURE COMMENTS

FACILITY ID# 11410

DATE OF CLOSURE: 10-30-95 th. 11-2-95

CONTRACTOR # CL89074

Tank 608-4 was an oil/water separator located within Building 608 at the Lincoln Air Guard Base. It was of steel construction and had contained waste oil. The separator was surrounded by a concrete containment pit. No soil samples could be obtained for headspace analysis during closure proceedings.

Closure activities began on October 30, 1995. On this date liquids contained in the separator were removed and the oil/water separator with its associated piping were cut.

Work on cutting the separator continued on October 31, 1995. After cutting was completed, the separator and piping were removed rom the building. Holes were punched through the floor on this date.

On November 1, 1995 a groundwater sample was collected at the site. Groundwater had entered the containment pit through the holes. The analytical report is attached. The influent pipe was grouted shut at t edge of the containment pit.

Backfilling took place on November 1st and 2nd. A clean sand wa used to fill the area of the containment pit. A concrete cap was poured on November 7, 1995.

This tank was not required to be registered with the Nebraska State Fire Marshal.

Evergreen Analytical Sample Log Sheet

Project # 95-3706

Date(s) Sampled: 11/01,02/95 COC

Date Due: 11/08/95

Date Received: 11/03/95 1000

Holding Time(s):

Client Project I.D. 2302164

Rush STANDARD

Client: Geotechnical Services, Inc.

Address: 4817 N. 56th Street, Ste. A1
Lincoln, NE 68504

Contact: BOB JURGENS

Client P.O. 0201600

Phone #402-466-8154 Fax #402-466-8195

Shipping Charges 5.00

E.A. Cooler # N/A

Airbill # FEDEX 73307074526

Custody Seal Intact? Y
Cooler X Bottles X
COC Present Y
Sample Tags Present?
Sample Tags Listed?
Sample(s) Sealed?

Special Invoicing/Billing

Special Instructions

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X15155A	W-1-608-5	TRPH	S	4WM	C6
X15156A	E-1-608-5	TRPH	S	4WM	C6
X15157A	GW-1-608-4	TRPH	W	1LA	C6

R=Sample to be returned

Route To GC/MS ___ GC ___ Metals ___ Wet Chem X SxPrep ___ Acctg 1

SxRec C QA/QC C Sales C File Orig

Page 1 of 1 Page(s)

A-208

Custodian/Date: CC 11/03/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Date Sampled : 11/1,2/95
Date Received : 11/3/95
Date Prepared : 11/6/95
Date Analyzed : 11/6/95

Client Project ID: 2302164
Lab Project No. : 95-3706
Method : EPA 418.1

Evergreen Sample No.	Client Sample ID	Matrix	TRPH*	
				(mg/Kg)
X15155	W-1-608-5	Soil	68	
X15156	E-1-608-5	Soil	33	
				(mg/L)
X15157	GW-1-608-4	Water	1.1	

* Detection limit 3.33 mg/Kg for soils, 0.10 mg/L for waters.
Blank value subtracted.

Debra J. Byers
Analyst

Approved

3706mkp.2

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS
BY EPA METHOD 418.1

DATE	TIME
95/11/06	14:07

Project #
95-3706

Sample #
15157.000

.lient sample #
G-W-1-608-4

Matrix : Water

Volume of water (liters) extracted
1.000

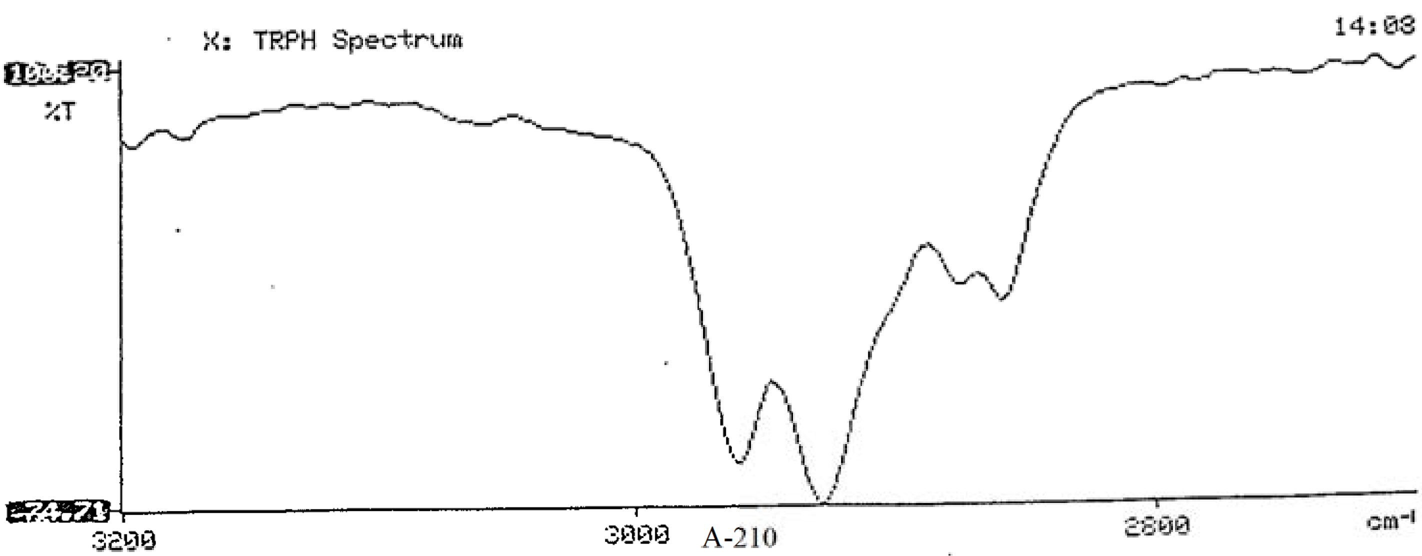
Detection limit in mg/L
0.100

Reagent blank
0.037

Dilution factor
1.000

TRPH mg/L

1.107



Evergreen Analytical Sample Receipt/Check-in Record

Date & Time Rec'd: 11/03/95 1000 Shipped Via: FED EXP. 7230704
(Airbill # if applicable)

Client : GSI

Client Project ID(s): 2302164

EAL Project #(s): 95- 3706 EAL Cooler(s): Y N

Cooler# Clients

Ice packs Y N Y N Y N Y N Y N

Temperature °C 9°C OBTAIN APPROVAL FROM NDEQ SINCE ~~[illegible]~~ SAMPLES WERE NOT PRESERVED AT 4oC.

	Y	N	N/A
1. Custody seal(s) present:	X		
Seals on cooler intact	X		
Seals on bottle intact	X		
2. Chain of Custody present:	X		
3. Samples Radioactive: (Comment on COC if > 0.5mr/h)		X	
4. Containers broken or leaking: (Comment on COC if Y)		X	
5. Containers labeled:	X		
6. COC agrees w/ bottles received: (Comment on COC if N)	X		
7. COC agrees w/ labels: (Comment on COC if N)	X		
8. Headspace in vials-waters only: (Comment on COC if Y)			X
9. VOA samples preserved:			X
10. pH measured on metals, cyanide or phenolics*:			X

List discrepancies

*Non-EAL provided containers only, water samples only.

	Y	N
11. Metal samples present:		X
Total ____ , Dissolved ____ , TCLP ____		
D or PD to be filtered:		
T,TR,D,PD to be Preserved:		
12. Short holding times:		X
Specify parameters		
13. Multi-phase sample(s) present:		X
14. COC signed w/ date/time:	X	

Comments:

(Additional comments on back)

Custodian Signature/Date: [signature] 11/03/95

Page 1 of 1

Evergreen Analytical Inc.

4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Geotechnical Services Inc
ADDRESS 4817 N.56th St., Ste 27
CITY Lincoln STATE NE ZIP 68504
PHONE# 402-466-8154 FAX # 402-466-8195 FAX RESULTS Y / N

CLIENT CONTACT (print) Bob Jurgens
PROJECT I.D. 2302164
EAL QUOTE # ______ P.O.# 020160C
TURNAROUND REQUIRED* std UST
*expedited turnaround subject to additional fee

Sampler Name:
(signature) [signature]
(print) Bob Jurgens
GSI
~~Evergreen Analytical~~ Cooler No. 27A
Cooler Received ______

Please **PRINT** all information:

EAL use only. Do not write in shaded area
EAL ______
Project # ______
Custodian ______

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water: ~~Drinking/Discharge~~/Ground (circle)	MATRIX: Soil/~~Solid~~	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/~~Oil & Grease 413.1~~ (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	EAL Sample No.
W-1-608-5	11-2-95	AM	1		X										X					
E-1-608-5	11-2-95	AM	1		X										X					
GW-1-608-4	11-1-95	PM	1	X											X					
HT:																				Location
DD:																				Container Size

Instructions:

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date
[signature]	11/2/95 17:52	[signature]	11/2			C. Carlson	11/07/95

TANK 608-5
Concrete Emergency Spill Pit

FACILITY ID# 11410

October 25, 1995 thru
DATE OF CLOSURE November 2, 1995

NEBRASKA STATE FIRE MARSHAL

FLAMMABLE LIQUID STORAGE DIVISION

CLOSURE ASSESSMENT REPORT

RECEIVED
FEB 05 1996
DEPARTMENT OF
ENVIRONMENTAL QUALITY

CERTIFICATION OF COMPLIANCE

I CERTIFY THAT THIS CLOSURE WAS CONDUCTED IN ACCORDANCE WITH TITLE 159. RULES AND REGULATIONS FOR UNDERGROUND STORAGE TANKS. REGARDING PERMANENT CLOSURE AND CHANGE-IN-SERVICE AND THAT ALL THE INFORMATION PRESENTED HEREIN IS CORRECT AND ACCURATE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

X Carl R. Willert
CARL R. WILLERT, LTC, NEANG
BASE CIVIL ENGINEER
OWNER/OPERATOR

DATE: 26 Jan 96

X Deborah L. Myers
CERTIFIED CLOSURE INDIVIDUAL

DATE: 12-13-95

(REV 3/93)

TANK CLOSURE CHECKLIST

FACILITY ID#: 11410
FACILITY NAME: Lincoln Air Guard Base
ADDRESS: Building 608
CITY: Lincoln, NE

OWNER NAME: Nebraska Air National Guard
ADDRESS: 2420 W. Butler Avenue
CITY/STATE: Lincoln, NE
PHONE #: 402-458-1513

INSPECTOR: ______
DATE: ______
CONTRACTOR LICENSE #: CL89074
DATE TANK(S) LAST USED: 10-95

PRODUCT STORED: TANK ID# (1) Waste Oil ( ) ____ ( ) ____ ( ) ____ ( ) ____
TANK DIMENSIONS: TANK ID# (1) 12'L x 5'W x 8.5'D ( ) ____ ( ) ____ ( ) ____ ( ) ____

TYPE OF CLOSURE - (TANK) REMOVAL - IN PLACE
(PIPING) REMOVAL - IN PLACE (CIRCLE ONE)

MATERIAL USED TO FILL TANK IN PLACE: 47B Sand/Gravel

		YES	NO	NW	NA
1.	PERMIT TO CLOSE ON SITE?				X
2.	CERTIFIED CLOSER ON SITE?		X		
3.	AREA SECURED FROM PUBLIC AND NO SMOKING SIGNS POSTED?	X			
4.	TANK INERTED / PURGED (CIRCLE ONE).				X
5.	TANK ATMOSPHERE MONITORED BEFORE AND DURING CLOSURE?				X
	a. Instrument(s) used: ______ ______				
6.	IS TANK ATMOSPHERE SAFE FOR CLOSURE?				X
	a. Instrument(s) readings ____ ____ ____ ____				
7.	ANY PRODUCT SPILLED DURING EXCAVATION OF TANK / PIPING?		X		
	a. Approximate amount ______				
8.	ANY CORROSION HOLES PRESENT BEFORE OR AFTER SCRAPING?				X
	a. Tank ID#'s ____ ____ ____ ____ b. Piping ID#'s ____ ____ ____ ____				
9.	GROUND WATER PRESENT IN EXCAVATION?		X		
	a. Approximate depth to groundwater ______				
10.	ANY DISCOLORED SOILS (GREEN-GRAY/BLACK) ENCOUNTERED?				X
	a. Tank excavation (tank ID#) ____ ____ ____ ____ b. Piping excavation (tank ID#) ____ ____ ____ ____				
11.	ANY SIGNS OF CONTAMINATION?		X		
	a. Visible (Tank ID#'s) ____ ____ ____ ____ ____ b. Odor (Tank ID#'s) ____ ____ ____ ____ ____				
12.	WAS A SITE ASSESSMENT PERFORMED?	X			
	LABORATORY ANALYSIS OR FIELD ASSESSMENT? (CIRCLE TYPE DONE) IF FIELD ANALYSIS, INSTRUMENT USED ______				
13.	PHOTOS TAKEN?	X			
14.	WAS OVEREXCAVATION PERFORMED?		X		
15.	DESCRIBE HOW AND WHERE THE CONTAMINATED SOIL WAS DISPOSED OF: ______				

FACILITY ID # 11410

CONTRACTOR # CL8907

SAMPLING RESULTS

TANK: COLLECT AND ANALYZE TWO SAMPLES PER TANK. INDICATE THE LOCATIONS WHERE THE SAMPLES WERE COLLECTED AND THEIR RESPECTIVE IDENTIFICATION NUMBERS ON THE SITE PLAN. IN THE TABLE BELOW PLACE THE RESULTS OF SAMPLING IN THE TANK NUMBER COLUMNS. INDICATE THE DEPTH AT WHICH EACH SAMPLE WAS TAKEN IN THE DEPTH COLUMN.

TRPH Results in parts per million (ppm)

TANK #	1		2		3		4		5		6		7		8	
SAMPLE	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH
1T (T1)	68	9.5'														
2T (T2)	33	9.5'														
3T																
4T																
6T																
7T																
8T																
9T																
10T																

_____ CHECK HERE IF DISPENSER IS DIRECTLY ABOVE TANK - NO ADDITIONAL SAMPLING IS REQUIRED FOR PRODUCT LINES

LINES: INDICATE WHERE EACH SAMPLE WAS TAKEN AND THEIR RESPECTIVE IDENTIFICATION NUMBER ON THE SITE PLAN.

LINE #	1		2		3		4		5		6		7		8	
SAMPLE	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH
1L																
2L																
3L																
4L																
5L																
6L																
7L																
8L																

DISPENSER ISLANDS: INDICATE WHERE EACH SAMPLE WAS TAKEN AND THEIR RESPECTIVE IDENTIFICATION NUMBER ON THE SITE PLAN.

DISPENSER	1		2		3		4		5		6		7		8	
SAMPLE	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH	TEST RESULTS	DEPTH
1D																
2D																
3D																
4D																

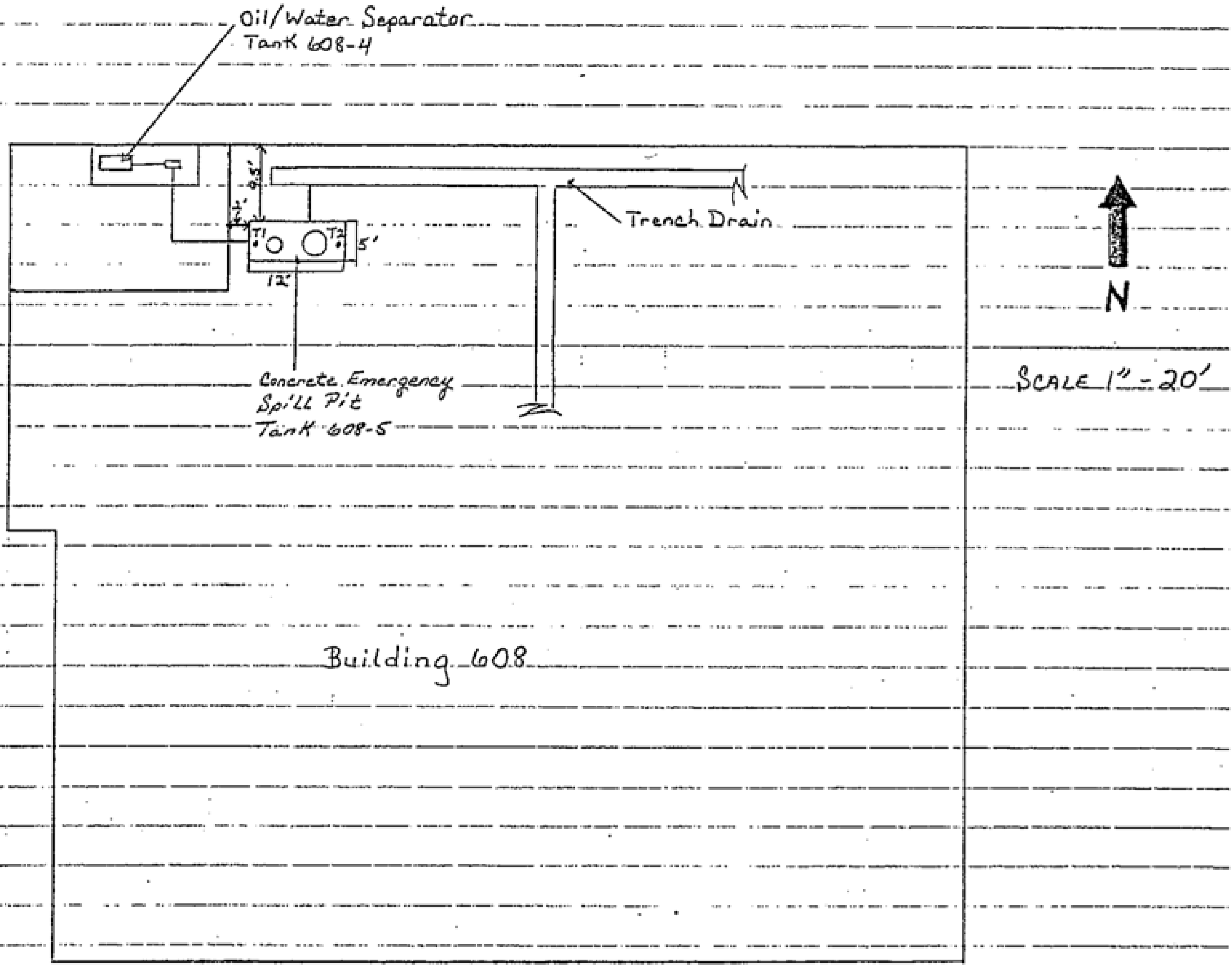
SITE PLAN

FACILITY ID# 11410 DATE OF CLOSURE: ~~Oct. 25, 1995~~ Nov. 2, 1995

CONTRACTOR # CL89074

LAYOUT OF THE TANK SYSTEM (TANK AND PRODUCT LINES) AND PLACEMENT OF EXCAVATION AND DISPENSER(S) LOCATION. THE SITE PLAN MUST BE APPROXIMATELY TO SCALE, INCLUDING DISTANCES AND THE NORTH ARROW. ALSO SHOW THE TANKS RELATIONSHIP TO PERMANENT OBJECTS.

INDICATE NORTH WITH AN ARROW



ADDITIONAL CLOSURE COMMENTS

FACILITY ID# 11410

DATE OF CLOSURE: Oct. 25, 1995 - Nov. 2, 1995

CONTRACTOR # CL89074

Tank 608-5 was a concrete emergency spill pit located within Building 608 at the Lincoln Air Guard Base. This tank was part of an oil/water separator system and as such was not required to be registered with the Nebraska State Fire Marshal. No soil samples could be obtained for headspace analysis.

Closure of this structure began October 25, 1995. Concrete was sawed and jackhammered on this date.

Debris was removed from the pit on October 26, 1995. Pumpable liquids were removed, drummed and labeled. The drums were transported to a designated storage area on base.

The pit was steam cleaned November 1, 1995. Rinsate was pumped and drummed. The drums were labeled and transported to the designated storage area. Holes were pierced through the bottom of the pit. Soil samples were collected for laboratory analysis. The analytical report is attached. Influent and effluent lines were plugged with non-shrink grout.

Backfilling took place on November 1st and 2nd. The backfill material was 47B Sand/Gravel. A concrete cap was poured on November 7, 1995.

Evergreen Analytical Sample Log Sheet

Project # 95-3706

Date(s) Sampled: 11/01,02/95 COC

Date Due: 11/08/95

Date Received: 11/03/95 1000

Holding Time(s):

Client Project I.D. 2302164

Rush STANDARD

Client: Geotechnical Services, Inc.

Address: 4817 N. 56th Street, Ste. A1

Lincoln, NE 68504

Contact: BOB JURGENS

Client P.O. 0201600

Phone #402-466-8154 Fax #402-466-8195

Shipping Charges 5.00

E.A. Cooler # N/A

Airbill # FEDEX 73307074526

Custody Seal Intact? Y

Cooler X Bottles X

COC Present

Sample Tags Present?

Sample Tags Listed?

Sample(s) Sealed?

Special Invoicing/Billing

Special Instructions

Lab ID #	Client ID#	Analysis	Mtx	Btl	Loc
X15155A	W-1-608-5 (T1)	TRPH	S	4WM	C6
X15156A	E-1-608-5 (T2)	TRPH	S	4WM	C6
X15157A	GW-1-608-4	TRPH	W	1LA	C6

R=Sample to be returned

Route To GC/MS __ GC __ Metals __ Wet Chem X SxPrep __ Acctg 1

SxRec C QA/QC C Sales C File Orig

Custodian/Date: CC 11/03/95

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS

Date Sampled : 11/1,2/95
Date Received : 11/3/95
Date Prepared : 11/6/95
Date Analyzed : 11/6/95

Client Project ID: 2302164
Lab Project No. : 95-3706
Method : EPA 418.1

Evergreen Sample No.	Client Sample ID	Matrix	TRPH*
			(mg/Kg)
X15155	W-1-608-5 (T1)	Soil	68
X15156	E-1-608-5 (T2)	Soil	33
			(mg/L)
X15157	GW-1-608-4	Water	1.1

* Detection limit 3.33 mg/Kg for soils, 0.10 mg/L for waters.
Blank value subtracted.

Analyst

Approved

3706mkp.2

EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS
BY EPA METHOD 418.1

DATE	TIME
95/11/06	16:35

Project #
95-3706

mple #
.5155.000

Client sample # W-1-608-5 (T1)

Matrix : soil

Weight of soil (Kg) extracted
0.030

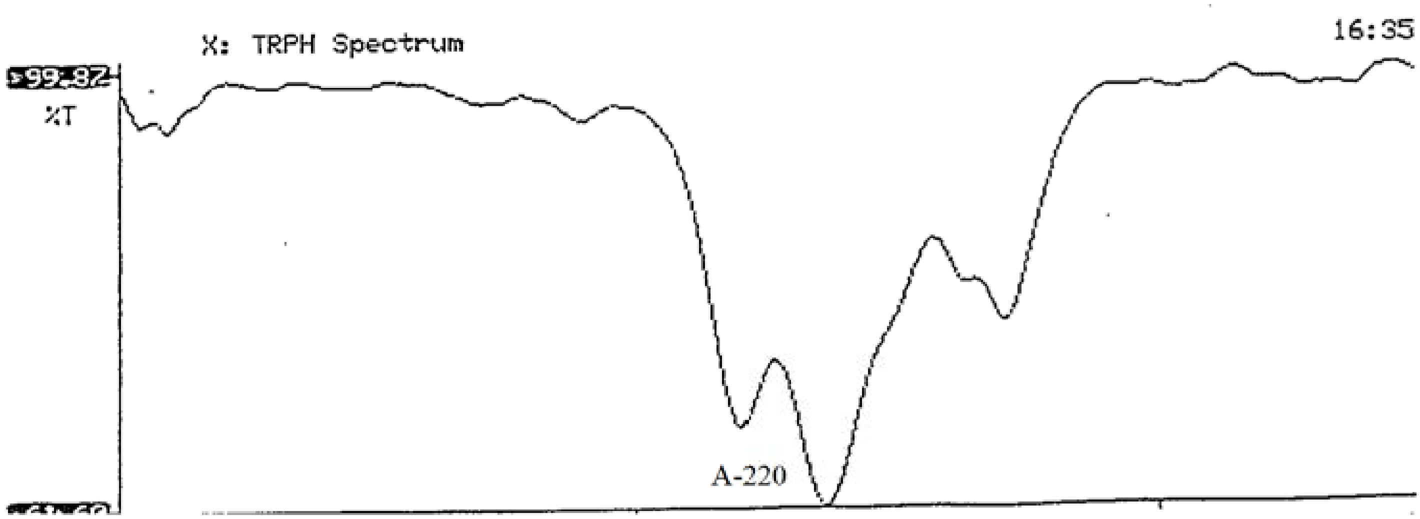
Detection limit in mg/Kg
3.333

Reagent blank
2.110

Dilution factor
1.000

TRPH mg/Kg

67.533



EVERGREEN ANALYTICAL, INC.
4036 Youngfield St. Wheat Ridge, CO 80033
(303) 425-6021

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS
BY EPA METHOD 418.1

DATE	TIME
95/11/06	16:38

Project #
95-3706

Sample #
15156.000

Client sample # E-1-668-5 (T2)

Matrix : soil

Weight of soil (Kg) extracted
0.030

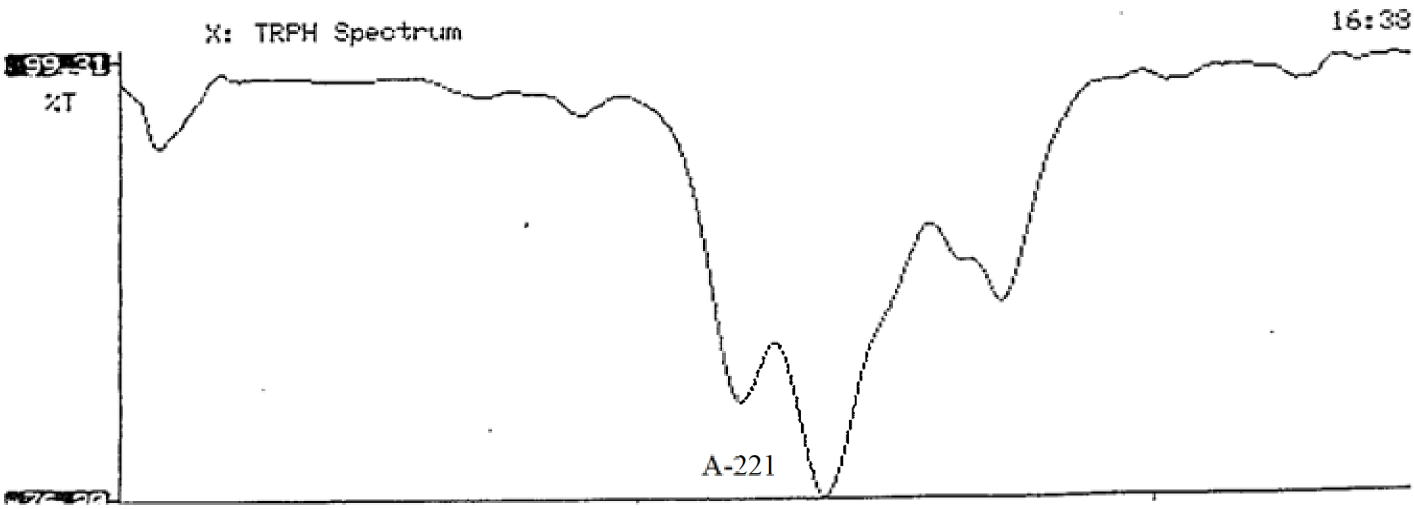
Detection limit in mg/Kg
3.333

Reagent blank
2.110

Dilution factor
1.000

TRPH mg/Kg

33.443



Evergreen Analytical Sample Receipt/Check-in Record

Date & Time Rec'd: 11/03/95 1100 Shipped Via: FED-EXP. 723070 4:
(Airbill # if applicable)

Client : GSI

Client Project ID(s): 2302164

EAL Project #(s): 95- 3706 EAL Cooler(s): Y N

Cooler# Clients

Ice packs	Y	N	Y	N	Y	N	Y	N	Y	N

Temperature °C 9°C OBTAIN APPROVAL FROM NDEQ SINCE ~~[illegible]~~ SAMPLES WERE NOT PRESERVED AT 4°C.

	Y	N	N/A
1. Custody seal(s) present:	X		
Seals on cooler intact	X		
Seals on bottle intact	X		
2. Chain of Custody present:	X		
3. Samples Radioactive: (Comment on COC if >0.5mr/h)		X	
4. Containers broken or leaking: (Comment on COC if Y)		X	
5. Containers labeled:	X		
6. COC agrees w/ bottles received: (Comment on COC if N)	X		
7. COC agrees w/ labels: (Comment on COC if N)	X		
8. Headspace in vials-waters only: (Comment on COC if Y)			X
9. VOA samples preserved:			X
10. pH measured on metals, cyanide or phenolics*:			X

List discrepancies

*Non-EAL provided containers only, water samples only.

	Y	N
11. Metal samples present:		X
Total ____, Dissolved ____, TCLP ____		
D or PD to be filtered:		
T,TR,D,PD to be Preserved:		
12. Short holding times:		X
Specify parameters		
13. Multi-phase sample(s) present:		X
14. COC signed w/ date/time:	X	

Comments:

(Additional comments on back)

A-222

Custodian Signature/Date: [illegible] 11/03/95

Page 1 of 1

Evergreen Analytical Inc.

4036 Youngfield St.
Wheat Ridge, Colorado 80033
(303) 425-6021
FAX (303) 425-6854
(800) 845-7400

COMPANY Geotechnical Services Inc

ADDRESS 4817 N.56th St., Ste 27

CITY Lincoln STATE NE ZIP 68504

PHONE# 402-466-8154 FAX # 402-466-8195 FAX RESULTS Y / N

CLIENT CONTACT (print) Bob Jurgens

PROJECT I.D. 2302164

EAL QUOTE # ______ P.O.# 020160C

TURNAROUND REQUIRED* std UST

*expedited turnaround subject to additional fee

Sampler Name:

(signature) [signature]

(print) Bob Jurgens

GSI

~~Evergreen Analytical~~ Cooler No. 27A

Cooler Received ______

Please **PRINT** all information:

CLIENT SAMPLE IDENTIFICATION	DATE SAMPLED	TIME	No. of Containers	MATRIX: Water (Drinking/Discharge/Ground) (circle)	MATRIX: Soil/~~Solid~~	MATRIX: Oil / Sludge	TCLP VOA/BNA/Pest/Herb/Metals (circle)	VOA 8260/624/524.2 (circle)	BNA 8270/625 (circle)	Pesticides 8080/608 (circle)	Pest/PCBs 8080/608/508 (circle)	Herbicides 8150/515 (circle)	PCB Screen	BTEX 8020/602 (circle)/MTBE (circle)	TRPH 418.1/Oil & Grease 418.1 (circle)	TVPH 8015mod. (Gasoline)	TEPH 8015mod. (Diesel)	Total Metals-DW / NPDES / SW846 (circle & list metals below)	Dissolved Metals - DW / SW846 (circle & list metals below)	EAL use only. Do not write in shaded area. EAL # / Project # / Custodian / EAL Sample No.
W-1-608-5	11-2-95	AM	1		X										X					
E-1-608-5	11-2-95	AM	1		X										X					
GW-1-608-4	11-1-95	PM	1	X											X					
HT:																				Location
DD:																				Container Size

Instructions:

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time	Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date
[signature]	11/2/95 17:52	[signature]	11/2			C. Carlson	11/03/95

101

FINAL

TIER 1 PETROLEUM RELEASE SITE INVESTIGATION BUILDING 608 (NDEQ RELEASE No. UG#040996-GW-0935)

NEBRASKA AIR NATIONAL GUARD
155TH AIR REFUELING WING
LINCOLN, NEBRASKA

Prepared For:

Nebraska Air National Guard
Lincoln, Nebraska

Project No. 1911914.781803

April 2001

Prepared By:

Montgomery Watson
11153 Aurora Avenue
Des Moines, Iowa 50322
(515) 253-0830

TABLE OF CONTENTS

NEBRASKA AIR NATIONAL GUARD
155 Air Refueling Wing
2420 West Butler Avenue
Lincoln, NE 68524 – 1897

Monday, 09 April, 2001

Certification of Receipt:

TIER 1 PETROLEUM RELEASE SITE INVESTIGATIONS,
Buildings 203, 635 and 608

Please send this receipt and Nebraska Air National Guard Document to:

Ms. Nancy Mann
LUST/ER section

Printed name of NDEQ representative: Jill Jarosz

Signature: Jill Jarosz

RE[illegible]D
AP[illegible]
NEBRA[illegible] OF
ENVIRO[illegible]

1.0 RESPONSIBLE PARTY/GENERAL SITE INFORMATION

Montgomery Watson, under contract with the Nebraska Air National Guard (NEANG), has prepared this report documenting a petroleum release investigation completed at Building 608, 155th Air Refueling Wing (155th ARW). The site is located on property owned by the Nebraska Military Department, and is adjacent to the southeast corner the Lincoln Municipal Airport, Lincoln, Nebraska, as depicted in Figure 1, included in Appendix A. The Nebraska Department of Environmental Quality (NDEQ) spill number and, responsible party and consultant information are included on the Report Format Sheet #1, included in Appendix B.

The purpose of the field investigation is to collect site information necessary for the NDEQ to perform a Tier 1 assessment. Montgomery Watson met with the NDEQ Project Manager to review NDEQ site files and requirements, conducted a preliminary site survey, and interviewed NEANG employees on product history. This information was used to develop the October 2000 work plan for the soil and groundwater sampling field investigation. The work plan was approved by the NDEQ on November 14, 2000. Montgomery Watson completed soil and groundwater sampling activities at the site in December 2000 and January 2001.

2.0 HISTORICAL DATA/LAND USE ASSESSMENT

2.1 PETROLEUM RELEASE HISTORY

The site is located adjacent to and inside Building 608, the Fuel Cell Repair building. The site consists of several former oil-water separators that have been removed and replaced. One 265-gallon welded steel oil-water separator underground storage tank (UST) (UST 608-1), one 250-gallon welded steel oil interceptor tank UST and concrete containment pit (UST 608-4), and one 2,600-gallon concrete emergency containment pit (UST 608-5) were all installed in 1975. No dispensers were associated with this oil-water separator system. This UST was in use through October 1995, and has subsequently been replaced with a new oil-water separator system.

There are no known reported releases from this UST system prior to 1996. There are three separate spill releases documented to be at Building 608 (NDEQ file numbers 071196-NM-1115, 010896-NH-1530, and 102595-NH-1600), each apparently associated with releases of fire-fighting foam. It was unknown whether these spills entered the oil-water separator system. The NDEQ is not requiring any further action associated with these releases.

On October 25, 1995, closure activities for UST 608-1 were initiated. Approximately 260 to 270 gallons of pumpable fluids were removed from the tank prior to removal. Discolored soils and a strong petroleum odor were observed after removal of the UST by Tony's Cement Works, Inc. (Tony). The UST was reported to be corroded and had numerous holes of up to ¼-inch in diameter. Removed piping appeared to be in good condition, and there were no visible signs of leakage observed in the piping excavation. Excavated soils were stockpiled on polyethylene sheeting awaiting disposal. It is Montgomery Watson's understanding that these soils were ultimately disposed at the NEANG 155th ARW. Groundwater was not encountered. Two soil samples were collected from the excavation beneath either end of the removed UST by GeoTechnical Services, Inc. (GTS), and submitted to Evergreen Analytical, Inc. (Evergreen), for analysis of total recoverable petroleum hydrocarbons (TRPH) using EPA Method 418.1. Detectable concentrations of TRPH were reported in both soil samples. A summary of these activities and the sample results was documented in a Closure Assessment Report dated January 1996.

