Lower Duwamish Waterway
RM 3.7-3.9 East
Early Action Area 6

Summary of Existing Information and Identification of Data Gaps

Prepared for

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List of Acronyms

ARFF	Aircraft Rescue Fire Fighting
AWQC	Ambient Water Quality Criteria
BEHP	bis(2-ethylhexyl)phthalate
Bgs	below ground surface
BMP	best management practice
CB	catch basin
COC	chemical of concern
CSCSL	Confirmed and Suspected Contaminated Sites List
CSL	Cleanup Screening Level
DMR	Discharge Monitoring Report
DW	dry weight
EAA	Early Action Area
ECHO	Enforcement Compliance and History Online
Ecology	Washington State Department of Ecology
EE/CA	Engineering Evaluation/Cost Analysis
EMF	Electronics Manufacturing Facility
EOF	Emergency Overflow
EP	Extraction Procedure
EPA	U.S. Environmental Protection Agency
ERTS	Environmental Report Tracking System
FAA	Federal Aviation Administration
FBO	fixed base operations
FSD	Facility/Site Database
GIS	Geographic Information System
IAA	Industrial Auto Auctions
KCIA	King County International Airport
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
LUST	leaking underground storage tank
MCL	Maximum Contaminant Level
MTCA	Model Toxics Control Act
NFA	no further action
NPDES	National Pollutant Discharge Elimination System
NWRO	Northwest Regional Office, Washington Department of Ecology
OC	organic carbon
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RM	river mile
SAIC	Science Applications International Corporation
SCAP	Source Control Action Plan
SIC	Standard Industrial Classification

List of Acronyms (Continued)

SMS	Sediment Management Standards
SPCC	Spill Prevention, Control and Countermeasures
SPU	Seattle Public Utilities
SQS	Sediment Quality Standard SSCC South Seattle Community College
SVOC	semivolatile organic compound
SWPPP	Stormwater Pollution Prevention Plan
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TPH	total petroleum hydrocarbons
TOC	total organic carbon
TRI	Toxics Release Inventory
TSD	Treatment, Storage, and Disposal
UST	underground storage tank
VOC	volatile organic compound
VCP	Voluntary Cleanup Program
WQS	Water Quality Standards

1.0 Introduction

1.1 Background and Purpose

This *Summary of Existing Information and Identification of Data Gaps* report (Data Gaps report) pertains to Early Action Area 6 (EAA-6), one of several source control areas identified as part of the overall cleanup process for the Lower Duwamish Waterway (LDW) Superfund site (Figure 1). It summarizes readily available information regarding properties in the EAA-6 drainage basin. The purpose of this Data Gaps Report is to:

- Identify chemicals of potential concern in sediments within the EAA-6 source control area;
- Evaluate potential contaminant migration pathways to EAA-6 sediments;
- Identify and describe potential adjacent or upland sources of contaminants that could be transported to EAA-6 sediments;
- Identify critical data gaps that should be addressed in order to assess the potential for recontamination of LDW sediments and the need for source control; and
- Determine what, if any, effective source control is already in place.

The LDW was added to the U.S. Environmental Protection Agency (EPA) National Priorities List in September 2001 due to chemical contaminants in sediment. The key parties involved in the LDW Superfund site are the Lower Duwamish Waterway Group (LDWG; comprised of the city of Seattle, King County, the Port of Seattle, and The Boeing Company), EPA, and the Washington State Department of Ecology (Ecology). LDWG is conducting a Remedial Investigation/Feasibility Study (RI/FS) for the LDW Superfund site.

Data collected during the Phase 1 Remedial Investigation (RI; Windward 2003a) were used to identify locations that could be candidates for early cleanup action. Seven candidate early action sites were identified (Windward 2003b); EAA-6 is one of these seven sites, and is located at River Mile (RM) 3.7 to 3.9, as measured from the southern tip of Harbor Island (Figure 1).

Ecology is the lead agency for source control for the LDW Superfund site. Source control is the process of finding and eliminating or reducing releases of contaminants to LDW sediments, to the extent practicable. The goal of source control is to prevent sediments from being recontaminated after cleanup has been undertaken.

The LDW Source Control Strategy (Ecology 2004) describes the process for identifying source control issues and implementing effective controls for the LDW. The basic plan is to identify and manage potential sources of sediment recontamination in coordination with sediment cleanups. Source control will be achieved by using existing administrative and legal authorities to perform inspections and require necessary source control actions.

The strategy is based primarily on the principles of source control for sediment sites described in EPA's *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites* (EPA 2002), and the Washington State Sediment Management Standards (SMS; WAC 173-340-370([7] and WAC 173-204-400). The Source Control Strategy involves developing and implementing a series of detailed, area-specific Source Control Action Plans (SCAPs). Several areas, generally defined by stormwater drainage basins, have been identified and prioritized for SCAP development as described in the *Lower Duwamish Waterway Source Control Status Report, 2003 to June 2007* (Ecology 2007c).

Before developing a SCAP, Ecology prepares a Data Gaps Report for the source control area. Findings from the Data Gaps report are reviewed by LDW stakeholders and are incorporated into the SCAP. This process helps to ensure that the action items identified in the SCAP will be effective, implementable, and enforceable. As part of the source control efforts for EAA-6, Ecology requested Science Applications International Corporation (SAIC) to prepare this Data Gaps report.

1.2 Report Organization

Section 2 provides background information on EAA-6, including location, physical characteristics, chemicals of potential concern, and potential pathways by which contaminants may reach sediments. Sections 3 through 5 describe potential sources of contaminants, including adjacent and upland properties, and data gaps that must be addressed in order to develop a SCAP for the site. Section 6 provides a summary of data gaps, and Section 7 lists the documents reviewed during preparation of this report.

Information presented in this report was obtained from the following sources:

- Ecology Northwest Regional Office (NWRO) Central Records
- Washington State Archives
- EPA files
- Seattle Public Utilities (SPU) Business Inspection reports
- Ecology Underground Storage Tank (UST) and Leaking Underground Storage Tank (LUST) lists
- Ecology Facility/Site Database (FSD)
- Washington Confirmed and Suspected Contaminated Sites List (CSCSL)
- EPA Enforcement and Compliance History Online (ECHO)
- EPA Envirofacts Warehouse
- King County Geographic Information Systems (GIS) Center Parcel Viewer and Property Tax Records
- GIS shape files produced by SPU

1.3 Scope of Report

This report documents readily available information relevant to potential sources of sediment recontamination at EAA-6, including outfalls, adjacent properties, and upland properties.

Adjacent and upland properties located within the EAA-6 drainage basin include Boeing Isaacson, Boeing Thompson, and the central portion of King County International Airport

(KCIA). This report does not identify or assess the possibility of migration of contaminants from sources outside of the EAA-6 drainage basin[1].

Air pollution is a potential source of contaminants to EAA-6 sediments with origins outside of the EAA-6 drainage basin. Although limited discussion of atmospheric deposition is provided in Section 2, the scope of this report does not include an assessment of data gaps pertaining to the effects of air pollution on EAA-6 sediments. Because air pollution is a concern for the wider LDW region, Ecology will review work being conducted by the Washington State Department of Health and planned by the Puget Sound Partnership regarding atmospheric deposition. Ecology is planning to hire a contractor to develop options and recommendations for addressing data gaps related to air pollution.

Information presented in this report is limited to EAA-6, direct discharges to EAA-6, and potential adjacent and upland contaminant sources. It does not assess the potential for recontamination from capped sediments if this remedial option is selected. Source control with regard to contaminated sediments left in place will be important to address as part of the remedial action selection process for EAA-6.

Chemical data have been compared to relevant regulatory criteria and guidelines, as appropriate. The level of assessment conducted for the data reviewed in this report is determined by the source control objectives. The scope of this Data Gaps report does not include data validation or analysis that exceeds what is required to reasonably achieve source control.

[1] The area referred to in this report as the EAA-6 drainage basin is actually a sub-drainage of the LDW drainage basin, and is defined by stormwater collection systems and outfalls. In other words, the area from which stormwater drains to EAA-6 is defined as the EAA-6 drainage basin.

2.0 Early Action Area 6

EAA-6 is located along the eastern side of the LDW Superfund Site between 3.7 and 3.9 miles from the southern tip of Harbor Island (Figure 1). The EAA-6 source control area includes two properties that are located directly adjacent to EAA-6: Boeing Isaacson and Boeing Thompson (Figure 2). These properties are bounded by Jorgensen Forge Corporation (Jorgensen Forge) to the north, East Marginal Way S. and KCIA to the east, and Kenworth Motor Corporation/Insurance Auto Auctions (IAA), also known as the former PACCAR site, to the south.

The source control area includes the central portion of KCIA; stormwater from this area drains to EAA-6 through a 48-inch public storm drain outfall (Figure 3). This public storm drain outfall also serves as an emergency overflow (EOF) for Pump Station 45 on the city of Seattle's sanitary sewer system.

2.1 Site Description

General background information on the LDW is provided in the Phase 1 RI Report (Windward 2003a), which describes the history of dredging/filling and industrialization of the Duwamish River and its environs, as well as the physiography, physical characteristics, hydrogeology, and hydrology of the area.

EAA-6 is located adjacent to a former tidal marsh area that was reclaimed when the Duwamish River was straightened and channelized to form the current LDW in the late 1800s and early 1900s. Available information indicates that a meander of the Duwamish River once flowed in a west-to-east direction between the current Boeing Isaacson and Thompson properties before continuing its generally northward flow direction (ERM 2000a). Extensive dredge and fill efforts in the early 1900s placed the LDW channel in its present position west of the Boeing Isaacson and Boeing Thompson properties. A portion of the former river channel formed Slip 5 as shown in Figure 4.

A hydrologic survey map of a 1907 flood episode indicates that land use in the area at that time consisted of a race track, located immediately south of Slip 5, pasture land, a brewery, hop fields, and a few homes. Bissell Lumber Company occupied the Boeing Thompson site to the south of Slip 5 from the 1920s through approximately 1945 (Foster 1945). In about 1941, the United States Navy utilized the property just north of Boeing Isaacson (currently known as the Jorgensen Forge property) and constructed steel melting, forging, and fabricating facilities that were then known as Isaacson Iron Works Plant No. 2 (Dames & Moore 1983). The Isaacson Steel Company purchased the plant in the 1950s and expanded the steel fabrication facility to what is now the Boeing Isaacson property during the 1950s and 1960s (Landau 1988a). The Boeing Company purchased the Thompson property in 1957 and the Isaacson property in 1984.

Filling in of portions of Slip 5 occurred between the 1930s and the mid-1960s (Figure 4). By about 1966, Slip 5 was completely filled as part of site development at Boeing Thompson (Dames & Moore 1983). Reportedly, the fill material consisted of silty sand with significant amounts of slag, fire bricks, and miscellaneous construction materials (ERM 2000a).

Groundwater in the vicinity of EAA-6 is unconfined and generally flows toward the LDW and the former Slip 5 (Figure 5), with water levels ranging from 11 to 12 feet below ground surface (Landau 1988a). Groundwater is influenced by the tidal cycle of the LDW, with tidal effects observed at a distance of at least 700 feet from the waterway. Fluctuations in groundwater levels in wells closest to the LDW have been observed to be as much as 4 feet (ERM 2000a). Conductivity ranges from 72 umhos/cm upgradient of the source control area to 1,779 umhos/cm near the LDW (ERM 2000a). Total dissolved solids in groundwater are estimated to range from 3.96 to 968 mg/L.

Bottom sediment composition is variable throughout the LDW, ranging from sands to mud. Typically, the sediment consists of slightly sandy silt with varying amounts of organic detritus. Coarser sediments are present in nearshore areas adjacent to storm drain discharges (Weston 1999); finer-grained sediments are typically located in remnant mudflats and along channel side slopes. Sediments in the EAA-6 area generally consist of over 60 percent fines (dry weight [DW]), except for coarser sediments near the public storm drain outfall. Sediments in this area are 20 to 40 percent fines immediately adjacent to the outfall, and 40 to 60 percent fines downstream of the outfall (Windward 2003a). Total organic carbon (TOC) ranges from <1 to 3 percent in this area (Windward 2003a).

2.2 Chemicals of Concern in Sediment

Results of sediment sampling at EAA-6 are provided in Appendix A; sampling locations are identified in Table 1. Chemical results above SMS values are summarized in Tables 2 and 3. Sampling locations are shown in Figure 6.

2.2.1 Sediment Investigations

Sediment samples have been collected from the vicinity of EAA-6 as part of the following investigations:

- **Boeing Site Characterization (Exponent 1998, as cited in Windward 2003a)**

  Six surface sediment samples were collected within EAA-6 during Boeing site characterization activities conducted in October 1997 (Table 1). One of these samples (R30) was superseded by a later sample in the same location (LDW-SS119). Samples were analyzed for metals, semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). Arsenic, polycyclic aromatic hydrocarbons (PAHs), phthalates, and PCBs were detected at concentrations above Sediment Quality Standard (SQS) values.

- **Duwamish Waterway Sediment Characterization Study (NOAA 1998)**

  Seven surface sediment samples were collected near the Boeing Isaacson and Boeing Thompson properties during September through November, 1997 (Table 1). These samples were analyzed for PCBs. PCBs were detected in all seven of the samples, with total PCB concentrations ranging from 0.087 to 0.69 mg/kg DW (5.3 to 53 mg/kg organic carbon [OC]). PCBs in five of the samples exceeded the SQS value for total PCBs of 12 mg/kg OC.

- **EPA Site Inspection, Lower Duwamish River (Weston 1999)**

Three surface sediment and two subsurface sediment samples were collected from EAA-6 sediments in August 1998 as part of EPA's Site Inspection. One of the surface sediment samples (DR187) was superseded by a later sample (LDW-SS115). Samples were analyzed for SVOCs, metals, PCBs as Aroclors and congeners, dioxins/furans, and TOC. PAHs, phthalates, and total PCBs were detected at concentrations above the SQS values. In addition, dioxins were detected in a sample collected at the mouth of the public storm drain outfall (sample location DR187, Figure 6).

- **LDW Phase 2 Remedial Investigation, Round 1, 2, and 3 Sediment Sampling (Windward 2005a, 2005b, 2007b)**

  Ten surface sediment samples were collected during three rounds of sampling for the Phase 2 RI in 2005/2006. All samples were analyzed for the SMS list of chemicals. Arsenic, PAHs, phthalates, benzoic acid, and total PCBs were detected above SQS values.

- **LDW Phase 2 RI Subsurface Sediment Sampling (Windward 2007a)**

  Seven sediment samples were collected from two coring locations in 2006. Samples were analyzed for metals, SVOCs, and PCBs. Arsenic, PAHs, bis(2-ethylhexyl)phthalate (BEHP), benzyl alcohol, dibenzofuran, and total PCBs were detected above SQS values.

2.2.2 Contaminants of Concern

A contaminant of concern (COC) is defined in this report as a chemical that is present at concentrations above regulatory criteria in EAA-6 sediments, and is therefore of particular interest with respect to source control. These COCs are the initial focus of the evaluation of potential contaminant sources.

The Washington Sediment Management Standards (SMS; Chapter 173-204 WAC) establish marine Sediment Quality Standard (SQS) and Cleanup Screening Level (CSL) values for some chemicals that may be present in sediments. The SQS values correspond to a sediment quality level that will result in no adverse effects on biological resources and no significant human health risk. CSLs represent minor adverse effects levels used as an upper regulatory threshold for making decisions about source control and cleanup.

A chemical was identified as a COC for EAA-6 if it was detected in surface or subsurface sediment at concentrations above the SQS and/or CSL. A comparison of sample results to the SQS and CSL values is provided in Appendix A, and those chemicals that were detected at concentrations above their respective SQS/CSL values are listed in Tables 2 and 3. For non-polar organics, the measured dry weight concentrations were OC-normalized to allow comparison to the SQS/CSL.

Additional contaminants may be present in soil, groundwater, stormwater, or stormwater solids at concentrations above regulatory criteria and/or soil-to-sediment or groundwater-to-sediment screening levels. While not currently considered COCs in sediment, these chemicals may warrant further investigation, depending on site-specific conditions, to evaluate the likelihood that they will lead to exceedance of marine sediment CSLs. These additional contaminants are discussed as appropriate in Sections 3 through 5.

COCs for EAA-6 are listed below. Shaded chemicals exceeded both the SQS and CSL in one or more samples. In general, COCs were present in sediment samples at concentrations only slightly above the SQS or CSL values; the greatest exceedances were observed for arsenic at locations LDW-SS114 (surface sediment) and LDW-SC50a (subsurface sediment), along the Boeing Isaacson shoreline (Figure 6).

Chemical of Concern (COC)	Surface Sediment		Subsurface Sediment	
	> SQS	> CSL	> SQS	> CSL
Metals				
Arsenic	●	●	●	●
PAHs				
Acenaphthene	●		●	
Benzo(a)anthracene	●			
Benzo(a)pyrene	●	●		
Benzo(b)fluoranthene	●			
Benzo(g,h,i)perylene	●	●	●	
Benzo(k)fluoranthene	●			
Benzofluoranthenes (total)	●	●		
Chrysene	●		●	
Dibenzo(a,h)anthracene	●	●		
Fluoranthene	●		●	
Fluorene	●			
Indeno(1,2,3-cd)pyrene	●	●	●	
Phenanthrene	●		●	
Total HPAH	●			
Total LPAH	●			
Phthalates				
Bis(2-ethylhexyl)phthalate	●	●	●	●
Butyl benzyl phthalate	●			
Other SVOCs				
Benzoic acid	●	●		
Benzyl alcohol			●	●
Dibenzofuran	●		●	
PCBs				
PCBs (total)	●		●	●

2.3 Potential Pathways to Sediment

Transport pathways that could contribute to the recontamination of EAA-6 sediments following remedial activities include direct discharges via outfalls, surface runoff (sheet flow) from adjacent properties, bank erosion, groundwater discharges, air deposition, and spills directly to the LDW. These pathways are described below, and are discussed in more specific detail in Sections 3 through 5.

2.3.1 Direct Discharges via Outfalls

Direct discharges may occur from public or private storm drain systems, combined sewer overflows (CSOs), and emergency overflows (EOFs).

Some areas of the Lower Duwamish Waterway are served by combined sewer systems, which carry both stormwater and municipal/industrial wastewater in a single pipe. These systems were generally constructed before about 1970 because it was less expensive to install a single pipe rather than separate storm and sanitary systems. Under normal rainfall conditions, wastewater and stormwater are conveyed through this combined sewer pipe to a wastewater treatment facility. During large storm events, however, the total volume of wastewater and stormwater can sometimes exceed the conveyance and treatment capacity of the combined sewer system. When this occurs, the combined sewer system is designed to overflow through relief points, called CSOs. The CSOs prevent the combined sewer system from backing up and creating flooding problems.

Untreated municipal/industrial wastewater and stormwater can potentially be discharged through CSOs to the LDW during these storm events. The city of Seattle owns and operates the local sanitary sewer collectors and trunk lines, while King County owns and operates the larger interceptor lines that transport flow from the local systems to the West Point Wastewater Treatment Plant (WWTP). The City's CSO network has its own National Pollutant Discharge Elimination System (NPDES) permit; the County's CSOs are administered under the NPDES permit established for the West Point WWTP.

An EOF is a discharge that can occur from either the combined or sanitary sewer systems that is not necessarily related to storm conditions and/or system capacity limitations. EOF discharges typically occur as a result of mechanical issues (e.g., pump station failures) or when transport lines are blocked; pump stations are operated by both the City and County. Pressure relief points are provided in the drainage network to discharge flow to an existing storm drain or CSO pipe under emergency conditions to prevent sewer backups. EOF events are not covered under the City's or County's existing CSO wastewater permits.

CSO/EOF outfalls that discharge to the LDW are listed in Table 4. Of the County CSO outfalls along the LDW, the Michigan CSO, S. Brandon Street CSO, and Hanford No. 1 (discharging via the City's Diagonal Avenue S. CSO/SD) outfalls had the highest average combined sewer overflow volumes between 1999 and 2005. Annual stormwater discharge volumes are usually substantially higher than annual CSO discharge volumes because storm drains discharge whenever it rains, and CSOs only discharge during storm events that exceed the system capacity. Annual stormwater discharges to the LDW have been estimated at approximately 4,000 million gallons per year (mgy) compared to less than 65 mgy from the county CSOs and less than 10 mgy from the city CSOs (Windward 2007c)[2].

To minimize the frequency and volume of CSO events, the County utilizes different CSO control strategies to maximize system capacity. An automated control system manages flows through the King County interceptor system so that the maximum amount of flow is contained in pipelines

[2] It should be noted that stormwater discharges are regulated under a separate NPDES permit.

and storage facilities until it can be conveyed to a regional wastewater treatment plant for secondary treatment. In some areas of the system, where flows cannot be conveyed to the plant, the flows are sent to CSO treatment facilities for primary treatment and disinfection prior to discharge. County CSOs discharge untreated wastewater only when flows exceed the capacity of these systems (King County 2007).[3].

As a result, some areas of the CSO drainage basins may discharge to different outfalls at different times, depending on the route that the combined stormwater/wastewater has taken through the County conveyance system. Furthermore, some industrial facilities in the LDW basin may discharge stormwater to a separated system and industrial wastewater to a combined system, or a conveyance that begins as a separated system may discharge to a combined system further downstream along the flow path.

When preparing a Data Gaps report for a source control area, all properties that potentially discharge to that source control area (whether through a CSO/EOF or a separated storm drain) are identified to the extent that the boundaries of the drainage basin are known. However, for areas where drainage basins overlap, a property review is performed only if the property has not already been included in a previously published Data Gaps report. Exceptions include situations where contaminants may be transported to the current source control area via a transport pathway that was not applicable for the earlier evaluation.

Three outfalls are present in the EAA-6 area, including one publicly-owned outfall and two private outfalls. The publicly-owned outfall, referred to in this report as the Slip 5 outfall, discharges storm drainage from 237 acres of the central portion of KCIA (KCIA Drainage Basin 2), including aircraft maintenance and fueling areas. In addition, the outfall serves as an EOF for Pump Station 45 on the city of Seattle's sanitary sewer system. The two private outfalls are owned by Boeing and discharge stormwater from the Boeing Thompson and Isaacson properties. Contaminants discharged via these outfalls could directly affect sediments.

2.3.2 Surface Runoff (Sheet Flow)

In areas lacking collection systems, spills or leaks on properties adjacent to the LDW could flow directly over impervious surfaces or through creeks and ditches to the waterway. While the Boeing Thompson property is served by a stormwater drainage system, most of the Boeing Isaacson property is not (Figure 7).

2.3.3 Groundwater Discharges

Contaminants in soil resulting from spills and releases to adjacent (and possibly upland) properties may be transported to groundwater and subsequently be released to the LDW. Seeps have been sampled along the LDW shoreline near the northern property boundary of Boeing Isaacson (southern end of the Jorgensen Forge property). Copper was detected in a seep water sample at a concentration above the marine chronic water quality standard (WQS). In addition, arsenic contamination of groundwater has been documented in this area since the early 1980s.

[3] City CSOs are generally smaller and flows are not treated prior to discharge.

2.3.4 Bank Erosion

The banks of the LDW shoreline are susceptible to erosion by wind and surface water, particularly in areas where banks are steep. Shoreline armoring and the presence of vegetation reduces the potential for bank erosion. Contaminants in soils along the banks of EAA-6 could be released directly to sediments via erosion. A wooden bulkhead is located along the boundary between the Boeing Thompson/Isaacson properties and the waterway; rock and rubble fill material have been placed behind the bulkhead. Very little erodable soil material is present in this area.

2.3.5 Atmospheric Deposition

Atmospheric deposition occurs when air pollutants enter the LDW directly or through stormwater. Air pollutants may be generated from point or non-point sources. Point sources include industrial facilities, and air pollutants may be generated from painting, sandblasting, loading/unloading of raw materials, and other activities, or through industrial smokestacks. Non-point sources include dispersed sources such as vehicle emissions, aircraft exhaust, and off-gassing from common materials such as plastics. Air pollutants may be transported over long distances by wind, and can be deposited to land and water surfaces by precipitation or particle deposition. None of the properties within the EAA-6 source control area are currently regulated as point sources of air emissions.

Air traffic at KCIA may result in significant emissions, but this relates to operations at the entire airfield and lies outside the scope of this report. While contaminants originating from nearby properties and streets may be transported through the air and deposited at EAA-6 or in areas that drain to the LDW, this transport mechanism is not likely to result in sediment concentrations above local background levels. The atmospheric deposition pathway is therefore not evaluated further in this Data Gaps report. Additional information on recent and ongoing atmospheric deposition studies in the LDW area is summarized in the LDW Source Control Status Report (Ecology 2007c and subsequent updates); Ecology will continue to monitor these efforts.

2.3.6 Spills to the LDW

Near-water and over-water activities have the potential to impact adjacent sediments from spills of material containing contaminants of concern. No over-water activities are currently conducted in this area, and near-water spills at the Boeing Thompson property would be contained within the site stormwater system. The Boeing Isaacson property is currently vacant.

3.0 Potential for Sediment Recontamination from Outfalls

A 48-inch public (King County) storm drain/EOF outfall drains to the LDW at the location of the former Slip 5, and two private outfalls drain stormwater from the Boeing Thompson property (Figure 2). The public outfall is located immediately adjacent to the northern Boeing Thompson outfall.

3.1.1 Public Storm Drain/EOF

Stormwater from approximately 237 acres of the central portion of KCIA (KCIA Drainage Basin 2) is pumped to a 48-inch King County outfall (Boeing 1988b), referred to in this report as the Slip 5 Outfall. The Central KCIA stormwater drainage basin is shown in Figure 3. The lift station that pumps stormwater from KCIA Outfall #2 to the 48-inch storm drain pipe is located east of the Boeing Isaacson and Thompson properties, on the east side of East Marginal Way S.

The Slip 5 outfall also serves as an EOF for Pump Station 45 on the city of Seattle's sanitary sewer system (King County & SPU 2005). Pump Station 45 has not overflowed since 2000, when the City started maintaining pump station records.

In addition, stormwater may enter this storm drain from a catch basin (CB-39) on the Boeing Thompson property, located just before the terminus of the storm drain at the LDW (Figure 7; Boeing 2001).

At the time this Data Gaps report was prepared, no recent inline stormwater solids sampling had been conducted along this storm drain line. Stormwater solids were reportedly collected within this system as part of the Elliott Bay Action Program in the mid-1980s, however results were not available in the files reviewed during preparation of this Data Gaps report.

In the past, the Slip 5 outfall drained to the head of Slip 5 at the approximate location shown in Figure 9. In approximately 1966, prior to filling of Slip 5, the Boeing Company extended the 48-inch diameter storm sewer along the southern edge of the Isaacson property out to the LDW (Dames & Moore 1983). In 1990, in anticipation of redevelopment of the Isaacson parcel, the storm drain line was moved to its current location, as shown in Figure 3.

Facilities located within this stormwater drainage basin, and the potential for contaminants in stormwater from these facilities to reach the LDW, are discussed in Section 5, Potential for Sediment Recontamination from Upland Properties.

3.1.2 Private Stormwater Outfalls

Two private outfalls discharge stormwater from the Boeing Thompson site to EAA-6 (Figure 3). An outfall of unresolved origin is reportedly located near the Boeing Isaacson/Jorgensen Forge property boundary; this outfall is not shown on a stormwater system map provided by Boeing (Figure 7). These outfalls are described in more detail in Section 4.1 below.

3.1.3 Data Gaps

Information needed to assess the potential for sediment recontamination associated with the Slip 5 Outfall/EOF is listed below:

- No data is available about concentrations of COCs in storm drain solids and stormwater near the outfall.
- If contaminants are present at concentrations of potential concern near the outfall, then source tracing samples are needed to identify potential source(s) of the contaminants. Storm drain solids data from the 48-inch storm drain line near the lift station at KCIA Outfall #2, through the Boeing Isaacson property, and from CB-39 on the Boeing Thompson property are needed.
- Results of storm drain sampling by the Elliott Bay Action Program should be reviewed to identify additional contaminants that may be of concern in stormwater.
- Additional data gaps related to potential infiltration of contaminants in groundwater to the 48-inch public storm drain line are described in Section 4.1.6 for the Boeing Isaacson property.

4.0 Potential for Sediment Recontamination from Adjacent Properties

Two properties are located adjacent to EAA-6: Boeing Isaacson and Boeing Thompson. While these two properties are separate parcels, many of the documents reviewed (e.g., the Boeing Thompson Pollution Prevention Plan) cover both properties. In addition, some groundwater monitoring reports discuss results for wells located on both parcels. To further complicate matters, the Isaacson-Thompson property boundary was adjusted in 2001. Therefore, documents written prior to 2001 show the property line further to the south. The current property boundary is depicted on most of the figures in this report, except for Figure 9, which shows the historical Boeing Isaacson property layout. Overlaps and discrepancies are documented as appropriate in Sections 4.1 and 4.2 below.

4.1 Boeing Isaacson

Facility Summary: Boeing Isaacson	
Address	8625 East Marginal Way S. 8541 East Marginal Way S.
Property Owner	The Boeing Company
Tax Parcel No.	0001600014
Parcel Size	9.84 acres (428,482 sq.ft.)
Facility/Site ID	1138721 (Boeing Isaacson Property) 2218 (Boeing Isaacson Thompson)
SIC Code	Not listed
EPA ID No.	WAD980836159 (inactive)
NPDES Permit No.	SO3000148
UST/LUST ID No.	None

The Boeing Isaacson property is located along the east side of the LDW, at approximately RM 3.7 to 3.8, as measured from the southern tip of Harbor Island. The property is rectangular, about 9.8 acres, and is situated between the LDW on the west and East Marginal Way on the east; the property is bordered on the south by the Boeing Thompson property and on the north by the Jorgensen Forge property (ERM 2000a; Landau 2007). The current parcel boundary is shown in Figure 2. Land use in the vicinity of the Boeing Isaacson property is industrial.

The Boeing Company purchased this property from the Isaacson Steel Company on March 14, 1984. King County tax records list the parcel as currently vacant (industrial). The parcel was originally 12.29 acres in size (ERM 2000c), however a property boundary adjustment was recorded on November 8, 2001, which moved the southern Isaacson property line north to its current location, reducing the size of this parcel by 2.45 acres (City of Tukwila 2001). No structures are currently present on this property.

Boeing Isaacson is listed in Ecology's Facility/Site Database under two names: Boeing Isaacson Property (FS ID No. 1138721), located at 8625 East Marginal Way S., and Boeing Isaacson Thompson (FS ID No. 2218), located at 8541 East Marginal Way S. The property is listed on Ecology's CSCSL under both names. An independent Remedial Action was conducted at the Boeing Isaacson property between April 6, 2000 and December 5, 2002 for metals contamination in soil and groundwater. The Boeing Isaacson Thompson site is listed in Ecology's database as "awaiting a Site Hazard Assessment." Site discovery was documented on March 1, 1988. The Boeing Isaacson and Thompson properties are jointly covered under an industrial stormwater general permit, No. SO3000148, which was originally issued on December 22, 1993 and has been extended to May 2008. The facility does not currently have an air operating permit or a King County waste discharge permit or authorization.

4.1.1 Physical Setting

The Boeing Isaacson property is located in an area of extensive fill placed during the re-channelization of the Duwamish River in the early 1900s. The topography is relatively flat, with the exception of the soil cap area (see Section 4.1.3 below), which is characterized by elevation differences of up to 5 feet (ERM 2000a).

Upper soils vary from 5 to 15 feet in thickness, and are composed of man-made fill either imported or dredged from the adjacent waterway. The fill materials consist predominantly of sand and silty sand. Along the western and southern margins of the property, slag and fire brick materials have been encountered at depths ranging from 1.5 to 15 feet below the existing ground surface (Dames & Moore 1983). Fill soils above and between the slag generally consist of brown to black sand, silty sands, and silty gravels. The fill is underlain by a deep deposit of alluvial soils that were laid in place by the Duwamish River.

Groundwater elevations range from 10 to 15 feet below ground surface (bgs), however they vary significantly with tidal fluctuations in the LDW and season.

4.1.2 Current Operations

This property is currently vacant; the former 373,000-square foot Isaacson Steel Company buildings (shown as Former Isaacson Facility Building 14-05 on Figure 9) have been removed and the site is completely paved with asphalt and concrete slabs (Landau 2007). The concrete is a remnant of former steel mill operations and consists primarily of slab-on-grade, spread footings, and at least 20 large foundations that supported overhead cranes used during the active steel mill operations (ERM 2000a). A portion of the property is currently used for vehicle parking associated with Boeing Thompson operations.

The property also contains seven catch basins that drain to the Boeing Thompson storm drain system, and five storm drain manholes that are connected to the 48-inch KCIA storm drain line as shown in Figure 7. In addition, six edge drains are located along the shoreline. The purpose, function, and configuration of the edge drains are unclear.

An outfall of unresolved origin is reportedly located near the Boeing Isaacson/Jorgensen Forge property boundary (Windward 2007c); this outfall is not shown on a stormwater system map provided by Boeing (Figure 7). No additional information about this outfall was available.

Three groundwater monitoring wells are present on the Boeing Isaacson property, as shown on Figure 10: I-200 (upgradient), and I-104 and I-203 (downgradient). Two additional downgradient wells are located on the Boeing Thompson property: I-205 and I-206.

4.1.3 Historical Operations

This section summarizes the property ownership, land use, and regulatory activities at the Boeing Isaacson property between 1929 and 2001. Figure 8 presents a timeline showing property ownership and site investigations/cleanups from the late 1920s to the present. Details regarding environmental investigations and cleanups conducted during this period are presented in Section 4.1.4.

Prior to 1929, land use in this area consisted of pasture land, a brewery, hop fields, several homes, and a race track, which was located immediately south of Slip 5 (Dames & Moore 1983). Appendix B provides aerial photos of the property and its surroundings from 1936 to 2004.

Duwamish Lumber Company

A historical review of Sanborn Fire Insurance Maps from 1904 to 1946 indicates that in 1929, the Duwamish Lumber Company operated a sawmill directly north of Slip 5 (Ecology, No Date). The facility included lumber storage areas, a crane track and trestle, and a conveyer area. Slip 5 is identified as the Duwamish River Slough in these maps. The Bissell Lumber Company operated to the south of Slip 5 (the current Boeing Thompson property), as shown in the 1936 aerial photograph (Appendix B).

Isaacson Iron Works/U.S. Navy

In 1941, the U.S. Navy constructed steel melting, forging, and fabricating facilities, known as Isaacson Iron Works Plant No. 2, just north of the current Boeing Isaacson site. Portions of the Boeing Isaacson property were used to store scrap metal prior to being melted down (Dames & Moore 1983). Between 1943 and 1945, a galvanizing plant was constructed in the northeast corner of the property. As shown in a 1946 aerial photo, this galvanizing plant was the only building within the current Boeing Isaacson property lines (Appendix B). It was dismantled in 1967 and the area was later occupied by Steel Fabrication Bay 14 (Figure 9).

Mineralized-Cell Wood Preserving Company

According to a 1945 survey of pollution sources in the Duwamish-Green River drainage area, the Mineralized-Cell Wood Preserving Company was located to the south of the Isaacson Iron Works at that time, presumably on the current Boeing Isaacson parcel (Foster 1945). This facility is not apparent in the 1946 aerial photo of the property. This company employed a patented process in which a solution of arsenic and sulfate salts of copper and zinc was heated and applied to the base of logs under pressure. A precipitating agent was used to set the chemicals and thus harden the wood. The storage tanks in which the solution was heated were washed twice daily.

Any sludge or remaining chemicals were drained onto the ground. Supply tanks containing fuel oil occasionally overflowed during filling, however the oil seeped into the ground and reportedly did not drain directly into the LDW. According to Foster (1945), no chemicals reached the waterway except those that leached out of the wood when the poles were shipped by water. It is likely that operations at this facility resulted in contamination of soil with arsenic, copper, and zinc.

Isaacson Steel Company

The Isaacson Steel Company purchased the Isaacson Iron Works plant in the 1950s and expanded the steel fabrication facility to what is labeled as Building 14-05 in Figure 8 during the 1950s and 1960s (Landau 1988a). A 1956 aerial photo indicates the degree of site development at that time and shows filling in portions of Slip 5 (Appendix B). The fill reportedly consisted of both common fill material and slag/fire brick material, and was used to extend the site area at the main elevation to a distance of 20 to 50 feet beyond the south face of Bays 1, 2, and 5 through 10 (Dames & Moore 1983). Plant expansion and development continued into the 1960s. The building consisted of a series of interconnected metal-sided buildings (Landau 1988a). A 1961 aerial photo shows completion of Bay 2, the addition of Bay 1 and extension of Bays 3 and 4, and construction of other small structures. Appendix C-2 includes a map showing the Isaacson Steel Company structures.

Additional fill was also placed within Slip 5 during this time, and a bulkhead was constructed along the LDW and backfilled to reclaim an additional 50 feet of land between the waterway and the Isaacson Steel property line (Dames & Moore 1983). The fill placed in Slip 5 reportedly consisted of slag waste and soil; land reclamation along the LDW was primarily comprised of imported soil from offsite sources but may have also included slag, fire brick, and material dredged from Slip 5 (Dames & Moore 1983). In approximately 1966, Slip 5 was completely filled as part of site development of the Boeing Thompson property.

The Isaacson operation consisted primarily of structural steel fabrication and supply; the former site layout is shown in Figure. Isaacson Corporation operated the zinc galvanizing operation near the northeast corner of the property through 1967. Until its sale in 1965 to the Earle M. Jorgensen Company, the Isaacson Corporation also operated the steel manufacturing facilities on the adjacent parcel to the north (Wicks 1983).

During the period 1972 to 1973, Isaacson Steel Company made several efforts to reduce the amount of pollutants entering the waterway via the storm drain (Dames & Moore 1983). Traces of lubricating oil used with a friction cutting saw in Bay 3 may have entered the LDW via the introduction of cooling water into the storm drain system. Corrective action was taken to reduce additional pollution. In the painting area near Bays 12 and 13, the water-air wash system used to prevent paint solids from being exhausted into the atmosphere was disconnected from the storm sewer. Commercial waste disposal companies were subsequently used to dispose of water containing significant amounts of paint solids.

The Isaacson Corporation conducted a soil remedial action in 1984. Because it was conducted during and after purchase of the property by The Boeing Company, this remedial action is described with the Boeing Isaacson facility below.

Boeing Isaacson

In March 1984, Boeing purchased the Isaacson property to construct additional office and manufacturing facility space. Boeing used Building 14-05 for storage of miscellaneous parts, tools, and other material (Boeing 1988b). The bays had been constructed with slab-on-grade concrete or asphalt floors, with some dirt floors (Landau 1988a). Environmental investigation and remedial actions were conducted at the site from 1983 through 1991 to address elevated concentrations of arsenic in soil and groundwater as summarized below and detailed in Section 4.1.4. Structures on the property were demolished as part of a plan to expand the Boeing Thompson facility in 1989.

The following subsections provide a summary of activities at the property between 1984 and 2001; a timeline of these activities is provided in Figure 8. Detailed information on investigations and cleanups performed during this period is provided in Section 4.1.4.

<u>Initial Evaluations and Soil Removal</u>

Prior to the purchase, Boeing conducted Phase 1 and 2 site evaluations at the Isaacson Steel property in August 1983 to evaluate its potential purchase. Chemical analyses of soil and groundwater performed during Phase 1 investigations identified arsenic, zinc, and total carbon in samples taken from borings located near the sites of a steam cleaning rack and sump and a transformer rack (Dames & Moore 1983). Additional sampling was conducted by Patrick H. Wicks in October and December 1983 for the Isaacson Corporation, which confirmed the presence of arsenic, lead, and zinc in soil and groundwater at the property (Wicks 1983).

In January 1984, Isaacson Corporation submitted a remedial action plan to Ecology and requested "advice" (Isaacson 1984a).[4] Ecology responded in February 1984, indicating that the proposed excavation of arsenic and lead hot spots is "a reasonable approach" (Ecology 1984a). Ecology indicated that analytical verification would be required to demonstrate that the pockets of "high level material" have been suitably removed, however with a satisfactory outcome of the necessary analyses, the area could be made acceptably "clean" (Ecology 1984a). Further correspondence from Isaacson indicated that the remedial work would be performed during the summer of 1984 (Isaacson 1984b). In a letter dated June 29, 1984, Ecology stated that if this work is not completed in a timely manner, appropriate actions would be initiated by Ecology to compel Isaacson to comply with applicable statutes and regulations. The letter further states that Ecology would take enforcement action if they were not satisfied with the execution or completion of the cleanup (Ecology 1984c).

The initial remedial program was completed in late August 1984; Ecology indicated verbally that additional sampling and analysis was appropriate and perhaps additional excavation would be required (Isaacson 1984b). Subsequently, additional soil samples were collected and analyzed, and a final remedial plan was prepared (*Report on Remedial Project and Recommendations for Project Completion at Isaacson Corporation Property, October 1984*[5]). The remediation was

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[4] The remedial action plan was not present in the files reviewed by SAIC during preparation of this Data Gaps report.
[5] This document was not present in the files reviewed by SAIC during preparation of this Data Gaps report.

completed in early November 1984. The area between Buildings 14-05 and 14-01 (Thompson Bldg.) was paved (Landau 1988a).

A November 20, 1984 letter from Ecology to Isaacson Corporation indicated that additional sampling would be required at the property because arsenic levels remained high in several locations. Isaacson Corporation strenuously objected to this in a December 1984 letter (Isaacson 1984b), in which they stated that all remedial work had been completed in accordance with plans submitted to and discussions held with Ecology staff.

According to a December 1984 letter from Isaacson, Ecology had agreed to a 700 mg/kg arsenic cleanup level in soil (Isaacson 1984b).

In February 1985, Ecology prepared a conditional No Further Action (NFA) letter for soil; this letter was not found in the files reviewed during preparation of this Data Gaps report, however it reportedly identified the need for a deed restriction, and required Boeing to conduct groundwater monitoring and prepare annual reports presenting the results of this monitoring for two years (Ecology 2000b; Landau 1986). In October 1985, Landau Associates submitted a Groundwater Monitoring Plan to Boeing that outlined a program for continued monitoring of arsenic in groundwater. Based on groundwater monitoring completed in 1985 through 1987, Landau concluded that the site was unlikely to contribute enough arsenic to the LDW to cause exceedance of the chronic ambient water quality criteria (AWQC) (ERM 2000a).

Boeing applied for a NPDES stormwater discharge permit for this facility in April 1985 (Boeing 1985b). It is not known whether this permit was issued.

<u>Proposed Site Redevelopment</u>

In 1988, Boeing proposed to demolish Building 14-05, construct a new Building 14-09, which would be attached to a portion of the north side of Thompson Building 14-01, and pave the remaining area with roller-compacted concrete. The new building was to be used primarily for manufacturing. Pedestrian tunnels would be constructed and the 48-inch public storm drain would be rerouted along the property line on the north side of Building 14-05 (Landau 1988a). The proposed layout is shown in Appendix C-4. This building was never constructed.

To support construction of Building 14-09, Landau conducted a soil and groundwater investigation in May 1988, as described in Section 4.1.4 below. Ecology, in a letter dated May 10, 1988, concurred with the plan to pave the property as appropriate mitigation for the site, with the exceptions of Bay 13 and the area between Bay 11 and Bay 14 (identified as the Courtyard). The soil in these areas failed the Extraction Procedure (EP) Toxicity test and would need to be disposed of at a permitted hazardous waste disposal facility (Ecology 1988a). Boeing removed approximately 4,800 cubic yards of soils from Bay 13 and the Courtyard in the spring of 1989 (ERM 2000a; Boeing 1989, 1990a).

In December 1988, Boeing conducted a pilot demonstration study for extraction of arsenic from soil. The proposed treatment process involved mixing of soil with a dilute caustic solution to solubilize and extract the arsenic (Boeing 1988e). Boeing requested confirmation from Ecology that a Resource Conservation and Recovery Act (RCRA) treatment, storage, and disposal (TSD) permit would not be required for full-scale implementation, however Ecology apparently concluded that Boeing would be required to obtain a permit for this activity (Ecology 1989b). No information on the success of the pilot demonstration was found in the files reviewed during preparation of this Data Gaps. No further implementation of this treatment process was conducted.

As part of a planned storm drain construction in late 1989 and early 1990, Boeing conducted extensive grid sampling of soil, as described in Section 4.1.4 below. The sampling program found arsenic concentrations above 200 mg/kg primarily in a strip about 70 feet wide and 1,300 feet long along the northern property boundary (Boeing 1990a). The arsenic-containing soils were generally located at depths between 3 feet and the water table (10 to 12 feet bgs). Arsenic concentrations at the 3- to 11-foot depth varied from <100 mg/kg to 25,000 mg/kg (Boeing 1990a). An estimated 20,000 to 40,000 cubic yards of arsenic-contaminated soil warranted remediation (Boeing 1990a).

Soil Remedial Actions

Boeing proposed a program of soil stabilization, capping, and long-term groundwater monitoring in 1990, as described in the *Thompson-Isaacson Site Soil Remedial Action Plan* (Boeing 1990c; Landau 1990). Ecology requested that pilot testing be conducted to determine the effectiveness of the process prior to conducting full-scale soil stabilization (ERM 2000a). Pilot testing was conducted in June 1991, under the "on-site treatment by generator" rule of the Washington dangerous waste regulations (Ecology 1991a, 1991b). The pilot tests demonstrated that the process was effective in stabilizing the arsenic-contaminated soils (Boeing 1991a, 1991b; Ecology 1991c).

Approval for conducting the large scale soil remediation program was given by Ecology in July 1991 (Ecology 1991c). The actions were conducted between August and November 1991, including excavation of approximately 35,000 tons of soil, on-site treatment using a physical and chemical stabilization process, and placement of the treated soil in the ground beneath a polyethylene cap and asphalt cover (Landau & GeoEngineers 1992, Boeing 1992a). The soil cap area comprised a mound that was characterized by elevation differences of up to 5 feet above the surrounding grade (ERM 2000d).

A target cleanup level of 200 mg/kg arsenic was selected, which was the Model Toxics Control Act (MTCA) Method A industrial cleanup level for arsenic at that time[6]. After the soil removal action, arsenic in excess of 200 mg/kg remained along the north wall of the excavation (ERM 2000a), ranging from 200 mg/kg to approximately 2,000 mg/kg (ERM 2000a). Further soil removal would have compromised the integrity of the storm drain line in that location. An asphalt cap with a polyethylene liner was installed and institutional controls prohibiting access to this portion of the site were implemented (ERM 2000a).

Compliance monitoring for groundwater quality was conducted between 1991 and 1996 (Landau 1991; ERM 2000a). Based on a statistical analysis of groundwater data from the property, Boeing concluded that the downgradient monitoring wells on the Isaacson property (I-104s and I-203s) were in compliance with the freshwater chronic AWQC for arsenic based on protection

[6] The current MTCA industrial cleanup level for arsenic in soil is 88 mg/kg (https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx)

of aquatic life (190 ug/L for trivalent arsenic), however well I-206s on the adjacent Thompson property was not (see Section 4.2 for additional information on the Thompson property) (ERM 2000a).

A 1996 groundwater investigation at the Boeing Thompson property (GeoEngineers 1996, as cited in ERM 2000a) concluded that Boeing Isaacson is not the source of arsenic in well I-206(s). The GeoEngineers report was not available for review during preparation of this Data Gaps report and therefore this conclusion could not be validated.

No Further Action (NFA) Requests

In April 2000, Boeing submitted a conceptual proposal for an NFA determination at the Boeing Isaacson property (ERM 2000a). Boeing requested that the property be included in Ecology's Voluntary Cleanup Program (VCP), with technical oversight from Ecology staff. Boeing requested the NFA in consideration of the extensive soil remediation activities that had been conducted in 1991 and Boeing's plans for redevelopment of the site as an active commercial/industrial property (ERM 2000a). Boeing also made the following assertions:

- The costs of additional remediation to achieve clean closure for the site are substantial and disproportionate to the incremental degree of risk reduction that would be achieved;
- Implementation of deed restrictions, institutional controls, and groundwater monitoring to minimize human health and environmental risk is compatible with the commercial/industrial redevelopment plans;
- Precedent for the NFA determination has been established in the Duwamish Industrial Area through the application of the Maximum Beneficial Use criteria for groundwater as a recharge source to the LDW.

In a May 16, 2000 response to Boeing's proposal, Ecology determined that an appropriate cleanup level for arsenic in groundwater would be 0.14 ug/L, based on protection of human health from consumption of contaminated marine organisms, and that this cleanup level must be achieved at the point where groundwater flows into the LDW as depicted by the existing monitoring wells located along the shoreline (I-104s and I-203s) (Ecology 2000b). Ecology stated that the following additional information was needed: a contingency response action plan to address arsenic-impacted groundwater; and additional water level measurements to more clearly evaluate groundwater flow dynamics at the site. In addition, Ecology expressed concern about the possible co-mingling of arsenic-impacted groundwater with tidal fluctuations between the Boeing Thompson and Isaacson sites.

During a meeting on June 7, 2000, Ecology indicated that a soil NFA was appropriate, and requested additional information to support the preparation of a deed restriction (ERM 2000c). Before a groundwater NFA request could be granted, additional site studies would be required. In a July 24, 2000 meeting, Ecology agreed to consider an alternative cleanup level for groundwater based on a site-specific risk assessment (ERM 2000d). Boeing agreed to conduct a human health risk assessment and additional hydrogeologic site characterization, including groundwater flow and discharge analyses, a tidal study, and collection of additional data on aquifer characteristics (ERM 2000b).

In November 2000, Boeing submitted supporting information for a soil NFA determination (ERM 2000c). Boeing planned to level the mound of stabilized soil (generated during the 1991 soil remediation efforts), grade the area, and redistribute the stabilized soil throughout the site.

Also in November 2000, Boeing submitted a report summarizing the hydrogeologic investigation results and the site-specific human health risk assessment for groundwater at the Boeing Isaacson property (ERM 2000d). Results indicated that groundwater flow at the property is characterized by an unconfined, tidally-influenced aquifer in silt and fine sand native soils and fill materials with local variations in permeability. These variations are most apparent near the LDW shoreline, in the area of greatest tidal fluctuation. Groundwater flow across the site is generally west to west-southwest, with some flow deflection toward the axis of the former Slip 5. Arsenic distribution in groundwater was generally consistent with a former source in the northeastern quadrant of the site. However, significant attenuation of arsenic concentrations was apparently occurring as groundwater approaches the shoreline (ERM 2000d).

The human health risk assessment derived groundwater action levels based on human health risks from consumption of contaminated seafood. The action levels of 8,330 ug/L and 1,109 ug/L for recreational and subsistence anglers, respectively (ERM 2000d), were based on site-specific consumption rate estimates and the fraction of inorganic arsenic likely to be present in seafood.

Boeing also proposed to establish a long-term groundwater quality monitoring program to complement a groundwater NFA determination, consisting of three years of semi-annual sampling of two wells and two piezometers (ERM 2000d).

In response to the November 2000 soil NFA supporting information report (ERM 2000c), Ecology stated that leveling and grading by redistributing the stabilized soil throughout the site is unacceptable (Ecology 2001). Boeing would need to evaluate other pathways of exposure, such as direct contact and ingestion and leaching to groundwater, in the context of the MTCA regulations and cleanup standards. Ecology was concerned that crushing of the encapsulated material would increase the surface area of arsenic-contaminated soils, which would therefore be more vulnerable to attack and breakdown by the elements. Further, proposed landscaping at the site would provide recharge point sources for infiltration of water, and the proposed pile-driven foundation concept could ultimately introduce arsenic-impacted soils to greater depths, thereby further contaminating the site.

Ecology indicated that arsenic-stabilized soils that are excavated during construction should be disposed appropriately and the excavation pit backfilled with clean soil material. If Boeing addressed these concerns, Ecology agreed to issue an opinion letter that the site investigation appears to meet minimum requirements to protect human health and the environment, which would allow redevelopment of the property to proceed. Ecology’s NFA determination would be issued at a later date after the submittal of a final report containing empirical data of confirmation soil samples after the excavation and removal of re-crushed arsenic-stabilized soil, of stormwater control measures, of groundwater compliance monitoring results, stamped engineering maps/reports, etc. (Ecology 2001).

With regard to the November 2000 groundwater NFA supporting information (ERM 2000d), Ecology did not agree with Boeing’s assumptions with respect to target risk level, bioconcentration factor, inorganic arsenic percentage, and seafood consumption rates. Based on the concentration of arsenic in the upgradient (background) well, Ecology indicated that a remediation level of 2.7 ug/L would be acceptable (Ecology 2001).

On February 6, 2001, a meeting was held to discuss the status of the NFA requests between Ecology, Boeing, and Boeing contractors ERM and Exponent (ERM 2001). Boeing pointed out that about 400 Toxicity Characteristic Leaching Procedure (TCLP) samples had been analyzed for the post-treatment soil and all had passed. Ecology stated that TCLP is not adequate to evaluate the soil-to-groundwater pathway, and that soil would need to be retested after simulating actual conditions (e.g., breaking up cohesive soil into its granular state). Boeing offered to provide a work plan for an evaluation of leaching from treated soils.

Ecology concurred that stabilized soils can be used on the site if they do not provide a pathway to groundwater (ERM 2001). However, Ecology indicated that they would not issue a separate NFA determination for soil and groundwater if one medium (soil) is contributing to contamination of the other (groundwater).

No additional activity with respect to the soil and groundwater NFA requests is documented in the files reviewed for this Data Gaps report. According to Ecology's site manager for Boeing Isaacson, Ecology did not approve the NFA determinations and Boeing is no longer participating in the Voluntary Cleanup Program for this property (O'Brien 2007).

Spills

April 1987**.** A Boeing-owned asphalt truck working near Building 14-05 spilled approximately 10 gallons of Chevron Heat Transfer Oil #1 onto the pavement. Approximately 1 to 2 gallons of oil reached a nearby catch basin and passed through the storm sewer to the LDW. Absorbent pads were placed in the catch basin, and the visible sheen on the LDW was confined to a small area. An absorbent boom was laid around the spill area and was left in place to absorb the remaining oil (Boeing 1987).

No other information on spills associated with this property was found in the files reviewed during preparation of this Data Gaps report.

4.1.4 Environmental Investigations and Cleanups

Environmental investigations and cleanups were conducted at the site from 1983 to 1991 to address elevated concentrations of arsenic detected in soil and groundwater. Groundwater monitoring activities were conducted routinely between 1991 and 2007. The most recent groundwater monitoring event took place in September 2007 (O'Brien 2007).

Phase I and II Site Evaluation, Isaacson Steel Property (1983)

In August 1983, Boeing conducted Phase I and II site evaluations at the Isaacson Steel property to evaluate its potential purchase. The Phase I evaluation included drilling of eight soil borings to depths ranging from 2.0 to 11.5 feet and one boring to approximately 25 feet. The deep boring was completed as a groundwater monitoring well. Chemical analysis of 10 selected soil samples and one groundwater sample were conducted for metals; PCBs, TOC, and oil & grease were analyzed for selected samples (Dames & Moore 1983). Sampling results are provided in Appendix C-1.

Chemical analyses of soil and groundwater performed during Phase I investigations identified very high concentrations of arsenic, zinc, and TOC in samples taken from borings located near the sites of a steam cleaning rack and sump and a transformer rack. In addition, high concentrations of certain heavy metals (barium, chromium, lead, nickel, and zinc) were found in the near-surface fill that overlies the natural material in the southern and western margins of the site (Dames & Moore 1983).

Based on the results of the Phase I sampling, supplemental sampling was conducted in late August 1983 to determine the extent and source of the contamination. Thirteen soil borings were drilled, including four borings around the steam cleaning rack where high concentrations were detected during Phase I, four borings along the margins of the property to the south to evaluate the extent and concentration of contaminants in fill soils, two borings inside the building as controls, and three borings on the Boeing Thompson property to the south of the Isaacson Steel site. Groundwater monitoring wells were installed in two of the borings, one near the sump for the steam cleaning rack and the other near the former location of Slip 5. Groundwater samples and a water sample from the 48-inch diameter outfall on the LDW were also analyzed. Samples were tested for metals; selected samples were also tested for PCBs and organics (Dames & Moore 1983).

The following contaminants were detected at elevated concentrations in soil[7]:

- PCBs: <0.2 to 9.7 mg/kg DW
- Arsenic: 3.1 to 2,880 mg/kg
- Cadmium: 0.03 to 16 mg/kg
- Chromium: 1.3 to 1,170 mg/kg
- Lead: 1.3 to 1,170 mg/kg
- Mercury: <0.03 to 4.3 mg/kg
- Nickel: 7.0 to 2,030 mg/kg

The highest concentrations of arsenic were found near Bays 11 and 14 (Figure 9). In addition, the steam cleaning sump contained 94,950 mg/kg zinc and 350,000 mg/kg oil & grease.

Groundwater concentrations of several contaminants were also elevated:

- Arsenic: 19 to 41 ug/L
- Barium: 28 to 310 ug/L
- Chromium: 20 to 130 ug/L
- Lead: 1 to 95 ug/L

[7] Contaminants in soil and groundwater are identified as "elevated" if they exceed current MTCA Method A or B Cleanup Levels for unrestricted land use, as listed in Ecology's CLARC database at https://fortress.wa.gov/ecy/clarc/Reporting/ChemicalQuery.aspx

A water sample was collected from the 48-inch stormwater outfall; arsenic (8 ug/L), lead (23 ug/L), and antimony (17 ug/L) exceeded current MTCA groundwater cleanup levels.

According to Dames & Moore (1983), virtually all elevated contaminant concentrations could be correlated to two principal sources: a “hot spot” around the steam cleaning rack and sump, and materials used to fill the western and southern site margins (Dames & Moore 1983). Additional investigations were recommended to determine the source of arsenic. Maps and figures associated with this document were not present in the files reviewed during the preparation of this Data Gaps report.

Wicks Investigation (1983)

Patrick H. Wicks was retained on behalf of the Isaacson Corporation to evaluate the previous Dames & Moore (1983) study, and to conduct additional soil and groundwater sampling. Samples were analyzed for chemicals deemed of concern at the property based on the Dames & Moore evaluations, namely arsenic, chromium, copper, lead, zinc, and nickel. Wicks concluded that because the groundwater samples collected by Dames & Moore were not field filtered prior to being placed in the acid-fixed sample bottles, results from that study were not representative of in-situ groundwater quality (Wicks 1983).

Seven new groundwater monitoring wells (I-1 through I-7) were installed; soil samples were collected from borings and test pits during installation of the monitoring wells. Groundwater samples were collected from the seven new (I-1 through I-7) and three existing (No. 7, 12, 20) monitoring wells in October 1983 and again in December 1983. Sampling locations are shown in Figure 9 and results are provided in Appendix C-2. The following elevated concentrations were observed:

- Arsenic: 14 to 9,200 ug/L
- Lead: 2 to 30 ug/L
- Zinc: 27 to 14,000 ug/L

Arsenic concentrations exceeded the EPA Drinking Water Maximum Contaminant Level (MCL) of 50 ug/L in seven of the 10 wells. The highest concentrations of arsenic were found in wells I-2, I-1, and 12; these locations are near the steam cleaning pit and are just west of the former galvanizing plant (shown as Bay 14 on Figure 9). The highest zinc concentrations were found in this same area. Wicks identified the steam cleaning sump/rack, slag and other wastes from the Isaacson operation (steel manufacturing waste, paint wastes, galvanizing plant wastes), and fills and waste materials placed on the property prior to its purchase by Isaacson as probable sources of arsenic and zinc.

A detergent (Fist, supplied by Pace National Corporation) was used at the steam cleaning area from the early 1970s to the 1980s; this product reportedly did not contain heavy metals (Wicks 1983). Earlier detergent cleaners may have contained arsenic. Zinc in lubricating and hydraulic oils associated with equipment washed at the steam cleaning area may be the source of zinc in the steam cleaning sump sludge (Wicks 1983).

Water level measurements indicated that in the eastern portion of the property, the groundwater gradient is relatively constant (about 0.0009 feet per foot) and flows from east to west. In the western portion of the property, however, the groundwater flow direction in the shallow aquifer near the LDW appears to fluctuate with the tide. At low tide, groundwater flows toward the northwest (i.e., toward the river), while at high tide the groundwater flow is toward the south-southeast (i.e., away from the river) (Wicks 1983). Water table gradients on the western portion of the property ranged from approximately 0.001 to 0.004 feet per foot, more than four times higher than those found on the eastern portion of the property.

Initial Remedial Action (1984)

An initial remedial action, consisting of removal of 500 cubic yards of soil from arsenic hot spots, was conducted during August through November 1984 (ERM 2000a). Results of these remedial actions were presented in *Report on Remedial Project and Recommendation for Project Completion at Isaacson Corporation Property, Seattle, Washington*[8] (Wicks 1984b, as cited in Landau 1988a). No additional information was available regarding this remedial action.

Groundwater Monitoring (1985-1987)

Landau conducted groundwater monitoring at the Boeing Isaacson site from 1985 through January 1987. Sampling locations and results are presented in Appendix C-3.

In 1985, Landau repaired and replaced damaged groundwater monitoring wells and conducted semi-annual sampling of the monitoring wells for total and dissolved arsenic. Samples were collected at wells I-3, I-7, and B-12 in June 1985; these wells plus I-6, I-8, and I-104 were sampled in December 1985 (Landau 1986). Dissolved arsenic concentrations ranged from <5 to 1,200 ug/L; total arsenic ranged from 12 to 2,400 ug/L (Landau 1986). The highest concentrations were found at well I-105, located downgradient (to the west) of the former steam cleaning area (Figure 9).

In February 1986, a tidal groundwater level assessment was conducted (Landau 1987). Fluctuations in groundwater levels in response to tides were observed over 1,000 feet away from the LDW. During low tide, groundwater flow direction was generally west to northwest, with a gradient within the area of tidal influence of 0.0049 feet per foot. During high tide, there was a general groundwater flow reversal away from the LDW on the western portion of the site, with a gradient of 0.0018 feet per foot. The average water table gradient was 0.0016 feet per foot towards the LDW. Rising-head permeability tests were conducted at three wells; permeabilities ranged from 0.0036 feet per minute to 0.76 feet per minute, with an average permeability of 0.28 feet per minute (Landau 1987).

In July 1986 and January 1987, groundwater samples were collected from wells I-3, I-6, I-7, I-8, I-104, I-105, and B-12. Samples were analyzed for total and dissolved arsenic. Concentrations of dissolved arsenic ranged from <5 to 4,300 ug/L; total arsenic ranged from <5 to 4,700 ug/L (Landau 1987). The highest concentrations were again found at well I-105, located downgradient (to the west) of the former steam cleaning area.

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[8] This document was not found in the files reviewed during preparation of this Data Gaps report.

An assessment of arsenic migration was also conducted. Based on groundwater data obtained over a period of four years (1983 to 1986), Landau determined that arsenic is migrating slowly toward the LDW. The average annual flux of arsenic to the LDW was conservatively estimated as 59 pounds per year[9], with a resulting increase in arsenic concentration in the LDW of 0.02 ug/L (Landau 1987). Landau recommended that groundwater monitoring be terminated, and that additional sampling be conducted if onsite construction should occur in the future.

Landau concluded that, because of adsorption by soil and subsequent dilution in the LDW, the Boeing Isaacson property was unlikely to contribute significant arsenic to the LDW to cause exceedance of either the saltwater or freshwater chronic ambient water quality criteria (ERM 2000a).

Building 14-09 Thompson-Isaacson Site Investigation (1988)

In 1988, Landau conducted soil and groundwater investigations at the Isaacson and Thompson properties to support the planned construction by Boeing of a manufacturing facility at the site, designated as Building 14-09.

Soil samples were collected at 44 exploration locations, eight of which were completed as monitoring wells (Landau 1988a). Sampling locations are shown in Appendix C-4. All soil samples were analyzed for arsenic, and a subset of soil samples was analyzed for other metals, EP Toxicity, and PCBs. Soil samples collected within the area of former Slip 5 were also analyzed for cyanide, volatile organic compounds (VOCs), SVOCs, and pesticides.

Arsenic was detected at elevated concentrations in soil at depths to 15 feet, with concentrations ranging up to 4,120 mg/kg (Landau 1988a). For comparison, the current MTCA cleanup level for arsenic in industrial soil is 88 mg/kg[10]. The majority of arsenic exceedances occurred at depths between 4 and 12 feet along an east-west transect near the northern portion of the site, which includes the steam cleaning rack and sump area.

Groundwater samples were collected from the eight new wells plus seven pre-existing monitoring wells (Appendix C-4). The wells were screened at two depths: shallow (near the water table to a maximum depth of 30 feet), and intermediate (30 to 50 feet below ground surface) (Landau 1988a). Samples were analyzed for dissolved metals; in addition, wells within the former Slip 5 were analyzed for VOCs, SVOCs, and pesticides. Arsenic was found at concentrations ranging from 10 to 15,000 ug/L, well above the Washington background arsenic concentration of 5 ug/L[11] (Landau 1988a). Sampling results for chemicals other than arsenic were not available.

Additional soil samples were collected in June 1988 to better delineate the distribution of soil arsenic concentrations in selected portions of the Boeing Isaacson property (Landau 1988b). Samples were collected from three depths at 30 locations, as shown in Appendix C-4.

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[9] Estimate assumes a cross-sectional area of 12,000 sq.ft., calculated based on a length perpendicular to groundwater flow and a conservative depth of 20 feet.

[10] From Ecology's Cleanup Levels and Risk Calculations (CLARC) Database at https://fortress.wa.gov/ecy/clarc/Reporting/ChemicalQuery.aspx

[11] From Ecology CLARC database: https://fortress.wa.gov/ecy/clarc/Reporting/ParameterQuery.aspx

Specifically, eight additional borings were drilled near Bay 13, and 22 borings were drilled near Bays 11, 12, and 14. Arsenic concentrations up to 9,180 mg/kg were detected near Bay 13; arsenic was detected up to 24,200 mg/kg near Bays 11, 12, and 14 (Landau 1988b). The highest concentrations at both areas were found in the 0- to 5-foot depth interval.

Soil Remedial Action (1988)

As a result of the 1988 Site Investigation (Landau 1988a, 1988b), approximately 4,800 cubic yards of soil were excavated from the location of Bay 13 and the area between Bay 11 and Bay 14 (identified as the Courtyard) (Landau 1989). Excavation locations are shown in Appendix C-5. Over 3,000 cubic yards of the excavated soil, containing arsenic at concentrations ranging from 400 to 5,000 mg/kg, were transported offsite to the hazardous waste landfill in Arlington, Oregon. The remaining soil was returned to the excavations after analytical verification of acceptable[12] arsenic concentrations (ERM 2000a).

Storm Drain Construction (1989-1990)

Extensive grid sampling of soil from over 90 test pit locations was conducted by Technical Dryer, Inc. for Boeing as part of a planned storm drain construction in late 1989 and early 1990 (Technical Dryer 1991; ERM 2000a). A total of 1,150 cubic yards of soil with an average arsenic concentration of 1,102 mg/kg were removed from the pipeline excavation for offsite disposal at a Class I landfill. An additional 3,980 cubic yards containing an average arsenic concentration of 99 mg/kg was retained onsite for backfill. Concrete and asphalt removed from the surface of the site was steam cleaned and disposed of at Mount Olivet Landfill for construction debris in Renton, Washington (Technical Dryer 1991). Large pieces of metal slag were encountered in some areas of the site; these were analyzed for EP Toxicity metals and subsequently disposed of at the King County Cedar Hills landfill. Sample locations and results are presented in Appendix C-6.

This investigation indicated that large quantities of arsenic-contaminated soil were still present in the northern portion of the Boeing Isaacson property. An estimated 20,000 to 40,000 cubic yards of additional material warranted remediation based on subsequent investigation work completed by Landau and Parametrix (ERM 2000a).

Soil Remedial Action (1991)

Boeing implemented a remedial action program at the Boeing Isaacson property in 1991 to address elevated concentrations of arsenic in soil. The arsenic distribution in soil at the Isaacson site was characterized during a series of pre-1991 investigations and interim remedial actions. The approximate extent of arsenic contamination is shown in Appendix C-6, Figures 11, 12, and 13 (ERM 2000a).

The remedial action plan for the site was outlined in a document entitled *Thompson-Isaacson Site Soil Remedial Action Plan* (Landau 1990). The remedial action program was conducted between August and November 1991, during which time approximately 35,000 tons of soil were

[12] An acceptable arsenic concentration was defined as 700 mg/kg based on a human health risk evaluation, as described in Landau 1989.

excavated and treated on site using a chemical and physical stabilization process. The treated soil was placed back in the ground beneath a polyethylene cap and asphalt cover. A brief description of the soil remediation and stabilization process is presented below; a detailed description of the remedial action can be found in the *Final Report, Thompson-Isaacson Site Full-Scale Soil Stabilization Program Summary Report, Volumes I through III* (Landau & GeoEngineers 1992).

Soil Excavation and Treatment

During the full-scale remedial action program, the arsenic-contaminated soil was removed systematically from the affected areas using traditional excavation methods (e.g., track hoes and dump truck transport). The performance goal during the excavation activities was to remove soils with arsenic concentrations in excess of the MTCA industrial soil cleanup standard of 200 mg/kg[13] based on field screening and laboratory analysis (ERM 2000a). Soil exceeding this compliance level was excavated for treatment that included: (1) screening of soil with particles greater than 0.75 inches, (2) soil treatment with polysilicate and cement in a pug mill unit via a hopper and scale conveyor, (3) conveyance to a curing area, and (4) spreading in a lay-down area to a depth of approximately 18 inches. Finally, prior to final placement, the soil was graded and turned so that the end product was in granular form (sand and gravel sizes), allowing potential future excavation and/or grading activities if necessary for future development.

During the period between August and November 1991, approximately 35,000 tons of soil was removed for treatment using an above-ground physical and chemical process designed to stabilize the arsenic concentrations in soil such that soils, after treatment, no longer displayed dangerous waste characteristics. The process involved mixing contaminated soil with a proprietary silicate compound mixture that was custom-blended for the site soil conditions. The mixing resulted in a set of very rapid reactions between the polysilicate materials and arsenic, producing a low solubility arsenic metasilicate matrix.

When the soil had sufficiently cured (36 hours), verification sampling of treated soil was performed to validate that the treated soil met TCLP performance criteria. The successful results of the TCLP testing were reported in Landau & GeoEngineers (1992).

Performance Monitoring Soil Sampling

During the soil removal action, GeoEngineers conducted extensive sidewall sampling within excavated areas to verify compliance with the MTCA industrial cleanup level of 200 mg/kg. Soil removal and sampling were conducted in the general vicinity of the affected areas. Confirmation sampling was conducted in a systematic fashion in accordance with the procedures outlined in the work plan. The soil samples were screened for arsenic by Technical Dryer Corporation. If screening detected arsenic concentrations above 175 mg/kg, the side wall of the subject excavation was excavated an additional 12 feet. Samples from the new sidewall were then resubmitted to Technical Dryer Corporation for screening. If screening detected arsenic concentrations below 175 mg/kg, the sample was submitted to Laucks Testing Laboratory for confirmational analysis using EPA Test Method 6010.

[13] The current MTCA cleanup level for arsenic in industrial soil is 88 mg/kg.

At the completion of the soil removal action, arsenic soil concentrations in excess of 200 mg/kg remained along the north wall of the remedial excavation. Arsenic concentrations in this area typically ranged from greater than 200 mg/kg up to approximately 2,000 mg/kg. Compliance with the arsenic soil cleanup level on the north side of the excavation was not achieved because further soil removal would have compromised the integrity of the existing storm drain line. As such, the northern extent of the arsenic concentrations in soil beyond the storm drain is unknown. In contrast to the north wall, arsenic concentrations in confirmation samples from the remainder of the excavation were within the 200 mg/kg performance criterion.

Landfilling and Capping

Treated soil removed from the curing area was placed back in the excavation. The backfilled area extended from sewer line manhole cover 2 to approximately 100 feet west of manhole cover 5 and approximately 80 feet south of the storm sewer line (Appendix C-7). After soil was placed, it was compacted as required for intended future use. The backfilled material was capped with a polyethylene liner and asphalt cover (Landau & GeoEngineers 1992). The asphalt cap was extended to cover the remaining parts of the site not covered by buildings due to the potential that minor, localized concentrations of arsenic remained in the soil outside the capped area.

Compliance Monitoring

As noted above, concentrations of arsenic in excess of 200 mg/kg remained along the north side of the remedial action area. To protect human health and the environment, access to this soil was limited by placement of an asphalt cap. Institutional controls were implemented to prohibit access to the site.

Groundwater Monitoring (1992-1996)

Groundwater monitoring was conducted at the Boeing Isaacson and Thompson properties as part of the overall site remedial action program described in the *Thompson-Isaacson Site Soil Remedial Action Plan* (Landau 1990) and in accordance with the *Thompson-Isaacson Site Groundwater Monitoring Program* (Landau 1991).

The five compliance wells range in depth from 25 to 29 feet below ground surface (bgs). With the exception of well I-203, well screens are approximately 10 feet in length. Well I-203 has a well screen length of approximately 15 feet. The tops of the well screens are approximately 12 to 15 feet bgs. The locations of the wells are shown in Figure 10. Appendix C-8, Figure 5, is a geologic cross-section across the Boeing Isaacson/Thompson properties parallel to the LDW shoreline; this figure shows that wells I-104 and I-206 are screened within native soils; wells I-203 and I-205 are screened partly in native soil and partly in fill material.

Data collected between 1991 and 1996 were compiled in a report titled *Evaluation of Groundwater Compliance Monitoring Program, Boeing Thompson-Isaacson Site* (GeoEngineers 1997, as cited in ERM 2000a). Based on a statistical analysis of groundwater data from the Boeing Isaacson property (i.e., calculation of 95 percent upper confidence limits), GeoEngineers concluded that the downgradient monitoring wells on the site, I-104(s) and I-203(s), were in compliance with the freshwater chronic ambient water quality criterion for arsenic (190 ug/L for trivalent arsenic). Monitoring well I-206s on the adjacent Thompson property, however, exceeded this threshold.

Additional Groundwater Sampling (1999)

Groundwater samples were collected at the Boeing Isaacson property in December 1999 (ERM 2000a). The concentration of arsenic in the upgradient well (I-200) was 2 ug/L; the downgradient wells (I-104 and I-203) contained 150 to 160 ug/L arsenic.

Hydrogeologic Investigation and Human Health Risk Assessment (2000)

To further characterize hydrogeologic conditions at the site in support of Boeing's NFA request, ERM installed eight piezometers (PZ-1 through PZ-8) in August 2000 at locations shown in Appendix C-9. Subsurface soil samples were collected from the piezometer boreholes for lithologic logging and laboratory analysis for TOC and total iron. TOC ranged from 0.17 to 3.1 percent, and total iron ranged from 0.753 to 2.15 percent (ERM 2000d).

Single well hydraulic conductivity tests were conducted at the eight piezometers, including falling head and rising head tests. Aquifer hydraulic conductivity ranged from 1.52×10^{-4} centimeters per second (cm/sec) to 1.89×10^{-3} cm/sec, with an average hydraulic conductivity of 8.84×10^{-4} cm/sec.

Groundwater samples were collected from five existing monitoring wells (I-104, I-200, I-203 on the Boeing Isaacson property, and I-205 and I-206 on the Boeing Thompson property), and four piezometers (PZ-4, PZ-5, PZ-7, and PZ-8) in August and October 2000. Samples were analyzed for dissolved arsenic, TOC, total iron, and ferrous iron. Dissolved arsenic concentrations ranged from 2.7 ug/L at the background well (I-200) to 1,600 ug/L at well I-104 near the LDW (Appendix C-9). Concentrations of dissolved arsenic in the October sample were lower at wells I-104 and I-203 (Boeing Isaacson property) and significantly higher at well I-205 (on the Thompson property) than the corresponding samples collected in August.

A surface water sample was collected from a shoreline seep (Appendix C-9); the seep area emanated from within rock and rubble fill material beneath the wooden bulkhead forming the site boundary at an elevation of approximately -4 feet based on site survey data (ERM 2000d). The LDW stage at the time of sampling was approximately -7.5 feet, with a tidal stage of approximately 0.2 feet below mean low water. The seep flow was estimated at 5 gallons per minute from a generally horizontal area approximately 3 feet long. The seep sample was analyzed for dissolved arsenic, which was detected at a concentration of 7 ug/L (ERM 2000d).

A tidal survey was conducted. Water levels were recorded in site monitoring wells and piezometers from August 25 to 29, 2000 using data logging pressure transducers. Water levels were measured every 15 minutes in the wells, piezometers, and a stilling well in the Duwamish River (ERM 2000d). Tidal effects on groundwater elevations were noted across the entire study area. Minimal groundwater fluctuations were noted (approximately 0.5 feet) at the upgradient monitoring well, located approximately 1,330 feet from the LDW, but it did not exhibit the 12-hour cyclical tidal pattern observed at the other monitoring points. Significant tidal effects were attenuated approximately 400 feet from the LDW.

Groundwater flow across the site is generally west to west-southwest, with some flow deflection toward the axis of the former Slip 5. An average groundwater gradient of 0.004 was calculated.

A human health risk assessment was performed by Exponent, Inc. to derive a site-specific action level for arsenic in groundwater at the Boeing Isaacson property. The primary pathway of concern was identified as the consumption of fish and shellfish that might accumulate arsenic discharging to the LDW from groundwater; this pathway was used as the basis for a proposed groundwater action level. Proposed action levels of 8,330 ug/L and 1,109 ug/L were calculated for recreational and subsistence fishing scenarios based on the following assumptions:[14]

- target risk level of 10-5
- site-specific seafood consumption rates of 21 grams per day and 161 grams per day for recreational and subsistence anglers, respectively
- fractional intake of 0.2 to reflect a conservative estimate of the proportion of time that recreational anglers might collect seafood at this location
- proportion of total arsenic in seafood tissue that is in the form of inorganic arsenic is 1.4 percent
- bioconcentration factor of 1 (ERM 2000d).

Sump Removal and Soil Excavation (2006)

Boeing conducted an independent remedial action in 2006 to remove a below-grade, open-to-the-surface, 55-gallon drum that apparently was used as a sump along a former stormwater drainage line at this site (Boeing 2007; Landau 2007). The sump was discovered under a steel plate in the northeastern corner of the property during site reconnaissance activities in October 2006 (Landau 2007).

Two soil samples collected from the bottom of the sump in October 2006 indicated the presence of motor oil (2,200 to 2,700 mg/kg), PAHs (0.19 to 2.1 mg/kg), arsenic (60.1 to 72.4 mg/kg), cadmium (4.4 to 5.8 mg/kg), and lead (770 to 1,250 mg/kg) at concentrations above MTCA cleanup levels. Sample locations and results are presented in Appendix C-10. Based on these data, Boeing decided to remove the sump and excavate an additional 2 feet of soil surrounding the sump.

The remedial action included removal of the drum/sump along with approximately 8 cubic yards of soil for appropriate offsite disposal (Boeing 2007). Groundwater was not encountered to the maximum excavation depth of about 5 feet below grade (Boeing 2007). Three confirmation soil samples collected from the sump area excavation footprint indicated that analyte concentrations in soil at the limits of the excavation are below MTCA cleanup levels, except for arsenic. Arsenic concentrations ranged from 6.6 to 25.1 mg/kg in the confirmation samples; these concentrations are well below the 200 mg/kg remedial action goal established during previous remedial actions at Boeing Isaacson and only slightly higher than the MTCA Method A soil cleanup level for unrestricted land use of 20 mg/kg (Landau 2007). Boeing therefore concluded that no further action is warranted (Boeing 2007).

[14] Some of the assumptions used for this analysis are inconsistent with those selected for use in risk assessments planned or in progress at other sites in the LDW.

Groundwater Monitoring (2006 and 2007)

Groundwater monitoring was conducted during 2006 and 2007. Sampling of wells on the Boeing Thompson property is discussed in Section 4.2.4. In September 2007, samples from monitoring wells I-104, I-200, I-203, piezometer PZ-7, and a seep were analyzed for total dissolved arsenic. Arsenic concentrations in piezometer PZ-7 and the seep were 4 ug/L and 5 ug/L, respectively. The upgradient well I-200 contained 0.9 ug/L. Wells I-104 and I-203 (downgradient) contained 3,600 ug/L and 140 ug/L, respectively (Landau 2008b, as cited in McCrone 2008).

4.1.5 Potential for Sediment Recontamination

Past activities at the Boeing Isaacson property have resulted in soil and groundwater contamination.

Historical Contaminant Sources

The following potential contaminant sources associated with historical site use have been identified at the Boeing Isaacson property.

- **Fill Material**
  The fill placed in Slip 5 reportedly consisted of slag waste and soil; land reclamation along the LDW was primarily comprised of imported soil from offsite sources but may have also included slag, fire brick (which typically contained asbestos), and material dredged from the LDW (Dames & Moore 1983). Soil sampling conducted in 1983 identified high concentrations of metals in the fill material in the southern and western margins of the property.

- **Historical Releases from Mineralized-Cell Preserving Company**
  The Mineralized-Cell Preserving Company, which reportedly operated on the Boeing Isaacson site in the mid-1940s, used arsenic-containing solutions to treat and harden logs. Storage tanks were washed twice daily and sludge and remaining chemicals were reportedly drained onto the ground. This may have resulted in soil and groundwater contamination with arsenic and other metals such as copper and zinc.

- **Sump Near Former Location of Slip 5 Outfall**
  In the late 1950s or early 1960s, the Isaacson Steel Company installed a water/air wash system at the east end of Bay 12 (southeast of Bay 13 on Figure 9). The primary purpose of this system was to reduce exposure of employees to airborne paint. The system was comprised of a fan, scrubber, sump, several grates and underground tunnels through which airborne paint solvents and solids were drawn for scrubbing before discharge to the atmosphere (Wicks 1983). After its installation, water overflowing from the sump of this system discharged along the ground surface to an area south of the original end of the 48-inch storm drain (the eastern end of Slip 5). In 1967, after the storm sewer was extended to the LDW, sump overflow discharged into the storm drain until it was disconnected from the 48-inch line in 1971 (Wicks 1983).

- **Steam Cleaning Rack and Sump**
  A steam cleaning rack and sump were installed at the Isaacson Steel facility in 1970 or 1971 to eliminate drainage discharging from this area to the storm sewer (Figure 9). Cranes, forklifts, and other machinery were cleaned at this location; it was not used for process cleaning of steel products. The rack and sump consisted of a metal grate supported over a concrete-walled sump. One to two feet below the grate was a metal pan up to 12 inches deep, which was intended to capture sediment and large objects from the steam cleaning operations. The pan rested on a one-foot layer of sand with a one-foot layer of gravel below that. There was no seal beneath the gravel. Sludge that collected in and around the pan was removed when drainage became restricted, approximately every few years. Sludge was disposed by commercial disposal companies (Wicks 1983).

Ongoing Contaminant Sources

The Boeing Isaacson property is currently vacant. Portions of the site are used for parking for Boeing Thompson employees. No other potential pollutant sources associated with ongoing activities have been identified.

Potential Pathways to EAA-6 Sediments

The potential for sediment recontamination associated with this property is summarized by transport pathway below.

Stormwater Discharges

The Boeing Isaacson property is currently vacant, paved with concrete and/or asphalt, and does not have a stormwater drainage system. Seven catch basins located on this property connect to the Boeing Thompson Stormwater System (Figure 7), and may contribute contaminants to stormwater that discharges at the northern Boeing Thompson outfall. Six edge drains are located along the Boeing Isaacson shoreline; the function and configuration of these edge drains is unclear. Based on available information, it is not possible to determine whether stormwater discharge from Boeing Isaacson is a potential pathway of contaminants to EAA-6 sediments.

Groundwater Discharges

Historical activities at this property have resulted in contamination of soil and groundwater. Extensive remedial actions were conducted in 1984, 1988, and 1991 to remove and treat arsenic-contaminated soils. Concentrations of arsenic above 200 mg/kg remain on site along the northern portion of the excavation area, just to the south of the 48-inch storm drain line. Contaminants in soils may be transported to groundwater and subsequently to EAA-6.

Groundwater monitoring conducted between 1991 and 2007 has indicated the presence of arsenic at concentrations to 3,600 ug/L at the Boeing Isaacson property, significantly higher than the groundwater-to-sediment screening level of 370 ug/L[15] (Table 5), and groundwater at the site

[15] These screening levels were developed to assist in the identification of upland properties which may pose a potential risk of recontamination of sediments at Slip 4. The screening levels incorporate a number of conservative assumptions, including the absence of contaminant dilution and ample time for contaminant concentrations in soil,

flows toward the LDW. Arsenic has also been detected at elevated concentrations in groundwater at the adjacent Boeing Thompson property.

Sampling at Boeing Isaacson has focused on arsenic. However, investigations conducted in 1983 and 1988 identified lead (to 95 ug/L), silver (to 8.1 ug/L), and zinc (to 14,000 ug/L) at concentrations above groundwater-to-sediment screening levels[16]. Arsenic remediation activities may have resulted in reduction or elimination of the sources of these contaminants, however no information is available to support this conclusion.

Based on available information, the Boeing Isaacson property is considered a potential source of EAA-6 sediment recontamination via the groundwater discharge pathway.

Bank Erosion/Leaching

A wooden bulkhead is located along the boundary between the Boeing Isaacson property and the LDW. Rock and rubble fill material have been placed behind the bulkhead. Very little erodable soil material is present in this area. Bank erosion is believed to represent a less significant pathway for contaminants to the LDW than groundwater discharge. Given the documented soil contamination at this property, however, bank erosion can not be ruled out as a potential source of sediment recontamination.

Surface Runoff/Spills

The Boeing Isaacson property is paved and most of the site area is not connected to the Boeing Thompson stormwater system. Surface runoff to the LDW could potentially occur, however no industrial activities currently occur at the site. Therefore, there is a low potential for sediment recontamination associated with surface runoff and spills.

4.1.6 Data Gaps

Information needed to assess the potential for sediment recontamination associated with current or historical operations at the Boeing Isaacson property are listed below. Data gaps were identified for stormwater, groundwater, and bank erosion pathways to EAA-6 sediments.

Stormwater Discharges

- No information is available about the condition of the 48-inch county storm drain line that passes through the Boeing Isaacson property. Arsenic in soil and groundwater around this

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sediment, and groundwater to achieve equilibrium. In addition, the screening levels do not address issues of contaminant mass flux from upland to sediments nor do they address the area or volume of sediment that might be affected by upland contaminants. Because of these assumptions and uncertainties, these screening levels are most appropriately used for one-sided comparisons. If contaminant concentrations in upland soil or groundwater are below these screening levels, then it's unlikely that they will lead to exceedance of marine sediment CSLs. However, upland concentrations that exceed these screening levels *may or may not* pose a threat to sediments; additional site-specific information must be considered in order to make such an assessment.

[16] Groundwater-to-sediment screening levels, based on CSLs in sediment, are 13 ug/L for lead, 1.5 ug/L for silver, and 76 ug/L for zinc (SAIC 2006).

pipe could be entering the storm drain line through gaps or holes in the piping, if any exist, and could subsequently be transported to the LDW and EAA-6 sediments.

- The purpose, function, and configuration of the edge drains along the Boeing Isaacson shoreline are unclear.
- No information is available regarding contaminant concentrations in catch basins that drain to the Boeing Thompson stormwater system (CB-10, CB-11, CB-12, CB15, CB-16, CB-34, and CB-35).
- No information is available on the source or status of the “outfall of unresolved origin” reportedly located near the Boeing Isaacson/Jorgensen Forge property boundary.

Groundwater Discharges

- Data on contaminant concentrations in subsurface soil near the former location of the Slip 5 outfall (Figure 9) is not available. These data are needed to evaluate the potential for historical releases of contaminants from the central KCIA storm drain system; if present, these may be transported to the LDW and EAA-6 sediments via groundwater.
- The extent of contaminated soil to the north of the 48-inch storm drain line is unknown. Contaminants in soil could enter the storm drain line through gaps or holes in the piping, and subsequently could be transported to the LDW.
- Arsenic has been detected in groundwater at the Isaacson property at concentrations up to 1,600 ug/L. Additional groundwater data are needed to determine whether residual historical contamination poses a risk of sediment recontamination via groundwater transport.
- In 1997, GeoEngineers conducted a statistical analysis of groundwater data at the Boeing Isaacson (and Thompson) properties; they calculated a 95 percent upper confidence limit and concluded that downgradient monitoring wells at the Boeing Isaacson site were in compliance with ambient water quality criteria. This analysis was not available for review at the time this Data Gaps report was prepared, and the groundwater data available for review were incomplete. Additional groundwater samples at the Boeing Isaacson property were collected in 2000 and 2007. Therefore, the validity of this conclusion needs to be evaluated.
- Soil and groundwater sampling at this property has focused on arsenic. However, investigations conducted in 1983 and 1988 identified lead (to 95 ug/L), silver (to 8.1 ug/L), and zinc (to 14,000 ug/L) at concentrations above groundwater-to-sediment screening levels[17]. Other metals may be associated with fill material used at the site. Arsenic remediation activities may have resulted in reduction or elimination of the sources of these contaminants, however no sampling has been conducted to determine whether this is the case.

Bank Erosion/Leaching

- No information is available regarding contaminant concentrations in bank soils.

[17] Groundwater-to-sediment screening levels based on CSLs are 13 ug/L for lead, 1.5 ug/L for silver, and 76 ug/L for zinc, as described in SAIC 2006.

4.2 Boeing Thompson

Facility Summary: Boeing Thompson	
Address	8701 East Marginal Way S. 8770 East Marginal Way S. 8811 East Marginal Way S.
Property Owner	The Boeing Company
Tax Parcel No.	000740-0033
Parcel Size	19.35 acres (842,675 sq.ft.)
Facility/Site ID	83767996 (Boeing Thompson) 4274402 (Boeing Thompson Site)
SIC Code	3721: Aircraft 3728: Aircraft Parts and Auxiliary Equipment
EPA ID No.	WAD980982912
NPDES Permit No.	SO3000148
UST/LUST ID No.	10410

The Boeing Thompson property is located along the east side of the LDW, at approximately RM 3.8 to 3.9, as measured from the southern tip of Harbor Island. The property is rectangular, approximately 19.35 acres in size, and is situated between the Duwamish River on the west and East Marginal Way S. on the east; the property is bordered on the south by the Kenworth Motor Corporation (Insurance Auto Auctions), also known as the former PACCAR site, and on the north by the Boeing Isaacson property (Figure 2). Land use in the vicinity of the Boeing Thompson property is industrial. Between 1984 and 2002, Boeing also owned a small (0.89-acre) rectangular parcel located across East Marginal Way S. (Tax Parcel No. 0001600019), which was considered part of the Boeing Thompson facility. This parcel was sold to the King County Museum of Flight Authority in April 2002, and was subsequently sold to King County in December 2003.

The Boeing Thompson property is listed in documents, permits, and databases under a variety of addresses, including 8701 East Marginal Way S., 8770 East Marginal Way S., and 8811 East Marginal Way S., in Tukwila, Washington.

Ecology's Facility/Site Database lists this property as Boeing Thompson Site (FS ID No. 4274402) at 8770 East Marginal Way S., as Boeing Isaacson Thompson (FS ID No. 2218) at 8541 East Marginal Way S., and as Boeing Thompson (FS ID No. 83767996) at 8701 East Marginal Way S. EPA's Envirofacts database lists this property at 8701 East Marginal Way S., under the name Boeing Military Airplanes Thompson Site. Boeing's Stormwater Pollution Prevention Plan (SWPPP) for this property lists the Thompson site address as 7755 East Marginal Way S. (which is the address for Boeing Plant 2). The plan also references the physical address of the Thompson site as 8701 East Marginal Way S.

4.2.1 Physical Setting

The Boeing Thompson property is located in an area of extensive fill placed as part of the re-channelization of the LDW, as described in Section 2.1. Boreholes drilled at this property found up to 1.5 feet of sand and gravel fill beneath the pavement; fill material consisting of silty sand to sandy gravel was encountered to depths ranging from 6.5 to 17.5 feet below ground surface. Grain size distribution in the fill material exhibited significant variability both laterally and vertically. The boreholes with the thickest fill layers were encountered within the area of the former Slip 5 (ERM 2000d). Fill materials encountered in these borings include bricks and slag material. Native soils below the fill consist primarily of fine sand and silty fine sand with scattered silt intervals. Wood fragments were commonly observed in the native soils, and organic sediments and peat were observed at some locations (ERM 2000d).

The topography is relatively flat, sloping less than one half of one percent toward the LDW, and the property is almost entirely paved (Boeing 2001). Groundwater generally flows to the west toward the LDW, and is affected by a regular pattern of diurnal fluctuations over most of the property due to tidal influences. Localized effects of fill heterogeneity are observed, especially near the LDW shoreline.

Groundwater elevation measurements in 1996 and 2000 indicated that groundwater may also flow from the former Slip 5 area to the south-southwest near the Boeing Thompson shoreline (i.e., toward the location of monitoring well I-206 and possibly the Kenworth Truck/IAA property to the south (see Appendix C-8, Figures 10 and 11); however, the accuracy of this interpretation is limited by the number and location of existing monitoring wells.

Significant tidal effects on groundwater have been observed in a 2000 study (ERM 2000d). Tidal efficiencies were generally greatest near the LDW, but efficiency values were extremely variable (0.93 to 37.84 percent). The tidal efficiency of 0.93 percent at well I-205 (shown on Figure 10) was believed to be an anomaly, due to possible equipment malfunction, aquifer heterogeneity, or seawall effects. Recorded groundwater elevation changes at this well exhibited patterns inconsistent with data from the other wells and piezometers in the vicinity.

4.2.2 Current Operations

As of December 31, 2007, industrial/manufacturing operations have reportedly been relocated from the Boeing Thompson site to other Boeing facilities, primarily the aircraft final assembly locations in Renton and Everett. It is not clear what activities are currently being conducted at the property. The following description of activities is based on the 2001 SWPPP (Boeing 2001), which is the most recent available description of operations at the Boeing Thompson property.

The property, operated by the Boeing Commercial Airplane Group, includes nine buildings where industrial operations and associated utilities and logistics are located. The majority of the area is composed of outdoor parking areas, storage areas and transportation lanes. Industrial activity consists of assembly of jet engines for Boeing commercial aircraft. Engines are brought to the facility directly from engine manufacturers by truck and are fitted with external hardware which is required for connection with electrical, mechanical, and fuel systems on Boeing commercial aircraft. The engines are then mounted on struts before being shipped offsite to the

Renton and Everett airplane assembly plants. Activities conducted at the site include testing, machining, and painting of engine sub-assemblies; these occur within Building 14-01 (Figure 9).

The storm drain system at the Boeing Thompson property consists of 81 catch basins, 23 storm drain manholes, and two oil-water separators. The structures drain through two active private outfalls to the Duwamish River (Figure 7). These outfalls are partially or entirely submerged during high tides. The 48-inch King County storm drain line receives drainage from one catch basin on the Thompson property.

Potential sources of stormwater pollution include:

- Outside materials and wastes stored in tanks, which includes a 550-gallon aboveground diesel storage tank on the western side of Building 14-02, a 240-gallon aboveground diesel storage tank on the northern side of Building 14-13, one 5,000-gallon aboveground storage tank on the western side of Building 14-01 for aqueous degreaser fluids that has never been used, and one 20,000-gallon underground diesel/heating fuel storage tank on the western side of Building 14-02 that was closed in place.
- Outside material stored in containers in the Material Storage Sheds near Building 14-03
- Outside waste stored in containers at the Waste Storage Area near Building 14-03.

The facility employs a variety of Best Management Practices (BMPs) to minimize the potential for releases of contaminants to the environment. Manufacturing occurs inside buildings. Outside material storage areas are covered and provided with spill containment, and are constructed to reduce the influx of windborne precipitation. Storage and maintenance of materials, wastes, and tanks is conducted in accordance with applicable regulations. A spill prevention, control and countermeasures (SPCC) plan, a hazardous waste management plan, and a hazardous materials management plan have been developed and implemented for the facility (Boeing 2001).

Wastes that have been stored onsite are listed below (Boeing 2001):

Heavy duty alkaline cleaner	Solvent/solvent product
Rags contaminated with hydraulic fluids, oils, petroleum distillates, and tributyl phosphate	Parts cleaner: tetrachloroethylene, methylene chloride, petroleum distillate
Rags contaminated with solvents/solvent products and sealants with lead	Absorbent materials and debris contaminated with hydrofluoric acid
Containers with paints and adhesives	Sludge contaminated with arsenic and PCBs
Hydraulic fluids and oils, petroleum solvents	Alkaline cleaners and wetting agent
Containers of sealant, resins, silica	Debris with cured paints and primers
Containers with residual sealant	Dust and debris from structural steel cleanup

Ecology’s UST database lists two active underground tanks at this location: a used oil/waste oil tank and a heating fuel tank. In addition, a leaded gasoline tanks is listed as having been removed. According to Boeing’s records, there are currently no active USTs at this property, although there were three USTs historically. One 1,000-gallon leaded gasoline UST was removed from the northwestern corner of Building 14-02 in January of 1990, one 20,000-gallon diesel/heating fuel UST was closed in place on the western side of Building 14-02 in December

2003, and one 4,000-gallon holding tank associated with an oil/water separator was removed from the eastern side of Building 14-03 in 1995 (McCrone 2008).

Several catch basins that drain the paved shoulder on the west side of East Marginal Way S. flow into the Boeing Thompson storm drain system near the main gate. This flow combines with other property runoff, passes through an oil-water separator, then discharges to the LDW at an outfall on the northern portion of the Boeing Thompson shoreline (Boeing 2001). There are no identified areas where stormwater runs onto the Boeing Thompson property from offsite.

Non-stormwater discharges from the Boeing Thompson property result from fire hydrant flushing, water line flushing, and irrigation drainage; these are not associated with industrial discharges and are not exposed to contaminants before discharge.

Merrill Creek Holdings, LLC, the owner of the property located immediately south of Boeing Thompson (the former Kenworth Truck Motor Corporation/IAA), has identified two drainage pipes that discharge to their property from the south wall of the Boeing Thompson property (O’Brien 2008). Boeing reports that one of these drainage pipes is a 12-inch perforated culvert pipe that drains groundwater and releases pressure from behind the concrete wall. This culvert pipe has no tie-ins with the Boeing Thompson storm drain system. The second pipe is identified as a foundation drain. Boeing is currently preparing a memorandum to document information about these two pipes. The two drainage pipes have a potential to discharge at the surface onto the Kenworth Truck/IAA property (O’Brien 2008).

The facility operates under an industrial stormwater general permit, No. SO3000148, which was originally issued on December 22, 1993 and has been extended to May 2008. A stormwater compliance inspection was conducted by Ecology on April 6, 2007, which indicated that the benchmark level for total zinc had been exceeded for the preceding three quarters, and that a Level 1 response was required (Ecology 2007e).

Boeing Thompson operates under EPA ID No. WAD980982912. The most recent hazardous waste compliance inspection was conducted by Ecology on March 2, 2006, and no compliance issues were identified (Ecology 2006e). The facility does not have an air operating permit or a King County waste discharge permit or authorization.

4.2.3 Historical Operations

In December 1917, Bissell Lumber Company applied to the U.S. Corps of Engineers for permission to dredge, construct a log chute, and install pilings in Slip 5. The permit was completed in March 1931. In 1929, according to a review of Sanborn Fire Insurance Maps (Ecology, No Date), the Bissell Lumber Company operated a sawmill on the south bank of Slip 5, which contained various conveyors, lumber transfer areas, and planning areas.

At that time, the Prestolite Company was located on East Marginal Way across from the Bissell Lumber Company. Structures included a carbide drum shed, a filling shed, a compressor and gas scrubber, offices, and a warehouse (Ecology, No Date). The Fisher Body Corporation’s veneer factory was planned for construction directly south of the Bissell Lumber Company. Aerial photos from the 1930s indicate the presence of log booms on the southern edge of Slip 5 and log rafts in the LDW along the property line extending to the south (Appendix B).

The Bissell Lumber Company discontinued operations in mid-1945 (Foster 1945). At this time, the facility had expanded slightly beyond its 1929 size (Ecology, No Date). A large fuel tank was located at the southern edge of the property. The location of the Prestolite Company was now occupied by Linde Air Products Company, with very little change in onsite structures and operations. An airplane repair and painting facility was located directly north of the Linde site. The planned location for the Fisher Body Corporation veneer factory was occupied by Kenworth Motor Truck Corporation’s assembly plant; operations included paint spraying, carpentry, and parts storage.

In May 1952, the parcel was purchased by the Seattle Trust & Savings Bank (as Trustee). In September 1954, Puget Sound Bridge & Dredging Company requested a permit from the Corps of Engineers on behalf of Charles W. Thompson, to build a three tier timber bulkhead on the south side of Slip 5 to retain fill material dredged from the LDW. The permit was granted and the bulkhead was completed in January 1955. Aerial photos indicate that all buildings on the property were removed by 1956. In October 1956, the parcel was purchased by Parr Seattle Company; it was subsequently purchased by The Boeing Airplane Company in January 1957. Consolidated Freightways, Inc. had two leases on the property beginning in 1955; the end date of those leases is unknown.

Until 1981, the Boeing Thompson facility (Building 14-01) was used for plaster of paris mock-up and assembly of aircraft engines. In September 1981, the facility was expanded to include the 757 Fatigue Testing Facility (Ecology 1982e).

Prior to 1984, the Thompson site had a Metro Waste Discharge permit for a plating operation that was discontinued in 1984 (METRO 1990). Boeing submitted an application for a waste discharge permit in March 1990 (METRO 1990), however no industrial discharges were identified.

In September 1988, Boeing submitted a revised Notification of Dangerous Waste Activities (EPA ID No. WAD980982912) for the Thompson facility. The facility generated the following hazardous wastes in 1987 (Boeing 1988d):

Waste Description	Dangerous Waste Number	Waste Quantity (pounds)
Gasoline/water mixture	D001	1,336
Copper brush plating rinse water – contains copper sulfate, sulfuric acid, hydrochloric acid, pH<2	D002	454,198
Antifreeze – ethylene glycol and water	WT02	10,560
Paint booth wash water and sludge	WT02	245,073
Copper brush plating rinse water – 2<pH<12	WT02	80,578
Paint booth wash water and sludge, chrome contaminated	WT02, D007	209,418
Paint (latex, acrylic) contaminated cans, debris	WT02	6,016

Waste Description	Dangerous Waste Number	Waste Quantity (pounds)
Acid contaminated solids	WT02	170
Asbestos >10,000 ppm	WC01	3,190
Cans – Ignitable paint/adhesive/sealant/resin	D001	1,794
Concrete patch/asphalt patch	WT02	1,001
Epoxy resin/hardener	WT02	1,474
Arsenic contaminated dirt/debris	WT02, D004	1,084
Lab pack – flammable	D001, WL02	117
Lab pack – ORM-E	WL02	75
Lacquer thinner	D001	15
Methyl ethyl ketone	F005	381
Methyl ethyl ketone/paint mixture	F005	761
Mixed flammable solvents	D001	100
Oil contaminated rags/debris	WT02	338
Solvent contaminated rags/debris	WT02	21,643
Resin/adhesive	D001, WT02	459
Resin/resin kits	WT02	1,474
Sealant/sealant tubes	WT02	10,091
Small containers – paint/resin/sealant/adhesive	WT02, D006, D007, D008	209
Solvents/paint mixture	F003, F005, D007, D008	1,051

Approximately 79,604 pounds of products containing hazardous substances were used at the facility in 1990 (Boeing 1992c), including methyl ethyl ketone, toluene, copper sulfate, Jet Clean, Oxsolve, sealant (containing metals), ammonia, Freon, and paint. Approximately 1.7 million pounds of hazardous waste was generated at the facility in 1990.

EPA's Toxics Release Inventory (TRI) database lists the following releases from this facility in 1990, the most recent year for which data were available:

- Methyl ethyl ketone: 5,268 pounds fugitive air emissions, 750 pounds stack emissions, and 4,758 pounds off-site land disposal
- Toluene: 5,503 pounds fugitive air emissions, 7,768 pounds stack emissions, and 2,913 pounds off-site land disposal

In the early 1990s, the Thompson facility supported the B-2 bomber program; the facility was responsible for major assembly of the Out Board Section and Aft Center Section of the aircraft (Boeing 1992c). The operations included in major assembly included final priming and painting of parts; copper plating of parts for lightning protection; sealing and bonding to form section structures; and fuel systems testing. Hazardous substance use decreased to 35,677 pounds in 1993; hazardous waste generation decreased to 276,209 pounds in 1993 (Boeing 1994c) and to 12,250 pounds in 2007.

A letter to Boeing from Burlington Environmental in the Boeing Thompson file, dated May 21 1991, referred to Boeing's request for disposal of 25 pounds of unused Dearborn 711 product, which is designated as F027 (dioxin-containing waste) by EPA (Burlington Environmental 1991). The letter indicated that no incinerator permitted to destroy F027 wastes could be identified, and therefore the material could not be accepted for disposal. Ecology agreed with Boeing's plan to hold the material in a controlled product storage area at the Thompson site until a suitable reuse/treatment/disposal option could be found (Ecology 1992). Boeing records indicate that there was a shipment of F027 waste off-site in 1993; although details on the manifest differ from those cited above, it is likely that this was the same material referred to in the May 21, 1991 letter (McCrone 2008).

In 1993, B-2 bomber production was discontinued and the Boeing Defense and Space Group operations described above were discontinued. On May 1, 1994, the Boeing Commercial Airplane Group, Renton Division, assumed responsibility for the Thompson facility from the Boeing Defense and Space Group (Boeing 1994a).The facility was cleaned up and refurbished for occupancy by the Propulsion Systems Division (Boeing 1994c).

Ecology's LUST database lists one tank at this facility. Releases from a leaded gasoline tank (Release ID No. 2557) were documented; cleanup began in June 1995 and the tank was reported cleaned up in June 2000.

A Dangerous Waste compliance inspection was conducted by Ecology on August 5, 1997 (Ecology 1997). The facility was identified as a large quantity generator, with approximately 1,100 workers. Approximately 150 workers are engaged in engine systems assembly at the facility (SIC Code 3721). Processes generating waste were identified as application of sealant; cleaning; painting, tube-making; and small Alodine[18] coating (Ecology 1997). Waste streams include solvents, sealants, waste paint, absorbents, and paint filters. No issues of concern were identified.

Spills

<u>August 1992</u>**.** A spill was identified in August 1992 from the 1,000-gallon fiberglass oil collection/overflow tank associated with the three chamber oil/water separator, which was used during testing of Boeing 767 aircraft hydraulic systems (Boeing 1992b). The separator system and the overflow tank were supposed to be serviced/emptied on a regular basis. However, this system became inactive in 1983 and was removed from the servicing schedule. In 1992, Boeing personnel found the overflow tank overfilled and pumped it out; because the tank was overfilled, it is possible that hydraulic oil and/or surface oils from automobile traffic could have leaked into surrounding soils and groundwater. Boeing proposed and conducted an inspection of the suspected release as described in Section 4.2.5 below, and added the oil/water separator and spill containment tank to their Planned Maintenance Inspection program (Boeing 1992b).

<u>June 1997</u>**.** On June 18, 1997, Boeing discovered leakage from a cooling tower located on the roof of Building 14-14 at the Boeing Thompson site. The leak was estimated at about ½-gallon per minute. Water leaking from the cooling tower contained both a biocide and a corrosion

[18] Contains chromic acid, potassium ferricyanide, and hydrofluoric acid (

inhibitor. The biocide was Nalco 2818, which contained sodium hypochlorite. The corrosion inhibitor was Nalco 2826, which contained organophosphonate, polyglycol, and sodium polytriazole (Boeing 1997a). Boeing personnel stopped the flow of chemicals to the cooling tower as a short-term solution. By June 20, Boeing personnel had repaired the leak in the cooling tower so that discharge into the roof drains (and storm drain system) had ceased. This was confirmed during an inspection of the cooling tower on June 30, 1997 (Boeing 1997b).

October 1999**.** A spill of less than 70 gallons of hydraulic oil from a forklift in Building 14-01 was reported in October 1999 (Boeing 2001). None of the material was discharged to the LDW.

4.2.4 Historical Stormwater Discharges

Boeing submitted an application for an NPDES permit on March 18, 1981 (Boeing 1981a, 1981b, Ecology 1981c). According to the application, all industrial effluent discharged to the LDW from the Thompson site previously originated in the Building 14-02 boiler house. The effluent included two separate flows: air compressor blowdown and non-contact cooling water. The cooling water was discharged with no treatment, and the compressor blowdown was discharged to a small oil/water separator (Boeing 1981b). Boeing proposed to replace the existing separator with a more sophisticated system to accommodate fatigue testing of Boeing 757 aircraft frames on the west side of Building 14-01. The proposed system would treat the air compressor blowdown and the runoff water from the Fatigue Test pads due to the potential presence of oil. The proposed system incorporated a flow control collection basin, a three-cell oil/water separator, an emergency shut-off valve, and an overflow tank (Boeing 1981b). Under normal operating conditions, the runoff water would be treated by the separator and discharged to the storm drain system. In the case of an upset condition, the emergency valve would be closed and the oil and any contaminated water would be hauled away by a licensed disposal contractor (Boeing 1981b).

The following industrial waste streams were listed in the permit application (Boeing 1981b):

Waste Description	Source	Treatment	Disposal Method
Existing Discharges:			
Plaster rinse water	Engine mock-up, Bldg. 14-01	None	Metro sewer system
Leak detection water	Tube pressure test tank, Bldg. 14-01	None	Metro sewer system
Cooling water with low concentrations of nitrates	Cooling tower, Bldg. 14-01 roof	None	Metro sewer system
Cooling water	Booster pumps, Bldg. 14-01	None	Metro sewer system
Non-contact cooling water	Air compressors, Bldg. 14-02	None	Discharge to surface waters
Blowdown water	Boiler, Bldg. 14-02	None	Metro sewer system
Air compressor blowdown, possible oil	Bldg. 14-02	Oil/water separator	Water discharged to storm sewer; oil hauled away by disposal contractor
Proposed Discharges*:*			
Cooling water with low concentrations of nitrates	Cooling towers adjacent to Bldg. 14-03	None	Metro sewer system

Waste Description	Source	Treatment	Disposal Method
Washdown water	Test pad, Bldg. 14-03	Oil/water separator	Water discharged to storm sewer, oil hauled away by disposal contractor

A site inspection conducted by Ecology on May 20, 1981 confirmed the information cited in the permit application. An existing stormwater discharge to the LDW of air compressor blowdown (via an oil/water separator) and non-contact air compressor cooling water was identified (Ecology 1981b). The temperature of the cooling water was maintained at about 70^{o}F. The proposed Fatigue Test Pad would add a new discharge; wash water from the test pad would be discharged via a new oil/water separator. The new oil/water separator would also be connected to an overflow tank to contain any emergency spills of hydraulic oil from the test pads (Ecology 1981b, 1981d).

Although issuance of the permit was delayed due to an administrative backlog at Ecology, discharge of 22,000 gpd of air compressor blowdown and washdown water via an oil/water separator, and 16,000 gpd of non-contact cooling water (a total discharge of 38,000 gpd) was approved beginning September 18, 1981 (Ecology 1981c; Boeing 1982). The NPDES Waste Discharge Permit (WA-003065-1[I]) was issued on September 14, 1982 (Ecology 1982f).

The expanded facility replaced the existing oil/water separator with a large three-cell oil/water separator with an emergency shut-off valve and a holding tank. The new separator treated air compressor blowdown, runoff and washdown water from the fatigue test pads, and condensed moisture from the heating system (Ecology 1982e, 1984b). The wastewater from the oil/water separator emptied into a storm drain tributary to the LDW. A September 14, 1982 site inspection indicated that the operation “looks clean” (Ecology 1984b).

No fueling or de-fueling operations took place on the site; only hydraulic oil filling operations were conducted on the test pads (Ecology 1982e). In case of an oil spill, the emergency valve was closed to prevent any oil from entering the storm sewer. The oil/water separator and holding tank were used to contain the spilled oil, which was then properly disposed of (Ecology 1982e).

In April 1985, Boeing requested a revision to the NPDES permit to modify the range of acceptable pH values from “6.5 to 8.5” to “6.0 to 9.0” because rain and other natural waters often approach the lower limit (6.5) or even fall outside of the lower limit (Boeing 1985a).

Also in April 1985, Boeing applied for a stormwater discharge permit for the Boeing Thompson facility (Boeing 1985b). The discharge was described as a Group I stormwater point source that drains primarily paved parking and industrial areas and rooftops. Most industrial activities were conducted inside buildings. The area drained was listed as 14 acres, of which about 30 percent was rooftop and the remainder paved. Monthly monitoring between 1982 and 1985 for oil and grease indicated that the long-term average concentration was less than 10 mg/kg. Oil & grease and total organic carbon were attributed to the vehicular traffic in the area (Boeing 1985b).

The NPDES waste discharge permit expired on September 14, 1987, and Boeing did not submit a new application. In November 1987, Ecology conducted an NPDES Compliance Inspection at the Boeing Thompson site (Ecology 1987). The inspection report indicated that the two main discharges listed in the NPDES permit had ceased. The non-contact cooling water was being cooled and recirculated, rather than discharged. The floor drains and air compressor blowdown were being discharged to the Metro sewer system. The oil/water separator, which under the original operation was used to remove oil from the Fatigue Test Pad and air compressor blowdown discharges, was no longer essential. The separator was still active and was being used intermittently as an emergency unit to remove oil from uncontrollable oil spills.

The inspector noted that no record of Discharge Monitoring Reports (DMRs) was found (Ecology 1987). Monitoring of the effluent had been discontinued without informing Ecology. In addition, drums containing hazardous substances were being stored without containment. The facility was deemed to be in a noncompliance status. The inspection report also noted that there had been pH violations in the previous 12 months.

Boeing reapplied for the NPDES Permit (No. WA-003065-1(I)) on March 4, 1988. Although discharges and operations referenced in the permit had ceased, Boeing wanted to maintain the permit in an active status. Discharge of cooling water from the air compressors had been eliminated; the only remaining discharges were rainwater runoff (Boeing 1988b). Oil/water separators had been installed in the two main storm water discharges from the Boeing Thompson site; these were designed to the capacity required to handle 1100 gpm, equivalent to a 25-year storm (Boeing 1988a, 1988b). In August 1988, Boeing requested cancellation of this permit because the facility has no discharges other than storm water runoff (Boeing 1988c). The permit was cancelled by Ecology on February 24, 1989, with the stipulation that Boeing apply for a NPDES industrial stormwater general permit for this facility (Ecology 1989a). The facility is currently covered under industrial stormwater general permit No. SO3000148D.

4.2.5 Environmental Investigations and Cleanups

Investigation of Potential Release from Oil Collection Tanks (1992)

An overflow tank associated with an oil/water separator was found to have been overfilled in August 1992, and could have released hydraulic oil and/or surface oils from automobile traffic to surrounding soils and groundwater (Boeing 1992b). An investigation was conducted, which included drilling two soil borings adjacent to the overflow tank and installation of a groundwater monitoring well in one of the borings (Boeing 1992b). Two samples were to be collected and analyzed for total petroleum hydrocarbons.

Supplemental Investigation (1996)

GeoEngineers evaluated soil and groundwater quality near well I-206s in April 1996. Six strataprobe borings were advanced in close proximity to well I-206s as shown in Appendix C-8, Figure 11. Each probe was pushed to a depth of 20 feet bgs. Soil samples were collected from the probes on 1 or 3 foot sampling depth intervals. Sixty-three soil samples and six groundwater samples were analyzed for arsenic (GeoEngineers 1996, as cited in ERM 2000a).

The probes generally intercepted fill below the asphalt to depths of 5 or 6 feet bgs, consisting of 1 foot of sandy gravel immediately beneath the asphalt underlain by reddish brown sand with gravel. Underlying the fill was dark-gray to black, fine to medium sand with discontinuous lenses of silt and silty sand. Groundwater was encountered in the probes at depths of 14 to 14.5 feet bgs. Based on water level measurements presented in the GeoEngineers report, groundwater in the area of I-206s was inferred to flow west to southwest, toward the water tank and potentially the Kenworth Motor Corporation property to the south.

Arsenic was detected in soil samples at concentrations ranging from 0.7 to 43 mg/kg. The dissolved concentrations of arsenic in groundwater ranged from 66 to 660 ug/L.

GeoEngineers was unable to determine the source of arsenic in groundwater at well I-206s based on analytical results and depth to groundwater. It was also GeoEngineers' opinion that potential sources for arsenic contamination detected in well I-206s may be attributable to other source material in the fill, and the presence of arsenic-treated pilings associated with the former Slip 5. In addition, GeoEngineers concluded that migration of arsenic-contaminated groundwater from the Boeing Isaacson soil remediation area toward well I-206s was not occurring.

Groundwater Sampling (2006/2007)

As part of the wet and dry season groundwater monitoring conducted by Paccar, Inc. at the former Kenworth Truck Tukwila site located immediately south of the Boeing Thompson property, two Thompson groundwater monitoring wells (I-205 and I-206) were sampled in March 2006 (wet season) and August 2006 (dry season). These wells had previously been sampled as part of groundwater monitoring at the Boeing Isaacson facility, described in Section 4.1.4 above.

Results indicated that most metals were below laboratory detection limits with the exception of arsenic. Wet season dissolved arsenic concentrations were 13.3 and 213. ug/L in wells I-205 and I-206, respectively. Dry season arsenic concentrations were similar at 9.8 and 235 ug/L (Ecology 2007d).

A groundwater sample collected at I-206 in September 2007 contained 720 ug/L dissolved arsenic (Landau 2008b, as cited in McCrone 2008).

4.2.6 Potential for Sediment Recontamination

Past activities at Boeing Thompson and adjacent properties have resulted in groundwater contamination.

Historical Contaminant Sources

The following potential contaminant sources associated with historical use have been identified at the Boeing Thompson property.

- **Soil Contamination at Boeing Isaacson**
  Soil and groundwater at Boeing Isaacson are contaminated with arsenic (see Section 3.2). Although extensive soil remediation has been conducted, arsenic-contaminated soils remain at the site. Groundwater flow toward the former Slip 5 and toward the Boeing Thompson property has been documented (ERM 2000d).

- **Arsenic-Treated Pilings Associated with the Former Slip 5**

  The Bissell Lumber Company constructed various structures within what was then Slip 5, including pilings and a log chute. It has been suggested that the pilings may have been treated with arsenic, and could therefore be a source of arsenic contamination in the Slip 5 area.

- **Fill Material**

  The fill placed in Slip 5 reportedly consisted of slag waste and soil; land reclamation along the LDW was primarily comprised of imported soil from offsite sources but may have also included slag, fire brick (which typically contained asbestos), and material dredged from the LDW (Dames & Moore 1983). Soil sampling conducted in 1983 identified high concentrations of metals in the fill material in the southern and western margins of the Boeing Isaacson property to the north (Dames & Moore 1983).

Ongoing Contaminant Sources

Potential sources of contaminants associated with current operations include: storage of materials in aboveground and underground tanks; outside material stored in containers; and outside waste stored in containers. The facility employs a variety of BMPs to minimize the potential for releases to the environment, and has implemented a SPCC plan, a hazardous waste management plan, and a hazardous materials management plan.

Current operations do not appear to be a significant source of potential recontamination of EAA-6 sediments, however no stormwater solids sampling has been conducted at this facility.

Potential Pathways to EAA-6 Sediments

The potential for sediment recontamination associated with this property is summarized by transport pathway below.

<u>Stormwater Discharges</u>

The stormwater system at Boeing Thompson discharges at two location, along the northern and southern shoreline. Contaminants in stormwater or storm drain solids may be discharged to the LDW through these outfalls. The facility operates under an industrial stormwater general permit. No sampling of stormwater solids has been conducted. The most recent stormwater compliance inspection conducted in April 2007 indicated that the benchmark level for zinc had been exceeded for three quarters, and that a Level 1 response was required. Therefore stormwater discharge is considered a potential sediment recontamination pathway at Boeing Thompson.

<u>Groundwater Discharges</u>

Arsenic is present at elevated concentrations in two groundwater monitoring wells (I-205 and I-206) at this property. This represents a potential source of contaminants to EAA-6 sediments.

Two drainage pipes extend from Boeing Thompson to the Kenworth Truck/Insurance Auto Auctions (IAA) property located immediately to the south. One of these drainage pipes is a 12-

inch perforated culvert pipe that drains groundwater and releases pressure from behind the concrete wall. This culvert pipe has no tie-ins with the Boeing Thompson stormwater system. The second pipe is identified as a foundation drain. Boeing is currently preparing a memorandum to document information about these two pipes. The two drainage pipes have a potential to discharge at the surface onto the Kenworth Truck/IAA property. Contaminants in groundwater at the Boeing Thompson site may therefore be transported to the adjacent property and ultimately to the LDW.