Closure activities for UST 608-4 were also initiated by Tony's on October 25 1995. Fluids from the UST were removed, and the tank and piping were cut and removed from the concrete containment pit. No soil samples were collected during the UST removal activities. A hole was punched through the floor of the containment pit on October 31, 1995, and groundwater that had entered through the holes was sampled on November 1, 1995 by GTS. The groundwater sample was submitted to Evergreen for analysis of TRPH using EPA Method 418.1. Detectable concentrations of TRPH were reported in the groundwater sample. The influent piping was grouted shut and the containment pit was backfilled with clean sand. The excavation was capped with concrete on November 7, 1995. A summary of these activities and sample results was documented in a separate Closure Assessment Report dated January 1996.

Closure activities for UST 608-5 were also initiated by Tony's on October 25, 1995. The concrete above the emergency spill pit was cut and removed, and pumpable liquids were removed on October 26, 1995. The pit was steam-cleaned on November 1, 1995 and holes were pierced through the bottom of the pit. The presence or absence of groundwater in the excavation was not reported. Although no soil samples were collected for headspace analysis, two soil samples were collected from these holes by GTS on November 1 and 2, 1995. The soil samples were submitted to Evergreen for analysis of TRPH using EPA Method 418.1. Detectable concentrations of TRPH were reported in the two soil samples. The influent and effluent lines were grouted, the excavation backfilled with sand, and a concrete cap poured by November 7, 1995. A summary of these activities and sample results was documented in a separate Closure Assessment Report dated January 1996. The locations of the former USTs, replacement oil-water separators, soil and groundwater samples, and other pertinent site features are illustrated in Figure 2, included in Appendix A.

In August 1996, Olsson Environmental Services (Olsson) reviewed the Closure Assessment Reports and data collected at NEANG Installation Restoration Program (IRP) sites to determine areal hydrogeologic conditions and possible off-site contaminant sources near the Building 608 site. No possible off-site sources were identified. Olsson recommended a Step 6 Groundwater Investigation be conducted at the site. On June 18, 1997, the NDEQ sent a letter to the NEANG indicating this site was scored and no further investigation would be required until the site reached the top of the priority list. On November 3, 1999, the NDEQ notified the NEANG that the site was being reactivated, and an Initial (Tier 1) Site Investigation and Pre-Investigation Work Plan Form would be required.

2.2 PRODUCT STORAGE HISTORY

Available documentation on the characteristics of the wastes stored in USTs 608-1, 608-4, and 608-5 indicate their contents consisted on "Unknown" (UST 608-1 and 608-5) and "oil" (UST 608-4). To better determine the types of materials that may have been stored in these former USTs, Montgomery Watson reviewed the Spill Prevention and Response Plan (Plan) prepared by Odgen Environmental dated June 1999 to determine the types of hazardous substances stored at Building 608. According to this Plan, antifreeze, hydraulic fluid, motor oil, used oil, and PD-680 cleaning solvent (containing petroleum distillates) were stored at this facility. Given the nature of the operations at this facility, it is likely jet fuels may also have been handled inside the Fuel Cell Repair building.

2.3 LAND USE

The site is located southeast of the Lincoln Municipal Airport on the 155th ARW military facility. The land use at the site is military, approximately equivalent to commercial use. No residential dwellings or sensitive population centers are present within a 500-foot radius of the site source area, as illustrated in Figure 3, included in Appendix A.

2.4 COMMINGLED OR OFF-SITE SOURCE AREAS

An active flight ramp is located in the apparent upgradient direction from the site. Although no spills have been documented, it is possible minor spills associated with operations on this ramp could impact the site.

Montgomery Watson is aware of a Waste JP-4 release site (UST 608-3; IRP Site 2) located southwest of the Building 608 source areas (NDEQ file No. UG#073191-RF-1200). The results of sampling activities documented in a March 1992 Site Assessment Report prepared by Operational Technologies Corporation (OpTech), indicate low concentrations of benzene were reported in soil samples collected from borehole MW-5 completed closest to the Building 608 source areas. Low concentrations of toluene and xylenes were also reported in groundwater samples collected from monitoring wells (MW-2 and MW-5) located nearest to the Building 608 source areas. The locations of these sampling points are illustrated in Figure 2, included in Appendix A. It is possible these constituents may have impacted the Building 608 source areas, given the distance and side-gradient location of IRP Site 2 to the Building 608 source areas, as documented in the Site Assessment Report prepared by OpTech. The NDEQ is not requiring any further action for the IRP Site 2 release.

2.5 POTENTIAL POINTS OF EXPOSURE

2.5.1 Water Supply Wells

Montgomery Watson contacted the Nebraska Department of Natural Resources (NDNR), Captain John Buhrmann of the 155th ARW Environmental Management Office, and Mr. Dennis McCaugerty of the 155th ARW Civil Engineering Squadron regarding the locations of any water supply wells in the vicinity of the site. These sources indicated no water supply wells were located within a 2,000-foot radius of the Building 608 source areas, as illustrated in Figure 3.

2.5.2 Subsurface Structures and Utilities

There are no known basements or inhabitable subsurface structures identified as being located within a 200-foot radius of the site source areas. There are numerous subsurface utilities located in the vicinity of the site source areas, as illustrated in Figure 4. Buried utilities identified as being located within a 200-foot radius include water, storm sewer, sanitary sewer, natural gas, electric, communications, and an abandoned steam line. Information regarding the depth and backfill characteristics of these utilities is summarized on Report Format Sheet # 3B, included as part of Appendix B. A vapor survey of these utilities was not completed, as free product was not encountered during this site investigation.

2.5.3 Surface Water Bodies

The only surface water body located within 1,000 feet is Old Oak Creek Channel, an ephemeral wetland/drainage located approximately 175 feet south-southwest of former UST source areas, as shown in Figure 3, included as Attachment A. Old Oak Creek Channel generally slopes eastward and drains into Oak Creek southeast of the NEANG 155th ARW. These wetlands were inspected on January 5, 2001. No obvious impacts (i.e., petroleum sheen or staining, or stressed vegetation) that would be associated with the site were noted.

3.0 SITE INVESTIGATION ACTIVITIES

3.1 SOURCE AREA IDENTIFICATION/SAMPLING LOCATIONS

The source area(s) for this investigation are the excavation areas for former USTs 608-1, 608-4 and 608-5. Grab samples of soil and groundwater that were present in each of these excavations indicated elevated concentrations of TRPH. Additional assessment of current petroleum impacts to each of these source areas was determined to be necessary, to document the likely reduction in contaminant concentrations in the 6-year period since the closure activities.

On December 28, 2000, as part of site investigation activities, Montgomery Watson completed four soil borings and installed four monitoring wells (MW-608-8 through MW-608-11). Soil boring and monitoring well installation activities were completed by J&R Drilling Services, Inc. of Grimes, Iowa, under the supervision of Montgomery Watson. Monitoring well MW-608-8 was installed north of Building 608 as a background monitoring point. Monitoring well MW-608-9 was installed off of the south end of former UST 608-1. Monitoring well MW-608-10 was installed outside of Building 608, immediately north of former UST 608-4. Monitoring well MW-608-11 was installed inside Building 608 off of the south end of former UST 608-5. The locations of these monitoring points are illustrated in Figure 2, included in Appendix A.

A truck-mounted drill rig equipped with hollow-stem augers and a split-spoon soil sampler was used to advance the borings and collect soil samples. Soil samples were collected continuously from both locations using the 5-foot long split-spoon sampler until a saturated unit was encountered capable of yielding sufficient groundwater for sampling. Soil samples were collected at 2 ½-foot intervals for headspace readings and possible laboratory analysis. If poor recovery was obtained from the split-spoon sampler, a single soil sample was collected from the 5-foot interval. For those soil samples retained for potential laboratory analysis, portions of each sample interval were placed in 4-ounce laboratory-provided jars, labeled, and placed on ice. Portions of the soil samples were also placed in clean, 1-quart mason jars, covered with tin foil, and allowed to equilibrate for at least 30 minutes pursuant to NDEQ Tier 1 assessment guidance. Headspace readings were collected from these samples using a calibrated MicroTIP™ photoionization detector (PID). The surficial geology and field screening results for each sampling point are documented on the soil boring diagrams included in Appendix C. Two soil samples collected from intervals located above the field-interpreted saturated zone in each soil boring were submitted for laboratory analysis under chain-of-custody protocol. All soil samples were submitted to Keystone Laboratories, Inc. (Keystone) of Newton, Iowa for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tert-butyl ether (MTBE) and n-hexane using EPA Method 8260; total extractable hydrocarbon (TEH) constituents using Method OA-2; and Resource Conservation and Recovery Act (RCRA) metals using Solid Waste (SW) Method 6010B.

Upon completion of each soil boring a monitoring well was constructed as documented in the monitoring well construction diagrams included in Appendix C. After completion, Montgomery Watson personnel developed each monitoring well via hand-bailing to remove fine-grained sediments and to ensure hydraulic communication with the surrounding aquifer. The location and surface elevation of each sampling location was surveyed by HWS Consulting, Inc. (HWS), as documented in Appendix D. Permanent marks were placed on the top of casing of each monitoring well to be gauged to indicate the surveyed location and to ensure duplication when collecting future groundwater elevation data, if necessary.

Montgomery Watson returned to the site on January 4, 2001 to collect water level data and groundwater samples from the newly-installed monitoring wells. Prior to sampling, each monitoring well was gauged to determine the depth to water and to inspect for the presence of free product using a Solinst Model 110 electronic oil-water interface probe. After gauging, the newly-installed monitoring wells were purged with dedicated disposable hand-bailers. Temperature, pH, and conductivity were monitored with a Myron L Model ARH1 pH/conductivity meter during purging activities to verify stabilization (within $\pm$ 10 percent) of parameters prior to collection of groundwater samples. At least three saturated well volumes were removed from each monitoring well to be sampled. The wells were then allowed sufficient time to recover before sampling. A groundwater sample was collected from each monitoring well, using a dedicated disposable bailer, placed in laboratory-provided containers, sealed, labeled, and placed in laboratory-provided coolers on ice. The groundwater samples were sent to Keystone, under chain-of-custody protocol, for analysis of BTEX, MTBE, and n-hexane using EPA Method 8260, TEH using Method OA-2, and dissolved RCRA metals using SW Method 6010B. The groundwater samples collected for metals were field filtered through 0.45-micron filters prior to preservation in laboratory-supplied bottles.

3.2 SURFACE SOIL SAMPLING RESULTS

No surface soil samples were collected at the source areas, as there were no surficial piping or dispensers associated with the UST system. The excavation was apparently backfilled with clean soil after removal of the tanks and piping. Source areas UST-608-4 and UST-608-5 are covered with concrete. Source area UST-608-1 is capped with sod.

One surface soil sample (0- to 2.5-foot interval) was collected at the background sampling location, MW-608-8, to verify there was no surficial contamination and to quantify background surface soil concentrations. The analytical results for petroleum constituents are summarized on Report Format Sheet # 4, included in Appendix B. The concentrations of all analyzed constituents in this soil sample were reportedly less than laboratory quantitation limits with the exception of arsenic, barium, and chromium. The analytical laboratory data report and completed chain-of-custody record are included in Appendix E.

3.3 SUBSURFACE SOIL SAMPLING RESULTS

The native site geology generally consists of silty clays to a depth of approximately 10 to 19 feet below ground surface (bgs), underlain by clayey sands and sands to a maximum investigative depth of 20 feet bgs. Fill sands associated with the former UST-608-1 excavation were encountered to a depth of 9.5 feet during completion of MW-608-9. Fill sand associated with a buried abandoned steam line was encountered at a depth of 4 to 4.5 feet bgs during the completion of MW-608-10. Saturated soils, field-interpreted as the local water table, were generally encountered at depths of 14 to 15 feet bgs. Although petroleum odors and staining were noted during the completion of MW-608-9, product-saturated soils were not encountered during completion of any of the monitoring wells.

With the exception of MW-608-8, a total of two subsurface soil samples were collected from each monitoring well from the intervals exhibiting the highest field-screening readings above the field-interpreted saturated zone. For upgradient sampling location MW-608-8, one soil sample was collected immediately above the field screening readings, as this location did not exhibit detectable volatile organic concentrations using field screening techniques. A total of seven subsurface soil samples were submitted for laboratory analysis. The analytical results for petroleum constituents are summarized on Report Format Sheet # 5, included in Appendix B. Detectable levels of MTBE was not reported in any of the subsurface soil samples. Detectable levels of n-hexane were not reported in any of the soil samples, with the exception of the 7.5- to 10-foot interval collected from MW-608-11. The concentrations of BTEX and TEH constituents in the seven subsurface soil samples were reported to be less than laboratory quantitation limits with the exception of the 10- to 12.5-foot interval collected from MW-608-9, and the 5- to 7.5-foot and 7.5- to 10-foot intervals collected from MW-608-11. Detectable concentrations of metals including arsenic, barium, chromium, lead, and mercury were reported in all submitted subsurface soil samples. The analytical laboratory data report and completed chain-of-custody record are included in Appendix E.

3.4 GROUNDWATER SAMPLING RESULTS

Groundwater samples were collected from the four newly-installed monitoring wells and submitted for laboratory analysis using the methodology previously discussed. One trip blank was also submitted with the groundwater samples and analyzed for BTEX constituents, MTBE, and n-hexane using EPA Method 8260. The analytical results for petroleum constituents are summarized on Report Format Sheet #6 (Appendix B). The concentrations of MTBE and n-hexane were not reported above detectable levels in these samples. Detectable levels of BTEX constituents were reported in the groundwater samples collected from MW-608-9 and MW-608-11. Detectable levels of TEH constituents were reported in the groundwater sample collected from MW-608-9. With the exception of barium, detectable levels of dissolved metals were not reported in any of the groundwater samples. The analytical laboratory data report and completed chain-of-custody record are included in Appendix E.

3.5 SATURATED ZONE PARAMETERS

On January 4, 2001, groundwater elevations were gauged at each of the newly-installed monitoring wells. Surveyed top-of-casing elevations provided by HWS, and depth-to-water measurements in each well were used in determining groundwater elevations. A copy of the survey information prepared by HWS is included in Appendix D for reference.

Groundwater elevations were measured from each newly-installed monitoring point at various times following installation, to determine stabilization in groundwater levels, as documented on the monitoring well construction diagrams included in Appendix C. The newly-installed monitoring wells and three existing monitoring wells located west and south of the site were gauged on January 4, 2001 to determine groundwater flow direction and gradient across the site.

For reference, copies of the available soil boring log and well construction information for the three gauged existing wells are included in Appendix C. A summary of the static groundwater levels as measured on January 4, 2001 is included in Appendix F. Based on this information, apparent groundwater flow is to the southwest at a gradient of approximately 0.005 feet/foot. A groundwater elevation map is presented as Figure 5, included in Appendix A.

The surficial aquifer at the site generally consists of a clayey sand to sand unit at least 8 feet thick. The hydraulic conductivity of this aquifer is estimated to range between 1.9×10^{-3} to 3.7×10^{-2} centimeters per second (cm/sec). This information is based on data collected and evaluated by Parsons-ES at nearby IRP Site 1 (Old POL site), located at the NEANG base. Based on a review of well logs generated at the Old POL site, the sand aquifers appear to be similar lithologically, and would be expected to have similar hydrogeologic characteristics. The slug test data is reported in the December 1992 Draft Final Site Assessment Report for Sites 1 and 13 prepared by Parsons ES.

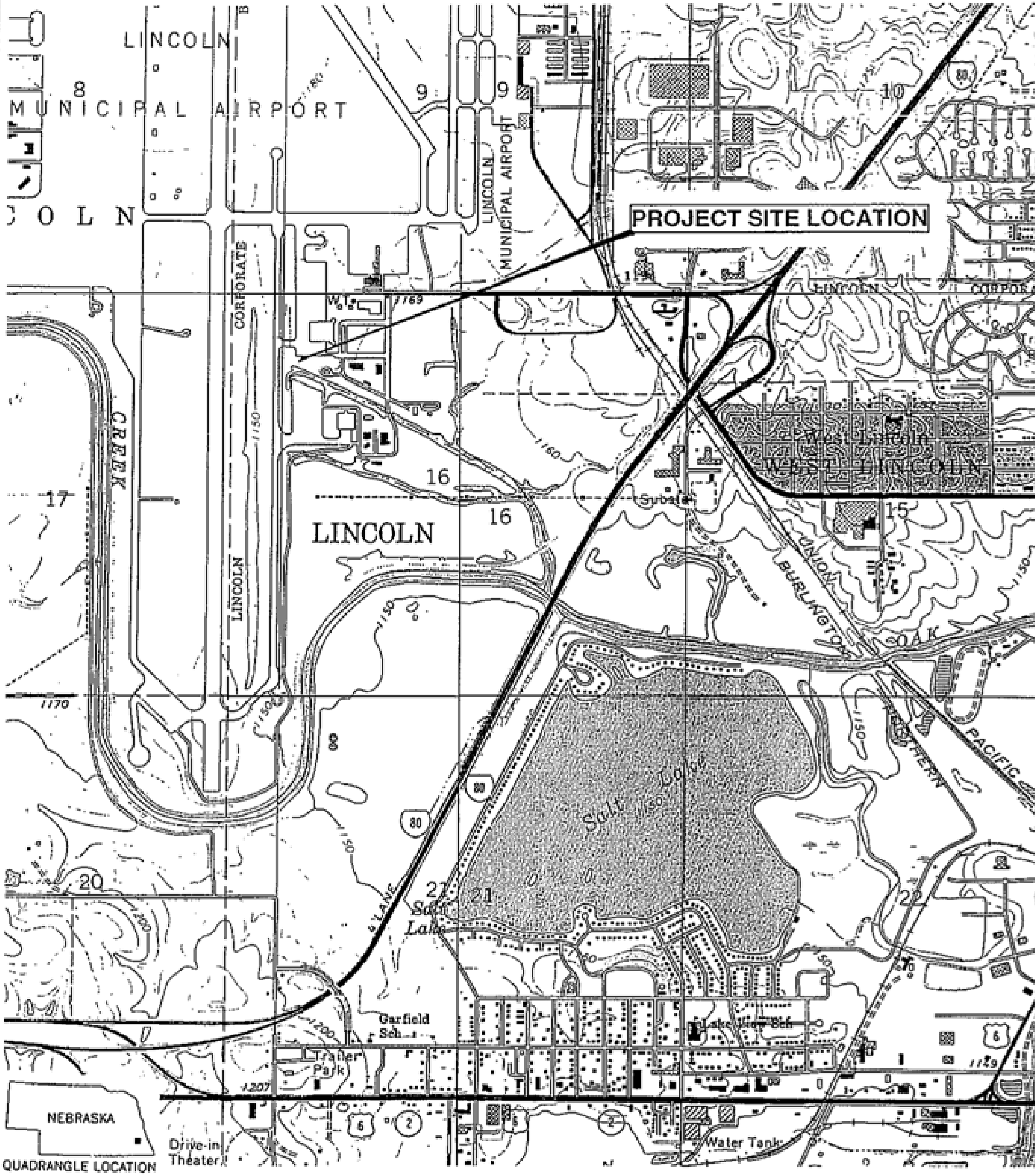
The porosity of the clayey sand to sand aquifer is estimated at 40%, based on the range of values of sands given in Groundwater (1979), a book authored by Freeze and Cherry. Using the conservative estimate of hydraulic conductivity of 3.7×10^{-2} cm/sec (or 105 feet per day), a porosity of 40%, and a gradient of 0.005 feet/foot, groundwater velocity at the site is estimated at 1.3 feet per day.

4.0 FREE PRODUCT CHARACTERIZATION

The four newly-installed monitoring, and the three existing and assessable nearby monitoring wells, were gauged with a Solinst Model 110 electronic oil-water interface probe to detect floating free product. Measurable amounts of free product were not detected using this instrument. The disposable bailers were used to visually inspect for free product in the four newly-installed monitoring wells at the initiation of purging activities. No observable thickness of free product was identified during well development, well purging, or groundwater sampling activities conducted by Montgomery Watson. A slight "sheen" was observed on development waters removed from MW-608-9 on December 29, 2000.

A further assessment of free product or petroleum vapors was not conducted at the site given the current site conditions.

APPENDIX A



MAP SOURCE:
USGS TOPOGRAPHIC QUADRANGLES,
EMERALD, NEBRASKA (1964, REVISED 1972) &
LINCOLN, NEBRASKA (1964, REVISED 1980)

north

0 1000 2000

SCALE IN FEET

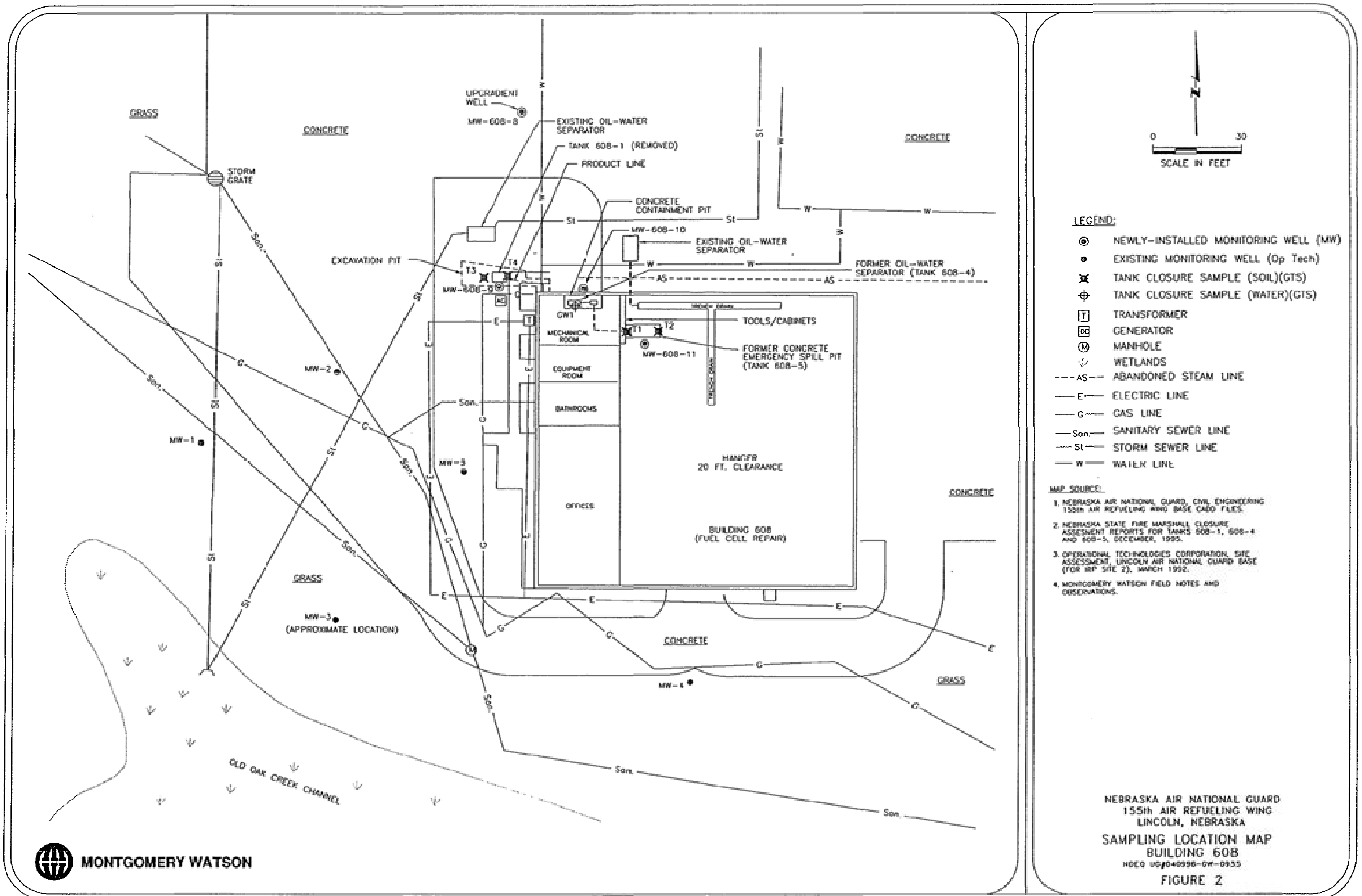
NEBRASKA AIR NATIONAL GUARD – OLD POL
155th AIR REFUELING WING
LINCOLN, NEBRASKA

SITE LOCATION MAP

FIGURE 1

MONTGOMERY WATSON

bdr.dgn



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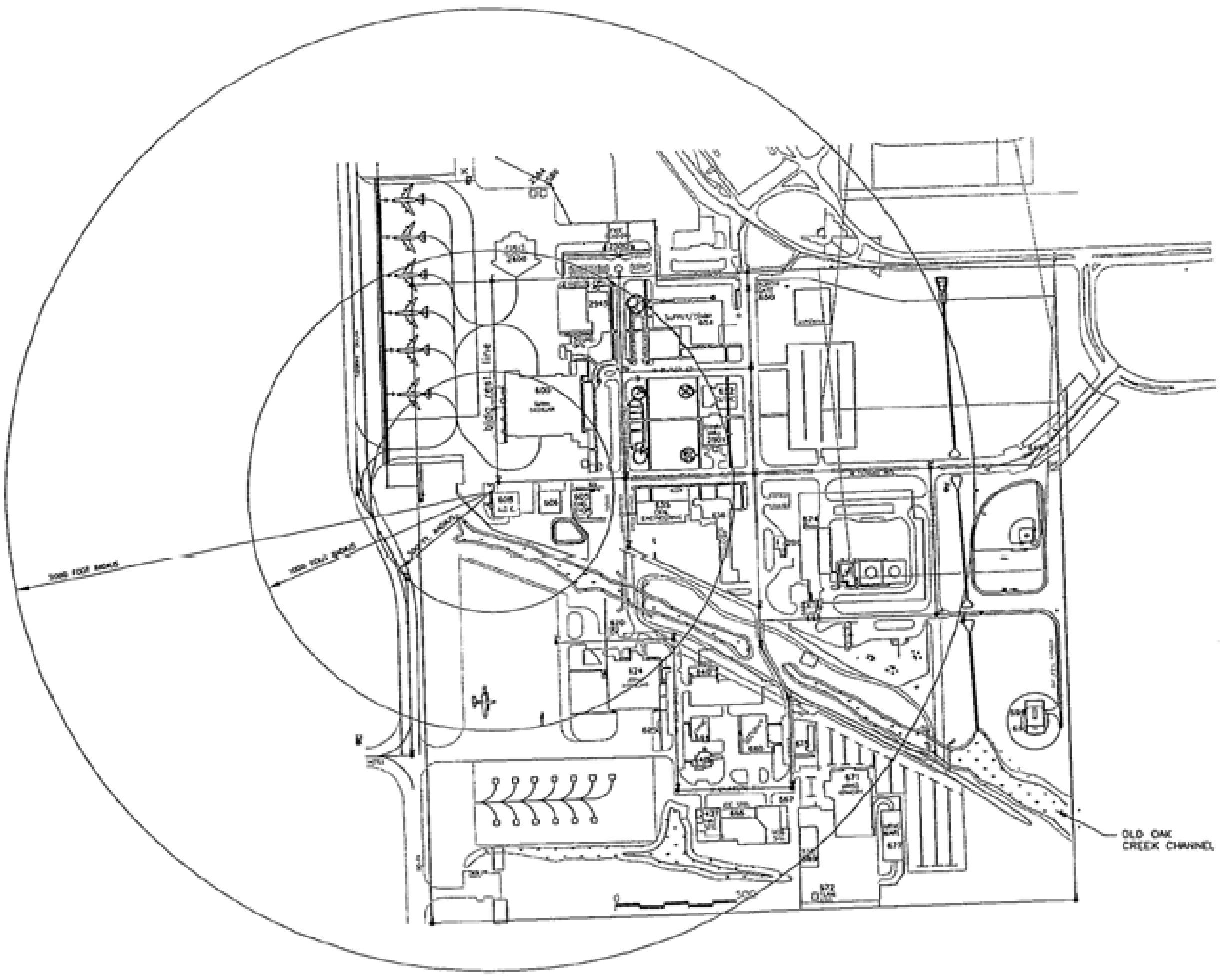


0 500
SCALE IN FEET

LEGEND:

BUILDING

WETLANDS/WATERWAYS

NOTES:

1. THERE ARE NO SENSITIVE POPULATIONS LOCATED WITHIN 500 FEET OF THE SITE SOURCE AREAS.
2. THERE ARE NO WATER SUPPLY WELLS LOCATED WITHIN 2000 FEET OF THE SITE SOURCE AREAS.

MAP SOURCE:

1. NEBRASKA AIR NATIONAL GUARD, CIVIL ENGINEERING 155TH AIR REFUELING WING BASE CADD FILES.
2. MONTGOMERY WATSON FIELD NOTES AND OBSERVATIONS (AUGUST AND SEPTEMBER, 2000)

NEBRASKA AIR NATIONAL GUARD
155th AIR REFUELING WING
LINCOLN, NEBRASKA

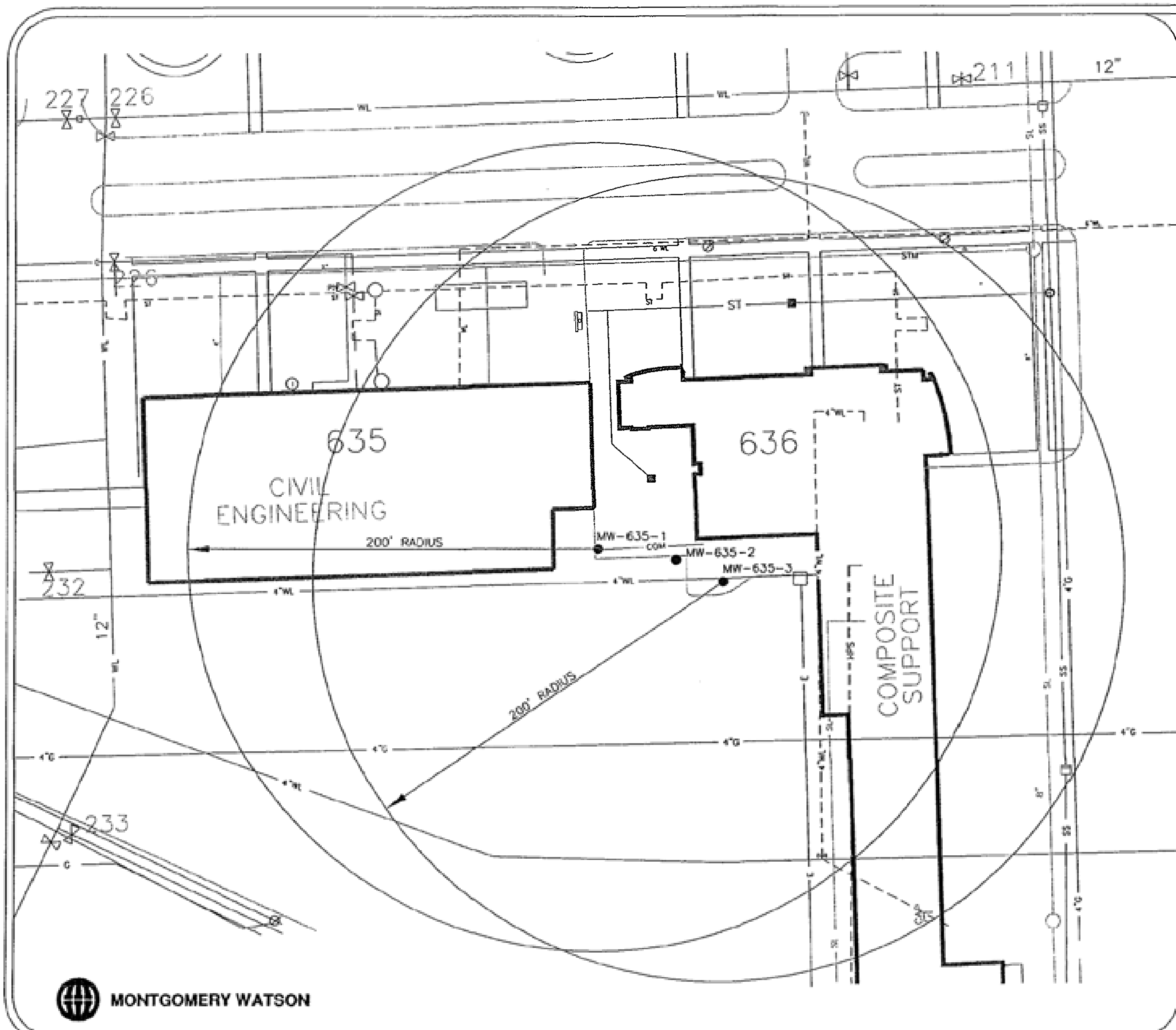
SENSITIVE POPULATION, SURFACE WATER AND WATER WELL SURVEY MAP
BUILDING 608

NDEQ UG#040996-GW-0935

FIGURE 3

MONTGOMERY WATSON

POINTMAP FILE: BLOWUP608_3.DWG (3/8/01)



0 50
SCALE IN FEET

LEGEND:

- ● MONITORING WELL
- - - - ABANDONED UTILITIES
- —E— ELECTRIC LINE
- —4"G— GAS LINE
- —SL— SANITARY SEWER LINE
- —SS— STORM SEWER LINE
- —WL— WATER LINE
- —COM— COMMUNICATION LINE
- ⋈ SHUT-OFF VALVE
- -O- MANHOLE

MAP SOURCE:

1. NEBRASKA AIR NATIONAL GUARD, CIVIL ENGINEERING 155TH AIR REFUELING WING BASE CADD FILES.
4. SINCLAIR, HILLE AND ASSOCIATES, INC. COMPOSITE SUPPLY UTILITY CONSTRUCTION (DATE UNKNOWN).
5. MONTGOMERY WATSON FIELD NOTES AND OBSERVATIONS (AUGUST AND SEPTEMBER, 2000).

NOTE:

THERE ARE NO INHABITABLE SUBSURFACE STRUCTURES LOCATED WITHIN 200 FEET OF THE SITE SOURCE AREAS.

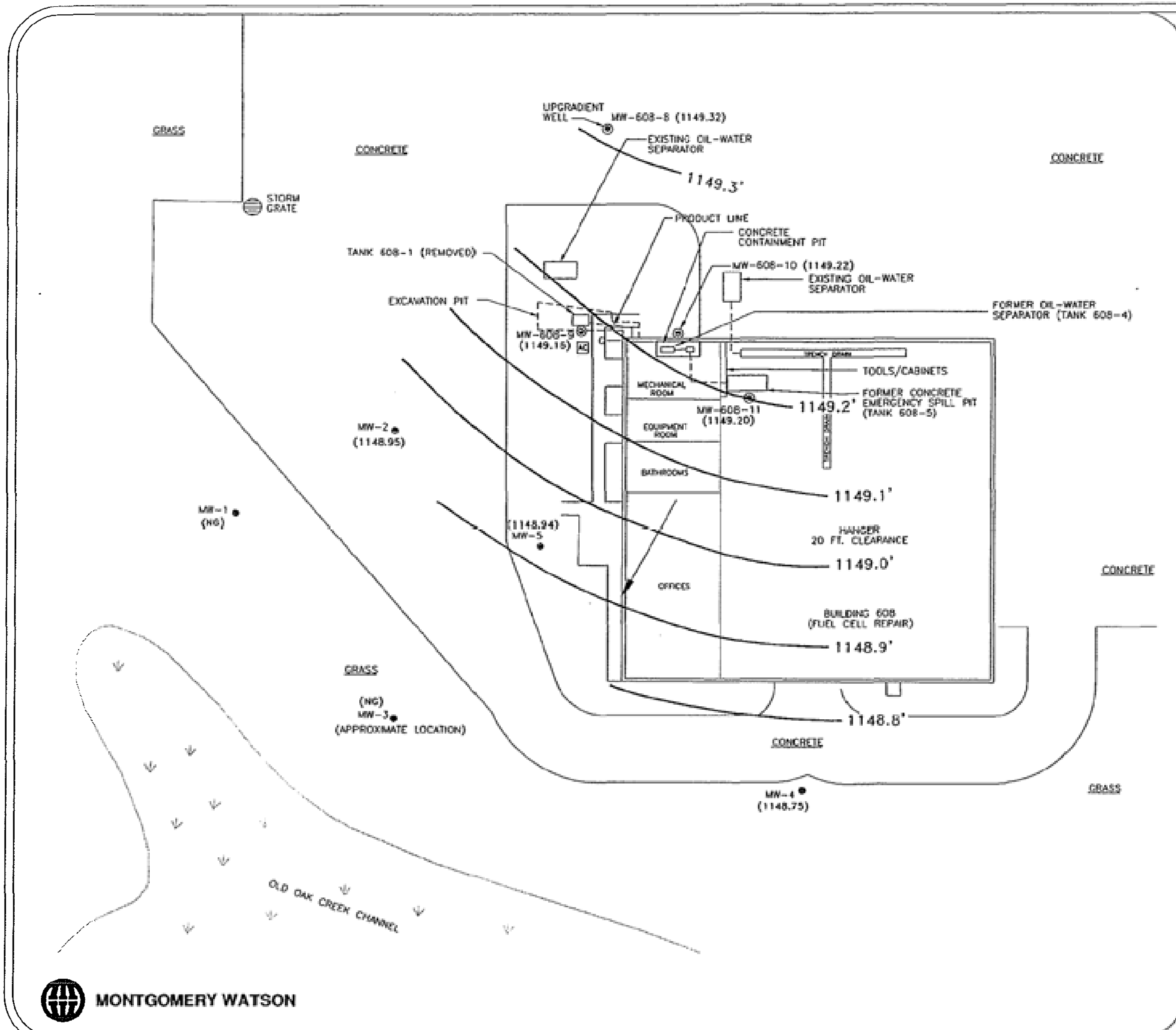
NEBRASKA AIR NATIONAL GUARD
155th AIR REFUELING WING
LINCOLN, NEBRASKA

SUBSURFACE STRUCTURE
AND UTILITY MAP
BUILDING 635

NDEQ UG#072996-GW-1450

FIGURE 4

PGM/MAP FILE: BLDMUP635_4.DWG (3/8/01)



MONTGOMERY WATSON

LEGEND:

- NEWLY-INSTALLED MONITORING WELL (MW)
- EXISTING MONITORING WELL (Op Tech)
- WETLANDS
- 1149.1' GROUNDWATER ELEVATION CONTOUR
- (NG) NOT GAUGED
- APPARENT GROUNDWATER FLOW DIRECTION

MAP SOURCE:

1. NEBRASKA AIR NATIONAL GUARD, CIVIL ENGINEERING 155th AIR REFUELING WING BASE CADD FILES.
2. NEBRASKA STATE FIRE MARSHALL CLOSURE ASSESMENT REPORTS FOR TANKS 608-1, 608-4 AND 608-5, DECEMBER, 1995.
3. OPERATIONAL TECHNOLOGIES CORPORATION, SITE ASSESSMENT, LINCOLN AIR NATIONAL GUARD BASE (FOR IRP SITE 2), MARCH 1997.
4. MONTGOMERY WATSON FIELD NOTES AND OBSERVATIONS.

NEBRASKA AIR NATIONAL GUARD
155th AIR REFUELING WING
LINCOLN, NEBRASKA
GROUNDWATER ELEVATION MAP
BUILDING 608
NDEQ UG#040998-GW-0935
FIGURE 5

POINTMAP FILE:BLDG608_5.DWG (3/8/01)

APPENDIX B

Report Format Sheet #1: General Site/RP/Consultant Information

Basic Site Information

Site Name: Nebraska Air National Guard - Building 608

NDEQ Spill Number: UG #040996-GW-0935

Street Address: 2420 West Butler Avenue

Spill City: Lincoln

Legal Location: T10 N, R6E, Section 16 NW¼, NW ¼, SW½

Latitude/Longitude: N40° 50.4', W96° 45.4'

Responsible Party Information

RP Point of Contact: Captain John Buhrmann

RP Phone Number: 402-458-1490

Company Name: Nebraska Air National Guard, 155th Air Refueling Wing

Mailing Address: 2420 West Butler Avenue

City: Lincoln State: NE Zip Code: 68524-1888

Consultant Information

Consulting Firm Name: Montgomery Watson

Consultant Firm Project Manager: Jeffrey L. Coon, P.E.

Consultant Phone Number: (515) 253-0830

Statement of Completion & RP/Consultant Signature Block

The consultant representative acknowledges that this report meets the minimum requirements for site investigations at this petroleum release site, as specified in the Department's Site Investigation Procedures at Petroleum Release Sites guidance document. Any procedures that differ from the guidance document specifications are noted in the report, were approved by the Department and are accompanied by appropriate documentation. The responsible party acknowledges that they have read or discussed with their consultant this site investigation report and are aware of their responsibility for the timely submission to the Department of the required report.

Jeff L Coon	4/5/01	John D. Buhrmann	9 Apr 01
Consultant Representative Signature	Date	Responsible Party Signature	Date

Report Format Sheet #2: Petroleum Release/Storage History & Area Land Use

Part A. Petroleum Release History NOT APPLICABLE

If past petroleum releases have been identified at this site other than the release currently under investigation (e.g., an older UST system, surface spill from overfill), provide the following information.

NDEQ Spill Number: ______________ Product Released: ______________

RP Company Name: ______________ Investigation/Cleanup Performed? YES ☐ NO ☐

NDEQ Spill Number: ______________ Product(s) Released: ______________

RP Company Name: ______________ Investigation/Cleanup Performed? YES ☐ NO ☐

If additional releases have occurred, attach a second Petroleum Release sheet.

Part B. Product Storage History

Identify and indicate the various petroleum products and associated waste products stored at any time during the tenure of the responsible party.

Gasoline ☐ Jet Fuels ☒ Kerosene ☐

Diesel Fuel/Fuel Oil #2 ☐ Other Fuel Oil ☐ If other, specify: ______________

Waste Oil ☒ If waste oil was stored, waste included: Motor oil ☒

Solvents ☒

Antifreeze ☒

Hydraulic Fluid ☒

Part C. Land Use

Determine the presence and location of dwellings and sensitive population centers within 500 feet of any source area.

Are any dwellings present within 500 feet of a source area? YES ☐ NO ☒

Are any sensitive population centers within 500 feet of a source area? YES ☐ NO ☒

Check the type(s) of sensitive population centers present.

Day Care Centers ☐ Grade Schools ☐ Hospitals ☐ Nursing Homes ☐ Other ☐
If other, specify: ______________

Locate all dwellings and sensitive population centers on the Area and Site Maps in Appendix A.

Report Format Sheet #3A: Point of Exposure Survey

<u>Water Supply Wells</u> NO WATER SUPPLY WELLS WITHIN 2,000 FEET.

Provide the location of all water supply wells within 2000 feet of any source area. Use the well designation provided below as a map label. Provide the following information for each well.

Well Designation: ____________ Well Location: ________________________________

Distance from source area (feet): ________ Well type: ___________________

Well Designation: ____________ Well Location: ________________________________

Distance from source area (feet): ________ Well type: ___________________

Well Designation: ____________ Well Location: ________________________________

Distance from source area (feet): ________ Well type: ___________________

Well Designation: ____________ Well Location: ________________________________

Distance from source area (feet): ________ Well type: ___________________

Well Designation: ____________ Well Location: ________________________________

Distance from source area (feet): ________ Well type: ___________________

Well designation may be the DWR Registration #, municipal designation, land owner or some other designation. Well location may be a property address or a brief point of reference description. Well type refers to municipal, domestic, irrigation, industrial or other use.

If additional water supply wells are present, attach another Point of Exposure sheet.

<u>Subsurface Structures: Basements/Other Habitable Subgrade Structures</u>

NO BASEMENTS OR HABITABLE SUBSURFACE STRUCTURES WITHIN 200 FEET.

Provide the location of the three closest habitable subsurface structures, when present, within 200 feet of a source area.

Location: ________________________________ Use: __________________________

Location: ________________________________ Use: __________________________

Location: ________________________________ Use: __________________________

Report Format Sheet #3B: Point of Exposure Survey

Subsurface Utilities

Provide the following information regarding subsurface utilities within 200 feet of a source area.

Type of Utility	Depth of Utility (feet)	Type of Fill Material
Sanitary Sewer	18	Sand/Gravel
Storm Sewer	5-8	Unknown
Water Lines	5	Sand
Electrical	2-3	Sand
Natural Gas	3	Sand
Communications	2-3	Sand
Abandoned/Steam Line	5	Sand

Depth of utility refers to the bottom of the utility. If this depth cannot be measured or otherwise determined, indicate the depth is unknown. If municipal authorities or utilities personnel cannot provide information regarding the fill material around the utility, indicate this information is unknown. If the utility listed is not present within 200 feet of a source area, indicate that this information is not applicable.

Surface Water

Provide the name (or some other designation if not named) of any surface water body within 1000 feet of a source area and indicate any evidence of petroleum impact to the water body.

Surface Water Name/Designation: Old Oak Creek Channel

Distance from source area (feet): 175

Evidence for petroleum impact: None

Surface Water Name/Designation: ____________

Distance from source area (feet): ____________

Evidence for petroleum impact: ____________

Surface Water Name/Designation: ____________

Distance from source area (feet): ____________

Evidence for petroleum impact: ____________

Report Format Sheet #4: Surface Soil Sampling Data

Petroleum Constituent	Surface Soil Sample Designation		
	1 MW-608-8 @ 0-2.5'	2	3
Benzene	<0.005		
Toluene	<0.005		
Ethylbenzene	<0.005		
Total Xylenes	<0.015		
MTBE	<0.015		
n-Hexane	<0.005		
Naphthalene	Not Analyzed		
Pyrene	Not Analyzed		
Benzo(a)pyrene	Not Analyzed		
TEH	<10		

List laboratory results in units of milligrams per kilogram (mg/kg).

Provide laboratory analysis sheets and chain of custody form(s) in Appendix E.

Indicate the location of sampling points on the Site Map in Appendix A. Use the appropriate sample designation as the map label.

Report Format Sheet #5: Subsurface Soil Sampling Data

Petroleum Constituent	Subsurface Soil Sample Designation (provide depth or interval from which the sample was obtained below the sample designation)						
	1 MW-608-8	2 MW-608-9	3 MW-608-9	4 MW-608-10	5 MW-608-10	6 MW-608-11	7 MW-608-11
Sample Depth/Interval	10-12.5 feet	5-10 feet	10-12.5 feet	7.5-10 feet	10-12.5 feet	5-7.5 feet	7.5-10 feet
Benzene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Toluene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007
Ethylbenzene	<0.005	<0.005	0.671	<0.005	<0.005	0.006	0.283
Total Xylenes	<0.015	<0.015	1.16	<0.015	<0.015	0.090	2.46
MTBE	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
n-Hexane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.040
Naphthalene	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
Pyrene	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
Benzo(a)pyrene	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
TEH	<10	<10	261	<10	<10	223	678

List laboratory results in units of milligrams per kilogram (mg/kg).

Provide laboratory analysis sheets and chain of custody form(s) in Appendix E.

Indicate the location of sampling points on the Site Map in Appendix A. Use the appropriate sample designation as the map label.

Report Format Sheet #6: Ground Water Sampling Data

Petroleum Constituent	Ground Water Sample Designation					
	1 MW-608-8	2 MW-608-9	3 MW-608-10	4 MW-608-11	5	6
Benzene	<0.001	<0.001	<0.001	0.0017		
Toluene	<0.001	<0.001	<0.001	<0.001		
Ethylbenzene	<0.001	0.119	<0.001	0.0016		
Total Xylenes	<0.003	0.0935	<0.003	0.0114		
MTBE	<0.001	<0.001	<0.001	<0.001		
n-Hexane	<0.001	<0.001	<0.001	<0.001		
Naphthalene	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed		
Pyrene	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed		
Benzo(a)pyrene	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed		
TEH	<0.380	2.340	<0.380	<0.380		

List laboratory results in units of milligrams per liter (mg/l).

Provide laboratory analysis sheets and chain of custody form(s) in Appendix E.

Indicate the location of sampling points on the Site Map in Appendix A. Use the appropriate sample designation as the map label.

Report Format Sheet #7: Saturated Zone Parameters

Provide the following information.

Depth to Ground Water

Monitoring Well Designation	Depth to Ground Water (feet) (measured from top of casing)
MW-2	13.04
MW-4	16.12
MW-5	16.29
MW-608-8	13.17
MW-608-9	13.70
MW-608-10	14.05
MW-608-11	14.16

Locations of points on well casings where measurements were taken for purposes of measuring ground water depth must be marked on the well casings and stated in the report.

If monitoring wells were not constructed, provide the sampling point designation.

Ground Water Flow Velocity

Hydraulic Conductivity: 105 (feet/day)
(For multiple slug out tests, provide the highest value calculated.)

Water Table Gradient: 0.005

Aquifer porosity: 40%

Calculated flow velocity: 1.3 (feet/day)

Hydraulic conductivity, unless otherwise agreed to by the Department, is to be determined by the use of multiple slug out tests or a pump test. Porosity may be estimated from literature values. Flow velocity may be calculated by multiplying the hydraulic conductivity by the water table gradient and dividing by the aquifer porosity.

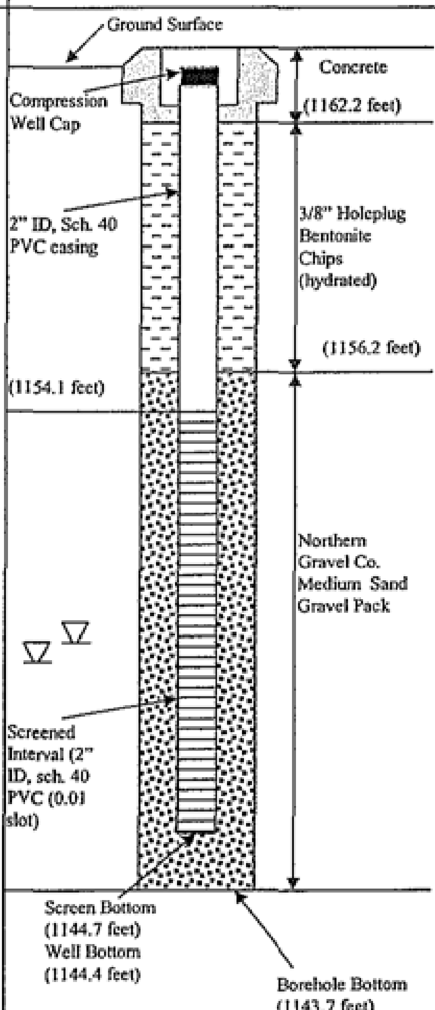
Ground Water Flow Direction: Southwest

APPENDIX C

SOIL BORING LOG AND MONITORING WELL CONSTRUCTION DIAGRAM

Boring / Well Number: **MW-608-8**	Facility Name: **NEANG – Building 608**	Facility Street Address: **2420 W. Butler Avenue, Lincoln**
Boring Depth (ft) X Diameter (in): 19.5 feet X 8 inch OD		Drilling Method: Hollow-Stem Auger
Well Contractor Name/Location: J&R Drilling/Grimes, Iowa Certified Driller Number: 19205		Logged by: Steve Varsa Consultant: Montgomery Watson
Ground Surface Elevation (ASL): 1,163.20 feet	Top of Casing Elevation (ASL): 1,162.49 feet	
Start Date: 01-28-2001 Start Time: 08:00	End Date: 01-28-2001 End Time: 09:10	NDEQ Release Number: **UG # 040996-GW-0935**

Static GW (feet)	Well Construction Details (Elevations in feet ASL)	Blow Count	Sample Interval	Recovery	PID Reading	Rock Formations, Soil, Color Classifications, Observations (moisture, odor, etc.), USCS.
0		Not Applicable	0-2.5	4/5	0.0*	0-1': Concrete, base sand fill.
1			2.5-5		0.0	1-2': Dark gray and brown sandy clay, with pebbles, hard, dry to moist, no odor, CL-SW/GW.
2			5-7.5	3.5/5	0.0	2-5': Brown silty clay, firm, moist, no odor, CL-ML.
3			7.5-10		0.0	5-9': Light brown and black mottled silty clay, firm, moist, no odor, CL-ML.
4			10-12.5	5/5	0.0*	9-10': Tan med-coarse sand, moist, no odor, SW.
5			12.5-15		0.0	10-12': Light brown silty clay, soft, moist, no odor, CL-ML.
6			15-17.5	4/4.5	0.0	12-15': Dark brown sandy clay, soft, moist to wet, no odor, CL-SW.
7			17.5-20		0.0	15-16.5': Brown very fine to fine sand, soft, wet, no odor, SW.
8						16.5-19': Light brown sandy silt, soft to firm, wet, no odor, ML-SW.
9						19-19.5': Reddish brown fine to coarse sand, wet, no odor, SW.
10						End of boring at 19.5 feet below ground surface.
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						



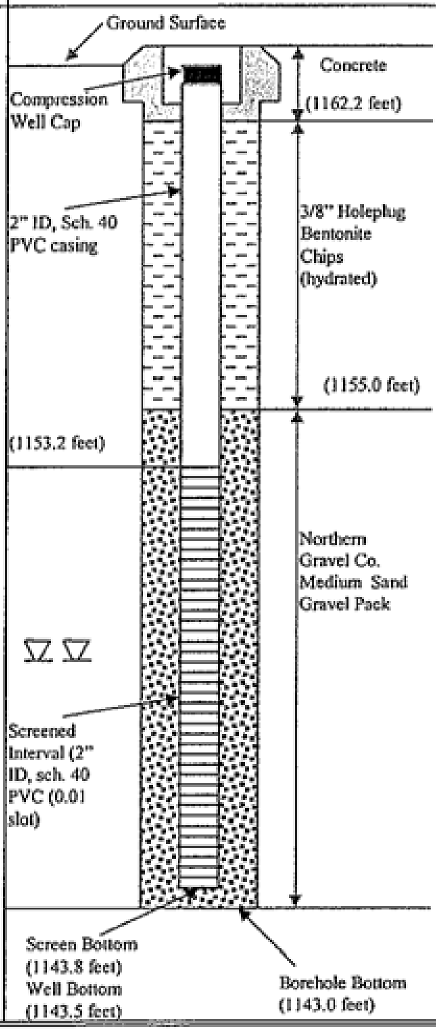
* Soil sample submitted for laboratory analysis. Note: All soil samples were collected using a 5-foot split-spoon sampler.

Static Groundwater Observations	Date:	12-29-2000	01-04-2001			
Water Levels (feet ASL)	Level:	1,148.94	1,149.32			
Static Water Level Symbol v	Time:	14:40	11:38			

SOIL BORING LOG AND MONITORING WELL CONSTRUCTION DIAGRAM

Boring / Well Number: **MW-608-9**	Facility Name: **NEANG – Building 608**	Facility Street Address: **2420 W. Butler Avenue, Lincoln**
Boring Depth (ft) X Diameter (in): 20 feet X 8 inch OD		Drilling Method: Hollow-Stem Auger
Well Contractor Name/Location: J&R Drilling/Grimes, Iowa Certified Driller Number: 19205		Logged by: Steve Varsa Consultant: Montgomery Watson
Ground Surface Elevation (ASL): 1,163.25 feet	Top of Casing Elevation (ASL): 1,162.86 feet	
Start Date: 01-28-2001 Start Time: 09:30	End Date: 01-28-2001 End Time: 10:25	NDEQ Release Number: **UG # 040996-GW-0935**

Well Construction Details (Elevations in feet ASL)



Static GW (feet)	Blow Count	Sample Interval	Sample Recovery	PID Reading
0	Not Applicable	0-2.5	3.5/5	0.0
1		2.5-5		0.1
2		5-10	1.5/5	24.2*
3		10-12.5	5/5	>2500*
4		12.5-15		2421
5		15-17.5	4/5	>2500
6		17.5-20		42.4
7				
8				
9				
10				
11				
12				
13				
14 ∇ ∇				
15				
16				
17				
18				
19				
20				

Rock Formations, Soil, Color Classifications, Observations (moisture, odor, etc.), USCS.

0-3': Dark brown silty clay, moist, no odor, CL-ML.

3-9': Tan fine to coarse sand, moist, no odor, SW.

9-13': Greenish gray silty sandy clay, moist, petroleum odor, CL-SM.

13-15': Dark greenish gray sandy clay, moist to wet at 14.5', petroleum odor, CL-ML.

15-16': Greenish gray and black clayey sand, wet, petroleum odor, SC.

16-17.5': Grayish brown clayey sand, wet, petroleum odor, SC.

17.5-20': Reddish brown clayey sand, wet, no odor, SC.

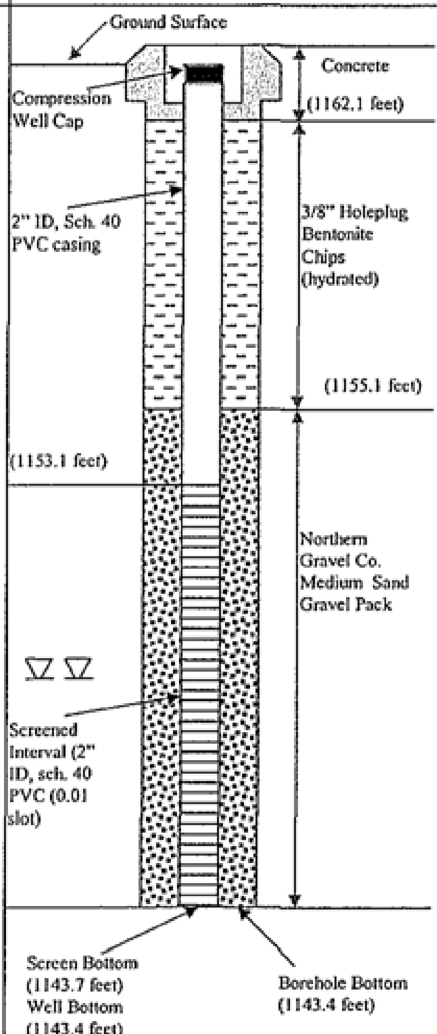
End of boring at 20 feet below ground surface.

* Soil sample submitted for laboratory analysis. Note: All soil samples were collected using a 5-foot split-spoon sampler.

Static Groundwater Observations	Date:	12-29-2000	01-04-2001			
Water Levels (feet ASL)	Level:	1,148.95	1,149.16			
Static Water Level Symbol v	Time:	15:05	11:57			

SOIL BORING LOG AND MONITORING WELL CONSTRUCTION DIAGRAM

Boring / Well Number: **MW-608-10**	Facility Name: **NEANG – Building 608**	Facility Street Address: **2420 W. Butler Avenue, Lincoln**
Boring Depth (ft) X Diameter (in): 20 feet X 8 inch OD		Drilling Method: Hollow-Stem Auger
Well Contractor Name/Location: J&R Drilling/Grimes, Iowa Certified Driller Number: 19205		Logged by: Steve Varsa Consultant: Montgomery Watson
Ground Surface Elevation (ASL): 1,163.59 feet	Top of Casing Elevation (ASL): 1,163.27 feet	
Start Date: 01-28-2001 Start Time: 10:40	End Date: 01-28-2001 End Time: 12:00	NDEQ Release Number: **UG # 040996-GW-0935**

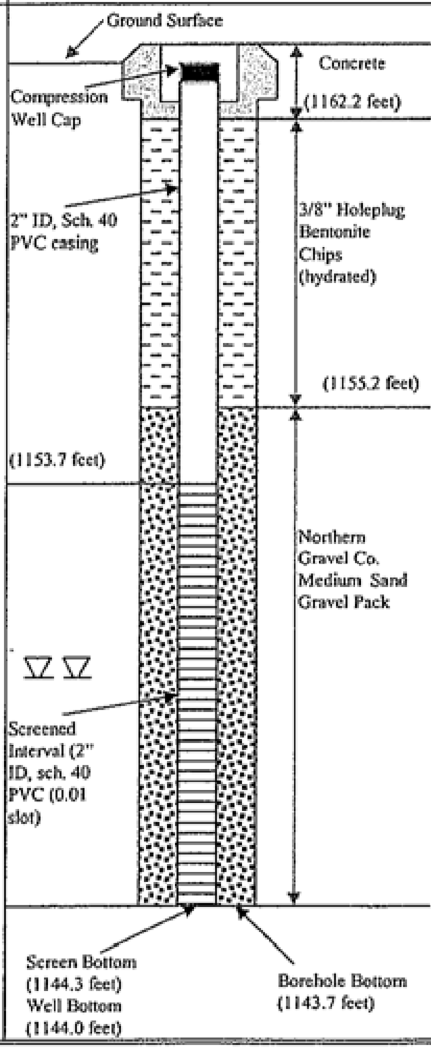
Static GW (feet)	Well Construction Details (Elevations in feet ASL)	Blow Count	Sample Interval	Sample Recovery	PID Reading	Rock Formations, Soil, Color Classifications, Observations (moisture, odor, etc.), USCS.
0		Not Applicable	0-2.5	3/5	0.0	0-0.5': Concrete and base sand, no odor, fill.
1			2.5-5		0.0	0.5-2': Dark brown gravelly clay fill, moist, no odor, CL-GW.
2			5-7.5	5/5	0.0	2-4': Brown silty clay, moist, no odor, CL-ML.
3			7.5-10		0.2*	4-4.5': Tan c-f sand, moist, no odor, SW.
4			10-12.5	5/5	0.1*	4.5-8': Brownish gray and darl brown silty clay, firm, moist, no odor, CL-ML.
5			12.5-15		0.0	8-9': Reddish brown, gray and brown mottled silty clay, hard, moist, no odor, CL-ML.
6			15-17.5	5/5	0.0	9-10': Very dark brown silty clay, firm, moist, slight petroleum odor, CL-ML.
7			17.5-20		0.0	10-14': Grayish brown silty clay, with few pebbles, moist, no odor, CL-ML.
8						14-15': Reddish brown silty clay, hard, moist, no odor, CL-ML.
9						15-19.5': Reddish brown sandy clay, wet, no odor, CL-SW.
10						19.5-20': Reddish brown sand, wet, no odor, SW.
11						End of boring at 20 feet below ground surface.
12						
13						
14						
15						
16						
17						
18						
19						
20						

* Soil sample submitted for laboratory analysis. Note: All soil samples were collected using a 5-foot split-spoon sampler.

Static Groundwater Observations	Date:	12-29-2000	01-04-2001			
Water Levels (feet ASL)	Level:	1,149.11	1,149.22			
Static Water Level Symbol v	Time:	15:25	11:52			

SOIL BORING LOG AND MONITORING WELL CONSTRUCTION DIAGRAM

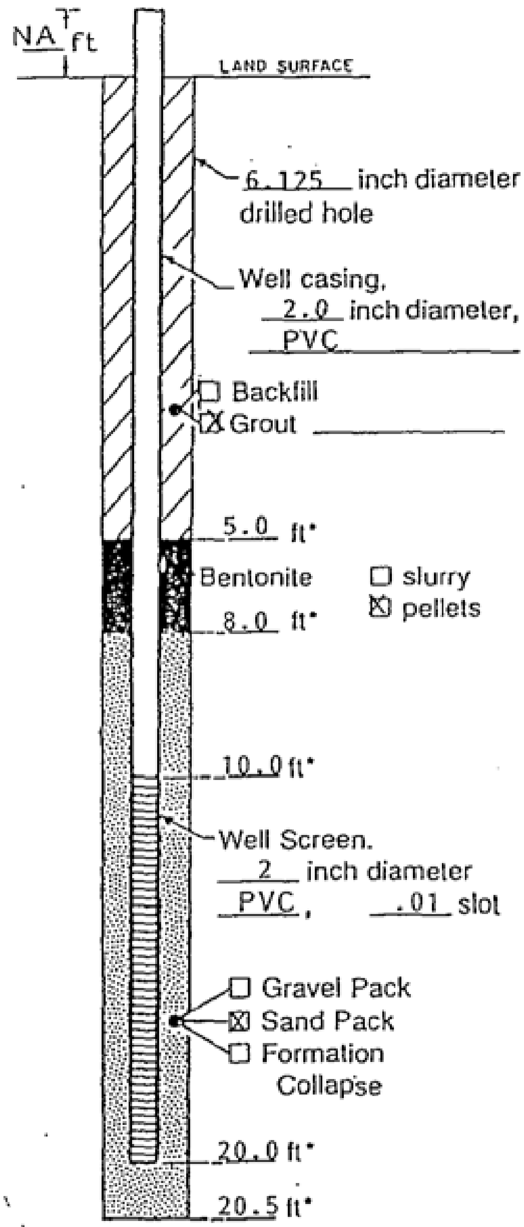
Boring / Well Number: **MW-608-11**	Facility Name: **NEANG – Building 608**	Facility Street Address: **2420 W. Butler Avenue, Lincoln**
Boring Depth (ft) X Diameter (in): 20 feet X 8 inch OD		Drilling Method: Hollow-Stem Auger
Well Contractor Name/Location: J&R Drilling/Grimes, Iowa Certified Driller Number: 19205		Logged by: Steve Varsa Consultant: Montgomery Watson
Ground Surface Elevation (ASL): 1,163.73 feet	Top of Casing Elevation (ASL): 1,163.36 feet	
Start Date: 01-28-2001 Start Time: 13:50	End Date: 01-28-2001 End Time: 16:00	NDEQ Release Number: **UG # 040996-GW-0935**

Static GW (feet)	Well Construction Details (Elevations in feet ASL)	Blow Count	Sample Interval	Sample Recovery	PID Reading	Rock Formations, Soil, Color Classifications, Observations (moisture, odor, etc.), USCS.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20		Not Applicable	0-2.5 2.5-5 5-7.5 7.5-10 10-12.5 12.5-15 15-17.5 17.5-20	3/5 3/5 4.5/5 3.5/5 	0.0 0.0 249* 1121* 54.6 1.2 2.9 0.3	0-2': Concrete and base sand, no odor, fill. 2-6.5': Brown silty clay, with few pebbles, moist, no odor, CL-ML. 6.5-10': Grayish brown silty clay, moist, no odor, CL-ML. 10-12': Very dark brown silty clay, firm, moist, no odor, CL-ML. 12-15': Grayish brown sandy clay, very firm, moist, septic odor, CL-SW. 15-17': Brown silty clay, firm, wet, no odor, CL-ML. 17-19': Grayish brown clay, with minor sand, very firm, wet, no odor, CL. 19-20': Dark grayish brown sandy clay, wet, no odor, CL-SW. End of boring at 20 feet below ground surface.

* Soil sample submitted for laboratory analysis. Note: All soil samples were collected using a 5-foot split-spoon sampler.