A storm drain line located on the northern edge of the former Kenworth Truck/IAA property, just south of the Thompson property line, drains to the LDW via a pumped oil/water separator located in the northwest corner of the former Kenworth Truck/IAA property. Due to the presence of a hole in this storm drain line and the continued operation of the pump, it is possible that arsenic-contaminated groundwater from the Thompson property may have moved offsite to the south.[19] Groundwater contours reportedly indicate a depression in this area. The pipe was slip-lined in 2006. This situation represents a potential source of LDW sediment recontamination.

Bank Erosion/Leaching

A wooden bulkhead is located along the boundary between the Boeing Isaacson property and the LDW. Rock and rubble fill material have been placed behind the bulkhead. Very little erodable soil material is present in this area. Bank erosion is believed to represent a less significant pathway for contaminants to the LDW than groundwater discharge. Given the lack of information on soil contamination at this property, however, bank erosion can not be ruled out as a potential source of sediment recontamination.

Surface Runoff/Spills

Surface drainage at the Boeing Thompson property is captured by the stormwater system, and the facility operates under a SWPPP and Best Management Practices (BMPs) to minimize the potential for environmental releases from spills. Therefore, there is a low potential for sediment recontamination associated with surface runoff and spills.

4.2.7 Data Gaps

Information needed to assess the potential for sediment recontamination associated with current or historical operations at the Boeing Thompson property are listed below. Data gaps were identified for the stormwater, groundwater, and bank erosion pathways to EAA-6 sediments.

General

- As of December 31, 2007, industrial/manufacturing activities have reportedly been relocated from the Boeing Thompson property to other facilities. No information was available regarding current activities at this site. An inspection is needed to evaluate the potential that current operations may contribute to recontamination of EAA-6 sediments.

[19] Personal communication with Rick Thomas, Washington Department of Ecology, February 11, 2008.

Stormwater Discharges

- Although stormwater from this facility discharges to the LDW at two locations, no sampling of stormwater solids has been conducted and therefore it is not possible to determine whether stormwater from current operations at Boeing Thompson is a source of contaminants to EAA-6 sediments.
- A stormwater compliance inspection was conducted by Ecology on April 6, 2007, which indicated that the benchmark level for total zinc had been exceeded for the preceding three quarters, and that a Level 1 response was required (Ecology 2007e). Follow-up should be conducted to ensure that this issue has been corrected.

Groundwater Discharges

- Arsenic is present at elevated concentrations in two groundwater monitoring wells at this property. Although these wells have been sampled several times since 1988, a comprehensive soil and groundwater investigation has not been conducted at this property. Information on groundwater concentrations of arsenic and other contaminants of concern from throughout the site is needed to determine the sources of arsenic and to evaluate potential contaminant transport pathways to LDW sediment.
- Boeing is currently preparing a memorandum to document their findings associated with the two drainage pipes that may be discharging to the Kenworth Motor/IAA property. A review of this memorandum may provide additional information needed to assess the potential for sediment recontamination.
- The tidal efficiency observed in well I-205 measured during a tidal study in 2000 appeared to be anomalous (ERM 2000d). Recorded groundwater elevation changes at this well exhibited patterns inconsistent with data from other wells and piezometers in the vicinity. The reason for these anomalous results is unknown.
- The source of arsenic in groundwater as measured at wells I-205 and I-206 is not known. GeoEngineers (1996, as cited in ERM 2000a) concluded that the Boeing Isaacson was not the source of arsenic in these wells. However, the GeoEngineers report was not available in the files reviewed during preparation of this Data Gaps report, and this conclusion could not be verified.
- Although monitoring wells I-205 and I-206 have been sampled numerous times, little information on arsenic concentrations in groundwater in other areas of the property is available; this makes identification of the arsenic source difficult.
- Soil samples were collected and analyzed for arsenic at the Boeing Thompson property in 1996. No information on other contaminants that may be present in soils is available. Since contaminants in fill material are considered a potential source, additional soil data for arsenic and other chemicals is needed to evaluate the potential for recontamination of EAA-6 sediments.

Bank Erosion/Leaching

- No information is available regarding contaminant concentrations in bank soils.

5.0 Potential for Sediment Recontamination from Upland Properties

Stormwater from the central portion of KCIA drains to the Slip 5 outfall at EAA-6. Much of central KCIA is leased to a variety of airport tenants; these are listed in Table 6 and their locations are shown on Figure 11.

5.1 King County International Airport

KCIA is a general aviation airport owned and operated by King County as a public utility. The site covers about 615 acres, of which 435 acres are impervious surface covered by buildings and paved areas. The remaining 180 acres consist of grass and landscape areas (King County 2003).

Stormwater from approximately 237 acres of the central portion of KCIA drains to the Slip 5 storm drain outfall. The following tax parcels are located wholly or partially within this drainage basin:

Parcel No.	Taxpayer	Address	Parcel Size
0001600019	King County / Property Services	None Listed	0.89 acres
0001600049	King County	8700 East Marginal Way S.	9.09 acres
3324049011	King County	None Listed	0.61 acres
0007400032	King County	None Listed	8.13 acres
5422600160	King County	None Listed	2.43 acres
2824049007	King County	6771 Perimeter Rd. S.	564.77 acres

Parcel No. 0001600019 was formerly owned by Boeing; it was sold to the Museum of Flight Authority on April 9, 2002, and was subsequently sold to King County on December 19, 2003. Boeing had purchased the parcel from the Isaacson Corporation on March 14, 1984.

5.1.1 Current Operations

KCIA is a general aviation airport, serving industrial, business, and recreational purposes. The airport currently averages more than 300,000 operations (takeoffs and landings) each year and serves small commercial passenger airlines, cargo carriers, private aircraft owners, helicopters, corporate jets, and military and other aircraft.

There are about 15 miles of pipe in the airport storm drainage system. All stormwater discharges into the LDW. There are two pumping stations, which lift the water and pump it out at two outfalls. The north pump station discharges to Slip 4. The southern pump station drains the central portion of KCIA through the 48-inch pipe that runs under the Boeing Isaacson property and discharges to EAA-6 at approximately RM 3.8.

Facility Summary: KCIA	
Address	6771 Perimeter Rd. S. 7299 Perimeter Rd. S. 8700 East Marginal Way S.
Property Owner	King County
Tax Parcel No.	2824949007; 5422600160; 0007400032; 3324049011; 0001600049; 0001600019
Parcel Size	586 acres
Facility/Site ID	2387398
SIC Code	4581: Airports, Flying Fields, & Services
EPA ID No.	WAH000031371 (Inactive)
NPDES Permit No.	SO3000343 (KCIA Maintenance Facility and runways)
UST/LUST ID No.	NA

Potential sources of pollutants include de-icing activities, which are performed on aircraft to minimize ice buildup on the wings and plane body during cold weather conditions. Several tenants perform limited aircraft de-icing. KCIA has constructed dedicated areas for aircraft de-icing; the runoff from these areas is diverted to the sanitary sewer system and is conveyed to the local municipal treatment facilities. All tenants are required to de-ice aircraft in the specified locations to prevent de-icing fluids from entering the airport's stormwater system.

Airport tenants are listed in Table 6. Activities of airport tenants include fuel storage and maintenance of aircraft, maintenance of vehicles and equipment, and repair/storage of vehicles and equipment. Most maintenance and repair work is performed inside hangars. Tenant operations are described in more detail in Sections 5.1.3 through 5.1.21.

According to KCIA policy, airport tenants who generate a spill are responsible for cleanup and management of waste resulting from that spill (KCIA 2001). If KCIA assists in the cleanup of a spill, airport tenants will be required to reimburse the Airport for the associated costs. In the event of a spill, airport tenants are required to immediately notify the KCIA Aircraft Rescue Fire Fighting (ARFF) unit, which will respond to all reported spills. Facility operators are expected to take immediate action, using the best means available, to absorb or divert the flow of the spill from any nearby storm drain opening (KCIA 2001). It is KCIA's responsibility to report the spill to all agencies as required by federal, state and local laws and regulations.

Since 2002, Boeing has removed concrete joint caulking material containing up to 79,000 mg/kg PCBs from areas of north KCIA (within the EAA-3/Slip 4 drainage basin). A joint caulk sample collected from KCIA within the EAA-4 drainage basin (location JC-3) contained elevated levels of PCBs (Ecology 2007c). No sampling of joint caulking material has been conducted in the central portion of KCIA that drains to EAA-6.

5.1.2 Historical Operations

In the early 1900s, the winding course of the Duwamish River, which ran through much of the airport property, was straightened and filled. Construction of the airport began in 1928. The airport served as the community's aviation center until December 6, 1941, when the U.S. Army took over the airport for strategic and production reasons. The airport remained under military jurisdiction through the end of World War II.

In the late 1940s, the airport was reopened for passenger and other commercial traffic. Usage evolved to general aviation, serving industrial, business, and recreational purposes with the opening of Sea-Tac International Airport in 1947.

5.1.3 United Parcel Service (UPS) Boeing Field

Facility Summary: UPS Boeing Field	
Address	7500 Perimeter Rd. S. (per KC lease) 7575 Perimeter Rd. S. (per inspection report and FSD)
Property Owner	King County
Facility/Site ID	15215836
SIC Code	4513: Air Courier Services
EPA ID No.	WAD988521563
NPDES Permit No.	SO3000434
UST/LUST ID No.	NA

UPS conducts air cargo transport operations at this location, known as Hangar 5; the other side of Hangar 5 is operated by Ameriflight. The facility operates under an industrial stormwater general permit (SO3000434). Main activities include loading and unloading of packages from aircraft and general office activities (SPU 2001b). There is a small airplane maintenance area in part of the hangar section, and de-icing operations are conducted approximately once per year on this property. SPU conducted an inspection at this property on September 26, 2001. All catch basins were clean and clear at the time of the inspection. In a letter dated September 28, 2001, SPU indicated that the facility was in compliance with stormwater pollutant source control requirements (SPU 2001c).

The facility was inspected again on August 4, 2004 (SPU 2004b). At that time, outdoor mobile fueling operations were conducted at the site by Galvin. Two outdoor aboveground storage tanks were identified: a 6,000-gallon propylene glycol tank and a 2,000-gallon double-wall tank, contents unspecified (SPU 2004b). Wastes generated onsite included antifreeze (propylene glycol) between December and March, fluorescent light tubes, and petroleum/oils. No environmental compliance problems were identified (SPU 2004q).

Ecology conducted a stormwater compliance inspection on January 11, 2006 (Ecology 2006a). The following concerns and recommendations were noted:

- zinc exceeded the benchmark permit limits during the first and second quarters of 2005 and exceeded the permit action level during the third quarter of 2005
- copper exceeded the permit action level during the third quarter of 2005.

An unannounced NPDES compliance inspection was conducted by Ecology on February 26, 2008. During this inspection, the 6,000-gallon propylene glycol tank was under cover and properly located within secondary containment; however several partially-full 2000-gallon propylene glycol totes were stored outdoors without containment. UPS agreed to correct this situation immediately. According to Ecology's inspector, UPS is working on a Level 2 response to the elevated metals concentrations in their stormwater discharge (Wright 2008). An inspection report has not yet been prepared.

5.1.4 Caliber Inspection, Inc.

Facility Summary: Caliber Inspection	
Address	7500 Perimeter Rd. S.
Property Owner	King County (Facility subleased from UPS)
Facility/Site ID	18182664
SIC Code	8734: Testing Laboratories (per Ecology FSD) 7389: Business Services (per SPU inspection report)
EPA ID No.	WAD000067686
NPDES Permit No.	NA
UST/LUST ID No.	NA

Caliber Inspection conducts four types of non-destructive testing: X-ray testing using radioactive isotopes (indium-192, cobalt-60), ultrasonic testing, magnetic particle testing, and dye penetrant testing (SPU 2004o). Approximately half of the testing work is conducted at the facility's lab, and the other half is conducted in the field at client sites. About half of the testing conducted by Caliber Inspection is related to the aerospace industry.

An inspection was conducted by SPU on August 18, 2004 (SPU 2004o). A 15-ft by 15-ft by 3-ft immersion tank located in the central portion of the building contained a corrosion inhibitor (Immunol 1228). During the inspection, facility personnel indicated that the tank is emptied twice per year to the storm drain system (SPU 2004o). SPU requested that this be discharged to the sanitary sewer, with concurrence from King County Industrial Waste. Hazardous materials handled at this facility included radioactive materials (Indium-192, Cobalt-60), silver and other chemicals used in photo developing, cutting oils, and shop rags. Wastewater was pretreated to recover silver. Washing of passenger vehicles was conducted at this facility; washwater drained to the storm drain system (SPU 2004o). Three catch basins are located at this facility; these are maintained by King County.

In a letter dated December 28, 2004 (SPU 2004bbb), Ecology required the following corrective actions:

- Cease discharge of immersion tank contents into the storm drain system;
- Seal the catch basin in the central portion of the building (near the immersion tank) to prevent leaks or spills from entering the storm drain;
- Install an outlet trap in the catch basin located in the parking lot on the south side of the building;
- Obtain additional spill containment and clean-up materials in the magnetic particle testing building; modify the spill prevention and cleanup plan to include calling AARF in the case of a spill;
- Dispose of cutting oils that have been accumulating at the facility, and properly dispose of fluorescent tubes.

A re-inspection was conducted by SPU on May 31, 2005 (SPU 2005f). The facility was in compliance at that time, and no further action was recommended.

5.1.5 GSM, Inc.

Facility Summary: GSM	
Address	7575 Perimeter Road S.
Property Owner	King County (Facility subleased from UPS)
Facility/Site ID	NA
SIC Code	4581: Airports, Flying Fields, and Airport Terminal Services
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	NA

GSM, Inc. conducts aircraft ground support services and equipment maintenance (SPU 2004p). There are no catch basins associated with this facility. Following a site inspection conducted on August 19, 2004, SPU commended the facility on its excellent waste disposal/recycling documentation practices (SPU 2004r).

Because there is no pathway for contaminants to reach the LDW from this facility, it poses minimal potential for LDW sediment recontamination.

5.1.6 Ameriflight, Inc. (Hangar 5)

Facility Summary: Ameriflight, Inc.	
Address	7585 Perimeter Rd. S. (Hangar 5)
Property Owner	King County
Facility/Site ID	8137128
SIC Code	4513: Air Courier Services
EPA ID No.	WAD988521324
NPDES Permit No.	SO3002830
UST/LUST ID No.	NA

Ameriflight is an air cargo airline. It operates at Hangar 5 and operations include outdoor mobile fueling of airplanes. Airplanes and fuel trucks are washed periodically; washwater drains to the sanitary sewer. UPS conducts de-icing at this location (SPU 2005d). Wastes and other materials generated at the site include: batteries, fluorescent light tubes, sheet metal (airplane parts), gasoline, solvents, shop rags, and Jet Fuel A. Metal and painted parts as well as trucks and forklifts are stored outside (Ecology 2006d). Catch basins at this facility are maintained by King County. This facility operates under an industrial stormwater general permit (SO3002830).

SPU conducted a stormwater pollution prevention inspection at Ameriflight on August 4, 2004 (SPU 2004a, 2004aa). Several housekeeping items were identified that needed to be addressed, including preparation of a spill prevention and cleanup plan, maintenance of adequate spill containment and clean-up materials, employee education, leaking containers in the flammables storage cabinet, and regular inspection of chemical and storage waste locations.

The inspector noted that a catch basin located in the southwest corner of the building drained to the public storm drain system. SPU requested that this catch basin be sealed to prevent leaks or spills from entering the storm drain.

A sample of storm drain solids was collected by SPU from a catch basin located just west of the hangar building. The sample was analyzed for PCBs, metals, and petroleum hydrocarbons. Results indicated elevated concentrations of PCBs (6.6 mg/kg DW, 154 mg/kg OC), mercury (0.61 mg/kg DW), and BEHP (185 mg/kg OC) (SPU 2004aa). The concentration of Total Petroleum Hydrocarbon (TPH)-heavy oil exceeded the MTCA Method A cleanup level for soil.

The SPU inspector indicated that the PCB contamination is likely historical because she did not identify any current use or storage of materials containing PCBs. SPU requested that the catch basins be cleaned and the sediment disposed of according to state and local regulations.

A re-inspection of this property was conducted on March 14, 2005, and the facility was judged to be in compliance with stormwater pollution source control requirements (SPU 2005d, 2005e). The interior catch basin had been covered with a polyurethane mat. Although the exterior catch basin (CB 1232) had been cleaned, it still contained approximately 9 inches of material within 3 inches of the outlet pipe (SPU 2005d). The inspector suggested that the catch basin be cleaned again, and the gravel area/roof downspout area be paved or a catch basin insert installed (SPU 2005d). No information was available with regard to whether this was done.

Ecology inspected this property on October 25, 2006 (Ecology 2006d). No stormwater sampling had been conducted at this facility since December 31, 2004. Ameriflight believed that KCIA was responsible for stormwater sampling, however according to the Airport Engineer, King County maintains the stormwater system but tenants are responsible for their own stormwater discharges (Ecology 2006d). The Ecology inspector was not able to determine whether the interior storm drains discharge to the sanitary or stormwater system. The following concerns and recommendations were identified:

- begin stormwater sampling by the third quarter of 2007
- develop a SWPPP as required by their stormwater permit
- conduct quarterly visual monitoring and summarize in a report or checklist
- determine if the drains in the hangar discharge to the sanitary or stormwater system
- if the drains discharge to the stormwater system, then take necessary actions to stop contaminants from entering the drains.

Ecology notified the facility that it is not in compliance with the terms and conditions of its stormwater permit in a letter dated March 8, 2007 (Ecology 2007b). A follow-up inspection has not been conducted.

5.1.7 Federal Express Perimeter Rd

Facility Summary: Federal Express	
Address	7607 Perimeter Road S.
Property Owner	King County
Facility/Site ID	75575157
SIC Code	4215: Courier Services, Except by Air
EPA ID No.	WAD988474698
NPDES Permit No.	NA
UST/LUST ID No.	2392

Federal Express leases the property at 7607 Perimeter Road S. from KCIA. No inspection reports were identified for this facility. Ecology’s LUST/UST databases list this facility as “BFI Federal Express Station,” and report that one unleaded gasoline tank was located at this site. Soil and groundwater cleanup was conducted between January 1990 and June 1995. The cleanup is complete and the tank has been removed. The facility operated under EPA ID No. WAD988474698; this number is currently inactive. No other information about operations at this facility was available at the time this Data Gaps report was prepared.

5.1.8 Hangar Holdings, Inc. (Vulcan, TAG Aviation, Former Shell Oil)

Facility Summary: Hangar Holdings, Inc.	
Address	7675 Perimeter Rd. S.
Property Owner	King County
Facility/Site ID	72811433
SIC Code	3721: Aircraft
EPA ID No.	WA8690590007 (inactive)
NPDES Permit No.	NA
UST/LUST ID No.	484990
Listed on CSCSL	YES

Hangar Holdings currently leases the property located at 7675 Perimeter Road S. from KCIA. Eight USTs at this location have been removed; these contained aviation fuel, and ranged in size from 5,000-9,999 gallons to 30,000-49,999 gallons.[20] Ecology's LUST database indicates that this was also the former location of a Shell Oil gas station. Two underground aviation fuel tanks, installed in September 1998, are currently operational.

In 1996, Hangar Holdings began excavation of two underground storage vaults for fire suppression water. During construction, a strong petroleum-like odor and visible staining were observed. Approximately 930 cubic yards of petroleum hydrocarbon-affected soil were excavated from this area and segregated from soils that showed no evidence of contamination (Hart Crowser 1997a, 1997b). This soil was stockpiled in the northeastern corner of the site. A series of five soil samples were collected from the side walls of the excavation, which indicated detectable concentrations of petroleum hydrocarbons in the southeastern corner and part of the east wall, and nondetectable concentrations in the other corners and side walls (Hart Crowser 1997b).

In July 1997, eight test pits were excavated in the area east of the excavation to identify the extent of the contaminated soils. At that time, the excavation for the first storage vault (the water storage tank) was complete, while excavation had not begun for the second vault (the water detention tank). Results indicated that the plume of hydrocarbon-affected soils appears to extend eastward from the water storage tank excavation, through the area of the water detention tank, and more than 50 feet beyond. The eastern and southern extents of the plume were not delineated (Hart Crowser 1997b). Petroleum concentrations ranged from <5 to 10,000 mg/kg as gasoline, <20 to 10,000 mg/kg as diesel, and <50 to 270 mg/kg as oil. Ethylbenzene (to 15 mg/kg) and xylenes (to 20 mg/kg) were also detected (Hart Crowser 1997b). Low concentrations of petroleum hydrocarbons (<1 mg/L) were also detected (Hart Crowser 1997a).

Hart Crowser (1997b) estimated that approximately 2,000 cubic yards of contaminated soil would be generated, assuming the excavation was made to the design depth of the vault of 12 to 13 feet. Test pits indicated that contaminated soils extended below this depth, possibly to 16 feet. Excavating this material would result in an additional 930 cubic yards of contaminated soils, for

[20] Washington State Department of Ecology Regulated Underground Storage Tanks Site List, February 19, 2008 (https://fortress.wa.gov/ecy/tcpwebreporting/reports.aspx)

a total volume of contaminated soil of approximately 4,000 cubic yards. Removal of all contaminated soil from the site (including soil outside the tank excavation) was estimated to result in 9,000 to 10,000 cubic yards of material.

At least some of this contaminated soil was taken to King County's land-farming facility at the north end of North Boeing Field (in an area also known as the Fire Training Area). According to an Ecology Environmental Report Tracking System (ERTS) Referral in April 2000, petroleum hydrocarbon contamination remains in the southern and eastern portions of the property, and the areal extent of contamination has not been determined (Ecology 2000a).

The site was added to Ecology's CSCSL, which cites confirmed contamination with petroleum products (soil and groundwater) and non-halogenated solvents (soil). In addition, PAHs (soil and groundwater) and non-halogenated solvents (groundwater) were present at concentrations below MTCA cleanup levels.[21] Site discovery took place on October 3, 2003, and the remedial action is listed as "currently in progress."

SPU conducted an inspection at this address in November 2001 (SPU 2001l). The facility occupying the parcel at this time was TAG Aviation USA, Inc., a company owned by Paul Allen. The company provided transportation for clients and small packages. Fueling of aircraft was conducted outdoors; maintenance was conducted inside the hangar. The building had a detention system in the parking lot, however it was blocked by a parked car at the time of the inspection. The parking lot had eight inlets to the detention system. On the hangar side, several inlets appeared to be connected to the storm drain system. An on/off valve was also located in this area; employees were reportedly trained to turn the valve to the off position in the event of a spill during fueling operations (SPU 2001l).

Based on this inspection, SPU identified one required corrective action: to post a written spill plan in the work area (SPU 2001n). The facility was re-inspected on February 2, 2002, and no further action was required (SPU 2002b).

An October 2004 SPU inspection at this address identified the operator as Vulcan, and indicated that it was a hangar for aircraft and maintenance activities (SPU 2004oo). The inspection report identified mobile fueling of aircraft as the only activity conducted outside of the hangar; all other activities were conducted inside the hangar. Approximately 12 catch basins are located at this property; all appeared clean. Wastes generated include petroleum/oils, solvents from a parts washer, and shop towels. A paint booth is located inside the hangar. No corrective actions were identified.

Both of the 20,000-gallon USTs currently located at this facility, which contain Jet-A fuel, passed a February 2007 underground tank inspection (Ecology 2007a).

[21] Department of Ecology – Toxics Cleanup Program, Integrated Site Information System, Confirmed and Suspected Contaminated Sites List. November 8, 2007. http://www.ecy.wa.gov/programs/tcp/cscs/cscspage.htm

5.1.9 Western Metal Products, Inc.

Facility Summary: Western Metal Products	
Address	7696 Perimeter Rd. S. 7800-7802 Perimeter Rd S.
Property Owner	King County
Facility/Site ID	NA
SIC Code	3499: Fabricated Metal Products
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	NA

Western Metal Products is a small metal parts fabrication shop. There are three small buildings: the main building (7696 Perimeter Rd.), which houses office and fabrication space; the welding area (7800 Perimeter Rd.); and a storage building (7801 or 7802 Perimeter Rd.).

Wastes generated include aluminum scrap, used oils/cutting oils, mineral spirits (parts washer solvent), and other lubricants. Containerized products are stored outside.

There are three catch basins onsite; sediment had filled these catch basins to over 60 percent of their capacity at the time of an October 2004 inspection (SPU 2004nn). Corrective actions identified during the inspection included: improve or create spill response procedures; clean storm drain facilities; replace/repair missing or damaged storm drain components; and properly store non-containerized materials.

A March 2006 inspection indicated that the catch basins again (or possibly still) contained sediments to over 60 percent of their capacity (SPU 2006a). Open 5-gallon buckets of used oil were observed, and unlabeled and corroding bottles of chemicals were observed in a cabinet. Outside, several unlabeled 55-gallon drums of used oil were observed. A container used for disposal of metal shavings was not covered and was located near a full catch basin. The following corrective actions were required by SPU (SPU 2006b):

- dispose of fluorescent tubes properly
- prepare and maintain waste manifests
- label waste containers as required
- cover the metal shaving container
- implement additional sweeping practices around the outside of this container to prevent metal shavings from being discharged into the catch basin
- dispose of unwanted or unused chemicals or used oil.

A second and final corrective action notice was sent to Western Metal Products on August 22, 2006 (SPU 2006c). The facility was re-inspected on October 25, 2006 (SPU 2006d). At that time, very little work was being done at the facility. Although unknown chemicals had been disposed of and the scrap metal container was covered with a tarp, the used oil and other drums had not been removed and there were still no labels on containers and no manifests on file. A December 22, 2006 letter from SPU indicated that the facility was in compliance with stormwater regulations (SPU 2006e). It is not clear whether the catch basins were cleaned out.

5.1.10 Galvin Flying Services

Facility Summary: Galvin Flying Services	
Address	7777 Perimeter Rd. S.
Property Owner	King County
Facility/Site ID	NA
SIC Code	4581: Airports, Flying Fields, & Services
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	NA

Galvin Flying Services operates several buildings along the airport strip on Perimeter Road S. One of these, located at 7777 Perimeter Road, is within the EAA-6 stormwater drainage basin. This building is attached to 7827 Perimeter Road S., to the east, which is leased by Galvin Flying Services to Clay Lacy Aviation (see Section 5.1.11 below).

SPU conducted an inspection at the 7777 Perimeter Road side of the property on September 18, 2001 (SPU 2001a). At the time of the inspection, this building was being used for storage, and was scheduled for demolition (SPU 2001a). The facility was in compliance with stormwater pollutant source control requirements (SPU 2001d).

Another inspection of the 7777 Perimeter Road S. property was conducted on August 11, 2004 (SPU 2004l). At that time, the property was subleased to at least two tenants (Costco and Paul Allen), and was being used as a storage hangar and light maintenance area. Activities at the property included service and repair of aircraft, mobile fueling operations, and indoor aircraft washing. Two parts washers were located onsite within a fenced maintenance area (SPU 2004l). Washwater was being discharged to the sanitary sewer. A large trench at the entrance of the hangar doors drained to an oil/water separator and then to the sanitary sewer. Four catch basins were identified on the property; these were being inspected and cleaned on an annual basis. The following corrective actions were identified:

- update written spill prevention and cleanup plan
- obtain spill containment and cleanup materials
- educate employees about the spill plan and containment/cleanup materials (SPU 2004w).

A re-inspection was conducted on December 7, 2004 (SPU 2004ww). The facility was in compliance with source control requirements and no further action was required (SPU 2004aaa).

5.1.11 Galvin Flying Services / Clay Lacy Aviation

Facility Summary: Galvin Flying Services/Clay Lacy	
Address	7827 Perimeter Rd. S.
Property Owner	King County
Facility/Site ID	NA
SIC Code	4522: Air Transportation, Nonscheduled 4581: Airports, Flying Fields, and Airport Terminal Services
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	NA

The 7827 Perimeter Road S. property is leased by Clay Lacy Aviation from Galvin Flying Services, which leases the property from King County. At the time of an October 2001 inspection, Clay Lacy was doing business as Flight Center (SPU 2001e). No storm drain inlets were located in this area, and no corrective actions were required as a result of the inspection (SPU 2001f).

Clay Lacy subleases portions of this building to several other businesses: Civil Air Patrol, MJL Partners, and IV Management. SPU inspections have been conducted at Civil Air Patrol and MJL Partners. No information was available about IV Management.

Civil Air Patrol rents office and parking space from Clay Lacy Aviation. They park two airplanes at the Clay Lacy field and have meeting space at this property. A September 20, 2004 inspection of this business indicated that no repairs are done at this property and no chemicals are used (SPU 2004bb).

MJL Partners rents space from Clay Lacy Aviation for service and repair of two aircraft. Four catch basins are located in this area. The following corrective actions were required as a result of the September 20, 2004 inspection (SPU 2004cc):

- complete a written spill prevention and cleanup plan
- install a spill kit
- educate employees about the spill plan and spill kit (SPU 2004pp).

SPU also requested that a container of insecticide left by a previous tenant be disposed of (SPU 2004qq). A follow-up inspection was conducted on December 7, 2004; a written spill plan had not been prepared (SPU 2004xx). On December 27, 2004, SPU indicated that the facility was in compliance and no further action was required (SPU 2004aaa).

5.1.12 Nordstrom, Inc.

Facility Summary: Nordstrom, Inc.	
Address	7979 Perimeter Rd. S.
Property Owner	King County
Facility/Site ID	36699669
SIC Code	4522: Air Transportation, Non-scheduled
EPA ID No.	WAD981773583
NPDES Permit No.	NA
UST/LUST ID No.	8045

Nordstrom flies material and clients into this property. Two aviation fuel USTs and a small (111 to 1,100 gallon) used oil/waste oil tank are located at this property. An aircraft washing area is connected to the sanitary sewer. The parking lot area has two storm drain inlets; these were clean and clear at the time of a November 5, 2001 inspection (SPU 2001o). No action was required (SPU 2001p).

The facility was inspected again in October 2004 (SPU 2004ccc). Wastes generated included batteries, fluorescent tubes, petroleum oils, and rags. According to the inspection report, there are seven catch basins at the property: one near the fueling area and six at the parking lot east of the runway. KCIA is responsible for maintenance of the parking lot catch basins; these drain to a KCIA oil/water separator and then to the storm drain system. Planes and helicopters are washed outdoors; a nearby catch basin is connected to an oil/water separator that drains to the sanitary sewer system (SPU 2004ccc). The only corrective action identified was to begin recycling of fluorescent light tubes (SPU 2004ddd).

5.1.13 DHL Express (ABX Air, Airborne Express)

Facility Summary: DHL	
Address	8013 to 8075 Perimeter Rd. S.
Property Owner	King County
Facility/Site ID	7723743
SIC Code	4513: Air Courier Services
EPA ID No.	NA
NPDES Permit No.	SO3004602
UST/LUST ID No.	NA

DHL Express (also known as ABX Air, Inc. and Airborne Express) operates a courier service at this location. They transport packages, perform some aircraft maintenance, and occasionally de-ice aircraft (SPU 2004g).

Wastes generated include fluorescent tubes, petroleum/oils, and de-icing wash (SPU 2004g). Aircraft de-icing is performed on this property; fueling of aircraft is done by Galvin Flying Services. Mobile fueling of fleet vehicles is done by a contractor. There is a wash rack for vehicles and aircraft. Five catch basins are located on this property; several of the catch basins have no outlet trap because they are too shallow. An August 2004 site inspection resulted in one recommended action: to post a copy of the written spill prevention plan on the spill kit (SPU 2004g, 2004k). The facility operates under an industrial stormwater general permit (SO3004602).

Ecology conducted a stormwater compliance inspection in May 2006 (Ecology 2006c). During the inspection, petroleum sheens were observed entering the catch basin located in the northeast corner of the property. Aircraft de-icing wash water could enter the facility's storm drains. In addition, DMRs had not been submitted for the last three quarters of 2005 and the first quarter of 2006. The following concerns and recommendations were identified:

- retain a copy of the SWPPP onsite or within reasonable access to the site
- monitor stormwater discharges and submit DMRs as required
- implement operational and/or source control BMPs to stop petroleum sheens from entering storm drains
- do not allow wash water to enter the facility's stormwater drains (Ecology 2006c).

No follow-up inspection has been conducted.

5.1.14 Airwest Repair Services (Airwest Sales & Services, Bicknell)

Facility Summary: Airwest Repair Services	
Address	8167 Perimeter Rd S. 8187 Perimeter Rd. S.
Property Owner	King County
Facility/Site ID	NA
SIC Code	4581: Airports, Flying Fields, and Airport Terminal Services (Airwest)
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	NA

The property located at 8167 and 8187 Perimeter Road S. is currently leased by Airwest Repair Services. The business has also been identified as Airwest Sales & Services; it is owned by Charles Bicknell (aka "Shorty"). The business is engaged in aircraft maintenance and storage.

Fueling operations on-site are rare; this is usually done by pilots from Galvin or Clay Lacy. Wastes generated at the facility include batteries, petroleum/oils, and sludge from the parts washer. There is one catch basin located at this facility, in the parking lot. There are no floor drains in the building and no washing is conducted at the facility.

SPU conducted an inspection of this property and its subtenants on August 5, 2004 (SPU 2004c). No environmental compliance problems were identified (SPU 2004h). At that time, Airwest subleased portions of this property to Puget Sound Aviators, CJ Systems Aviation Group, and Sparrow Hawk Gyroplanes (SPU 2004c).

Puget Sound Aviators (PSA) operates a flight school at 8167 Perimeter Road S. (SIC Code 8299: Schools and Educational Services). Their airplanes are stored and maintained at Aeroflight (8555 Perimeter Road S.); this facility houses mainly office and classroom space. During the August 5, 2004 inspection, no environmental compliance issues were observed (SPU 2004d, 2004i).

CJ Systems Aviation Group (Corporate Jets, Inc.) maintains and stores helicopters at 8167 Perimeter Road S. (SIC Code 4581: Airports, Flying Fields, and Airport Terminal Services). Mobile fueling is performed by Galvin Flying Services; very little washing is done on site. The facility operates a parts washer. Wastes generated at this facility include motor oil, turbine engine oil, sludge from parts washer, mineral spirits, batteries, and rags. Helicopter parts are stored in two sheds. There is no floor drain in the building. The August 5, 2004 inspection identified the following corrective action: complete a written spill prevention and cleanup plan and post at appropriate locations (SPU 2004e, 2004t). A re-inspection was conducted on December 8, 2004, and no further actions were identified (SPU 2004yy).

GBA (Gyroplanes of Seattle, LLC) builds gyroplanes at 8167 Perimeter Road S. (no SIC code identified), and then transfers them to a facility in Auburn. They use up all chemicals and do not dispose of any wastes. No environmental compliance issues were observed during the August 5, 2004 SPU inspection (SPU 2004f, 2004j). It is not clear whether GBA is the same company as Sparrow Hawk Gyroplanes.

5.1.15 BAX Global, Inc.

Facility Summary: BAX Global	
Address	8201 Perimeter Rd. S.
Property Owner	King County
Facility/Site ID	NA
SIC Code	None Listed
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	NA

This business transports packages and containers. Loading/unloading occurs on the north side of the building; there are two catch basins in this area. Maintenance of trucks and aircraft is also conducted at this facility. Waste materials are stored on the south side of the building and include used petroleum products (oil, antifreeze); waste materials are stored on a pallet within spill containment barriers. At the time of a November 5, 2001 SPU inspection, no spill plan was in place and a spill kit was not available (SPU 2001k). The facility was requested to implement a spill plan (SPU 2001m). This corrective action had not been implemented during a February 13, 2002 re-inspection (SPU 2002c). The facility was deemed in compliance with the stormwater pollutant source control requirements after a March 6, 2002 re-inspection (SPU 2002d). No other inspections have been conducted at this facility.

5.1.16 Clay Lacy Aviation (Gateway USA, Flight Center, Flightcraft Inc. Seattle)

Facility Summary: Clay Lacy Aviation	
Address	8285 Perimeter Rd. S. 8403 Perimeter Road S.
Property Owner	King County
Facility/Site ID	6436627
SIC Code	4581: Airports, Flying Fields, and Airport Terminal Services
EPA ID No.	WAD063351332
NPDES Permit No.	NA
UST/LUST ID No.	8044

Clay Lacy Aviation provides airport services at two buildings in this general location: 8285 Perimeter Road S. and 8403 Perimeter Road S. They are mainly engaged in services to private jets and fixed base operations (FBO). Activities include aircraft fueling, de-icing, and hangar space.

This facility underwent a voluntary cleanup in 1996 under the name Flightcraft, Inc. A No Further Action (NFA) determination was made on July 23, 1996. Ecology's UST database lists 11 underground tanks at this location; seven tanks have been removed and four (installed in 1996) remain operational. Three aviation fuel tanks are within the 20,000 to 29,999-gallon size range, while one unleaded gasoline tank contains 10,000 to 10,999 gallons.[22] The tanks that were removed contained kerosene, aviation fuel, used oil/waste oil, and unleaded gasoline.

At the time of an August 2003 site inspection, Clay Lacy was not doing aircraft maintenance at this location, but was planning to do so in the future. They sublease hangar space to approximately 20 tenants (SPU 2003). Waste materials generated by this facility include: batteries; fluorescent tubes; hydraulic oil; and other petroleum products. There are five catch basins located in this area.

Clay Lacy operates six fueling trucks. The fueling pad is equipped with an oil/water separator that is connected to the storm drain system. There is a shut-off valve and a drain cover to minimize the risk of contaminant transport to the storm drain system. Jet-A fuel and aviation gasoline are stored in four underground storage tanks. The fueling area is uncovered.

The Clay Lacy de-icing/wash area is reportedly used for the entire airport. When the de-icing/wash area is in use, drainage is switched from the storm drain system to an oil/water separator connected to the sanitary system (SPU 2003).

The following corrective actions were identified during the August 2004 SPU inspection:

[22] Washington State Department of Ecology Regulated Underground Storage Tanks Site List, February 19, 2008 (https://fortress.wa.gov/ecy/tcpwebreporting/reports.aspx)

- complete a written spill prevention and cleanup plan and post at appropriate locations
- post signage near the dual valve shut off system in the de-icing area to alert operators how to properly use the system to avoid stormwater contamination
- place a spill kit in the de-icing area (SPU 2004v).

A re-inspection in December 2004 indicated that the facility is in compliance with stormwater pollutant source control requirements (SPU 2004zz).

5.1.17 Wings Aloft / Southeast "T" Hangars

Facility Summary: Wings Aloft / Southeast "T" Hangars	
Address	8453-8525 Perimeter Rd. S. (per KC lease) 8467 Perimeter Rd. S.
Property Owner	King County
Facility/Site ID	NA
SIC Code	8299: Schools and Educational Services
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	NA

Wings Aloft leases several buildings from KCIA. The company operates a flight school; activities at the property include maintenance and fueling of aircraft. All washing and de-icing is done at the Clay Lacy facility to the north. The company operates one fueling truck and a parts washer. Hazardous waste liquids are stored inside the hangar and are disposed of by Emerald Services. A stormwater inspection conducted by SPU in October 2001 found the business to be in compliance with stormwater pollutant source control requirements (SPU 2001g, 2001i). Another inspection was conducted in September 2004 (SPU 2004x). Seven catch basins were identified on this property; these were too shallow to be equipped with outlet traps. Waste oil is stored in a 650-gallon aboveground storage tank located inside the maintenance building. The following corrective action was identified as a result of this inspection: complete a written spill prevention and cleanup plan and post at appropriate locations. Secondary containment for the waste oil storage tank was recommended (SPU 2004ii). A letter dated February 8, 2005 indicated that the facility was in compliance with requirements, but recommended that secondary containment be implemented for the facility's hazardous waste storage areas (SPU 2005b).

Wings Aloft subleases portions of the hangar buildings to the following businesses: Reed Aviation, Airtech Instrument Company, Puget Sound Aviators, Cascade Air Frame, Helicopters NW, and Washington Avionics.

Reed Aviation conducts airframe maintenance inside a hangar at 8490 Perimeter Road S. All work is performed indoors. The facility includes a parts washer and generates small quantities of used oil. After an October 2004 SPU site inspection, Reed was notified that a written spill prevention and cleanup plan would be required (SPU 2004ll, 2004rr). Subsequently, SPU decided that this was not required because this is a one-man all indoor operation, however a spill plan was recommended (SPU 2005a).

Airtech Instrument Company repairs aviation-related instruments including pressure gauges and electrical volt meters (SIC 5065: Electronic Parts and Equipment) at 8490 Perimeter Road S. All activities are conducted indoors (SPU 2004dd). The facility uses various solvents and generates small quantities of waste oil, which are disposed of by Wings Aloft. No environmental compliance issues were identified during a September 2004 site inspection (SPU 2004dd, 2004hh).

Cascade Air Frame conducts routine maintenance for helicopters at 8500 Perimeter Road S. (SIC 4581: Airports, Flying Fields, and Airport Terminal Services). Activities at the site include washing of helicopters (using a King County wash rack that drains to the sanitary sewer) and parts washing. Virtually all activities are conducted indoors, and there is no floor drain (SPU 2004ss). During a November 2004 site inspection, the SPU inspector was impressed with the waste oil storage area, especially the secondary containment and spill control measures that were in place (SPU 2004tt). No compliance issues were noted.

Helicopters Northwest provides helicopter flight training (SIC 4522: Air Transportation, Nonscheduled) at 8500 Perimeter Road S. No maintenance is performed at this location; washing and maintenance are performed at Emerald City Leasing. Aircraft are stored inside the hangars. No environmental compliance issues were observed during a September 2004 SPU inspection (SPU 2004ff, 2004kk).

Washington Avionics, Inc. sells and repairs aviation equipment at 8525 Perimeter Road S. All activities are conducted indoors. The only hazardous materials used are aerosol cans. No environmental compliance issues were observed during a September 2004 SPU inspection (SPU 2004y, 2004z).

5.1.18 Aeroflight National Charter Network (Seattle Air Corp., BFI Holdings)

Facility Summary: Aeroflight	
Address	8535 Perimeter Rd. S. 8555 Perimeter Rd. S.
Property Owner	King County
Facility/Site ID	7318944
SIC Code	4581: Airports, Flying Fields, and Airport Terminal Services
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	447641

Aeroflight National Charter Network is located at 8535 and 8555 Perimeter Road S. The business transports passengers and packages; activities at the property include maintenance, fueling, and storage of aircraft and cargo. Maintenance of aircraft is performed inside the hangars. Washing is done outside. According to an October 2001 SPU site inspection, only water is used for washing (SPU 2001h). Five fuel trucks are located near the runway. A covered hazardous waste storage area is located on the north side of the property.

During the 2001 inspection, two tanks for waste fluids were located inside a bermed area on the north side of the hangar building; these tanks are no longer in use (SPU 2001h). Several 55-gallon drums and miscellaneous containers of hazardous materials were accumulating outside of the bermed, covered area; these were not labeled. A catch basin connected to the storm drain system was located approximately 40 to 50 feet away. Because the containers were exposed to rainwater, overflows to the pavement or physical damage to the drums/containers could result in transport of contaminants to the storm drain system (SPU 2001j). As a result, SPU required that the containers be removed and place inside the covered area. The facility was re-inspected in January 2002 and no further action was required (SPU 2002a).

The facility was inspected again in August 2004 (SPU 2004n). Five catch basins are located at this property. Waste materials generated at the site include batteries, paints, motor oil, solvent sludge, and occasionally Jet-A fuel and piston fuel. A sand blaster is used to clean metal parts. Mobile fueling operations are conducted at this location and aircraft are parked outdoors. Maintenance and repair activities are conducted in the two maintenance hangars. A shed next to the building was filled with drums. SPU required the facility to complete a written spill prevention and cleanup plan and post it at appropriate locations at the facility (SPU 2004u).

During another inspection in February 2005, a dye test was conducted at the catch basin near the wash rack; results indicated that the catch basin is connected to the storm drain system. As a result, the following corrective actions were required by SPU:

- coordinate re-routing of the washpad to the sanitary system or find a suitable location for washing where washwater drains to the sanitary sewer
- minimize washing and limit use of soap and other chemicals until the washpad is moved or rerouted
- upgrade the hazardous material storage area (SPU 2005c).

In a May 2005 letter to Aeroflight, King County requested information about the floor drain in the hazardous waste storage room and where it drains to (King County 2005). Subsequent inspections were conducted in June and July 2005 (SPU 2005h, Stewart 2005). The facility discontinued washing aircraft at this location in early 2005. A drain in the hazardous waste area was sealed in August 2005. An August 2005 letter from SPU to Aeroflight indicated that no further action was required, but reminded the facility that no outdoor washing is allowed (SPU 2005i).

5.1.19 Federal Drug Enforcement Administration

Facility Summary: FDEA	
Address	8700 East Marginal Way S., Hangar B
Property Owner	King County
Facility/Site ID	NA
SIC Code	4522: Air Transportation, Non-scheduled
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	NA

The Drug Enforcement Administration maintains a small office and a hangar with one helicopter at 8700 East Marginal Way S. (Hangar B). No maintenance is conducted at the site, and no chemicals are used. A catch basin located near Hangar B was clean at the time of a July 29, 2007 SPU inspection (SPU 2007). Used oil was stored south of the hangar; it was covered and within secondary containment.

5.1.20 South Seattle Community College (SSCC) Aviation Department

Facility Summary: SSCC/	
Address	8900 East Marginal Way S.
Property Owner	King County
Facility/Site ID	NA
SIC Code	8299: Schools and Educational Services
EPA ID No.	NA
NPDES Permit No.	NA
UST/LUST ID No.	NA

SSCC operates an aircraft repair school at this location. During a 2004 inspection, SSCC shared the hangar space with the Startube Company, which conducted research on fuel injectors. This business moved out as of November 2004 (SPU 2004eee).

Five catch basins are located at this property. Seven airplanes and two helicopters are stored at the site for use in training of mechanics; the aircraft do not fly – they are used for training purposes only. Chemicals used onsite include hydraulic fluid, oil, and solvents (in parts washer). Most chemicals are reused for training purposes. No fueling is conducted at this location. There is a floor drain in the hangar building. The following corrective actions were required as a result of an August 2004 SPU site inspection (SPU 2004m): develop and implement a written spill prevention plan, including preparation of a spill kit and education of employees about the spill plan and spill containment and cleanup materials (SPU 2004s). A November 2004 re-inspection indicated that no further action was required (SPU 2004uu, 2004vv).

5.1.21 Other Facilities at KCIA

Former Boeing Electronics Manufacturing Facility (EMF)

The former Boeing EMF (Building 3-962) was located at 7355 Airport Way S., near the northeast corner of the Slip 5 drainage basin. The facility was demolished in April 1996, however the property is still leased by Boeing and is currently subleased to UPS.

The EMF (FSD No. 63879778) was leased by Boeing in the 1940s and was initially used for prototype aircraft testing. It was reconfigured in the 1960s to manufacture electronic circuit boards using, among other things, solvent cleaning equipment including a vapor degreaser, underground solvent storage tank, and associated supply piping. Electronic circuit board manufacturing was discontinued in 1982, and the associated vapor degreasing equipment was removed during that time. During the removal of this equipment, trichloroethylene (TCE) contamination of groundwater underlying the EMF was discovered. The EMF buildings were demolished in 1996. Boeing initially worked to deal with the groundwater plume under Ecology’s Voluntary Cleanup Program (VCP ID No. NW0080). Groundwater cleanup actions conducted under the VCP included in-well vapor stripping and groundwater recirculation, chemical oxidation utilizing potassium permanganate and sodium persulfate, and implementation of an enhanced reductive dechlorination bioremediation remedy utilizing sodium lactate, sugar products and emulsified vegetable oil.

Groundwater treatment at the site has been ongoing since 1997. The plume extends west and travels beneath the Boeing Plant 2 site and toward the LDW within the EAA-4 Source Control Area. The EMF plume may be commingling with other VOC groundwater plumes originating from solid waste management units located at Boeing Plant 2. Boeing Plant 2 is the subject of an ongoing RCRA Corrective Action, under an Administrative Order on Consent issued to Boeing by EPA in 1994.

In a Removal Action Settlement Agreement and Order on Consent negotiated between Boeing and EPA, Boeing agreed to characterize the EMF and EMF plume and develop an Engineering Evaluation/Cost Analysis (EE/CA) of removal action alternatives, including a recommended alternative. Boeing is currently working to prepare the EE/CA.

Because the VOC groundwater plume flows toward Boeing Plant 2 (EAA-4), and because the facility has been demolished, the potential for contaminants in stormwater to reach EAA-6 from this property is very low. However, cleanup activities should be monitored to ensure that contaminated soil does not enter the KCIA stormwater system.

ARFF – King County Sheriff’s Office

A September 24, 2004 inspection report indicates that the Aircraft Rescue Fire Fighting (ARFF) facility is located at 8190 East Marginal Way S., on the west side of KCIA, northwest of the airport control tower and just east of Boeing Plant 2 (SPU 2004ee). At that time, the ARFF facility stored fire-fighting trucks and fire suppression foam. The following corrective actions were recommended in a letter dated October 4, 2004:

- install secondary containment for fire suppression foam product stored at the facility, or seal the floor drain in the storage room;
- inspect the sump inside the building annually and clean up as necessary
- eliminate storage of garbage or other materials over catch basins (SPU 2004mm).

A no further action letter was reportedly sent on November 19, 2004. Although this area is identified as draining to Slip 5 in the inspection report, KCIA storm drain maps indicate that this area drains to EAA-4.

The mailing address for this facility is 7300 Perimeter Road S., which is located at the northern tip of the Slip 5 drainage basin. King County lease information indicates that several agency/business offices are located in this building in addition to the King County Sheriff's Office Special Operations Division. These are: MicroDATA, Inc.; Boeing (Markov Site); King County E-911; King County Public Health; and King County Safety & Claims.

Midfield Airpark T-Hangars and Southwest T-Hangars

No inspection reports or other information was available for businesses located within these hangars. According to SPU, all are in compliance with stormwater pollution source control requirements.

FAA Air Traffic Control Tower

A source control inspection for the Federal Aviation Administration (FAA) Air Traffic Control Tower (located at 8200 East Marginal Way S.) indicates that this property drains to the Slip 5 drainage sub-basin, however a King County storm drainage system map indicates that it drains to an outfall within EAA-4. An inspection conducted in September 2004 indicated no environmental compliance issues (SPU 2004gg, 2004jj).

Pajaro, LLC

The property located at 8075 Perimeter Road S. is currently leased to Pajaro, LLC. Pajaro plans to use this property for air cargo/fixed base operations at some time in the future. No additional information was available about current or past uses at this location.

5.2 Potential for Sediment Recontamination

Activities at KCIA may result in the transport of contaminants to EAA-6 sediments via stormwater. No contaminant sources associated with historical site use have been identified.

Ongoing Contaminant Sources

The following potential ongoing contaminant sources at KCIA have been identified:

- **Airport Operations**

  Airport activities including de-icing of aircraft, fueling operations, and maintenance of aircraft and vehicles could represent a source of contaminants to EAA-6 sediments via the stormwater pathway.

- **Operations at KCIA Tenant Properties**

  KCIA tenants engage in a variety of activities, including aircraft maintenance, metal fabrication, fueling, and equipment/vehicle washing. These activities, if not properly managed, could result in the release of pollutants to the stormwater system and subsequently to the LDW.

- **PCBs in Concrete Joint Caulking Material**

  Since 2002, Boeing has removed concrete joint caulking material containing up to 79,000 mg/kg PCBs from areas of north KCIA (within the EAA-3/Slip 4 drainage basin). A joint caulk sample collected from KCIA within the EAA-4 drainage basin (location JC-3) contained elevated levels of PCBs (Ecology 2007c). If exposed concrete is present in this area, PCBs in joint caulking material within the EAA-6 drainage basin could be a source of sediment recontamination.

Potential Pathways to EAA-6 Sediments

The potential for sediment recontamination associated with this property is summarized by transport pathway below. Because KCIA is not adjacent to the LDW, bank erosion/leaching and spills to the waterway are not relevant pathways to EAA-6 sediments.

Stormwater

Very little sampling of storm drain solids has been conducted in this area of KCIA. However, storm drain solids collected from catch basins at the Ameriflight facility in 2004 contained PCBs at 6.6 mg/kg and mercury at 0.61 mg/kg. The source of these contaminants was not determined. Other properties have documented soil and groundwater contamination, such as the former Boeing EMF, which is currently undergoing investigation and cleanup, and Hangar Holdings, where petroleum-contaminated soil was left in place after construction activities in 1996/1997. Contaminants in soil and groundwater could enter the KCIA stormwater system through cracks or gaps in the stormwater piping. In addition, cleanup activities at the Boeing EMF could result in transport of contaminants in soil to the stormwater system if site activities are improperly managed. Most of the KCIA tenant facilities have not been inspected since 2004.

Groundwater

Due to the distance of KCIA from the LDW, and the lack of documented sources of COCs in groundwater that discharges to EAA-6, groundwater discharge is not believed to be a significant pathway for sediment recontamination.

5.3 Data Gaps

Information needed to assess the potential for sediment recontamination associated with operations at central KCIA is listed below. Data gaps were identified for the stormwater discharge pathway only.

Stormwater Discharge

- Sampling of storm drain solids is needed to determine whether these upland properties are a source of contaminants to EAA-6 sediments. In addition, KCIA has been asked to clean out all catch basins; the status of this effort is not known.
- The presence or absence of PCB-containing joint caulking material in central KCIA needs to be determined in order to assess the potential for EAA-6 sediment recontamination via this pathway.
- UPS Boeing Field was out of compliance with its stormwater permit during the most recent Ecology inspection. UPS is working to correct issues associated with elevated copper and zinc in their stormwater. Follow-up is needed to ensure that these issues are corrected.
- Ameriflight was out of compliance with its stormwater permit during the most recent Ecology inspection. Follow-up is needed to identify which drains discharge to stormwater and to ensure that contaminants are not entering storm drains.
- Completion of the cleanup of contamination associated with petroleum LUSTs at Hangar Holdings needs to be confirmed.
- An October 2006 inspection at Western Metal Products specified that catch basins needed to be cleaned out; it is not known whether these catch basins were cleaned. Contaminants in catch basin could potentially be transported to EAA-6 sediments.
- DHL Express was out of compliance with is stormwater permit during the most recent Ecology inspection. Follow-up inspection needed to ensure that contaminants are not entering KCIA storm drains.
- The most recent inspections at Galvin Flying Services/Clay Lacy Aviation and BAX Global were conducted over 5 years ago, and Federal Express Perimeter Rd. has never been inspected, based on the documents available during preparation of this Data Gaps report. The potential for sediment recontamination associated with these facilities cannot be determined.
- Remedial activities at the former Boeing EMF need to be monitored to ensure that contaminated soil does not enter the storm drain system.
- Based on stormwater system maps from KCIA, the ARFF facility and the Air Traffic Control Tower drain to EAA-4, not EAA-6. Confirmation is needed.
- Several KCIA tenant inspections were conducted in 2004 or 2005. Some of the facilities inspected may no longer be conducting business at this location, and new ones may have taken their place. Additional site inspections are needed to verify that the activities at the KCIA tenant facilities are in compliance with source control best management practices.

6.0 Summary of Data Gaps

Data gaps have been identified for outfalls, adjacent properties, and upland properties in Sections 3 through 5, respectively. These data gaps are summarized below, listed by potential sediment recontamination pathway.

6.1 Stormwater Discharge

6.1.1 King County Slip 5 SD/City of Seattle EOF

- No data is available about concentrations of COCs in storm drain solids and stormwater near the outfall.
- If contaminants are present at concentrations of potential concern near the outfall, then source tracing samples are needed to identify potential source(s) of the contaminants. Storm drain solids data are needed from the 48-inch storm drain line near the lift station at KCIA Outfall #2, through the Boeing Isaacson property, and from CB-39 on the Boeing Thompson property.
- Results of storm drain sampling by the Elliott Bay Action Program should be reviewed to identify additional contaminants that may be of concern in stormwater.

6.1.2 Boeing Isaacson

- No information is available about the condition of the 48-inch county storm drain line that passes through the Boeing Isaacson property. Arsenic in soil and groundwater around this pipe could be entering the storm drain line through gaps or holes in the piping, if any exist, and could subsequently be transported to the LDW and EAA-6 sediments.
- The purpose, function, and configuration of the edge drains along the Boeing Isaacson shoreline are unclear.
- No information is available regarding contaminant concentrations in catch basins that drain to the Boeing Thompson stormwater system (CB-10, CB-11, CB-12, CB-15, CB-16, CB-34, and CB-35).
- No information is available on the source or status of the “outfall of unresolved origin” reportedly located near the Boeing Isaacson/Jorgensen Forge property boundary.

6.1.3 Boeing Thompson

- Although stormwater from this facility discharges to the LDW at two locations, no sampling of stormwater solids has been conducted and therefore it is not possible to determine whether stormwater from current operations at Boeing Thompson is a source of contaminants to EAA-6 sediments.
- A stormwater compliance inspection was conducted by Ecology on April 6, 2007, which indicated that the benchmark level for total zinc had been exceeded for the preceding three quarters, and that a Level 1 response was required (Ecology 2007e). Follow-up should be conducted to ensure that this issue has been corrected.

- As of December 31, 2007, industrial/manufacturing activities have reportedly been relocated from the Boeing Thompson property to other facilities. No information was available regarding current activities at this site. An inspection is needed to evaluate the potential that current operations may contribute to recontamination of EAA-6 sediments.

6.1.4 KCIA

- Sampling of storm drain solids is needed to determine whether these upland properties are a source of contaminants to EAA-6 sediments. In addition, KCIA has been asked to clean out all catch basins; the status of this effort is not known.
- The presence or absence of PCB-containing joint caulking material in central KCIA needs to be determined in order to assess the potential for EAA-6 sediment recontamination via this pathway.
- UPS Boeing Field was out of compliance with its stormwater permit during the most recent Ecology inspection. UPS is working to correct issues associated with elevated copper and zinc in their stormwater. Follow-up is needed to ensure that these issues are corrected.
- Ameriflight was out of compliance with its stormwater permit during the most recent Ecology inspection. Follow-up is needed to identify which drains discharge to stormwater and to ensure that contaminants are not entering storm drains.
- Completion of the cleanup of contamination associated with petroleum LUSTs at Hangar Holdings needs to be confirmed.
- An October 2006 inspection at Western Metal Products specified that catch basins needed to be cleaned out; it is not known whether these catch basins were cleaned. Contaminants in catch basin could potentially be transported to EAA-6 sediments.
- DHL Express was out of compliance with is stormwater permit during the most recent Ecology inspection. Follow-up inspection needed to ensure that contaminants are not entering KCIA storm drains.
- The most recent inspections at Galvin Flying Services/Clay Lacy Aviation and BAX Global were conducted over 5 years ago, and Federal Express Perimeter Rd. has never been inspected, based on the documents available during preparation of this Data Gaps report. The potential for sediment recontamination associated with these facilities cannot be determined.
- Remedial activities at the former Boeing EMF need to be monitored to ensure that contaminated soil does not enter the storm drain system.
- Based on stormwater system maps from KCIA, the ARFF facility and the Air Traffic Control Tower drain to EAA-4, not EAA-6. Confirmation is needed.
- Several KCIA tenant inspections were conducted in 2004 or 2005. Some of the facilities inspected may no longer be conducting business at this location, and new ones may have taken their place. Additional site inspections are needed to verify that the activities at the KCIA tenant facilities are in compliance with source control best management practices.

6.2 Groundwater Discharge

6.2.1 Boeing Isaacson

- Data on contaminant concentrations in subsurface soil near the former location of the Slip 5 outfall is not available. These data are needed to evaluate the potential for historical releases of contaminants from the central KCIA storm drain system; if present, these may be transported to the LDW and EAA-6 sediments via groundwater.
- The extent of contaminated soil to the north of the 48-inch storm drain line is unknown. Contaminants in soil could enter the storm drain line through gaps or holes in the piping, and subsequently could be transported to the LDW.
- Arsenic has been detected in groundwater at the Isaacson property at concentrations up to 1,600 ug/L. Additional groundwater data are needed to determine whether residual historical contamination poses a risk of sediment recontamination via groundwater transport.
- In 1997, GeoEngineers conducted a statistical analysis of groundwater data at the Boeing Isaacson (and Thompson) properties; they calculated a 95 percent upper confidence limit and concluded that downgradient monitoring wells at the Boeing Isaacson site were in compliance with ambient water quality criteria. This analysis was not available for review at the time this Data Gaps report was prepared, and the groundwater data available for review were incomplete. Additional groundwater samples at the Boeing Isaacson property were collected in 2000 and 2007. Therefore, the validity of this conclusion needs to be evaluated.
- Soil and groundwater sampling at this property has focused on arsenic. However, investigations conducted in 1983 and 1988 identified lead (to 95 ug/L), silver (to 8.1 ug/L), and zinc (to 14,000 ug/L) at concentrations above groundwater-to-sediment screening levels[23]. Other metals may be associated with fill material used at the site. Arsenic remediation activities may have resulted in reduction or elimination of the sources of these contaminants, however no sampling has been conducted to determine whether this is the case.