Static Groundwater Observations	Date:	12-29-2000	01-04-2001			
Water Levels (feet ASL)	Level:	1,149.21	1,149.20			
Static Water Level Symbol v	Time:	15:55	11:54			

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRG Lincoln, NE Well LANGB MW-2

Town/City Lincoln

County Lancaster State Nebraska

Permit No. NA

Land-Surface Elevation and Datum 1160.88 feet ☒ surveyed

ASL ☐ estimated

Installation Dates(s) 14 Nov 91

Drilling Method Hollow Stem Auger

Drilling Contractor Lanyne-Western

Drilling Fluid None

Development Techniques(s) and Date(s)

Bailer & Rediflow 2 pump & surge block

Fluid Loss During Drilling None gallons

Water Removed During Development 17 gallons

Static Depth to Water 14.89 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration 3.5 hours

Yield NA gpm Date 20 Nov 91

Specific Capacity NA gpm/ft

Well Purpose Ground Water Monitoring Well

Remarks Well recovered very slowly

Prepared by

Depth (Feet)	Blows	PID	S	Graphic	Description
0					Portland Cement Concrete
		10.1			
5		10.1			Silty Clay, brown very dense, moist
		20.2			
10		20.2			Clayey Sand, light brown, subrounded, fine-medium grained; 60% sand, moist
		16.6			
15		20.2			Sand, light brown medium-coarse grained; 70% sand, subrounded to subangular, moist
20					

Logged By: JHM

Drilling Co.: Layne-Western

Date Drilled: 14 Nov 91

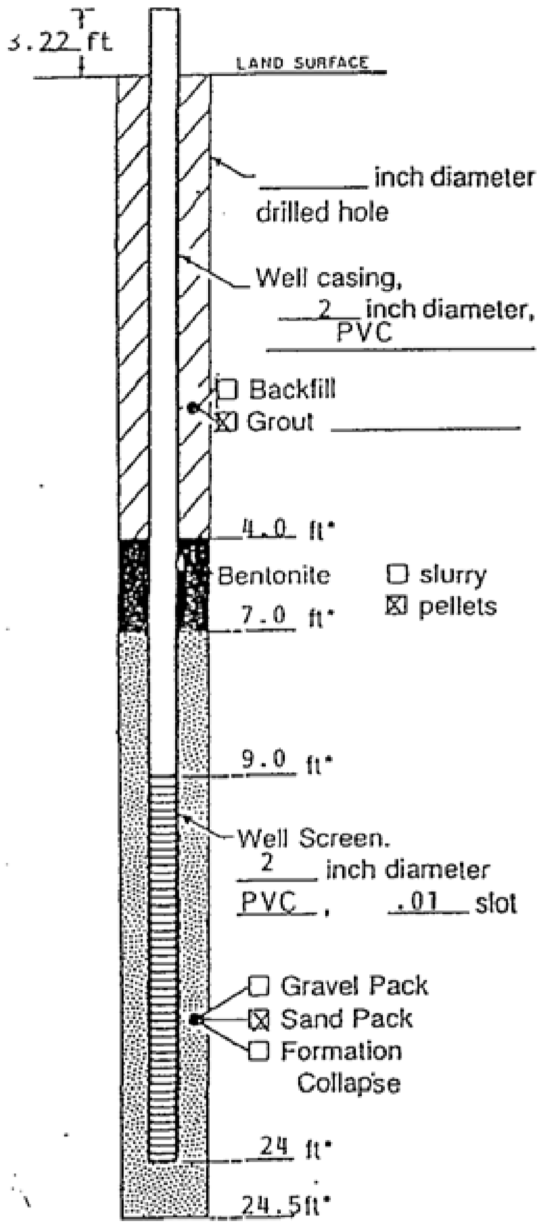
Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Monitor Well MW-2
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
Operational Technologies Corporation

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRG Lincoln, NE Well LANGB MW-4

Town/City Lincoln

County Lancaster State Nebraska

Permit No. NA

Land-Surface Elevation and Datum 1164.39 feet ☒ surveyed ☐ estimated

ASL

Installation Dates(s) 17 Nov 91

Drilling Method Hollow stem Auger

Drilling Contractor Layne-Western

Drilling Fluid None

Development Techniques(s) and Date(s)

Rediflow 2 pump

Fluid Loss During Drilling ______ gallons

Water Removed During Development 47 gallons

Static Depth to Water 17.00 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration 2.0 hours

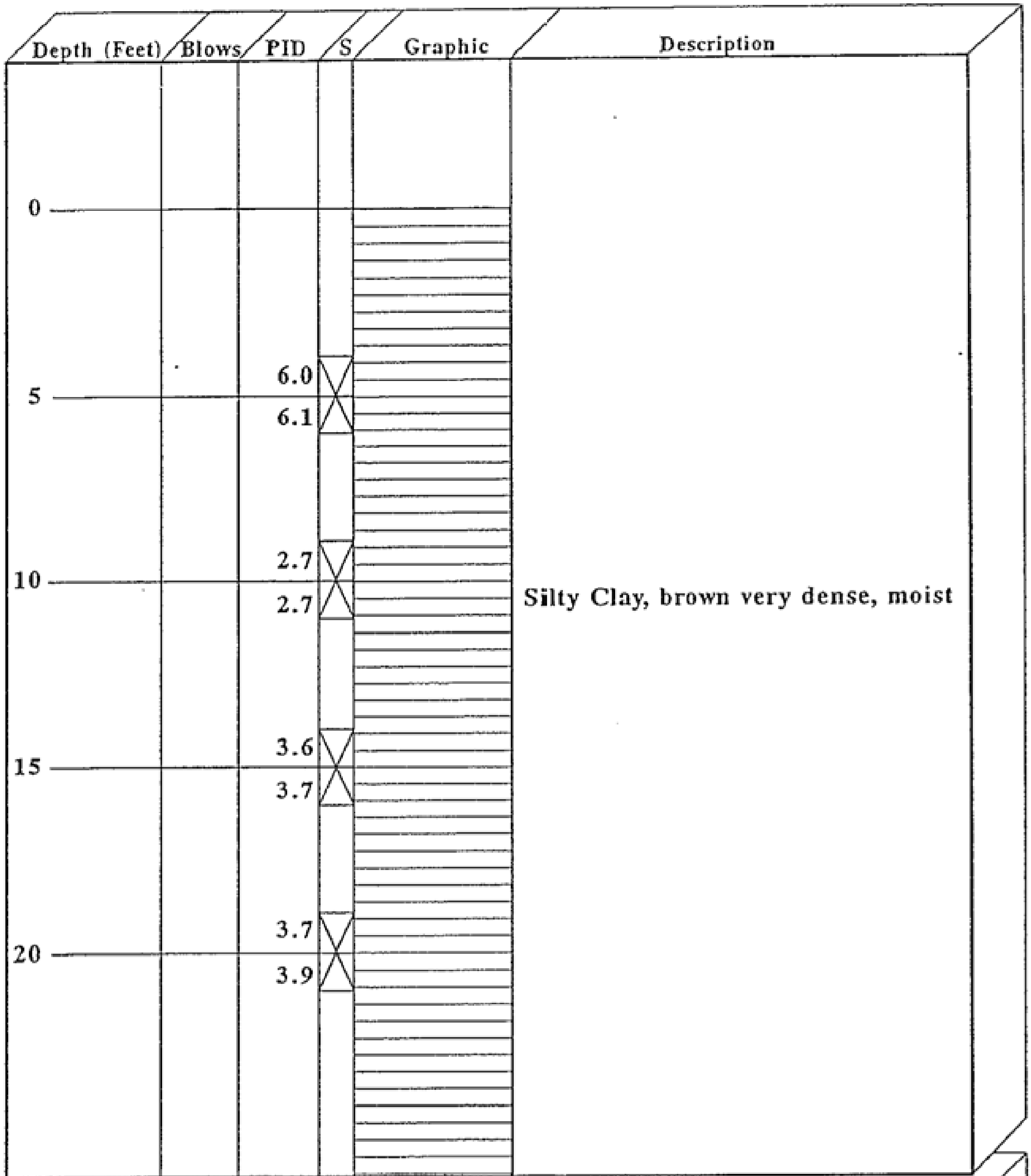
Yield NA gpm Date 20 Nov 91

Specific Capacity NA gpm/ft

Well Purpose Ground Water Monitoring Well

Remarks

Prepared by



Logged By: JHM

Drilling Co.: Layne-Western

Date Drilled: 17 Nov 91

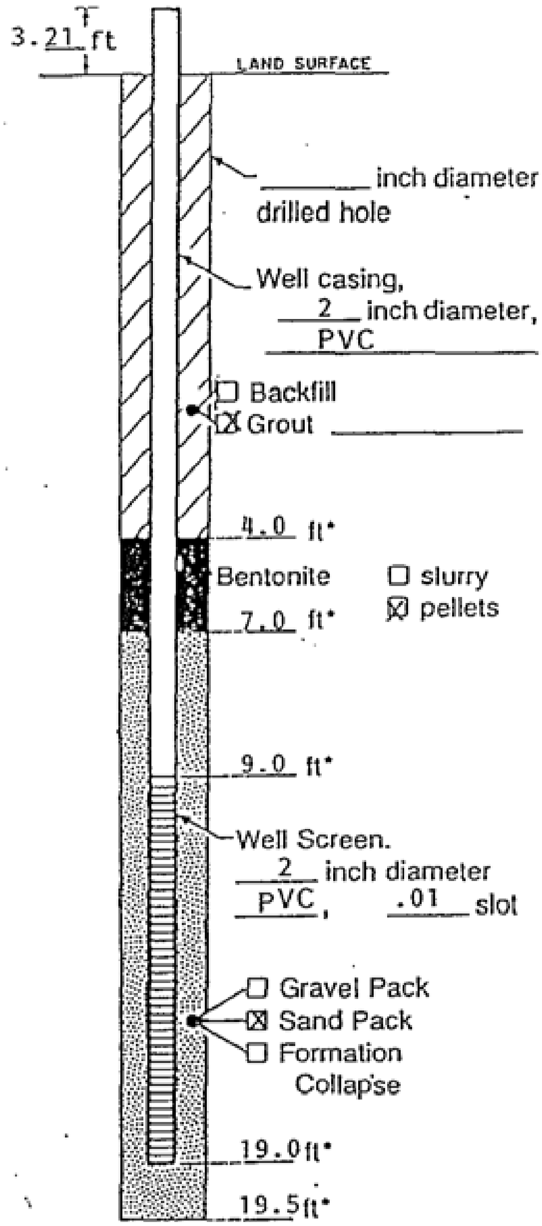
Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Monitor Well MW-4
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION

WELL CONSTRUCTION LOG



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project 155th TRG Lincoln, NE Well LANGB MW-5

Town/City Lincoln

County Lancaster State Nebraska

Permit No. NA

Land-Surface Elevation and Datum 1164.93 feet ☒ surveyed ☐ estimated

Installation Dates(s) 18 Nov 91

Drilling Method Hollow Stem Auger

Drilling Contractor Layne-Western

Drilling Fluid None

Development Techniques(s) and Date(s)

Rediflow 2 pump

Fluid Loss During Drilling None gallons

Water Removed During Development 42 gallons

Static Depth to Water 17.29 feet below M.P.

Pumping Depth to Water NA feet below M.P.

Pumping Duration 1.5 hours

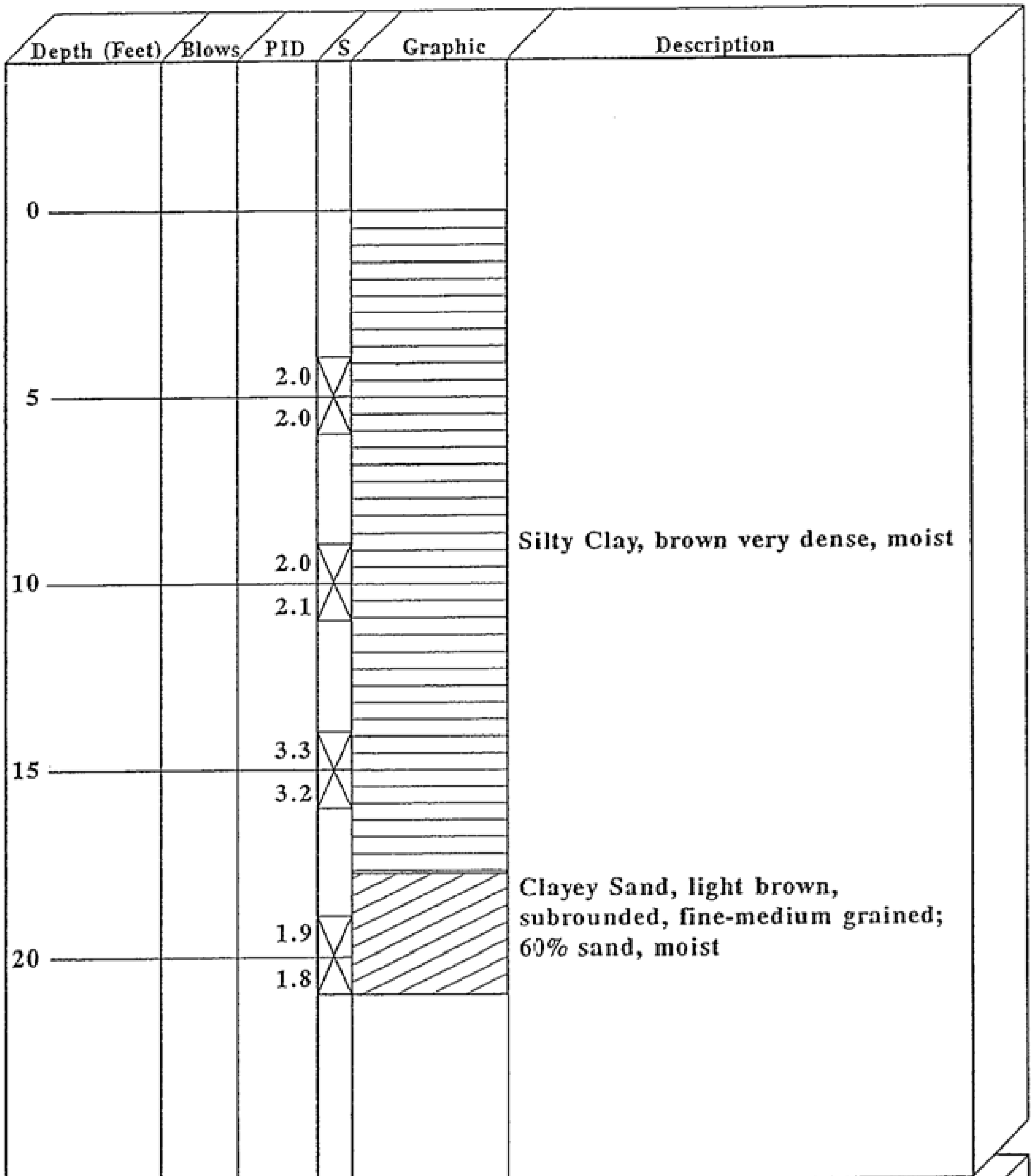
Yield NA gpm Date 20 Nov 91

Specific Capacity NA gpm/ft

Well Purpose Ground Water Monitoring Well

Remarks

Prepared by



Logged By: JHM

Date Drilled: 18 Nov 91

Drilling Co.: Layne-Western

Drilling Method: Hollow-Stem Auger

Sampling Method: 2" Split Spoon

Log of Monitor Well MW-5
Lincoln Air National Guard Base
Lincoln, Nebraska

OPTECH
OPERATIONAL TECHNOLOGIES CORPORATION

APPENDIX D

Well Name	North Coordinate	East Coordinate	Elevation	Description	Notes
MW 608-08	383,763.91	2,537,096.32	1,162.49	MW 608-08 - Top of 2" PVC Casing - North Edge	At Building 608
			1,162.83	MW 608-08 - North Rim Protective Cover	At Building 608
MW 608-09	383,703.10	2,537,092.06	1,162.86	MW 608-09 - Top of 2" PVC Casing - North Edge	At Building 608
			1,163.30	MW 608-09 - North Rim Protective Cover	At Building 608
			1,163.2	MW 608-09 - Ground Surface	At Building 608
MW 608-10	383,703.18	2,537,117.37	1,163.27	MW 608-10 - Top of 2" PVC Casing - North Edge	At Building 608
			1,163.59	MW 608-10 - North Rim Protective Cover	At Building 608
MW 608-11	383,686.92	2,537,138.66	1,163.36	MW 608-11 - Top of 2" PVC Casing - North Edge	At Building 608
			1,163.73	MW 608-11 - North Rim Protective Cover	At Building 608
MW 635-01	383,575.15	2,537,926.56	1,158.05	MW 635-01 - Top of 2" PVC Casing - Northwest Edge	At Building 635
			1,158.49	MW 635-01 - North Rim Protective Cover	At Building 635
MW 635-02	383,578.84	2,537,959.70	1,157.95	MW 635-02 - Top of 2" PVC Casing - West Edge	At Building 635
			1,158.44	MW 635-02 - North Rim Protective Cover	At Building 635
MW 635-03	383,567.24	2,537,984.29	1,158.11	MW 635-03 - Top of 2" PVC Casing - West Edge	At Building 635
			1,158.44	MW 635-03 - North Rim Protective Cover	At Building 635
			1,158.6	MW 635-03 - Ground Surface	At Building 635
MW 203-01	382,103.12	2,537,086.22	1,157.00	MW 203-01 - Top of 2" PVC Casing - North Edge	At Former Building 203
			1,155.2	MW 203-01 - Ground Surface	At Former Building 203
MW 203-02	382,138.67	2,537,067.29	1,156.87	MW 203-02 - Top of 2" PVC Casing - South Edge	At Former Building 203
			1,154.3	MW 203-02 - Ground Surface	At Former Building 203
MW 1	383,664.13	2,536,997.65	1,161.32	MW 1 - Top of 2" Steel Casing Cap - Unable to remove	At Building 608
			1,161.42	MW 1 - Rim - Inner Rim - Original Protective Casing - North Side	At Building 608
			1,161.69	MW 1 - Flush Mount Rim - Outer Rim Flush With Conc - North Side	At Building 608
MW 2	383,678.96	2,537,038.96	1,161.99	MW 2 - Top of 2" PVC Casing - North Edge	At Building 608
			1,162.29	MW 2 - North Rim Protective Cover	At Building 608
MW 4	383,569.06	2,537,168.44	1,164.87	MW 4 - Top of 2" PVC Casing - North Edge	At Building 608
			1,163.22	MW 4 - Concrete Base - North Side Steel Protective Casing	At Building 608
			1,163.2	MW 4 - Ground Surface	At Building 608
MW 5	383,632.93	2,537,065.01	1,165.23	MW 5 - Top of 2" PVC Casing - North Edge	At Building 608
			1,163.54	MW 5 - Concrete Base - North Side Steel Protective Casing	At Building 608
			1,163.4	MW 5 - Ground Surface	At Building 608
MW 6	383,437.93	2,537,010.87	1,156.66	MW 6 - Top of 2" PVC Casing - North Edge	At Building 608
			1,154.23	MW 6 - Concrete Base - North Side Steel Protective Casing	At Building 608
			1,153.7	MW 6 - Ground Surface	At Building 608

Well Name	North Coordinate	East Coordinate	Elevation	Description	Notes
MW 7	383,393.40	2,537,130.86	1,156.14	MW 7 - Top of 2" PVC Casing - North Edge	At Building 608
			1,153.84	MW 7 - Concrete Base - North Side Steel Protective Casing	At Building 608
			1,153.3	MW 7 - Ground Surface	At Building 608
BORE 1	383,665.41	2,537,035.98	1,162.25	BORE 1 - Concrete Elevation	At Building 608
BORE 2	383,640.02	2,537,064.27	1,162.64	BORE 2 - Concrete Elevation	At Building 608
ADDITIONAL REQUESTED ELEVATIONS					
MW 0210	383,012.50	2,538,493.23	1,156.01	MW 0210 - Top of 4" PVC Casing - S. Side	1.23' Above Recorded Elevation - Well has been modified from original survey
1 MW 7	383,125.78	2,538,562.59	1,153.31	1 MW 7 - Top OF 2" PVC Casing - W. Side	1.24' Above Recorded Elevation - Well has been modified from original survey
1 MW 10	383,090.59	2,538,855.37	1,153.33	1 MW 10 - Top OF 2" PVC Casing - S. Side	1.30' Above Recorded Elevation - Well not modified from original survey
SURVEY CONTROL POINTS AND BENCHMARKS					
1" Rebar	383,223.56	2,538,205.45	1,152.52	Survey Monument - NW 24th & Oak	1.32' Above Recorded Elevation
1/2" Rebar	383,777.40	2,538,187.50	1,155.60	Survey Monument - NW 24th & W Furnas Avenue	
Benchmark	383,236.35	2,538,245.47	1,155.44	Tail of Arrow - FHY - NE Cor NW 24th & Oak	1.31' Above Recorded Elevation
Stainless Steel Rod			1,166.03	National Geodetic Survey Benchmark "N 440" - Elevation is NAVD '88	
1" Rebar	383,473.46	2,537,664.83	1,155.15	Survey Monument - NW 25th & Oak	
1" Rebar	383,759.89	2,537,655.28	1,161.08	Survey Monument - NW 25th & W Furnas Avenue	
1" Rebar	384,217.09	2,538,173.21	1,158.96	Survey Monument - NW 24th & W Butler Street	
Pk Spike	383,773.40	2,537,217.37	1,163.74	Topo Survey Control Point	
Pk Spike	383,657.11	2,537,020.68	1,162.05	Topo Survey Control Point	
3" Brass Disk	383,390.43	2,536,990.56	1,154.60	Defense Mapping Agency "IN-12 REF2 RESET 1988 GSS"	
Benchmark	383,364.98	2,537,036.00	1,154.50	Top Northeast Tiedown for ARNG Helicopter W8	
Pk Spike	383,545.83	2,537,966.02	1,157.99	Topo Survey Control Point	
Pk Spike	382,300.72	2,537,046.13	1,153.10	Topo Survey Control Point	
ELEVATION SUMMARY					

The original survey was done April 18th, 1997. The elevations that were used at that time were based off information supplied by Dennis McCaugherty with the Nebraska Air National Guard. The elevations used for this survey were based off NGS Benchmark "N440" located at the intersection of Adams Street and the original entrance to the Nebraska Air National Guard. The elevations obtained during this survey are 1.31 feet above the original elevations obtained and are on North American Vertical Datum of 1988. The factor of 1.31 feet was derived from the average of three elevation points that are the same as the original survey. The Fire Hydrant at the Northeast Corner of 24th & Oak, the 1" Rebar in the intersection of 24th & Oak and the measuring point on Monitor Well 1 MW 10 have not been tampered with or adjusted since the original survey in 1997.

APPENDIX E

TestAmerica
INCORPORATED

RECEIVED
JAN 17 2001
MW / IOWA

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Sample Number: 600470

Project ID: NEANG-Bldg. 608, Lincoln, NE

Sample ID: MW-608-8 0-2.5'

Date Taken: 12/28/2000 Date Received: 01/03/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,CVAA	<0.020	mg/kg		heh	01/11/2001	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.032	g		gjv	01/05/2001		
ICP Metals-Solid	Complete	mg/kg	IE	llw	01/08/2001	SW 6010B	
Arsenic, ICP	8.1	mg/kg		llw	01/08/2001	SW 6010B	4.0
Barium, ICP	73	mg/kg		llw	01/08/2001	SW 6010B	0.50
Cadmium, ICP	<2.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
Chromium, ICP	7.4	mg/kg		llw	01/08/2001	SW 6010B	1.0
Lead, ICP	<10	mg/kg		llw	01/08/2001	SW 6010B	5.0
Selenium, ICP	<15	mg/kg		llw	01/08/2001	SW 6010B	7.5
Silver, ICP	<2.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Extraction Prep, soil	COMPLETE			jdm	01/04/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Diesel	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Gasoline	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Ethylene Glycol Non-Aqueous	<10	ug/g		sjg	01/05/2001	GC-FID	10

IE - Elevated Reporting Limit due to interelement interference.

R.L. Bindert
Operations Manager

704 ENTERPRISE DRIVE / CEDAR FALLS, IOWA 50613 / 319-277-2401 / FAX: 319-277-2425 / 800-750-2401

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Sample Number: 600471

Project ID: NEANG-Bldg. 608, Lincoln, NE

Sample ID: MW-608-8 10-12.5'

Date Taken: 12/28/2000

Date Received: 01/03/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,CVAA	<0.020	mg/kg		heh	01/11/2001	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.024	g		gjv	01/05/2001		
ICP Metals-Solid	Complete	mg/kg		llw	01/08/2001	SW 6010B	
Arsenic, ICP	6.6	mg/kg		llw	01/08/2001	SW 6010B	4.0
Barium, ICP	71	mg/kg		llw	01/08/2001	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
Chromium, ICP	11	mg/kg		llw	01/08/2001	SW 6010B	1.0
Lead, ICP	9.0	mg/kg		llw	01/08/2001	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg		llw	01/08/2001	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Extraction Prep, soil	COMPLETE			jdm	01/04/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Diesel	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Gasoline	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Ethylene Glycol Non-Aqueous	<10	ug/g		sjg	01/05/2001	GC-FID	10

R.L. Bindert
Operations Manager

704 ENTERPRISE DRIVE / CEDAR FALLS, IOWA 50613 / 319-277-2401 / FAX: 319-277-2425 / 800-750-2401

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Sample Number: 600472

Project ID: NEANG-Bldg. 608, Lincoln, NE

Sample ID: MW-608-9 5-10'

Date Taken: 12/28/2000

Date Received: 01/03/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,CVAA	<0.020	mg/kg		heh	01/11/2001	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.026	g		gjv	01/05/2001		
ICP Metals-Solid	Complete	mg/kg		llw	01/08/2001	SW 6010B	
Arsenic, ICP	<4.0	mg/kg		llw	01/08/2001	SW 6010B	4.0
Barium, ICP	12	mg/kg		llw	01/08/2001	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
Chromium, ICP	1.8	mg/kg		llw	01/08/2001	SW 6010B	1.0
Lead, ICP	<5.0	mg/kg		llw	01/08/2001	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg		llw	01/08/2001	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg		mmk	01/08/2001	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg		mmk	01/08/2001	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg		mmk	01/08/2001	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg		mmk	01/08/2001	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg		mmk	01/08/2001	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg		mmk	01/08/2001	IA OA-1/8260B	0.005
Extraction Prep, soil	COMPLETE			jdm	01/04/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Diesel	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Gasoline	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Ethylene Glycol Non-Aqueous	<10	ug/g		sjg	01/05/2001	GC-FID	10

R.L. Bindert
Operations Manager

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Sample Number: 600473

Project ID: NEANG-Bldg. 608, Lincoln, NE

Sample ID: MW-608-9 10-12.5'

Date Taken: 12/28/2000

Date Received: 01/03/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,CVAA	<0.020	mg/kg		heh	01/11/2001	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.016	g		gjv	01/05/2001		
ICP Metals-Solid	Complete	mg/kg		llw	01/08/2001	SW 6010B	
Arsenic, ICP	<4.0	mg/kg		llw	01/08/2001	SW 6010B	4.0
Barium, ICP	59	mg/kg		llw	01/08/2001	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
Chromium, ICP	6.7	mg/kg		llw	01/08/2001	SW 6010B	1.0
Lead, ICP	6.6	mg/kg		llw	01/08/2001	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg		llw	01/08/2001	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Ethylbenzene	0.671	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Xylenes	1.16	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Extraction Prep, soil	COMPLETE			jdm	01/04/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	261	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Diesel	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Gasoline	261	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Ethylene Glycol Non-Aqueous	<10	ug/g		sjg	01/05/2001	GC-FID	10

R.L. Bindert
Operations Manager

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Sample Number: 600474

Project ID: NEANG-Bldg. 608, Lincoln, NE

Sample ID: MW-608-10 7.5-10'

Date Taken: 12/28/2000 Date Received: 01/03/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,CVAA	<0.020	mg/kg		heh	01/11/2001	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.043	g		gjv	01/05/2001		
ICP Metals-Solid	Complete	mg/kg		llw	01/08/2001	SW 6010B	
Arsenic, ICP	7.6	mg/kg		llw	01/08/2001	SW 6010B	4.0
Barium, ICP	120	mg/kg		llw	01/08/2001	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
Chromium, ICP	11	mg/kg		llw	01/08/2001	SW 6010B	1.0
Lead, ICP	12	mg/kg		llw	01/08/2001	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg		llw	01/08/2001	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Extraction Prep, soil	COMPLETE			jdm	01/04/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg		mpc	01/08/2001	IA-OA2/S-8015	10
Diesel	<10	mg/kg		mpc	01/08/2001	IA-OA2/S-8015	10
Gasoline	<10	mg/kg		mpc	01/08/2001	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg		mpc	01/08/2001	IA-OA2/S-8015	10
Ethylene Glycol Non-Aqueous	<10	ug/g		sjg	01/05/2001	GC-FID	10

R.L. Bindert
Operations Manager

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Sample Number: 600475

Project ID: NEANG-Bldg. 608, Lincoln, NE

Sample ID: MW-608-10 10-12.5'

Date Taken: 12/28/2000

Date Received: 01/03/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,CVAA	<0.020	mg/kg		heh	01/11/2001	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.011	g		gjv	01/05/2001		
ICP Metals-Solid	Complete	mg/kg		llw	01/08/2001	SW 6010B	
Arsenic, ICP	10	mg/kg		llw	01/08/2001	SW 6010B	4.0
Barium, ICP	180	mg/kg		llw	01/08/2001	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
Chromium, ICP	12	mg/kg		llw	01/08/2001	SW 6010B	1.0
Lead, ICP	13	mg/kg		llw	01/08/2001	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg		llw	01/08/2001	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Extraction Prep, soil	COMPLETE			jdm	01/04/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Diesel	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Gasoline	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Ethylene Glycol Non-Aqueous	<10	ug/g		sjg	01/05/2001	GC-FID	10

R.L. Bindert
Operations Manager

704 ENTERPRISE DRIVE / CEDAR FALLS, IOWA 50613 / 319-277-2401 / FAX: 319-277-2425 / 800-750-2401

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ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Sample Number: 600476

Project ID: NEANG-Bldg. 608, Lincoln, NE

Sample ID: MW-608-11 5-7.5'

Date Taken: 12/28/2000

Date Received: 01/03/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,CVAA	0.029	mg/kg		heh	01/11/2001	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.035	g		gjv	01/05/2001		
ICP Metals-Solid	Complete	mg/kg		llw	01/08/2001	SW 6010B	
Arsenic, ICP	9.1	mg/kg		llw	01/08/2001	SW 6010B	4.0
Barium, ICP	240	mg/kg		llw	01/08/2001	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
Chromium, ICP	11	mg/kg		llw	01/08/2001	SW 6010B	1.0
Lead, ICP	12	mg/kg		llw	01/08/2001	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg		llw	01/08/2001	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Ethylbenzene	0.006	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Xylenes	0.090	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg		mmk	01/05/2001	IA OA-1/8260B	0.005
Extraction Prep, soil	COMPLETE			jdm	01/04/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	223	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Diesel	39.9	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Gasoline	183	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Ethylene Glycol Non-Aqueous	<10	ug/g		sjg	01/05/2001	GC-FID	10

R.L. Bindert
Operations Manager

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ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Sample Number: 600477

Project ID: NEANG-Bldg. 608, Lincoln, NE

Sample ID: MW-608-11 7.5-10'

Date Taken: 12/28/2000 Date Received: 01/03/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury, CVAA	0.036	mg/kg		heh	01/11/2001	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.062	g		gjv	01/05/2001		
ICP Metals-Solid	Complete	mg/kg		llw	01/08/2001	SW 6010B	
Arsenic, ICP	8.6	mg/kg		llw	01/08/2001	SW 6010B	4.0
Barium, ICP	400	mg/kg		llw	01/08/2001	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
Chromium, ICP	11	mg/kg		llw	01/08/2001	SW 6010B	1.0
Lead, ICP	12	mg/kg		llw	01/08/2001	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg		llw	01/08/2001	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg		llw	01/08/2001	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Toluene	0.007	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Ethylbenzene	0.283	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Xylenes	2.46	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.015
Hexane	0.040	mg/kg		mmk	01/09/2001	IA OA-1/8260B	0.005
Extraction Prep, soil	COMPLETE			jdm	01/04/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	678	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Diesel	66.5	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Gasoline	611	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg		mpc	01/05/2001	IA-OA2/S-8015	10
Ethylene Glycol Non-Aqueous	<10	ug/g		sjg	01/05/2001	GC-FID	10

R.L. Bindert
Operations Manager

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QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Steve Varsa

Job Number: 00.16528.1

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600470 MW-608-8 0-2.5'			12/28/2000				
Mercury, CVAA	<0.020	mg/kg	01/11/2001		1582	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.032	g	01/05/2001	950			
ICP Metals-Solid	Complete	mg/kg	01/08/2001		1149	SW 6010B	
Arsenic, ICP	8.1	mg/kg	01/08/2001	950	1179	SW 6010B	4.0
Barium, ICP	73	mg/kg	01/08/2001	950	1183	SW 6010B	0.50
Cadmium, ICP	<2.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
Chromium, ICP	7.4	mg/kg	01/08/2001	950	1187	SW 6010B	1.0
Lead, ICP	<10	mg/kg	01/08/2001	950	1187	SW 6010B	5.0
Selenium, ICP	<15	mg/kg	01/08/2001	950	1179	SW 6010B	7.5
Silver, ICP	<2.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg	01/05/2001		590	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg	01/05/2001		590	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Toluene-d8 (Surr.)	92	%	01/05/2001		590	IA OA-1/8260B	
4-Bromofluorobenzene (Surr.)	95	%	01/05/2001		590	IA OA-1/8260B	
Extraction Prep, soil	COMPLETE		01/04/2001	2373		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Diesel	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Gasoline	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
N-Octacosane (Surr.)	93	%	01/05/2001	2373	3837	IA-OA2/S-8015	1.0
Ethylene Glycol Non-Aqueous	<10	ug/g	01/05/2001		66	GC-FID	10

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QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Steve Varsa

Job Number: 00.16528.1

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600471 MW-608-8 10-12.5'			12/28/2000				
Mercury,CVAA	<0.020	mg/kg	01/11/2001		1582	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.024	g	01/05/2001	950			
ICP Metals-Solid	Complete	mg/kg	01/08/2001		1149	SW 6010B	
Arsenic, ICP	6.6	mg/kg	01/08/2001	950	1179	SW 6010B	4.0
Barium, ICP	71	mg/kg	01/08/2001	950	1183	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
Chromium, ICP	11	mg/kg	01/08/2001	950	1187	SW 6010B	1.0
Lead, ICP	9.0	mg/kg	01/08/2001	950	1187	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg	01/08/2001	950	1179	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg	01/05/2001		590	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg	01/05/2001		590	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Toluene-d8 (Surr.)	88	%	01/05/2001		590	IA OA-1/8260B	
4-Bromofluorobenzene (Surr.)	93	%	01/05/2001		590	IA OA-1/8260B	
Extraction Prep, soil	COMPLETE		01/04/2001	2373		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Diesel	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Gasoline	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
N-Octacosane (Surr.)	88	%	01/05/2001	2373	3837	IA-OA2/S-8015	1.0
Ethylene Glycol Non-Aqueous	<10	ug/g	01/05/2001		66	GC-FID	10

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QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Steve Varsa

Job Number: 00.16528.1

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600472 MW-608-9 5-10'			12/28/2000				
Mercury,CVAA	<0.020	mg/kg	01/11/2001		1582	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.026	g	01/05/2001	950			
ICP Metals-Solid	Complete	mg/kg	01/08/2001		1149	SW 6010B	
Arsenic, ICP	<4.0	mg/kg	01/08/2001	950	1179	SW 6010B	4.0
Barium, ICP	12	mg/kg	01/08/2001	950	1183	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
Chromium, ICP	1.8	mg/kg	01/08/2001	950	1187	SW 6010B	1.0
Lead, ICP	<5.0	mg/kg	01/08/2001	950	1187	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg	01/08/2001	950	1179	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg	01/08/2001		591	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg	01/08/2001		591	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg	01/08/2001		591	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg	01/08/2001		591	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg	01/08/2001		591	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg	01/08/2001		591	IA OA-1/8260B	0.005
Toluene-d8 (Surr.)	99	%	01/08/2001		591	IA OA-1/8260B	
4-Bromofluorobenzene (Surr.)	98	%	01/08/2001		591	IA OA-1/8260B	
Extraction Prep, soil	COMPLETE		01/04/2001	2373		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Diesel	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Gasoline	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
N-Octacosane (Surr.)	102	%	01/05/2001	2373	3837	IA-OA2/S-8015	1.0
Ethylene Glycol Non-Aqueous	<10	ug/g	01/05/2001		66	GC-FID	10

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QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Steve Varsa

Job Number: 00.16528.1

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600473 MW-608-9 10-12.5'			12/28/2000				
Mercury,CVAA	<0.020	mg/kg	01/11/2001		1582	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.016	g	01/05/2001	950			
ICP Metals-Solid	Complete	mg/kg	01/08/2001		1149	SW 6010B	
Arsenic, ICP	<4.0	mg/kg	01/08/2001	950	1179	SW 6010B	4.0
Barium, ICP	59	mg/kg	01/08/2001	950	1183	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
Chromium, ICP	6.7	mg/kg	01/08/2001	950	1187	SW 6010B	1.0
Lead, ICP	6.6	mg/kg	01/08/2001	950	1187	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg	01/08/2001	950	1179	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Ethylbenzene	0.671	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Xylenes	1.16	mg/kg	01/09/2001		591	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg	01/09/2001		591	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Toluene-d8 (Surr.)	92	%	01/09/2001		591	IA OA-1/8260B	
4-Bromofluorobenzene (Surr.)	93	%	01/09/2001		591	IA OA-1/8260B	
Extraction Prep, soil	COMPLETE		01/04/2001	2373		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	261	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Diesel	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Gasoline	261	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg	01/05/2001	2373	3837	IA-OA2/S-8015	10
N-Octacosane (Surr.)	87	%	01/05/2001	2373	3837	IA-OA2/S-8015	1.0
Ethylene Glycol Non-Aqueous	<10	ug/g	01/05/2001		66	GC-FID	10

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Steve Varsa

Job Number: 00.16528.1

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600474 MW-608-10 7.5-10'			12/28/2000				
Mercury,CVAA	<0.020	mg/kg	01/11/2001		1582	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.043	g	01/05/2001	950			
ICP Metals-Solid	Complete	mg/kg	01/08/2001		1149	SW 6010B	
Arsenic, ICP	7.6	mg/kg	01/08/2001	950	1179	SW 6010B	4.0
Barium, ICP	120	mg/kg	01/08/2001	950	1183	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
Chromium, ICP	11	mg/kg	01/08/2001	950	1187	SW 6010B	1.0
Lead, ICP	12	mg/kg	01/08/2001	950	1187	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg	01/08/2001	950	1179	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg	01/09/2001		591	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg	01/09/2001		591	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Toluene-d8 (Surr.)	98	%	01/09/2001		591	IA OA-1/8260B	
4-Bromofluorobenzene (Surr.)	98	%	01/09/2001		591	IA OA-1/8260B	
Extraction Prep, soil	COMPLETE		01/04/2001	2374		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg	01/08/2001	2374	3838	IA-OA2/S-8015	10
Diesel	<10	mg/kg	01/08/2001	2374	3838	IA-OA2/S-8015	10
Gasoline	<10	mg/kg	01/08/2001	2374	3838	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg	01/08/2001	2374	3838	IA-OA2/S-8015	10
N-Octacosane (Surr.)	112	%	01/08/2001	2374	3838	IA-OA2/S-8015	1.0
Ethylene Glycol Non-Aqueous	<10	ug/g	01/05/2001		66	GC-FID	10

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Steve Varsa

Job Number: 00.16528.1

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600475 MW-608-10 10-12.5'			12/28/2000				
Mercury,CVAA	<0.020	mg/kg	01/11/2001		1582	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.011	g	01/05/2001	950			
ICP Metals-Solid	Complete	mg/kg	01/08/2001		1149	SW 6010B	
Arsenic, ICP	10	mg/kg	01/08/2001	950	1179	SW 6010B	4.0
Barium, ICP	180	mg/kg	01/08/2001	950	1183	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
Chromium, ICP	12	mg/kg	01/08/2001	950	1187	SW 6010B	1.0
Lead, ICP	13	mg/kg	01/08/2001	950	1187	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg	01/08/2001	950	1179	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Ethylbenzene	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Xylenes	<0.015	mg/kg	01/09/2001		591	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg	01/09/2001		591	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Toluene-d8 (Surr.)	98	%	01/09/2001		591	IA OA-1/8260B	
4-Bromofluorobenzene (Surr.)	103	%	01/09/2001		591	IA OA-1/8260B	
Extraction Prep, soil	COMPLETE		01/04/2001	2374		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	<10	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
Diesel	<10	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
Gasoline	<10	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
N-Octacosane (Surr.)	103	%	01/05/2001	2374	3836	IA-OA2/S-8015	1.0
Ethylene Glycol Non-Aqueous	<10	ug/g	01/05/2001		66	GC-FID	10

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Steve Varsa

Job Number: 00.16528.1

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600476 MW-608-11 5-7.5'			12/28/2000				
Mercury,CVAA	0.029	mg/kg	01/11/2001		1582	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.035	g	01/05/2001	950			
ICP Metals-Solid	Complete	mg/kg	01/08/2001		1149	SW 6010B	
Arsenic, ICP	9.1	mg/kg	01/08/2001	950	1179	SW 6010B	4.0
Barium, ICP	240	mg/kg	01/08/2001	950	1183	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
Chromium, ICP	11	mg/kg	01/08/2001	950	1187	SW 6010B	1.0
Lead, ICP	12	mg/kg	01/08/2001	950	1187	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg	01/08/2001	950	1179	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Toluene	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Ethylbenzene	0.006	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Xylenes	0.090	mg/kg	01/05/2001		590	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg	01/05/2001		590	IA OA-1/8260B	0.015
Hexane	<0.005	mg/kg	01/05/2001		590	IA OA-1/8260B	0.005
Toluene-d8 (Surr.)	89	%	01/05/2001		590	IA OA-1/8260B	
4-Bromofluorobenzene (Surr.)	101	%	01/05/2001		590	IA OA-1/8260B	
Extraction Prep, soil	COMPLETE		01/04/2001	2374		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	223	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
Diesel	39.9	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
Gasoline	183	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
N-Octacosane (Surr.)	93	%	01/05/2001	2374	3836	IA-OA2/S-8015	1.0
Ethylene Glycol Non-Aqueous	<10	ug/g	01/05/2001		66	GC-FID	10

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QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

Steve Varsa

01/12/2001

Job Number: 00.16528.1

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600477 MW-608-11 7.5-10'			12/28/2000				
Mercury,CVAA	0.036	mg/kg	01/11/2001		1582	EPA 245.5	0.020
ICP Metals Prep (Solid)	1.062	g	01/05/2001	950			
ICP Metals-Solid	Complete	mg/kg	01/08/2001		1149	SW 6010B	
Arsenic, ICP	8.6	mg/kg	01/08/2001	950	1179	SW 6010B	4.0
Barium, ICP	400	mg/kg	01/08/2001	950	1183	SW 6010B	0.50
Cadmium, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
Chromium, ICP	11	mg/kg	01/08/2001	950	1187	SW 6010B	1.0
Lead, ICP	12	mg/kg	01/08/2001	950	1187	SW 6010B	5.0
Selenium, ICP	<7.5	mg/kg	01/08/2001	950	1179	SW 6010B	7.5
Silver, ICP	<1.0	mg/kg	01/08/2001	950	1186	SW 6010B	1.0
UST VOLATILE COMPOUNDS - 8260							
Benzene	<0.005	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Toluene	0.007	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Ethylbenzene	0.283	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Xylenes	2.46	mg/kg	01/09/2001		591	IA OA-1/8260B	0.015
MTBE	<0.015	mg/kg	01/09/2001		591	IA OA-1/8260B	0.015
Hexane	0.040	mg/kg	01/09/2001		591	IA OA-1/8260B	0.005
Toluene-d8 (Surr.)	92	%	01/09/2001		591	IA OA-1/8260B	
4-Bromofluorobenzene (Surr.)	93	%	01/09/2001		591	IA OA-1/8260B	
Extraction Prep, soil	COMPLETE		01/04/2001	2374		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	678	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
Diesel	66.5	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
Gasoline	611	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
Motor Oil	<10	mg/kg	01/05/2001	2374	3836	IA-OA2/S-8015	10
N-Octacosane (Surr.)	101	%	01/05/2001	2374	3836	IA-OA2/S-8015	1.0
Ethylene Glycol Non-Aqueous	<10	ug/g	01/05/2001		66	GC-FID	10

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QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Analyte	Prep Batch No.	Run Batch No.	CCV True Value	Units	CCV Conc Found	CCV % Rec	Flag	Date Analyzed
Mercury,CVAA		1582	1.00	ug/kg	0.96	96		01/11/2001
Mercury,CVAA		1582	1.00	ug/kg	0.96	96		01/11/2001
Mercury,CVAA		1582	1.00	ug/kg	1.02	102		01/11/2001
Mercury,CVAA		1582	1.00	ug/kg	1.01	101		01/11/2001
Mercury,CVAA		1582	1.00	ug/kg	1.04	104		01/11/2001
Mercury,CVAA		1582	1.00	ug/kg	1.05	105		01/11/2001
ICP Metals-Solid		1149	1.0	mg/L	1.0	100		01/08/2001
Arsenic, ICP		1179	5.00	mg/L	4.77	95		01/08/2001
Arsenic, ICP		1179	5.00	mg/L	4.77	95		01/08/2001
Barium, ICP		1183	5.0	mg/L	4.97	99		01/08/2001
Barium, ICP		1183	5.0	mg/L	4.95	99		01/08/2001
Cadmium, ICP		1186	5.0	mg/L	4.90	98		01/08/2001
Cadmium, ICP		1186	5.0	mg/L	4.85	97		01/08/2001
Chromium, ICP		1187	5.0	mg/L	4.81	96		01/08/2001
Chromium, ICP		1187	5.0	mg/L	4.78	96		01/08/2001
Lead, ICP		1187	5.0	mg/L	4.89	98		01/08/2001
Lead, ICP		1187	5.0	mg/L	4.80	96		01/08/2001
Selenium, ICP		1179	5.0	mg/L	4.76	95		01/08/2001
Selenium, ICP		1179	5.0	mg/L	4.77	95		01/08/2001
Silver, ICP		1186	1.0	mg/L	0.9747	98		01/08/2001
Silver, ICP		1186	1.0	mg/L	0.9678	97		01/08/2001
UST VOLATILE COMPOUNDS - 8260								
UST VOLATILE COMPOUNDS - 8260								
Benzene		590	50.0	ug/L	54.4	109		01/05/2001
Toluene		590	50.0	ug/L	47.8	96		01/05/2001
Ethylbenzene		590	50.0	ug/L	50.8	102		01/05/2001
Xylenes		590	150.	ug/L	154	103		01/05/2001
MTBE		590	50.0	ug/L	57.8	116		01/05/2001
Hexane		590	50.0	ug/L	62.7	125		01/05/2001
Toluene-d8 (Surr.)		590	100	%	94	94		01/05/2001
4-Bromofluorobenzene (Surr.)		590	100	%	98	98		01/05/2001
UST VOLATILE COMPOUNDS - 8260								

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QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Analyte	Prep Batch No.	Run Batch No.	CCV True Value	Units	CCV Conc Found	CCV % Rec	Flag	Date Analyzed
Benzene		591	50.0	mg/kg	54.4	109		01/08/2001
Toluene		591	50.0	mg/kg	54.8	110		01/08/2001
Ethylbenzene		591	50.0	mg/kg	55.8	112		01/08/2001
Xylenes		591	150.	mg/kg	166	111		01/08/2001
MTBE		591	50.0	mg/kg	51.2	102		01/08/2001
Hexane		591	50.0	mg/kg	49.6	99		01/08/2001
Toluene-d8 (Surr.)		591	100	%	102	102		01/08/2001
4-Bromofluorobenzene (Surr.)		591	100	%	102	102		01/08/2001
EXTRACTABLE HYDROCARBONS-SOIL								
Diesel		3836	2500	mg/kg	2,595	104		01/05/2001
Motor Oil		3836	2500	mg/kg	2,502	100		01/05/2001
EXTRACTABLE HYDROCARBONS-SOIL								
Diesel		3837	2500	mg/kg	2,723	109		01/05/2001
Motor Oil		3837	2500	mg/kg	2,488	100		01/05/2001
EXTRACTABLE HYDROCARBONS-SOIL								
Diesel		3838	2500	mg/kg	2,577	103		01/08/2001
Motor Oil		3838	2500	mg/kg	2,449	98		01/08/2001
Ethylene Glycol Non-Aqueous		66	143	ug/g	142	99		01/05/2001
Ethylene Glycol Non-Aqueous		66	143	ug/g	132	92		01/06/2001

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QUALITY CONTROL REPORT
BLANKS

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Analyte	Prep Batch No.	Run Batch No.	Blank Value	Flag	Units	Quantitation Limit	Date Analyzed
Mercury, CVAA		1582	<0.020		mg/kg	0.020	01/11/2001
Arsenic, ICP	950	1179	<0.080		mg/L	4.0	01/08/2001
Barium, ICP	950	1183	<0.010		mg/L	0.50	01/08/2001
Cadmium, ICP	950	1186	<0.020		mg/L	1.0	01/08/2001
Chromium, ICP	950	1187	<0.020		mg/L	1.0	01/08/2001
Lead, ICP	950	1187	<0.10		mg/L	5.0	01/08/2001
Selenium, ICP	950	1179	<0.15		mg/L	7.5	01/08/2001
Silver, ICP	950	1186	<0.020		mg/L	1.0	01/08/2001
UST VOLATILE COMPOUNDS - 8260							
UST VOLATILE COMPOUNDS - 8260							
Benzene		590	<0.005		mg/kg	0.005	01/05/2001
Toluene		590	<0.005		mg/kg	0.005	01/05/2001
Ethylbenzene		590	<0.005		mg/kg	0.005	01/05/2001
Xylenes		590	<0.015		mg/kg	0.015	01/05/2001
MTBE		590	<0.015		mg/kg	0.015	01/05/2001
Hexane		590	<0.005		mg/kg	0.005	01/05/2001
Toluene-d8 (Surr.)		590	89		%		01/05/2001
4-Bromofluorobenzene (Surr.)		590	97		%		01/05/2001
UST VOLATILE COMPOUNDS - 8260							
UST VOLATILE COMPOUNDS - 8260							
Benzene		591	<0.005		mg/kg	0.005	01/08/2001
Toluene		591	<0.005		mg/kg	0.005	01/08/2001
Ethylbenzene		591	<0.005		mg/kg	0.005	01/08/2001
Xylenes		591	<0.015		mg/kg	0.015	01/08/2001
MTBE		591	<0.015		mg/kg	0.015	01/08/2001
Hexane		591	<0.005		mg/kg	0.005	01/08/2001
Toluene-d8 (Surr.)		591	97		%		01/08/2001
4-Bromofluorobenzene (Surr.)		591	95		%		01/08/2001
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	2374	3834	<10		mg/kg	10	01/04/2001
Diesel	2374	3834	<10		mg/kg	10	01/04/2001
Gasoline	2374	3834	<10		mg/kg	10	01/04/2001
Motor Oil	2374	3834	<10		mg/kg	10	01/04/2001
N-Octacosane (Surr.)	2374	3834	61		%	1.0	01/04/2001

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QUALITY CONTROL REPORT
BLANKS

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Analyte	Prep Batch No.	Run Batch No.	Blank Value	Flag	Units	Quantitation Limit	Date Analyzed
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	2373	3833	<10		mg/kg	10	01/03/2001
Diesel	2373	3833	<10		mg/kg	10	01/03/2001
Gasoline	2373	3833	<10		mg/kg	10	01/03/2001
Motor Oil	2373	3833	<10		mg/kg	10	01/03/2001
N-Octacosane (Surr.)	2373	3833	78		%	1.0	01/03/2001
EXTRACTABLE HYDROCARBONS-SOIL							
Total Extractable Hydrocarbons	2373	3836	<10		mg/kg	10	01/05/2001
Diesel	2373	3836	<10		mg/kg	10	01/05/2001
Gasoline	2373	3836	<10		mg/kg	10	01/05/2001
Motor Oil	2373	3836	<10		mg/kg	10	01/05/2001
N-Octacosane (Surr.)	2373	3836	105		%	1.0	01/05/2001
Ethylene Glycol Non-Aqueous		66	<10		ug/g	10	01/05/2001

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QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Analyte	Prep Batch No.	Run Batch No.	LCS True Conc	Units	LCS Conc Found	LCS % Rec.	Flag	Date Analyzed
Mercury,CVAA		1582	0.0997	mg/kg	0.103	103		01/11/2001
Arsenic, ICP	950	1179	2.00	mg/L	1.89	95		01/08/2001
Barium, ICP	950	1183	1.0	mg/L	0.9374	94		01/08/2001
Cadmium, ICP	950	1186	1.0	mg/L	0.9654	97		01/08/2001
Chromium, ICP	950	1187	1.0	mg/L	0.9460	95		01/08/2001
Lead, ICP	950	1187	2.0	mg/L	1.97	99		01/08/2001
Selenium, ICP	950	1179	4.0	mg/L	3.76	94		01/08/2001
Silver, ICP	950	1186	1.0	mg/L	1.01	101		01/08/2001
UST VOLATILE COMPOUNDS - 8260								
UST VOLATILE COMPOUNDS - 8260								
Benzene		590	0.0257	mg/kg	0.0248	97		01/05/2001
Toluene		590	0.0257	mg/kg	0.0227	88		01/05/2001
Ethylbenzene		590	0.0257	mg/kg	0.0251	98		01/05/2001
Xylenes		590	0.0771	mg/kg	0.0794	103		01/05/2001
MTBE		590	0.0257	mg/kg	0.0299	116		01/05/2001
Hexane		590	0.0257	mg/kg	0.0308	120		01/05/2001
Toluene-d8 (Surr.)		590	100.000	%	92.3	92		01/05/2001
4-Bromofluorobenzene (Surr.)		590	100.000	%	98.4	98		01/05/2001
UST VOLATILE COMPOUNDS - 8260								
UST VOLATILE COMPOUNDS - 8260								
Benzene		591	0.0261	mg/kg	0.0247	95		01/08/2001
Toluene		591	0.0261	mg/kg	0.0254	97		01/08/2001
Ethylbenzene		591	0.0261	mg/kg	0.0274	105		01/08/2001
Xylenes		591	0.0782	mg/kg	0.0822	105		01/08/2001
MTBE		591	0.0261	mg/kg	0.0249	95		01/08/2001
Hexane		591	0.0261	mg/kg	0.0229	88		01/08/2001
Toluene-d8 (Surr.)		591	100.000	%	96.7	97		01/08/2001
4-Bromofluorobenzene (Surr.)		591	100.000	%	103	103		01/08/2001
EXTRACTABLE HYDROCARBONS-SOIL								
Diesel	2374	3834	65.3	mg/kg	49.4	76		01/04/2001
N-Octacosane (Surr.)	2374	3834	100	%	71	71		01/04/2001
EXTRACTABLE HYDROCARBONS-SOIL								
Diesel	2373	3833	65.3	mg/kg	59.9	92		01/03/2001

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QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Analyte	Prep Batch No.	Run Batch No.	LCS True Conc	Units	LCS Conc Found	LCS % Rec.	Flag	Date Analyzed
N-Octacosane (Surr.)	2373	3833	100	%	85	85		01/03/2001
Ethylene Glycol Non-Aqueous		66	142	ug/g	128	90		01/05/2001
Ethylene Glycol Non-Aqueous		66	142	ug/g	132	93		01/05/2001

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QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/12/2001

Job Number: 00.16528.1

Analyte	Prep Batch No.	Run Batch No.	Sample Result	Units	MS Spike Conc. Added	MS Result	MS %Rec.	MSD Spike Conc. Added	MSD Result	MSD % Rec.	RPD	Flag(s)
Mercury,CVAA		1582	<0.020	mg/kg	0.0997	0.106	106	0.0996	0.106	106	0	
ICP Metals-Solid		1149	Complete	mg/kg								
Arsenic, ICP	950	1179	<4.0	mg/kg	188	180	96	194	188	97	4.3	
Barium, ICP	950	1183	12	mg/kg	94.0	96.6	90	97.2	100	91	3.4	
Cadmium, ICP	950	1186	<1.0	mg/kg	94.0	90.4	96	97.2	94.0	97	3.9	
Chromium, ICP	950	1187	1.8	mg/kg	94.0	90.6	95	97.2	94.2	95	3.9	
Lead, ICP	950	1187	<5.0	mg/kg	188	184	98	194	190	98	3.2	
Selenium, ICP	950	1179	<7.5	mg/kg	376	357	95	389	373	96	4.4	
Silver, ICP	950	1186	<1.0	mg/kg	48.7	48.6	100					
UST VOLATILE COMPOUNDS - 8260												
Benzene		590	<0.005	mg/kg	0.0372	0.0330	89	0.0370	0.0283	77	15	
Toluene		590	<0.005	mg/kg	0.0372	0.0299	80	0.0370	0.0235	64	24	M
Ethylbenzene		590	<0.005	mg/kg	0.0372	0.0316	85	0.0370	0.0247	67	25	M
Xylenes		590	<0.015	mg/kg	0.112	0.100	89	0.111	0.078	70	25	M
MTBE		590	<0.015	mg/kg	0.0372	0.0419	113	0.0370	0.0566	153	30	M
Hexane		590	<0.005	mg/kg	0.0372	0.0377	101	0.0370	0.0284	77	28	M
UST VOLATILE COMPOUNDS - 8260												
Benzene		591	<0.005	mg/kg	0.0471	0.0456	97	0.0420	0.0401	96	13	
Toluene		591	<0.005	mg/kg	0.0471	0.0470	100	0.0420	0.0417	99	12	
Ethylbenzene		591	<0.005	mg/kg	0.0471	0.0495	105	0.0420	0.0429	102	14	
Xylenes		591	<0.015	mg/kg	0.141	0.133	94	0.126	0.115	91	15	
MTBE		591	<0.015	mg/kg	0.0471	0.0436	93	0.0420	0.0402	96	8.1	
Hexane		591	<0.005	mg/kg	0.0471	0.0377	80	0.0420	0.0329	78	14	
EXTRACTABLE HYDROCARBONS-SOIL												MSO
Diesel	2374	3834	199	mg/kg	64.9	190	0	64.5	218	30	14	
EXTRACTABLE HYDROCARBONS-SOIL												
Diesel	2373	3833	<10	mg/kg	56.1	64.8	116	51.6	64.1	124	1.1	

MSO - MS or MSD is out control for this analyte.

TestAmerica INCORPORATED

r Fal: sion
704 Enterprise Drive
Cedar Falls, IA 50613

ne: 3 77 - : or) - 7: :01
Fax: 319 - 277 - 2425

Company: Montgomery Watson
Send Report To: Steve Vavra
Address: 11153 Aurora Avenue
City/State/Zip Code: Des Moines, IA 50322
Telephone Number: (515) 253-0830 Fax: 253-0830
Sampled by: (Print Name) Stephen Vavra
(Signature) [signature]

Your PO #: 10071 OF
Invoice To: Steve Vavra
TA Quote #: 08-09-00: Tier I Investigation -3 UST sites
Project Name: NEANG - Bldg 635, Lincoln, NE
Project Number: 1911914.781801
Project Manager: Jeff Coon
Proj. Mgr. Telephone: (515) 253-0830

Sample ID	Date Sampled	Time Sampled	# of containers shipped	Grab	Composite	Field Filtered	Preservative: Ice	HNO_3 (Red & White Label)	HCl (Blue & White Label)	NaOH (Orange & White Label)	H_2SO_4 Plastic (Yellow & White Label)	H_2SO_4 Glass(Yellow & White Label)	None (Black & White Label)	Other (Specify)
MW-608-8 @ 0-2.5'	12/28/00	08:13	2	X			X						X	
MW-608-8 @ 10-12.5'	12/28/00	08:28	2	X			X						X	
MW-608-9 @ 5-10'	12/28/00	09:45	2	X			X						X	
MW-608-9 @ 10-12.5'	12/28/00	09:48	2	X			X						X	
MW-608-10 @ 7.5-10'	12/28/00	11:00	2	X			X						X	
MW-608-10 @ 10-12.5'	12/28/00	11:03	2	X			X						X	
MW-608-11 @ 5-7.5'	12/28/00	15:08	2	X			X						X	
MW-608-11 @ 7.5-10'	12/28/00	15:10	2	X			X						X	

Sample ID	Matrix: Groundwater	Wastewater	Drinking Water	Sludge	Soil	Other Specify:	Analyze For: BTEX (8260)	n-hexane (8260)	MTBE (8260)	Ethylene Glycol	TEH-gasoline (OA-2)	TEH-diesel (OA-2)	TEH-used oil (OA-2)	8 RCRA metals				RUSH TAT (Must call ahead!)	Standard TAT	Fax Results	Send QC with report
MW-608-8 @ 0-2.5'					X		X	X	X	X	X	X	X	X					X	X	X
MW-608-8 @ 10-12.5'					X		X	X	X	X	X	X	X	X					X	X	X
MW-608-9 @ 5-10'					X		X	X	X	X	X	X	X	X					X	X	X
MW-608-9 @ 10-12.5'					X		X	X	X	X	X	X	X	X					X	X	X
MW-608-10 @ 7.5-10'					X		X	X	X	X	X	X	X	X					X	X	X
MW-608-10 @ 10-12.5'					X		X	X	X	X	X	X	X	X					X	X	X
MW-608-11 @ 5-7.5'					X		X	X	X	X	X	X	X	X					X	X	X
MW-608-11 @ 7.5-10'					X		X	X	X	X	X	X	X	X					X	X	X

NOTE: All turn around times are calculated from the time of receipt at TestAmerica.
NOTICE: Pre-Arrangements must be made *AT LEAST 48 Hours in ADVANCE* to receive results with RUSH turn around time commitments; *additional charges* may be assessed.
NOTE: There may be a charge assessed for TestAmerica disposing of sample remainders.

NOTES:
see bid sheet for requirements
Nebraska LUST/RBCA requirements

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
[signature]	12/29/00	23:00	Test America	1-3-01	2:30	[signature]		
Shipped Via:			Comments:			Shipped Via:		
Received for TestAmerica by	Date	Time	Temperature Upon Receipt:	Laboratory Comments:				

TestAmerica INCORPORATED

RECEIVED
JAN 19 2001
MW / IOWA

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Job Number: 00.16625

Sample Number: 600767

Project ID: NEANG-Bldg. 608/Lincoln, NE

Sample ID: MW-608-8

Date Taken: 01/04/2001 Date Received: 01/06/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,Cold Vapor	<0.00020	mg/L		heh	01/11/2001	EPA 245.1	0.0002
ICP Metals - SW-6010B	Complete			llw	01/10/2001	SW 6010B	
Arsenic, ICP	<0.080	mg/L		llw	01/10/2001	SW 6010B	0.080
Barium, ICP	0.101	mg/L		llw	01/10/2001	SW 6010B	0.010
Cadmium, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
Chromium, ICP	0.021	mg/L		llw	01/10/2001	SW 6010B	0.020
Lead, ICP	<0.10	mg/L		llw	01/10/2001	SW 6010B	0.10
Selenium, ICP	<0.15	mg/L		llw	01/10/2001	SW 6010B	0.15
Silver, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
UST VOLATILE COMPOUNDS - 8260							
Benzene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Ethylbenzene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Xylenes	<3.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Extraction Prep	COMPLETE			kje	01/08/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-WATER							
Total Extractable Hydrocarbons	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Diesel	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Gasoline	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Motor Oil	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Ethylene Glycol - Aqueous	<10	mg/L		sjg	01/16/2001	SW-8015B	10
VOA Preservation pH	<2.0	units		mmk	01/10/2001	SW 9041A	

R.L. Bindert
Operations Manager

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Job Number: 00.16625

Sample Number: 600768

Project ID: NEANG-Bldg. 608/Lincoln, NE

Sample ID: MW-608-9

Date Taken: 01/04/2001 Date Received: 01/06/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,Cold Vapor	<0.00020	mg/L		heh	01/11/2001	EPA 245.1	0.0002
ICP Metals - SW-6010B	Complete			llw	01/10/2001	SW 6010B	
Arsenic, ICP	<0.080	mg/L		llw	01/10/2001	SW 6010B	0.080
Barium, ICP	0.195	mg/L		llw	01/10/2001	SW 6010B	0.010
Cadmium, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
Chromium, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
Lead, ICP	<0.10	mg/L		llw	01/10/2001	SW 6010B	0.10
Selenium, ICP	<0.15	mg/L		llw	01/10/2001	SW 6010B	0.15
Silver, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
UST VOLATILE COMPOUNDS - 8260							
Benzene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Ethylbenzene	119	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Xylenes	93.5	ug/L		mmk	01/10/2001	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Extraction Prep	COMPLETE			kje	01/08/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-WATER							
Total Extractable Hydrocarbons	2,340	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Diesel	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Gasoline	2,340	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Motor Oil	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Ethylene Glycol - Aqueous	<10	mg/L		sjg	01/16/2001	SW-8015B	10
VOA Preservation pH	<2.0	units		mmk	01/10/2001	SW 9041A	

R.L. Bindert
Operations Manager

TestAmerica INCORPORATED

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Job Number: 00.16625

Sample Number: 600769

Project ID: NEANG-Bldg. 608/Lincoln, NE

Sample ID: MW-608-10

Date Taken: 01/04/2001 Date Received: 01/06/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,Cold Vapor	<0.00020	mg/L		heh	01/11/2001	EPA 245.1	0.0002
ICP Metals - SW-6010B	Complete			llw	01/10/2001	SW 6010B	
Arsenic, ICP	<0.080	mg/L		llw	01/10/2001	SW 6010B	0.080
Barium, ICP	0.127	mg/L		llw	01/10/2001	SW 6010B	0.010
Cadmium, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
Chromium, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
Lead, ICP	<0.10	mg/L		llw	01/10/2001	SW 6010B	0.10
Selenium, ICP	<0.15	mg/L		llw	01/10/2001	SW 6010B	0.15
Silver, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
UST VOLATILE COMPOUNDS - 8260							
Benzene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Ethylbenzene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Xylenes	<3.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Extraction Prep	COMPLETE			kje	01/08/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-WATER							
Total Extractable Hydrocarbons	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Diesel	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Gasoline	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Motor Oil	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Ethylene Glycol - Aqueous	<10	mg/L		sjg	01/16/2001	SW-8015B	10
VOA Preservation pH	<2.0	units		mmk	01/10/2001	SW 9041A	

R.L. Bindert
Operations Manager

TestAmerica INCORPORATED

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Job Number: 00.16625

Sample Number: 600770

Project ID: NEANG-Bldg. 608/Lincoln, NE

Sample ID: MW-608-11

Date Taken: 01/04/2001 Date Received: 01/06/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
Mercury,Cold Vapor	<0.00020	mg/L		heh	01/11/2001	EPA 245.1	0.0002
ICP Metals - SW-6010B	Complete			llw	01/10/2001	SW 6010B	
Arsenic, ICP	<0.080	mg/L		llw	01/10/2001	SW 6010B	0.080
Barium, ICP	0.123	mg/L		llw	01/10/2001	SW 6010B	0.010
Cadmium, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
Chromium, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
Lead, ICP	<0.10	mg/L		llw	01/10/2001	SW 6010B	0.10
Selenium, ICP	<0.15	mg/L		llw	01/10/2001	SW 6010B	0.15
Silver, ICP	<0.020	mg/L		llw	01/10/2001	SW 6010B	0.020
UST VOLATILE COMPOUNDS - 8260							
Benzene	1.7	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Ethylbenzene	1.6	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Xylenes	11.4	ug/L		mmk	01/10/2001	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Extraction Prep	COMPLETE			kje	01/08/2001	IOWA-OA2	
EXTRACTABLE HYDROCARBONS-WATER							
Total Extractable Hydrocarbons	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Diesel	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Gasoline	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Motor Oil	<380	ug/L		mpc	01/09/2001	IA-OA2/S-8015	380
Ethylene Glycol - Aqueous	<10	mg/L		sjg	01/16/2001	SW-8015B	10
VOA Preservation pH	<2.0	units		mmk	01/10/2001	SW 9041A	

R.L. Bindert
Operations Manager

TestAmerica
INCORPORATED

ANALYTICAL REPORT

Steve Varsa
MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Job Number: 00.16625

Sample Number: 600771

Project ID: NEANG-Bldg. 608/Lincoln, NE

Sample ID: Trip Blank

Date Taken:

Date Received: 01/06/2001

Analyte	Result	Units	Result Flag	Analyst	Date Analyzed	Method	Quantitation Limit
UST VOLATILE COMPOUNDS - 8260							
Benzene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Ethylbenzene	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Xylenes	<3.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L		mmk	01/10/2001	IA OA-1/8260B	1.0
VOA Preservation pH	<2.0	units		mmk	01/10/2001	SW 9041A	

R.L. Bindert
Operations Manager

704 Enterprise Drive / Cedar Falls, Iowa 50613 / 319-277-2401 / Fax: 319-277-2425 / 800-750-2401

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Job Number: 00.16625

Steve Varsa

Enclosed is the Quality Control data for the following samples submitted to TestAmerica, Inc. - Cedar Falls for analysis:

Sample Number	Sample Description	Date Taken	Date Received
600767	MW-608-8	01/04/2001	01/06/2001
600768	MW-608-9	01/04/2001	01/06/2001
600769	MW-608-10	01/04/2001	01/06/2001
600770	MW-608-11	01/04/2001	01/06/2001
600771	Trip Blank		01/06/2001

This Quality Control report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

Iowa Laboratory Certification number - 7

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600767 MW-608-8			01/04/2001				
Mercury,Cold Vapor	<0.00020	mg/L	01/11/2001		1858	EPA 245.1	0.00020
ICP Metals - SW-6010B	Complete		01/10/2001		2954	SW 6010B	
Arsenic, ICP	<0.080	mg/L	01/10/2001	2252	3310	SW 6010B	0.080
Barium, ICP	0.101	mg/L	01/10/2001	2252	3344	SW 6010B	0.010
Cadmium, ICP	<0.020	mg/L	01/10/2001	2252	3356	SW 6010B	0.020
Chromium, ICP	0.021	mg/L	01/10/2001	2252	3356	SW 6010B	0.020
Lead, ICP	<0.10	mg/L	01/10/2001	2252	3326	SW 6010B	0.10
Selenium, ICP	<0.15	mg/L	01/10/2001	2252	3304	SW 6010B	0.15
Silver, ICP	<0.020	mg/L	01/10/2001	2252	3351	SW 6010B	0.020
UST VOLATILE COMPOUNDS - 8260							
Benzene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Ethylbenzene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Xylenes	<3.0	ug/L	01/10/2001		923	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Toluene-d8 (Surr.)	104	%	01/10/2001		923	IA OA-1/SW 8260B	
4-Bromofluorobenzene (Surr.)	99	%	01/10/2001		923	IA OA-1/SW 8260B	
Extraction Prep	COMPLETE		01/08/2001	1604		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-WATER							
Total Extractable Hydrocarbons	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Diesel	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Gasoline	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Motor Oil	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
N-Octacosane (Surr.)	87	%	01/09/2001	1604	2695	IA-OA2/S-8015	100
Ethylene Glycol - Aqueous	<10	mg/L	01/16/2001		150	SW-8015B	10
VOA Preservation pH	<2.0	units	01/10/2001		115	SW 9041A	

TestAmerica
INCORPORATED

QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600768 MW-608-9			01/04/2001				
Mercury,Cold Vapor	<0.00020	mg/L	01/11/2001		1858	EPA 245.1	0.00020
ICP Metals - SW-6010B	Complete		01/10/2001		2954	SW 6010B	
Arsenic, ICP	<0.080	mg/L	01/10/2001	2252	3310	SW 6010B	0.080
Barium, ICP	0.195	mg/L	01/10/2001	2252	3344	SW 6010B	0.010
Cadmium, ICP	<0.020	mg/L	01/10/2001	2252	3356	SW 6010B	0.020
Chromium, ICP	<0.020	mg/L	01/10/2001	2252	3356	SW 6010B	0.020
Lead, ICP	<0.10	mg/L	01/10/2001	2252	3326	SW 6010B	0.10
Selenium, ICP	<0.15	mg/L	01/10/2001	2252	3304	SW 6010B	0.15
Silver, ICP	<0.020	mg/L	01/10/2001	2252	3351	SW 6010B	0.020
UST VOLATILE COMPOUNDS - 8260							
Benzene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Ethylbenzene	119	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Xylenes	93.5	ug/L	01/10/2001		923	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Toluene-d8 (Surr.)	105	%	01/10/2001		923	IA OA-1/SW 8260B	
4-Bromofluorobenzene (Surr.)	98	%	01/10/2001		923	IA OA-1/SW 8260B	
Extraction Prep	COMPLETE		01/08/2001	1604		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-WATER							
Total Extractable Hydrocarbons	2,340	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Diesel	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Gasoline	2,340	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Motor Oil	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
N-Octacosane (Surr.)	81	%	01/09/2001	1604	2695	IA-OA2/S-8015	100
Ethylene Glycol - Aqueous	<10	mg/L	01/16/2001		150	SW-8015B	10
VOA Preservation pH	<2.0	units	01/10/2001		115	SW 9041A	

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QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600769 MW-608-10			01/04/2001				
Mercury,Cold Vapor	<0.00020	mg/L	01/11/2001		1858	EPA 245.1	0.00020
ICP Metals - SW-6010B	Complete		01/10/2001		2954	SW 6010B	
Arsenic, ICP	<0.080	mg/L	01/10/2001	2252	3310	SW 6010B	0.080
Barium, ICP	0.127	mg/L	01/10/2001	2252	3344	SW 6010B	0.010
Cadmium, ICP	<0.020	mg/L	01/10/2001	2252	3356	SW 6010B	0.020
Chromium, ICP	<0.020	mg/L	01/10/2001	2252	3356	SW 6010B	0.020
Lead, ICP	<0.10	mg/L	01/10/2001	2252	3326	SW 6010B	0.10
Selenium, ICP	<0.15	mg/L	01/10/2001	2252	3304	SW 6010B	0.15
Silver, ICP	<0.020	mg/L	01/10/2001	2252	3351	SW 6010B	0.020
UST VOLATILE COMPOUNDS - 8260							
Benzene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Ethylbenzene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Xylenes	<3.0	ug/L	01/10/2001		923	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Toluene-d8 (Surr.)	105	%	01/10/2001		923	IA OA-1/SW 8260B	
4-Bromofluorobenzene (Surr.)	99	%	01/10/2001		923	IA OA-1/SW 8260B	
Extraction Prep	COMPLETE		01/08/2001	1604		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-WATER							
Total Extractable Hydrocarbons	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Diesel	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Gasoline	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Motor Oil	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
N-Octacosane (Surr.)	62	%	01/09/2001	1604	2695	IA-OA2/S-8015	100
Ethylene Glycol - Aqueous	<10	mg/L	01/16/2001		150	SW-8015B	10
VOA Preservation pH	<2.0	units	01/10/2001		115	SW 9041A	