6.2.2 Boeing Thompson

- Arsenic is present at elevated concentrations in two groundwater monitoring wells at this property. Although these wells have been sampled several times since 1988, a comprehensive soil and groundwater investigation has not been conducted at this property. Information on groundwater concentrations of arsenic and other contaminants of concern from throughout the site is needed to determine the sources of arsenic and to evaluate potential contaminant transport pathways to LDW sediment.
- Boeing is currently preparing a memorandum to document their findings associated with the two drainage pipes that may be discharging to the Kenworth Motor/IAA property. A review of this memorandum may provide additional information needed to assess the potential for sediment recontamination.

[23] Groundwater-to-sediment screening levels based on CSLs are 13 ug/L for lead, 1.5 ug/L for silver, and 76 ug/L for zinc, as described in SAIC 2006.

- The tidal efficiency observed in well I-205 measured during a tidal study in 2000 appeared to be anomalous (ERM 2000d). Recorded groundwater elevation changes at this well exhibited patterns inconsistent with data from other wells and piezometers in the vicinity. The reason for these anomalous results is unknown.
- The source of arsenic in groundwater as measured at wells I-205 and I-206 is not known. GeoEngineers (1996, as cited in ERM 2000a) concluded that the Boeing Isaacson was not the source of arsenic in these wells. However, the GeoEngineers report was not available in the files reviewed during preparation of this Data Gaps report, and this conclusion could not be verified.
- Although monitoring wells I-205 and I-206 have been sampled numerous times, little information on arsenic concentrations in groundwater in other areas of the property is available; this makes identification of the arsenic source difficult.
- Soil samples were collected and analyzed for arsenic at the Boeing Thompson property in 1996. No information on other contaminants that may be present in soils is available. Since contaminants in fill material are considered a potential source, additional soil data for arsenic and other chemicals is needed to evaluate the potential for recontamination of EAA-6 sediments.

6.3 Bank Erosion/Leaching

6.3.1 Boeing Isaacson

- No information is available regarding contaminant concentrations in bank soils.

6.3.2 Boeing Thompson

- No information is available regarding contaminant concentrations in bank soils.

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Figures

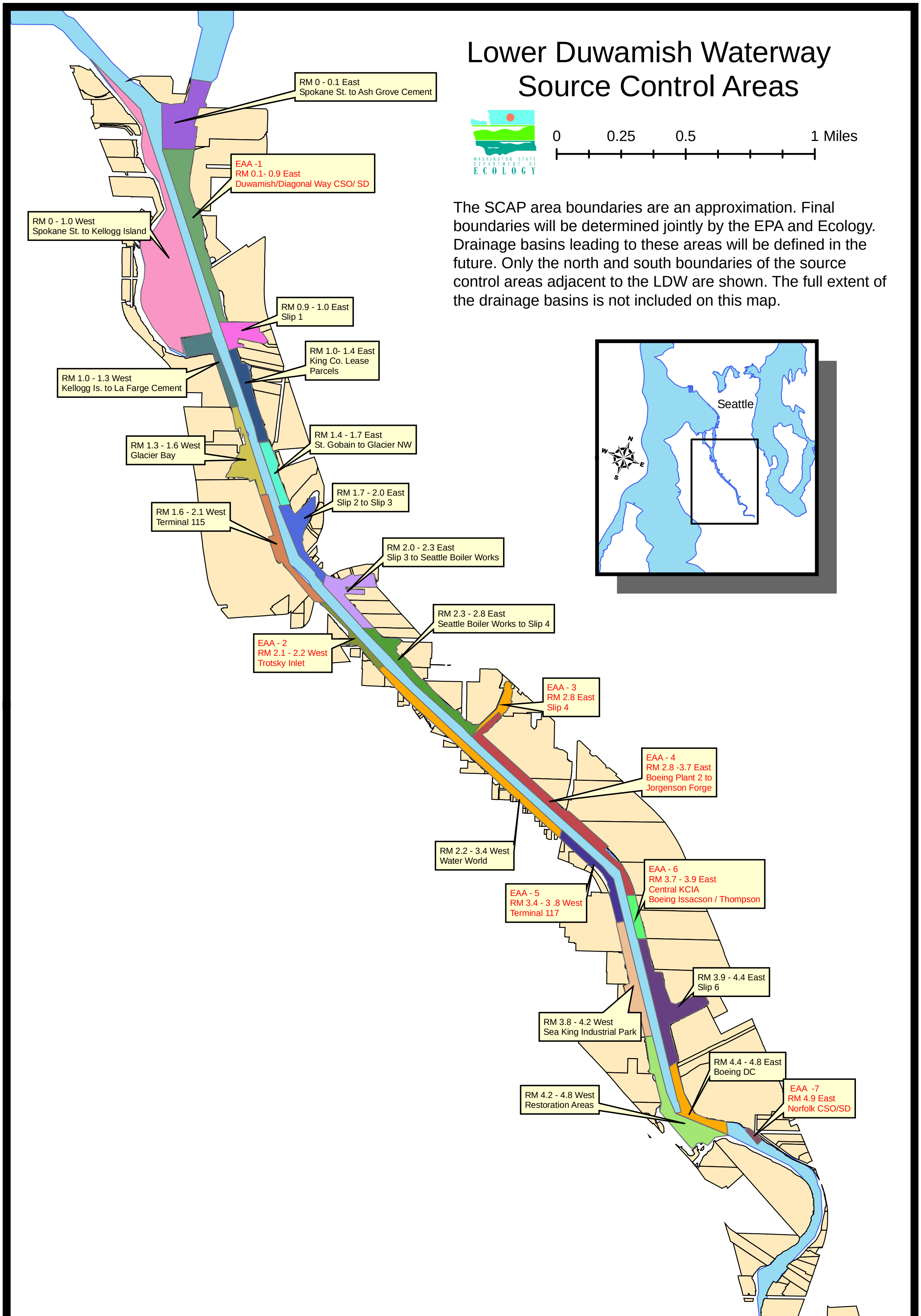


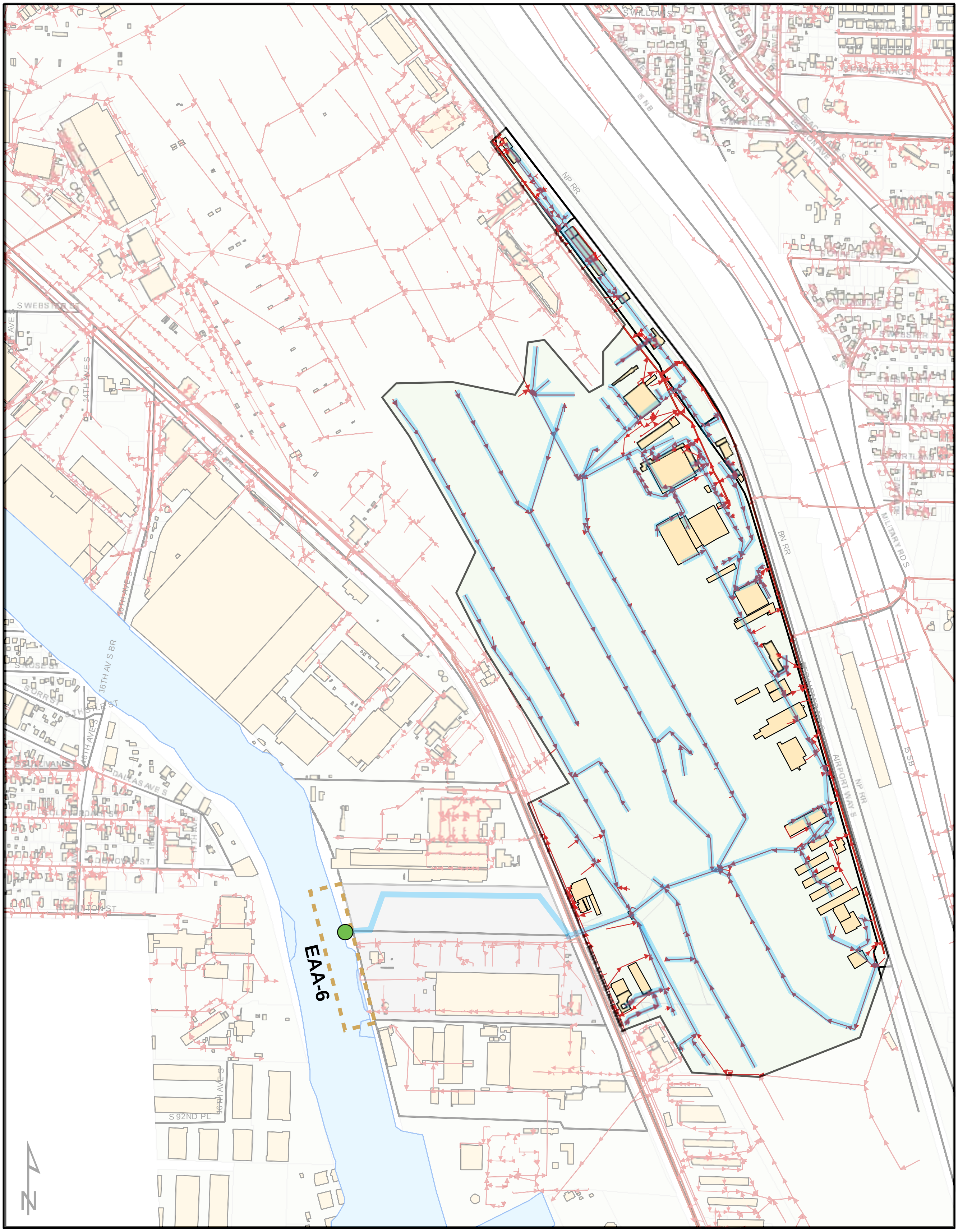
Figure 1. Lower Duwamish Waterway Source Control Areas

SAIC From Science to Solutions

Legend

- Public Storm Drain Outfall/EOF
- Private Storm Drain Outfall

Figure 2. EAA-6 Adjacent Properties



Legend

Stormwater Drain Line

Public Storm Drain Outfall and EOF

0 250 500 750 1,000 Feet 1:9,500

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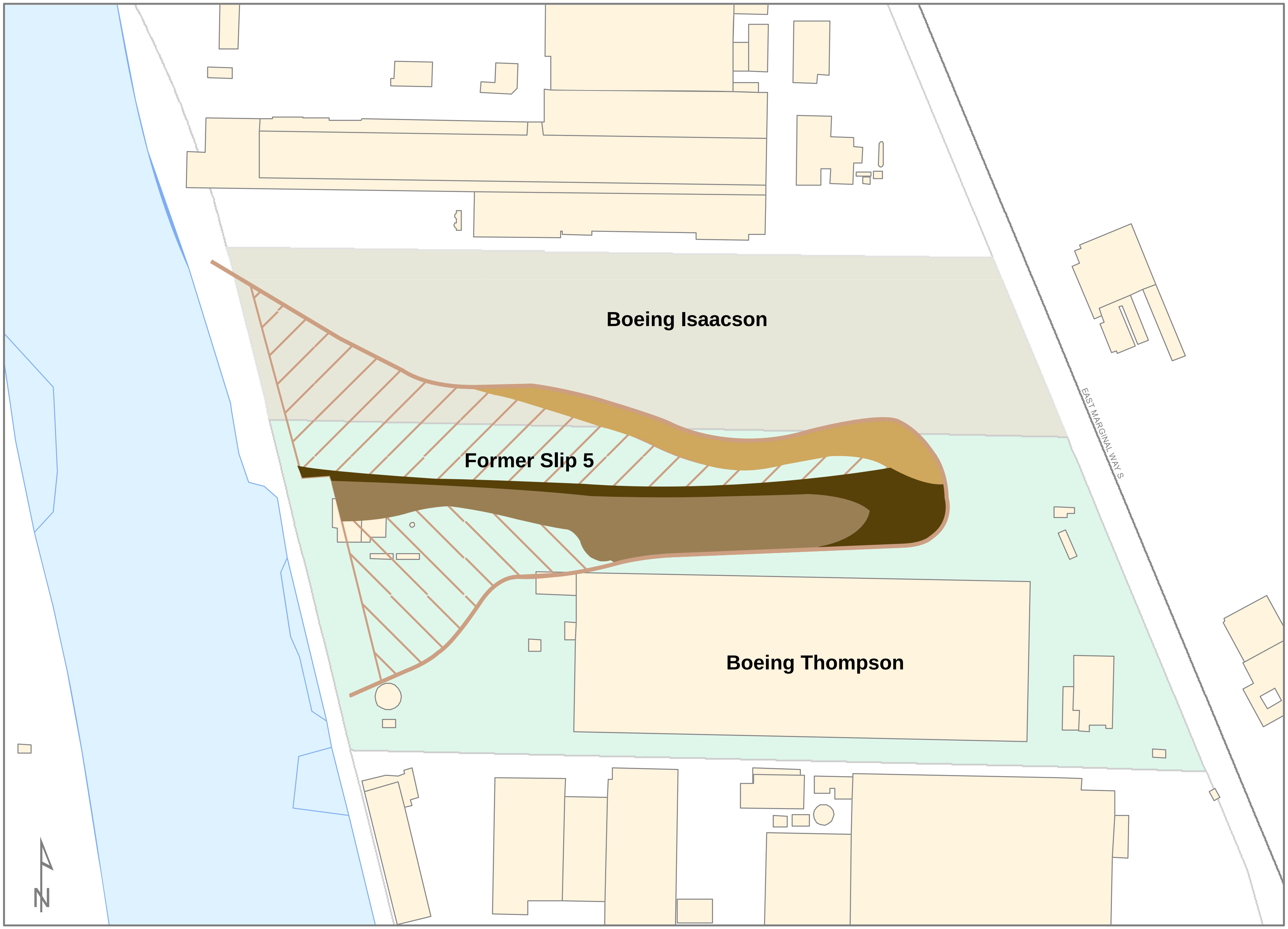
Figure 3. Central KCIA Stormwater Drainage Basin

Base Map Source: City of Seattle



0 50 100 200 300 400 Feet

1:2,600

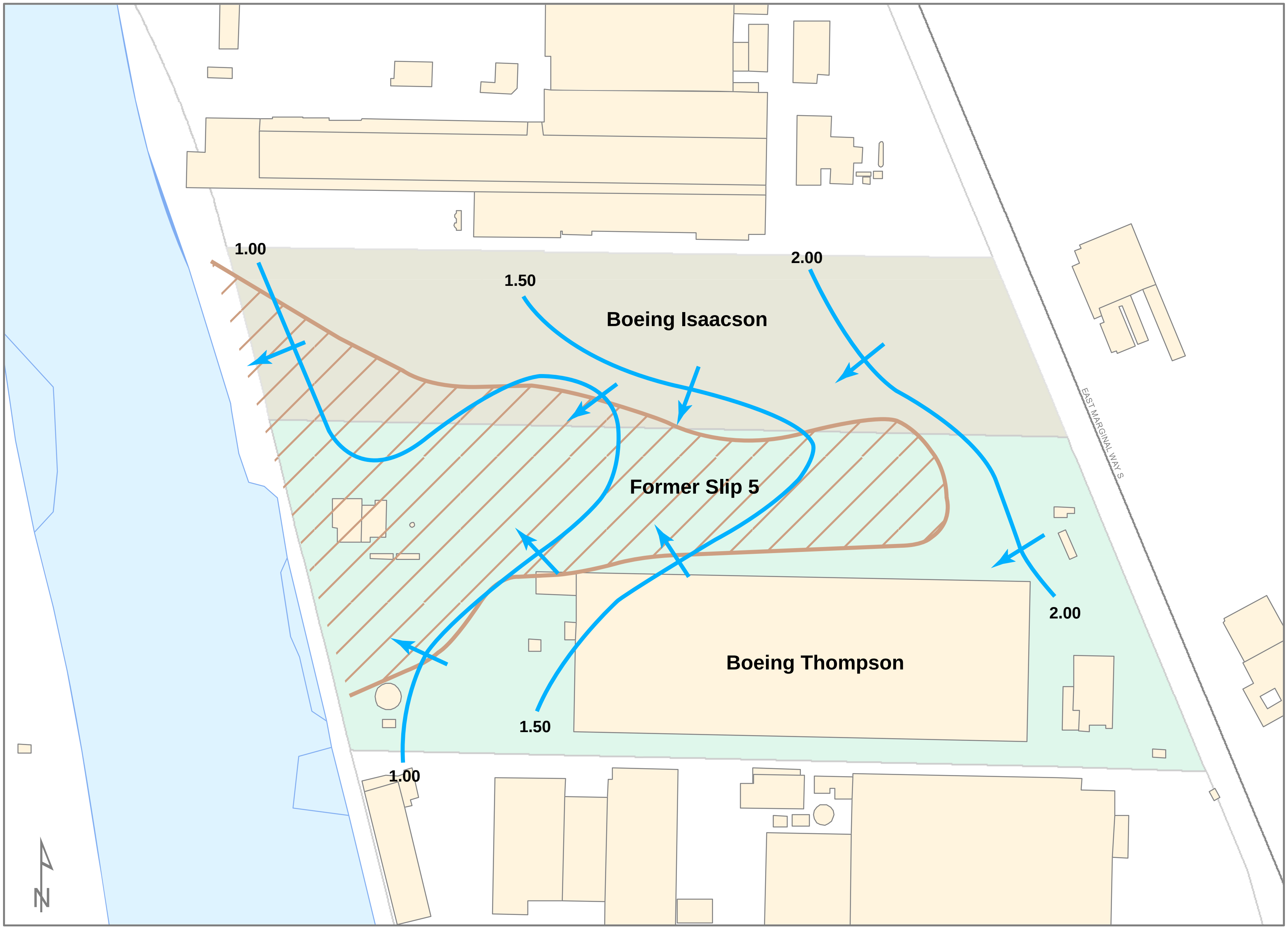
Legend

- 1936 – 1946
- 1946 – 1960*
- 1946 – 1960*
- 1960 – 1965
- 1965 – 1966

*Fill placed during the same time period but from possibly different sources.

Figure 4. Slip 5 Fill History

Source: Landau 1990



0 50 100 200 300 400
Feet
1:2,600

Legend

Former Slip 5
Current Groundwater Flow Direction

Figure 5. Former Slip 5 Location and General Groundwater Flow Direction

Source: ERM 2000d

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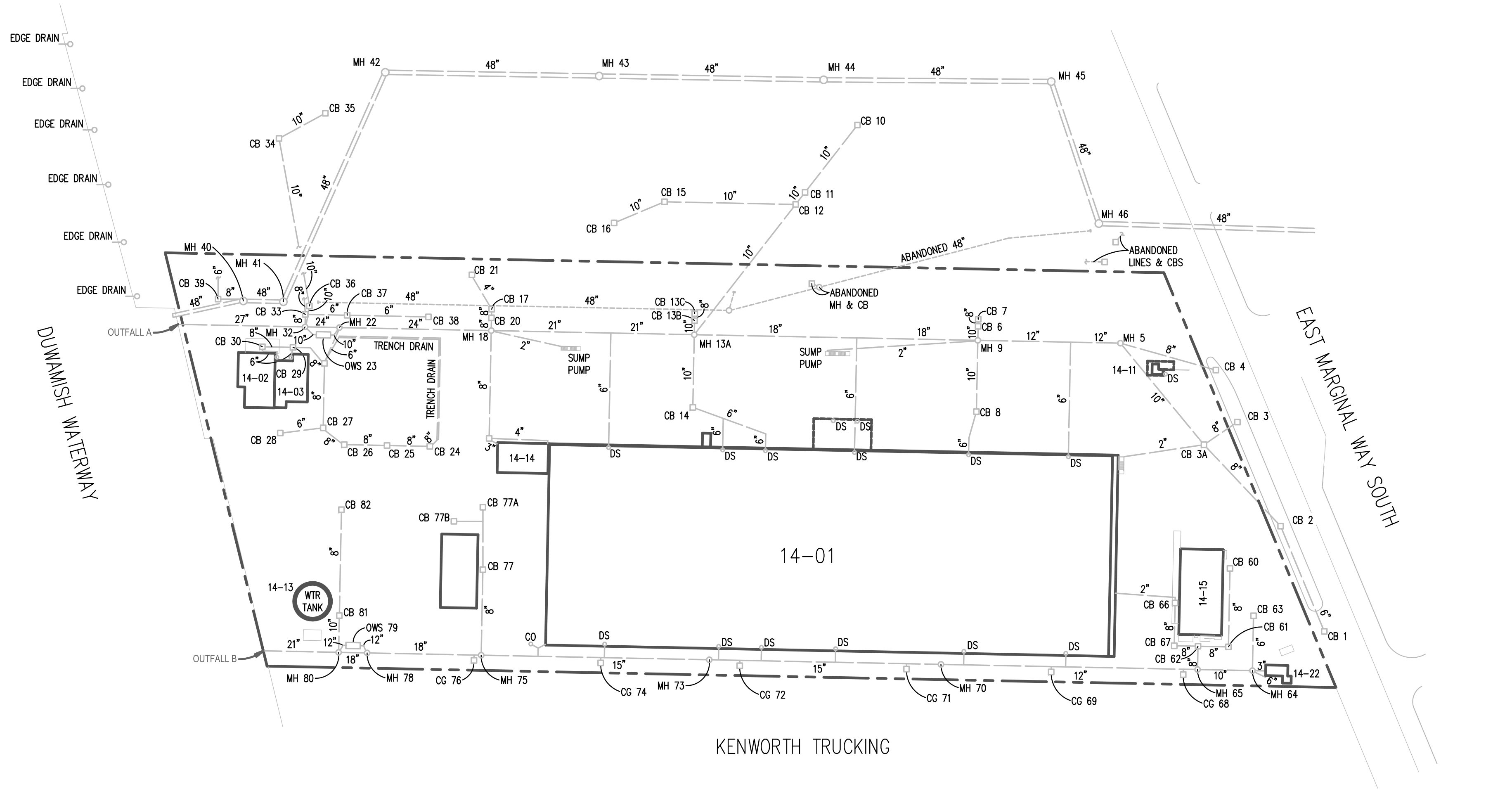
Figure 6. EAA-6 Sediment Sampling Locations



THOMPSON SITE
STORMWATER SITE MAP
SCALE: 1" = 100'

N

DRAINAGE AREA TABLE

OUTFALL LETTER	BASIN NUMBER	BASIN AREA (ACRES)	REMARKS
A	1	13.06	
B	2	6.05	
TOTAL		19.11	

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Figure 7. Stormwater System, Boeing Thompson and Isaacson Properties
Source: Boeing 2008

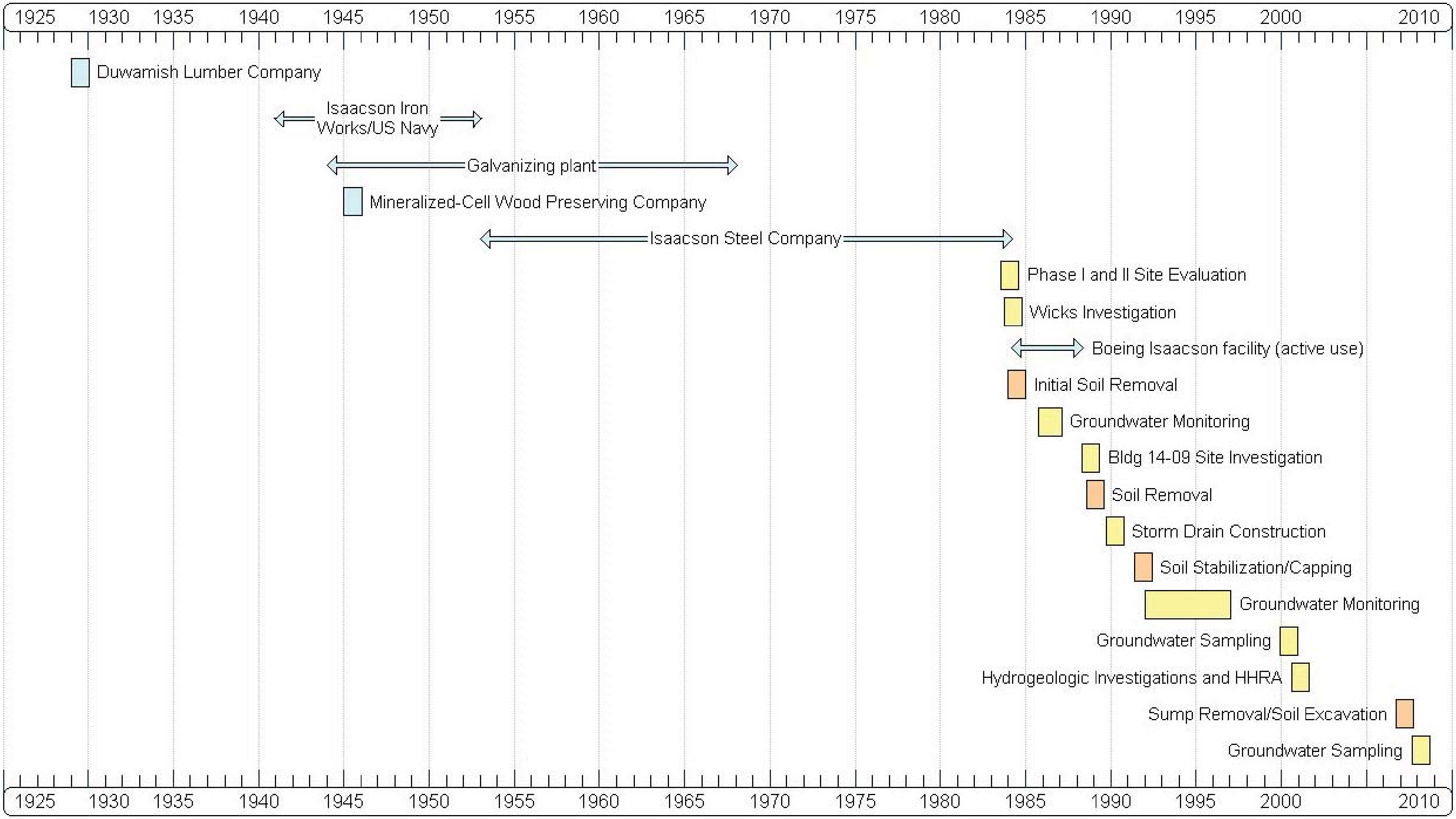

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Figure 8. Timeline of Property Ownership and Investigations/Cleanups at Boeing Isaacson Property

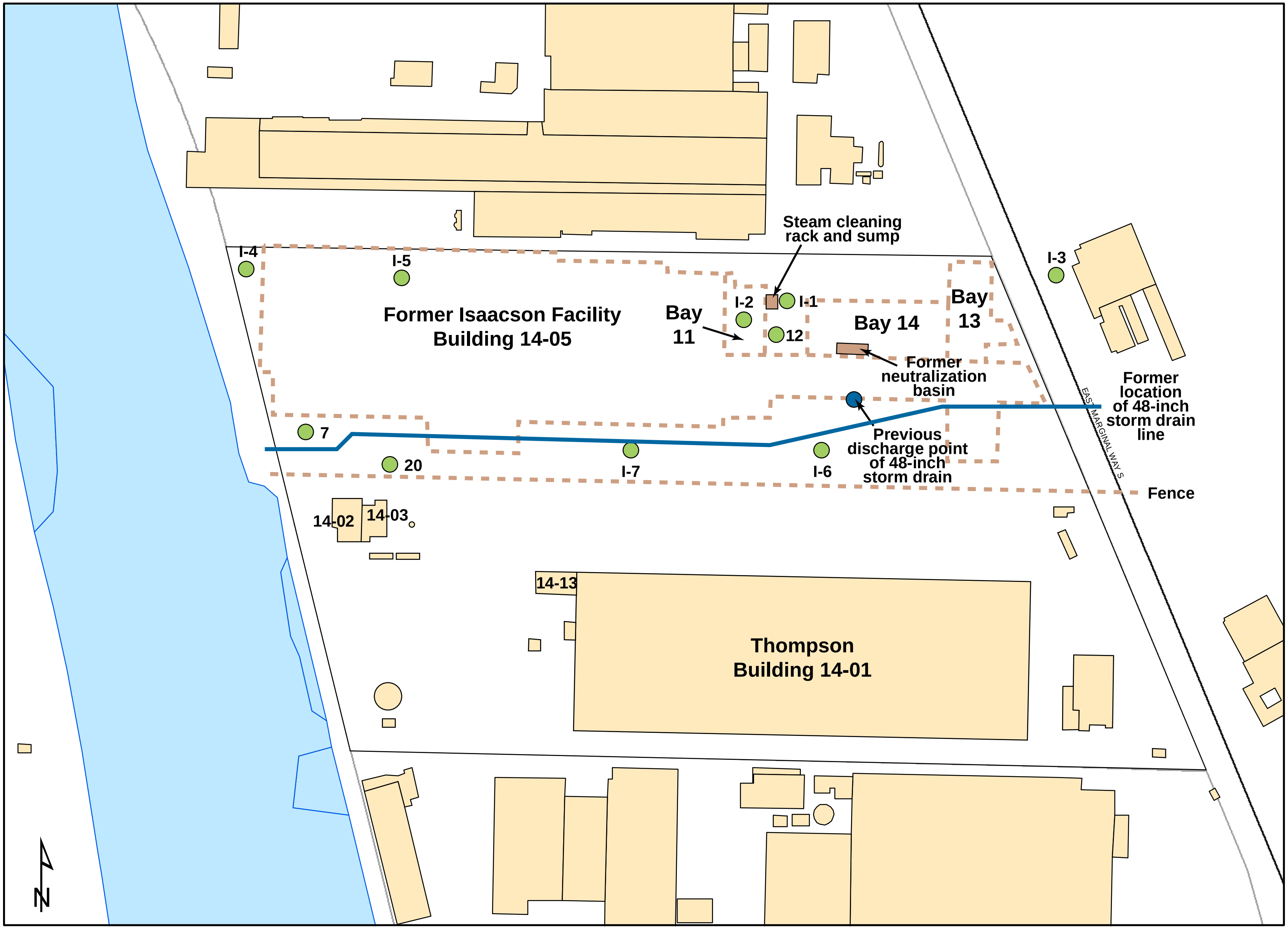

Figure 9. Isaacson Property Layout and Groundwater Sampling Locations, 1983

Adapted From: Wicks 1983; Landau 1990

Figure 10. Current Groundwater Monitoring Wells, Boeing Thompson and Isaacson Properties

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Figure 11. EAA-6 Upland Properties

Tables

Table 1
Sediment Samples Collected Near EAA-6

Location Name	Location Number	Date Collected	Collection Depth	Event Name	Reference
Surface Sediment Samples					
EIT060	70	9/26/1997	Surface	NOAA Site Characterization	Windward 2003a
EST141	136	9/25/1997	Surface	NOAA Site Characterization	Windward 2003a
EST142	137	10/24/1997	Surface	NOAA Site Characterization	Windward 2003a
EST143	138	9/25/1997	Surface	NOAA Site Characterization	Windward 2003a
EST147	142	9/25/1997	Surface	NOAA Site Characterization	Windward 2003a
EST148	143	11/12/1997	Surface	NOAA Site Characterization	Windward 2003a
EST158	151	9/24/1997	Surface	NOAA Site Characterization	Windward 2003a
EST159	152	9/24/1997	Surface	NOAA Site Characterization	Windward 2003a
EST160	153	9/25/1997	Surface	NOAA Site Characterization	Windward 2003a
EST161	154	11/13/1997	Surface	NOAA Site Characterization	Windward 2003a
EST162	155	9/25/1997	Surface	NOAA Site Characterization	Windward 2003a
DR187[a]	753	8/27/1998	Surface	EPA SI	Windward 2003a
DR188	754	8/25/1998	Surface	EPA SI	Windward 2003a
DR220	786	8/25/1998	Surface	EPA SI	Windward 2003a
R22	899	10/8/1997	Surface	Boeing Site Characterization	Windward 2003a
R23	900	10/11/1997	Surface	Boeing Site Characterization	Windward 2003a
R26	903	10/9/1997	Surface	Boeing Site Characterization	Windward 2003a
R27	904	10/11/1997	Surface	Boeing Site Characterization	Windward 2003a
R30[b]	908	10/11/1997	Surface	Boeing Site Characterization	Windward 2003a
R31	909	10/9/1997	Surface	Boeing Site Characterization	Windward 2003a
LDW-SS112	SS112	1/19/2005	Surface	LDW RI Phase 2 Round 1	Windward 2005a
LDW-SS114	SS114	1/20/2005	Surface	LDW RI Phase 2 Round 1	Windward 2005a
LDW-SS115	SS115	1/25/2005	Surface	LDW RI Phase 2 Round 1	Windward 2005a
LDW-SS116	SS116	1/20/2005	Surface	LDW RI Phase 2 Round 1	Windward 2005a
LDW-SS118	SS118	1/20/2005	Surface	LDW RI Phase 2 Round 1	Windward 2005a
LDW-SS119	SS119	1/19/2005	Surface	LDW RI Phase 2 Round 1	Windward 2005a
LDW-SS157	SS157	3/16/2005	Surface	LDW RI Phase 2 Round 2	Windward 2005b
LDW-SS158	SS158	3/16/2005	Surface	LDW RI Phase 2 Round 2	Windward 2005b
LDW-SS159	SS159	3/16/2005	Surface	LDW RI Phase 2 Round 2	Windward 2005b
LDW-SS338	SS338	10/3/2006	Surface	LDW RI Phase 2 Round 3	Windward 2007b
Subsurface Sediment Samples					
DR220	786	9/23/1998	0 - 2 feet	EPA SI	Windward 2003a
DR220	786	9/23/1998	2 - 4 feet	EPA SI	Windward 2003a
LDW-SC50a	SC50a	2/24/2006	0 - 1 feet	LDW RI Phase 2 Subsurface	Windward 2007a
LDW-SC50a	SC50a	2/24/2006	1 - 2 feet	LDW RI Phase 2 Subsurface	Windward 2007a
LDW-SC50a	SC50a	2/24/2006	2 - 2.8 feet	LDW RI Phase 2 Subsurface	Windward 2007a
LDW-SC50a	SC50a	2/24/2006	2.8 - 4 feet	LDW RI Phase 2 Subsurface	Windward 2007a
LDW-SC51	SC51	2/22/2006	0 - 2 feet	LDW RI Phase 2 Subsurface	Windward 2007a
LDW-SC51	SC51	2/22/2006	2 - 3.8 feet	LDW RI Phase 2 Subsurface	Windward 2007a
LDW-SC51	SC51	2/22/2006	3.8 - 5.8 feet	LDW RI Phase 2 Subsurface	Windward 2007a

a - This sample was superseded by LDW-SS115; results for this sample are not included in Table 2.
b - This sample was superseded by LDW-SS119; results for this sample are not included in Table 2.

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Table 2
Chemicals above Screening Levels in Surface Sediment
Early Action Area 6

Source	Sample Date	Sample Location	Chemical	Conc'n (mg/kg DW)	TOC (%)	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor	CSL Exceedance Factor
Metals and trace elements											
RI Phase 2 Round 1	**1/1/05**	**LDW-SS114**	**Arsenic**	**1,100**	**1.53**	**NA**	**57**	**93**	**mg/kg DW**	**19**	**11.8**
LDW RI Phase 2 Round 1	1/19/05	LDW-SS112	Arsenic	481	1.82	NA	57	93	mg/kg DW	8.4	5.2
Boeing Site Characterization	10/8/97	R22 (899)	Arsenic	80	1.40	NA	57	93	mg/kg DW	1.4	<1
PAHs											
Boeing Site Characterization	10/11/97	R23 (900)	Acenaphthene	0.39	1.70	23	16	57	mg/kg OC	1.4	<1
Boeing Site Characterization	10/11/97	R23 (900)	Benzo(a)anthracene	3.9	1.70	229	110	270	mg/kg OC	2.1	<1
Boeing Site Characterization	10/8/97	R22 (899)	Benzo(a)anthracene	2.1	1.40	150	110	270	mg/kg OC	1.4	<1
Boeing Site Characterization	10/11/97	R23 (900)	Benzo(a)pyrene	4.5	1.70	265	99	210	mg/kg OC	2.7	1.3
Boeing Site Characterization	10/8/97	R22 (899)	Benzo(a)pyrene	2.4	1.40	171	99	210	mg/kg OC	1.7	<1
Boeing Site Characterization	10/11/97	R23 (900)	Benzo(b)fluoranthene	4.6	1.70	271	230	450	mg/kg OC	1.2	<1
Boeing Site Characterization	10/11/97	R23 (900)	Benzo(g,h,i)perylene	3.1	1.70	182	31	78	mg/kg OC	5.9	2.3
Boeing Site Characterization	10/8/97	R22 (899)	Benzo(g,h,i)perylene	1.4	1.40	100	31	78	mg/kg OC	3.2	1.3
Boeing Site Characterization	10/11/97	R23 (900)	Benzo(k)fluoranthene	4.2	1.70	247	230	450	mg/kg OC	1.1	<1
Boeing Site Characterization	10/11/97	R23 (900)	Benzofluoranthenes (total-calc'd)	8.8	1.70	518	230	450	mg/kg OC	2.3	1.2
Boeing Site Characterization	10/8/97	R22 (899)	Benzofluoranthenes (total-calc'd)	4.6	1.40	329	230	450	mg/kg OC	1.4	<1
Boeing Site Characterization	10/11/97	R23 (900)	Chrysene	5.3	1.70	312	100	460	mg/kg OC	3.1	<1
Boeing Site Characterization	10/8/97	R22 (899)	Chrysene	2.8	1.40	200	100	460	mg/kg OC	2.0	<1
LDW RI Phase 2 Round 1	1/25/05	LDW-SS115	Chrysene	2.5	1.92	130	100	460	mg/kg OC	1.3	<1
LDW RI Phase 2 Round 1	1/20/05	LDW-SS114	Chrysene	1.9	1.53	124	100	460	mg/kg OC	1.2	<1
Boeing Site Characterization	10/11/97	R23 (900)	Dibenzo(a,h)anthracene	1.2	1.70	71	12	33	mg/kg OC	5.9	2.1
Boeing Site Characterization	10/8/97	R22 (899)	Dibenzo(a,h)anthracene	0.51	1.40	36	12	33	mg/kg OC	3.0	1.1
Boeing Site Characterization	10/11/97	R23 (900)	Dibenzofuran	0.30	1.70	18	15	58	mg/kg OC	1.2	<1
Boeing Site Characterization	10/11/97	R23 (900)	Fluoranthene	11.0	1.70	647	160	1,200	mg/kg OC	4.0	<1
Boeing Site Characterization	10/8/97	R22 (899)	Fluoranthene	5.6	1.40	400	160	1,200	mg/kg OC	2.5	<1
LDW RI Phase 2 Round 1	1/25/05	LDW-SS115	Fluoranthene	5.2	1.92	271	160	1,200	mg/kg OC	1.7	<1
LDW RI Phase 2 Round 1	1/19/05	LDW-SS112	Fluoranthene	3.4	1.82	187	160	1,200	mg/kg OC	1.2	<1
LDW RI Phase 2 Round 1	1/20/05	LDW-SS114	Fluoranthene	3.1	1.53	203	160	1,200	mg/kg OC	1.3	<1
Boeing Site Characterization	10/11/97	R23 (900)	Fluorene	0.50	1.70	29	23	79	mg/kg OC	1.3	<1
Boeing Site Characterization	10/11/97	R23 (900)	Indeno(1,2,3-cd)pyrene	3.2	1.70	188	34	88	mg/kg OC	5.5	2.1
Boeing Site Characterization	10/8/97	R22 (899)	Indeno(1,2,3-cd)pyrene	1.5	1.40	107	34	88	mg/kg OC	3.2	1.2
LDW RI Phase 2 Round 1	1/20/05	LDW-SS114	Indeno(1,2,3-cd)pyrene	0.56	1.53	37	34	88	mg/kg OC	1.1	<1
Boeing Site Characterization	10/11/97	R23 (900)	Phenanthrene	6.6	1.70	388	100	480	mg/kg OC	3.9	<1
Boeing Site Characterization	10/8/97	R22 (899)	Phenanthrene	2.9	1.40	207	100	480	mg/kg OC	2.1	<1
LDW RI Phase 2 Round 1	1/25/05	LDW-SS115	Phenanthrene	2.4	1.92	125	100	480	mg/kg OC	1.3	<1
Boeing Site Characterization	10/11/97	R23 (900)	Total HPAH (calc'd)	50.6	1.70	2,976	960	5,300	mg/kg OC	3.1	<1
Boeing Site Characterization	10/8/97	R22 (899)	Total HPAH (calc'd)	25.7	1.40	1,836	960	5,300	mg/kg OC	1.9	<1
Boeing Site Characterization	10/11/97	R23 (900)	Total LPAH (calc'd)	8.6	1.70	507	370	780	mg/kg OC	1.4	<1

Table 2
Chemicals above Screening Levels in Surface Sediment
Early Action Area 6

Source	Sample Date	Sample Location	Chemical	Conc'n (mg/kg DW)	TOC (%)	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor	CSL Exceedance Factor
Phthalates											
Boeing Site Characterization	10/11/97	R23 (900)	Bis(2-ethylhexyl)phthalate	1.4	1.70	82	47	78	mg/kg OC	1.8	1.1
LDW RI Phase 2 Round 1	1/20/05	LDW-SS114	Bis(2-ethylhexyl)phthalate	1.2	1.53	78	47	78	mg/kg OC	1.7	<1
Boeing Site Characterization	10/9/97	R31 (909)	Bis(2-ethylhexyl)phthalate	0.72	1.20	60	47	78	mg/kg OC	1.3	<1
Boeing Site Characterization	10/9/97	R31 (909)	Butyl benzyl phthalate	0.22	1.20	18	5	64	mg/kg OC	3.7	<1
LDW RI Phase 2 Round 1	1/19/05	LDW-SS112	Butyl benzyl phthalate	0.22	1.82	12	5	64	mg/kg OC	2.5	<1
Boeing Site Characterization	10/11/97	R23 (900)	Butyl benzyl phthalate	0.20	1.70	12	5	64	mg/kg OC	2.4	<1
LDW RI Phase 2 Round 2	3/16/05	LDW-SS157	Butyl benzyl phthalate	0.20	3.10	6.5	5	64	mg/kg OC	1.3	<1
LDW RI Phase 2 Round 1	1/19/05	LDW-SS119	Butyl benzyl phthalate	0.14	1.50	9.3	5	64	mg/kg OC	1.9	<1
Boeing Site Characterization	10/9/97	R26 (903)	Butyl benzyl phthalate	0.11 J	1.10	10	5	64	mg/kg OC	2.0	<1
Boeing Site Characterization	10/11/97	R27 (904)	Butyl benzyl phthalate	0.091 J	1.50	6.1	5	64	mg/kg OC	1.2	<1
Other SVOCs											
LDW RI Phase 2 Round 2	3/16/05	LDW-SS157	Benzoic acid	0.77	3.10	NA	650	650	ug/kg DW	1.2	1.2
PCBs											
LDW RI Phase 2 Round 1	1/19/05	LDW-SS119	PCBs (total calc'd)	0.88 J	1.50	59	12	65	mg/kg OC	4.9	<1
LDW RI Phase 2 Round 1	1/20/05	LDW-SS114	PCBs (total calc'd)	0.82	1.53	54	12	65	mg/kg OC	4.5	<1
LDW RI Phase 2 Round 1	1/19/05	LDW-SS112	PCBs (total calc'd)	0.47	1.82	26	12	65	mg/kg OC	2.2	<1
LDW RI Phase 2 Round 2	3/16/05	LDW-SS158	PCBs (total calc'd)	0.39 J	1.96	20	12	65	mg/kg OC	1.7	<1
Boeing Site Characterization	10/11/97	R23 (900)	PCBs (total-calc'd)	0.87	1.70	51	12	65	mg/kg OC	4.3	<1
NOAA Site Char.	9/25/97	EST147 (142)	PCBs (total-calc'd)	0.69	1.30	53	12	65	mg/kg OC	4.4	<1
NOAA Site Char.	11/12/97	EST148 (143)	PCBs (total-calc'd)	0.67	2.23	30	12	65	mg/kg OC	2.5	<1
NOAA Site Char.	9/25/97	EST143 (138)	PCBs (total-calc'd)	0.39	1.38	28	12	65	mg/kg OC	2.4	<1
Boeing Site Characterization	10/11/97	R27 (904)	PCBs (total-calc'd)	0.34	1.50	23	12	65	mg/kg OC	1.9	<1
NOAA Site Char.	11/13/97	EST161 (154)	PCBs (total-calc'd)	0.16	0.85	19	12	65	mg/kg OC	1.6	<1
NOAA Site Char.	9/25/97	EST162 (155)	PCBs (total-calc'd)	0.23	1.46	16	12	65	mg/kg OC	1.3	<1
Boeing Site Characterization	10/8/97	R22 (899)	PCBs (total-calc'd)	0.18	1.40	13	12	65	mg/kg OC	1.1	<1
NOAA Site Char.	9/26/97	EIT060 (70)	PCBs (total-calc'd)	0.17	0.88	19	12	65	mg/kg OC	1.6	<1
Boeing Site Characterization	10/9/97	R26 (903)	PCBs (total-calc'd)	0.16	1.10	15	12	65	mg/kg OC	1.2	<1

DW - Dry weight
TOC - Total organic carbon
OC - Organic carbon normalized
SQS - Sediment Quality Standard
CSL - Cleanup Screening Level

NA - Not applicable
PAH - Polynuclear aromatic hydrocarbon
SVOC - Semivolatile organic compound
PCB - polychlorinated biphenyl

Exceedance factors are the ratio of the detected concentration to the CSL or SQS.
Chemicals with exceedance factors greater than 10 are shown in **Bold**

Table 3
Chemicals above Screening Levels in Subsurface Sediment
Early Action Area 6

Source	Sample Date	Sample Depth	Sample Location	Chemical	Conc'n (mg/kg DW)	TOC (%)	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor	CSL Exceedance Factor
Metals and trace elements												
LDW RI Phase 2 Subsurface	**2/24/06**	**0-1**	**LDW-SC50a**	**Arsenic**	**707**	**0.63**	**NA**	**57**	**93**	**mg/kg DW**	**12**	7.6
LDW RI Phase 2 Subsurface	2/24/06	1-2	LDW-SC50a	Arsenic	281	0.82	NA	57	93	mg/kg DW	4.9	3.0
LDW RI Phase 2 Subsurface	2/24/06	2-2.8	LDW-SC50a	Arsenic	161	1.18	NA	57	93	mg/kg DW	2.8	1.7
PAHs												
LDW RI Phase 2 Subsurface	2/22/06	0-2	LDW-SC51	Acenaphthene	0.38	1.47	26	16	57	mg/kg OC	1.6	<1
LDW RI Phase 2 Subsurface	2/22/06	0-0.5	LDW-SC51	Acenaphthene	0.35	1.61	22	16	57	mg/kg OC	1.4	<1
LDW RI Phase 2 Subsurface	2/22/06	1-1.5	LDW-SC51	Acenaphthene	0.25	0.47	53	16	57	mg/kg OC	3.3	<1
LDW RI Phase 2 Subsurface	2/22/06	0-0.5	LDW-SC51	Benzo(g,h,i)perylene	0.59	1.61	37	31	78	mg/kg OC	1.2	<1
LDW RI Phase 2 Subsurface	2/22/06	0-0.5	LDW-SC51	Chrysene	1.9	1.61	118	100	460	m/gkg OC	1.2	<1
LDW RI Phase 2 Subsurface	2/22/06	0-0.5	LDW-SC51	Fluoranthene	4.0	1.61	248	160	1,200	mg/kg OC	1.6	<1
LDW RI Phase 2 Subsurface	2/22/06	0-0.5	LDW-SC51	Indeno(1,2,3-cd)pyrene	0.69	1.61	43	34	88	mg/kg OC	1.3	<1
LDW RI Phase 2 Subsurface	2/22/06	0-0.5	LDW-SC51	Phenanthrene	2.3	1.61	143	100	480	mg/kg OC	1.4	<1
Phthalates												
LDW RI Phase 2 Subsurface	2/22/06	0.5-1	LDW-SC51	Bis(2-ethylhexyl)phthalate	1.8	1.64	110	47	78	mg/kg OC	2.3	1.4
LDW RI Phase 2 Subsurface	2/22/06	0-0.5	LDW-SC51	Bis(2-ethylhexyl)phthalate	0.97	1.61	60	47	78	mg/kg OC	1.3	<1
LDW RI Phase 2 Subsurface	2/24/06	0-1	LDW-SC50a	Bis(2-ethylhexyl)phthalate	0.68	0.63	108	47	78	mg/kg OC	2.3	1.4
Other SVOCs												
LDW RI Phase 2 Subsurface	2/22/06	0-0.5	LDW-SC51	Benzyl alcohol	0.18	1.61		57	73	ug/kg DW	3.2	2.5
LDW RI Phase 2 Subsurface	2/22/06	1-1.5	LDW-SC51	Dibenzofuran	0.13	0.47	27	15	58	mg/kg OC	1.8	<1
PCBs												
LDW RI Phase 2 Subsurface	2/22/06	0-2	LDW-SC51	PCBs (total calc'd)	1.3	1.47	88	12	65	mg/kg OC	7.3	1.4
LDW RI Phase 2 Subsurface	2/24/06	1-2	LDW-SC50a	PCBs (total calc'd)	0.78	0.82	96	12	65	mg/kg OC	8.0	1.5
LDW RI Phase 2 Subsurface	2/22/06	2-3.8	LDW-SC51	PCBs (total calc'd)	0.70	1.73	40	12	65	mg/kg OC	3.4	<1
LDW RI Phase 2 Subsurface	2/24/06	0-1	LDW-SC50a	PCBs (total calc'd)	0.51	0.63	81	12	65	mg/kg OC	6.7	1.2
EPA SI	9/23/98	0-2	DR220 (786)	PCBs (total-calc'd)	0.83	2.42	34	12	65	mg/kg OC	2.9	<1

DW - Dry weight
TOC - Total organic carbon
OC - Organic carbon normalized
SQS - Sediment Quality Standard
CSL - Cleanup Screening Level

NA - Not applicable
PAH - Polynuclear aromatic hydrocarbon
SVOC - Semivolatile organic compound
PCB - polychlorinated biphenyl

Exceedance factors are the ratio of the detected concentration to the CSL or SQS.
Chemicals with exceedance factors greater than 10 are shown in **Bold**

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Table 4
CSO/EOF Discharges to the Lower Duwamish Waterway

Outfall	Type (Owner)	Discharge Serial Number	Location	Average Overflow Frequency (events/year) 1999 to 2005	Annual average volume (mgy) 1999 to 2005
Diagonal Avenue S.[1]	CSO (SPU/King County) SD (SPU)	NA	RM 0.5 E	20.1	15.8[2]
Hanford No. 1[3]	CSO (King County)	031	RM 0.5 E	5.5	10.4
Duwamish pump station East	CSO (King County)	035	RM 0.5 E	0.2	0.67
Duwamish pump station West	CSO (King County)	034	RM 0.5 W	1.0	0.58
S. Brandon Street	CSO (King County)	041	RM 1.1 E	26.3	31.0
Terminal 115	CSO (King County)	038	RM 1.9 W	2.0	3.17
S. Brighton Street	CSO (SPU) SD (SPU)	NA	RM 2.1 E	NA[7]	NA
King County Airport SD#3/PS44 EOF[4]	SD (King County) EOF (SPU)	NA	RM 2.8 E	NA	NA
E. Marginal Way S. pump station	EOF (King County)	043	RM 2.8 E	None recorded	NA
8th Avenue S.	CSO (King County)	040	RM 2.8 W	0	0
King County Airport SD#2/PS78 EOF[5]	SD (King County) EOF (SPU)	NA	RM 3.8 E	NA	NA
Michigan	CSO (King County)	039	RM 1.9 E	8.1	19.0
W. Michigan	CSO (King County)	042	RM 2.0 W	3.6	0.98
Norfolk	CSO (King County) SD (King County) EOF (SPU)[6]	044	RM 4.8 E	1.1	0.28

1 - The Diagonal Avenue S. SD outfall is shared by stormwater and seven separate overflow points, including the City's Diagonal CSOs and the County's Hanford No. 1 CSO. The overflow frequency and volume listed are for the Diagonal CSOs only.
2 - This average volume does not include the contribution from King County's Hanford No. 1 CSO, but does include the remaining seven overflow points that discharge through the Diagonal Avenue S. CSO/SD.
3 - Hanford No. 1 discharges to the LDW through the Diagonal Avenue S. SD.
4 – SPU Pump Station 44 discharges via EOF No. 117 to King County Airport SD#3 at Slip 4.
5 – SPU Pump Station 78 discharges via EOF No. 156 to King County Airport SD#2, near Boeing Isaacson.
6 – SPU Pump Station 17 discharges to the Norfolk CSO/SD.
7 – Has not overflowed since monitoring began in March 2000.
NA – Not available

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Table 5
Arsenic Concentrations in Groundwater
Boeing Isaacson and Boeing Thompson

Source	Sample Date	Dissolved Arsenic Conc'n in Groundwater (ug/L)								
		I-200 (Upgradient)	I-104 (Isaacson)	I-203 (Isaacson)	PZ-7 (Isaacson)	I-205 (Thompson)	PZ-8 (Thompson)	I-206 (Thompson)	Freshwater AWQC (2)	GW-to-Sediment Screening Level (3)
Landau 1988a	Feb-88	10	12	60	NA	30	NA	**1,700**	190	370
Landau 2008	Sep-91	NA	NA	NA	NA	129	NA	**1,790**	190	370
Landau 2008	Oct-91	NA	NA	NA	NA	126	NA	**1,610**	190	370
Landau 2008	Apr-92	NA	NA	NA	NA	7	NA	**1,770**	190	370
Landau 2008	May-92	NA	NA	NA	NA	<1	NA	**1,600**	190	370
Landau 2008	Sep-92	NA	NA	NA	NA	57	NA	**1,680 J**	190	370
Landau 2008	Oct-92	NA	NA	NA	NA	9	NA	**1,700**	190	370
Landau 2008	Apr-93	NA	NA	NA	NA	56	NA	**1,710**	190	370
Landau 2008	Oct-93	NA	NA	NA	NA	19	NA	**1,810**	190	370
Landau 2008	Nov-93	NA	NA	NA	NA	**310**	NA	**1,510**	190	370
Landau 2008	Apr-94	NA	NA	NA	NA	7	NA	**1,480**	190	370
Landau 2008	May-94	NA	NA	NA	NA	1	NA	**1,430**	190	370
Landau 2008	Dec-95	NA	NA	NA	NA	**640**	NA	**2,000**	190	370
Landau 2008	Apr-96	NA	NA	NA	NA	**320**	NA	**1,800**	190	370
ERM 2000a	1991-1996 (1)	1	81	180	NA	**300**	NA	**1,670**	190	370
ERM 2000a	Dec-99	2	160	150	NA	10	NA	**1,600**	190	370
ERM 2000d	Aug-00	3	**1,600**	**1,200**	9	27	2	**1,100**	190	370
ERM 2000d	Oct-00	2.7	**810**	98	NA	112	2.8	**1,350**	190	370
Ecology 2007d	Mar-06	NS	NS	NS	NA	<50	NA	**610**	190	370
Ecology 2007d	Aug-06	NS	NS	NS	NA	10.2 (4)	NA	181 (4)	190	370
McCrone 2008	Sep-07	0.9	**3,600**	140	NA	<50 / 28 (5)	<50 / 5 (5)	**720**	190	370

(1) Represents a 95% upper confidence limit of groundwater arsenic concentrations from 1991 through 1996
(2) Chronic freshwater AWQC for protection of aquatic life for trivalent arsenic
(3) Groundwater-to-sediment screening level, based on sediment CSLs. From: SAIC 2006
(4) Sample was analyzed for total arsenic
(5) Sample was analyzed by Methods 6010B and 200.8

[yellow highlight] Concentration above screening level
Note: If multiple samples were collected from a sampling location in a given month, the highest detected concentration is reported.
NA - Not available or not analyzed
NS - Not sampled

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Table 6
KCIA Tenants - Slip 5 Drainage Basin

Facility Name	Address	Facility/Site ID No.	EPA ID No.	NPDES Permit No.	UST/LUST ID No.	Listed in CSCSL?	Most Recent Inspection Date	In Compliance?
UPS Boeing Field	7500 Perimeter Rd. S.; 7575 Perimeter Rd. S.	15215836	WAD988521563	SO3000434	NA	No	1/11/2006 (Ecology)	No
Caliber Inspection, Inc.	7500 Perimeter Rd. S.	18182664	WAD000067686	NA	NA	No	5/31/2005 (SPU)	Yes
GSM, Inc.	7575 Perimeter Rd. S.	NA	NA	NA	NA	No	8/19/2004 (SPU)	Yes
Ameriflight, Inc.	7585 Perimeter Rd. S.	8137128	WAD988521324	SO3002830	NA	No	10/25/2006 (Ecology)	No
Federal Express Perimeter Rd.	7607 Perimeter Rd. S.	75575157	WAD988474698	NA	2392	No	None	Unknown
Hangar Holdings Inc.	7675 Perimeter Rd. S.	72811433	WA8690590007	NA	484990	Yes	10/8/2004 (SPU)	Yes
Western Metal Products Inc.	7696 Perimeter Rd. S.; 7800-7802 Perimeter Rd. S.	NA	NA	NA	NA	No	10/25/2006 (SPU)	Yes
Galvin Flying Services	7777 Perimeter Rd. S.	NA	NA	NA	NA	No	12/7/2004 (SPU)	Yes
Galvin Flying Services/Clay Lacy Aviation	7827 Perimeter Rd. S.	NA	NA	NA	NA	No	10/9/2001 (SPU)	Yes
Civil Air Patrol	7827 Perimeter Rd. S.	NA	NA	NA	NA	No	9/20/2004 (SPU)	Yes
MJL Partners	7827 Perimeter Rd. S.	NA	NA	NA	NA	No	12/7/2004 (SPU)	Yes
Nordstrom	7979 Perimeter Rd. S.	36699669	WAD981773583	NA	8045	No	10/29/2004 (SPU)	Yes
DHL Express (ABX Air)	8013-8075 Perimeter Rd. S.	7723743	NA	SO3004602	NA	No	5/4/2006 (Ecology)	No
Airwest Repair Services	8167 Perimeter Rd. S., 8187 Perimeter Rd. S.	NA	NA	NA	NA	No	8/5/2004 (SPU)	Yes
Puget Sound Aviators	8167 Perimeter Rd. S.	NA	NA	NA	NA	No	8/5/2004 (SPU)	Yes
CJ Systems Aviation Group	8167 Perimeter Rd. S.	NA	NA	NA	NA	No	12/8/2004 (SPU)	Yes
GBA (Gyroplanes of Seattle LLC)	8167 Perimeter Rd. S.	NA	NA	NA	NA	No	8/5/2004 (SPU)	Yes
BAX Global, Inc.	8201 Perimeter Rd. S.	NA	NA	NA	NA	No	3/6/2002 (SPU)	Yes
Clay Lacy Aviation	8285 Perimeter Rd. S.; 8403 Perimeter Rd. S.	6436627	WAD063351332	NA	8044	No	12/16/2004 (SPU)	Yes
Wings Aloft	8453-8525 Perimeter Rd. S.; 8467 Perimeter Rd. S.	NA	NA	NA	NA	No	9/13/2004 (SPU)	Yes