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QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600770 MW-608-11			01/04/2001				
Mercury,Cold Vapor	<0.00020	mg/L	01/11/2001		1858	EPA 245.1	0.00020
ICP Metals - SW-6010B	Complete		01/10/2001		2954	SW 6010B	
Arsenic, ICP	<0.080	mg/L	01/10/2001	2252	3310	SW 6010B	0.080
Barium, ICP	0.123	mg/L	01/10/2001	2252	3344	SW 6010B	0.010
Cadmium, ICP	<0.020	mg/L	01/10/2001	2252	3356	SW 6010B	0.020
Chromium, ICP	<0.020	mg/L	01/10/2001	2252	3356	SW 6010B	0.020
Lead, ICP	<0.10	mg/L	01/10/2001	2252	3326	SW 6010B	0.10
Selenium, ICP	<0.15	mg/L	01/10/2001	2252	3304	SW 6010B	0.15
Silver, ICP	<0.020	mg/L	01/10/2001	2252	3351	SW 6010B	0.020
UST VOLATILE COMPOUNDS - 8260							
Benzene	1.7	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Ethylbenzene	1.6	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Xylenes	11.4	ug/L	01/10/2001		923	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L	01/10/2001		923	IA 0A-1/8260B	1.0
Toluene-d8 (Surr.)	106	%	01/10/2001		923	IA OA-1/SW 8260B	
4-Bromofluorobenzene (Surr.)	99	%	01/10/2001		923	IA OA-1/SW 8260B	
Extraction Prep	COMPLETE		01/08/2001	1604		IOWA-OA2	
EXTRACTABLE HYDROCARBONS-WATER							
Total Extractable Hydrocarbons	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Diesel	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Gasoline	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
Motor Oil	<380	ug/L	01/09/2001	1604	2695	IA-OA2/S-8015	380
N-Octacosane (Surr.)	79	%	01/09/2001	1604	2695	IA-OA2/S-8015	100
Ethylene Glycol - Aqueous	<10	mg/L	01/16/2001		150	SW-8015B	10
VOA Preservation pH	<2.0	units	01/10/2001		115	SW 9041A	

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QUALITY CONTROL REPORT

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Analysis Method	Quantitation Limit
600771 Trip Blank							
UST VOLATILE COMPOUNDS - 8260							
Benzene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Toluene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Ethylbenzene	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Xylenes	<3.0	ug/L	01/10/2001		923	IA OA-1/8260B	3.0
MTBE	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Hexane	<1.0	ug/L	01/10/2001		923	IA OA-1/8260B	1.0
Toluene-d8 (Surr.)	104	%	01/10/2001		923	IA OA-1/SW 8260B	
4-Bromofluorobenzene (Surr.)	98	%	01/10/2001		923	IA OA-1/SW 8260B	
VOA Preservation pH	<2.0	units	01/10/2001		115	SW 9041A	

QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

Analyte	Prep Batch Number	Run Batch Number	CCV True Concentration	Concentration Found	Percent Recovery
Mercury,Cold Vapor		1858	1.00	0.96	96.0
Mercury,Cold Vapor		1858	1.00	0.93	93.0
ICP Metals - SW-6010B		2954		Complete	
Arsenic, ICP		3310	5.00	4.84	96.8
Arsenic, ICP		3310	5.00	4.79	95.8
Barium, ICP		3344	5.00	5.06	101.2
Barium, ICP		3344	5.00	5.05	101.0
Cadmium, ICP		3356	5.00	5.04	100.8
Cadmium, ICP		3356	5.00	5.05	101.0
Chromium, ICP		3356	5.00	5.00	100.0
Chromium, ICP		3356	5.00	5.00	100.0
Lead, ICP		3326	5.00	5.06	101.2
Lead, ICP		3326	5.00	5.11	102.2
Selenium, ICP		3304	5.00	4.96	99.2
Selenium, ICP		3304	5.00	4.86	97.2
Silver, ICP		3351	1.00	1.00	100.0
Silver, ICP		3351	1.00	1.00	100.0
UST VOLATILE COMPOUNDS - 8260					
UST VOLATILE COMPOUNDS - 8260					
Benzene		923	50.0	49.2	98.4
Toluene		923	50.0	50.2	100.4
Ethylbenzene		923	50.0	48.0	96.0
Xylenes		923	150.	148	98.7
MTBE		923	50.0	42.5	85.0
Hexane		923	50.0	39.4	78.8
Toluene-d8 (Surr.)		923	100	103	103.0
4-Bromofluorobenzene (Surr.)		923	100	99	99.0
EXTRACTABLE HYDROCARBONS-WATER					
Diesel		2695	2500	2,663	106.5
Motor Oil		2695	2500	2,381	95.2
Ethylene Glycol - Aqueous		150	125	131	104.8
Ethylene Glycol - Aqueous		150	125	160	128.0

CCV - Continuing Calibration Verification

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QUALITY CONTROL REPORT
CONTINUING CALIBRATION VERIFICATION

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

Analyte	Prep Batch Number	Run Batch Number	CCV True Concentration	Concentration Found	Percent Recovery
VOA Preservation pH		115	0.0	1.02	0

CCV - Continuing Calibration Verification

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QUALITY CONTROL REPORT
BLANKS

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

Analyte	Prep Batch Number	Run Batch Number	Blank Analysis	Units
Mercury,Cold Vapor		1858	<0.00020	mg/L
Arsenic, ICP	2252	3310	<0.080	mg/L
Barium, ICP	2252	3344	<0.010	mg/L
Cadmium, ICP	2252	3356	<0.020	mg/L
Chromium, ICP	2252	3356	<0.020	mg/L
Lead, ICP	2252	3326	<0.10	mg/L
Selenium, ICP	2252	3304	<0.15	mg/L
Silver, ICP	2252	3351	<0.020	mg/L
UST VOLATILE COMPOUNDS - 8260				
UST VOLATILE COMPOUNDS - 8260				
Benzene		923	<1.0	ug/L
Toluene		923	<1.0	ug/L
Ethylbenzene		923	<1.0	ug/L
Xylenes		923	<3.0	ug/L
MTBE		923	<1.0	ug/L
Hexane		923	<1.0	ug/L
Toluene-d8 (Surr.)		923	104	%
4-Bromofluorobenzene (Surr.)		923	98	%
EXTRACTABLE HYDROCARBONS-WATER				
Total Extractable Hydrocarbons	1604	2694	<380	ug/L
Diesel	1604	2694	<380	ug/L
Motor Oil	1604	2694	<380	ug/L
N-Octacosane (Surr.)	1604	2694	94	%

Advisory Control Limits for Blanks:
Metals/Wet Chemistry/ Conventionals/GC - all compounds should be less than the Reporting Limit.
GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.
Volatiles - Toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit. All other volatile compounds should be less than the Reporting Limit.

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QUALITY CONTROL REPORT
BLANKS

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

Analyte	Prep Batch Number	Run Batch Number	Blank Analysis	Units
EXTRACTABLE HYDROCARBONS-WATER				
Total Extractable Hydrocarbons	1604	2696	<380	ug/L
Diesel	1604	2696	<380	ug/L
Motor Oil	1604	2696	<380	ug/L
N-Octacosane (Surr.)	1604	2696	104	%
Ethylene Glycol - Aqueous		150	<10	mg/L
VOA Preservation pH		115	<0.10	units

Advisory Control Limits for Blanks:
Metals/Wet Chemistry/ Conventionals/GC - all compounds should be less than the Reporting Limit.
GC/MS - Semi-Volatiles - all compounds should be less than the Reporting Limit except for phthalates which should be less than 5 times the reporting limit.
Volatiles - Toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit. All other volatile compounds should be less than the Reporting Limit.

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QUALITY CONTROL REPORT
MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

Analyte	Prep Batch Number	Run Batch Number	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
Mercury,Cold Vapor		1858	0.00167	<0.0002	0.0016	mg/L	100.0	0.0016	0.0016	mg/L	101.2	1.2
Mercury,Cold Vapor		1858	0.00168	<0.0002	0.0016	mg/L	100.6	0.0016	0.0016	mg/L	100.6	0.0
ICP Metals - SW-6010B		2954		Complet								
Arsenic, ICP	2252	3310	2.01	<0.080	2.00	mg/L	100.5	2.01	2.00	mg/L	100.5	0.0
Barium, ICP	2252	3344	1.10	0.101	1.00	mg/L	99.9	1.10	1.00	mg/L	99.9	0.0
Cadmium, ICP	2252	3356	1.01	<0.020	1.00	mg/L	101.0	1.02	1.00	mg/L	102.0	1.0
Chromium, ICP	2252	3356	1.01	0.021	1.00	mg/L	98.9	1.01	1.00	mg/L	98.9	0.0
Lead, ICP	2252	3326	2.05	<0.10	2.00	mg/L	102.5	2.06	2.00	mg/L	103.0	0.5
Selenium, ICP	2252	3304	4.04	<0.15	4.00	mg/L	101.0	4.09	4.00	mg/L	102.3	1.2
Silver, ICP	2252	3351	1.98	<0.020	2.00	mg/L	99.0			mg/L		

NOTE: Matrix Spike Samples may not be samples from this job.

Advisory Control Limits for MS/MSDs
Inorganic Parameters and GC Volatiles
The spike recovery should be 75 - 125% if the spike added value was greater than or equal to one fourth of the sample result value. If not, the control limits are not established. The RPD for the MS/MSD pair should be less than 20.

RPD = Relative Percent Difference

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QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

Analyte	Prep Batch Number	Run Batch Number	LCS True Concentration	LCS % Recovery
Mercury,Cold Vapor		1858	0.00167	99.4
Arsenic, ICP	2252	3310	2.00	99.5
Barium, ICP	2252	3344	1.00	101.0
Cadmium, ICP	2252	3356	1.00	103.0
Chromium, ICP	2252	3356	1.00	101.0
Lead, ICP	2252	3326	2.00	104.5
Selenium, ICP	2252	3304	4.00	101.3
Silver, ICP	2252	3351	1.00	101.0
UST VOLATILE COMPOUNDS - 8260				
UST VOLATILE COMPOUNDS - 8260				
Benzene		923	20.0	108.0
Toluene		923	20.0	116.0
Ethylbenzene		923	20.0	119.5
Xylenes		923	60.0	122.5
MTBE		923	20.0	89.0
Hexane		923	20.0	90.0
Toluene-d8 (Surr.)		923	100	105.0
4-Bromofluorobenzene (Surr.)		923	100	100.0
EXTRACTABLE HYDROCARBONS-WATER				
Diesel	1604	2694	1,960	83.4
N-Octacosane (Surr.)	1604	2694	100	85.0
EXTRACTABLE HYDROCARBONS-WATER				
Diesel	1604	2694	1,960	101.6
N-Octacosane (Surr.)	1604	2694	100	96.0

LCS - Laboratory Control Standard

Advisory Control Limits - Inorganics - LCS recovery should be 80 - 120%.

QUALITY CONTROL REPORT
LABORATORY CONTROL STANDARD

MONTGOMERY WATSON
11153 Aurora Avenue
Des Moines, IA 50322

01/17/2001

Steve Varsa

Job Number: 00.16625

Analyte	Prep Batch Number	Run Batch Number	LCS True Concentration	LCS % Recovery
Ethylene Glycol - Aqueous		150	125	117.6
Ethylene Glycol - Aqueous		150	125	144.8
VOA Preservation pH		115	0.0	0

LCS - Laboratory Control Standard

Advisory Control Limits - Inorganics - LCS recovery should be 80 - 120%.

COOLER TEMPERATURES

CLIENT: Montgomery Watson

CITY: ____________ PROJECT: Bldg 608

DATE TAKEN: 1-6-01 TAKEN BY: CH

Cooler #1: −1° °C / ON ICE Cooler #3: ____ °C / ON ICE

Cooler #2: ____ °C / ON ICE Cooler #4: ____ °C / ON ICE

Increased emphasis has been put on sample preservation by the various regulators. Any sample being sent to NET must be properly preserved, this includes sending samples in a properly cooled shipping container. The majority of tests performed for regulatory compliance must be preserved at 4^{o} C $\pm$ 2^{o} C during storage and shipment as directed by 40 CFR Part 136. Results from samples which are not properly preserved at $4\,^{o}C \pm 2\,^{o}$ C may be rejected by regulators. Rejection or acceptance is solely at the discretion of the regulators.

TestAmerica
INCORPORATED

Cedar Falls Division
704 Enterprise Drive
Cedar Falls, IA 50613

Phone: 319-277-2401
Fax: 319-277-2425

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring Nebraska LUST

Client Name: Montgomery Watson
Client #:
Address: 11153 Aurora Avenue
City/State/Zip Code: Des Moines, IA 50322
Project Manager: Jeff Coon
Telephone Number: (515) 253-0830
Fax: (515) 253-9572
Sampler Name: (Print Name) Stephen Vavra
Sampler Signature: [signature]

Project Name: Nebraska Air National Guard - Building 608
Project #: 1911914.781801
Site/Location ID: Lincoln
State: NE
Report To: Steve Vavra
Invoice To: Steve Vavra
Quote #: NEANG-LUST
PO#: 10071 OF

TAT
X Standard
___ Rush (surcharges may apply)
Date Needed: ___
Fax Results: (Y) N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: per Quote

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix: SL - Sludge, DW - Drinking Water, GW - Groundwater, S - Soil/Solid, WW - Wastewater, Specify Other	Preservation & # of Containers: HNO_3 / Field filtered	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: BTEX (8260)	n-hexane (8260)	MTBE (8260)	Ethylene Glycol	TEH-gasoline (OA-2)	TEH-diesel (OA-2)	TEH-waste oil (OA-2)	RCRA metals			REMARKS
mw-608-8	01-04-01	15:50	G	✓		1	3				3		X	X	X	X	X	X	X	X			
mw-608-9	01-04-01	16:15	G	✓		1	3				3		X	X	X	X	X	X	X	X			
mw-608-10	01-04-01	15:55	G	✓		1	3				3		X	X	X	X	X	X	X	X			
mw-608-11	01-04-01	16:05	G	✓		1	3				3		X	X	X	X	X	X	X	X			
Trip Blank	01-04-01	—	—				1						X	X	X								

Special Instructions:
see bid package for requirements

Relinquished By: [signature]	Date: 1-5-01	Time: 16:00	Received By: Fedex # 311 2006 466	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By: Norma Johnson	Date: 1/6/01	Time: 10:15

LABORATORY COMMENTS:
Init Lab Temp:
Rec Lab Temp:
Custody Seals: Y N N/A
Bottles Supplied by TestAmerica: Y N
Method of Shipment:

APPENDIX F

APPENDIX F

GROUNDWATER ELEVATION DATA
NEBRASKA AIR NATIONAL GUARD - BUILDING 608
LINCOLN, NEBRASKA

Date Collected: January 4, 2001

Monitoring Point	Top of Casing Elevation (feet ASL)	Depth to Water (feet)	Groundwater Elevation (feet ASL)
MW-1	–	Not Accessible	Not Accurately Surveyed, or Gauged
MW-2	1,161.99	13.04	1,148.95
MW-3	–	Not Found	Not Surveyed or Gauged
MW-4	1,164.87	16.12	1,148.75
MW-5	1,165.23	16.29	1,148.94
MW-608-8	1,162.49	13.17	1,149.32
MW-608-9	1,162.86	13.70	1,149.16
MW-608-10	1,163.27	14.05	1,149.22
MW-608-11	1,163.36	14.16	1,149.20

Notes:

ASL = Above sea level.

APPENDIX F

GROUNDWATER ELEVATION DATA
NEBRASKA AIR NATIONAL GUARD - BUILDING ~~635~~ 608
LINCOLN, NEBRASKA

Date Collected: January 4, 2001

Monitoring Point	Top of Casing Elevation (feet ASL)	Depth to Water (feet)	Groundwater Elevation (feet ASL)
~~MW-635-1~~	1158.05 1,158.05	9.93	~~1148.12~~
MW-635-2	~~1157.95~~ ?	9.91	1148.04
MW-635-3	1158.11	8.89	~~1149.22~~

Notes:

ASL = Above sea level.

mw-1		Not Accessible - Not Gauged	accurately ~~accurate~~ surveyed at
mw-2	1,161.99	13.04	1,148.95 ~~1,145.87~~
mw-3		Not Found - Not Surveyed or Gauged	
mw-4	1,164.87	16.12	1,148.75
mw-5	1,165.23	16.29	1,148.94
mw-608-8	1,162.49	13.17	1,149.32
mw-608-9	1,162.86	13.70	1,149.16
mw-608-10	1,163.27	14.05	1,149.22
mw-608-11	1,163.36	14.16	1,149.20

14.15 on ~~18~~ sheet #7 Appendix B based upon log — need to change sheet #7

used on Figure 5

Steve Varsa
03/04/2001 01:48 PM

To: Verlee A Snedden/User/Americas/Montgomery Watson@MW
cc:

Subject: NEANG UST Compliance - Building 608 Tier 1 SI Report

The NDEQ file number referenced on the cover is wrong. It should be:

UG# 040996-GW-0935

not

UG# 072996-GW-1450

Thanks!

Steve Varsa
03/02/2001 09:07 PM

To: Verlee A Snedden/User/Americas/Montgomery Watson@MW
cc:

Subject: NEANG UST Compliance - Building 608 Tier 1 SI Report

Please format and proof, similar to the previous reports.

02-01-Bldg 608 Tier 1 SI Report.(

Hard copies of attachment mark-ups in your "in-box". Thanks.

BATTERY ACID NEUTRALIZATION PIT IN BUILDING 636 (TU017)

TU017_Sept 5 12

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FORMER DETERGENT AND/OR WASTE OIL UNDERGROUND STORAGE TANKS AT BUILDING 608 (TU018)

1989_Detergent Analysis

1990_608 UST Removal

1992a_608 USTs Status

1992b_608 Dropped from SFM

1992c_LUST at 608

1995_608-1 Status

1995_Site 2 SI

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fake 511K

LABORATORY ANALYSIS REPORT AND RECORD (General)

Date: 14 NOV 1995

To: USAF

From: TMA/Norcal

Sample Identity Bulk Material

Date Received July 7, 1989

NSN = 6850-01-235-7458 ARCRET SOAP

Sample From LINCOLN NEANG

Lab Control NR MK-89-24

USED BY MAGI + MAFSM PERSONNEL - PRODUCT PLACED IN SOAP TANK AT BLDG 608

Test For Bulk Identification

Date Analyzed: August 3, 1989

Base Number:	GM890014			
OEHL Number:	034839		Bulk	Bulk
TMA/Norcal:	3624-532-11	pH	Components	Concentration %
		10.3	Aqueous	100

EP Toxicity Metals Results	mg/l	Detection Limits mg/l	Method
Arsenic	<20	20	EPA 6010
Barium	<3	3	" "
Cadmium	<2	2	" "
Chromium	620	2	" "
Lead	<2	2	" "
Mercury	<0.005	0.005	EPA 7470
Selenium	<20	20	EPA 6010
Silver	<3	3	" "

Reactivity	mg/l	mg/l	
Cyanide	<0.02	0.02	SM 412D
Sulfide	<100	100	SM 427D

J.W. ENNIS, SSGT, AFSC 90770
BIO-ENVIRONMENTAL ENG. TECH
155th TACTICAL CLINIC, NEANG

MICHAEL J. WANTLAND, TSgt, USAF,
NCOIC Occupational Chemistry Branch

SAMPLES ANALYZED BY CONTRACT LAB

Requesting Agency (Mailing Address)

155 TAC CLINIC/SGPB
LINCOLN MAP NEANG, NE 68524-1897

Lawrence A. Johnson
Program Manager

AFSC Form 3511, DEC 85

UST

file 3/K
TB
19 Ju

NEBRASKA AIR NATIONAL GUARD
HEADQUARTERS 155TH TACTICAL RECONNAISSANCE GROUP
2301 WEST ADAMS
LINCOLN MAP (ANG), LINCOLN, NEBRASKA 68524-1897

REPLY TO ATTN OF: 155 TRG/SGPB

1 April 1990

SUBJECT: Fuel Tank Removal

TO: 155 MSS/AO
TRG/CC
CES/CC
DE
IN TURN:

1. The underground fuel tank removal from the apron west of Bldg. 608 began on 29 March 1991 using contract No. DAHA25-91-C-0002.

2. Upon removal of the surrounding concrete and exposing the substrait it was noted that there was extensive saturation of sand fill encompassing this 1000 gallon tank.

3. A Photo ionizing device (PID) was used to determine the extent of saturation of the soil.

4. The contaminant has been identified as waste JP-4 aviation fuel.

5. PID values were in excess of 200 parts per million (ppm).

6. Mr. Hank Lohman of the National Guard Bureau was notified of this condition on 1 April 91 at approximately 0930 hours.

7. It is this offices belief that reporting to the Nebraska State Department of Environmental Control be pursued IAW Title 126, Chapter 18, para. 002 through 008.01.

J.W. ENNIS TSgt, NE ANG
NCOIC, Bioenvironmental Engineering Services

copy:
file

FILE 31 K EM

NEBRASKA AIR NATIONAL GUARD
HEADQUARTERS 155TH TACTICAL RECONNAISSANCE GROUP
2301 WEST ADAMS
LINCOLN MAP (ANG), LINCOLN, NEBRASKA 68524-1897

PARATI ATQUE POTENTES

REPLY TO ATTN OF: DEE

25 February 1992

SUBJECT: Underground Storage Tank (UST) Program Status Report

TO: 155 TRG/CC BS 27 Feb 92
TAG NE/ESSO
ANGRC/CEV
IN TURN

1. This letter serves to report status of test results on 25 UST's at the Lincoln ANG Base. Basically, all tanks that are currently in use passed. Three tanks that are abandoned pending closure failed to hold air pressure and are as follows:

Tank ID	Cap	Prod	Test Date
600-1	500	Waste Oil	26 Nov 91
608-2	2,000	Detergent	25 Nov 91
637	8,000	Diesel	25 Nov 91

One additional tank still carried on your records has been removed, it is:

608-3	1,000	Waste JP-4

See attached Underground Storage Tank Leak Detection Compliance worksheet for specific information.

2. In addition, several activities are occurring in the UST program for Lincoln that you should be made aware of:

a. The Bureau of Fire Prevention for the City of Lincoln conducted an inspection of the NEANG UST program 12 Feb 92 and found that everything was in order. Some deficiencies in recordkeeping by the State was pointed out by NEANG as is addressed in para 2.C.

b. A monitoring system for pressurized piping is currently in design and should be installed by summer 92.

c. A clarification of registration requirements letter has been sent to the State Fire Marshall's office. Of the 11 tanks the State currently carries, one has been removed and two others are not regulated. On the flip side of this, fifteen other tanks are in operation and we believe five or six of those should be registered. We will update our records with you once this is all sorted out. As an aside, we originally registered twenty-one tanks with the State--how they ended up with eleven, we don't know.

d. In addition, we have also asked the State to waiver closure requirements on the three abandoned tanks shown in para 1. pending removal under the UST Removal Project scheduled for FY 95.

READINESS . . . . IS OUR PROFESSION

3. This summarizes our current work with the UST Program. If you have any questions or comments, please call us at DSN 946-1251.

J. STEVEN KRAJNIK, CPT, NEANG
Assistant Base Civil Engineer

1 Atch
UST Leak Detection Compliance Worksheet

cc: CETSC
EM

MEMO FOR RECORD

Response to State Fire Marshall Orders per 28 April Inspection

1. Tanks 635-2 and 635-3.

   a. Inventory will now be monitored daily.

   b. Measurements of water level will be measured and recorded.

   c. Warning and operations signs are posted.

   d. Annual tank tightness testing was performed in Nov 91 and is currently being contracted to occur in June or July 93.

2. Tanks 624-2 and 655.

   a. Inventory measurements will be performed Apr - Nov.

3. Tanks 203-2, 605-1, 608-1, 632, and 635-1. All expeditiously emptied and all are to dropped from SFM Order.

4. Tanks 640-1 and 640-2. ARNG FMO is handling these tanks.

DEE/CPT Krajnik/19 May 92/1251/tp

STATE OF NEBRASKA

DEPARTMENT OF ENVIRONMENTAL CONTROL
Randolph Wood
Director
301 Centennial Mall South
P.O. Box 98922
Lincoln, Nebraska 68509-8922
Phone (402) 471-2186

E. Benjamin Nelson
Governor

DEC 01 1992

Major Carl R. Willert
Nebraska Air National Guard
Headquarters 155th Tactical Reconnaissance Group
2301 West Adams, Lincoln Map (ANG)
Lincoln, NE 68524-1897

RE: Site Closure
UG #073191-RF-1200

Dear Major Willert:

The Department has reviewed the Step 7 detailed site assessment report submitted by Operational Technologies. The report indicated that ground water samples taken from eight monitoring wells detected recordable concentrations of four of the eight analyzed compounds. The following is a list of the compounds with the highest recorded concentrations:

Toluene - 2.1 ppb
Xylenes - 3.7 ppb
1,3-dichlorobenzenes - 2.5 ppb
1,4-dichlorobenzenes - 5.9 ppb
ppb - parts per billion

These levels are below Nebraska maximum contamination levels for these compounds.

No further remedial actions will be required at this time. However, if a problem arises in the future as a result of this release, Nebraska Air National Guard will be held responsible for further remedial action.

Since ground water has been impacted, the Department is required by law to publish the proposed site closure for a 30-day comment period (copy enclosed). In most cases, few, if any, comments are received. However, if the Department receives a comment which is justified, additional remedial actions will be required.

Thank you for your cooperation. If you have any questions, please contact me at (402) 471-4230.

Sincerely,

Nancy Mann

Nancy Mann, Geologist
LUST/ER Section
Water Quality Division

NM/sh
Enclosure

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
NATIONAL GUARD BUREAU
OFFICE OF THE UNITED STATES PROPERTY AND FISCAL OFFICER, NEBRASKA
1234 MILITARY ROAD
LINCOLN, NEBRASKA 68508-1092

USPFO-PC-C 6 NOVEMBER 1995

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: PN: NGCB 909559, REPL USTS, CONTRACT NO. DAHA-25-C-0009, CONTAMINATED SITES, 0930 HRS, BCE CLASSROOM, ANG BASE, LINCOLN, NE

1. A meeting was held to discuss the contaminated sites situation with the persons in attendance as stated on the attached roster.

2. CPT Yager stated the intent of the ANGRC/CE was to have all contaminated sites at a state of a "buildable site". A "buildable site" was further defined as a contaminated site that would pass the DEQ requirements for disturbed soils. This requirement will stand if the site can be overexcavated as stated in the specifications to meet this standard.

3. The contaminated soils are to remain separate from each site to allow specific testing of those soils to determine how the soils will be disposed of.

4. The ANGRC/CE will only allow 3 different types of disposal.

a. Land farming - if the soil is volitable - petroleum based.
b. Incineration.
c. Taken to an asphalt batch plant for use in making asphalt.

5. The BCE does not know of a disposal site for b and c, therefore a is the only option at this point.

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7. The status of the tanks are as follows.

a. 203-1 & 203-2 have been backfilled and final grading is done. Contamination was found in 203-2.

b. 608-1 has been backfilled. There was contamination.

c. 605-1 & 605-2 have been backfilled. These tanks are considered clean sites. A trace of contamination was found but would sites fall within disturbed soils standards based on the A-E's opinion.

SUBJECT: PN: NGCB 909559, REPL USTS, CONTRACT NO. DAHA-25-C-0009, CONTAMINATED SITES, 0930 HRS, BCE CLASSROOM, ANG BASE, LINCOLN, NE

d. 600 has been backfilled. Hazardous waste was found in this tank and site. RECRA closure will be required by DEQ according to A-E's opinion of test results.

e. 637 has been backfilled to amount of contract. The ground water is contaminated. Contractor has been directed to backfill all sites to contract amounts. Additional backfill will be added to the contract.

f. The samples for contamination were taken intermitently through out the excavation process. The A-E stated that the samples were to be submitted at 4 degrees celsius and some of the samples were not. Contractor will retake samples for those submitted that were above 6 degrees celsius.

g. A-E is going to meet with BCE to determine additional requirements needed and the BCE Will begin a change order for a design change to start remidiation of the sites as needed.

h. The A-E will be doing ground water samples at tanks 608-1, 203-2 and 600-1.

Carrie L. Hancock

CARRIE L. HANCOCK
CONTRACT SPEC
Contract Administrator

CF:
Mr. Dale Bixler
Mr. Tony Ruhge
Mr. Harlan Biere
Ms. Holly Johnson
Mr. Jim Condon
Mr. Jeff Johnson
CPT Dan Kluck
CPT Bob Yager
SMSgt Garry Jochum
SFC Carrie Hancock

INSTALLATION RESTORATION PROGRAM

FINAL
REVISION 04

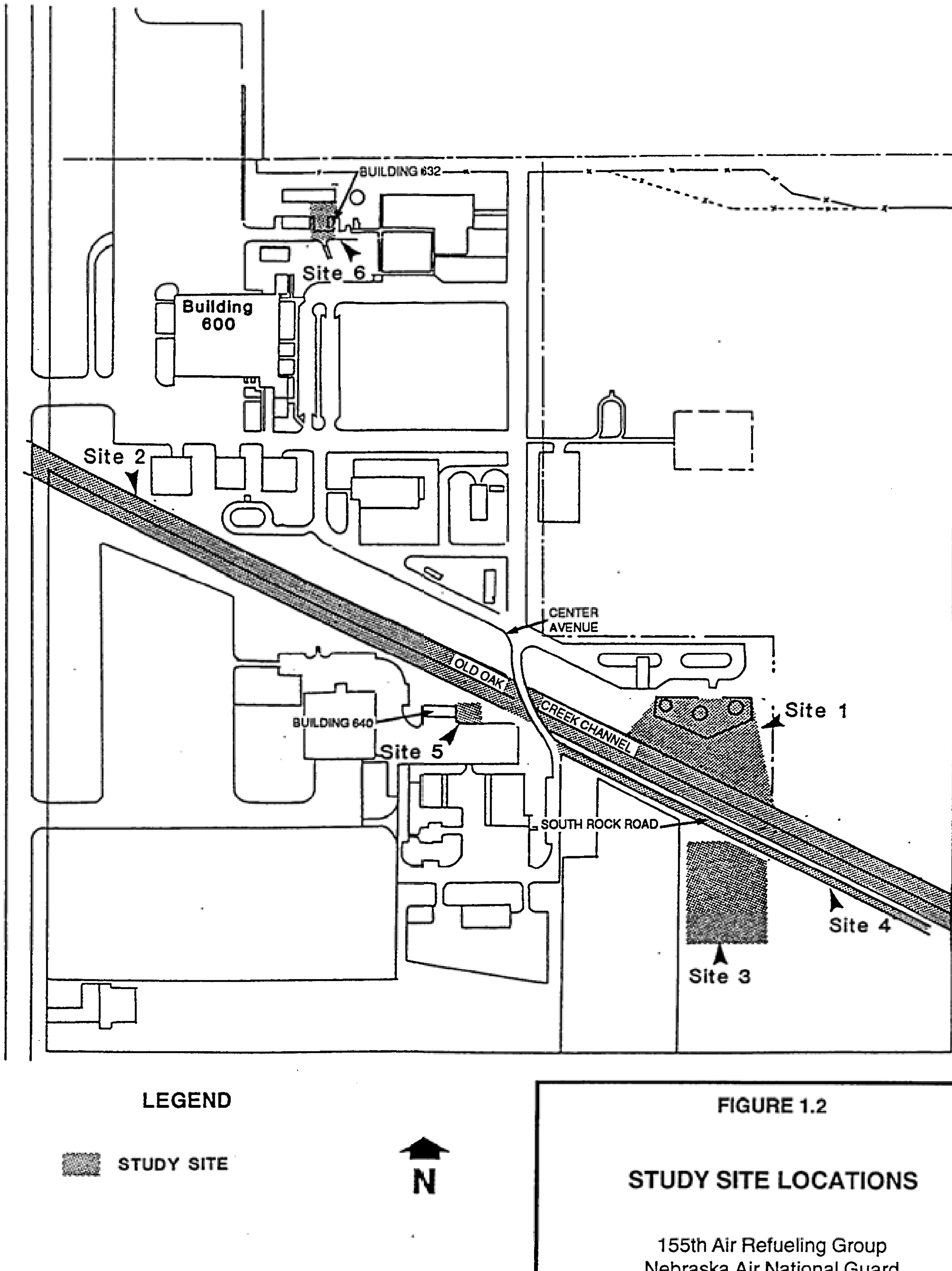
SITE INVESTIGATION REPORT
VOLUME 1: SECTIONS 1 THROUGH 6, APPENDIX A

155th Air Refueling Group
Nebraska Air National Guard
Lincoln Municipal Airport
Lincoln, Nebraska

April 1995

AIR NATIONAL GUARD

HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
Environmental Restoration and Waste Management Programs
Oak Ridge, Tennessee 37831-7606
managed by MARTIN MARIETTA ENERGY SYSTEMS, INC.
For the U.S. DEPARTMENT OF ENERGY under contract DE-AC05-840R21400



Source: Base Records

FIGURE 1.2

STUDY SITE LOCATIONS

155th Air Refueling Group
Nebraska Air National Guard
Lincoln Municipal Airport
Lincoln, Nebraska

PARSONS
ENGINEERING SCIENCE, INC.
Denver, Colorado

SECTION 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

6.1.1 Site 1 - POL Storage Area

Site 1, the POL storage area, showed the highest degree of contamination and poses the greatest potential threat to human health and the environment. Measurable free product was observed in wells RW-2 and 1201. In addition, product films were noted in wells 1202 and 1203, and slight sheens were present in wells 0209 and 0216. Ground water samples were collected and analyzed. Dissolved chemicals of concern associated with free product included benzene, ethyl benzene, toluene, and xylenes. The extent of the plume of dissolved contaminants is larger than the area of detected free product; however, both dissolved chemicals and free product contamination appears to be localized in the vicinity of the tank farm. Levels of petroleum hydrocarbons detected in 1989 appear to have decreased since 1983, perhaps due to a combination of dilution, degradation, and operation of the product recovery system. Levels of common anions and metals in ground water were similar to levels observed in upgradient wells 0206 and 2-MW1. No soils samples were collected at Site 1.

Results of the risk evaluation show that benzene, nitrate, and selenium exceed their respective human health criteria in ground water. Nitrate in ground water also exceeded the livestock drinking water criterion at this site. Nitrate, often the result of agricultural practices, was detected at levels similar to those found throughout the state (Chambers, 1989). Selenium is a naturally-occurring element (see Table 4.6 and Section 5.2.4.2), and ground water concentrations are probably derived from the soil. Benzene poses a health risk only if ground water is used as a potable water source, which is unlikely due to its onsite location. Because Site 1 shows evidence of ground water contamination by petroleum products, both from the presence of free product and dissolved constituents, and because a southerly ground water migration direction appears to have brought the leading edges of the plumes into close proximity to the Old Oak Creek channel, additional investigations are recommended at Site 1.

6.1.2 Site 2 - Old Oak Creek Channel

Site 2, the Old Oak Creek channel, exhibits minimal contamination near storm drainage outfalls. Surface water, sediment, and ground water samples were collected from Site 2 and analyzed. Volatile and semivolatile organics were not detected in the surface water samples, but low levels of petroleum hydrocarbons were detected at stations located downstream from Site 1. This suggests that ground water containing petroleum hydrocarbons is discharging into the creek at Site 1. Levels of common anions and metals in surface water were generally similar to those detected in upgradient wells 0206 and 2-MW1. At several stations located near storm drainage outfalls, levels were slightly higher.