Table 6
KCIA Tenants - Slip 5 Drainage Basin

Facility Name	Address	Facility/Site ID No.	EPA ID No.	NPDES Permit No.	UST/LUST ID No.	Listed in CSCSL?	Most Recent Inspection Date	In Compliance?
Reed Aviation	8490 Perimeter Rd. S.	NA	NA	NA	NA	No	10/4/2004 (SPU)	Yes
Airtech Instrument Company	8490 Perimeter Rd. S.	NA	NA	NA	NA	No	9/24/2004 (SPU)	Yes
Cascade Air Frame	8500 Perimeter Rd. S.	NA	NA	NA	NA	No	11/2/2004 (SPU)	Yes
Helicopters Northwest	8500 Perimeter Rd. S.	NA	NA	NA	NA	No	9/29/2004 (SPU)	Yes
Washington Avionics, Inc.	8525 Perimeter Rd. S.	NA	NA	NA	NA	No	9/15/2004 (SPU)	Yes
Aeroflight National Charter Network	8535 Perimeter Rd. S.; 8555 Perimeter Rd. S.	7318944	NA	NA	447641	No	July 2005 (SPU)	Yes
Federal Drug Enforcement Administration	8700 East Marginal Way S.	NA	NA	NA	NA	No	7/29/2007 (SPU)	Yes
SSCC Aviation Department	8900 East Marginal Way S.	NA	NA	NA	NA	No	11/19/2004 (SPU)	Yes
Former Boeing Electronics Manufacturing Facility	7355 Airport Way S.	63879778	NA	NA	NA	Yes	NA	NA
ARFF - King County Sheriff's Offic	7300 Perimeter Rd. S.	NA	NA	NA	NA	No	9/24/2004 (SPU)	Yes
Midfield Airpark T-Hangars	NA	NA	NA	NA	NA	No	NA	Yes
Southwest T-Hangars	NA	NA	NA	NA	NA	No	NA	Yes
Pajaro LLC	8075 Perimeter Rd. S.	NA	NA	NA	NA	No	NA	NA

NA - Not Available or Not Applicable

Appendix A
Sediment Sampling Data

Table A-1 Surface Sediment Sampling Results, Early Action Area 6

Table A-2 Subsurface Sediment Sampling Results, Early Action Area 6

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
EPA SI	DR187 (753)	2,3,7,8-TCDD TEQ	1.06E-05		1.9	5.58E-04					
Boeing Site Characterization	R23 (900)	2-Methylnaphthalene	1.10E-01		1.7	6.47E+00	38	64	mg/kg OC	0.2	0.1
EPA SI	DR187 (753)	2-Methylnaphthalene	9.00E-02		1.9	4.74E+00	38	64	mg/kg OC	0.1	0.1
Boeing Site Characterization	R22 (899)	2-Methylnaphthalene	3.60E-02		1.4	2.57E+00	38	64	mg/kg OC	0.1	0.04
EPA SI	DR187 (753)	2-Methylphenol	2.00E-02		1.9	1.05E+00	63	63	mg/kg OC	0.02	0.02
Boeing Site Characterization	R23 (900)	4-Methylphenol	5.10E-02		1.7	3.00E+00	670	670	mg/kg OC	0.004	0.004
Boeing Site Characterization	R26 (903)	4-Methylphenol	4.70E-02		1.1	4.27E+00	670	670	mg/kg OC	0.01	0.01
EPA SI	DR187 (753)	Acenaphthene	4.40E-01		1.9	2.32E+01	16	57	mg/kg OC	1.4	0.4
Boeing Site Characterization	R23 (900)	Acenaphthene	3.90E-01		1.7	2.29E+01	16	57	mg/kg OC	1.4	0.4
Boeing Site Characterization	R22 (899)	Acenaphthene	2.10E-01		1.4	1.50E+01	16	57	mg/kg OC	0.9	0.3
RI Phase 2 Round 1	LDW-SS115	Acenaphthene	1.50E-01	J	1.92	7.81E+00	16	57	mg/kg OC	0.5	0.1
RI Phase 2 Round 1	LDW-SS114	Acenaphthene	1.40E-01		1.53	9.15E+00	16	57	mg/kg OC	0.6	0.2
RI Phase 2 Round 2	LDW-SS157	Acenaphthene	8.60E-02		3.1	2.77E+00	16	57	mg/kg OC	0.2	0.05
Boeing Site Characterization	R27 (904)	Acenaphthene	3.00E-02		1.5	2.00E+00	16	57	mg/kg OC	0.1	0.04
Boeing Site Characterization	R31 (909)	Acenaphthene	2.00E-02		1.2	1.67E+00	16	57	mg/kg OC	0.1	0.03
RI Phase 2 Round 2	LDW-SS157	Acenaphthylene	3.40E-02	J	3.1	1.10E+00	66	66	mg/kg OC	0.02	0.02
Boeing Site Characterization	R23 (900)	Acenaphthylene	2.20E-02		1.7	1.29E+00	66	66	mg/kg OC	0.02	0.02
EPA SI	DR187 (753)	Acenaphthylene	2.00E-02		1.9	1.05E+00	66	66	mg/kg OC	0.02	0.02
EPA SI	DR220 (786)	Aluminum	2.30E+04		2.76						
EPA SI	DR188 (754)	Aluminum	1.81E+04		1.75						
EPA SI	DR187 (753)	Aluminum	1.22E+04		1.9						
Boeing Site Characterization	R23 (900)	Anthracene	1.00E+00		1.7	5.88E+01	220	1200	mg/kg OC	0.3	0.05
EPA SI	DR187 (753)	Anthracene	8.00E-01		1.9	4.21E+01	220	1200	mg/kg OC	0.2	0.04
Boeing Site Characterization	R22 (899)	Anthracene	6.30E-01		1.4	4.50E+01	220	1200	mg/kg OC	0.2	0.04
RI Phase 2 Round 1	LDW-SS115	Anthracene	3.90E-01		1.92	2.03E+01	220	1200	mg/kg OC	0.1	0.02
RI Phase 2 Round 2	LDW-SS157	Anthracene	2.70E-01		3.1	8.71E+00	220	1200	mg/kg OC	0.0	0.01
RI Phase 2 Round 1	LDW-SS114	Anthracene	2.50E-01		1.53	1.63E+01	220	1200	mg/kg OC	0.1	0.01
RI Phase 2 Round 1	LDW-SS112	Anthracene	2.00E-01		1.82	1.10E+01	220	1200	mg/kg OC	0.05	0.01
Boeing Site Characterization	R31 (909)	Anthracene	1.60E-01		1.2	1.33E+01	220	1200	mg/kg OC	0.1	0.01
RI Phase 2 Round 2	LDW-SS159	Anthracene	9.00E-02		2.78	3.24E+00	220	1200	mg/kg OC	0.01	0.003
RI Phase 2 Round 2	LDW-SS158	Anthracene	6.30E-02		1.96	3.21E+00	220	1200	mg/kg OC	0.01	0.003
Boeing Site Characterization	R27 (904)	Anthracene	5.50E-02		1.5	3.67E+00	220	1200	mg/kg OC	0.02	0.003

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
Boeing Site Characterization	R26 (903)	Anthracene	5.20E-02		1.1	4.73E+00	220	1200	mg/kg OC	0.02	0.004
RI Phase 2 Round 1	LDW-SS116	Anthracene	5.10E-02	J	1.34	3.81E+00	220	1200	mg/kg OC	0.02	0.003
Boeing Site Characterization	R30 (908)	Anthracene	4.30E-02		1.2	3.58E+00	220	1200	mg/kg OC	0.02	0.003
EPA SI	DR188 (754)	Anthracene	2.00E-02		1.75	1.14E+00	220	1200	mg/kg OC	0.01	0.001
EPA SI	DR220 (786)	Anthracene	2.00E-02		2.76	7.25E-01	220	1200	mg/kg OC	0.00	0.001
RI Phase 2 Round 2	LDW-SS158	Aroclor-1242	6.10E-02	J	1.96	3.11E+00					
Boeing Site Characterization	R31 (909)	Aroclor-1242	1.20E-02	J	1.2	1.00E+00					
RI Phase 2 Round 1	LDW-SS119	Aroclor-1248	1.80E-01		1.5	1.20E+01					
RI Phase 2 Round 1	LDW-SS112	Aroclor-1248	7.60E-02		1.82	4.18E+00					
Boeing Site Characterization	R30 (908)	Aroclor-1254	9.70E-01	J	1.2	8.08E+01					
RI Phase 2 Round 1	LDW-SS114	Aroclor-1254	5.40E-01		1.53	3.53E+01					
Boeing Site Characterization	R23 (900)	Aroclor-1254	4.80E-01		1.7	2.82E+01					
RI Phase 2 Round 1	LDW-SS119	Aroclor-1254	4.60E-01		1.5	3.07E+01					
RI Phase 2 Round 1	LDW-SS112	Aroclor-1254	2.40E-01		1.82	1.32E+01					
Boeing Site Characterization	R27 (904)	Aroclor-1254	2.30E-01		1.5	1.53E+01					
RI Phase 2 Round 2	LDW-SS158	Aroclor-1254	1.90E-01		1.96	9.69E+00					
EPA SI	DR187 (753)	Aroclor-1254	1.64E-01		1.9	8.63E+00					
RI Phase 2 Round 1	LDW-SS115	Aroclor-1254	1.10E-01		1.92	5.73E+00					
RI Phase 2 Round 2	LDW-SS157	Aroclor-1254	1.10E-01		3.1	3.55E+00					
Boeing Site Characterization	R26 (903)	Aroclor-1254	1.00E-01		1.1	9.09E+00					
Boeing Site Characterization	R22 (899)	Aroclor-1254	9.80E-02		1.4	7.00E+00					
RI Phase 2 Round 2	LDW-SS159	Aroclor-1254	9.60E-02		2.78	3.45E+00					
RI Phase 2 Round 1	LDW-SS116	Aroclor-1254	6.50E-02	J	1.34	4.85E+00					
Boeing Site Characterization	R31 (909)	Aroclor-1254	5.90E-02		1.2	4.92E+00					
EPA SI	DR188 (754)	Aroclor-1254	5.80E-02		1.75	3.31E+00					
RI Phase 2 Round 3	LDW-SS338	Aroclor-1254	4.70E-02		1.99	2.36E+00					
EPA SI	DR220 (786)	Aroclor-1254	4.20E-02		2.76	1.52E+00					
RI Phase 2 Round 1	LDW-SS118	Aroclor-1254	2.40E-02		1.84	1.30E+00					
Boeing Site Characterization	R23 (900)	Aroclor-1260	3.90E-01		1.7	2.29E+01					
Boeing Site Characterization	R30 (908)	Aroclor-1260	2.80E-01	J	1.2	2.33E+01					
RI Phase 2 Round 1	LDW-SS114	Aroclor-1260	2.80E-01		1.53	1.83E+01					
RI Phase 2 Round 1	LDW-SS119	Aroclor-1260	2.40E-01	J	1.5	1.60E+01					

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 1	LDW-SS112	Aroclor-1260	1.50E-01		1.82	8.24E+00					
RI Phase 2 Round 2	LDW-SS157	Aroclor-1260	1.50E-01		3.1	4.84E+00					
RI Phase 2 Round 2	LDW-SS158	Aroclor-1260	1.40E-01		1.96	7.14E+00					
Boeing Site Characterization	R27 (904)	Aroclor-1260	1.10E-01		1.5	7.33E+00					
RI Phase 2 Round 1	LDW-SS115	Aroclor-1260	1.10E-01		1.92	5.73E+00					
Boeing Site Characterization	R22 (899)	Aroclor-1260	8.40E-02		1.4	6.00E+00					
EPA SI	DR187 (753)	Aroclor-1260	8.20E-02		1.9	4.32E+00					
RI Phase 2 Round 2	LDW-SS159	Aroclor-1260	7.70E-02		2.78	2.77E+00					
Boeing Site Characterization	R26 (903)	Aroclor-1260	6.30E-02		1.1	5.73E+00					
RI Phase 2 Round 1	LDW-SS116	Aroclor-1260	5.30E-02	J	1.34	3.96E+00					
Boeing Site Characterization	R31 (909)	Aroclor-1260	4.80E-02		1.2	4.00E+00					
EPA SI	DR188 (754)	Aroclor-1260	4.60E-02		1.75	2.63E+00					
RI Phase 2 Round 3	LDW-SS338	Aroclor-1260	4.10E-02		1.99	2.06E+00					
EPA SI	DR220 (786)	Aroclor-1260	3.50E-02		2.76	1.27E+00					
RI Phase 2 Round 1	LDW-SS114	Arsenic	1.10E+03		1.53		57	93	mg/kg DW	19.3	11.8
RI Phase 2 Round 1	LDW-SS112	Arsenic	4.81E+02		1.82		57	93	mg/kg DW	8.4	5.2
Boeing Site Characterization	R22 (899)	Arsenic	8.00E+01		1.4		57	93	mg/kg DW	1.4	0.9
EPA SI	DR187 (753)	Arsenic	4.81E+01		1.9		57	93	mg/kg DW	0.8	0.5
RI Phase 2 Round 1	LDW-SS115	Arsenic	4.44E+01		1.92		57	93	mg/kg DW	0.8	0.5
Boeing Site Characterization	R23 (900)	Arsenic	3.62E+01		1.7		57	93	mg/kg DW	0.6	0.4
Boeing Site Characterization	R31 (909)	Arsenic	2.67E+01		1.2		57	93	mg/kg DW	0.5	0.3
RI Phase 2 Round 2	LDW-SS157	Arsenic	2.11E+01		3.1		57	93	mg/kg DW	0.4	0.2
RI Phase 2 Round 2	LDW-SS158	Arsenic	2.05E+01		1.96		57	93	mg/kg DW	0.4	0.2
Boeing Site Characterization	R26 (903)	Arsenic	1.58E+01		1.1		57	93	mg/kg DW	0.3	0.2
EPA SI	DR220 (786)	Arsenic	1.53E+01		2.76		57	93	mg/kg DW	0.3	0.2
Boeing Site Characterization	R27 (904)	Arsenic	1.41E+01		1.5		57	93	mg/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS118	Arsenic	1.30E+01		1.84		57	93	mg/kg DW	0.2	0.1
EPA SI	DR188 (754)	Arsenic	1.25E+01		1.75		57	93	mg/kg DW	0.2	0.1
Boeing Site Characterization	R30 (908)	Arsenic	1.24E+01		1.2		57	93	mg/kg DW	0.2	0.1
RI Phase 2 Round 1	LDW-SS119	Arsenic	1.09E+01		1.5		57	93	mg/kg DW	0.2	0.1
RI Phase 2 Round 2	LDW-SS159	Arsenic	1.00E+01		2.78		57	93	mg/kg DW	0.2	0.1
RI Phase 2 Round 1	LDW-SS116	Arsenic	9.60E+00		1.34		57	93	mg/kg DW	0.2	0.1

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 3	LDW-SS338	Arsenic	8.70E+00		1.99		57	93	mg/kg DW	0.2	0.1
EPA SI	DR220 (786)	Barium	7.80E+01		2.76						
EPA SI	DR188 (754)	Barium	5.50E+01		1.75						
EPA SI	DR187 (753)	Barium	4.20E+01		1.9						
EPA SI	DR187 (753)	Benzo(a)anthracene	4.80E+00		1.9	2.53E+02	110	270	mg/kg OC	2.3	0.9
Boeing Site Characterization	R23 (900)	Benzo(a)anthracene	3.90E+00		1.7	2.29E+02	110	270	mg/kg OC	2.1	0.8
Boeing Site Characterization	R22 (899)	Benzo(a)anthracene	2.10E+00		1.4	1.50E+02	110	270	mg/kg OC	1.4	0.6
RI Phase 2 Round 1	LDW-SS115	Benzo(a)anthracene	1.50E+00		1.92	7.81E+01	110	270	mg/kg OC	0.7	0.3
RI Phase 2 Round 1	LDW-SS114	Benzo(a)anthracene	1.10E+00		1.53	7.19E+01	110	270	mg/kg OC	0.7	0.3
RI Phase 2 Round 2	LDW-SS157	Benzo(a)anthracene	1.10E+00		3.1	3.55E+01	110	270	mg/kg OC	0.3	0.1
RI Phase 2 Round 1	LDW-SS112	Benzo(a)anthracene	9.30E-01		1.82	5.11E+01	110	270	mg/kg OC	0.5	0.2
RI Phase 2 Round 2	LDW-SS159	Benzo(a)anthracene	4.10E-01		2.78	1.47E+01	110	270	mg/kg OC	0.1	0.1
RI Phase 2 Round 1	LDW-SS116	Benzo(a)anthracene	3.10E-01		1.34	2.31E+01	110	270	mg/kg OC	0.2	0.1
Boeing Site Characterization	R31 (909)	Benzo(a)anthracene	3.00E-01		1.2	2.50E+01	110	270	mg/kg OC	0.2	0.1
Boeing Site Characterization	R26 (903)	Benzo(a)anthracene	2.30E-01		1.1	2.09E+01	110	270	mg/kg OC	0.2	0.1
Boeing Site Characterization	R27 (904)	Benzo(a)anthracene	2.20E-01		1.5	1.47E+01	110	270	mg/kg OC	0.1	0.1
Boeing Site Characterization	R30 (908)	Benzo(a)anthracene	2.20E-01		1.2	1.83E+01	110	270	mg/kg OC	0.2	0.1
RI Phase 2 Round 1	LDW-SS119	Benzo(a)anthracene	1.60E-01		1.5	1.07E+01	110	270	mg/kg OC	0.1	0.04
RI Phase 2 Round 1	LDW-SS118	Benzo(a)anthracene	1.30E-01		1.84	7.07E+00	110	270	mg/kg OC	0.1	0.03
EPA SI	DR188 (754)	Benzo(a)anthracene	1.20E-01		1.75	6.86E+00	110	270	mg/kg OC	0.1	0.03
EPA SI	DR220 (786)	Benzo(a)anthracene	1.10E-01		2.76	3.99E+00	110	270	mg/kg OC	0.04	0.01
RI Phase 2 Round 3	LDW-SS338	Benzo(a)anthracene	8.20E-02		1.99	4.12E+00	110	270	mg/kg OC	0.04	0.02
RI Phase 2 Round 2	LDW-SS158	Benzo(a)anthracene	5.30E-02		1.96	2.70E+00	110	270	mg/kg OC	0.02	0.01
Boeing Site Characterization	R23 (900)	Benzo(a)pyrene	4.50E+00		1.7	2.65E+02	99	210	mg/kg OC	2.7	1.3
EPA SI	DR187 (753)	Benzo(a)pyrene	3.70E+00		1.9	1.95E+02	99	210	mg/kg OC	2.0	0.9
Boeing Site Characterization	R22 (899)	Benzo(a)pyrene	2.40E+00		1.4	1.71E+02	99	210	mg/kg OC	1.7	0.8
RI Phase 2 Round 1	LDW-SS115	Benzo(a)pyrene	1.70E+00		1.92	8.85E+01	99	210	mg/kg OC	0.9	0.4
RI Phase 2 Round 1	LDW-SS114	Benzo(a)pyrene	1.30E+00		1.53	8.50E+01	99	210	mg/kg OC	0.9	0.4
RI Phase 2 Round 2	LDW-SS157	Benzo(a)pyrene	1.30E+00		3.1	4.19E+01	99	210	mg/kg OC	0.4	0.2
RI Phase 2 Round 1	LDW-SS112	Benzo(a)pyrene	1.10E+00		1.82	6.04E+01	99	210	mg/kg OC	0.6	0.3
RI Phase 2 Round 1	LDW-SS116	Benzo(a)pyrene	3.90E-01		1.34	2.91E+01	99	210	mg/kg OC	0.3	0.1
Boeing Site Characterization	R31 (909)	Benzo(a)pyrene	3.60E-01		1.2	3.00E+01	99	210	mg/kg OC	0.3	0.1

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 2	LDW-SS159	Benzo(a)pyrene	3.60E-01		2.78	1.29E+01	99	210	mg/kg OC	0.1	0.1
Boeing Site Characterization	R26 (903)	Benzo(a)pyrene	2.90E-01		1.1	2.64E+01	99	210	mg/kg OC	0.3	0.1
Boeing Site Characterization	R30 (908)	Benzo(a)pyrene	2.70E-01		1.2	2.25E+01	99	210	mg/kg OC	0.2	0.1
Boeing Site Characterization	R27 (904)	Benzo(a)pyrene	2.60E-01		1.5	1.73E+01	99	210	mg/kg OC	0.2	0.1
RI Phase 2 Round 1	LDW-SS119	Benzo(a)pyrene	1.80E-01		1.5	1.20E+01	99	210	mg/kg OC	0.1	0.1
EPA SI	DR188 (754)	Benzo(a)pyrene	1.40E-01		1.75	8.00E+00	99	210	mg/kg OC	0.1	0.04
RI Phase 2 Round 1	LDW-SS118	Benzo(a)pyrene	1.40E-01		1.84	7.61E+00	99	210	mg/kg OC	0.1	0.04
EPA SI	DR220 (786)	Benzo(a)pyrene	1.30E-01		2.76	4.71E+00	99	210	mg/kg OC	0.05	0.02
RI Phase 2 Round 3	LDW-SS338	Benzo(a)pyrene	7.90E-02		1.99	3.97E+00	99	210	mg/kg OC	0.04	0.02
RI Phase 2 Round 2	LDW-SS158	Benzo(a)pyrene	5.80E-02		1.96	2.96E+00	99	210	mg/kg OC	0.03	0.01
Boeing Site Characterization	R23 (900)	Benzo(b)fluoranthene	4.60E+00		1.7	2.71E+02	230	450	mg/kg OC	1.2	0.6
EPA SI	DR187 (753)	Benzo(b)fluoranthene	3.30E+00		1.9	1.74E+02	230	450	mg/kg OC	0.8	0.4
Boeing Site Characterization	R22 (899)	Benzo(b)fluoranthene	2.10E+00		1.4	1.50E+02	230	450	mg/kg OC	0.7	0.3
RI Phase 2 Round 1	LDW-SS115	Benzo(b)fluoranthene	1.90E+00		1.92	9.90E+01	230	450	mg/kg OC	0.4	0.2
RI Phase 2 Round 2	LDW-SS157	Benzo(b)fluoranthene	1.90E+00		3.1	6.13E+01	230	450	mg/kg OC	0.3	0.1
RI Phase 2 Round 1	LDW-SS112	Benzo(b)fluoranthene	1.40E+00		1.82	7.69E+01	230	450	mg/kg OC	0.3	0.2
RI Phase 2 Round 1	LDW-SS114	Benzo(b)fluoranthene	1.30E+00		1.53	8.50E+01	230	450	mg/kg OC	0.4	0.2
RI Phase 2 Round 2	LDW-SS159	Benzo(b)fluoranthene	7.40E-01		2.78	2.66E+01	230	450	mg/kg OC	0.1	0.1
RI Phase 2 Round 1	LDW-SS116	Benzo(b)fluoranthene	5.60E-01		1.34	4.18E+01	230	450	mg/kg OC	0.2	0.1
Boeing Site Characterization	R31 (909)	Benzo(b)fluoranthene	4.00E-01		1.2	3.33E+01	230	450	mg/kg OC	0.1	0.1
Boeing Site Characterization	R26 (903)	Benzo(b)fluoranthene	3.30E-01		1.1	3.00E+01	230	450	mg/kg OC	0.1	0.1
Boeing Site Characterization	R30 (908)	Benzo(b)fluoranthene	3.20E-01		1.2	2.67E+01	230	450	mg/kg OC	0.1	0.1
Boeing Site Characterization	R27 (904)	Benzo(b)fluoranthene	2.50E-01		1.5	1.67E+01	230	450	mg/kg OC	0.1	0.04
RI Phase 2 Round 1	LDW-SS119	Benzo(b)fluoranthene	2.30E-01		1.5	1.53E+01	230	450	mg/kg OC	0.1	0.03
RI Phase 2 Round 1	LDW-SS118	Benzo(b)fluoranthene	2.10E-01		1.84	1.14E+01	230	450	mg/kg OC	0.05	0.03
EPA SI	DR220 (786)	Benzo(b)fluoranthene	1.70E-01		2.76	6.16E+00	230	450	mg/kg OC	0.03	0.01
EPA SI	DR188 (754)	Benzo(b)fluoranthene	1.50E-01		1.75	8.57E+00	230	450	mg/kg OC	0.04	0.02
RI Phase 2 Round 3	LDW-SS338	Benzo(b)fluoranthene	1.20E-01		1.99	6.03E+00	230	450	mg/kg OC	0.03	0.01
RI Phase 2 Round 2	LDW-SS158	Benzo(b)fluoranthene	5.80E-02		1.96	2.96E+00	230	450	mg/kg OC	0.01	0.01
Boeing Site Characterization	R23 (900)	Benzo(g,h,i)perylene	3.10E+00		1.7	1.82E+02	31	78	mg/kg OC	5.9	2.3
EPA SI	DR187 (753)	Benzo(g,h,i)perylene	2.30E+00		1.9	1.21E+02	31	78	mg/kg OC	3.9	1.6
Boeing Site Characterization	R22 (899)	Benzo(g,h,i)perylene	1.40E+00		1.4	1.00E+02	31	78	mg/kg OC	3.2	1.3

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 2	LDW-SS157	Benzo(g,h,i)perylene	5.10E-01		3.1	1.65E+01	31	78	mg/kg OC	0.5	0.2
RI Phase 2 Round 1	LDW-SS115	Benzo(g,h,i)perylene	4.90E-01		1.92	2.55E+01	31	78	mg/kg OC	0.8	0.3
RI Phase 2 Round 1	LDW-SS114	Benzo(g,h,i)perylene	4.60E-01		1.53	3.01E+01	31	78	mg/kg OC	1.0	0.4
RI Phase 2 Round 1	LDW-SS112	Benzo(g,h,i)perylene	3.70E-01		1.82	2.03E+01	31	78	mg/kg OC	0.7	0.3
Boeing Site Characterization	R31 (909)	Benzo(g,h,i)perylene	2.80E-01		1.2	2.33E+01	31	78	mg/kg OC	0.8	0.3
Boeing Site Characterization	R30 (908)	Benzo(g,h,i)perylene	2.40E-01		1.2	2.00E+01	31	78	mg/kg OC	0.6	0.3
Boeing Site Characterization	R27 (904)	Benzo(g,h,i)perylene	2.10E-01		1.5	1.40E+01	31	78	mg/kg OC	0.5	0.2
Boeing Site Characterization	R26 (903)	Benzo(g,h,i)perylene	1.90E-01		1.1	1.73E+01	31	78	mg/kg OC	0.6	0.2
RI Phase 2 Round 2	LDW-SS158	Benzo(g,h,i)perylene	1.40E-01		1.96	7.14E+00	31	78	mg/kg OC	0.2	0.1
RI Phase 2 Round 1	LDW-SS116	Benzo(g,h,i)perylene	1.20E-01		1.34	8.96E+00	31	78	mg/kg OC	0.3	0.1
RI Phase 2 Round 2	LDW-SS159	Benzo(g,h,i)perylene	1.20E-01		2.78	4.32E+00	31	78	mg/kg OC	0.1	0.1
EPA SI	DR188 (754)	Benzo(g,h,i)perylene	1.00E-01		1.75	5.71E+00	31	78	mg/kg OC	0.2	0.1
EPA SI	DR220 (786)	Benzo(g,h,i)perylene	1.00E-01		2.76	3.62E+00	31	78	mg/kg OC	0.1	0.05
RI Phase 2 Round 1	LDW-SS118	Benzo(g,h,i)perylene	7.10E-02	J	1.84	3.86E+00	31	78	mg/kg OC	0.1	0.05
RI Phase 2 Round 3	LDW-SS338	Benzo(g,h,i)perylene	5.80E-02	J	1.99	2.91E+00	31	78	mg/kg OC	0.1	0.04
Boeing Site Characterization	R23 (900)	Benzo(k)fluoranthene	4.20E+00		1.7	2.47E+02	230	450	mg/kg OC	1.1	0.5
EPA SI	DR187 (753)	Benzo(k)fluoranthene	4.00E+00		1.9	2.11E+02	230	450	mg/kg OC	0.9	0.5
Boeing Site Characterization	R22 (899)	Benzo(k)fluoranthene	2.50E+00		1.4	1.79E+02	230	450	mg/kg OC	0.8	0.4
RI Phase 2 Round 1	LDW-SS115	Benzo(k)fluoranthene	1.70E+00		1.92	8.85E+01	230	450	mg/kg OC	0.4	0.2
RI Phase 2 Round 2	LDW-SS157	Benzo(k)fluoranthene	1.50E+00		3.1	4.84E+01	230	450	mg/kg OC	0.2	0.1
RI Phase 2 Round 1	LDW-SS112	Benzo(k)fluoranthene	1.20E+00		1.82	6.59E+01	230	450	mg/kg OC	0.3	0.1
RI Phase 2 Round 1	LDW-SS114	Benzo(k)fluoranthene	1.20E+00		1.53	7.84E+01	230	450	mg/kg OC	0.3	0.2
RI Phase 2 Round 2	LDW-SS159	Benzo(k)fluoranthene	6.00E-01		2.78	2.16E+01	230	450	mg/kg OC	0.1	0.0
Boeing Site Characterization	R31 (909)	Benzo(k)fluoranthene	3.70E-01		1.2	3.08E+01	230	450	mg/kg OC	0.1	0.1
RI Phase 2 Round 1	LDW-SS116	Benzo(k)fluoranthene	3.60E-01		1.34	2.69E+01	230	450	mg/kg OC	0.1	0.1
Boeing Site Characterization	R27 (904)	Benzo(k)fluoranthene	3.20E-01		1.5	2.13E+01	230	450	mg/kg OC	0.1	0.0
Boeing Site Characterization	R26 (903)	Benzo(k)fluoranthene	3.10E-01		1.1	2.82E+01	230	450	mg/kg OC	0.1	0.1
RI Phase 2 Round 2	LDW-SS158	Benzo(k)fluoranthene	3.10E-01		1.96	1.58E+01	230	450	mg/kg OC	0.1	0.0
Boeing Site Characterization	R30 (908)	Benzo(k)fluoranthene	2.90E-01		1.2	2.42E+01	230	450	mg/kg OC	0.1	0.1
EPA SI	DR188 (754)	Benzo(k)fluoranthene	1.70E-01		1.75	9.71E+00	230	450	mg/kg OC	0.04	0.02
EPA SI	DR220 (786)	Benzo(k)fluoranthene	1.60E-01		2.76	5.80E+00	230	450	mg/kg OC	0.03	0.01
RI Phase 2 Round 1	LDW-SS119	Benzo(k)fluoranthene	1.60E-01		1.5	1.07E+01	230	450	mg/kg OC	0.05	0.02

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 1	LDW-SS118	Benzo(k)fluoranthene	1.20E-01		1.84	6.52E+00	230	450	mg/kg OC	0.03	0.01
RI Phase 2 Round 3	LDW-SS338	Benzo(k)fluoranthene	8.40E-02		1.99	4.22E+00	230	450	mg/kg OC	0.02	0.01
Boeing Site Characterization	R23 (900)	Benzofluoranthenes (total-calc'd)	8.80E+00		1.7	5.18E+02	230	450	mg/kg OC	2.3	1.2
EPA SI	DR187 (753)	Benzofluoranthenes (total-calc'd)	7.30E+00		1.9	3.84E+02	230	450	mg/kg OC	1.7	0.9
Boeing Site Characterization	R22 (899)	Benzofluoranthenes (total-calc'd)	4.60E+00		1.4	3.29E+02	230	450	mg/kg OC	1.4	0.7
RI Phase 2 Round 1	LDW-SS115	Benzofluoranthenes (total-calc'd)	3.60E+00		1.92	1.88E+02	230	450	mg/kg OC	0.8	0.4
RI Phase 2 Round 2	LDW-SS157	Benzofluoranthenes (total-calc'd)	3.40E+00		3.1	1.10E+02	230	450	mg/kg OC	0.5	0.2
RI Phase 2 Round 1	LDW-SS112	Benzofluoranthenes (total-calc'd)	2.60E+00		1.82	1.43E+02	230	450	mg/kg OC	0.6	0.3
RI Phase 2 Round 1	LDW-SS114	Benzofluoranthenes (total-calc'd)	2.50E+00		1.53	1.63E+02	230	450	mg/kg OC	0.7	0.4
RI Phase 2 Round 2	LDW-SS159	Benzofluoranthenes (total-calc'd)	1.34E+00		2.78	4.82E+01	230	450	mg/kg OC	0.2	0.1
RI Phase 2 Round 1	LDW-SS116	Benzofluoranthenes (total-calc'd)	9.20E-01		1.34	6.87E+01	230	450	mg/kg OC	0.3	0.2
Boeing Site Characterization	R31 (909)	Benzofluoranthenes (total-calc'd)	7.70E-01		1.2	6.42E+01	230	450	mg/kg OC	0.3	0.1
Boeing Site Characterization	R26 (903)	Benzofluoranthenes (total-calc'd)	6.40E-01		1.1	5.82E+01	230	450	mg/kg OC	0.3	0.1
Boeing Site Characterization	R30 (908)	Benzofluoranthenes (total-calc'd)	6.10E-01		1.2	5.08E+01	230	450	mg/kg OC	0.2	0.1
Boeing Site Characterization	R27 (904)	Benzofluoranthenes (total-calc'd)	5.70E-01		1.5	3.80E+01	230	450	mg/kg OC	0.2	0.1
RI Phase 2 Round 1	LDW-SS119	Benzofluoranthenes (total-calc'd)	3.90E-01		1.5	2.60E+01	230	450	mg/kg OC	0.1	0.1
RI Phase 2 Round 2	LDW-SS158	Benzofluoranthenes (total-calc'd)	3.70E-01		1.96	1.89E+01	230	450	mg/kg OC	0.1	0.04
EPA SI	DR220 (786)	Benzofluoranthenes (total-calc'd)	3.30E-01		2.76	1.20E+01	230	450	mg/kg OC	0.1	0.03
RI Phase 2 Round 1	LDW-SS118	Benzofluoranthenes (total-calc'd)	3.30E-01		1.84	1.79E+01	230	450	mg/kg OC	0.1	0.04
EPA SI	DR188 (754)	Benzofluoranthenes (total-calc'd)	3.20E-01		1.75	1.83E+01	230	450	mg/kg OC	0.1	0.04
RI Phase 2 Round 3	LDW-SS338	Benzofluoranthenes (total-calc'd)	2.00E-01		1.99	1.01E+01	230	450	mg/kg OC	0.04	0.02
RI Phase 2 Round 2	LDW-SS157	Benzoic acid	7.70E-01		3.1		650	650	ug/kg DW	1.2	1.2
RI Phase 2 Round 1	LDW-SS119	Benzoic acid	1.30E-01		1.5		650	650	ug/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS118	Benzoic acid	8.40E-02		1.84		650	650	ug/kg DW	0.1	0.1
Boeing Site Characterization	R22 (899)	Benzyl alcohol	2.70E-02	J	1.4		57	73	ug/kg DW	0.5	0.4
EPA SI	DR220 (786)	Beryllium	4.20E-01		2.76						
EPA SI	DR188 (754)	Beryllium	3.40E-01		1.75						
EPA SI	DR187 (753)	Beryllium	2.50E-01		1.9						
EPA SI	DR188 (754)	bis(2-chloroethoxy)methane	4.00E-02		1.75	2.29E+00					
EPA SI	DR187 (753)	Bis(2-ethylhexyl)phthalate	1.50E+00		1.9	7.89E+01	47	78	mg/kg OC	1.7	1.0
Boeing Site Characterization	R23 (900)	Bis(2-ethylhexyl)phthalate	1.40E+00		1.7	8.24E+01	47	78	mg/kg OC	1.8	1.1
RI Phase 2 Round 1	LDW-SS114	Bis(2-ethylhexyl)phthalate	1.20E+00		1.53	7.84E+01	47	78	mg/kg OC	1.7	1.0

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 2	LDW-SS157	Bis(2-ethylhexyl)phthalate	1.20E+00		3.1	3.87E+01	47	78	mg/kg OC	0.8	0.5
Boeing Site Characterization	R31 (909)	Bis(2-ethylhexyl)phthalate	7.20E-01		1.2	6.00E+01	47	78	mg/kg OC	1.3	0.8
Boeing Site Characterization	R22 (899)	Bis(2-ethylhexyl)phthalate	6.90E-01		1.4	4.93E+01	47	78	mg/kg OC	1.0	0.6
RI Phase 2 Round 2	LDW-SS158	Bis(2-ethylhexyl)phthalate	5.10E-01		1.96	2.60E+01	47	78	mg/kg OC	0.6	0.3
Boeing Site Characterization	R30 (908)	Bis(2-ethylhexyl)phthalate	4.60E-01		1.2	3.83E+01	47	78	mg/kg OC	0.8	0.5
EPA SI	DR220 (786)	Bis(2-ethylhexyl)phthalate	4.00E-01		2.76	1.45E+01	47	78	mg/kg OC	0.3	0.2
Boeing Site Characterization	R26 (903)	Bis(2-ethylhexyl)phthalate	3.70E-01		1.1	3.36E+01	47	78	mg/kg OC	0.7	0.4
RI Phase 2 Round 1	LDW-SS115	Bis(2-ethylhexyl)phthalate	3.30E-01		1.92	1.72E+01	47	78	mg/kg OC	0.4	0.2
RI Phase 2 Round 1	LDW-SS112	Bis(2-ethylhexyl)phthalate	3.20E-01		1.82	1.76E+01	47	78	mg/kg OC	0.4	0.2
Boeing Site Characterization	R27 (904)	Bis(2-ethylhexyl)phthalate	2.80E-01		1.5	1.87E+01	47	78	mg/kg OC	0.4	0.2
RI Phase 2 Round 1	LDW-SS119	Bis(2-ethylhexyl)phthalate	2.80E-01		1.5	1.87E+01	47	78	mg/kg OC	0.4	0.2
EPA SI	DR188 (754)	Bis(2-ethylhexyl)phthalate	2.60E-01		1.75	1.49E+01	47	78	mg/kg OC	0.3	0.2
RI Phase 2 Round 1	LDW-SS116	Bis(2-ethylhexyl)phthalate	2.40E-01		1.34	1.79E+01	47	78	mg/kg OC	0.4	0.2
RI Phase 2 Round 1	LDW-SS118	Bis(2-ethylhexyl)phthalate	2.40E-01		1.84	1.30E+01	47	78	mg/kg OC	0.3	0.2
RI Phase 2 Round 2	LDW-SS159	Bis(2-ethylhexyl)phthalate	1.90E-01		2.78	6.83E+00	47	78	mg/kg OC	0.1	0.1
RI Phase 2 Round 3	LDW-SS338	Bis(2-ethylhexyl)phthalate	1.80E-01		1.99	9.05E+00	47	78	mg/kg OC	0.2	0.1
Boeing Site Characterization	R30 (908)	Butyl benzyl phthalate	2.90E-01		1.2	2.42E+01	4.9	64	mg/kg OC	4.9	0.4
Boeing Site Characterization	R31 (909)	Butyl benzyl phthalate	2.20E-01		1.2	1.83E+01	4.9	64	mg/kg OC	3.7	0.3
RI Phase 2 Round 1	LDW-SS112	Butyl benzyl phthalate	2.20E-01		1.82	1.21E+01	4.9	64	mg/kg OC	2.5	0.2
Boeing Site Characterization	R23 (900)	Butyl benzyl phthalate	2.00E-01		1.7	1.18E+01	4.9	64	mg/kg OC	2.4	0.2
RI Phase 2 Round 2	LDW-SS157	Butyl benzyl phthalate	2.00E-01		3.1	6.45E+00	4.9	64	mg/kg OC	1.3	0.1
RI Phase 2 Round 1	LDW-SS119	Butyl benzyl phthalate	1.40E-01		1.5	9.33E+00	4.9	64	mg/kg OC	1.9	0.1
Boeing Site Characterization	R26 (903)	Butyl benzyl phthalate	1.10E-01	J	1.1	1.00E+01	4.9	64	mg/kg OC	2.0	0.2
Boeing Site Characterization	R27 (904)	Butyl benzyl phthalate	9.10E-02	J	1.5	6.07E+00	4.9	64	mg/kg OC	1.2	0.1
RI Phase 2 Round 2	LDW-SS158	Butyl benzyl phthalate	7.80E-02		1.96	3.98E+00	4.9	64	mg/kg OC	0.8	0.1
RI Phase 2 Round 1	LDW-SS116	Butyl benzyl phthalate	6.30E-02	J	1.34	4.70E+00	4.9	64	mg/kg OC	1.0	0.1
EPA SI	DR188 (754)	Butyl benzyl phthalate	6.00E-02		1.75	3.43E+00	4.9	64	mg/kg OC	0.7	0.1
EPA SI	DR187 (753)	Butyl benzyl phthalate	5.00E-02		1.9	2.63E+00	4.9	64	mg/kg OC	0.5	0.04
EPA SI	DR220 (786)	Butyl benzyl phthalate	3.00E-02		2.76	1.09E+00	4.9	64	mg/kg OC	0.2	0.02
RI Phase 2 Round 1	LDW-SS118	Butyl benzyl phthalate	2.50E-02		1.84	1.36E+00	4.9	64	mg/kg OC	0.3	0.02
RI Phase 2 Round 2	LDW-SS159	Butyl benzyl phthalate	2.40E-02		2.78	8.63E-01	4.9	64	mg/kg OC	0.2	0.01
RI Phase 2 Round 3	LDW-SS338	Butyl benzyl phthalate	1.70E-02		1.99	8.54E-01	4.9	64	mg/kg OC	0.2	0.01

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
Boeing Site Characterization	R23 (900)	Cadmium	1.70E+00	J	1.7		5.1	6.7	mg/kg DW	0.3	0.3
RI Phase 2 Round 1	LDW-SS114	Cadmium	1.60E+00	J	1.53		5.1	6.7	mg/kg DW	0.3	0.2
RI Phase 2 Round 2	LDW-SS157	Cadmium	1.60E+00		3.1		5.1	6.7	mg/kg DW	0.3	0.2
EPA SI	DR187 (753)	Cadmium	1.40E+00		1.9		5.1	6.7	mg/kg DW	0.3	0.2
Boeing Site Characterization	R22 (899)	Cadmium	1.30E+00	J	1.4		5.1	6.7	mg/kg DW	0.3	0.2
RI Phase 2 Round 1	LDW-SS115	Cadmium	1.10E+00		1.92		5.1	6.7	mg/kg DW	0.2	0.2
Boeing Site Characterization	R30 (908)	Cadmium	9.17E-01	J	1.2		5.1	6.7	mg/kg DW	0.2	0.1
RI Phase 2 Round 1	LDW-SS112	Cadmium	7.00E-01		1.82		5.1	6.7	mg/kg DW	0.1	0.1
RI Phase 2 Round 2	LDW-SS158	Cadmium	7.00E-01		1.96		5.1	6.7	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS119	Cadmium	6.00E-01		1.5		5.1	6.7	mg/kg DW	0.1	0.1
Boeing Site Characterization	R31 (909)	Cadmium	5.00E-01	J	1.2		5.1	6.7	mg/kg DW	0.1	0.1
RI Phase 2 Round 2	LDW-SS159	Cadmium	4.00E-01		2.78		5.1	6.7	mg/kg DW	0.1	0.1
EPA SI	DR220 (786)	Cadmium	3.80E-01		2.76		5.1	6.7	mg/kg DW	0.1	0.1
EPA SI	DR188 (754)	Cadmium	2.90E-01		1.75		5.1	6.7	mg/kg DW	0.1	0.04
Boeing Site Characterization	R23 (900)	Carbazole	2.00E+00		1.7	1.18E+02					
EPA SI	DR187 (753)	Carbazole	1.10E+00		1.9	5.79E+01					
Boeing Site Characterization	R22 (899)	Carbazole	9.00E-01		1.4	6.43E+01					
RI Phase 2 Round 1	LDW-SS115	Carbazole	3.50E-01		1.92	1.82E+01					
RI Phase 2 Round 2	LDW-SS157	Carbazole	2.60E-01		3.1	8.39E+00					
RI Phase 2 Round 1	LDW-SS114	Carbazole	2.40E-01		1.53	1.57E+01					
RI Phase 2 Round 1	LDW-SS112	Carbazole	2.20E-01		1.82	1.21E+01					
Boeing Site Characterization	R31 (909)	Carbazole	1.20E-01		1.2	1.00E+01					
RI Phase 2 Round 2	LDW-SS159	Carbazole	8.50E-02		2.78	3.06E+00					
Boeing Site Characterization	R27 (904)	Carbazole	8.20E-02		1.5	5.47E+00					
Boeing Site Characterization	R26 (903)	Carbazole	7.80E-02		1.1	7.09E+00					
RI Phase 2 Round 1	LDW-SS116	Carbazole	5.50E-02	J	1.34	4.10E+00					
RI Phase 2 Round 2	LDW-SS158	Carbazole	5.40E-02	J	1.96	2.76E+00					
EPA SI	DR188 (754)	Carbazole	2.00E-02		1.75	1.14E+00					
EPA SI	DR220 (786)	Carbazole	2.00E-02		2.76	7.25E-01					
RI Phase 2 Round 2	LDW-SS158	Chromium	1.74E+02		1.96		260	270	mg/kg DW	0.7	0.6
RI Phase 2 Round 1	LDW-SS114	Chromium	7.28E+01	J	1.53		260	270	mg/kg DW	0.3	0.3
RI Phase 2 Round 2	LDW-SS157	Chromium	6.90E+01		3.1		260	270	mg/kg DW	0.3	0.3

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
Boeing Site Characterization	R22 (899)	Chromium	6.50E+01	J	1.4		260	270	mg/kg DW	0.3	0.2
EPA SI	DR187 (753)	Chromium	6.40E+01		1.9		260	270	mg/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS112	Chromium	6.24E+01		1.82		260	270	mg/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS115	Chromium	5.50E+01		1.92		260	270	mg/kg DW	0.2	0.2
Boeing Site Characterization	R23 (900)	Chromium	5.30E+01	J	1.7		260	270	mg/kg DW	0.2	0.2
Boeing Site Characterization	R30 (908)	Chromium	4.17E+01	J	1.2		260	270	mg/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS119	Chromium	3.76E+01		1.5		260	270	mg/kg DW	0.1	0.1
Boeing Site Characterization	R31 (909)	Chromium	3.60E+01	J	1.2		260	270	mg/kg DW	0.1	0.1
Boeing Site Characterization	R27 (904)	Chromium	3.10E+01	J	1.5		260	270	mg/kg DW	0.1	0.1
RI Phase 2 Round 2	LDW-SS159	Chromium	2.93E+01		2.78		260	270	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS118	Chromium	2.90E+01	J	1.84		260	270	mg/kg DW	0.1	0.1
EPA SI	DR220 (786)	Chromium	2.80E+01		2.76		260	270	mg/kg DW	0.1	0.1
Boeing Site Characterization	R26 (903)	Chromium	2.80E+01	J	1.1		260	270	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS116	Chromium	2.62E+01	J	1.34		260	270	mg/kg DW	0.1	0.1
RI Phase 2 Round 3	LDW-SS338	Chromium	2.60E+01		1.99		260	270	mg/kg DW	0.1	0.1
EPA SI	DR188 (754)	Chromium	2.50E+01		1.75		260	270	mg/kg DW	0.1	0.1
Boeing Site Characterization	R23 (900)	Chrysene	5.30E+00		1.7	3.12E+02	100	460	mg/kg OC	3.1	0.7
EPA SI	DR187 (753)	Chrysene	4.10E+00		1.9	2.16E+02	100	460	mg/kg OC	2.2	0.5
Boeing Site Characterization	R22 (899)	Chrysene	2.80E+00		1.4	2.00E+02	100	460	mg/kg OC	2.0	0.4
RI Phase 2 Round 1	LDW-SS115	Chrysene	2.50E+00		1.92	1.30E+02	100	460	mg/kg OC	1.3	0.3
RI Phase 2 Round 1	LDW-SS114	Chrysene	1.90E+00		1.53	1.24E+02	100	460	mg/kg OC	1.2	0.3
RI Phase 2 Round 1	LDW-SS112	Chrysene	1.60E+00		1.82	8.79E+01	100	460	mg/kg OC	0.9	0.2
RI Phase 2 Round 2	LDW-SS157	Chrysene	1.50E+00		3.1	4.84E+01	100	460	mg/kg OC	0.5	0.1
RI Phase 2 Round 2	LDW-SS159	Chrysene	7.80E-01		2.78	2.81E+01	100	460	mg/kg OC	0.3	0.1
RI Phase 2 Round 1	LDW-SS116	Chrysene	6.60E-01		1.34	4.93E+01	100	460	mg/kg OC	0.5	0.1
Boeing Site Characterization	R31 (909)	Chrysene	4.80E-01		1.2	4.00E+01	100	460	mg/kg OC	0.4	0.1
Boeing Site Characterization	R26 (903)	Chrysene	3.70E-01		1.1	3.36E+01	100	460	mg/kg OC	0.3	0.1
RI Phase 2 Round 1	LDW-SS119	Chrysene	3.50E-01		1.5	2.33E+01	100	460	mg/kg OC	0.2	0.1
Boeing Site Characterization	R27 (904)	Chrysene	3.40E-01		1.5	2.27E+01	100	460	mg/kg OC	0.2	0.05
Boeing Site Characterization	R30 (908)	Chrysene	3.40E-01		1.2	2.83E+01	100	460	mg/kg OC	0.3	0.1
RI Phase 2 Round 2	LDW-SS158	Chrysene	3.20E-01		1.96	1.63E+01	100	460	mg/kg OC	0.2	0.04
RI Phase 2 Round 1	LDW-SS118	Chrysene	2.70E-01		1.84	1.47E+01	100	460	mg/kg OC	0.1	0.03

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
EPA SI	DR188 (754)	Chrysene	1.80E-01		1.75	1.03E+01	100	460	mg/kg OC	0.1	0.02
EPA SI	DR220 (786)	Chrysene	1.80E-01		2.76	6.52E+00	100	460	mg/kg OC	0.1	0.01
RI Phase 2 Round 3	LDW-SS338	Chrysene	1.20E-01		1.99	6.03E+00	100	460	mg/kg OC	0.1	0.01
RI Phase 2 Round 1	LDW-SS115	Cobalt	1.10E+01		1.92						
EPA SI	DR220 (786)	Cobalt	1.00E+01		2.76						
RI Phase 2 Round 1	LDW-SS114	Cobalt	9.00E+00		1.53						
RI Phase 2 Round 2	LDW-SS157	Cobalt	9.00E+00		3.1						
RI Phase 2 Round 1	LDW-SS118	Cobalt	8.50E+00		1.84						
RI Phase 2 Round 1	LDW-SS119	Cobalt	8.30E+00		1.5						
RI Phase 2 Round 3	LDW-SS338	Cobalt	8.30E+00		1.99						
EPA SI	DR187 (753)	Cobalt	8.00E+00		1.9						
EPA SI	DR188 (754)	Cobalt	8.00E+00		1.75						
RI Phase 2 Round 2	LDW-SS158	Cobalt	7.70E+00		1.96						
RI Phase 2 Round 1	LDW-SS112	Cobalt	7.60E+00		1.82						
RI Phase 2 Round 1	LDW-SS116	Cobalt	7.60E+00		1.34						
RI Phase 2 Round 2	LDW-SS159	Cobalt	6.90E+00		2.78						
RI Phase 2 Round 1	LDW-SS115	Copper	9.97E+01		1.92		390	390	mg/kg DW	0.3	0.3
RI Phase 2 Round 1	LDW-SS112	Copper	7.77E+01		1.82		390	390	mg/kg DW	0.2	0.2
RI Phase 2 Round 2	LDW-SS157	Copper	7.47E+01	J	3.1		390	390	mg/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS114	Copper	5.85E+01		1.53		390	390	mg/kg DW	0.2	0.2
EPA SI	DR187 (753)	Copper	5.60E+01		1.9		390	390	mg/kg DW	0.1	0.1
Boeing Site Characterization	R23 (900)	Copper	5.60E+01		1.7		390	390	mg/kg DW	0.1	0.1
Boeing Site Characterization	R31 (909)	Copper	5.30E+01		1.2		390	390	mg/kg DW	0.1	0.1
RI Phase 2 Round 2	LDW-SS158	Copper	5.21E+01	J	1.96		390	390	mg/kg DW	0.1	0.1
Boeing Site Characterization	R22 (899)	Copper	5.20E+01		1.4		390	390	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS118	Copper	4.74E+01		1.84		390	390	mg/kg DW	0.1	0.1
EPA SI	DR220 (786)	Copper	4.70E+01		2.76		390	390	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS119	Copper	4.68E+01		1.5		390	390	mg/kg DW	0.1	0.1
Boeing Site Characterization	R30 (908)	Copper	4.57E+01		1.2		390	390	mg/kg DW	0.1	0.1
RI Phase 2 Round 3	LDW-SS338	Copper	4.30E+01		1.99		390	390	mg/kg DW	0.1	0.1
Boeing Site Characterization	R26 (903)	Copper	4.00E+01		1.1		390	390	mg/kg DW	0.1	0.1
Boeing Site Characterization	R27 (904)	Copper	4.00E+01		1.5		390	390	mg/kg DW	0.1	0.1

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 1	LDW-SS116	Copper	3.85E+01		1.34		390	390	mg/kg DW	0.1	0.1
EPA SI	DR188 (754)	Copper	3.70E+01		1.75		390	390	mg/kg DW	0.1	0.1
RI Phase 2 Round 2	LDW-SS159	Copper	3.70E+01	J	2.78		390	390	mg/kg DW	0.1	0.1
Boeing Site Characterization	R23 (900)	Dibenzo(a,h)anthracene	1.20E+00		1.7	7.06E+01	12	33	mg/kg OC	5.9	2.1
EPA SI	DR187 (753)	Dibenzo(a,h)anthracene	9.50E-01		1.9	5.00E+01	12	33	mg/kg OC	4.2	1.5
Boeing Site Characterization	R22 (899)	Dibenzo(a,h)anthracene	5.10E-01		1.4	3.64E+01	12	33	mg/kg OC	3.0	1.1
RI Phase 2 Round 1	LDW-SS115	Dibenzo(a,h)anthracene	2.40E-01		1.92	1.25E+01	12	33	mg/kg OC	1.0	0.4
Boeing Site Characterization	R30 (908)	Dibenzo(a,h)anthracene	1.00E-01		1.2	8.33E+00	12	33	mg/kg OC	0.7	0.3
Boeing Site Characterization	R31 (909)	Dibenzo(a,h)anthracene	1.00E-01		1.2	8.33E+00	12	33	mg/kg OC	0.7	0.3
Boeing Site Characterization	R27 (904)	Dibenzo(a,h)anthracene	9.50E-02		1.5	6.33E+00	12	33	mg/kg OC	0.5	0.2
RI Phase 2 Round 1	LDW-SS114	Dibenzo(a,h)anthracene	8.60E-02	J	1.53	5.62E+00	12	33	mg/kg OC	0.5	0.2
Boeing Site Characterization	R26 (903)	Dibenzo(a,h)anthracene	8.30E-02		1.1	7.55E+00	12	33	mg/kg OC	0.6	0.2
RI Phase 2 Round 2	LDW-SS157	Dibenzo(a,h)anthracene	7.90E-02		3.1	2.55E+00	12	33	mg/kg OC	0.2	0.1
RI Phase 2 Round 2	LDW-SS158	Dibenzo(a,h)anthracene	5.40E-02	J	1.96	2.76E+00	12	33	mg/kg OC	0.2	0.1
EPA SI	DR188 (754)	Dibenzo(a,h)anthracene	3.00E-02		1.75	1.71E+00	12	33	mg/kg OC	0.1	0.1
EPA SI	DR220 (786)	Dibenzo(a,h)anthracene	2.00E-02		2.76	7.25E-01	12	33	mg/kg OC	0.1	0.0
RI Phase 2 Round 3	LDW-SS338	Dibenzo(a,h)anthracene	8.00E-03		1.99	4.02E-01	12	33	mg/kg OC	0.0	0.0
Boeing Site Characterization	R23 (900)	Dibenzofuran	3.00E-01		1.7	1.76E+01	15	58	mg/kg OC	1.2	0.3
EPA SI	DR187 (753)	Dibenzofuran	2.80E-01		1.9	1.47E+01	15	58	mg/kg OC	1.0	0.3
Boeing Site Characterization	R22 (899)	Dibenzofuran	1.40E-01		1.4	1.00E+01	15	58	mg/kg OC	0.7	0.2
RI Phase 2 Round 2	LDW-SS157	Dibenzofuran	5.90E-02		3.1	1.90E+00	15	58	mg/kg OC	0.1	0.03
Boeing Site Characterization	R31 (909)	Dibenzofuran	2.40E-02		1.2	2.00E+00	15	58	mg/kg OC	0.1	0.03
Boeing Site Characterization	R27 (904)	Dibenzofuran	2.30E-02		1.5	1.53E+00	15	58	mg/kg OC	0.1	0.03
EPA SI	DR187 (753)	Dibutyltin as ion	2.00E-02		1.9						
RI Phase 2 Round 1	LDW-SS112	Diethyl phthalate	1.10E-01		1.82	6.04E+00	61	110	mg/kg OC	0.1	0.1
RI Phase 2 Round 1	LDW-SS119	Diethyl phthalate	1.10E-01		1.5	7.33E+00	61	110	mg/kg OC	0.1	0.1
RI Phase 2 Round 1	LDW-SS118	Diethyl phthalate	8.60E-03		1.84	4.67E-01	61	110	mg/kg OC	0.01	0.004
Boeing Site Characterization	R23 (900)	Dimethyl phthalate	2.00E-01		1.7	1.18E+01	53	53	mg/kg OC	0.2	0.2
Boeing Site Characterization	R31 (909)	Dimethyl phthalate	9.70E-02		1.2	8.08E+00	53	53	mg/kg OC	0.2	0.2
EPA SI	DR187 (753)	Dimethyl phthalate	5.00E-02		1.9	2.63E+00	53	53	mg/kg OC	0.05	0.05
EPA SI	DR188 (754)	Dimethyl phthalate	4.00E-02		1.75	2.29E+00	53	53	mg/kg OC	0.04	0.04
RI Phase 2 Round 1	LDW-SS119	Dimethyl phthalate	3.70E-02		1.5	2.47E+00	53	53	mg/kg OC	0.05	0.05

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 2	LDW-SS159	Dimethyl phthalate	3.00E-02		2.78	1.08E+00	53	53	mg/kg OC	0.02	0.02
Boeing Site Characterization	R22 (899)	Dimethyl phthalate	2.60E-02		1.4	1.86E+00	53	53	mg/kg OC	0.04	0.04
Boeing Site Characterization	R26 (903)	Dimethyl phthalate	2.50E-02		1.1	2.27E+00	53	53	mg/kg OC	0.04	0.04
RI Phase 2 Round 3	LDW-SS338	Dimethyl phthalate	9.30E-03		1.99	4.67E-01	53	53	mg/kg OC	0.01	0.01
RI Phase 2 Round 1	LDW-SS116	Dimethyl phthalate	8.60E-03		1.34	6.42E-01	53	53	mg/kg OC	0.01	0.01
RI Phase 2 Round 1	LDW-SS118	Dimethyl phthalate	7.30E-03		1.84	3.97E-01	53	53	mg/kg OC	0.01	0.01
RI Phase 2 Round 2	LDW-SS157	Di-n-butyl phthalate	9.10E-02		3.1	2.94E+00	220	1700	mg/kg OC	0.01	0.002
EPA SI	DR187 (753)	Di-n-butyl phthalate	9.00E-02		1.9	4.74E+00	220	1700	mg/kg OC	0.02	0.003
RI Phase 2 Round 1	LDW-SS114	Di-n-butyl phthalate	8.30E-02	J	1.53	5.42E+00	220	1700	mg/kg OC	0.02	0.003
Boeing Site Characterization	R26 (903)	Di-n-butyl phthalate	6.40E-02		1.1	5.82E+00	220	1700	mg/kg OC	0.03	0.003
Boeing Site Characterization	R30 (908)	Di-n-butyl phthalate	5.00E-02		1.2	4.17E+00	220	1700	mg/kg OC	0.02	0.002
Boeing Site Characterization	R23 (900)	Di-n-butyl phthalate	4.30E-02		1.7	2.53E+00	220	1700	mg/kg OC	0.01	0.001
RI Phase 2 Round 3	LDW-SS338	Di-n-butyl phthalate	3.20E-02	J	1.99	1.61E+00	220	1700	mg/kg OC	0.01	0.001
Boeing Site Characterization	R31 (909)	Di-n-butyl phthalate	3.10E-02		1.2	2.58E+00	220	1700	mg/kg OC	0.01	0.002
Boeing Site Characterization	R22 (899)	Di-n-butyl phthalate	2.10E-02		1.4	1.50E+00	220	1700	mg/kg OC	0.01	0.001
EPA SI	DR187 (753)	Di-n-octyl phthalate	1.10E-01		1.9	5.79E+00	220	1700	mg/kg OC	0.03	0.003
Boeing Site Characterization	R31 (909)	Di-n-octyl phthalate	5.10E-02	J	1.2	4.25E+00	220	1700	mg/kg OC	0.02	0.003
Boeing Site Characterization	R23 (900)	Fluoranthene	1.10E+01		1.7	6.47E+02	160	1200	mg/kg OC	4.0	0.5
EPA SI	DR187 (753)	Fluoranthene	8.80E+00		1.9	4.63E+02	160	1200	mg/kg OC	2.9	0.4
Boeing Site Characterization	R22 (899)	Fluoranthene	5.60E+00		1.4	4.00E+02	160	1200	mg/kg OC	2.5	0.3
RI Phase 2 Round 1	LDW-SS115	Fluoranthene	5.20E+00		1.92	2.71E+02	160	1200	mg/kg OC	1.7	0.2
RI Phase 2 Round 1	LDW-SS112	Fluoranthene	3.40E+00		1.82	1.87E+02	160	1200	mg/kg OC	1.2	0.2
RI Phase 2 Round 2	LDW-SS157	Fluoranthene	3.40E+00		3.1	1.10E+02	160	1200	mg/kg OC	0.7	0.1
RI Phase 2 Round 1	LDW-SS114	Fluoranthene	3.10E+00		1.53	2.03E+02	160	1200	mg/kg OC	1.3	0.2
RI Phase 2 Round 2	LDW-SS159	Fluoranthene	2.10E+00		2.78	7.55E+01	160	1200	mg/kg OC	0.5	0.1
RI Phase 2 Round 1	LDW-SS116	Fluoranthene	1.00E+00		1.34	7.46E+01	160	1200	mg/kg OC	0.5	0.1
RI Phase 2 Round 2	LDW-SS158	Fluoranthene	6.10E-01		1.96	3.11E+01	160	1200	mg/kg OC	0.2	0.03
Boeing Site Characterization	R26 (903)	Fluoranthene	5.90E-01		1.1	5.36E+01	160	1200	mg/kg OC	0.3	0.04
Boeing Site Characterization	R31 (909)	Fluoranthene	5.70E-01		1.2	4.75E+01	160	1200	mg/kg OC	0.3	0.04
Boeing Site Characterization	R27 (904)	Fluoranthene	5.40E-01		1.5	3.60E+01	160	1200	mg/kg OC	0.2	0.03
Boeing Site Characterization	R30 (908)	Fluoranthene	5.20E-01		1.2	4.33E+01	160	1200	mg/kg OC	0.3	0.04
RI Phase 2 Round 1	LDW-SS119	Fluoranthene	5.10E-01		1.5	3.40E+01	160	1200	mg/kg OC	0.2	0.03

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 1	LDW-SS118	Fluoranthene	4.90E-01		1.84	2.66E+01	160	1200	mg/kg OC	0.2	0.02
EPA SI	DR188 (754)	Fluoranthene	3.40E-01		1.75	1.94E+01	160	1200	mg/kg OC	0.1	0.02
EPA SI	DR220 (786)	Fluoranthene	3.40E-01		2.76	1.23E+01	160	1200	mg/kg OC	0.1	0.01
RI Phase 2 Round 3	LDW-SS338	Fluoranthene	1.70E-01		1.99	8.54E+00	160	1200	mg/kg OC	0.1	0.01
EPA SI	DR187 (753)	Fluorene	5.30E-01		1.9	2.79E+01	23	79	mg/kg OC	1.2	0.4
Boeing Site Characterization	R23 (900)	Fluorene	5.00E-01		1.7	2.94E+01	23	79	mg/kg OC	1.3	0.4
Boeing Site Characterization	R22 (899)	Fluorene	2.60E-01		1.4	1.86E+01	23	79	mg/kg OC	0.8	0.2
RI Phase 2 Round 1	LDW-SS115	Fluorene	1.80E-01	J	1.92	9.38E+00	23	79	mg/kg OC	0.4	0.1
RI Phase 2 Round 1	LDW-SS114	Fluorene	1.30E-01		1.53	8.50E+00	23	79	mg/kg OC	0.4	0.1
RI Phase 2 Round 2	LDW-SS157	Fluorene	9.90E-02		3.1	3.19E+00	23	79	mg/kg OC	0.1	0.04
RI Phase 2 Round 2	LDW-SS159	Fluorene	4.00E-02	J	2.78	1.44E+00	23	79	mg/kg OC	0.1	0.02
Boeing Site Characterization	R27 (904)	Fluorene	3.40E-02		1.5	2.27E+00	23	79	mg/kg OC	0.1	0.03
Boeing Site Characterization	R31 (909)	Fluorene	3.40E-02		1.2	2.83E+00	23	79	mg/kg OC	0.1	0.04
Boeing Site Characterization	R26 (903)	Fluorene	2.50E-02		1.1	2.27E+00	23	79	mg/kg OC	0.1	0.03
Boeing Site Characterization	R30 (908)	Fluorene	2.00E-02		1.2	1.67E+00	23	79	mg/kg OC	0.1	0.02
Boeing Site Characterization	R23 (900)	Hexachlorobenzene	1.30E-03		1.7	7.65E-02	0.38	2.3	mg/kg OC	0.2	0.03
Boeing Site Characterization	R26 (903)	Hexachlorobenzene	1.20E-03		1.1	1.09E-01	0.38	2.3	mg/kg OC	0.3	0.05
Boeing Site Characterization	R31 (909)	Hexachlorobenzene	1.20E-03		1.2	1.00E-01	0.38	2.3	mg/kg OC	0.3	0.04
Boeing Site Characterization	R23 (900)	Indeno(1,2,3-cd)pyrene	3.20E+00		1.7	1.88E+02	34	88	mg/kg OC	5.5	2.1
EPA SI	DR187 (753)	Indeno(1,2,3-cd)pyrene	2.90E+00		1.9	1.53E+02	34	88	mg/kg OC	4.5	1.7
Boeing Site Characterization	R22 (899)	Indeno(1,2,3-cd)pyrene	1.50E+00		1.4	1.07E+02	34	88	mg/kg OC	3.2	1.2
RI Phase 2 Round 2	LDW-SS157	Indeno(1,2,3-cd)pyrene	6.70E-01		3.1	2.16E+01	34	88	mg/kg OC	0.6	0.2
RI Phase 2 Round 1	LDW-SS115	Indeno(1,2,3-cd)pyrene	6.00E-01		1.92	3.13E+01	34	88	mg/kg OC	0.9	0.4
RI Phase 2 Round 1	LDW-SS114	Indeno(1,2,3-cd)pyrene	5.60E-01		1.53	3.66E+01	34	88	mg/kg OC	1.1	0.4
RI Phase 2 Round 1	LDW-SS112	Indeno(1,2,3-cd)pyrene	4.10E-01		1.82	2.25E+01	34	88	mg/kg OC	0.7	0.3
Boeing Site Characterization	R31 (909)	Indeno(1,2,3-cd)pyrene	2.50E-01		1.2	2.08E+01	34	88	mg/kg OC	0.6	0.2
Boeing Site Characterization	R30 (908)	Indeno(1,2,3-cd)pyrene	2.40E-01		1.2	2.00E+01	34	88	mg/kg OC	0.6	0.2
Boeing Site Characterization	R27 (904)	Indeno(1,2,3-cd)pyrene	2.20E-01		1.5	1.47E+01	34	88	mg/kg OC	0.4	0.2
Boeing Site Characterization	R26 (903)	Indeno(1,2,3-cd)pyrene	2.00E-01		1.1	1.82E+01	34	88	mg/kg OC	0.5	0.2
RI Phase 2 Round 2	LDW-SS159	Indeno(1,2,3-cd)pyrene	1.80E-01		2.78	6.47E+00	34	88	mg/kg OC	0.2	0.1
RI Phase 2 Round 2	LDW-SS158	Indeno(1,2,3-cd)pyrene	1.70E-01		1.96	8.67E+00	34	88	mg/kg OC	0.3	0.1
RI Phase 2 Round 1	LDW-SS116	Indeno(1,2,3-cd)pyrene	1.50E-01		1.34	1.12E+01	34	88	mg/kg OC	0.3	0.1

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
EPA SI	DR188 (754)	Indeno(1,2,3-cd)pyrene	1.10E-01		1.75	6.29E+00	34	88	mg/kg OC	0.2	0.1
EPA SI	DR220 (786)	Indeno(1,2,3-cd)pyrene	1.00E-01		2.76	3.62E+00	34	88	mg/kg OC	0.1	0.04
RI Phase 2 Round 1	LDW-SS119	Indeno(1,2,3-cd)pyrene	6.30E-02		1.5	4.20E+00	34	88	mg/kg OC	0.1	0.05
RI Phase 2 Round 3	LDW-SS338	Indeno(1,2,3-cd)pyrene	5.10E-02	J	1.99	2.56E+00	34	88	mg/kg OC	0.1	0.03
RI Phase 2 Round 1	LDW-SS118	Indeno(1,2,3-cd)pyrene	4.60E-02		1.84	2.50E+00	34	88	mg/kg OC	0.1	0.03
EPA SI	DR187 (753)	Iron	3.29E+04		1.9						
EPA SI	DR220 (786)	Iron	3.16E+04		2.76						
EPA SI	DR188 (754)	Iron	2.39E+04		1.75						
Boeing Site Characterization	R23 (900)	Lead	2.21E+02		1.7		450	530	mg/kg DW	0.5	0.4
EPA SI	DR187 (753)	Lead	1.81E+02		1.9		450	530	mg/kg DW	0.4	0.3
RI Phase 2 Round 2	LDW-SS157	Lead	1.48E+02		3.1		450	530	mg/kg DW	0.3	0.3
RI Phase 2 Round 1	LDW-SS114	Lead	1.10E+02		1.53		450	530	mg/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS115	Lead	9.80E+01		1.92		450	530	mg/kg DW	0.2	0.2
Boeing Site Characterization	R31 (909)	Lead	9.40E+01		1.2		450	530	mg/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS112	Lead	8.20E+01		1.82		450	530	mg/kg DW	0.2	0.2
Boeing Site Characterization	R30 (908)	Lead	8.03E+01		1.2		450	530	mg/kg DW	0.2	0.2
Boeing Site Characterization	R22 (899)	Lead	7.43E+01		1.4		450	530	mg/kg DW	0.2	0.1
RI Phase 2 Round 1	LDW-SS119	Lead	7.10E+01		1.5		450	530	mg/kg DW	0.2	0.1
RI Phase 2 Round 2	LDW-SS158	Lead	5.10E+01		1.96		450	530	mg/kg DW	0.1	0.1
RI Phase 2 Round 2	LDW-SS159	Lead	3.60E+01		2.78		450	530	mg/kg DW	0.1	0.1
Boeing Site Characterization	R27 (904)	Lead	3.10E+01		1.5		450	530	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS116	Lead	3.00E+01		1.34		450	530	mg/kg DW	0.1	0.1
Boeing Site Characterization	R26 (903)	Lead	2.80E+01		1.1		450	530	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS118	Lead	2.80E+01		1.84		450	530	mg/kg DW	0.1	0.1
EPA SI	DR220 (786)	Lead	2.23E+01		2.76		450	530	mg/kg DW	0.05	0.04
RI Phase 2 Round 3	LDW-SS338	Lead	2.20E+01		1.99		450	530	mg/kg DW	0.05	0.04
EPA SI	DR188 (754)	Lead	2.07E+01		1.75		450	530	mg/kg DW	0.05	0.04
EPA SI	DR187 (753)	Manganese	5.58E+02		1.9						
EPA SI	DR220 (786)	Manganese	3.36E+02		2.76						
EPA SI	DR188 (754)	Manganese	2.58E+02		1.75						
Boeing Site Characterization	R27 (904)	Mercury	1.70E-01		1.5		0.41	0.59	mg/kg DW	0.4	0.3
RI Phase 2 Round 1	LDW-SS119	Mercury	1.60E-01		1.5		0.41	0.59	mg/kg DW	0.4	0.3

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
EPA SI	DR220 (786)	Mercury	1.40E-01		2.76		0.41	0.59	mg/kg DW	0.3	0.2
EPA SI	DR188 (754)	Mercury	1.30E-01		1.75		0.41	0.59	mg/kg DW	0.3	0.2
RI Phase 2 Round 3	LDW-SS338	Mercury	1.30E-01		1.99		0.41	0.59	mg/kg DW	0.3	0.2
RI Phase 2 Round 1	LDW-SS114	Mercury	1.20E-01		1.53		0.41	0.59	mg/kg DW	0.3	0.2
RI Phase 2 Round 1	LDW-SS118	Mercury	1.20E-01		1.84		0.41	0.59	mg/kg DW	0.3	0.2
RI Phase 2 Round 2	LDW-SS157	Mercury	1.20E-01	J	3.1		0.41	0.59	mg/kg DW	0.3	0.2
Boeing Site Characterization	R22 (899)	Mercury	1.03E-01		1.4		0.41	0.59	mg/kg DW	0.3	0.2
Boeing Site Characterization	R23 (900)	Mercury	1.00E-01		1.7		0.41	0.59	mg/kg DW	0.2	0.2
Boeing Site Characterization	R26 (903)	Mercury	1.00E-01		1.1		0.41	0.59	mg/kg DW	0.2	0.2
Boeing Site Characterization	R31 (909)	Mercury	1.00E-01		1.2		0.41	0.59	mg/kg DW	0.2	0.2
RI Phase 2 Round 2	LDW-SS158	Mercury	1.00E-01	J	1.96		0.41	0.59	mg/kg DW	0.2	0.2
RI Phase 2 Round 2	LDW-SS159	Mercury	1.00E-01	J	2.78		0.41	0.59	mg/kg DW	0.2	0.2
EPA SI	DR187 (753)	Mercury	9.00E-02		1.9		0.41	0.59	mg/kg DW	0.2	0.2
Boeing Site Characterization	R30 (908)	Mercury	7.50E-02		1.2		0.41	0.59	mg/kg DW	0.2	0.1
RI Phase 2 Round 1	LDW-SS115	Mercury	7.00E-02		1.92		0.41	0.59	mg/kg DW	0.2	0.1
RI Phase 2 Round 1	LDW-SS116	Mercury	7.00E-02		1.34		0.41	0.59	mg/kg DW	0.2	0.1
RI Phase 2 Round 2	LDW-SS158	Molybdenum	7.60E+00		1.96						
RI Phase 2 Round 2	LDW-SS157	Molybdenum	6.00E+00		3.1						
RI Phase 2 Round 1	LDW-SS115	Molybdenum	4.00E+00		1.92						
RI Phase 2 Round 1	LDW-SS112	Molybdenum	3.50E+00		1.82						
RI Phase 2 Round 1	LDW-SS114	Molybdenum	3.40E+00		1.53						
RI Phase 2 Round 1	LDW-SS119	Molybdenum	1.70E+00		1.5						
RI Phase 2 Round 2	LDW-SS159	Molybdenum	1.60E+00		2.78						
RI Phase 2 Round 1	LDW-SS116	Molybdenum	1.20E+00		1.34						
RI Phase 2 Round 1	LDW-SS118	Molybdenum	1.00E+00		1.84						
RI Phase 2 Round 3	LDW-SS338	Molybdenum	8.00E-01		1.99						
EPA SI	DR187 (753)	Naphthalene	2.00E-01		1.9	1.05E+01	99	170	mg/kg OC	0.1	0.1
Boeing Site Characterization	R23 (900)	Naphthalene	1.00E-01		1.7	5.88E+00	99	170	mg/kg OC	0.1	0.03
Boeing Site Characterization	R22 (899)	Naphthalene	4.30E-02		1.4	3.07E+00	99	170	mg/kg OC	0.03	0.02
RI Phase 2 Round 2	LDW-SS157	Naphthalene	4.00E-02	J	3.1	1.29E+00	99	170	mg/kg OC	0.01	0.01
EPA SI	DR187 (753)	n-Butyltin	8.00E-03	J	1.9	4.21E-01					
RI Phase 2 Round 2	LDW-SS158	Nickel	4.80E+01		1.96		140	370	mg/kg DW	0.3	0.1

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 2	LDW-SS157	Nickel	3.70E+01		3.1		140	370	mg/kg DW	0.3	0.1
Boeing Site Characterization	R23 (900)	Nickel	3.50E+01		1.7		140	370	mg/kg DW	0.3	0.1
RI Phase 2 Round 1	LDW-SS115	Nickel	3.50E+01		1.92		140	370	mg/kg DW	0.3	0.1
EPA SI	DR187 (753)	Nickel	3.18E+01		1.9		140	370	mg/kg DW	0.2	0.1
Boeing Site Characterization	R22 (899)	Nickel	2.90E+01		1.4		140	370	mg/kg DW	0.2	0.1
Boeing Site Characterization	R27 (904)	Nickel	2.60E+01		1.5		140	370	mg/kg DW	0.2	0.1
RI Phase 2 Round 1	LDW-SS114	Nickel	2.60E+01		1.53		140	370	mg/kg DW	0.2	0.1
RI Phase 2 Round 1	LDW-SS112	Nickel	2.50E+01		1.82		140	370	mg/kg DW	0.2	0.1
Boeing Site Characterization	R31 (909)	Nickel	2.40E+01		1.2		140	370	mg/kg DW	0.2	0.1
Boeing Site Characterization	R30 (908)	Nickel	2.37E+01		1.2		140	370	mg/kg DW	0.2	0.1
Boeing Site Characterization	R26 (903)	Nickel	2.30E+01		1.1		140	370	mg/kg DW	0.2	0.1
RI Phase 2 Round 3	LDW-SS338	Nickel	2.20E+01		1.99		140	370	mg/kg DW	0.2	0.1
EPA SI	DR220 (786)	Nickel	2.08E+01		2.76		140	370	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS116	Nickel	2.00E+01		1.34		140	370	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS118	Nickel	2.00E+01		1.84		140	370	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS119	Nickel	1.90E+01		1.5		140	370	mg/kg DW	0.1	0.1
RI Phase 2 Round 2	LDW-SS159	Nickel	1.90E+01		2.78		140	370	mg/kg DW	0.1	0.1
EPA SI	DR188 (754)	Nickel	1.88E+01		1.75		140	370	mg/kg DW	0.1	0.1
RI Phase 2 Round 2	LDW-SS159	N-Nitrosodiphenylamine	8.00E-03		2.78	2.88E-01	11	11	mg/kg OC	0.03	0.03
RI Phase 2 Round 2	LDW-SS157	N-Nitrosodiphenylamine	7.10E-03		3.1	2.29E-01	11	11	mg/kg OC	0.02	0.02
RI Phase 2 Round 1	LDW-SS119	PCBs (total calc'd)	8.80E-01	J	1.5	5.87E+01	12	65	mg/kg OC	4.9	0.9
RI Phase 2 Round 1	LDW-SS114	PCBs (total calc'd)	8.20E-01		1.53	5.36E+01	12	65	mg/kg OC	4.5	0.8
RI Phase 2 Round 1	LDW-SS112	PCBs (total calc'd)	4.70E-01		1.82	2.58E+01	12	65	mg/kg OC	2.2	0.4
RI Phase 2 Round 2	LDW-SS158	PCBs (total calc'd)	3.90E-01	J	1.96	1.99E+01	12	65	mg/kg OC	1.7	0.3
RI Phase 2 Round 2	LDW-SS157	PCBs (total calc'd)	2.60E-01		3.1	8.39E+00	12	65	mg/kg OC	0.7	0.1
RI Phase 2 Round 1	LDW-SS115	PCBs (total calc'd)	2.20E-01		1.92	1.15E+01	12	65	mg/kg OC	1.0	0.2
RI Phase 2 Round 2	LDW-SS159	PCBs (total calc'd)	1.73E-01		2.78	6.22E+00	12	65	mg/kg OC	0.5	0.1
RI Phase 2 Round 1	LDW-SS116	PCBs (total calc'd)	1.18E-01	J	1.34	8.81E+00	12	65	mg/kg OC	0.7	0.1
RI Phase 2 Round 3	LDW-SS338	PCBs (total calc'd)	8.80E-02		1.99	4.42E+00	12	65	mg/kg OC	0.4	0.1
RI Phase 2 Round 1	LDW-SS118	PCBs (total calc'd)	2.40E-02		1.84	1.30E+00	12	65	mg/kg OC	0.1	0.0
Boeing Site Characterization	R30 (908)	PCBs (total-calc'd)	1.25E+00	J	1.2	1.04E+02	12	65	mg/kg OC	8.7	1.6
Boeing Site Characterization	R23 (900)	PCBs (total-calc'd)	8.70E-01		1.7	5.12E+01	12	65	mg/kg OC	4.3	0.8

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
NOAA Site Char.	EST147 (142)	PCBs (total-calc'd)	6.90E-01		1.3	5.31E+01	12	65	mg/kg OC	4.4	0.8
NOAA Site Char.	EST148 (143)	PCBs (total-calc'd)	6.70E-01		2.23	3.00E+01	12	65	mg/kg OC	2.5	0.5
NOAA Site Char.	EST143 (138)	PCBs (total-calc'd)	3.90E-01		1.38	2.83E+01	12	65	mg/kg OC	2.4	0.4
Boeing Site Characterization	R27 (904)	PCBs (total-calc'd)	3.40E-01		1.5	2.27E+01	12	65	mg/kg OC	1.9	0.3
EPA SI	DR187 (753)	PCBs (total-calc'd)	2.46E-01		1.9	1.29E+01	12	65	mg/kg OC	1.1	0.2
NOAA Site Char.	EST162 (155)	PCBs (total-calc'd)	2.30E-01		1.46	1.58E+01	12	65	mg/kg OC	1.3	0.2
Boeing Site Characterization	R22 (899)	PCBs (total-calc'd)	1.82E-01		1.4	1.30E+01	12	65	mg/kg OC	1.1	0.2
NOAA Site Char.	EIT060 (70)	PCBs (total-calc'd)	1.70E-01		0.88	1.93E+01	12	65	mg/kg OC	1.6	0.3
Boeing Site Characterization	R26 (903)	PCBs (total-calc'd)	1.63E-01		1.1	1.48E+01	12	65	mg/kg OC	1.2	0.2
NOAA Site Char.	EST161 (154)	PCBs (total-calc'd)	1.60E-01		0.85	1.88E+01	12	65	mg/kg OC	1.6	0.3
Boeing Site Characterization	R31 (909)	PCBs (total-calc'd)	1.19E-01	J	1.2	9.92E+00	12	65	mg/kg OC	0.8	0.2
NOAA Site Char.	EST141 (136)	PCBs (total-calc'd)	1.10E-01		1.52	7.24E+00	12	65	mg/kg OC	0.6	0.1
EPA SI	DR188 (754)	PCBs (total-calc'd)	1.04E-01		1.75	5.94E+00	12	65	mg/kg OC	0.5	0.1
NOAA Site Char.	EST142 (137)	PCBs (total-calc'd)	8.70E-02		1.64	5.30E+00	12	65	mg/kg OC	0.4	0.1
NOAA Site Char.	EST159 (152)	PCBs (total-calc'd)	7.80E-02	J	1.19	6.55E+00	12	65	mg/kg OC	0.5	0.1
EPA SI	DR220 (786)	PCBs (total-calc'd)	7.70E-02		2.76	2.79E+00	12	65	mg/kg OC	0.2	0.0
NOAA Site Char.	EST158 (151)	PCBs (total-calc'd)	7.40E-02	J	1.52	4.87E+00	12	65	mg/kg OC	0.4	0.1
NOAA Site Char.	EST 160 (153)	PCBs (total-calc'd)	3.20E-02	J	1.59	2.01E+00	12	65	mg/kg OC	0.2	0.0
Boeing Site Characterization	R23 (900)	Phenanthrene	6.60E+00		1.7	3.88E+02	100	480	mg/kg OC	3.9	0.8
EPA SI	DR187 (753)	Phenanthrene	6.30E+00		1.9	3.32E+02	100	480	mg/kg OC	3.3	0.7
Boeing Site Characterization	R22 (899)	Phenanthrene	2.90E+00		1.4	2.07E+02	100	480	mg/kg OC	2.1	0.4
RI Phase 2 Round 1	LDW-SS115	Phenanthrene	2.40E+00		1.92	1.25E+02	100	480	mg/kg OC	1.3	0.3
RI Phase 2 Round 1	LDW-SS114	Phenanthrene	1.60E+00		1.53	1.05E+02	100	480	mg/kg OC	1.0	0.2
RI Phase 2 Round 2	LDW-SS157	Phenanthrene	1.40E+00		3.1	4.52E+01	100	480	mg/kg OC	0.5	0.1
RI Phase 2 Round 1	LDW-SS112	Phenanthrene	1.20E+00		1.82	6.59E+01	100	480	mg/kg OC	0.7	0.1
RI Phase 2 Round 2	LDW-SS159	Phenanthrene	5.70E-01		2.78	2.05E+01	100	480	mg/kg OC	0.2	0.04
Boeing Site Characterization	R31 (909)	Phenanthrene	3.90E-01		1.2	3.25E+01	100	480	mg/kg OC	0.3	0.1
Boeing Site Characterization	R27 (904)	Phenanthrene	3.60E-01		1.5	2.40E+01	100	480	mg/kg OC	0.2	0.1
Boeing Site Characterization	R26 (903)	Phenanthrene	3.30E-01		1.1	3.00E+01	100	480	mg/kg OC	0.3	0.1
RI Phase 2 Round 2	LDW-SS158	Phenanthrene	3.10E-01		1.96	1.58E+01	100	480	mg/kg OC	0.2	0.03
Boeing Site Characterization	R30 (908)	Phenanthrene	2.80E-01		1.2	2.33E+01	100	480	mg/kg OC	0.2	0.05
RI Phase 2 Round 1	LDW-SS116	Phenanthrene	2.80E-01		1.34	2.09E+01	100	480	mg/kg OC	0.2	0.04

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 1	LDW-SS119	Phenanthrene	1.60E-01		1.5	1.07E+01	100	480	mg/kg OC	0.1	0.02
EPA SI	DR188 (754)	Phenanthrene	1.40E-01		1.75	8.00E+00	100	480	mg/kg OC	0.1	0.02
RI Phase 2 Round 1	LDW-SS118	Phenanthrene	1.40E-01		1.84	7.61E+00	100	480	mg/kg OC	0.1	0.02
EPA SI	DR220 (786)	Phenanthrene	1.10E-01		2.76	3.99E+00	100	480	mg/kg OC	0.04	0.01
RI Phase 2 Round 3	LDW-SS338	Phenanthrene	5.40E-02	J	1.99	2.71E+00	100	480	mg/kg OC	0.03	0.01
RI Phase 2 Round 2	LDW-SS157	Phenol	1.10E-01		3.1		420	1200	ug/kg DW	0.3	0.1
Boeing Site Characterization	R23 (900)	Phenol	6.40E-02		1.7		420	1200	ug/kg DW	0.2	0.1
Boeing Site Characterization	R26 (903)	Phenol	4.80E-02		1.1		420	1200	ug/kg DW	0.1	0.04
Boeing Site Characterization	R22 (899)	Phenol	4.00E-02		1.4		420	1200	ug/kg DW	0.1	0.03
EPA SI	DR187 (753)	Phenol	2.00E-02		1.9		420	1200	ug/kg DW	0.05	0.02
EPA SI	DR187 (753)	Pyrene	1.00E+01		1.9	5.26E+02	1000	1400	mg/kg OC	0.5	0.4
Boeing Site Characterization	R23 (900)	Pyrene	9.60E+00		1.7	5.65E+02	1000	1400	mg/kg OC	0.6	0.4
Boeing Site Characterization	R22 (899)	Pyrene	4.80E+00		1.4	3.43E+02	1000	1400	mg/kg OC	0.3	0.2
RI Phase 2 Round 1	LDW-SS115	Pyrene	3.20E+00		1.92	1.67E+02	1000	1400	mg/kg OC	0.2	0.1
RI Phase 2 Round 1	LDW-SS114	Pyrene	2.50E+00		1.53	1.63E+02	1000	1400	mg/kg OC	0.2	0.1
RI Phase 2 Round 2	LDW-SS157	Pyrene	2.20E+00		3.1	7.10E+01	1000	1400	mg/kg OC	0.1	0.1
RI Phase 2 Round 1	LDW-SS112	Pyrene	2.00E+00		1.82	1.10E+02	1000	1400	mg/kg OC	0.1	0.1
RI Phase 2 Round 2	LDW-SS159	Pyrene	1.60E+00		2.78	5.76E+01	1000	1400	mg/kg OC	0.1	0.04
Boeing Site Characterization	R31 (909)	Pyrene	8.30E-01		1.2	6.92E+01	1000	1400	mg/kg OC	0.1	0.05
RI Phase 2 Round 1	LDW-SS116	Pyrene	7.80E-01	J	1.34	5.82E+01	1000	1400	mg/kg OC	0.1	0.04
Boeing Site Characterization	R26 (903)	Pyrene	6.60E-01		1.1	6.00E+01	1000	1400	mg/kg OC	0.1	0.04
Boeing Site Characterization	R30 (908)	Pyrene	6.50E-01		1.2	5.42E+01	1000	1400	mg/kg OC	0.1	0.04
Boeing Site Characterization	R27 (904)	Pyrene	6.40E-01		1.5	4.27E+01	1000	1400	mg/kg OC	0.04	0.03
RI Phase 2 Round 2	LDW-SS158	Pyrene	5.00E-01		1.96	2.55E+01	1000	1400	mg/kg OC	0.03	0.02
RI Phase 2 Round 1	LDW-SS119	Pyrene	3.80E-01		1.5	2.53E+01	1000	1400	mg/kg OC	0.03	0.02
RI Phase 2 Round 1	LDW-SS118	Pyrene	3.60E-01		1.84	1.96E+01	1000	1400	mg/kg OC	0.02	0.01
EPA SI	DR188 (754)	Pyrene	2.90E-01		1.75	1.66E+01	1000	1400	mg/kg OC	0.02	0.01
EPA SI	DR220 (786)	Pyrene	2.70E-01		2.76	9.78E+00	1000	1400	mg/kg OC	0.01	0.01
RI Phase 2 Round 3	LDW-SS338	Pyrene	1.60E-01		1.99	8.04E+00	1000	1400	mg/kg OC	0.01	0.01
EPA SI	DR187 (753)	Selenium	1.20E+01		1.9						
EPA SI	DR220 (786)	Selenium	1.20E+01	J	2.76						
EPA SI	DR188 (754)	Selenium	1.00E+01	J	1.75						

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
Boeing Site Characterization	R23 (900)	Silver	2.30E+00		1.7		6.1	6.1	mg/kg DW	0.4	0.4
RI Phase 2 Round 2	LDW-SS157	Silver	2.00E+00		3.1		6.1	6.1	mg/kg DW	0.3	0.3
Boeing Site Characterization	R22 (899)	Silver	1.70E+00		1.4		6.1	6.1	mg/kg DW	0.3	0.3
EPA SI	DR187 (753)	Silver	1.28E+00		1.9		6.1	6.1	mg/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS115	Silver	1.00E+00		1.92		6.1	6.1	mg/kg DW	0.2	0.2
RI Phase 2 Round 1	LDW-SS114	Silver	8.00E-01		1.53		6.1	6.1	mg/kg DW	0.1	0.1
Boeing Site Characterization	R26 (903)	Silver	7.00E-01		1.1		6.1	6.1	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS119	Silver	7.00E-01		1.5		6.1	6.1	mg/kg DW	0.1	0.1
RI Phase 2 Round 2	LDW-SS158	Silver	6.00E-01		1.96		6.1	6.1	mg/kg DW	0.1	0.1
RI Phase 2 Round 1	LDW-SS112	Silver	5.00E-01		1.82		6.1	6.1	mg/kg DW	0.1	0.1
EPA SI	DR220 (786)	Silver	3.00E-01		2.76		6.1	6.1	mg/kg DW	0.05	0.05
EPA SI	DR188 (754)	Silver	1.90E-01		1.75		6.1	6.1	mg/kg DW	0.03	0.03
EPA SI	DR220 (786)	Thallium	9.00E-02		2.76						
EPA SI	DR187 (753)	Thallium	7.00E-02		1.9						
EPA SI	DR188 (754)	Thallium	7.00E-02		1.75						
EPA SI	DR188 (754)	Tin	4.00E+00		1.75						
EPA SI	DR220 (786)	Tin	3.00E+00		2.76						
Boeing Site Characterization	R23 (900)	Total HPAH (calc'd)	5.06E+01		1.7	2.98E+03	960	5300	mg/kg OC	3.1	0.6
EPA SI	DR187 (753)	Total HPAH (calc'd)	4.49E+01		1.9	2.36E+03	960	5300	mg/kg OC	2.5	0.4
Boeing Site Characterization	R22 (899)	Total HPAH (calc'd)	2.57E+01		1.4	1.84E+03	960	5300	mg/kg OC	1.9	0.3
RI Phase 2 Round 1	LDW-SS115	Total HPAH (calc'd)	1.90E+01		1.92	9.90E+02	960	5300	mg/kg OC	1.0	0.2
RI Phase 2 Round 2	LDW-SS157	Total HPAH (calc'd)	1.42E+01		3.1	4.58E+02	960	5300	mg/kg OC	0.5	0.1
RI Phase 2 Round 1	LDW-SS114	Total HPAH (calc'd)	1.35E+01	J	1.53	8.82E+02	960	5300	mg/kg OC	0.9	0.2
RI Phase 2 Round 1	LDW-SS112	Total HPAH (calc'd)	1.24E+01		1.82	6.81E+02	960	5300	mg/kg OC	0.7	0.1
RI Phase 2 Round 2	LDW-SS159	Total HPAH (calc'd)	6.90E+00		2.78	2.48E+02	960	5300	mg/kg OC	0.3	0.0
RI Phase 2 Round 1	LDW-SS116	Total HPAH (calc'd)	4.30E+00	J	1.34	3.21E+02	960	5300	mg/kg OC	0.3	0.1
Boeing Site Characterization	R31 (909)	Total HPAH (calc'd)	3.94E+00		1.2	3.28E+02	960	5300	mg/kg OC	0.3	0.1
Boeing Site Characterization	R26 (903)	Total HPAH (calc'd)	3.25E+00		1.1	2.96E+02	960	5300	mg/kg OC	0.3	0.1
Boeing Site Characterization	R30 (908)	Total HPAH (calc'd)	3.19E+00		1.2	2.66E+02	960	5300	mg/kg OC	0.3	0.1
Boeing Site Characterization	R27 (904)	Total HPAH (calc'd)	3.10E+00		1.5	2.06E+02	960	5300	mg/kg OC	0.2	0.04
RI Phase 2 Round 2	LDW-SS158	Total HPAH (calc'd)	2.27E+00	J	1.96	1.16E+02	960	5300	mg/kg OC	0.1	0.02
RI Phase 2 Round 1	LDW-SS119	Total HPAH (calc'd)	2.03E+00		1.5	1.35E+02	960	5300	mg/kg OC	0.1	0.03

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Round 1	LDW-SS118	Total HPAH (calc'd)	1.84E+00	J	1.84	1.00E+02	960	5300	mg/kg OC	0.1	0.02
EPA SI	DR188 (754)	Total HPAH (calc'd)	1.63E+00		1.75	9.31E+01	960	5300	mg/kg OC	0.1	0.02
EPA SI	DR220 (786)	Total HPAH (calc'd)	1.58E+00		2.76	5.72E+01	960	5300	mg/kg OC	0.1	0.01
RI Phase 2 Round 3	LDW-SS338	Total HPAH (calc'd)	9.30E-01	J	1.99	4.67E+01	960	5300	mg/kg OC	0.05	0.01
Boeing Site Characterization	R23 (900)	Total LPAH (calc'd)	8.61E+00		1.7	5.07E+02	370	780	mg/kg OC	1.4	0.6
EPA SI	DR187 (753)	Total LPAH (calc'd)	8.29E+00		1.9	4.36E+02	370	780	mg/kg OC	1.2	0.6
Boeing Site Characterization	R22 (899)	Total LPAH (calc'd)	4.04E+00		1.4	2.89E+02	370	780	mg/kg OC	0.8	0.4
RI Phase 2 Round 1	LDW-SS115	Total LPAH (calc'd)	3.10E+00	J	1.92	1.61E+02	370	780	mg/kg OC	0.4	0.2
RI Phase 2 Round 1	LDW-SS114	Total LPAH (calc'd)	2.10E+00		1.53	1.37E+02	370	780	mg/kg OC	0.4	0.2
RI Phase 2 Round 2	LDW-SS157	Total LPAH (calc'd)	1.90E+00	J	3.1	6.13E+01	370	780	mg/kg OC	0.2	0.1
RI Phase 2 Round 1	LDW-SS112	Total LPAH (calc'd)	1.40E+00		1.82	7.69E+01	370	780	mg/kg OC	0.2	0.1
RI Phase 2 Round 2	LDW-SS159	Total LPAH (calc'd)	7.00E-01	J	2.78	2.52E+01	370	780	mg/kg OC	0.1	0.0
Boeing Site Characterization	R31 (909)	Total LPAH (calc'd)	6.04E-01		1.2	5.03E+01	370	780	mg/kg OC	0.1	0.1
Boeing Site Characterization	R27 (904)	Total LPAH (calc'd)	4.79E-01		1.5	3.19E+01	370	780	mg/kg OC	0.1	0.04
Boeing Site Characterization	R26 (903)	Total LPAH (calc'd)	4.07E-01		1.1	3.70E+01	370	780	mg/kg OC	0.1	0.05
RI Phase 2 Round 2	LDW-SS158	Total LPAH (calc'd)	3.70E-01		1.96	1.89E+01	370	780	mg/kg OC	0.1	0.02
Boeing Site Characterization	R30 (908)	Total LPAH (calc'd)	3.43E-01		1.2	2.86E+01	370	780	mg/kg OC	0.1	0.04
RI Phase 2 Round 1	LDW-SS116	Total LPAH (calc'd)	3.30E-01	J	1.34	2.46E+01	370	780	mg/kg OC	0.1	0.03
EPA SI	DR188 (754)	Total LPAH (calc'd)	1.60E-01		1.75	9.14E+00	370	780	mg/kg OC	0.02	0.01
RI Phase 2 Round 1	LDW-SS119	Total LPAH (calc'd)	1.60E-01		1.5	1.07E+01	370	780	mg/kg OC	0.03	0.01
RI Phase 2 Round 1	LDW-SS118	Total LPAH (calc'd)	1.40E-01		1.84	7.61E+00	370	780	mg/kg OC	0.02	0.01
EPA SI	DR220 (786)	Total LPAH (calc'd)	1.30E-01		2.76	4.71E+00	370	780	mg/kg OC	0.01	0.01
RI Phase 2 Round 3	LDW-SS338	Total LPAH (calc'd)	5.40E-02	J	1.99	2.71E+00	370	780	mg/kg OC	0.01	0.003
EPA SI	DR187 (753)	Tributyltin as ion	2.70E-02		1.9						
RI Phase 2 Round 1	LDW-SS115	Vanadium	8.10E+01		1.92						
RI Phase 2 Round 1	LDW-SS114	Vanadium	7.26E+01		1.53						
RI Phase 2 Round 1	LDW-SS112	Vanadium	7.19E+01		1.82						
EPA SI	DR220 (786)	Vanadium	7.10E+01		2.76						
RI Phase 2 Round 1	LDW-SS118	Vanadium	6.76E+01		1.84						
RI Phase 2 Round 2	LDW-SS157	Vanadium	6.70E+01		3.1						
RI Phase 2 Round 2	LDW-SS158	Vanadium	6.57E+01		1.96						
RI Phase 2 Round 1	LDW-SS116	Vanadium	6.13E+01		1.34						

Table A-1
Surface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
EPA SI	DR187 (753)	Vanadium	5.90E+01		1.9						
RI Phase 2 Round 1	LDW-SS119	Vanadium	5.88E+01		1.5						
RI Phase 2 Round 3	LDW-SS338	Vanadium	5.75E+01		1.99						
EPA SI	DR188 (754)	Vanadium	5.40E+01		1.75						
RI Phase 2 Round 2	LDW-SS159	Vanadium	5.35E+01		2.78						
RI Phase 2 Round 1	LDW-SS115	Zinc	3.43E+02		1.92		410	960	mg/kg DW	0.8	0.4
Boeing Site Characterization	R22 (899)	Zinc	2.87E+02		1.4		410	960	mg/kg DW	0.7	0.3
RI Phase 2 Round 2	LDW-SS157	Zinc	2.48E+02		3.1		410	960	mg/kg DW	0.6	0.3
EPA SI	DR187 (753)	Zinc	2.33E+02		1.9		410	960	mg/kg DW	0.6	0.2
RI Phase 2 Round 1	LDW-SS114	Zinc	2.30E+02		1.53		410	960	mg/kg DW	0.6	0.2
RI Phase 2 Round 1	LDW-SS112	Zinc	2.06E+02		1.82		410	960	mg/kg DW	0.5	0.2
Boeing Site Characterization	R23 (900)	Zinc	1.88E+02		1.7		410	960	mg/kg DW	0.5	0.2
RI Phase 2 Round 2	LDW-SS158	Zinc	1.51E+02		1.96		410	960	mg/kg DW	0.4	0.2
Boeing Site Characterization	R31 (909)	Zinc	1.28E+02		1.2		410	960	mg/kg DW	0.3	0.1
Boeing Site Characterization	R30 (908)	Zinc	1.15E+02		1.2		410	960	mg/kg DW	0.3	0.1
RI Phase 2 Round 1	LDW-SS119	Zinc	1.15E+02		1.5		410	960	mg/kg DW	0.3	0.1
RI Phase 2 Round 1	LDW-SS118	Zinc	1.03E+02		1.84		410	960	mg/kg DW	0.3	0.1
RI Phase 2 Round 2	LDW-SS159	Zinc	9.90E+01		2.78		410	960	mg/kg DW	0.2	0.1
EPA SI	DR220 (786)	Zinc	9.80E+01		2.76		410	960	mg/kg DW	0.2	0.1
RI Phase 2 Round 3	LDW-SS338	Zinc	9.50E+01		1.99		410	960	mg/kg DW	0.2	0.1
Boeing Site Characterization	R27 (904)	Zinc	9.30E+01		1.5		410	960	mg/kg DW	0.2	0.1
RI Phase 2 Round 1	LDW-SS116	Zinc	9.28E+01		1.34		410	960	mg/kg DW	0.2	0.1
Boeing Site Characterization	R26 (903)	Zinc	9.10E+01		1.1		410	960	mg/kg DW	0.2	0.1
EPA SI	DR188 (754)	Zinc	8.10E+01		1.75		410	960	mg/kg DW	0.2	0.1

Table presents detections only.

a - Exceedance factors are the ratio of the detected concentration to the CSL or SQS; an exceedance factor greater than 1 indicates that the measured concentration is higher than the corresponding CSL or SQS.

DW - Dry weight
OC - Organic carbon normalized
TOC - Total organic carbon

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	1,2,4-Trichlorobenzene	4.10E-03	J	0.816	5.02E-01	0.81	1.8	mg/kg OC	0.6	0.3
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	1,2,4-Trichlorobenzene	3.60E-03	J	0.63	5.71E-01	0.81	1.8	mg/kg OC	0.7	0.3
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	1,2-Dichlorobenzene	2.00E-02		1.73	1.16E+00	2.3	2.3	mg/kg OC	0.5	0.5
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	1,2-Dichlorobenzene	6.20E-03		0.643	9.64E-01	2.3	2.3	mg/kg OC	0.4	0.4
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	1,2-Dichlorobenzene	4.80E-03	J	1.64	2.93E-01	2.3	2.3	mg/kg OC	0.1	0.1
RI Phase 2 Subsurface	LDW-SC51	0	-	2	1,2-Dichlorobenzene	4.80E-03	J	1.47	3.27E-01	2.3	2.3	mg/kg OC	0.1	0.1
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	1,4-Dichlorobenzene	1.10E-02		1.73	6.36E-01	3.1	9.0	mg/kg OC	0.2	0.07
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	1,4-Dichlorobenzene	8.70E-03		0.643	1.35E+00	3.1	9.0	mg/kg OC	0.4	0.2
RI Phase 2 Subsurface	LDW-SC51	0	-	2	1,4-Dichlorobenzene	5.40E-03	J	1.47	3.67E-01	3.1	9.0	mg/kg OC	0.1	0.04
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	2,4-Dimethylphenol	9.50E-03	J	1.73		29	29	ug/kg DW	0.3	0.3
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	2-Methylnaphthalene	7.90E-02		1.61	4.91E+00	38	64	mg/kg OC	0.1	0.08
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	2-Methylnaphthalene	5.60E-02	J	0.63	8.89E+00	38	64	mg/kg OC	0.2	0.1
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	2-Methylphenol	2.10E-02	J	1.61	1.30E+00	63	63	mg/kg OC	0.02	0.02
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	2-Methylphenol	3.00E-03	J	0.63	4.76E-01	63	63	mg/kg OC	0.01	0.01
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Acenaphthene	3.80E-01		1.47	2.59E+01	16	57	mg/kg OC	1.6	0.5
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Acenaphthene	3.50E-01		1.61	2.17E+01	16	57	mg/kg OC	1.4	0.4
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Acenaphthene	2.50E-01		0.473	5.29E+01	16	57	mg/kg OC	3.3	0.9
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Acenaphthene	1.80E-01		1.64	1.10E+01	16	57	mg/kg OC	0.7	0.2
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Acenaphthene	8.40E-02		0.643	1.31E+01	16	57	mg/kg OC	0.8	0.2
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Acenaphthene	6.20E-02		1.73	3.58E+00	16	57	mg/kg OC	0.2	0.06
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Acenaphthene	4.10E-02	J	0.63	6.51E+00	16	57	mg/kg OC	0.4	0.1
EPA SI	DR220 (786)	0	-	2	Aluminum	2.34E+04		2.42						
EPA SI	DR220 (786)	2	-	4	Aluminum	2.19E+04		2.37						
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Anthracene	5.40E-01		1.61	3.35E+01	220	1200	mg/kg OC	0.2	0.03
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Anthracene	2.00E-01		1.47	1.36E+01	220	1200	mg/kg OC	0.06	0.01
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Anthracene	1.60E-01		1.64	9.76E+00	220	1200	mg/kg OC	0.04	0.008
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Anthracene	1.00E-01		0.63	1.59E+01	220	1200	mg/kg OC	0.07	0.01
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Anthracene	8.20E-02		1.73	4.74E+00	220	1200	mg/kg OC	0.02	0.004
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Anthracene	5.90E-02	J	0.473	1.25E+01	220	1200	mg/kg OC	0.06	0.01
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Anthracene	4.60E-02	J	0.816	5.64E+00	220	1200	mg/kg OC	0.03	0.005
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Anthracene	4.20E-02	J	0.643	6.53E+00	220	1200	mg/kg OC	0.03	0.005
EPA SI	DR220 (786)	2	-	4	Anthracene	3.00E-02		2.37	1.27E+00	220	1200	mg/kg OC	0.006	0.001
EPA SI	DR220 (786)	0	-	2	Aroclor-1242	1.28E-01		2.42	5.29E+00					
EPA SI	DR220 (786)	2	-	4	Aroclor-1242	3.30E-02		2.37	1.39E+00					

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Aroclor-1248	2.70E-01		0.816	3.31E+01					
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Aroclor-1248	1.70E-01		1.47	1.16E+01					
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Aroclor-1248	1.40E-01		0.63	2.22E+01					
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Aroclor-1248	1.20E-01		1.73	6.94E+00					
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Aroclor-1248	1.40E-02	J	1.18	1.19E+00					
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Aroclor-1254	9.30E-01		1.47	6.33E+01					
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Aroclor-1254	5.10E-01		0.816	6.25E+01					
EPA SI	DR220 (786)	0	-	2	Aroclor-1254	4.74E-01		2.42	1.96E+01					
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Aroclor-1254	4.00E-01		1.73	2.31E+01					
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Aroclor-1254	3.70E-01		0.63	5.87E+01					
EPA SI	DR220 (786)	2	-	4	Aroclor-1254	1.10E-01		2.37	4.64E+00					
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Aroclor-1254	2.70E-02		1.18	2.29E+00					
EPA SI	DR220 (786)	0	-	2	Aroclor-1260	2.30E-01		2.42	9.50E+00					
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Aroclor-1260	1.90E-01		1.47	1.29E+01					
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Aroclor-1260	1.80E-01		1.73	1.04E+01					
EPA SI	DR220 (786)	2	-	4	Aroclor-1260	8.40E-02		2.37	3.54E+00					
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Aroclor-1260	3.40E-02		1.18	2.88E+00					
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Arsenic	7.07E+02		0.63		57	93	mg/kg DW	12.4	7.6
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Arsenic	2.81E+02		0.816		57	93	mg/kg DW	4.9	3.0
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Arsenic	1.61E+02		1.18		57	93	mg/kg DW	2.8	1.7
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Arsenic	5.50E+01		1.73		57	93	mg/kg DW	1.0	0.6
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Arsenic	2.50E+01		1.47		57	93	mg/kg DW	0.4	0.3
RI Phase 2 Subsurface	LDW-SC50a	2.8	-	4	Arsenic	2.10E+01		0.129		57	93	mg/kg DW	0.4	0.2
EPA SI	DR220 (786)	0	-	2	Arsenic	1.00E+01		2.42		57	93	mg/kg DW	0.2	0.1
EPA SI	DR220 (786)	2	-	4	Arsenic	1.00E+01		2.37		57	93	mg/kg DW	0.2	0.1
EPA SI	DR220 (786)	2	-	4	Barium	8.10E+01		2.37						
EPA SI	DR220 (786)	0	-	2	Barium	7.90E+01		2.42						
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Benzo(a)anthracene	1.60E+00		1.61	9.94E+01	110	270	mg/kg OC	0.9	0.4
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Benzo(a)anthracene	5.40E-01		1.47	3.67E+01	110	270	mg/kg OC	0.3	0.1
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Benzo(a)anthracene	4.10E-01		1.64	2.50E+01	110	270	mg/kg OC	0.2	0.09
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Benzo(a)anthracene	2.80E-01		0.63	4.44E+01	110	270	mg/kg OC	0.4	0.2
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Benzo(a)anthracene	2.70E-01		1.73	1.56E+01	110	270	mg/kg OC	0.1	0.06
EPA SI	DR220 (786)	2	-	4	Benzo(a)anthracene	1.70E-01		2.37	7.17E+00	110	270	mg/kg OC	0.07	0.03
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Benzo(a)anthracene	1.40E-01		0.816	1.72E+01	110	270	mg/kg OC	0.2	0.06

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Benzo(a)anthracene	1.30E-01		0.473	2.75E+01	110	270	mg/kg OC	0.2	0.1
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Benzo(a)anthracene	7.10E-02		0.643	1.10E+01	110	270	mg/kg OC	0.1	0.04
EPA SI	DR220 (786)	0	-	2	Benzo(a)anthracene	6.00E-02		2.42	2.48E+00	110	270	mg/kg OC	0.02	0.009
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Benzo(a)anthracene	1.20E-02	J	1.18	1.02E+00	110	270	mg/kg OC	0.01	0.004
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Benzo(a)pyrene	1.60E+00		1.61	9.94E+01	99	210	mg/kg OC	1.0	0.5
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Benzo(a)pyrene	4.90E-01		1.47	3.33E+01	99	210	mg/kg OC	0.3	0.2
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Benzo(a)pyrene	3.90E-01		1.64	2.38E+01	99	210	mg/kg OC	0.2	0.1
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Benzo(a)pyrene	2.60E-01		0.63	4.13E+01	99	210	mg/kg OC	0.4	0.2
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Benzo(a)pyrene	2.60E-01		1.73	1.50E+01	99	210	mg/kg OC	0.2	0.07
EPA SI	DR220 (786)	2	-	4	Benzo(a)pyrene	1.90E-01		2.37	8.02E+00	99	210	mg/kg OC	0.08	0.04
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Benzo(a)pyrene	9.20E-02		0.816	1.13E+01	99	210	mg/kg OC	0.1	0.05
EPA SI	DR220 (786)	0	-	2	Benzo(a)pyrene	7.00E-02		2.42	2.89E+00	99	210	mg/kg OC	0.03	0.01
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Benzo(a)pyrene	5.00E-02	J	0.473	1.06E+01	99	210	mg/kg OC	0.1	0.05
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Benzo(a)pyrene	4.20E-02	J	0.643	6.53E+00	99	210	mg/kg OC	0.07	0.03
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Benzo(b)fluoranthene	1.60E+00		1.61	9.94E+01	230	450	mg/kg OC	0.4	0.2
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Benzo(b)fluoranthene	5.20E-01		1.47	3.54E+01	230	450	mg/kg OC	0.2	0.08
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Benzo(b)fluoranthene	4.10E-01		1.64	2.50E+01	230	450	mg/kg OC	0.1	0.06
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Benzo(b)fluoranthene	2.30E-01		0.63	3.65E+01	230	450	mg/kg OC	0.2	0.08
EPA SI	DR220 (786)	2	-	4	Benzo(b)fluoranthene	2.30E-01		2.37	9.70E+00	230	450	mg/kg OC	0.04	0.02
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Benzo(b)fluoranthene	2.10E-01		1.73	1.21E+01	230	450	mg/kg OC	0.05	0.03
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Benzo(b)fluoranthene	8.80E-02		0.816	1.08E+01	230	450	mg/kg OC	0.05	0.02
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Benzo(b)fluoranthene	8.70E-02		0.473	1.84E+01	230	450	mg/kg OC	0.08	0.04
EPA SI	DR220 (786)	0	-	2	Benzo(b)fluoranthene	8.00E-02		2.42	3.31E+00	230	450	mg/kg OC	0.01	0.007
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Benzo(b)fluoranthene	5.00E-02	J	0.643	7.78E+00	230	450	mg/kg OC	0.03	0.02
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Benzo(b)fluoranthene	1.10E-02	J	1.18	9.32E-01	230	450	mg/kg OC	0.004	0.002
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Benzo(g,h,i)perylene	5.90E-01		1.61	3.66E+01	31	78	mg/kg OC	1.2	0.5
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Benzo(g,h,i)perylene	1.60E-01		1.47	1.09E+01	31	78	mg/kg OC	0.4	0.1
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Benzo(g,h,i)perylene	1.30E-01		1.64	7.93E+00	31	78	mg/kg OC	0.3	0.1
EPA SI	DR220 (786)	2	-	4	Benzo(g,h,i)perylene	1.30E-01		2.37	5.49E+00	31	78	mg/kg OC	0.2	0.07
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Benzo(g,h,i)perylene	7.80E-02		1.73	4.51E+00	31	78	mg/kg OC	0.1	0.06
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Benzo(g,h,i)perylene	7.50E-02		0.63	1.19E+01	31	78	mg/kg OC	0.4	0.2
EPA SI	DR220 (786)	0	-	2	Benzo(g,h,i)perylene	5.00E-02		2.42	2.07E+00	31	78	mg/kg OC	0.07	0.03
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Benzo(k)fluoranthene	1.40E+00		1.61	8.70E+01	230	450	mg/kg OC	0.4	0.2
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Benzo(k)fluoranthene	4.80E-01		1.47	3.27E+01	230	450	mg/kg OC	0.1	0.07

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Benzo(k)fluoranthene	3.60E-01		1.64	2.20E+01	230	450	mg/kg OC	0.1	0.05
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Benzo(k)fluoranthene	2.80E-01		1.73	1.62E+01	230	450	mg/kg OC	0.07	0.04
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Benzo(k)fluoranthene	2.60E-01		0.63	4.13E+01	230	450	mg/kg OC	0.2	0.09
EPA SI	DR220 (786)	2	-	4	Benzo(k)fluoranthene	1.70E-01		2.37	7.17E+00	230	450	mg/kg OC	0.03	0.02
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Benzo(k)fluoranthene	1.10E-01		0.816	1.35E+01	230	450	mg/kg OC	0.06	0.03
EPA SI	DR220 (786)	0	-	2	Benzo(k)fluoranthene	8.00E-02		2.42	3.31E+00	230	450	mg/kg OC	0.01	0.007
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Benzo(k)fluoranthene	5.40E-02	J	0.473	1.14E+01	230	450	mg/kg OC	0.05	0.03
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Benzo(k)fluoranthene	5.20E-02	J	0.643	8.09E+00	230	450	mg/kg OC	0.04	0.02
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Benzo(k)fluoranthene	1.00E-02	J	1.18	8.47E-01	230	450	mg/kg OC	0.004	0.002
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Benzofluoranthenes (total-calc'd)	3.00E+00		1.61	1.86E+02	230	450	mg/kg OC	0.8	0.4
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Benzofluoranthenes (total-calc'd)	1.00E+00		1.47	6.80E+01	230	450	mg/kg OC	0.3	0.2
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Benzofluoranthenes (total-calc'd)	7.70E-01		1.64	4.70E+01	230	450	mg/kg OC	0.2	0.1
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Benzofluoranthenes (total-calc'd)	4.90E-01		0.63	7.78E+01	230	450	mg/kg OC	0.3	0.2
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Benzofluoranthenes (total-calc'd)	4.90E-01		1.73	2.83E+01	230	450	mg/kg OC	0.1	0.06
EPA SI	DR220 (786)	2	-	4	Benzofluoranthenes (total-calc'd)	4.00E-01		2.37	1.69E+01	230	450	mg/kg OC	0.07	0.04
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Benzofluoranthenes (total-calc'd)	2.00E-01		0.816	2.45E+01	230	450	mg/kg OC	0.1	0.05
EPA SI	DR220 (786)	0	-	2	Benzofluoranthenes (total-calc'd)	1.60E-01		2.42	6.61E+00	230	450	mg/kg OC	0.03	0.01
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Benzofluoranthenes (total-calc'd)	1.41E-01	J	0.473	2.98E+01	230	450	mg/kg OC	0.1	0.07
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Benzofluoranthenes (total-calc'd)	1.02E-01	J	0.643	1.59E+01	230	450	mg/kg OC	0.07	0.04
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Benzofluoranthenes (total-calc'd)	2.10E-02	J	1.18	1.78E+00	230	450	mg/kg OC	0.008	0.004
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Benzoic acid	3.30E-01	J	0.63		650	650	ug/kg DW	0.5	0.5
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Benzoic acid	9.00E-02		1.47		650	650	ug/kg DW	0.1	0.1
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Benzoic acid	6.80E-02		1.73		650	650	ug/kg DW	0.1	0.1
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Benzyl alcohol	1.80E-01		1.61		57	73	ug/kg DW	3.2	2.5
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Benzyl alcohol	2.10E-02	J	1.73		57	73	ug/kg DW	0.4	0.3
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Benzyl alcohol	1.80E-02	J	1.47		57	73	ug/kg DW	0.3	0.2
EPA SI	DR220 (786)	0	-	2	Beryllium	4.20E-04		2.42						
EPA SI	DR220 (786)	2	-	4	Beryllium	4.00E-04		2.37						
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Bis(2-ethylhexyl)phthalate	1.80E+00		1.64	1.10E+02	47	78	mg/kg OC	2.3	1.4
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Bis(2-ethylhexyl)phthalate	9.70E-01		1.61	6.02E+01	47	78	mg/kg OC	1.3	0.8
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Bis(2-ethylhexyl)phthalate	6.80E-01		0.63	1.08E+02	47	78	mg/kg OC	2.3	1.4
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Bis(2-ethylhexyl)phthalate	4.80E-01		1.47	3.27E+01	47	78	mg/kg OC	0.7	0.4
EPA SI	DR220 (786)	2	-	4	Bis(2-ethylhexyl)phthalate	4.70E-01		2.37	1.98E+01	47	78	mg/kg OC	0.4	0.3
EPA SI	DR220 (786)	0	-	2	Bis(2-ethylhexyl)phthalate	1.60E-01		2.42	6.61E+00	47	78	mg/kg OC	0.1	0.08