PNAs, phthalates, and petroleum hydrocarbons were detected in stream sediments at Site 2. However, phthalates and PNAs are strongly adsorbed onto suspended particulates in bottom sediments and are typically found in most sediments throughout the world, including those not polluted by man. The EPA guideline of 100 mg/Kg for total PNAs in soils was not exceeded. Common anions and metals were also detected in sediments along the length of the stream. Levels of lead and cadmium exceeded phytotoxic levels for plants. However, these metals may be relatively immobile in the sediments and unavailable for uptake by aquatic plants. The phytotoxicity level for lead is based on the soluble lead fraction; the guideline for total lead was not exceeded.

Ground water quality in well 2-MW1 at Site 2 is generally indicative of background water quality, except that petroleum hydrocarbons were detected at concentrations slightly above the detection limit. Levels of anions and metals were similar to those detected in upgradient well 0206. Nitrate exceeded the MCL of 10 mg/L and livestock drinking water criteria in ground water, but the levels detected are similar to those found in ground water throughout the state (Chambers, 1989).

Old Oak Creek exhibits minimal contamination at outfalls, but appears to pose no immediate threat to human health or the environment. However, because of the potential for contaminated ground water at Site 1 to migrate into Site 2, continued monitoring of the Old Oak Creek channel located downgradient from Site 1 is recommended.

6.1.3 Site 3 - Former Tank Cleaning Area

At Site 3, the former tank-cleaning area, soils and ground water were sampled. Petroleum hydrocarbons were detected in soil borings, but were not detected in ground water samples. Metals and anions were detected in soil samples, but were within typical background ranges. The risk evaluation showed that arsenic in soils was the only chemical to exceed its health-based criteria. Arsenic is not associated with any site-related activities, and occurs at levels similar to those reported regionally (Table 4.6 and Section 5.2.4.3). Fluoride and lead exceeded plant phytotoxic levels in soils, however, the phytotoxicity guideline for total lead was not exceeded. Fluoride concentrations are similar to those reported for the region (Section 5.3.3.3). Both elements are expected to be relatively immobile in the environment and unavailable for plant uptake, and appear to be indicative of baseline conditions. Therefore, the potential for adverse health or environmental effects is low, and no further action is recommended.

6.1.4 Site 4 - South Rock Road

At Site 4, the access road, soil samples were collected. Petroleum hydrocarbons were detected, with the highest concentrations occurring at the 0- to 1-foot interval. This is probably due to past road spraying (dust control) activities and movement of motor vehicles across the road. Petroleum hydrocarbons are not particularly mobile in the soil, and would not be expected to migrate into the ground water.

Anion concentrations are within reported background ranges. Arsenic, barium, cadmium, and lead concentrations were highest at Site 4, and may not represent baseline conditions. However, the risk evaluation indicated that only arsenic levels in soils exceeded the human health criterion, and fluoride and lead exceeded their plant phytotoxic levels. Maximum site arsenic concentrations (10.4 mg/Kg and 6.9 mg/Kg in surface and subsurface soils, respectively) are similar to levels reported regionally (Table 4.6 and Section 5.2.4.3). Fluoride concentrations were within reported background concentrations for the region (Section 5.3.3.3), and only slightly exceeded the criterion for plants. Fluoride is not expected to be readily bioavailable. The lead criterion is based on the soluble fraction, and the phytotoxicity guideline for total lead in soils was not exceeded. The maximum detected value for lead in soils at Site 4 was found to be an outlier, which may indicate a low to moderate risk to vegetation at Site 4. However, lead levels decrease rapidly with depth, indicating that lead is relatively immobile in the soil and plant growth is inhibited by the road surface and use. Therefore, risks to human health and environmental receptors are low, and no further action is recommended.

6.1.5 Site 5 - Army National Guard Oil Storage Area

Soil and ground water samples were collected at Site 5, the Army National Guard Oil Storage Area. Petroleum hydrocarbons were detected in soil samples, but were not found in the ground water sample. Common anions and metals were detected in soil samples, but did not exceed background ranges. Levels of metals and anions detected in the ground water were comparable to levels detected in background wells 0206 and 2-MW1. The risk evaluation showed that arsenic in soils was the only chemical exceeding its human health criterion, and fluoride in soils exceeded its plant phytotoxic level. According to available baseline and historical data, both elements are naturally occurring. Because the small amounts of petroleum hydrocarbons in soils do not appear to be migrating, no further action is recommended for Site 5.

6.1.6 Site 6 - Hydraulic Fluid Spill Area

Three soil samples and one ground water sample were collected at Site 6. Petroleum hydrocarbons were detected in soil samples, but were not detected in the ground water sample. Levels of metals in soils and ground water were comparable to background levels. The risk evaluation showed that arsenic in soils was the only chemical exceeding its human health criteria. Arsenic is not associated with any site-related activities, was not an outlier in a statistical analysis of site samples, and is similar in concentration to regional levels (Table 4.6 and Section 5.2.4.3). No other criteria were exceeded. Therefore, no further action is recommended for this site.

6.2 RECOMMENDATIONS

Based on the information collected during the SI, no further action is needed at Sites 3, 4, 5, and 6. Contamination at Site 2 is presently at low levels which do not threaten human health or the environment. However, its proximity to Site 1 indicates that contaminant concentrations may increase in the future. Therefore, no further action is recommended for the upgradient portions of Site 2, and the lower portions are proposed for inclusion in Site 1. It is recommended that additional information be obtained for Site 1 through an extended SI. Recommended activities at Site 1 are listed below.

1. Recover existing free product to the extent possible utilizing existing monitoring and/or recovery wells.

2. Obtain additional information on existing monitoring and recovery wells. Currently, geologic logs and well construction information are available for 8 of 25 existing wells at Site 1. Additional information will allow further definition of geologic and hydrogeologic conditions for design of a remedial action program, and will help determine the suitability of the wells for continued use. If the information cannot be obtained from existing records, well depths can be determined using weighted probes, and a physical means of well probing can be employed to determine screened intervals.

3. Redevelop the existing monitoring wells. Due to the incomplete documentation for these wells, it is not known whether they were ever developed following their installation. Redevelopment will allow for greater confidence in results obtained from product thickness measurements, ground water quality sampling, and aquifer testing.

4. Obtain additional water level and product thickness measurements in existing wells to define seasonal variations. Data obtained from additional measurements will allow further quantification of the thickness of the free product layer, and will aid in design of a remedial system.

5. Install additional monitoring wells to better define the lateral extent of the dissolved contaminant plume, and perform supplemental ground water sampling in selected wells. A greater number of wells in the sampling program will allow for better definition of the extent and magnitude of dissolved contamination, and will guide the placement of a remedial system. Samples should be analyzed for total petroleum hydrocarbons and the VOCs benzene, toluene, ethyl benzene, and xylenes.

6. Perform slug tests in selected monitoring wells to provide more refined estimations of hydraulic conductivity. Such estimations will be necessary for design of a remedial action program.

7. Drill soil borings and collect soil samples from the unsaturated zone to define the extent and magnitude of soil contamination. Information obtained from soil sampling should help evaluate the necessity for remediation of soils in the unsaturated zone.

8. Install a limited number of monitoring well clusters, each consisting of one well screened entirely in the less-permeable clay horizon and one well screened entirely in the underlying sand. Hydrogeologic data obtained from Appendix D of the Hazardous Materials Technical Center report (1987) indicates that ground water was often first encountered in the upper, clayey unit during drilling of the existing wells, and that wells 0202 and 0209, which are screened entirely within the clayey zone, are water-bearing. In addition, the moderate to high fuel concentrations observed during drilling were located in the upper unit. In order to facilitate development of a remedial action program, water quality variations in the sand and clay layers, as well as the hydraulic characteristics of each of the horizons, should be investigated.

9. Collect additional soil samples in an area where no contaminant sources are known to exist to determine background concentrations of metals and anions.

10. Continue monitoring surface water quality in the Old Oak Creek channel at stations 2-SW4, 2-SW3, and 2-SW1. Surface water samples obtained from these stations should be analyzed for total petroleum hydrocarbons and the VOCs benzene, toluene, ethyl benzene, and xylenes. Periodic monitoring should provide data on the degree to which discharge of Site 1 ground water into the creek is affecting surface water quality.

The shallow ground water at Site 1 has little or no potential for use as a public or private drinking water supply. In such cases, the State of Nebraska ground water remedial action protocol (Title 118, Appendix A) requires cleanup of readily-removable contaminants (i.e., free product) and monitoring. It may also be necessary to set cleanup levels which protect streams from contaminated ground water discharge that would violate surface water standards. The recommended SI activities are designed to facilitate achievement of these remedial action objectives.

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FORMER OIL/WATER SEPARATOR AT BUILDING 605 (OW020)

1992_605 USTs

1995_605 Status

1996a_605_UST_SI

1996b_605-1_Closure

2003_605 Site Closure

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MEMO FOR RECORD

Response to State Fire Marshall Orders per 28 April Inspection

1. Tanks 635-2 and 635-3.

   a. Inventory will now be monitored daily.

   b. Measurements of water level will be measured and recorded.

   c. Warning and operations signs are posted.

   d. Annual tank tightness testing was performed in Nov 91 and is currently being contracted to occur in June or July 93.

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   a. Inventory measurements will be performed Apr - Nov.

3. Tanks 203-2, 605-1, 608-1, 632, and 635-1. All expeditiously emptied and all are to dropped from SFM Order.

4. Tanks 640-1 and 640-2. ARNG FMO is handling these tanks.

DEE/CPT Krajnik/19 May 92/1251/tp

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
NATIONAL GUARD BUREAU
OFFICE OF THE UNITED STATES PROPERTY AND FISCAL OFFICER, NEBRASKA
1234 MILITARY ROAD
LINCOLN, NEBRASKA 68508-1092

USPFO-PC-C 6 NOVEMBER 1995

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: PN: NGCB 909559, REPL USTS, CONTRACT NO. DAHA-25-C-0009, CONTAMINATED SITES, 0930 HRS, BCE CLASSROOM, ANG BASE, LINCOLN, NE

1. A meeting was held to discuss the contaminated sites situation with the persons in attendance as stated on the attached roster.

2. CPT Yager stated the intent of the ANGRC/CE was to have all contaminated sites at a state of a "buildable site". A "buildable site" was further defined as a contaminated site that would pass the DEQ requirements for disturbed soils. This requirement will stand if the site can be overexcavated as stated in the specifications to meet this standard.

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h. The A-E will be doing ground water samples at tanks 608-1, 203-2 and 600-1.

Carrie L. Hancock

CARRIE L. HANCOCK
CONTRACT SPEC
Contract Administrator

CF:
Mr. Dale Bixler
Mr. Tony Ruhge
Mr. Harlan Biere
Ms. Holly Johnson
Mr. Jim Condon
Mr. Jeff Johnson
CPT Dan Kluck
CPT Bob Yager
SMSgt Garry Jochum
SFC Carrie Hancock

March 6, 1996

GARY JOCHUM
NE AIR NATIONAL GUARD
2420 WEST BUTLER AVE
LINCOLN NE 68524

Facility ID Number: AP11410 030696-AP-0000
Facility Location: BLDG 605 City: LINCOLN

Dear GARY JOCHUM:

This letter is in regard to the site assessment conducted in accordance with the Underground Storage Tank System Site Assessment Protocol for Permanent Closure and Change-in-Service for the above referenced facility.

At this time, the Department will not require any further action at this facility. However, if a problem is recognized in the future that may be attributed to a release of a regulated substance from this tank system, the last owner/operator, as defined by Nebr. Rev. Stat. 81-15,119, will be held responsible for further remedial action.

Thank you for your cooperation in this matter. If you have any questions, please call Rosemary Fenton (402) 471-4230.

Sincerely,

David Chambers

David Chambers, Section Supervisor
Ground Water Section
Water Quality Division

cc State Fire Marshal

STATE OF NEB .ASKA

DEPARTMENT OF ENVIRONMENTAL QUALITY
Randolph Wood
Director
Suite 400, The Atrium
1200 'N' Street
P.O. Box 98922
Lincoln, Nebraska 68509-8922
Phone (402) 471-2186

JUL 23 1996

E. Benjamin Nelson
Governor

Lt. Col Carl Willert
USP&FO
1234 Military
Lincoln, Ne 68508

Re:	Facility Name:	Lincoln ANG Base, #605-1
	Facility Id Number:	11410
	UG#:	**071796-AP-0004**
	Location:	Lincoln ANG Base, Building 605
	City:	Lincon, Nebraska

Dear Col. Willert:

The Department has received the Closure Assessment Report for the October 24, 1996 closure of all or part of the underground storage tank system at the facility listed above. Based on the information presented in this report the Department is not requiring any action.

If at a later time additional information is presented that shows contamination resulting from a release at this facility, the Department may require further action.

Sincerely,

Gene Wiggins

Gene Wiggins, UST Closure Coordinator
LUST/ER Section
Water Quality Division

GW/dph

1SH59696

STATE OF NEBRASKA

Department of Environmental Quality
Michael J. Linder
Director
Suite 400, The Atrium
1200 'N' Street
P.O. Box 98922
Lincoln, Nebraska 68509-8922
Phone (402) 471-2186
FAX (402) 471-2909

OCT 3 0 2003

Mike Johanns
Governor

Captain John Buhrmann
Nebraska Air National Guard
155th Air Refueling Wing
2415 West Butler Avenue
Lincoln, NE 68524

RE: Site Closure
Nebraska Air National Guard
UG #072996-GW-1450, UG #040996-GW-0800, UG #040996-GW-0935

Dear Mr. Buhrmann:

The Department has received notification of water well abandonment at the above referenced site. No further remedial actions will be required at this time. However, if problem arises in the future as a result of this release, Nebraska Air National Guard will remain responsible for further remedial actions.

Thank you for your cooperation in this matter. If you have any questions or comments, please contact me at (402) 471-4230.

Sincerely,

Heather Stetson
for Nancy Mann, Geologist
Petroleum Remediation Section
Water Quality Division

2003000667

APPENDIX B
BORING LOGS

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HTRW DRILLING LOG

PROJECT Lincoln, NANGB	INSPECTOR M Kudzzets	HOLE NUMBER TU014 SB-1
		SHEET 2 OF 3

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	0	0.0-2.2FT: SAND (SW) LOOSE, POORLY SORTED, PREDOMINATELY QUARTZ, VERY PALE BROWN (10YR 7/3) DRY.		PID=0.0 PPM		RUN: 0-5FT REC: 2.2FT
	1			PID= 0.0ppm		
	2	2.2-5.0FT: LOSS		2.0FT HS= 0.0ppm		
	3					
	4					
	5	5.0-5.9FT: CONCRETE, BROKEN BY DPT. FRESH, NO ODOR, WET	PID= 0.0ppm			RUN: 5.0-7.0FT REC 0.9FT
	6					
	7					DRILLER REPORTS REFUSAL AT 7.FT BGS
	8					
	9					
	10					

PROJECT HOLE NUMBER SB-1

HTRW DRILLING LOG

HOLE NUMBER TUØ14 SB-1A

PROJECT: Lincoln, NANGB

INSPECTOR: M. KLIDZEJS

SHEET 3 OF 3

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	0	0.0-0.5FT: CONCRETE				RUN: 0-5FT REC: 1.1FT SOIL 0.5FT CONCRETE
	1–4	0.5-1.6FT: SAND (SP), LOOSE, POORLY SORTED, QUARTZ + FELDSPAR MOIST, VERY PALE BROWN	PID=0.0 ppm 1.1FT HS=0.0 ppm			
	4	1.6-5.0FT: LOSS				
	5–6					RUN: 5-10FT REC: 1.7FT
	6–8	5.0-6.3FT: SAND AS ABOVE. DRY WET AT C.1FT.	PID= 0.0ppm			
	8–11	6.3-6.7FT: CLAY (CH), SOFT, PLASTIC TRACE GRAVEL (FINE) DARK GRAY (10YR 4/1) VERY MOIST TO WET. 6.7-10.0FT LOSS	6.7FT HS=1.3ppm PID= 0.0ppm		LNC-014-08-SB1-01 15:25 10-11FT	RUN: 10-15FT REC: 3.0FT 2.0FT COLLAPSE
	12–14	10.0-13.0FT: CLAY AS ABOVE, NO GRAVEL, WET	PID= 0.0ppm 11.0FT HS=0.8ppm			
	15–19	15.0-18.0FT: CLAY AS ABOVE. WET	15.0FT HS=1.1ppm PID= 0.0ppm 18.0FT HS= 2.7ppm			RUN: 15-20FT REC: 3.0FT 2.0FT OF COLLAPSE
	20					

HOLE NUMBER SB-1A

70014

HTRW DRILLING LOG

HOLE NUMBER SB-2

INSPECTOR M. Kudzeis

SHEET 2 OF 3

PROJECT Lincoln, NANGB

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	0	0.0-0.5FT: CONCRETE (CREP)				RUN: 0-5FT REC: 1.2FT (SOIL)
	1	0.5-1.7FT: SAND (SW) POORLY SORTED, FINE TO COARSE GRAINED. PREDOMINATELY FELDSPAR, SLIGHTLY LESS QUARTZ	PID= 0.0			
			1.0FT HS= 0.1ppm			
	2	1.7-5.0FT: LOSS				
	3					
	4					
			5.0FT HS= 1.7PPM			
	5	5.0-7.5FT: CLAY (CL) STIFF LOW TO MOD. PLASTICITY, OLIVE GRAY (5Y 4/2) V. SL. MOIST	PID= 0.0PPM			RUN: 5-10FT REC: 4.7FT
	6				6.4-7.5	
		7.5-8.0FT: CLAY (CH) SOFT, HIGHLY PLASTIC, GRAY (5Y 5/1), WET				
	7		PID= 0.0ppm			WET AT 7.5FT
		8.0-9.7FT: CLAY, (CL) STIFF, LOW TO MOD. PLASTICITY. V. DARK GRAY (2.5Y 3/1) V. SL. MOIST.	7.5FT PID= 1.7ppm			
	8		PID= 0.0ppm			
	9				8.7-9.5	
		9.7-10.0FT: LOSS	10.0FT HS= 1.7PPM			
	10					

TU014 47

HTRW DRILLING LOG

HOLE NUMBER SB-2

INSPECTOR M. Kudzitz

SHEET 3 OF 3

PROJECT Lincoln, NANGB

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	10	10.0-14.2FT: CLAY (CH) MED STIFF, HIGHLY PLASTIC, DARK GRAY (2.5Y 4/1) GRADING DOWNWARD TO OLIVE BROWN (2.5Y 4/3), V. MOIST.				RUN: 10-15FT REC: ~~9.2~~ 4.2 FT
	11		PID= 0.0ppm			
	12		PID= 0.0ppm 12.5FT HS= 1.4ppm			
	13		PID= 0.0ppm			
	14	14.2-15.0FT: LOSS	14.2FT HS= 0.6ppm			
	15	15.0-16.5FT: CLAY (CH), SOFT, HIGHLY PLASTIC, V. DARK GRAY (2.5Y 3/1), V. MOIST.				RUN: ~~15-20FT~~ 15-20FT REC: 5.0 FT
	16	~~16.5~~ -16.6 FT: SAND (SW) POORLY SORTED, PACKED IN SEAM BETWEEN CLAY, FINE TO COARSE GRAINED, PREDOM COARSE, WET.	PID= 0.0ppm			
	17	16.6-17.5FT: CLAY (CH) STIFF, MOD PLASTICITY GRAYISH BROWN (2.5Y 5/2), V. MOIST.	17.5FT HS= 0.5ppm			
	18	17.5-20.0FT: CLAY (CH) STIFF, HIGHLY PLASTIC V. DARK GRAY (2.5Y 3/1) MOIST.	PID= 0.0ppm			
	19		PID= 0.0ppm 19.7FT HS=1.4ppm			
	20					

HOLE NUMBER SB-2

PROJECT: Lincoln, NANGB

ELEV (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	0	0.0-0.5FT: CONCRETE (CORRD)				RUN: 0-5FT REC: 4.3FT
		0.5-0.8FT: SAND (SW)) LOOSE, FINE TO COARSE GRAINED, PREDOM QUARTZ + FELDSPAR			0.5-1.5FT	
	1					
	2	0.8-1.2FT: CLAY (CH), MED STIFF, HIGHLY PLASTIC, BROWN (7.5YR 5/4). SL. MOIST.				
	3	1.2-4.3FT: CLAY (CL) STIFF, LOW TO MOD PLASTICITY DARK OLIVE GRAY (5Y 3/2). SL. MOIST				
	4	4.3-5.0FT: LOSS				
	5					TD= 5FT

HTRW DRILLING LOG

HOLE NUMBER TU016 SB-2	
INSPECTOR M. Kidzzis	SHEET 2 OF 2

PROJECT Lincoln, NANGB

ELEV (ft)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	0	0.0-0.5 FT: CONCRETE				RUN: 0-5 FT REC 4.05 FT
		0.5-1.0 FT: ~~SANDY~~ CLAY, SOFT TO MED. STIFF, PLASTIC, YELLOWISH BROWN (10YR 5/4) V. MOIST				
	1					
		1.0-2.5 FT: CLAY (CL) STIFF, LOW TO MOD PLASTICITY BLACK (10YR 7/1) SL. MOIST				
	2					
	3	2.5-4.05 FT: CLAY (CH) VARIABLE HARDNESS FROM SOFT TO STIFF PLASTIC, DARK GRAY (10YR 4/1) MOIST.				
	4					
	5					TD = 5 FT

HOLE NUMBER SB-2

HTRW DRILLING LOG

PROJECT Lincoln, NANGB	INSPECTOR M. Kridzejs	HOLE NUMBER TU016 SB-3
		SHEET 2 OF 2

ELEV.	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
	0	0.0-0.5FT: CONCRETE (CORED)				RUN: 0-5FT
		~~0.5-1.1FT~~ 1.1-4.33FT: CLAY (CH) VARIABLE HARDNESS RANGING FROM SOFT TO STIFF, MOSTLY HIGHLY PLASTIC (SOME MODERATE) DARK OLIVE GRAY (5Y 3/2) SL MOIST.				REC: 4.33
	1					
	2					
		0.5-1.1FT: CLAY (CH), SOFT TO MED STIFF, PLASTIC YELLOWISH BROWN (10YR 5/4) V. MOIST				
	3					
	4					
	5					

PROJECT | HOLE NUMBER SB-3

65

HTRW DRILLING LOG

HOLE NUMBER SB-1

PROJECT Lincoln, NANGB

INSPECTOR M. Kuiders

SHEET 2 OF 3

DEPTH (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
0	~~0.0~~ 0.0-0.9 FT: CONCRETE (CORED)				RUN: 0-5FT REC: 4.3FT (SOIL)
	0.9-5.0FT: CLAY				
1	(CH). MED. STIFF, HIGHLY PLASTIC, DARK YELLOWISH BROWN (10YR 3/4) MOIST TO 4.7	0.0ppm			
2	WET IN LAST 0.3FT OF CORE	0.0ppm			
		2.5FT HS=0.5ppm			
3		0.0ppm			
4		4.3FT HS= 0.3ppm		2.5-4.7	WET CORE AT ~~4.8FT~~ 4.7F
5	5.0-6.4FT: CLAY (CH) VERY SOFT, HIGHLY PLASTIC, BROWN (10YR 5/3) V. MOIST TO WET.				RUN: 5-10FT REC:
6		~~HS=~~ 0.0ppm			
	6.4-10.0FT: CLAY GRADING TO SILTY CLAY, (CL) FIRM, LOW PLASTICITY, DARK GRAY (10YR 4/1) SL. MOIST.				
7		~~HS~~ 0.0ppm			
		7.5FT HS: ~~0.5~~ppm 1.3			
8		~~HS~~ 0.0ppm			
9		1710ppm		8.3-10.0	NOTICEABLE PETROLEUM ODOR
10					

PROJECT | HOLE NUMBER SB-1

14415

HTRW DRILLING LOG

PROJECT	INSPECTOR	HOLE NUMBER
Lincoln, NANGB	M. Kurkzejs	SB-1
		SHEET 3 OF 3

DEPTH	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
10	10.0-11.2FT: CLAY SAME AS AT 5.4FT. V. MOIST TO WET	10.0FT HS= 3.2ppm			RUN: 10-15FT REC: 5.0FT PID IN BZ = 0.0 ppm
11	11.2 - 15.0FT: CLAY (CL) STIFF, MOD. PLASTIC. V. DARK GRAY (10YR 3/1) MOIST	0.3ppm			TOP OF BORE-HOLE = 0.0ppm
12		3.4ppm			PID IN BZ = 0.0ppm
		12.5FT HS=1.6ppm			
13		0.3ppm			
14		0.1			
15		15.0FT HS= 1.3ppm			RUN: 15-20FT REC: 4.8FT
	15.5-20.0FT: CLAY (CH) VERY SOFT, PLASTIC V. DARK GRAY (10YR 3/1) WET.				
16		0.4ppm			
17		0.1ppm			PID IN BZ = 0.0ppm
		17.5FT HS= 0.8ppm			
18		0.0ppm			
19		19.8FT HS= 0.7ppm			
20					

PROJECT	HOLE NUMBER SB-1

TU015 93

HTRW DRILLING LOG

HOLE NUMBER SB-2

INSPECTOR M. Kuedzejs

SHEET 2 OF 3

Lincoln, NANGB

DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
0	0.0-0.9FT: CONCRETE (CORED). 0.9-1.6FT:				RUN: 0-5FT REC: 2.0FT (SOIL)
1	ROAD BASE GRAVEL AND SILT; 1.6-2.9FT:				
2	SILTY CLAY (CL) SOFT, SLIGHTLY PLASTIC, V. DARK GRAY (2.5Y 3/1)	PID= 0.0ppm; 2.9FT HS=1.2			PID IN BZ= 0.0ppm
3	2.9-5.0FT: LOSS				
4					
5	5.0-5.7FT: SAME AS ABOVE	6.2ppm			RUN: 5-10FT REC: ~~4.9FT~~ 5.0FT
6	5.7-7.0FT: CLAY (CH) STIFF, MOD TO HIGHLY PLASTIC, DARK GRAYISH BROWN (2.Y 4/2) SL MOIST.	12.2ppm; 6.8FT HS=7.6ppm			
7	7.0-7.4FT: SAME AS ABOVE BUT DARK GRAY (2.5Y 4/1) MOIST.	11.4 PPM			
8	7.4-8.1FT: CLAY (CH) SOFT, PLASTIC DARK GRAY (5Y 4/1) V. MOIST.	12.4pm	8.1	7.3-8.1	
9	8.1-10.0FT: SILTY CLAY, (CL) STIFF, LOW PLASTICITY, BLACK (2.5Y 2.5/1) SL. MOIST	8.9ppm; 10.0FT 3.0ppm		8.5-9.3	
10					

HOLE NUMBER SB-2

TJ015 94

HTRW DRILLING LOG

HOLE NUMBER SB-2

INSPECTOR M. Kwickets

SHEET 3 OF 3

Lincoln, NANGB

DEPTH (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
10	10.0-11.2FT: CLAY (CH) SOFT, V PLASTIC, GRAYISH BROWN (2.5Y 5/2) BUT W/ GREENISH HUE (NOT ON CHART) V. MOIST TO WET	10.7FT HS= 76.3ppm			RUN: 10-15FT REC: 5.0FT
11		11.8FT 1488ppm HS= 17.9ppm			
12	11.2-15.0 FT: CLAY (CH) STIFF W/ SOME ZONES SOFT, PLASTIC V. DARK GRAY (2.5Y 3/1) MOIST.	1.7ppm			
13		5.8ppm			
14		0.3ppm			
15	15.0-20.0 FT: CLAY (CH) SOFT, H. PLASTIC, LIGHT OLIVE BROWN (2.5Y 5/3) V MOIST TO WET	15.0FT HS=1.8ppm			RUN: 15-20FT REC: 5.0FT
16		0.0ppm			
17		0.1ppm 17.5ppm HS=1.8ppm			
18		0.0ppm			
19		0.0ppm			
20	-20	20FT HS=1.4ppm			TD = 20FT

HOLE NUMBER SB-2

SHW 14

HTRW DRILLING LOG

HOLE NUMBER SB-1

INSPECTOR M. Klidzejs

SHEET 2 OF 3

PROJECT Lincoln, NANGB

DEPTH (B)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
0	0.0-0.6FT: CONCRETE (CORED)				RUN: 0-5FT REC: 4.4FT (SOIL)
1	0.6-1.0FT: SAND (SW), POORLY SORTED, PRED. MED TO COARSE GRAINED, LOOSE WET (FROM RAIN).	0.0ppm			
2	1.0-3.5FT: CLAY (CL) STIFF, MOD. PLASTIC, DARK GRAY (10YR 4/1) SL MOIST	0.0ppm 2.5FT HS=1.7ppm			
3	3.5-5.0FT: CL (CH), SOFT, PLASTIC, LT. OLIVE BROWN (2.5Y 5/3) V. MOIST	0.0ppm 0.0ppm			
5	5.0-7.2FT: SAME AS AT 1.0FT SL MOIST	5.0FT HS=1.9ppm 0.0ppm			RUN: 5-10FT REC: 4.4FT
7	7.2-8.4FT: SILTY CLAY (CL), SOFT, MOD. PLASTIC, GRAY (5Y 6/1) SL MOIST.	0.0ppm 7.0FT HS=2.1ppm 0ppm		7.2-7.9	
8	8.4-9.4FT: SILTY CLAY (CH) SOFT, PLASTIC, LT OLIVE BROWN (2.5Y 5/3). V. MOIST TO 9.0, WET BELOW 9.0FT	0.0ppm 9.4FT HS=2.0ppm		8.5-9.2	
10					

HOLE NUMBER SB-1

100

HTRW DRILLING LOG

HOLE NUMBER SB-1 (SH-41)	INSPECTOR M. Kiklezsz	SHEET 3 OF 3

Lincoln, NANGB

DEPTH (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
10					RUN: 10-15F REC: 5.0F
11	SAME AS ABOVE EXTREMELY SOFT TO SOUPY BELOW ~12FT SATURATE	0.0ppm			
12		0.0ppm 12.5FT HS= 1.6ppm			
13	GRADING FROM ABOVE TO SANDY CLAY AND TO CLAYEY SAND BY 17FT				
14	SLIGHTLY COHESIVE	0.0ppm 15.0FT HS=			
15	YELLOWISH BROWN (10YR 5/4) SATURATED.				RUN: 15-20F REC: 3.5FT
16		0.0ppm			
17		0.0ppm 17.5FT HS: 1.2ppm			
18		0.0ppm 18.5FT HS: 1.2ppm			
19					
20					TD = 20FT

HOLE NUMBER SB-1

SAW017

HTRW DRILLING LOG

HOLE NUMBER SB-2

INSPECTOR M. Kuiders

SHEET 2 OF 3

Lincoln, NANGB

DEPTH (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
0	0.0-0.6FT: CONCRETE (CORED) 0.6-0.9FT: SAND				RUN: 0-5FT REC: 3.4FT
1	(SW) FINE TO COARSE GRAINED, POORLY SORTED, LOOSE	0.0ppm			
	0.9-4.0FT: CLAY	2.0FT HS=0.1ppm			
2	(CH), MED STIFF HIGHLY PLASTIC DARK GRAY (2.5Y 4/1), SL. MOIST.	0.0ppm			
3		0.0ppm			
4	4.0-5.0FT: LOSS	4.0FT HS= 0.2ppm			
5	5.0-10.0FT: CLAY (CH), SOFT, MOD. PLASTIC				RUN: 5-10FT REC: 4.8FT
6	GRADING IN COLOR FROM DARK GRAY (AS ABOVE) TO LIGHT BROWNISH GRAY (2.5Y 6/2)	0.0ppm		6.0-7.0FT	
7	V. MOIST TO WET BELOW 9.0 FT.	0.0ppm			
		7.5FT HS=0.4ppm			
8		0.0ppm		8.0-9.0FT	
9		0.0ppm			
		9.8FT HS=0.3ppm ~~10.0~~			
10					

HOLE NUMBER SB-2

SA014 122

HTRW DRILLING LOG

HOLE NUMBER SB2
SHEET 3 OF 3

INSPECTOR M. Kuickeiss

Lincoln, NANGB

DEPTH	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
10					RUN: 10-15FT REC: 4.5FT
11	SAME AS ABOVE, LIGHT BROWNISH GRAY, EXTREMELY SOFT/SOUPY SATURATED.	0.0ppm			
12		0.0ppm 12.5FT HS= 0.5ppm			
13		0.0ppm			
14		0.0ppm 14.5FT HS= 0.5ppm			
15	GRADING FROM ABOVE TO ~~CLAYE~~ SANDY CLAY TO CLAYEY SAND TO SAND AT 18.4FT				RUN: 15-20FT REC: 5.0FT
16		0.0ppm			
17		0.0ppm 17.5FT HS= 0.9ppm			
18	18.4-20.0FT: SAND W/ SOME CLAY (SC), MOD COHESION FINE TO MED GRAINED. MOD WELL SORTED. ~~DARK~~ YELLOWISH BROWN (10YR 5/4) SATURATED	0.0ppm			
19		0.0ppm 20 FT HS=0.1ppm			
20					TD=20FT

HOLE NUMBER SB-2

SH414 (3)

HTRW DRILLING LOG

HOLE NUMBER SB-3

SHEET 2 OF 3

INSPECTOR M. Kuidzejs

Lincoln, NANGB

DEPTH (ft)	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
0	0.0–~2.3FT: CLAY (CH) MOD. STIFF, HIGHLY PLASTIC, DARK GRAY (2.5Y 4/1) SL. MOIST	0.0FT HS=0.7PPM			RUN: 0.0-5.0F REC: 5.0FT
1		0.0ppm			
2		46.4ppm			
	2.3-3.4FT: SILTY CLAY (CL) MOD. STIFF, V. SL PLASTICITY BLACK (2.5Y 2.5/1) V. SL MOIST.	3.3FT HS=15.7PPM ~~1452~~ 2322		2.6-3.3	POTENTIAL DARK STAINING AT
3					
4	3.4-5.0FT CLAY AS AT 0.0-2.3FT SL. MOIST	59.1ppm			
5	5.0-10.0FT: CLAY (CH) SOFT HIGHLY PLASTIC LIGHT BROWNISH GRAY (2.5Y 6/2) V. MOIST GRADING TO WET AT 10.0FT	5.0FT HS=25.9ppm			RUN: 5.0-10.0 REC:
6		8.0ppm			
7		0.7ppm		6.6-7.7 ~~7.5~~	
8		8.0FT HS=0.5ppm 0.3			
9		0.2ppm			
10		10.0FT HS=0.8ppm			

SHALL-1 154

HTRW DRILLING LOG

HOLE NUMBER SB-3

INSPECTOR M. KNUDZENS

SHEET 3 OF 3

Lincoln, NANGB

Depth	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
10	SAME AS ABOVE AT 11.1 FT BECOMES SATURATED AND SOUPY IN CONSISTENCY COLOR GRADES TO DARK YELLOWISH BROWN (10YR 4/4	0.0ppm			
11					
12		0.0ppm 12.5FT HS=0.8ppm			
13		0.0ppm			
14		15.0FT HS= 0.6ppm			
15					TD AT 15FT ADVANCE TO 20 ft DMB
16					
17					
18					
19					
20					

HOLE NUMBER SB-3

144

HTRW DRILLING LOG

HOLE NUMBER TU018 SB-1

INSPECTOR M. Kidree Jr

SHEET 2 OF 3

PROJECT Lincoln, NANGB

Depth	Description of Materials (C)	Headspace Screening Results	Geotech Sample or Core Box	Analytical Sample No. (F)	Remarks (G)
0	0.0-4.2FT: CLAY (CH) MED. STIFF, HIGHLY PLASTIC, LIGHT OLIVE BROWN (2.5Y 5/3) MOIST	0.0FT HS=0.7ppm			RUN: 0-5FT REC: 4.2FT
1		0.0ppm			
2		0.0ppm			
		2.5FT HS=0.8ppm			
3		0.0ppm			
4		0.0ppm			
	4.2-5.0FT: LOSS				
5	~~5.0-10.0FT CLAY (CL)~~ MED. STIFF TO STIFF MOD PLASTICITY LIGHT OLIVE BROWN (2.5Y 5/3) BUT BLACK BETWEEN 6.5-7.5FT. NO ODOR OR ELEVATED PID READING IN ~~THIS INTERVAL~~ SL MOIST	5.0FT HS=0.9ppm		5.3-6.0FT	RUN: 5-10FT REC: 5.0FT
6		0.0ppm			
7		0.0ppm			
		7.5FT HS=1.1ppm			
8		0.0ppm			
9		0.0ppm			
10		10.0FT HS=1.2ppm			

HOLE NUMBER SB-1

10410 150

HTRW DRILLING LOG

HOLE NUMBER SB-1	SHEET 3 OF 3

INSPECTOR M. Kuidzejs

...Lincoln, NANGB

DEPTH	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
10					RUN: 10-15 REC: 5.0 FT
11	SAME AS ABOVE BUT BECOMING SOFTER w/ DEPTH. SOFT AT 12 V SOFT BELOW 13 FT. WET BELOW 13 FT	0.0 ppm		~~1110~~ 11.0-12.0.	
12		0.0 ppm 12.5 FT HS=0.5 ppm			
13		0.0 ppm			WET AT ~13 FT
14		0.0 ppm			
15		15.0 FT HS= 0.8 ppm			RUN: 15-20 FT REC: 5.0 FT
16	SAME AS ABOVE BUT BECOMING SLIGHTLY SANDY BY 18 FT	0.0 ppm			
17		0.0 ppm 17.5 FT HS=1.2 ppm			
18	AT 19 FT, BECOMES CLAY SAND, FINE GRAINED, SL. COHESIVE (SC) SATURATED.	0.0 ppm			
19					
20		20.0 FT HS= 0.9 ppm			TD = 20 FT

HOLE NUMBER SB-1

TU010	10)

HTRW DRILLING LOG

HOLE NUMBER SB-2	SHEET 2 OF 3

...coln, NANGB | INSPECTOR M. Kudzess

DEPTH	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
0	0.0-2.4FT: CLAY (CL), MED. STIFF TO SOFT MOD. PLASTIC. MOTTLED LT OLIVE BROWN (2.5Y 5/3) AND DARK GRAYISH BROWN (2.5Y 4/2) MOIST	0.0FT HS= 0.0ppm			RUN: 0-5FT REC: 3.8FT
1		0.0ppm			
2	2.4-3.8FT: CLAY AS ABOVE W/ SOME COARSE SAND. V. MOIST.	0.0ppm; 2.5FT HS= 0.4ppm			
3		0.0ppm			
4	3.8-5.0FT: LOSS	3.8FT HS= 1.0ppm			
5	5.0-6.5FT: SAME AS AT 0.0-2.4FT.	0.0ppm		5.0-6.0	RUN: ~~0-5F~~ 5-10 REC: 5.0FT
6		0.0ppm			
7	6.5-10.0FT: CLAY (CL) STIFF LOW TO MOD PLAST. DARK GRAY (2.5Y 4/1) SL. MOIST.	0.0ppm; 7.5FT HS= 0.0ppm			
8		0.0ppm			
9		0.0ppm			
10		10.0FT HS= 0.8ppm			

HOLE NUMBER SB-2

HTRW DRILLING LOG

HOLE NUMBER SB-2

SHEET 3 OF 3

INSPECTOR M. Kludzejs

PROJECT Lincoln NANGB

DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)	Depth
				RUN: 10-15FT REC: 5.0FT	10
10.0 - 14.4FT: CLAY (CL) STIFF, LOW TO MOD. PLASTICITY, LIGHT OLIVE BROWN (2.5Y 5/3)	0.0ppm				11
MOIST BUT GRADATIONALLY BECOMING MORE MOIST W/ DEPTH. V. MOIST BY 14 FT	0.0ppm 12.5FT HSE 1.1ppm		11.6-12.5		12
	0.0ppm				13
14.4 - ~~15.0~~ 17.0FT: SILTY CLAY (CH) SOFT, V. PLASTIC, DARK GRAY (2.5Y 4/1) WET. SOUPY BELOW 15FT	0.0ppm ~~12.5FT~~ 15.0FT HS= 1.4ppm			RUN: 15-20 REC: 5.0FT	14-15
	0.0ppm				16
17.0 - 19.2FT: SILTY CLAY (CL) SOFT, MOD PLASTIC LT. OLIVE BROWN (2.5Y 5/3) V. MOIST	0.0ppm 17.5FT HS= 1.0ppm 0.0ppm				17-18
19.2 - 20.0FT: SAND (SP) TRACE CLAY, FINE GRAINED, MOD WELL SORTED. SLIGHTLY COHESIVE. WET SAME COLOR AS ABOVE	0.0ppm 20.0FT HS= 0.0ppm			TD = 20FT	19-20

HOLE NUMBER SB-2

HTRW DRILLING LOG

INSPECTOR M. Kirkpatrick

Lincoln, NANGB

DEPTH	DESCRIPTION OF MATERIALS (C)	HEADSPACE SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX	ANALYTICAL SAMPLE NO (F)	REMARKS (G)
0		0.0 FT HS= 1.1 ppm			RUN: 0-5 FT REC: 4.2 FT
	0.0-4.2FT: CLAY (CH) MED STIFF, HIGHLY PLASTIC OLIVE BROWN (2.5Y 4/3) MOTTLED W/ DARK GRAY (10YR 4/1) V. MOIST				
2		0.0 ppm			
		2.5 FT HS= 1.0 ppm			
3		0.0 ppm			
4	4.2-5.0FT: LOSS	4.2 FT HS= 1.3 ppm			
5	5.0-6.2FT: SAME AS AT 0.0-4.2FT.			5.0-6.0FT	RUN: 5-10FT REC: 4.3FT
6		0.0 ppm			
	6.2-8.3FT: CLAY (CH) SOFT, HIGHLY PLASTIC, LT OLIVE BROWN (2.5Y 5/3) WET				
7		0.0 ppm			
8	8.3-9.3FT: CLAY (CL) STIFF, MOD PLASTICITY, V. DARK GRAY (2.5Y 3/1) MOIST	0.0 ppm			
9	9.3-10.0FT: LOSS	0.0 ppm			
10		10.0 FT HS= 1.0 ppm			

APPENDIX C
ANALYTICAL RESULTS

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Between May 6 and 9, 2013, 19 soil samples and 2 field duplicates were collected from 5 areas of concern (AOCs) at the Lincoln Air National Guard Base in Lincoln, Nebraska. Samples were subsequently transported via Federal Express to Empirical Laboratories in Nashville, Tennessee, for analysis. Reported results for these samples included detections of acetone in 10 of 21 soil samples at concentrations ranging from 13 to 187 µg/kg and detections of methylene chloride in 17 of 21 soil samples ranging from 34.3 to 490 µg/kg. Neither acetone nor methylene chloride was detected in the associated method blanks, trip blank, or equipment rinsate sample.

Acetone and methylene chloride detections had not been expected based upon historical activities at the five AOCs. Similarly, soil samples collected at two other Installations and submitted by Science Applications International Corporation (SAIC) to Empirical Laboratories during a 3-week window were also unexpectedly reported to contain acetone and methylene chloride.

SAIC requested that Empirical Laboratories conduct an internal investigation to determine whether the reported acetone and methylene chloride concentrations might be the result of laboratory contamination. The subsequent corrective action report dated June 7, 2013, noted that "Samples were received in bulk jars and stored in the soil walk-in with all other bulk jars. While the samples were prepared in the [volatile organic analysis] VOA lab and the VOA lab is free from solvents, the hypothesis is that sample trays containing the VOA sample jars were accidentally taken to the main lab during preparation for another test instead of taking only the jars necessary for the other test preparation." The following note was added to the laboratory reports: "Reported concentrations of acetone/methylene chloride likely attributable to laboratory artifact and not due to actual soil sample concentrations."

Due to the uncertainty surrounding the potential exposure and subsequent contamination of these soil samples to these common laboratory solvents, results for detected concentrations of acetone and methylene chloride were qualified as unusable (R) during data validation.

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ANALYSIS DATA SHEET

LNC-014-05-SB-01

Laboratory:	Empirical Laboratories, LLC			SDG:	1305125
Client:	SAIC (S732)			Project:	Lincoln NE ANG
Matrix:	Solid	Laboratory ID:	1305125-01RE1	File ID:	0512501R.D
Sampled:	05/06/13 15:25	Prepared:	05/20/13 00:00	Analyzed:	05/20/13 10:40
Solids:	80.66	Preparation:	5035A	Dilution:	1
Batch:	3E20008	Sequence:	3E14106	Calibration:	3140003
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q	
67-64-1	Acetone	33.4	7.40	14.8	29.6	Rx ~~B~~	C05, F12
71-43-2	Benzene		1.85	3.70	7.40	U	U
74-97-5	Bromochloromethane		1.85	3.70	7.40	U	
75-27-4	Bromodichloromethane		1.85	3.70	7.40	U	
75-25-2	Bromoform		1.85	3.70	7.40	U	
74-83-9	Bromomethane		3.70	7.40	14.8	U	
78-93-3	2-Butanone		3.70	7.40	14.8	UX	
75-15-0	Carbon disulfide		1.85	3.70	7.40	U	
56-23-5	Carbon tetrachloride		1.85	3.70	7.40	U	
108-90-7	Chlorobenzene		1.85	3.70	7.40	U	
75-00-3	Chloroethane		3.70	7.40	14.8	U	
67-66-3	Chloroform		1.85	3.70	7.40	U	
74-87-3	Chloromethane		3.70	7.40	14.8	U	
110-82-7	Cyclohexane		1.85	3.70	7.40	U	
124-48-1	Dibromochloromethane		1.85	3.70	7.40	U	
96-12-8	1,2-Dibromo-3-chloropropane		3.70	7.40	14.8	U	
106-93-4	1,2-Dibromoethane (EDB)		1.85	3.70	7.40	U	
95-50-1	1,2-Dichlorobenzene		1.85	3.70	7.40	U	
541-73-1	1,3-Dichlorobenzene		1.85	3.70	7.40	U	
106-46-7	1,4-Dichlorobenzene		1.85	3.70	7.40	U	
75-71-8	Dichlorodifluoromethane		3.70	7.40	14.8	U	
75-34-3	1,1-Dichloroethane		1.85	3.70	7.40	U	
107-06-2	1,2-Dichloroethane		1.85	3.70	7.40	U	
75-35-4	1,1-Dichloroethene		1.85	3.70	7.40	U	
156-59-2	cis-1,2-Dichloroethene		1.85	3.70	7.40	U	
156-60-5	trans-1,2-Dichloroethene		1.85	3.70	7.40	U	
78-87-5	1,2-Dichloropropane		1.85	3.70	7.40	U	
10061-01-5	cis-1,3-Dichloropropene		1.85	3.70	7.40	U	
10061-02-6	trans-1,3-Dichloropropene		1.85	3.70	7.40	U	
100-41-4	Ethylbenzene		1.85	3.70	7.40	U	
591-78-6	2-Hexanone		3.70	7.40	14.8	UXQ	
98-82-8	Isopropylbenzene		1.85	3.70	7.40	U	
75-09-2	Methylene chloride	306	3.70	7.40	14.8		R, F12
79-20-9	Methyl Acetate		3.70	7.40	14.8	U	U
108-87-2	Methylcyclohexane		1.85	3.70	7.40	U	
108-10-1	4-Methyl-2-pentanone		3.70	7.40	14.8	U	
1634-04-4	Methyl t-Butyl Ether		1.85	3.70	7.40	U	
100-42-5	Styrene		1.85	3.70	7.40	U	
79-34-5	1,1,2,2-Tetrachloroethane		1.85	3.70	7.40	U	
127-18-4	Tetrachloroethene		1.85	3.70	7.40	U	

JU 06/25/2013

ANALYSIS DATA SHEET

LNC-014-05-SB-01

Laboratory:	Empirical Laboratories, LLC			SDG:	1305125		
Client:	SAIC (S732)			Project:	Lincoln NE ANG		
Matrix:	Solid	Laboratory ID:	1305125-01RE1	File ID:	0512501R.D		
Sampled:	05/06/13 15:25	Prepared:	05/20/13 00:00	Analyzed:	05/20/13 10:40		
Solids:	80.66	Preparation:	5035A	Dilution:	1		
Batch:	3E20008	Sequence:	3E14106	Calibration:	3140003	Instrument:	MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
108-88-3	Toluene		1.85	3.70	7.40	U
87-61-6	1,2,3-Trichlorobenzene		1.85	3.70	7.40	U
120-82-1	1,2,4-Trichlorobenzene		1.85	3.70	7.40	U
79-00-5	1,1,2-Trichloroethane		1.85	3.70	7.40	U
71-55-6	1,1,1-Trichloroethane		1.85	3.70	7.40	U
79-01-6	Trichloroethene		1.85	3.70	7.40	U
75-69-4	Trichlorofluoromethane		3.70	7.40	14.8	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		3.70	7.40	14.8	U
75-01-4	Vinyl chloride		1.85	3.70	7.40	U
108-38-3/106-42-	m,p-Xylene		3.70	7.40	14.8	U
95-47-6	o-Xylene		1.85	3.70	7.40	U

Total Target Analytes Reported: 51

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	44.38	43.32	97.6	85 - 120	
Dibromofluoromethane	44.38	50.45	114	80 - 125	
1,2-Dichloroethane-d4	44.38	50.63	114	75 - 140	
Toluene-d8	44.38	45.78	103	85 - 115	

ANALYSIS DATA SHEET

LNC-014-05-SB-01

Laboratory: Empirical Laboratories, LLC | SDG: 1305125
Client: SAIC (S732) | Project: Lincoln NE ANG
Matrix: Solid | Laboratory ID: 1305125-01 | File ID: 0512501.D
Sampled: 05/06/13 15:25 | Prepared: 05/20/13 16:00 | Analyzed: 06/02/13 03:57
Solids: 80.66 | Preparation: EXT 3546 | Dilution: 1
Batch: 3E17014 | Sequence: 3F15504 | Calibration: 2261001 | Instrument: MS-BNA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
98-86-2	Acetophenone		99.2	199	396	U
1912-24-9	Atrazine		99.2	199	396	U
100-52-7	Benzaldehyde		99.2	199	396	U
92-52-4	1,1-Biphenyl		99.2	199	396	U
101-55-3	4-Bromophenyl-phenylether		99.2	199	396	U
85-68-7	Butylbenzylphthalate		99.2	199	396	U
105-60-2	Caprolactam		99.2	199	396	UXQ
86-74-8	Carbazole		99.2	199	396	U
59-50-7	4-Chloro-3-methylphenol		99.2	199	396	U
106-47-8	4-Chloroaniline		99.2	199	396	U
111-91-1	Bis(2-chloroethoxy)methane		99.2	199	396	U
111-44-4	Bis(2-chloroethyl)ether		99.2	199	396	UQ
108-60-1	2,2'-Oxybis-1-chloropropane		99.2	199	396	U
91-58-7	2-Chloronaphthalene		99.2	199	396	U
95-57-8	2-Chlorophenol		99.2	199	396	U
7005-72-3	4-Chlorophenyl phenyl ether		99.2	199	396	U
132-64-9	Dibenzofuran		99.2	199	396	U
84-74-2	Di-n-butylphthalate		99.2	199	396	U
91-94-1	3,3'-Dichlorobenzidine		99.2	199	396	U
120-83-2	2,4-Dichlorophenol		99.2	199	396	U
84-66-2	Diethylphthalate		99.2	199	396	U
105-67-9	2,4-Dimethylphenol		396	794	1580	U
131-11-3	Dimethyl phthalate		99.2	199	396	U
534-52-1	4,6-Dinitro-2-methylphenol		992	1990	3960	U
51-28-5	2,4-Dinitrophenol		992	1990	3960	U
121-14-2	2,4-Dinitrotoluene		99.2	199	396	U
606-20-2	2,6-Dinitrotoluene		99.2	199	396	U
117-84-0	Di-n-octylphthalate		99.2	199	396	U
117-81-7	Bis(2-ethylhexyl)phthalate		99.2	199	396	U
118-74-1	Hexachlorobenzene		99.2	199	396	U
87-68-3	Hexachlorobutadiene		99.2	199	396	U
77-47-4	Hexachlorocyclopentadiene		99.2	199	396	U
67-72-1	Hexachloroethane		99.2	199	396	U
78-59-1	Isophorone		99.2	199	396	U
95-48-7	2-Methylphenol		99.2	199	396	U
106-44-5	4-Methylphenol		99.2	199	396	U
100-01-6	4-Nitroaniline		99.2	199	396	UQ
99-09-2	3-Nitroaniline		396	794	1580	U
88-74-4	2-Nitroaniline		396	794	1580	U
98-95-3	Nitrobenzene		396	794	1580	U
			99.2	199	396	U

ANALYSIS DATA SHEET

LNC-014-05-SB-01

Laboratory:	Empirical Laboratories, LLC			SDG:	1305125
Client:	SAIC (S732)			Project:	Lincoln NE ANG
Matrix:	Solid	Laboratory ID:	1305125-01	File ID:	0512501.D
Sampled:	05/06/13 15:25	Prepared:	05/20/13 16:00	Analyzed:	06/02/13 03:57
Solids:	80.66	Preparation:	EXT 3546	Dilution:	1

Batch: 3E17014 Sequence: 3F15504 Calibration: 2261001 Instrument: MS-BNA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
100-02-7	4-Nitrophenol		396	794	1580	U
88-75-5	2-Nitrophenol		99.2	199	396	U
86-30-6	N-Nitrosodiphenylamine		99.2	199	396	U
621-64-7	N-Nitroso-di-n-propylamine		99.2	199	396	U
87-86-5	Pentachlorophenol		396	794	1580	U
108-95-2	Phenol		99.2	199	396	U
95-94-3	1,2,4,5-Tetrachlorobenzene		99.2	199	396	U
58-90-2	2,3,4,6-Tetrachlorophenol		99.2	199	396	U
88-06-2	2,4,6-Trichlorophenol		99.2	199	396	U
95-95-4	2,4,5-Trichlorophenol		99.2	199	396	U

Total Target Analytes Reported: 50

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	3969	3043	76.7	45 - 105	
2-Fluorophenol	7937	7245	91.3	35 - 105	
Nitrobenzene-d5	3969	3072	77.4	35 - 100	
Phenol-d6	7937	7311	92.1	40 - 100	
Terphenyl-d14	3969	3349	84.4	30 - 125	
2,4,6-Tribromophenol	7937	6131	77.2	35 - 125	

ANALYSIS DATA SHEET

LNC-014-05-SB-01

Laboratory:	Empirical Laboratories, LLC			SDG:	1305125		
Client:	SAIC (S732)			Project:	Lincoln NE ANG		
Matrix:	Solid	Laboratory ID:	1305125-01	File ID:	0512501.D		
Sampled:	05/06/13 15:25	Prepared:	05/20/13 16:00	Analyzed:	06/05/13 23:15		
Solids:	80.66	Preparation:	EXT_3546	Dilution:	1		
Batch:	3E17014	Sequence:	3F15708	Calibration:	3122001	Instrument:	MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q	
83-32-9	Acenaphthene	**71.4**	1.99	3.96	7.94		=
208-96-8	Acenaphthylene		1.99	3.96	7.94	U	U
120-12-7	Anthracene	**14.0**	1.99	3.96	7.94		=
56-55-3	Benzo(a)anthracene	**3.33** •	1.99	3.96	7.94	J	J
50-32-8	Benzo(a)pyrene		1.99	3.96	7.94	U	U
205-99-2	Benzo(b)fluoranthene	**2.48**	1.99	3.96	7.94	J	J
191-24-2	Benzo(g,h,i)perylene		1.99	3.96	7.94	U	U
207-08-9	Benzo(k)fluoranthene		1.99	3.96	7.94	U	U
123-91-1	1,4-Dioxane		9.92	19.9	39.6	U	U
218-01-9	Chrysene	**2.22** •	1.99	3.96	7.94	J	J
53-70-3	Dibenz(a,h)anthracene		1.99	3.96	7.94	U	U
206-44-0	Fluoranthene	**8.02**	1.99	3.96	7.94		=
86-73-7	Fluorene	**47.4**	1.99	3.96	7.94		=
193-39-5	Indeno(1,2,3-cd)pyrene		1.99	3.96	7.94	U	U
91-57-6	2-Methylnaphthalene		1.99	3.96	7.94	U	U
91-20-3	Naphthalene		1.99	3.96	7.94	U	U
85-01-8	Phenanthrene	**53.5**	1.99	3.96	7.94		=
129-00-0	Pyrene	**6.01**	1.99	3.96	7.94	J	J

Total Target Analytes Reported: 18

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	3969	3432	86.5	45 - 105	
Terphenyl-d14	3969	3387	85.4	30 - 125	
2,4,6-Tribromophenol	7937	7575	95.4	35 - 125	

JU
09/04/2013

ANALYSIS DATA SHEET

LNC-014-05-SB-01

Laboratory: Empirical Laboratories, LLC SDG: 1305125
Client: SAIC (S732) Project: Lincoln NE ANG
Matrix: Solid Laboratory ID: 1305125-01 File ID: 021F2101.D
Sampled: 05/06/13 15:25 Prepared: 05/20/13 12:19 Analyzed: 05/23/13 04:33
Solids: 80.66 Preparation: EXT 3546 Dilution: 1
Batch: 3E17023 Sequence: 3E14606 Calibration: 3143004 Instrument: GL-GCFID2

CAS NO.	COMPOUND	CONC. (mg/Kg dry)	DL	LOD	LOQ	Q
11-84-7	Diesel Range Organics (C10-C28)		7.88	7.88	15.6	U

U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (mg/Kg dry)	CONC (mg/Kg dry)	% REC	QC LIMITS	Q
o-Terphenyl	1.567	1.169	74.6	35 - 140	

ANALYSIS DATA SHEET

LNC-014-05-SB-01

Laboratory:	Empirical Laboratories, LLC			SDG:	1305125
Client:	SAIC (S732)			Project:	Lincoln NE ANG
Matrix:	Solid	Laboratory ID:	1305125-01	File ID:	006F0601.D
Sampled:	05/06/13 15:25	Prepared:	05/18/13 17:28	Analyzed:	05/18/13 21:13
Solids:	80.66	Preparation:	8015GRO	Dilution:	1

Batch: 3E18011 Sequence: 3E14307 Calibration: 3044001 Instrument: GL-GCVOA2

CAS NO.	COMPOUND	CONC. (mg/Kg dry)	DL	LOD	LOQ	Q
8006-61-9	Gasoline Range Organics (C6-C10)		3.27	6.54	9.81	U

Total Target Analytes Reported: 1

SYSTEM MONITORING COMPOUND	ADDED (mg/Kg dry)	CONC (mg/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	3.270	3.896	119	50 - 150	X

ANALYSIS DATA SHEET

LNC-014-DS-SB2-01

Laboratory:	Empirical Laboratories, LLC			SDG:	1305125
Client:	SAIC (S732)			Project:	Lincoln NE ANG
Matrix:	Solid	Laboratory ID:	1305125-09RE1	File ID:	0512509R.D
Sampled:	05/06/13 12:45	Prepared:	05/20/13 00:00	Analyzed:	05/20/13 11:09
Solids:	78.85	Preparation:	5035A	Dilution:	1
Batch:	3E20008	Sequence:	3E14106	Calibration:	3140003
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q	
67-64-1	Acetone	187	5.83	11.7	23.3	R X J	COS, F12
71-43-2	Benzene		1.46	2.91	5.83	U	U
74-97-5	Bromochloromethane		1.46	2.91	5.83	U	
75-27-4	Bromodichloromethane		1.46	2.91	5.83	U	
75-25-2	Bromoform		1.46	2.91	5.83	U	
74-83-9	Bromomethane		2.91	5.83	11.7	U	
78-93-3	2-Butanone	42.5	2.91	5.83	11.7	X J	COS
75-15-0	Carbon disulfide		1.46	2.91	5.83	U	U
56-23-5	Carbon tetrachloride		1.46	2.91	5.83	U	
108-90-7	Chlorobenzene		1.46	2.91	5.83	U	
75-00-3	Chloroethane		2.91	5.83	11.7	U	
67-66-3	Chloroform		1.46	2.91	5.83	U	
74-87-3	Chloromethane		2.91	5.83	11.7	U	
110-82-7	Cyclohexane		1.46	2.91	5.83	U	
124-48-1	Dibromochloromethane		1.46	2.91	5.83	U	
96-12-8	1,2-Dibromo-3-chloropropane		2.91	5.83	11.7	U	
106-93-4	1,2-Dibromoethane (EDB)		1.46	2.91	5.83	U	
95-50-1	1,2-Dichlorobenzene		1.46	2.91	5.83	U	
541-73-1	1,3-Dichlorobenzene		1.46	2.91	5.83	U	
106-46-7	1,4-Dichlorobenzene		1.46	2.91	5.83	U	
75-71-8	Dichlorodifluoromethane		2.91	5.83	11.7	U	
75-34-3	1,1-Dichloroethane		1.46	2.91	5.83	U	
107-06-2	1,2-Dichloroethane		1.46	2.91	5.83	U	
75-35-4	1,1-Dichloroethene		1.46	2.91	5.83	U	
156-59-2	cis-1,2-Dichloroethene		1.46	2.91	5.83	U	
156-60-5	trans-1,2-Dichloroethene		1.46	2.91	5.83	U	
78-87-5	1,2-Dichloropropane		1.46	2.91	5.83	U	
10061-01-5	cis-1,3-Dichloropropene		1.46	2.91	5.83	U	
10061-02-6	trans-1,3-Dichloropropene		1.46	2.91	5.83	U	
100-41-4	Ethylbenzene		1.46	2.91	5.83	U	
591-78-6	2-Hexanone		2.91	5.83	11.7	UXQ	
98-82-8	Isopropylbenzene		1.46	2.91	5.83	U	
75-09-2	Methylene chloride	416	2.91	5.83	11.7		R, F12
79-20-9	Methyl Acetate		2.91	5.83	11.7	U	U
108-87-2	Methylcyclohexane		1.46	2.91	5.83	U	
108-10-1	4-Methyl-2-pentanone		2.91	5.83	11.7	U	
1634-04-4	Methyl t-Butyl Ether		1.46	2.91	5.83	U	
100-42-5	Styrene		1.46	2.91	5.83	U	
79-34-5	1,1,2,2-Tetrachloroethane		1.46	2.91	5.83	U	
127-18-4	Tetrachloroethene		1.46	2.91	5.83	U	

JW 06/26/2013

ANALYSIS DATA SHEET

LNC-014-DS-SB2-01

Laboratory:	Empirical Laboratories, LLC			SDG:	1305125
Client:	SAIC (S732)			Project:	Lincoln NE ANG
Matrix:	Solid	Laboratory ID:	1305125-09RE1	File ID:	0512509R.D
Sampled:	05/06/13 12:45	Prepared:	05/20/13 00:00	Analyzed:	05/20/13 11:09
Solids:	78.85	Preparation:	5035A	Dilution:	1
Batch:	3E20008	Sequence:	3E14106	Calibration:	3140003
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
108-88-3	Toluene		1.46	2.91	5.83	U
87-61-6	1,2,3-Trichlorobenzene		1.46	2.91	5.83	U
120-82-1	1,2,4-Trichlorobenzene		1.46	2.91	5.83	U
79-00-5	1,1,2-Trichloroethane		1.46	2.91	5.83	U
71-55-6	1,1,1-Trichloroethane		1.46	2.91	5.83	U
79-01-6	Trichloroethene		1.46	2.91	5.83	U
75-69-4	Trichlorofluoromethane		2.91	5.83	11.7	U
76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane		2.91	5.83	11.7	U
75-01-4	Vinyl chloride		1.46	2.91	5.83	U
108-38-3/106-42-	m,p-Xylene		2.91	5.83	11.7	U
95-47-6	o-Xylene		1.46	2.91	5.83	U

U

Total Target Analytes Reported: 51

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
Bromofluorobenzene	34.97	34.72	99.3	85 - 120	
Dibromofluoromethane	34.97	37.19	106	80 - 125	
1,2-Dichloroethane-d4	34.97	36.55	105	75 - 140	
Toluene-d8	34.97	35.27	101	85 - 115	

ANALYSIS DATA SHEET

LNC-014-DS-SB2-01

Laboratory: Empirical Laboratories, LLC   SDG: 1305125
Client: SAIC (S732)   Project: Lincoln NE ANG
Matrix: Solid   Laboratory ID: 1305125-09   File ID: 0512509.D
Sampled: 05/06/13 12:45   Prepared: 05/20/13 16:00   Analyzed: 06/02/13 04:25
Solids: 78.85   Preparation: EXT 3546   Dilution: 1
Batch: 3E17014   Sequence: 3F15504   Calibration: 2261001   Instrument: MS-BNA3

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
98-86-2	Acetophenone		101	203	404	U UJ A01
1912-24-9	Atrazine		101	203	404	U
100-52-7	Benzaldehyde		101	203	404	U
92-52-4	1,1-Biphenyl		101	203	404	U
101-55-3	4-Bromophenyl-phenylether		101	203	404	U
85-68-7	Butylbenzylphthalate		101	203	404	U
105-60-2	Caprolactam		101	203	404	UXQ
86-74-8	Carbazole		101	203	404	U
59-50-7	4-Chloro-3-methylphenol		101	203	404	U
106-47-8	4-Chloroaniline		101	203	404	U
111-91-1	Bis(2-chloroethoxy)methane		101	203	404	U
111-44-4	Bis(2-chloroethyl)ether		101	203	404	UQ
108-60-1	2,2'-Oxybis-1-chloropropane		101	203	404	U
91-58-7	2-Chloronaphthalene		101	203	404	U
95-57-8	2-Chlorophenol		101	203	404	U
7005-72-3	4-Chlorophenyl phenyl ether		101	203	404	U
132-64-9	Dibenzofuran		101	203	404	U
84-74-2	Di-n-butylphthalate		101	203	404	U
91-94-1	3,3'-Dichlorobenzidine		101	203	404	U
120-83-2	2,4-Dichlorophenol		101	203	404	U
84-66-2	Diethylphthalate		101	203	404	U
105-67-9	2,4-Dimethylphenol		404	809	1610	U
131-11-3	Dimethyl phthalate		101	203	404	U
534-52-1	4,6-Dinitro-2-methylphenol		1010	2030	4040	U
51-28-5	2,4-Dinitrophenol		1010	2030	4040	U
121-14-2	2,4-Dinitrotoluene		101	203	404	U
606-20-2	2,6-Dinitrotoluene		101	203	404	U
117-84-0	Di-n-octylphthalate		101	203	404	U
117-81-7	Bis(2-ethylhexyl)phthalate		101	203	404	U
118-74-1	Hexachlorobenzene		101	203	404	U
87-68-3	Hexachlorobutadiene		101	203	404	U
77-47-4	Hexachlorocyclopentadiene		101	203	404	U
67-72-1	Hexachloroethane		101	203	404	U
78-59-1	Isophorone		101	203	404	U
95-48-7	2-Methylphenol		101	203	404	U
106-44-5	4-Methylphenol		101	203	404	UQ
100-01-6	4-Nitroaniline		404	809	1610	U
99-09-2	3-Nitroaniline		404	809	1610	U
88-74-4	2-Nitroaniline		404	809	1610	U
98-95-3	Nitrobenzene		101	203	404	U

ANALYSIS DATA SHEET

LNC-014-DS-SB2-01

Laboratory:	Empirical Laboratories, LLC			SDG:	1305125
Client:	SAIC (S732)			Project:	Lincoln NE ANG
Matrix:	Solid	Laboratory ID:	1305125-09	File ID:	0512509.D
Sampled:	05/06/13 12:45	Prepared:	05/20/13 16:00	Analyzed:	06/02/13 04:25
Solids:	78.85	Preparation:	EXT 3546	Dilution:	1
Batch:	3E17014	Sequence:	3F15504	Calibration:	2261001
Instrument:	MS-BNA3				

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
100-02-7	4-Nitrophenol		404	809	1610	U UJ Ab1
88-75-5	2-Nitrophenol		101	203	404	U
86-30-6	N-Nitrosodiphenylamine		101	203	404	U
621-64-7	N-Nitroso-di-n-propylamine		101	203	404	U
87-86-5	Pentachlorophenol		404	809	1610	U
108-95-2	Phenol		101	203	404	U
95-94-3	1,2,4,5-Tetrachlorobenzene		101	203	404	U
58-90-2	2,3,4,6-Tetrachlorophenol		101	203	404	U
88-06-2	2,4,6-Trichlorophenol		101	203	404	U
95-95-4	2,4,5-Trichlorophenol		101	203	404	U

Total Target Analytes Reported: 50

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	4044	3382	83.6	45 - 105	
2-Fluorophenol	8088	8050	99.5	35 - 105	
Nitrobenzene-d5	4044	3466	85.7	35 - 100	
Phenol-d6	8088	8051	99.5	40 - 100	
Terphenyl-d14	4044	3807	94.1	30 - 125	
2,4,6-Tribromophenol	8088	7130	88.2	35 - 125	

ANALYSIS DATA SHEET

LNC-014-DS-SB2-01

Laboratory:	Empirical Laboratories, LLC		SDG:	1305125	
Client:	SAIC (S732)		Project:	Lincoln NE ANG	
Matrix:	Solid	Laboratory ID: 1305125-09	File ID:	0512509.D	
Sampled:	05/06/13 12:45	Prepared: 05/20/13 16:00	Analyzed:	06/05/13 23:42	
Solids:	78.85	Preparation: EXT 3546	Dilution:	1	
Batch:	3E17014	Sequence: 3F15708	Calibration:	3122001	Instrument: MS-BNA4

CAS NO.	COMPOUND	CONC. (ug/Kg dry)	DL	LOD	LOQ	Q
83-32-9	Acenaphthene		2.03	4.04	8.09	U UJ ni
208-96-8	Acenaphthylene		2.03	4.04	8.09	U
120-12-7	Anthracene		2.03	4.04	8.09	U
56-55-3	Benzo(a)anthracene		2.03	4.04	8.09	U
50-32-8	Benzo(a)pyrene		2.03	4.04	8.09	U
205-99-2	Benzo(b)fluoranthene		2.03	4.04	8.09	U
191-24-2	Benzo(g,h,i)perylene		2.03	4.04	8.09	U
207-08-9	Benzo(k)fluoranthene		2.03	4.04	8.09	U
123-91-1	1,4-Dioxane		10.1	20.3	40.4	U
218-01-9	Chrysene		2.03	4.04	8.09	U
53-70-3	Dibenz(a,h)anthracene		2.03	4.04	8.09	U
206-44-0	Fluoranthene		2.03	4.04	8.09	U
86-73-7	Fluorene		2.03	4.04	8.09	U
193-39-5	Indeno(1,2,3-cd)pyrene		2.03	4.04	8.09	U
91-57-6	2-Methylnaphthalene		2.03	4.04	8.09	U
91-20-3	Naphthalene		2.03	4.04	8.09	U
85-01-8	Phenanthrene		2.03	4.04	8.09	U
129-00-0	Pyrene		2.03	4.04	8.09	U

Total Target Analytes Reported: 18

SYSTEM MONITORING COMPOUND	ADDED (ug/Kg dry)	CONC (ug/Kg dry)	% REC	QC LIMITS	Q
2-Fluorobiphenyl	4044	3730	92.2	45 - 105	
Terphenyl-d14	4044	3730	92.2	30 - 125	
2,4,6-Tribromophenol	8088	8342	103	35 - 125	