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Bis(2-ethylhexyl)phthalate	7.60E-02		1.73	4.39E+00	47	78	mg/kg OC	0.09	0.06
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Bis(2-ethylhexyl)phthalate	7.50E-02		0.643	1.17E+01	47	78	mg/kg OC	0.2	0.1
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Bis(2-ethylhexyl)phthalate	6.40E-02		0.816	7.84E+00	47	78	mg/kg OC	0.2	0.1
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Bis(2-ethylhexyl)phthalate	6.30E-02		1.18	5.34E+00	47	78	mg/kg OC	0.1	0.07
EPA SI	DR220 (786)	2	-	4	Butyl benzyl phthalate	5.00E-02		2.37	2.11E+00	4.9	64	mg/kg OC	0.4	0.03
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Butyl benzyl phthalate	4.30E-02		1.61	2.67E+00	4.9	64	mg/kg OC	0.5	0.04
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Butyl benzyl phthalate	3.60E-02		1.47	2.45E+00	4.9	64	mg/kg OC	0.5	0.04
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Butyl benzyl phthalate	3.50E-02		1.64	2.13E+00	4.9	64	mg/kg OC	0.4	0.03
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Butyl benzyl phthalate	2.90E-02		1.73	1.68E+00	4.9	64	mg/kg OC	0.3	0.03
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Butyl benzyl phthalate	2.40E-02		0.63	3.81E+00	4.9	64	mg/kg OC	0.8	0.06
EPA SI	DR220 (786)	0	-	2	Butyl benzyl phthalate	2.00E-02		2.42	8.26E-01	4.9	64	mg/kg OC	0.2	0.01
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Butyl benzyl phthalate	1.70E-02		0.643	2.64E+00	4.9	64	mg/kg OC	0.5	0.04
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Butyl benzyl phthalate	1.40E-02		0.816	1.72E+00	4.9	64	mg/kg OC	0.4	0.03
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Butyl benzyl phthalate	1.00E-02		0.473	2.11E+00	4.9	64	mg/kg OC	0.4	0.03
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Butyl benzyl phthalate	6.60E-03		1.18	5.59E-01	4.9	64	mg/kg OC	0.1	0.01
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Cadmium	1.00E+00		1.73		5.1	6.7	mg/kg DW	0.2	0.1
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Cadmium	7.00E-01		1.47		5.1	6.7	mg/kg DW	0.1	0.1
EPA SI	DR220 (786)	2	-	4	Cadmium	4.80E-01		2.37		5.1	6.7	mg/kg DW	0.09	0.07
EPA SI	DR220 (786)	0	-	2	Cadmium	3.50E-01		2.42		5.1	6.7	mg/kg DW	0.07	0.05
EPA SI	DR220 (786)	2	-	4	Carbazole	3.00E+01		2.37	1.27E+03					
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Chromium	6.74E+01		1.47		260	270	mg/kg DW	0.3	0.2
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Chromium	3.48E+01		1.73		260	270	mg/kg DW	0.1	0.1
EPA SI	DR220 (786)	0	-	2	Chromium	3.00E+01		2.42		260	270	mg/kg DW	0.1	0.1
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Chromium	2.85E+01		0.63		260	270	mg/kg DW	0.1	0.1
EPA SI	DR220 (786)	2	-	4	Chromium	2.80E+01		2.37		260	270	mg/kg DW	0.1	0.1
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Chromium	2.43E+01		0.816		260	270	mg/kg DW	0.09	0.09
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Chromium	2.16E+01		1.18		260	270	mg/kg DW	0.08	0.08
RI Phase 2 Subsurface	LDW-SC50a	2.8	-	4	Chromium	1.18E+01		0.129		260	270	mg/kg DW	0.05	0.04
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Chrysene	1.90E+00		1.61	1.18E+02	100	460	m/gkg OC	1.2	0.3
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Chrysene	5.90E-01		1.47	4.01E+01	100	460	m/gkg OC	0.4	0.09
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Chrysene	4.90E-01		1.64	2.99E+01	100	460	m/gkg OC	0.3	0.06
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Chrysene	3.30E-01		0.63	5.24E+01	100	460	m/gkg OC	0.5	0.1
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Chrysene	3.20E-01		1.73	1.85E+01	100	460	m/gkg OC	0.2	0.04
EPA SI	DR220 (786)	2	-	4	Chrysene	2.30E-01		2.37	9.70E+00	100	460	m/gkg OC	0.1	0.02

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Chrysene	1.60E-01		0.816	1.96E+01	100	460	m/gkg OC	0.2	0.04
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Chrysene	1.20E-01		0.473	2.54E+01	100	460	m/gkg OC	0.3	0.06
EPA SI	DR220 (786)	0	-	2	Chrysene	9.00E-02		2.42	3.72E+00	100	460	m/gkg OC	0.04	0.008
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Chrysene	6.70E-02		0.643	1.04E+01	100	460	m/gkg OC	0.1	0.02
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Chrysene	1.40E-02	J	1.18	1.19E+00	100	460	m/gkg OC	0.01	0.003
EPA SI	DR220 (786)	0	-	2	Cobalt	1.00E+01		2.42						
EPA SI	DR220 (786)	2	-	4	Cobalt	1.00E+01		2.37						
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Cobalt	7.50E+00		1.47						
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Cobalt	7.40E+00		1.73						
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Cobalt	6.90E+00		1.18						
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Cobalt	5.90E+00		0.63						
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Cobalt	5.60E+00		0.816						
RI Phase 2 Subsurface	LDW-SC50a	2.8	-	4	Cobalt	4.90E+00		0.129						
EPA SI	DR220 (786)	0	-	2	Copper	4.70E+01		2.42		390	390	mg/kg DW	0.1	0.1
EPA SI	DR220 (786)	2	-	4	Copper	4.60E+01		2.37		390	390	mg/kg DW	0.1	0.1
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Copper	4.45E+01		1.47		390	390	mg/kg DW	0.1	0.1
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Copper	3.82E+01		1.73		390	390	mg/kg DW	0.1	0.1
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Copper	3.61E+01		0.63		390	390	mg/kg DW	0.09	0.09
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Copper	2.49E+01		1.18		390	390	mg/kg DW	0.06	0.06
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Copper	2.44E+01		0.816		390	390	mg/kg DW	0.06	0.06
RI Phase 2 Subsurface	LDW-SC50a	2.8	-	4	Copper	9.40E+00		0.129		390	390	mg/kg DW	0.02	0.02
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Dibenzo(a,h)anthracene	1.60E-01		1.61	9.94E+00	12	33	mg/kg OC	0.8	0.3
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Dibenzo(a,h)anthracene	4.90E-02	J	1.47	3.33E+00	12	33	mg/kg OC	0.3	0.1
EPA SI	DR220 (786)	2	-	4	Dibenzo(a,h)anthracene	4.00E-02		2.37	1.69E+00	12	33	mg/kg OC	0.1	0.05
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Dibenzo(a,h)anthracene	3.80E-02		1.64	2.32E+00	12	33	mg/kg OC	0.2	0.07
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Dibenzo(a,h)anthracene	4.30E-03	J	0.473	9.09E-01	12	33	mg/kg OC	0.08	0.03
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Dibenzo(a,h)anthracene	3.70E-03	J	0.643	5.75E-01	12	33	mg/kg OC	0.05	0.02
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Dibenzofuran	2.30E-01		1.61	1.43E+01	15	58	mg/kg OC	1.0	0.2
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Dibenzofuran	2.30E-01		1.47	1.56E+01	15	58	mg/kg OC	1.0	0.3
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Dibenzofuran	1.30E-01		0.473	2.75E+01	15	58	mg/kg OC	1.8	0.5
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Dibenzofuran	9.20E-02		0.643	1.43E+01	15	58	mg/kg OC	1.0	0.2
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Dibenzofuran	8.90E-02		1.64	5.43E+00	15	58	mg/kg OC	0.4	0.09
EPA SI	DR220 (786)	2	-	4	Dimethyl phthalate	3.00E-02		2.37	1.27E+00	53	53	mg/kg OC	0.02	0.02
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Di-n-butyl phthalate	5.10E-02	J	1.64	3.11E+00	220	1700	mg/kg OC	0.01	0.002

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Di-n-butyl phthalate	4.40E-02	J	1.61	2.73E+00	220	1700	mg/kg OC	0.01	0.002
EPA SI	DR220 (786)	2	-	4	Di-n-butyl phthalate	2.00E-02		2.37	8.44E-01	220	1700	mg/kg OC	0.004	0.0005
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Fluoranthene	4.00E+00		1.61	2.48E+02	160	1200	mg/kg OC	1.6	0.2
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Fluoranthene	2.10E+00		1.47	1.43E+02	160	1200	mg/kg OC	0.9	0.1
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Fluoranthene	1.20E+00		1.64	7.32E+01	160	1200	mg/kg OC	0.5	0.06
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Fluoranthene	8.10E-01		1.73	4.68E+01	160	1200	mg/kg OC	0.3	0.04
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Fluoranthene	7.70E-01		0.63	1.22E+02	160	1200	mg/kg OC	0.8	0.1
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Fluoranthene	7.30E-01		0.643	1.14E+02	160	1200	mg/kg OC	0.7	0.09
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Fluoranthene	7.20E-01		0.473	1.52E+02	160	1200	mg/kg OC	1.0	0.1
EPA SI	DR220 (786)	2	-	4	Fluoranthene	3.50E-01		2.37	1.48E+01	160	1200	mg/kg OC	0.09	0.01
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Fluoranthene	2.00E-01		0.816	2.45E+01	160	1200	mg/kg OC	0.2	0.02
EPA SI	DR220 (786)	0	-	2	Fluoranthene	1.40E-01		2.42	5.79E+00	160	1200	mg/kg OC	0.04	0.005
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Fluoranthene	4.00E-02		1.18	3.39E+00	160	1200	mg/kg OC	0.02	0.003
RI Phase 2 Subsurface	LDW-SC50a	2.8	-	4	Fluoranthene	1.40E-02	J	0.129	1.09E+01	160	1200	mg/kg OC	0.07	0.009
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Fluorene	3.20E-01		1.61	1.99E+01	23	79	mg/kg OC	0.9	0.3
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Fluorene	1.50E-01		1.47	1.02E+01	23	79	mg/kg OC	0.4	0.1
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Fluorene	1.10E-01		1.64	6.71E+00	23	79	mg/kg OC	0.3	0.08
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Fluorene	5.30E-02	J	1.73	3.06E+00	23	79	mg/kg OC	0.1	0.04
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Fluorene	4.10E-02	J	0.63	6.51E+00	23	79	mg/kg OC	0.3	0.08
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Indeno(1,2,3-cd)pyrene	6.90E-01		1.61	4.29E+01	34	88	mg/kg OC	1.3	0.5
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Indeno(1,2,3-cd)pyrene	2.20E-01		1.47	1.50E+01	34	88	mg/kg OC	0.4	0.2
EPA SI	DR220 (786)	2	-	4	Indeno(1,2,3-cd)pyrene	1.70E-01		2.37	7.17E+00	34	88	mg/kg OC	0.2	0.08
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Indeno(1,2,3-cd)pyrene	1.60E-01		1.64	9.76E+00	34	88	mg/kg OC	0.3	0.1
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Indeno(1,2,3-cd)pyrene	1.10E-01		1.73	6.36E+00	34	88	mg/kg OC	0.2	0.07
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Indeno(1,2,3-cd)pyrene	1.00E-01		0.63	1.59E+01	34	88	mg/kg OC	0.5	0.2
EPA SI	DR220 (786)	0	-	2	Indeno(1,2,3-cd)pyrene	6.00E-02		2.42	2.48E+00	34	88	mg/kg OC	0.07	0.03
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Indeno(1,2,3-cd)pyrene	3.50E-02	J	0.816	4.29E+00	34	88	mg/kg OC	0.1	0.05
EPA SI	DR220 (786)	0	-	2	Iron	3.07E+04		2.42						
EPA SI	DR220 (786)	2	-	4	Iron	2.85E+04		2.37						
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Lead	7.60E+01	J	1.47		450	530	mg/kg DW	0.2	0.1
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Lead	4.70E+01		0.63		450	530	mg/kg DW	0.1	0.09
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Lead	4.10E+01	J	1.73		450	530	mg/kg DW	0.09	0.08
EPA SI	DR220 (786)	2	-	4	Lead	3.34E+01		2.37		450	530	mg/kg DW	0.07	0.06
EPA SI	DR220 (786)	0	-	2	Lead	2.53E+01		2.42		450	530	mg/kg DW	0.06	0.05

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Lead	2.20E+01		0.816		450	530	mg/kg DW	0.05	0.04
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Lead	1.10E+01		1.18		450	530	mg/kg DW	0.02	0.02
EPA SI	DR220 (786)	0	-	2	Manganese	3.20E+02		2.42						
EPA SI	DR220 (786)	2	-	4	Manganese	2.80E+02		2.37						
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Mercury	2.00E-01		0.63		0.41	0.59	mg/kg DW	0.5	0.3
EPA SI	DR220 (786)	0	-	2	Mercury	2.00E-01	J	2.42		0.41	0.59	mg/kg DW	0.5	0.3
EPA SI	DR220 (786)	2	-	4	Mercury	2.00E-01	J	2.37		0.41	0.59	mg/kg DW	0.5	0.3
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Mercury	1.20E-01	J	1.73		0.41	0.59	mg/kg DW	0.3	0.2
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Mercury	1.00E-01	J	1.47		0.41	0.59	mg/kg DW	0.2	0.2
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Mercury	7.00E-02		1.18		0.41	0.59	mg/kg DW	0.2	0.1
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Molybdenum	7.60E+00		1.73						
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Molybdenum	3.00E+00		1.47						
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Molybdenum	1.50E+00		0.63						
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Molybdenum	1.00E+00		0.816						
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Molybdenum	7.00E-01		1.18						
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Naphthalene	2.30E-01		1.61	1.43E+01	99	170	mg/kg OC	0.1	0.08
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Naphthalene	5.60E-02	J	1.47	3.81E+00	99	170	mg/kg OC	0.04	0.02
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Naphthalene	5.40E-02	J	1.64	3.29E+00	99	170	mg/kg OC	0.03	0.02
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Nickel	3.40E+01		1.47		140	370	mg/kg DW	0.2	0.09
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Nickel	3.30E+01		1.73		140	370	mg/kg DW	0.2	0.09
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Nickel	3.20E+01		1.18		140	370	mg/kg DW	0.2	0.09
EPA SI	DR220 (786)	0	-	2	Nickel	2.20E+01		2.42		140	370	mg/kg DW	0.2	0.06
EPA SI	DR220 (786)	2	-	4	Nickel	1.89E+01		2.37		140	370	mg/kg DW	0.1	0.05
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Nickel	1.70E+01		0.63		140	370	mg/kg DW	0.1	0.05
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Nickel	1.40E+01		0.816		140	370	mg/kg DW	0.1	0.04
RI Phase 2 Subsurface	LDW-SC50a	2.8	-	4	Nickel	8.00E+00		0.129		140	370	mg/kg DW	0.06	0.02
RI Phase 2 Subsurface	LDW-SC51	0	-	2	PCBs (total calc'd)	1.29E+00		1.47	8.78E+01	12	65	mg/kg OC	7.3	1.4
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	PCBs (total calc'd)	7.80E-01		0.816	9.56E+01	12	65	mg/kg OC	8.0	1.5
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	PCBs (total calc'd)	7.00E-01		1.73	4.05E+01	12	65	mg/kg OC	3.4	0.6
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	PCBs (total calc'd)	5.10E-01		0.63	8.10E+01	12	65	mg/kg OC	6.7	1.2
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	PCBs (total calc'd)	7.50E-02	J	1.18	6.36E+00	12	65	mg/kg OC	0.5	0.1
EPA SI	DR220 (786)	0	-	2	PCBs (total-calc'd)	8.32E-01		2.42	3.44E+01	12	65	mg/kg OC	2.9	0.5
EPA SI	DR220 (786)	2	-	4	PCBs (total-calc'd)	2.27E-01		2.37	9.58E+00	12	65	mg/kg OC	0.8	0.1
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Phenanthrene	2.30E+00		1.61	1.43E+02	100	480	mg/kg OC	1.4	0.3

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Phenanthrene	9.10E-01		1.47	6.19E+01	100	480	mg/kg OC	0.6	0.1
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Phenanthrene	8.40E-01		1.64	5.12E+01	100	480	mg/kg OC	0.5	0.1
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Phenanthrene	4.40E-01		1.73	2.54E+01	100	480	mg/kg OC	0.3	0.05
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Phenanthrene	4.20E-01		0.63	6.67E+01	100	480	mg/kg OC	0.7	0.1
EPA SI	DR220 (786)	2	-	4	Phenanthrene	1.80E-01		2.37	7.59E+00	100	480	mg/kg OC	0.08	0.02
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Phenanthrene	1.20E-01		0.473	2.54E+01	100	480	mg/kg OC	0.3	0.05
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Phenanthrene	9.70E-02		0.643	1.51E+01	100	480	mg/kg OC	0.2	0.03
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Phenanthrene	9.60E-02		0.816	1.18E+01	100	480	mg/kg OC	0.1	0.02
EPA SI	DR220 (786)	0	-	2	Phenanthrene	6.00E-02		2.42	2.48E+00	100	480	mg/kg OC	0.02	0.005
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Phenanthrene	2.00E-02		1.18	1.69E+00	100	480	mg/kg OC	0.02	0.004
EPA SI	DR220 (786)	2	-	4	Phenol	8.00E-02		2.37		420	1200	ug/kg DW	0.2	0.07
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Phenol	4.20E-02	J	0.63		420	1200	ug/kg DW	0.1	0.04
RI Phase 2 Subsurface	LDW-SC50a	2.8	-	4	Phenol	1.30E-02	J	0.129		420	1200	ug/kg DW	0.03	0.01
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Phenol	1.30E-02	J	1.18		420	1200	ug/kg DW	0.03	0.01
RI Phase 2 Subsurface	LDW-SC51	0	-	0.5	Pyrene	2.60E+00		1.61	1.61E+02	1000	1400	mg/kg OC	0.2	0.1
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Pyrene	1.20E+00		1.47	8.16E+01	1000	1400	mg/kg OC	0.08	0.06
RI Phase 2 Subsurface	LDW-SC51	0.5	-	1	Pyrene	9.00E-01		1.64	5.49E+01	1000	1400	mg/kg OC	0.05	0.04
RI Phase 2 Subsurface	LDW-SC51	2	-	3.8	Pyrene	5.90E-01		1.73	3.41E+01	1000	1400	mg/kg OC	0.03	0.02
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Pyrene	5.00E-01		0.63	7.94E+01	1000	1400	mg/kg OC	0.08	0.06
EPA SI	DR220 (786)	2	-	4	Pyrene	4.40E-01		2.37	1.86E+01	1000	1400	mg/kg OC	0.02	0.01
RI Phase 2 Subsurface	LDW-SC51	1	-	1.5	Pyrene	4.00E-01		0.473	8.46E+01	1000	1400	mg/kg OC	0.08	0.06
RI Phase 2 Subsurface	LDW-SC51	1.5	-	2	Pyrene	3.60E-01		0.643	5.60E+01	1000	1400	mg/kg OC	0.06	0.04
EPA SI	DR220 (786)	0	-	2	Pyrene	1.70E-01		2.42	7.02E+00	1000	1400	mg/kg OC	0.01	0.005
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Pyrene	1.40E-01		0.816	1.72E+01	1000	1400	mg/kg OC	0.02	0.01
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Pyrene	2.80E-02		1.18	2.37E+00	1000	1400	mg/kg OC	0.002	0.002
RI Phase 2 Subsurface	LDW-SC50a	2.8	-	4	Pyrene	1.10E-02	J	0.129	8.53E+00	1000	1400	mg/kg OC	0.009	0.006
EPA SI	DR220 (786)	0	-	2	Selenium	7.00E-01	J	2.42						
EPA SI	DR220 (786)	2	-	4	Selenium	7.00E-01	J	2.37						
RI Phase 2 Subsurface	LDW-SC51	0	-	2	Silver	1.10E+00		1.47		6.1	6.1	mg/kg DW	0.2	0.2
EPA SI	DR220 (786)	2	-	4	Silver	4.10E-01		2.37		6.1	6.1	mg/kg DW	0.07	0.07
EPA SI	DR220 (786)	0	-	2	Silver	2.20E-01		2.42		6.1	6.1	mg/kg DW	0.04	0.04
EPA SI	DR220 (786)	0	-	2	Thallium	8.00E-02		2.42						
EPA SI	DR220 (786)	2	-	4	Thallium	8.00E-02		2.37						
EPA SI	DR220 (786)	0	-	2	Tin	5.00E+00		2.42						

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)	Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
EPA SI	DR220 (786)	2 - 4	Tin	4.00E+00		2.37						
RI Phase 2 Subsurface	LDW-SC51	0 - 0.5	Total HPAH (calc'd)	1.61E+01		1.61	1.00E+03	960	5300	mg/kg OC	1.0	0.2
RI Phase 2 Subsurface	LDW-SC51	0 - 2	Total HPAH (calc'd)	6.30E+00	J	1.47	4.29E+02	960	5300	mg/kg OC	0.4	0.08
RI Phase 2 Subsurface	LDW-SC51	0.5 - 1	Total HPAH (calc'd)	4.50E+00		1.64	2.74E+02	960	5300	mg/kg OC	0.3	0.05
RI Phase 2 Subsurface	LDW-SC51	2 - 3.8	Total HPAH (calc'd)	2.93E+00		1.73	1.69E+02	960	5300	mg/kg OC	0.2	0.03
RI Phase 2 Subsurface	LDW-SC50a	0 - 1	Total HPAH (calc'd)	2.81E+00		0.63	4.46E+02	960	5300	mg/kg OC	0.5	0.08
EPA SI	DR220 (786)	2 - 4	Total HPAH (calc'd)	2.12E+00		2.37	8.95E+01	960	5300	mg/kg OC	0.09	0.02
RI Phase 2 Subsurface	LDW-SC51	1 - 1.5	Total HPAH (calc'd)	1.57E+00	J	0.473	3.32E+02	960	5300	mg/kg OC	0.3	0.06
RI Phase 2 Subsurface	LDW-SC51	1.5 - 2	Total HPAH (calc'd)	1.38E+00	J	0.643	2.15E+02	960	5300	mg/kg OC	0.2	0.04
RI Phase 2 Subsurface	LDW-SC50a	1 - 2	Total HPAH (calc'd)	9.70E-01	J	0.816	1.19E+02	960	5300	mg/kg OC	0.1	0.02
EPA SI	DR220 (786)	0 - 2	Total HPAH (calc'd)	8.00E-01		2.42	3.31E+01	960	5300	mg/kg OC	0.03	0.006
RI Phase 2 Subsurface	LDW-SC50a	2 - 2.8	Total HPAH (calc'd)	1.15E-01	J	1.18	9.75E+00	960	5300	mg/kg OC	0.01	0.002
RI Phase 2 Subsurface	LDW-SC50a	2.8 - 4	Total HPAH (calc'd)	2.50E-02	J	0.129	1.94E+01	960	5300	mg/kg OC	0.02	0.004
RI Phase 2 Subsurface	LDW-SC51	0 - 0.5	Total LPAH (calc'd)	3.70E+00		1.61	2.30E+02	370	780	mg/kg OC	0.6	0.3
RI Phase 2 Subsurface	LDW-SC51	0 - 2	Total LPAH (calc'd)	1.70E+00	J	1.47	1.16E+02	370	780	mg/kg OC	0.3	0.1
RI Phase 2 Subsurface	LDW-SC51	0.5 - 1	Total LPAH (calc'd)	1.34E+00	J	1.64	8.17E+01	370	780	mg/kg OC	0.2	0.1
RI Phase 2 Subsurface	LDW-SC51	2 - 3.8	Total LPAH (calc'd)	6.40E-01	J	1.73	3.70E+01	370	780	mg/kg OC	0.1	0.05
RI Phase 2 Subsurface	LDW-SC50a	0 - 1	Total LPAH (calc'd)	6.00E-01	J	0.63	9.52E+01	370	780	mg/kg OC	0.3	0.1
RI Phase 2 Subsurface	LDW-SC51	1 - 1.5	Total LPAH (calc'd)	4.30E-01	J	0.473	9.09E+01	370	780	mg/kg OC	0.2	0.1
RI Phase 2 Subsurface	LDW-SC51	1.5 - 2	Total LPAH (calc'd)	2.23E-01	J	0.643	3.47E+01	370	780	mg/kg OC	0.09	0.04
EPA SI	DR220 (786)	2 - 4	Total LPAH (calc'd)	2.10E-01		2.37	8.86E+00	370	780	mg/kg OC	0.02	0.01
RI Phase 2 Subsurface	LDW-SC50a	1 - 2	Total LPAH (calc'd)	1.42E-01	J	0.816	1.74E+01	370	780	mg/kg OC	0.05	0.02
EPA SI	DR220 (786)	0 - 2	Total LPAH (calc'd)	6.00E-02		2.42	2.48E+00	370	780	mg/kg OC	0.007	0.003
RI Phase 2 Subsurface	LDW-SC50a	2 - 2.8	Total LPAH (calc'd)	2.00E-02		1.18	1.69E+00	370	780	mg/kg OC	0.005	0.002
EPA SI	DR220 (786)	0 - 2	Vanadium	7.00E+01		2.42						
EPA SI	DR220 (786)	2 - 4	Vanadium	6.40E+01		2.37						
RI Phase 2 Subsurface	LDW-SC51	2 - 3.8	Vanadium	6.01E+01		1.73						
RI Phase 2 Subsurface	LDW-SC51	0 - 2	Vanadium	5.25E+01		1.47						
RI Phase 2 Subsurface	LDW-SC50a	2 - 2.8	Vanadium	5.24E+01		1.18						
RI Phase 2 Subsurface	LDW-SC50a	1 - 2	Vanadium	5.22E+01		0.816						
RI Phase 2 Subsurface	LDW-SC50a	0 - 1	Vanadium	5.06E+01		0.63						
RI Phase 2 Subsurface	LDW-SC50a	2.8 - 4	Vanadium	3.99E+01		0.129						
RI Phase 2 Subsurface	LDW-SC51	2 - 3.8	Zinc	2.69E+02		1.73		410	960	mg/kg DW	0.7	0.3
RI Phase 2 Subsurface	LDW-SC51	0 - 2	Zinc	2.03E+02		1.47		410	960	mg/kg DW	0.5	0.2

Table A-2
Subsurface Sediment Sampling Results
Early Action Area 6

Sampling Event	Sample Location	Sample Depth (feet)			Chemical	Conc'n (mg/kg DW)		TOC %	Conc'n (mg/kg OC)	SQS	CSL	Units	SQS Exceedance Factor[a]	CSL Exceedance Factor[a]
RI Phase 2 Subsurface	LDW-SC50a	0	-	1	Zinc	1.61E+02		0.63		410	960	mg/kg DW	0.4	0.2
RI Phase 2 Subsurface	LDW-SC50a	1	-	2	Zinc	1.24E+02		0.816		410	960	mg/kg DW	0.3	0.1
RI Phase 2 Subsurface	LDW-SC50a	2	-	2.8	Zinc	1.08E+02		1.18		410	960	mg/kg DW	0.3	0.1
EPA SI	DR220 (786)	2	-	4	Zinc	1.06E+02		2.37		410	960	mg/kg DW	0.3	0.1
EPA SI	DR220 (786)	0	-	2	Zinc	1.03E+02		2.42		410	960	mg/kg DW	0.3	0.1
RI Phase 2 Subsurface	LDW-SC50a	2.8	-	4	Zinc	4.77E+01		0.129		410	960	mg/kg DW	0.1	0.05

Appendix B
Aerial Photographs

Early Action Area 6 - 1936 Aerial Photo

Early Action Area 6 - 1946 Aerial Photo

Early Action Area 6 - 1956 Aerial Photo

Early Action Area 6 - 1960 Aerial Photo

Early Action Area 6 - 1969 Aerial Photo

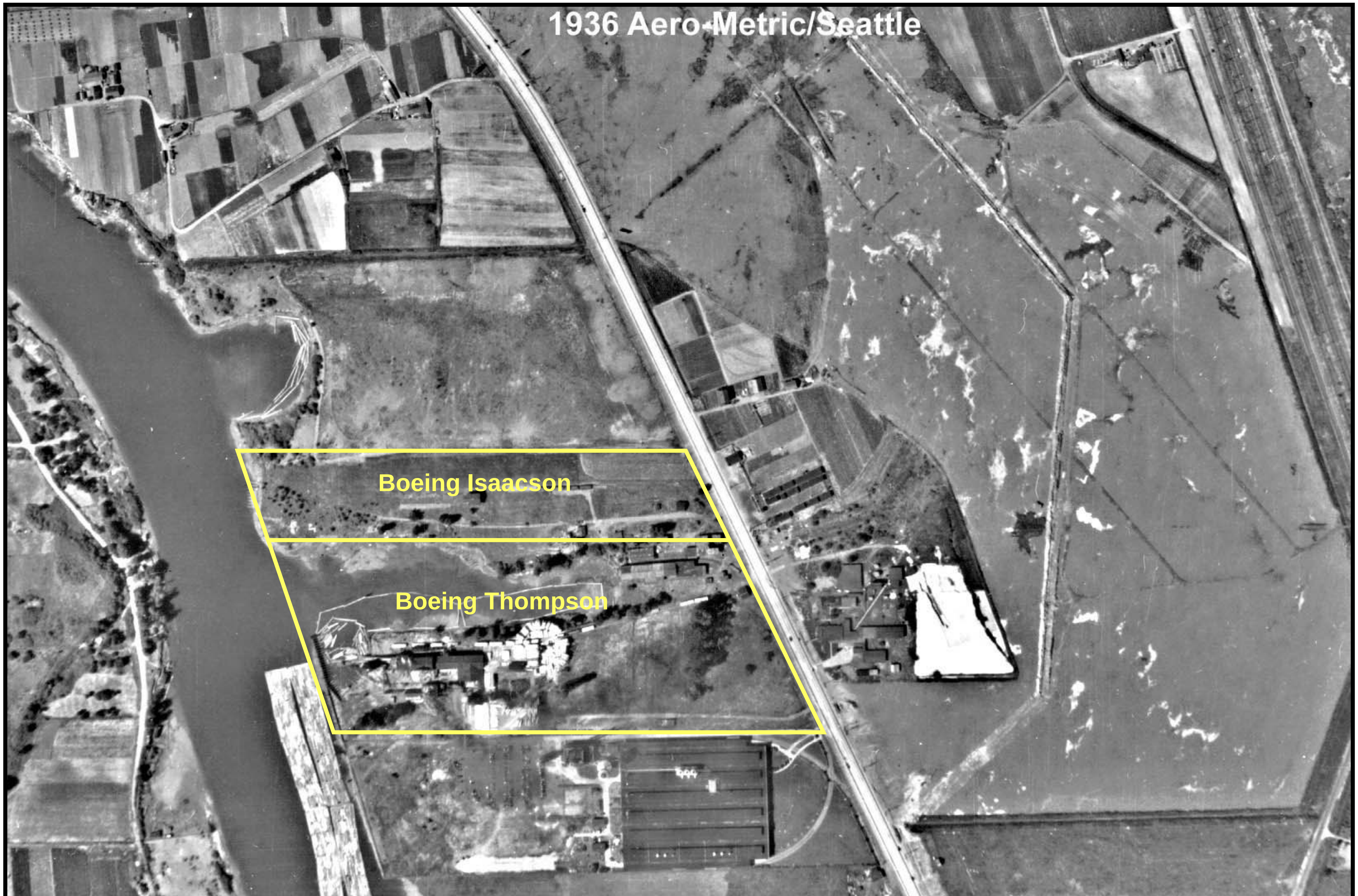
Early Action Area 6 - 1974 Aerial Photo

Early Action Area 6 - 1980 Aerial Photo

Early Action Area 6 - 1990 Aerial Photo

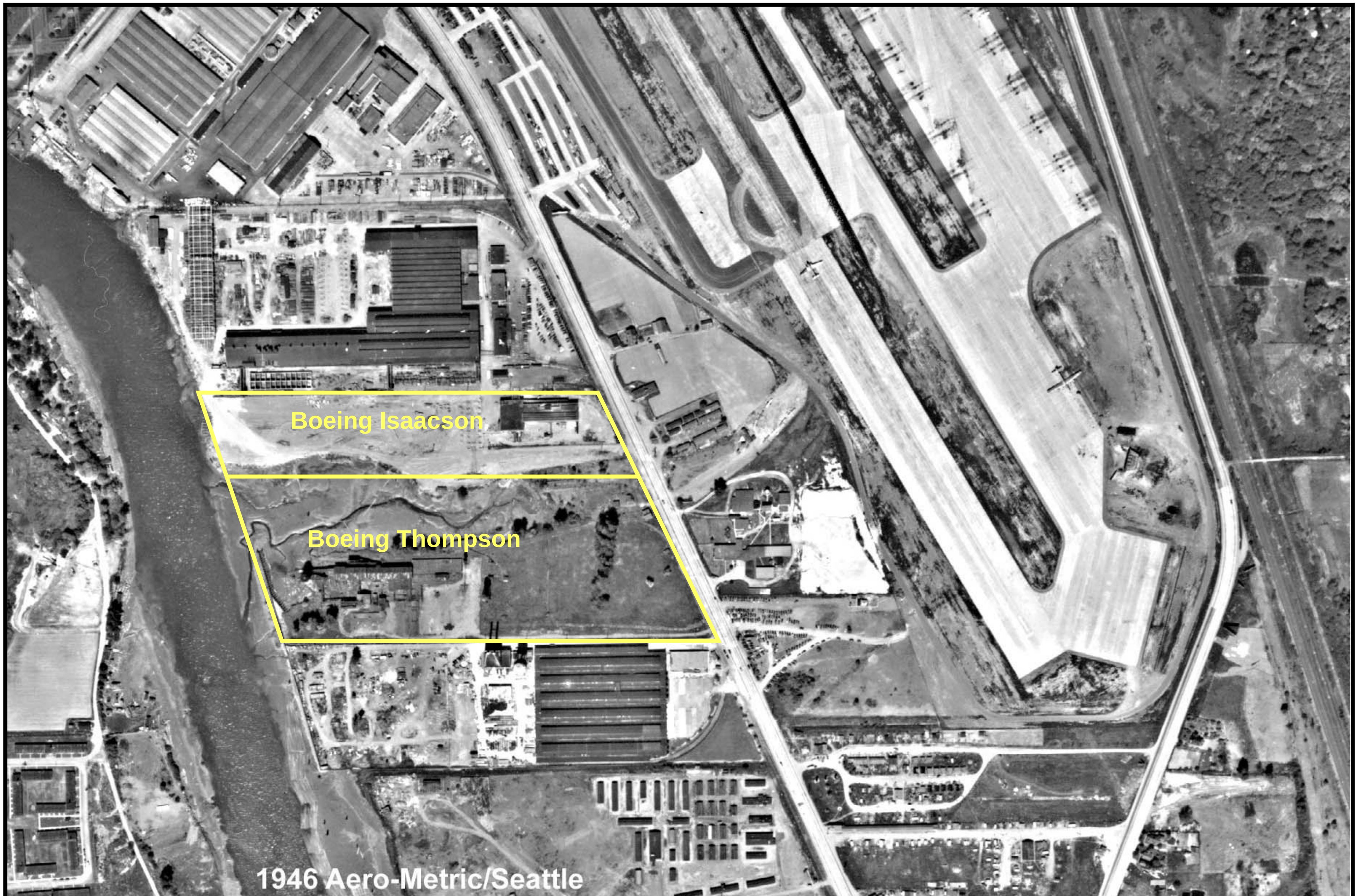
Early Action Area 6 - 1995 Aerial Photo

Early Action Area 6 - 2004 Aerial Photo



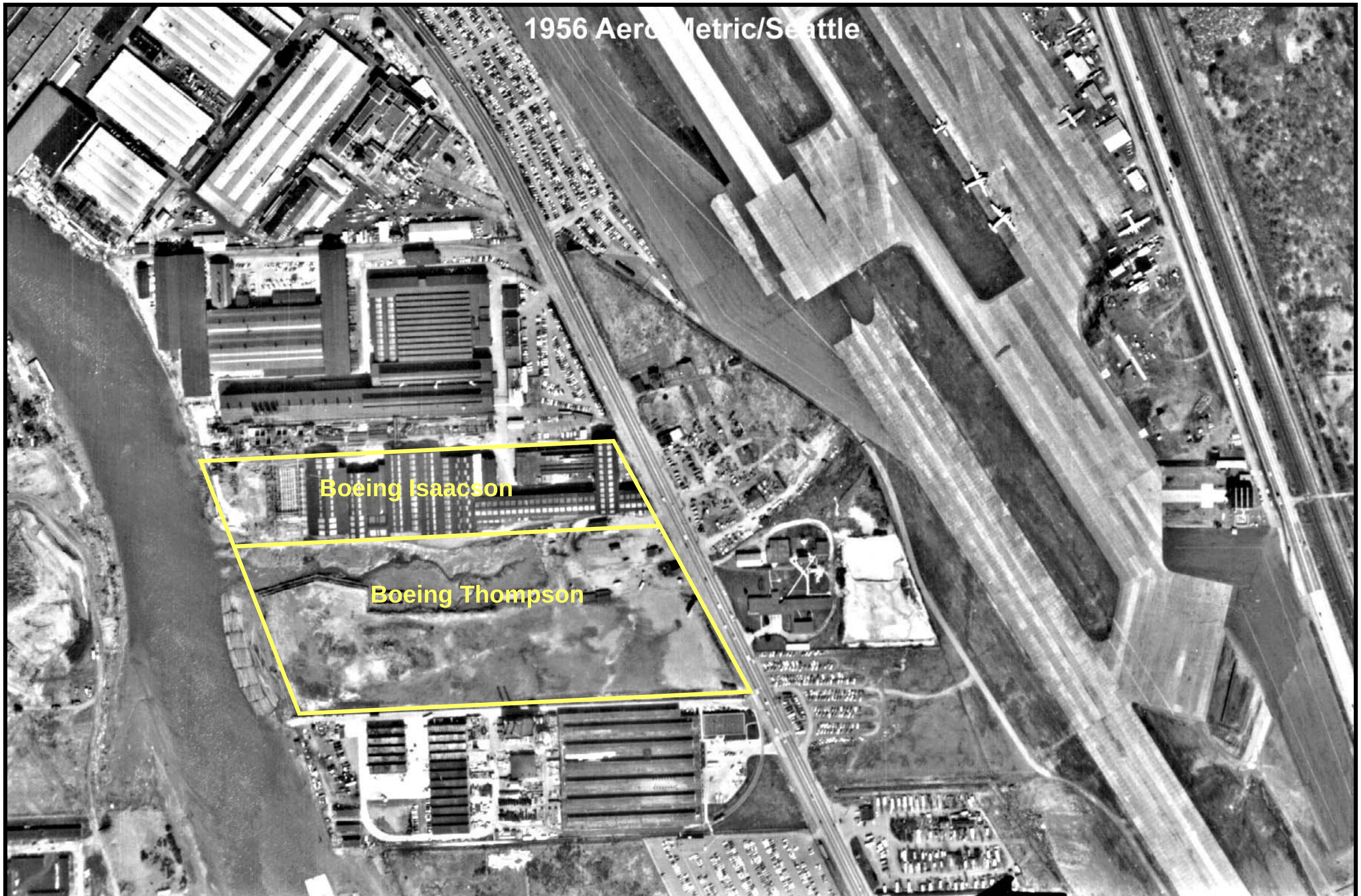
SAIC
From Science to Solutions

Early Action Area 6 — 1936 Aerial Photo



SAIC
From Science to Solutions

Early Action Area 6 — 1946 Aerial Photo



Early Action Area 6 — 1956 Aerial Photo

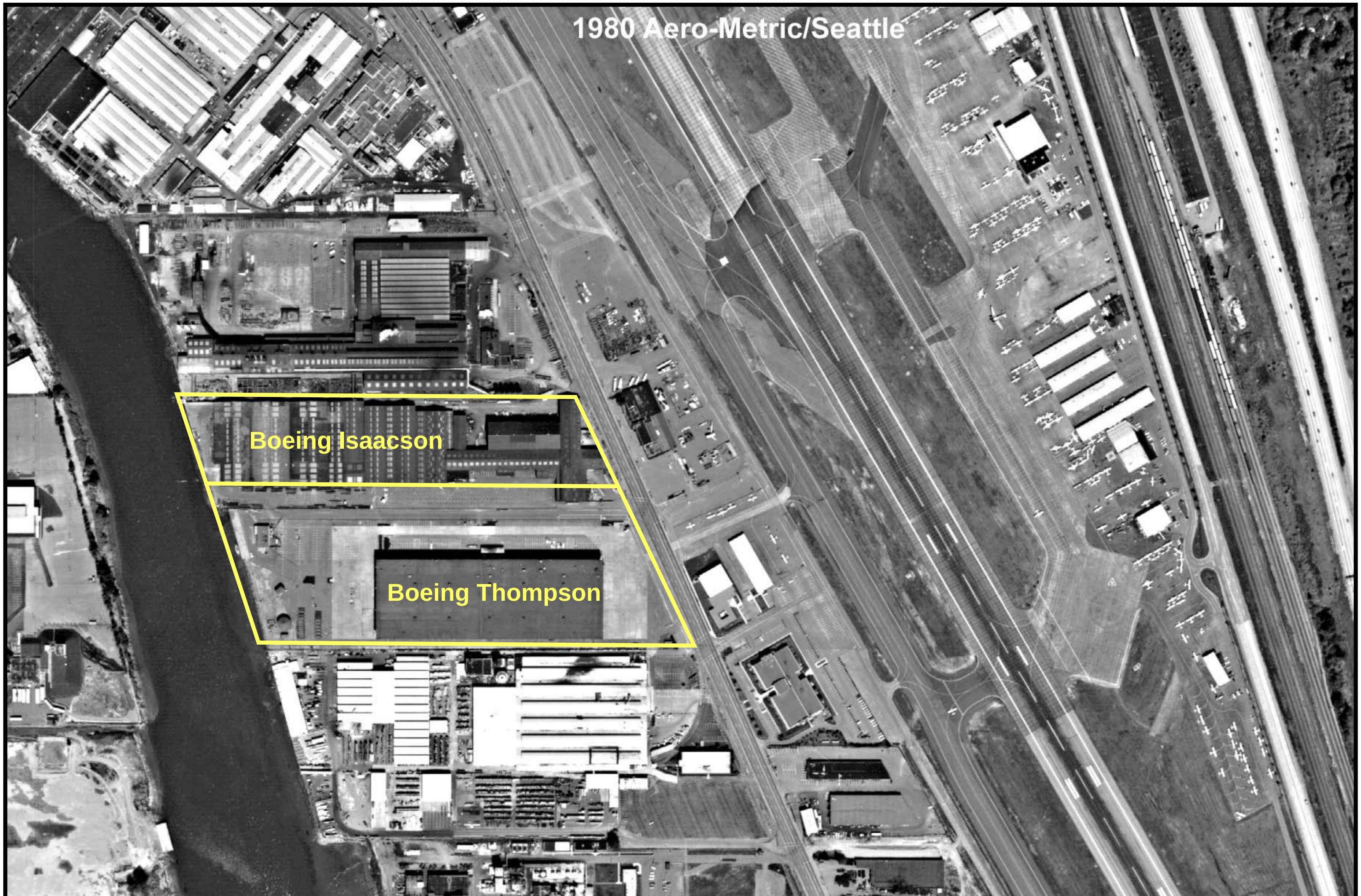
SAIC
From Science to Solutions

SAIC
From Science to Solutions

Early Action Area 6 — 1960 Aerial Photo

Early Action Area 6 — 1969 Aerial Photo

Early Action Area 6 — 1974 Aerial Photo

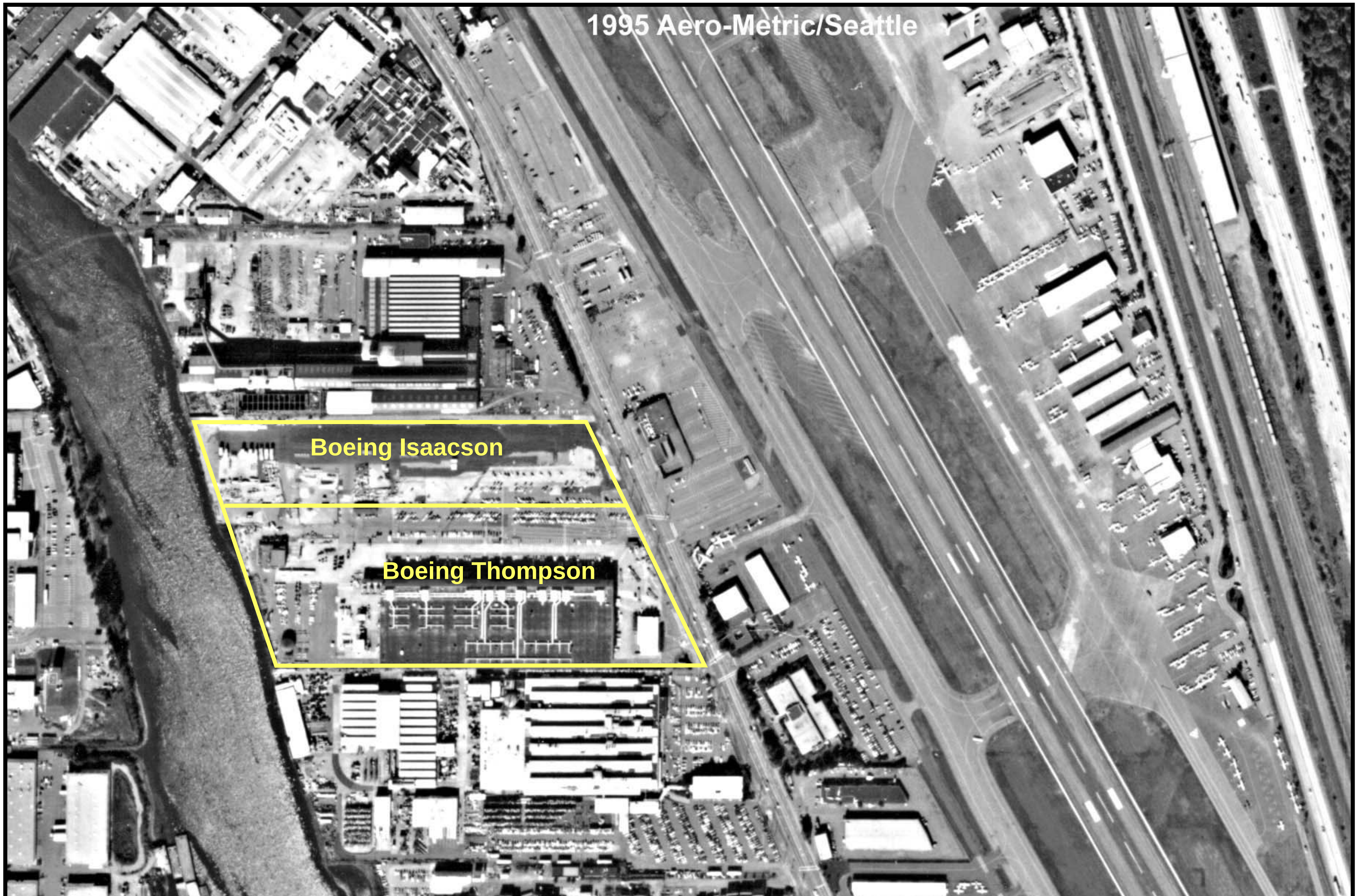


SAIC
From Science to Solutions

Early Action Area 6 — 1980 Aerial Photo

SAIC
From Science to Solutions

Early Action Area 6 — 1990 Aerial Photo



SAIC
From Science to Solutions

Early Action Area 6 — 1995 Aerial Photo

Early Action Area 6 — 2004 Aerial Photo

Appendix C
Selected Historical Data
Boeing Isaacson and
Boeing Thompson Properties

C-1. Dames & Moore 1983: Report of Evaluation of Site Contamination, Isaacson Steel Property

C-2. Wicks 1983: Evaluation of Potential Soil and Ground Water Contamination at the Isaacson Corporation Property, Seattle, Washington

C-3. Landau 1986: First Annual Report, Ground Water Monitoring Program, Boeing Isaacson Property

Landau 1987: Second Annual Report, Ground Water Monitoring Program, Boeing Isaacson Property

C-4. Landau 1988a: Data Report, Building 14-09, Thompson-Isaacson Site Investigation

Landau 1988b: Data Report 2, Building 14-09, Thompson-Isaacson Site Investigation

C-5. Landau 1990: Thompson-Isaacson Site, Soil Remedial Action Plan

C-6. Technical Dryer 1991: Thompson-Isaacson Site, Storm Drain Line and Soil Core Sampling, Summary Report

C-7. Landau 1992: Thompson-Isaacson Site, Full-Scale Soil Stabilization Program, Summary Report

C-8. ERM 2000a: Conceptual Proposal for No Further Action Determination at the Boeing Isaacson Property

C-9. ERM 2000d: Request for Groundwater NFA Determination, Hydrogeologic Investigation and Site-Specific Action Level for Arsenic in Groundwater, Boeing Isaacson Site, VCP ID# NW0453

C-10. Landau 2007: Sump Removal and Soil Excavation, Boeing Isaacson Property, Seattle, Washington

Appendix C-1

Dames & Moore 1983: Report of Evaluation of Site Contamination, Isaacson Steel Property

REPORT OF EVALUATION OF SITE CONTAMINATION
ISAACSON STEEL PROPERTY
FOR THE
BOEING AEROSPACE COMPANY

OCTOBER 4, 1983
0695-276-05

Dames & Moore

TABLE 1

RESULTS OF CHEMICAL ANALYSES OF SOIL SAMPLES[(a)]

Boring Number	Sample Number	Depth (feet)	PCBs (ppm)	Arsenic (ppm)	Barium (ppm)	Cadmium (ppm)	Chromium (ppm)	Total Cyanide (ppm)	Lead (ppm)	Mercury (ppm)	Nickel (ppm)	Selenium (ppm)	Silver (ppm)	Zinc (ppm)	Oil and Grease (ppm)	Total Organic Carbon (ppm)
1	2	5-1/2	<0.2	3.4	26.	0.03	11.	<3.	1.3	<0.03	9.5	--	<0.3	21.	—	--
2	1	2-1/2	--(b)	8.7	44.	0.12	20.	<3.	11.	0.08	16.	—	<0.3	37.	—	--
3	1	2-1/2	—	1,400.0	—	—	--	--	--	--	—	--	--	355.	1,040.(c)	5,400.
3	2	6-1/2	—	932.0	43.	0.35	12.	<3.	3.1	0.06	10.	—	<0.3	2,030.	—	—
3	3	10-1/2	<0.2	200.0	60.	0.20	16.	<3.	4.7	0.06	14.	—	<0.3	416.	1,850.	3,400.
4	1	2-1/2	—	270.5(c)	--	--	--	--	--	--	—	—	--	124.(c)	350.	2,400
4	2	6-1/2	<0.2	551.0	33.	0.06	11.	<3.	2.4	0.04	9.2	—	<0.3	40.	—	1,800.
4	3	10-1/2	—	15.0	--	--	--	--	--	--	—	--	--	132.	130.	1,500.
5	1	2-1/2	9.7(d)	33.0	650.	16.00	1,130.	<3.	1,170.	0.13	82.	—	2.5	2,270.	—	—
6-3	1	2	1.2(e)	18.0	520.	7.70	466.	<3.	580.	0.19	76.	—	2.5	2,320.	—	—
7-1	1	2-1/2	0.7(e)	12.0	59.	1.90	44.	<3.	230.	0.14	56.	—	1.2	1,640.	—	—
7-5	1	8-1/2	—	10.0	42.	0.76	15.	--	100.	0.12	34	0.73	0.9	877	—	—
7-5	2	13-1/2	<0.2	7.0	51.	0.26	21.	<3.	49.	0.05	17.	—	<0.3	77.	—	—
7-5	3	18-1/2	—	25.0	60.	1.10	32.	—	24.	0.24	25.	<0.20	0.8	194.	—	—
9	2	3	—	47.	63.	0.96	31.	<3.	16.	0.12	16.	—	0.6	80.	2,090.	—

(a) All test results are reported on a dry weight basis.
(b) Where no value is reported, the soil sample was not analyzed for that particular contaminant.
(c) Represents average of two values determined within one laboratory.
(d) Aroclor 1254.
(e) Aroclor 1260.

TABLE 1

Boring Number	Sample Number	Depth (feet)	PCBs (ppm)	Arsenic (ppm)	Barium (ppm)	Cadmium (ppm)	Chromium (ppm)	Total Cyanide (ppm)	Lead (ppm)	Mercury (ppm)	Nickel (ppm)	Selenium (ppm)	Silver (ppm)	Zinc (ppm)	Oil and Grease (ppm)	Total Organic Carbon (ppm)
10	2	6	--	20.0	--	--	--	--	--	--	--	--	--	59.5	130.	--
10(S)[f]	5	11	--	4.7	--	--	--	--	--	--	--	--	--	32.0	<100.	--
10(S)[f]	5	11	--	8.8	--	--	--	--	--	--	--	--	--	31.8	<69.	--
10	6	13-1/2	--	7.1	--	--	--	--	--	--	--	--	--	27.2	92.	--
11	2	6-1/2	--	2,880.0	--	--	--	--	--	--	--	--	--	301.0	<58.	--
11	4	11-1/2	--	1,210.0	--	--	--	--	--	--	--	--	--	261.0	649.	--
12	2	6-1/2	--	44.0	--	--	--	--	--	--	--	--	--	18.2	<57.	--
12(S)[f]	3	9	--	3.1	--	--	--	--	--	--	--	--	--	33.0	100.	--
12(S)[f]	3	9	--	13.0	--	--	--	--	--	--	--	--	--	28.5	173.	--
12	5	14	--	23.0	--	--	--	--	--	--	--	--	--	388.0	93.	--
13	4	9	--	7.2	--	--	--	--	--	--	--	--	--	25.0	110.	--
13	5	13-1/2	--	4.5[c]	--	--	--	--	--	--	--	--	--	102.5[c]	53.	--
14	1	2	--	41.0	33.	0.78	16.	--	69.	0.03	14.	<0.20	<0.30	73.9	210.	--
15(S)[f]	1	2	0.4	15.0	200	1.60	44.	--	490.	0.84	35.	0.60	0.24	440.0	900.	--
15(S)[f]	1	2	0.13[e]	11.0	135.	1.90	33.	--	200.	0.18	21.	0.24	0.54	272.0	2,020.	--
16	1	2-1/2	--	9.5	83.	1.90	45.	--	170.	0.04	88.	0.68	0.54	556.0	--	--
16	3	6-1/2	<0.1	5.3	24.	0.69	40.	--	36.	<0.03	20.	<0.20	<0.30	88.8	--	--
17(S)[f]	1	2-1/2	--	16.0	70	2.40	270.	--	280	<0.05	180.	0.60	0.36	390.	1,500.	--

(f) (S) designates split sample; both sets of data presented for correlation.

TABLE 1

Boring Number	Sample Number	Depth (feet)	PCBs (ppm)	Arsenic (ppm)	Barium (ppm)	Cadmium (ppm)	Chromium (ppm)	Total Cyanide (ppm)	Lead (ppm)	Mercury (ppm)	Nickel (ppm)	Selenium (ppm)	Silver (ppm)	Zinc (ppm)	Oil and Grease (ppm)	Total Organic Carbon (ppm)
17(S)[f]	1	2-1/2	<0.1	19.0	70	3.8	541	--	230	0.17	146	0.22	0.83	511.	--	--
17	3	6-1/2	--	7.4	149	5.1	62	--	396	0.05	108	0.96	3.0	3,640.	--	--
18	1	2	--	11.0	30	0.60	16	--	73	0.03	20	<0.20	<0.30	81.	107.	--
18	3	6-1/2	--	4.2[c]	25[c]	0.31[c]	11.5[c]	--	5.5[c]	0.04	8.5[c]	<0.20	<0.30	33.7[c]	<57.	--
19	1	1-1/2	<0.1	8.9	49	0.61	19	--	14	0.11	22	<0.20	<0.30	32.6	642.	--
19	2	3-1/2	0.28[e]	17.	75	1.5	180	--	323	0.03	281	0.28	1.4	289.	698.	--
19	4	9	--	36.0	63	2.9	835	--	220	<0.03	2,030	<0.20	2.8	300.	--	--
20	2	4	<0.1	5.3	28	0.40	19	--	8	<0.03	28	0.40	<0.30	26.8	73.	--
20	5	10-1/2	--	9.2	49	0.45	15	--	9	<0.03	19	0.75	<0.30	30.7	179.	--
20	6	14	--	18.0	71	0.68	19	--	93	4.3	15	0.31	<0.30	52.9	149.	--
21	1	1-1/2	<0.1	6.0	31	0.41	8.2	--	5.5	<0.03[c]	9.3	<0.20	<0.30	18.0	55.	--
21	4	8-1/2	--	5.2	18	0.30	8.5	--	4.0	<0.03	7.0	<0.20	<0.30	12.5	110.	--
22(S)[f]	2	4	0.05	3.8	50	0.10	23.	--	9.2	0.07	24.	<0.50	0.07	45.0	100.	--
22(S)[f]	2	4	<0.1	6.7	34	0.57	22	--	13	<0.03	27.	0.27	<0.30	70.2	165.	--
22	3	6-1/2	--	8.7	60.	1.30	48.	--	110.	0.06	26.	0.26	<0.30	268.	1,710.	--
Sump Sludge			--	39.0[c]	--	--	--	--	--	--	--	--	--	94,950.[c]	350,000	--

TABLE 2

RESULTS OF CHEMICAL ANALYSES OF WATER SAMPLES[a]

Boring Number	Antimony (mg/l)	Arsenic (mg/l)	Barium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Total Cyanide (mg/l)	Fluoride (mg/l)	Lead (mg/l)	Mercury (mg/l)	Nickel (mg/l)	Selenium (mg/l)	Silver (mg/l)	Phenol (mg/l)	Zinc (mg/l)	Total Organic Carbon (mg/l)
7	-[b]	0.028	0.39	<0.002	0.02	0.013	0	0.095	<0.001	0.01	-	<0.01	-	0.11	4.0
12	0.019	0.26	<0.25	0.0004	0.02	<0.003	0.24	0.001	<0.0002	-	0.003	0.0019	0.025	-	-
20(S)[c]	0.041	0.30	0.36	0.0036	0.13	<0.003	0.54	0.017	<0.0002	-	0.004	0.0081	0.016	-	-
20(S)	0.008	0.31	0.26	<0.002	0.031	<0.005	0.40	0.038	<0.001	-	<0.005	0.002	0.081	-	-
48-inch drain	0.017	0.008	<0.25	0.0008	0.033	0.005	0.37	0.023	<0.0002	-	0.004	0.0013	0.017	-	-

(a) All test results are reported on a dry weight basis.
(b) Where no value is reported, the water sample was not analyzed for that particular contaminant.
(c) (S) designates spilt sample; both sets of data are presented for comparison.

TABLE 3

RESULTS OF CHEMICAL ANALYSES OF SLAG SAMPLE[a]

		Parts per Million
MAJOR COMPONENTS		
Silica	SiO_2	-
Alumina	Al_2O_3	99,500
Iron	Fe_2O_3	123,000
Calcium	CaO	280,000
Magnesium	MgO	81,900
Sodium	Na_2O	3,800
Potassium	K_2O	750
Sulphur	SO_3	-
Loss on Ignition	L.O.I.	-
TRACE COMPONENTS		
Antimony	Sb	<15
Arsenic	As	<30
Barium	Ba	1,350
Beryllium	Be	<0.3
Bismuth	Bi	<50
Boron	B	<1.0
Cadmium	Cd	<2.5
Chromium	Cr	4,330
Cobalt	Co	<2.0
Copper	Cu	62
Lead	Pb	105
Manganese	Mn	70,000
Molybdenum	Mo	42.2
Nickel	Ni	275
Phosphorus	PO_4	9,520
Silver	Ag	<3.0
Strontium	Sr	240
Tim	Sn	8.1
Titanium	Ti	3,980
Tungsten	W	-
Uranium	U	-
Vanadium	V	1,270
Zinc	Zn	280

(a) Results were obtained by plasma spectrographic analysis; sample preparation: ground, digested, with $HNO_3/HClO_4/HF/HCl$.

Appendix C-2

Wicks 1983: Evaluation of Potential Soil and Ground Water Contamination at the Isaacson Corporation Property, Seattle, Washington

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EVALUATION OF POTENTIAL
SOIL AND GROUND WATER CONTAMINATION
AT THE ISAACSON CORPORATION PROPERTY
SEATTLE, WASHINGTON

December 21, 1983

Submitted to:

Isaacson Corporation
8620 East Marginal Way South
Seattle, WA 98108

and

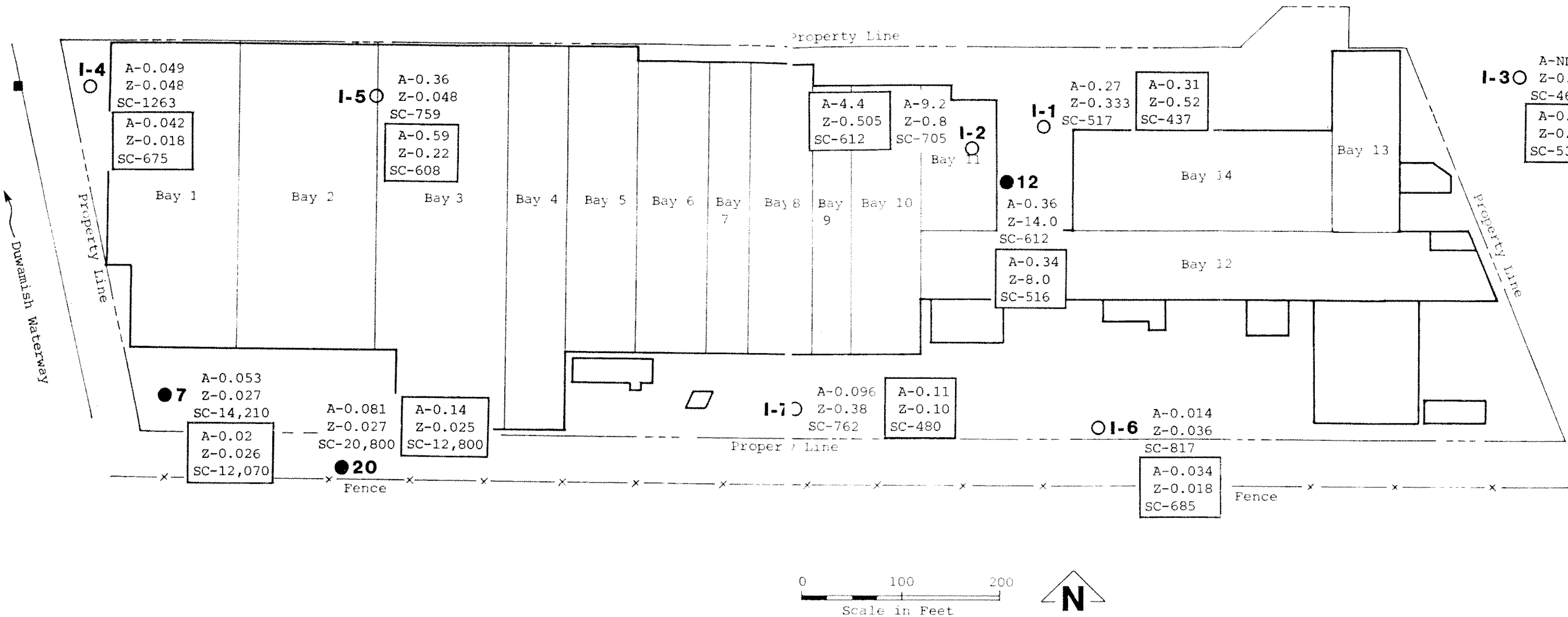
Graham & Dunn
Attorneys-at-Law
1301 Fifth Avenue
Seattle, WA 98101

Submitted by:

Patrick H. Wicks, P.E.
Consultant in Hazardous Waste Management
2535 - 152nd N.E., Suite A
Redmond, WA 98052

In association with

Sweet, Edwards & Associates, Inc.
P.O. Box 328
Kelso, WA 98626



EXPLANATION

A- Arsenic concentration (mg/l)

Z- Zinc concentration (mg/l)

SC- Specific Conductivity (µmho/cm)

7 ● Monitoring well: Previous study

I-1 ○ Monitoring well: Present study

Notes:

1. First water quality data is based on lab results from 10/25/83 and 10/26/83 sampling run.
2. Second sampling run is from 12/9/83 and 12/10/83 (results enclosed by box in this figure).

Figure 9

Isaacson Corporation

ARSENIC, ZINC and SPECIFIC CONDUCTIVITY Ground Water Data

Patrick H. Wicks
CONSULTANT IN HAZARDOUS WASTE MANAGEMENT
In association with:
Sweet, Edwards & Associates, Inc. • P.O. Box 328 • Kelso, WA 98626

TABLE 1. SUMMARY OF SOIL AND FILL ANALYSES DATA[1]

BORING NUMBER	SAMPLE DEPTH FT	SAMPLE[2] NUMBER S-E	SAMPLE[2] NUMBER LAB	TOTAL METALS ANALYSES,[3] ppm: Arsenic As	Barium Ba	Cadmium Cd	Total Chromium Cr	Copper Cu	Lead Pb
I-1	2.5- 3.5	S-2	12	8	--	--	39	21	9.
	5.0- 8.0	S-4	1	1300	--	--	25	1400	97
	10.0-11.5	S-7	2	1000	--	--	25	2400	23
	13.0-14.5	S-9	13	9	--	--	9.5	520	6.
I-2	4.0- 7.0	S-3	3	290	--	--	70	390	39
	7.0- 8.5	S-4	14	1100	--	--	23	450	440
	8.5-10.0	S-5	4	3800	--	--	26	450	32
	13.5-15.0	S-6	15	1200	--	--	9.3	420	4.
I-3	9.5-11.0	S-2	10	11	--	--	47	45	36
I-4	3.0	TP-2	5	510	--	--	16	280	150
I-5	3.0	TP-2	6	130	--	--	29	90	21
I-6	9.0-11.0	TP-5	7	79	--	--	540	390	150
I-7	2.0- 4.0	TP-1	8	30	89	2	580	360	3900
	4.0- 6.0	TP-2	11	23	--	--	740	340	630
I-4 & I-6	Slag Composite		9	18	440	2.2	1300	430	240
I-4	Slag		16	120	--	--	920	370	630
I-6	Slag		17	33			2200	1200	1400
I-7	Slag		18	26			1700	160	120

DATA FROM PREVIOUS EVALUATION

BORING[5] NUMBER	BORING NUMBER	SAMPLE DEPTH ft	TOTAL METALS ANALYSES, ppm: Arsenic As	Barium Ba	Cadmium Cd	Total Chromium Cr	Copper Cu	Lead Pb
I-1	11	6.5	2880	--	--	--	--	--
I-1	11	11.5	1210	--	--	--	--	--
I-2	3	6.5	932	43	0.4	12	--	3.
	12	6.5	44	--	--	--	--	--
I-2	3	10.5	200	60	0.2	16	--	4.
	4	10.5	15	--	--	--	--	--
	12	9.0	31-13	--	--	--	--	--
I-4	6	2.0	18	520	8	466	--	580
I-5	9	3.0	47	63	1	31	--	16
I-6	19	9.0	36	63	3	835	--	220
I-7	5	2.5	33	650	16	1130	--	1170
Slag			ND	1350	ND	4330	62	105

TABLE 1. SUMMARY OF SOIL AND FILL ANALYSES DATA[1]

SAMPLE[2] NUMBER S-E	LAB	EP TOXICITY ANALYSES,[4] mg/l Arsenic As	Barium Ba	Cadmium Cd	Total Chromium Cr	Hexaval. Chromium Cr(VI)	Lead Pb	Mercury Hg	Selenium Se	Silver Ag
S-2	12	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-4	1	7.8	ND	ND	ND	ND	ND	ND	ND	ND
S-7	2	7.3	ND	ND	ND	ND	ND	ND	ND	ND
S-9	13	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-3	3	--	--	--	--	--	--	--	--	--
S-4	14	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-5	4	--	--	--	--	--	--	--	--	--
S-6	15	ND	ND	ND	ND	ND	ND	ND	ND	ND
S-2	10	--	--	--	--	--	--	--	--	--
TP-2	5	--	--	--	--	--	--	--	--	--
TP-2	6	--	--	--	--	--	--	--	--	--
TP-5	7	--	--	--	--	--	--	--	--	--
TP-1	8	ND	ND	.02	0.1	ND	6.1	ND	ND	ND
TP-2	11	ND	ND	ND	ND	ND	ND	ND	ND	ND
osite	9	ND	ND	ND	ND	ND	ND	ND	ND	ND
	16	ND	ND	ND	ND	ND	ND	ND	ND	ND
	17	ND	ND	ND	ND	ND	ND	ND	ND	ND
	18	ND	ND	ND	ND	ND	ND	ND	ND	ND
EP TOXICITY ANALYSES, MAXIMUM CONCENTRATION LIMIT,[6] mg/l		5	100	1	5(EPA)	5(DOE)	5	0.2	1	5

(1) -- denotes analysis not performed.

(2) S-E column lists sample numbers assigned by Sweet, Edwards and Associates as samples were taken in the field. LAB column lists sample numbers assigned by the laboratory.

(3) Dry weight basis.

(4) ND denotes non-detectible above detection limit; for laboratory sample numbers 1, 2, 8, and 9, EP toxicity analyses lower detection limits are: As, 0.5; Ba, 0.5; Cd, 0.01; Cr. 0.1; Cr(VI), 0.1; Pb, 0.2; Hg, 0.005; Se, 0.5; Ag, 0.1. For laboratory sample numbers 11 through 18, EP toxicity analyses lower detection limits of detection are: As, 0.2; Ba, Cd, CrVI, Pb, and Hg are same as above; Se, 0.1; Ag, 0.2.

(5) Borings in this evaluation which are nearest to borings in previous evaluation.

(6) Soil/fill analyses results exceeding any one of these maximum concentration limits classifies that soil/fill as a hazardous waste under EPA regulations and/or as dangerous waste under DOE regulations.

TABLE 2. SUMMARY OF WATER QUALITY DATA

DATA SOURCE	LOCATION	Arsenic As 10/83	Arsenic As 12/83	Total Chromium Cr 10/83	Total Chromium Cr 12/83	Copper Cu 10/83	Copper Cu 12/83	Nickel Ni 10/83	Nickel Ni 12/83	Lead Pb 10/83	Lead Pb 12/83	Zinc Zn 10/83	Zinc Zn 12/83
		mg/l(4)											
(1)	Background	<0.005		<0.02		≤0.016		≤0.052		<0.005		≤0.032	
This evaluation (October through December 1983)	I-3 (background)	ND	0.010	ND	0.010	0.004	ND	ND	0.01	ND	--	0.05	0.010
	SITE WELLS												
This evaluation (October through December 1983)	[I-1	0.27	0.31	ND	ND	0.049	0.027	ND	0.01	ND	ND	0.27	0.52
	[I-1 (S)	0.235	--	0.0043	--	0.062	--	0.005	--	0.003	--	0.333	--
	[I-2	9.2	4.4	0.01	ND	0.016	0.008	0.03	0.02	ND	ND	0.8	0.18
	[I-2 (S)	--	3.0	--	0.0109	--	0.008	--	0.044	--	0.004	--	0.505
	[12	0.36	0.34	ND	ND	0.7	0.47	0.06	0.04	ND	ND	14.0	8.0
	[I-6	0.014	0.034	ND	ND	ND	ND	ND	0.01	ND	ND	0.036	0.018
	[I-7	0.096	0.11	ND	ND	0.026	ND	ND	ND	ND	ND	0.38	0.10
	[I-7 (S)	--	0.0085	--	0.0081	--	0.004	--	ND	--	0.003	--	0.058
This evaluation (October through December 1983)	[I-5	0.36	0.59	ND	ND	0.004	ND	ND	ND	ND	ND	0.048	0.22
	[I-4	0.041	0.042	ND	ND	ND	ND	ND	ND	ND	ND	0.041	0.018
	[I-4 (S)	0.049	--	0.0041	--	0.003	--	0.003	--	0.004	--	0.048	--
	[20	0.056	0.14	ND	0.030	0.06	0.013	ND	0.04	0.03	ND	ND	0.025
	[20 (S)	0.081	--	0.0416	--	0.034	--	0.005	--	0.002	--	0.027	--
	[7	0.053	0.020	ND	0.029	0.005	0.011	ND	0.04	0.002	ND	0.027	0.026
Previous Evaluation (August to October 1983)	[12	0.26		0.0		--		--		0.001		--	
	[20	0.30(5)		0.1(5)		--		--		0.017		--	
	[20 (S)	0.31(5)		0.01		--		--		0.038		--	
	[7	0.028		0.0		--		0.01		0.095(5)		0.11	
STANDARDS(2)													
Primary Drinking Water Standard		0.05		0.0		--		--		0.05		--	
Secondary Drinking Water Standard		--		--		1.0		--		--		5.0	
	DUWAMISH RIVER												
This evaluation (October 1983)	[Allentown - 10/14	ND	--	0.005	--	--	--	--	--	ND	--	0.023	--
	[Bridge - 10/25	ND	--	ND	--	0.049	--	--	--	ND	--	0.007	--
	[16th Ave. S. - 10/14	ND	--	0.016	--	--	--	--	--	ND	--	0.028	--
	[Bridge - 10/25	ND	--	0.11	--	--	--	--	--	0.003	--	0.017	--
(3)	[Allentown - Mean	0.0035		0.036		0.0126		0.02		0.034		0.0106	
	[- Max	0.009		0.0		0.023		0.02		0.06		0.02	
	[16th Ave. S. - Mean	0.004		0.06		0.0125		0.058		0.052		0.0134	
	[- Max	0.012		0.0		0.02		0.14		0.1		0.026	

TABLE 2. Continued

FOOTNOTES

1. These data are from a ground water evaluation performed at a location approximately 2.2 miles north in 1982 and 1983. Accordingly, they do not represent background, but do give a measure of ground water in the vicinity that may be uncontaminated."
2. Primary drinking water standards are based on human health considerations, as adopted through 1983. Secondary drinking water standards are based on aesthetics not health considerations; accordingly, values at or somewhat above these standards are considered safe to humans in drinking water, but may be displeasing to the taste/odor.
3. Metro has collected water quality data on the Duwamish River for 10 years. The values shown in this table are for the October data over the 10-year period of record, except for Arsenic. Arsenic analyses have not been performed by Metro. Accordingly, the values shown for Arsenic are from limited data available from other sources and as collected as part of this evaluation. The Arsenic data reported here for the 16th Avenue South Bridge are actually for 2-6 km from the river mouth, and the Arsenic data reported here for the Allentown Bridge are for 7-10 km from the river mouth.
4. Detection limits used for water analysis reported in this table which were performed during this evaluation are as follows:

	mg/1		
	Non-Split Samples		Split Samples(S)
	10/83	12/83	
Arsenic	0.005	0.005	0.001
Barium	0.02	---	---
Cadmium	0.001	---	---
Chromium	0.005	0.008	0.0005
Copper	0.004	0.004	0.001
Nickel	0.01*	0.01	0.001
Lead	0.001	0.005	0.001
Zinc	0.03	0.005	0.01

*Except for B-20 and field blank, where detection limit was 0.03 mg/1.

-- Denotes analysis not performed.

5. These heavy metal concentrations are not considered to be representative of in-situ ground water quality because the samples were reportedly not field filtered prior to being placed in the acide fixed sample bottle. See report RESULTS, Ground Water Quality section for detailed discussion.

Appendix C-3

Landau 1986: First Annual Report, Ground Water Monitoring Program, Boeing Isaacson Property

Landau 1987: Second Annual Report, Ground Water Monitoring Program, Boeing Isaacson Property

829 X

FIRST ANNUAL REPORT
GROUND WATER MONITORING PROGRAM
BOEING ISAACSON PROPERTY
8541 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON

Prepared by

Landau Associates, Inc.

for

The Boeing Company

Seattle, Washington

June 1986

LANDAU ASSOCIATES

MONITORING WELL LOCATIONS

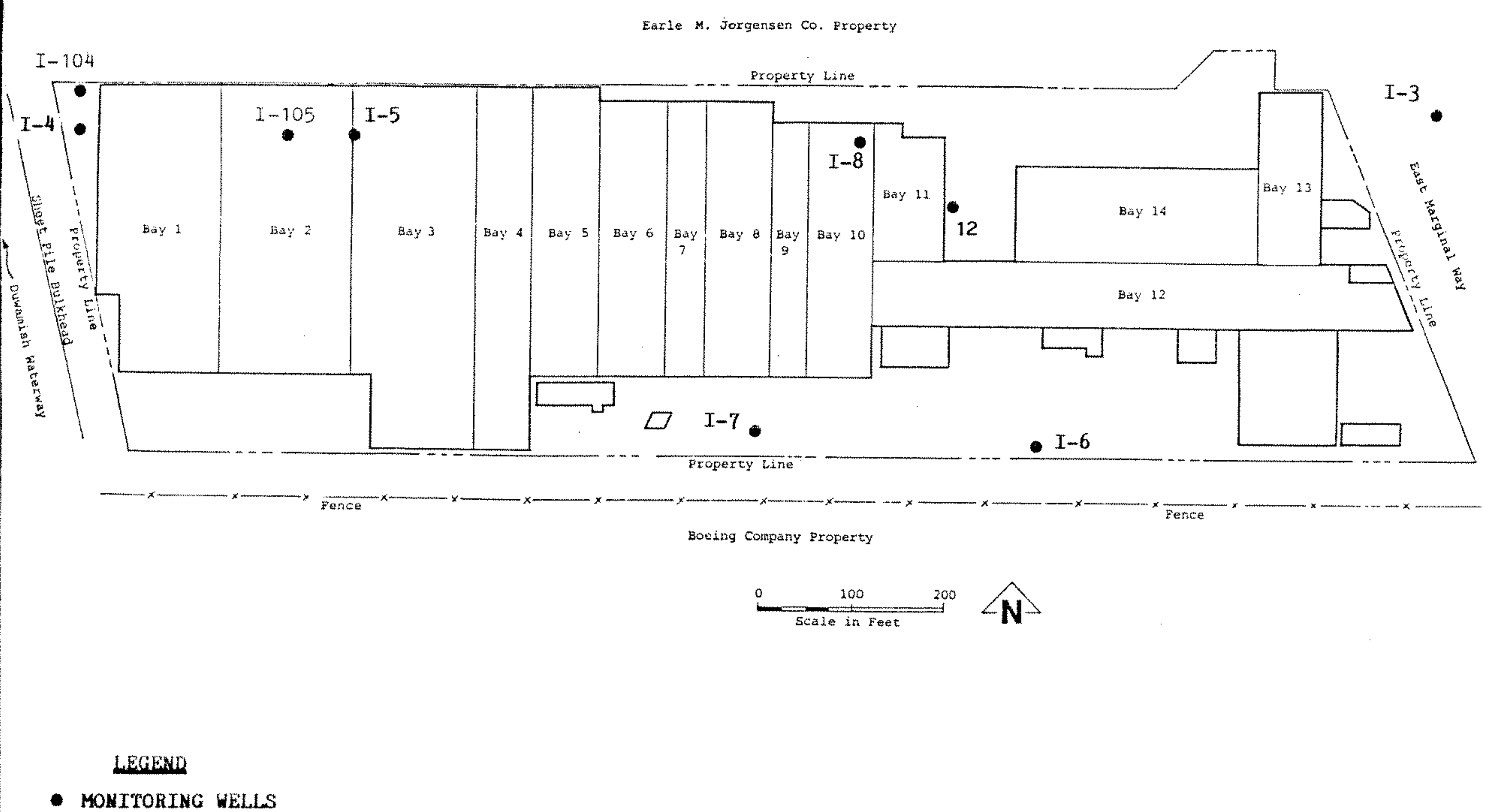


Figure 2

TABLE I

ARSENIC CONCENTRATIONS

IN GROUND WATER

ISAACSON PROPERTY[a]

Well	10/83[b]	12/83[b]	6/85	12/85
I-3	ND[c]	0.01	<0.005 (0.015)[d]	<0.005 (0.012)
I-4	0.041	0.042	----[e]	----
I-104	----	----	----	0.005 (0.018)
I-5	0.36	0.59	----	----
I-105	----	----	----	1.2 (2.4)
I-6	0.014	0.034	----	0.005 (0.048)
I-7	0.096	0.11	0.080 (0.11)	0.025 (0.11)
I-8	----	----	----	0.021 (0.21)
B-12	0.36	0.34	0.31 (0.62)	0.022 (1.2)

(a) Expressed in mg/l (parts per million); all values are for dissolved arsenic unless otherwise denoted.
(b) From Wicks (1983).
(c) ND denotes Non-Detectable.
(d) X(Y): X = dissolved arsenic, and (Y) = total arsenic.
(e) --- denotes analysis not performed.

SECOND ANNUAL REPORT
GROUND WATER MONITORING PROGRAM

BOEING ISAACSON PROPERTY
8541 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON

Prepared by

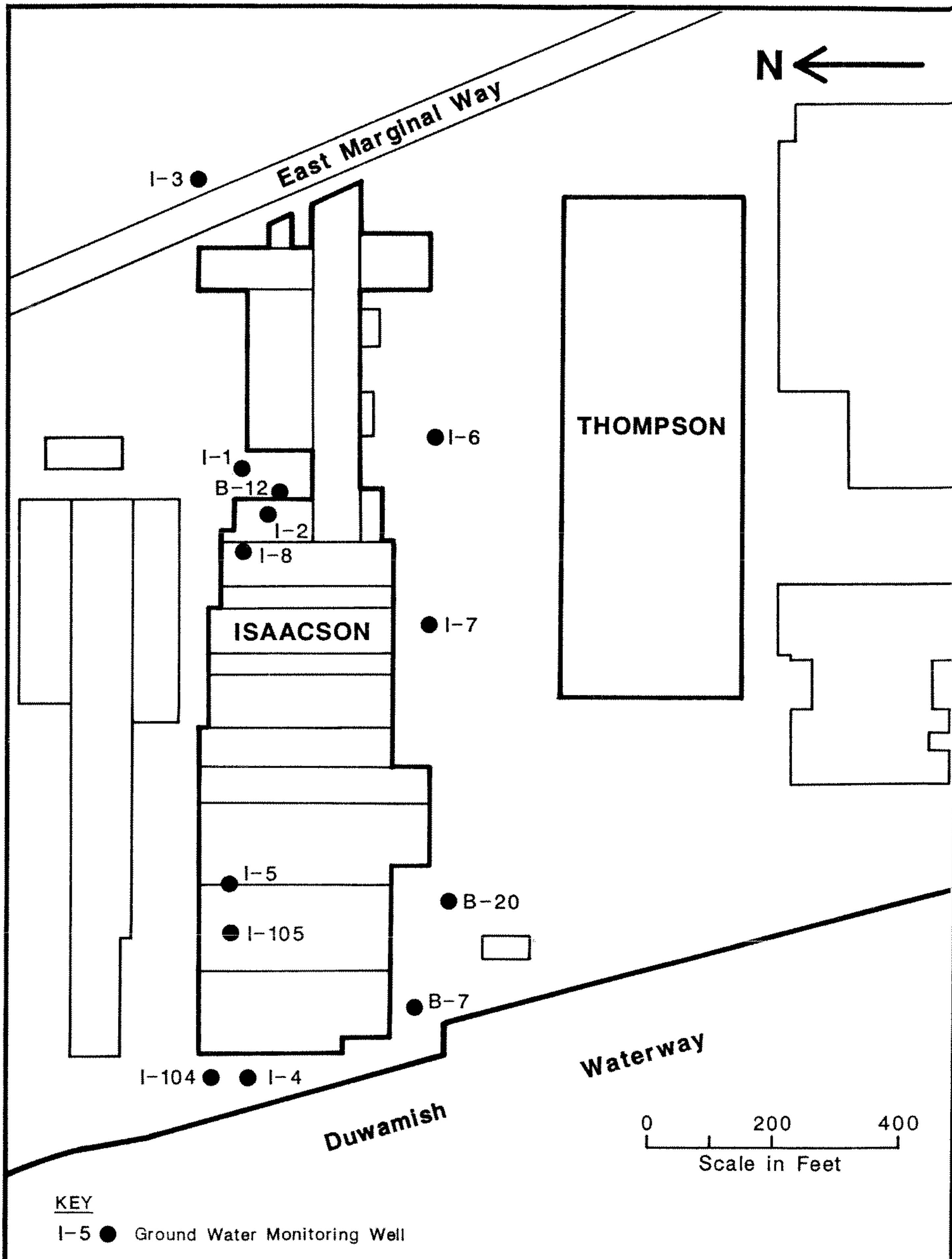
Landau Associates, Inc.

for

The Boeing Company

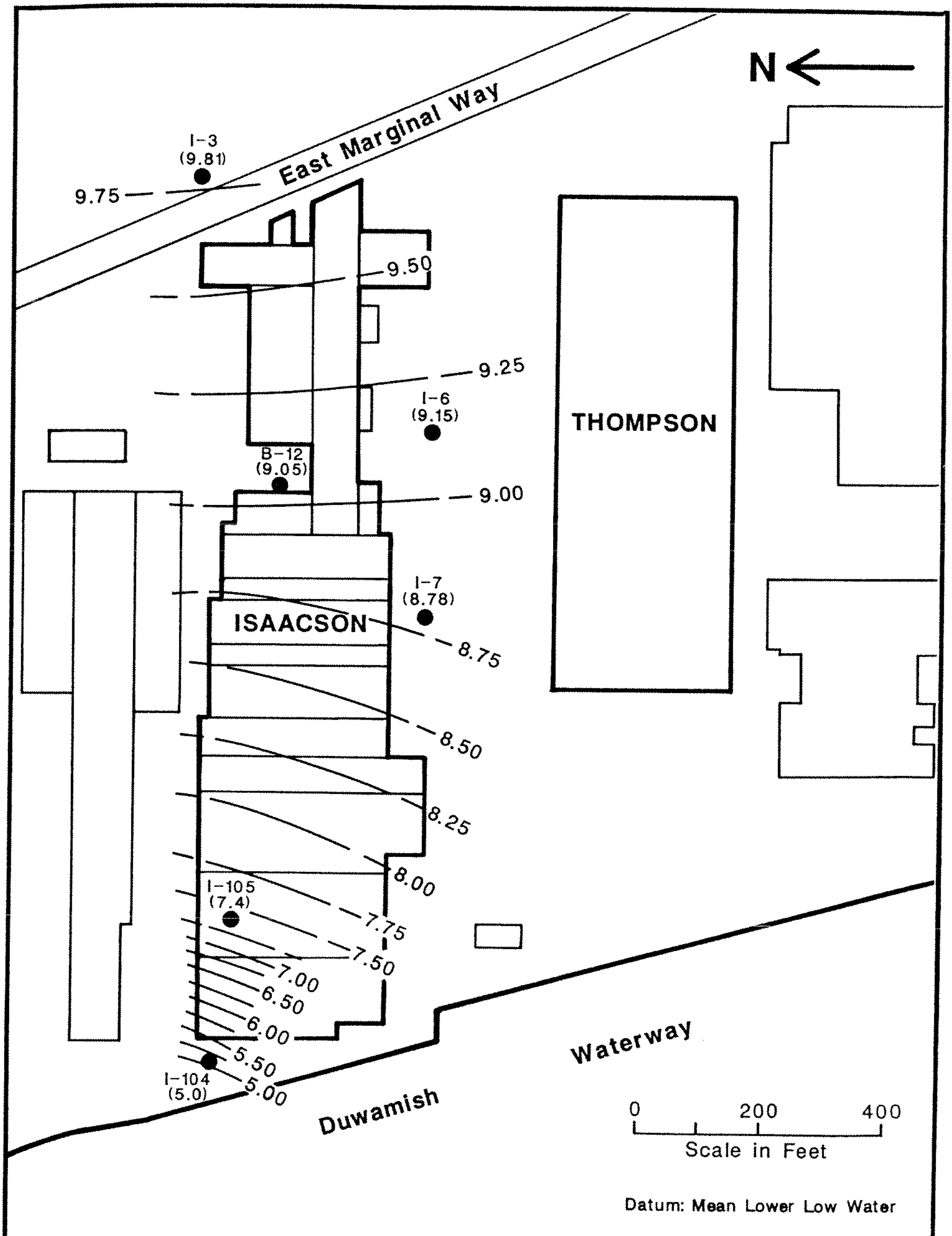
Seattle, Washington

29 May 1987



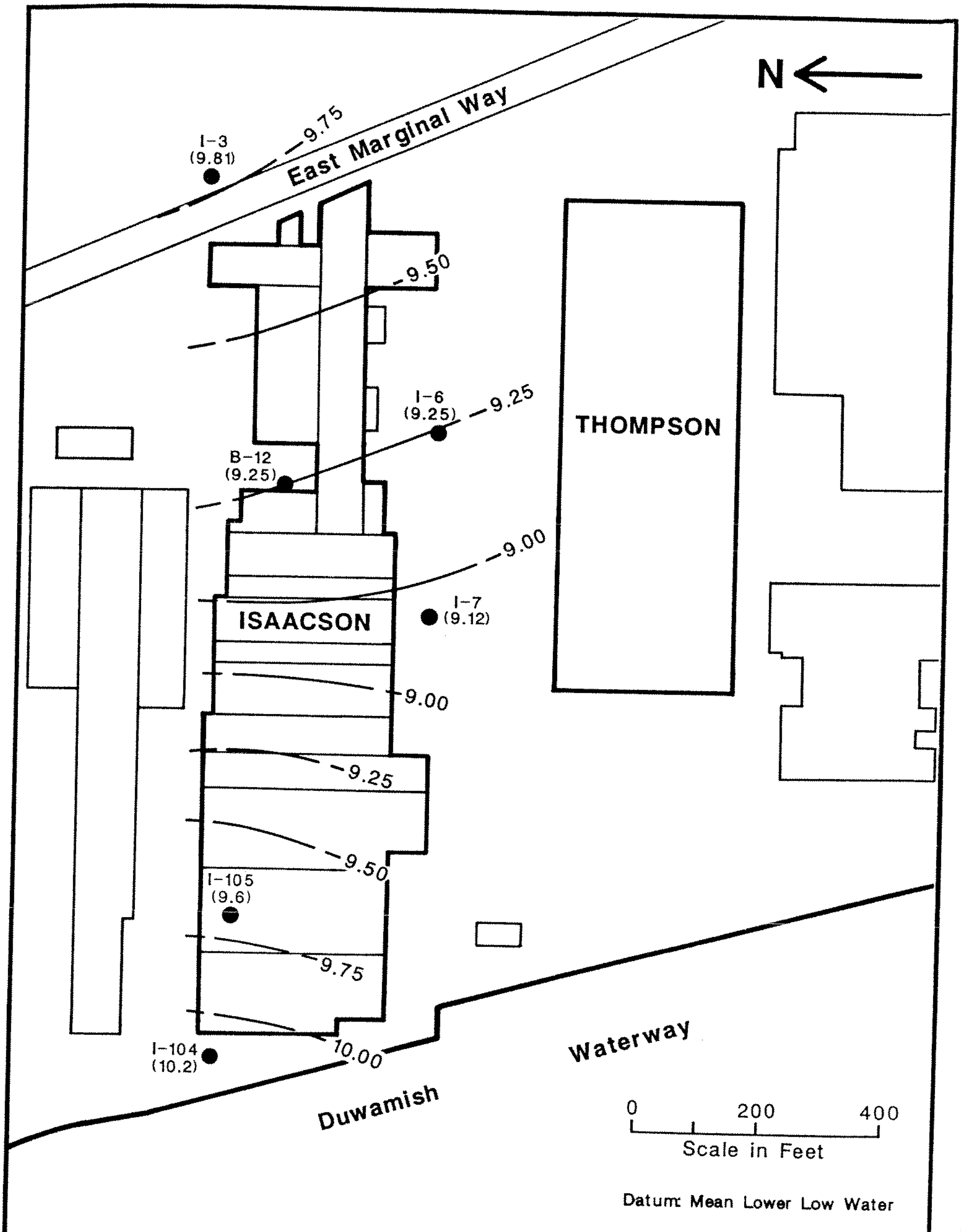
LANDAU ASSOCIATES, INC. | Site Map

Figure 2



LANDAU ASSOCIATES, INC.	Water Level Contours Low Tide

Figure 3



LANDAU ASSOCIATES, INC.	Water Level Contours High Tide

TABLE 3
ARSENIC CONCENTRATIONS
IN GROUND WATER
ISAACSON PROPERTY [(a)]

Well	8/83 (b)	10/83 (b)	12/83 (b)	6/85	12/85	7/86	1/87	Average
I-1	---- (c)	0.27	0.31	----	----	----	----	0.29
I-2	----	9.2	4.4	----	----	----	----	6.8
I-3	----	<0.005 (d)	0.01	<0.005 (0.015) (e)	<0.005 (0.012)	<0.005 (0.014)	<0.005 (0.027)	0.006 (0.017)
I-4	----	0.041	0.042	----	----	----	----	0.042
I-104	----	----	----	----	0.005 (0.018)	<0.005 (<0.005)	<0.005 (0.006)	0.005 (0.01)
I-5	----	0.36	0.59	----	----	----	----	0.48
I-105	----	----	----	----	1.2 (2.4)	0.48 (1.5)	4.3 (4.3) (f)	1.99 (2.73)
I-6	----	0.014	0.034	----	0.005 (0.048)	0.007 (0.087)	0.006 (0.024)	0.013 (0.053)
I-7	----	0.096	0.11	0.080 (0.11)	0.025 (0.11)	0.050 (0.15)	0.045 (0.080)	0.068 (0.11)
I-8	----	----	----	----	0.021 (0.21)	0.019 (0.24)	0.008 (0.050)	0.016 (0.17)
B-7	(0.028)	0.053	0.020	----	----	----	----	0.037 (0.028)
B-12	(0.26)	0.36	0.34	0.31 (0.62)	0.022 (1.2)	0.51 (1.0)	0.27 (0.64)	0.302 (0.74)
B-20	(0.30)	0.056	0.14	----	----	----	----	0.098 (0.30)

(a) Expressed in ppm (parts per million); all values are for dissolved arsenic unless otherwise denoted.
(b) From Wicks (1983).
(c) --- denotes analysis not performed.
(d) <Denotes "less than."
(e) X(Y): X = dissolved arsenic, and (Y) = total arsenic.
(f) Reanalysis of this sample indicated total arsenic values of 4.7 and 4.2 ppm. See Appendix B, Laucks #2700 and Brown & Caldwell #E87-03-147.

Appendix C-4

Landau 1988a: Data Report, Building 14-09, Thompson-Isaacson Site Investigation

Landau 1988b: Data Report, Building 14-09, Thompson-Isaacson Site Investigation

848 X

Data Report

BUILDING 14-09

THOMPSON-ISAACSON SITE INVESTIGATION

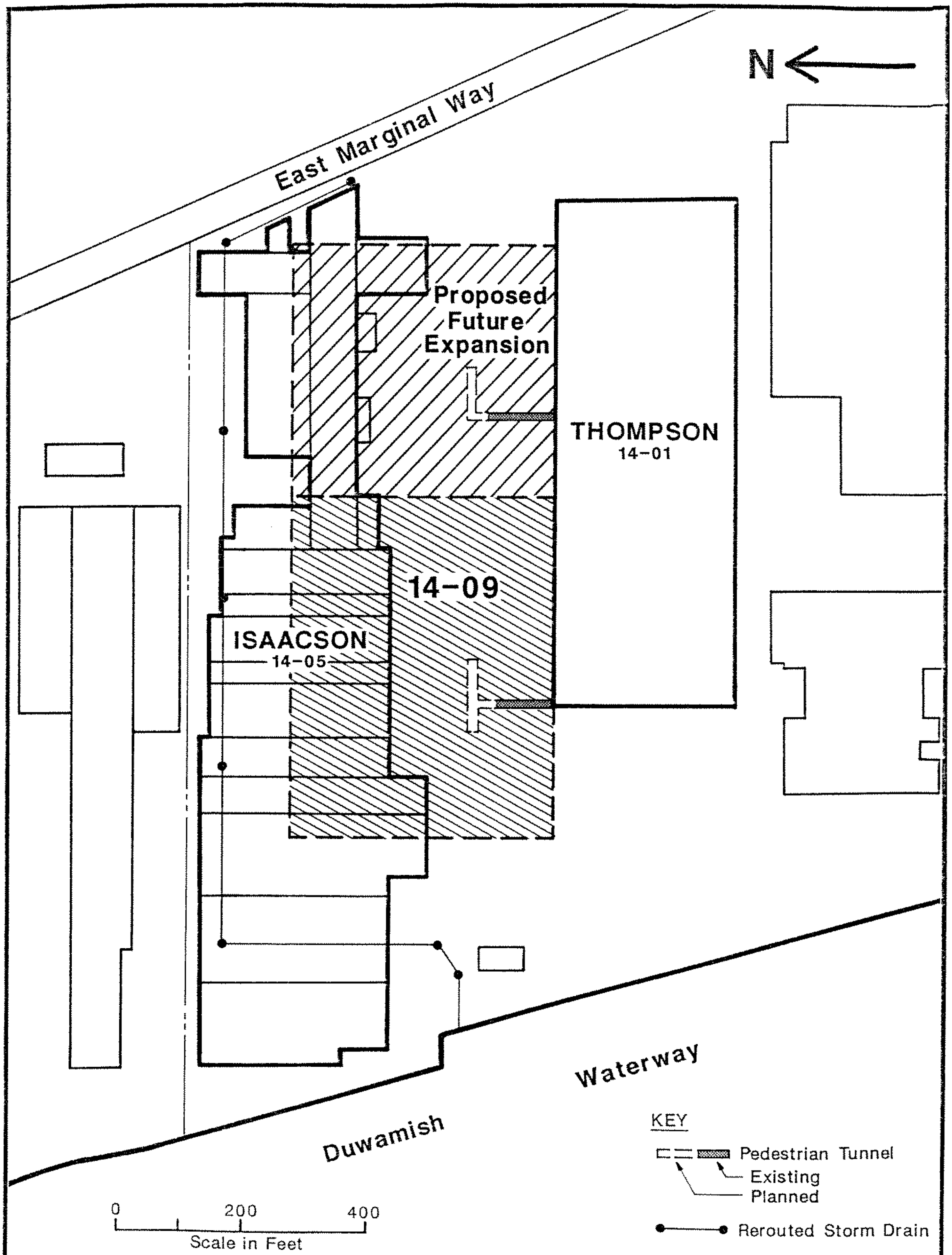
Prepared for

The Boeing Company

Prepared by

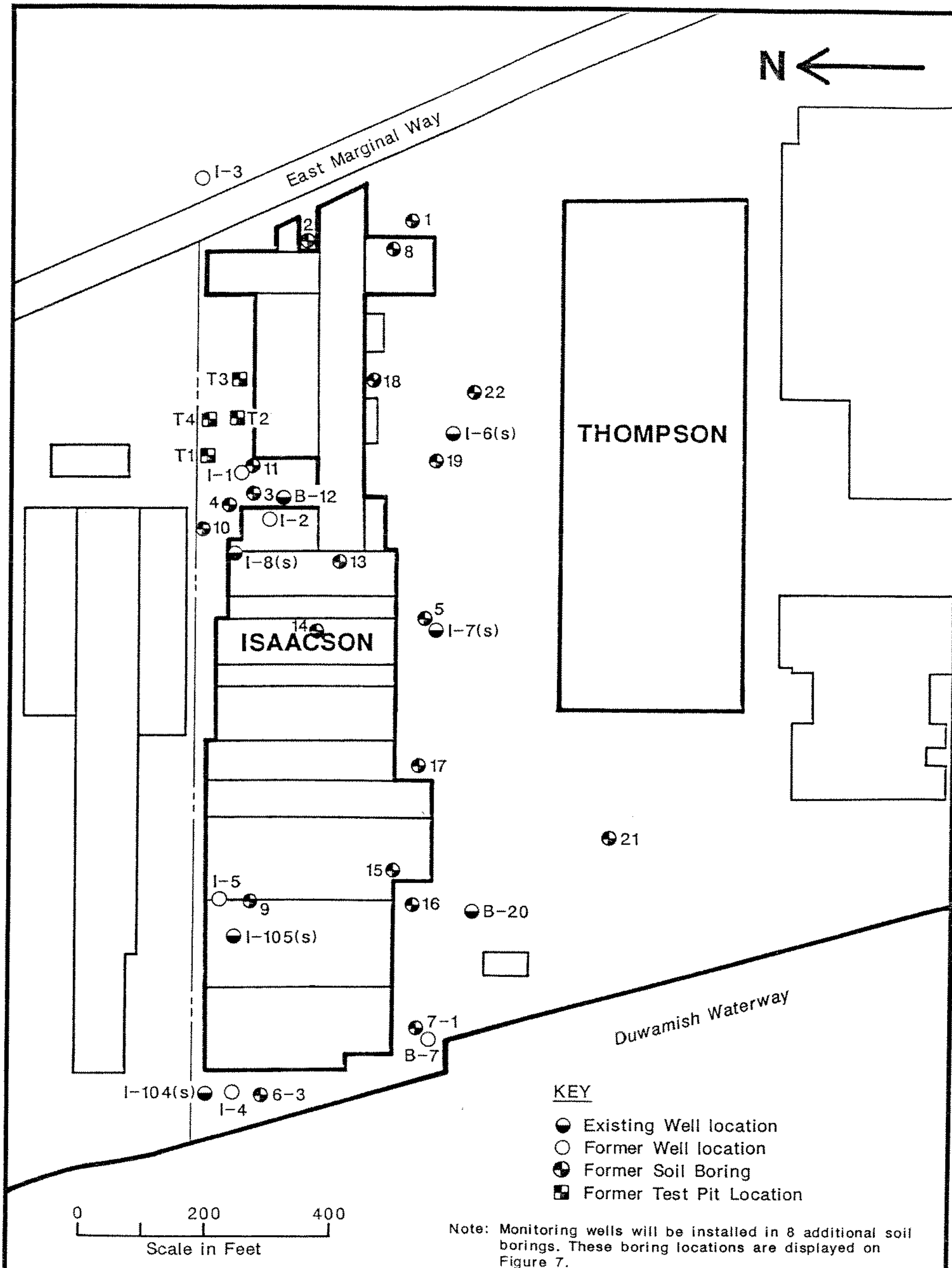
Landau Associates, Inc.

May 4, 1988



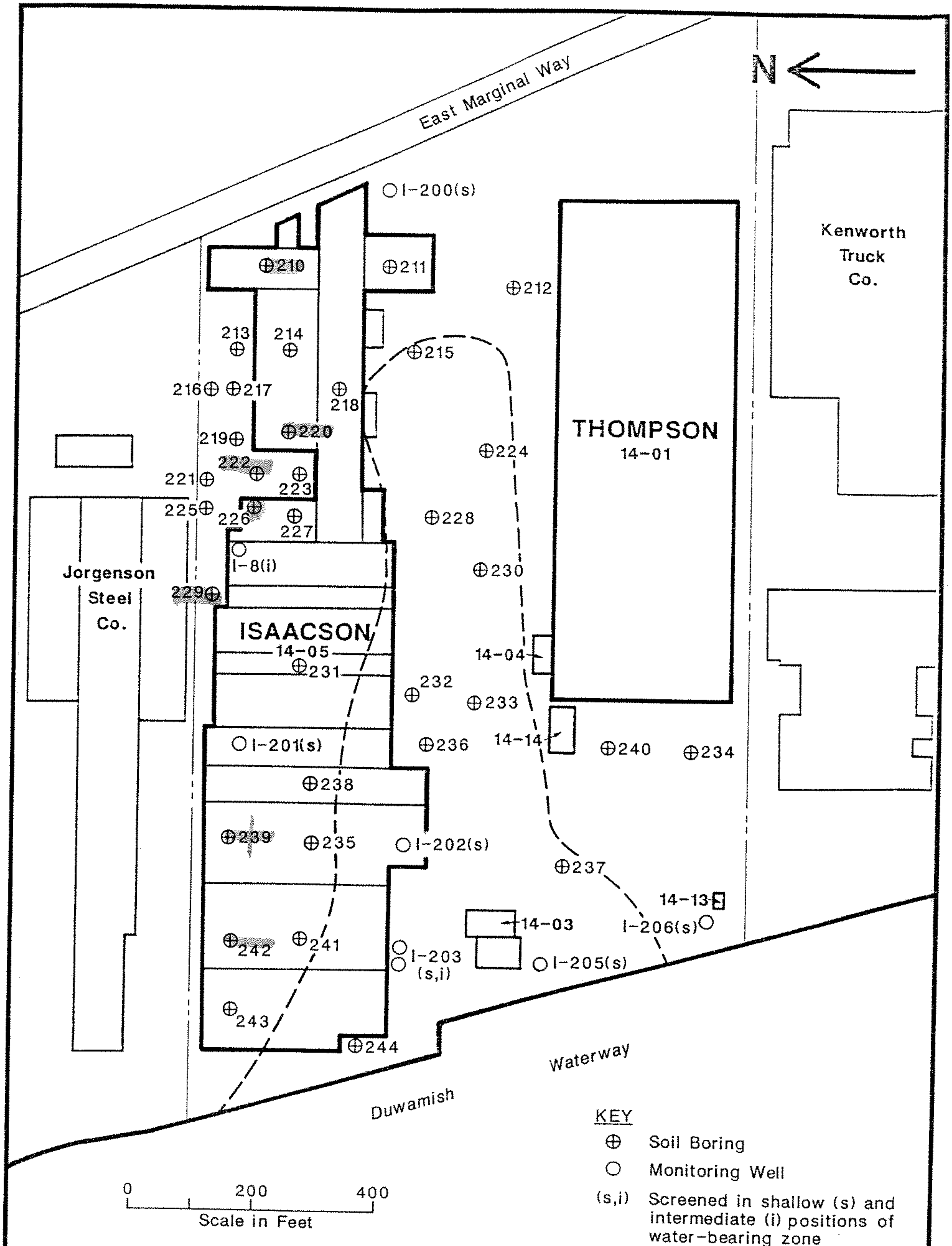
LANDAU ASSOCIATES, INC.	Thompson - Isaacson Site: Proposed Building 14-09

Figure 2-3



LANDAU ASSOCIATES, INC.

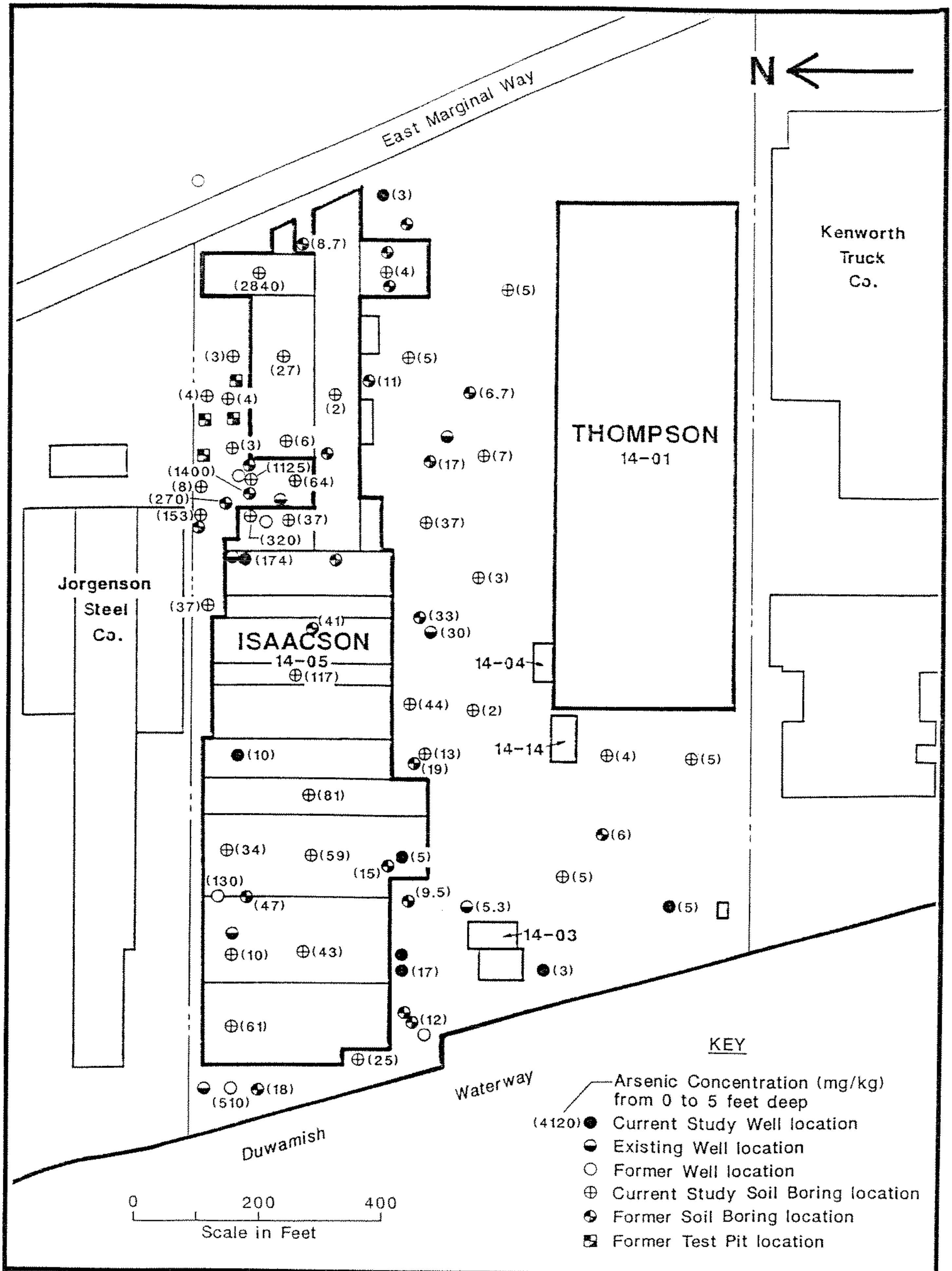
Thompson - Isaacson Site:
Location of Previous Explorations



LANDAU ASSOCIATES, INC.

Thompson - Isaacson: Location of Current Study Soil Borings and Monitoring Wells

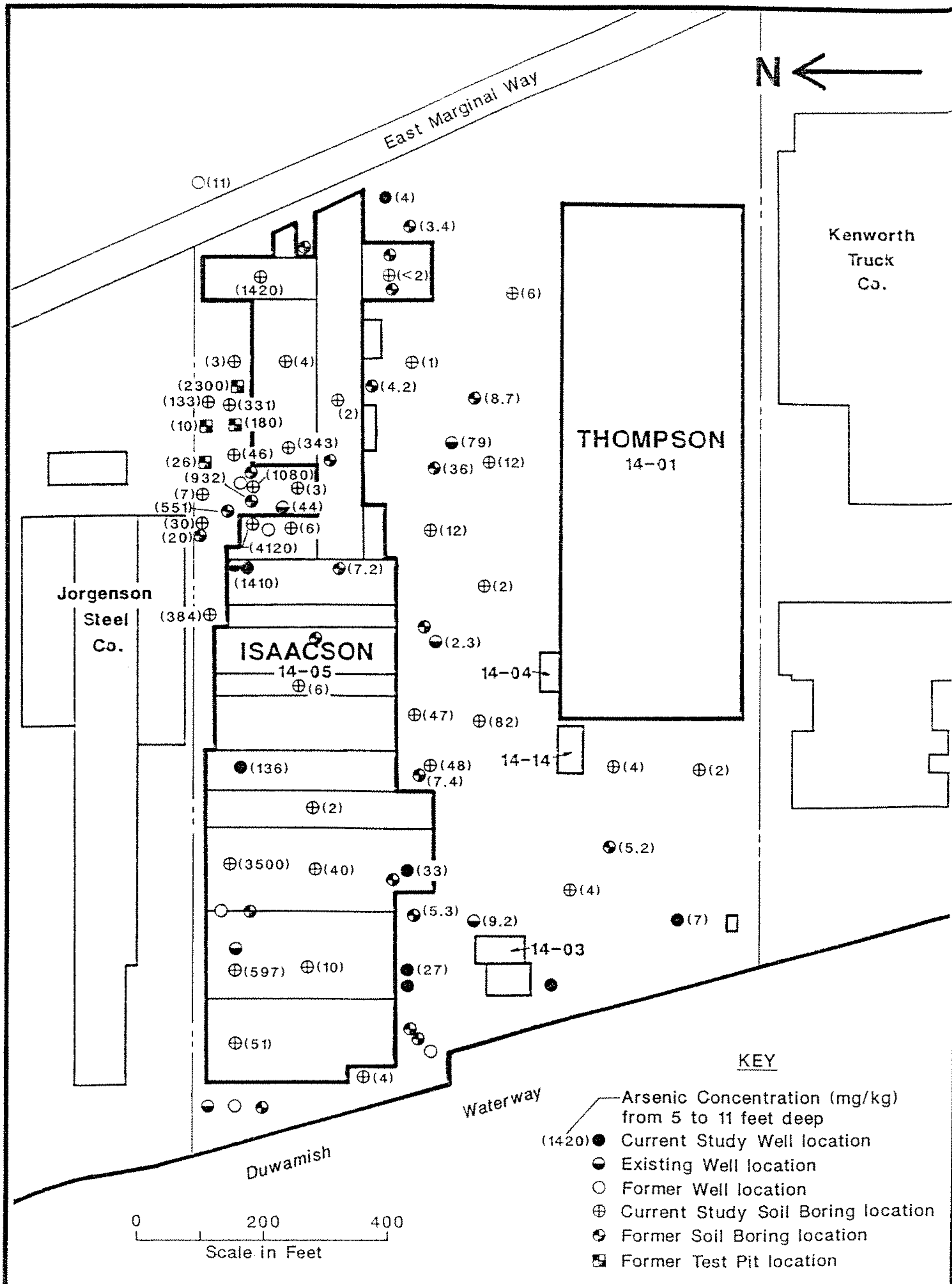
Figure 5-1



LANDAU ASSOCIATES, INC.

Distribution of Arsenic in Soil 0 to 5 Feet Deep

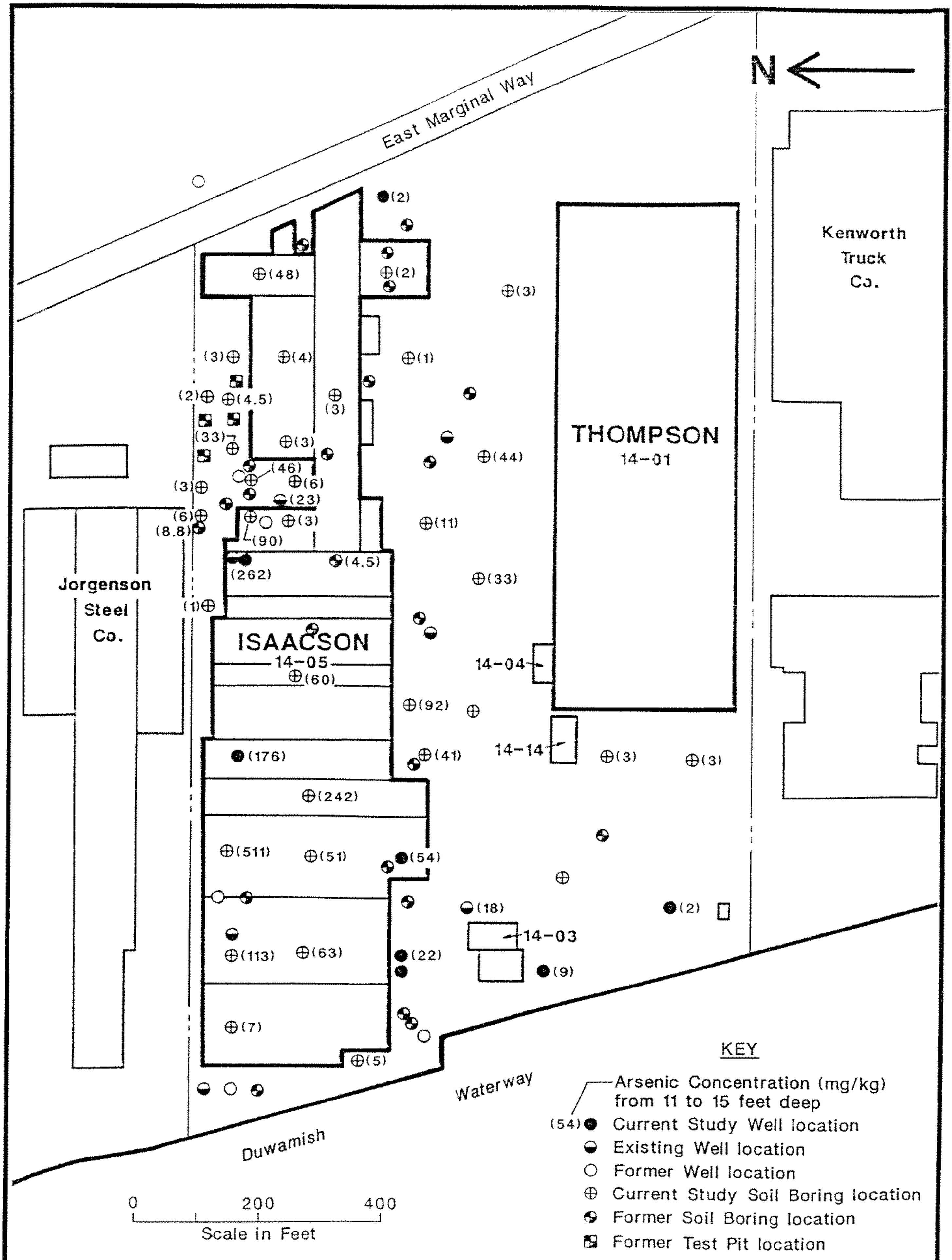
Figure 5-8



LANDAU ASSOCIATES, INC.

Distribution of Arsenic in Soil
5 to 11 Feet Deep

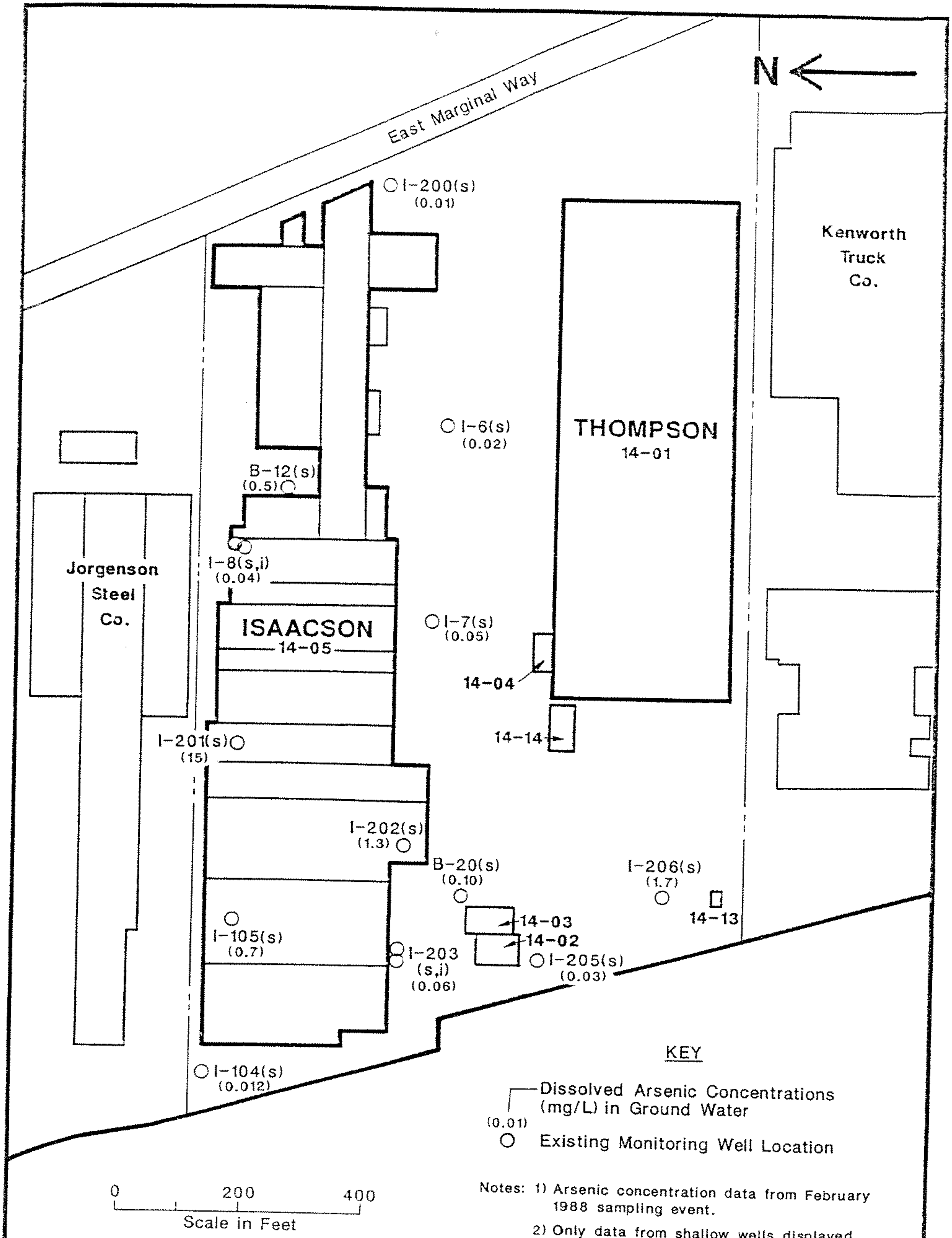
Figure 5-9



LANDAU ASSOCIATES, INC.

Distribution of Arsenic in Soil 11 to 15 Feet Deep

Figure 5-10



LANDAU ASSOCIATES, INC.	Dissolved Arsenic Concentrations in Ground Water

Figure 5-11

025 026,020

Data Report No. 2

BUILDING 14-09
THOMPSON-ISAACSON
SITE INVESTIGATION

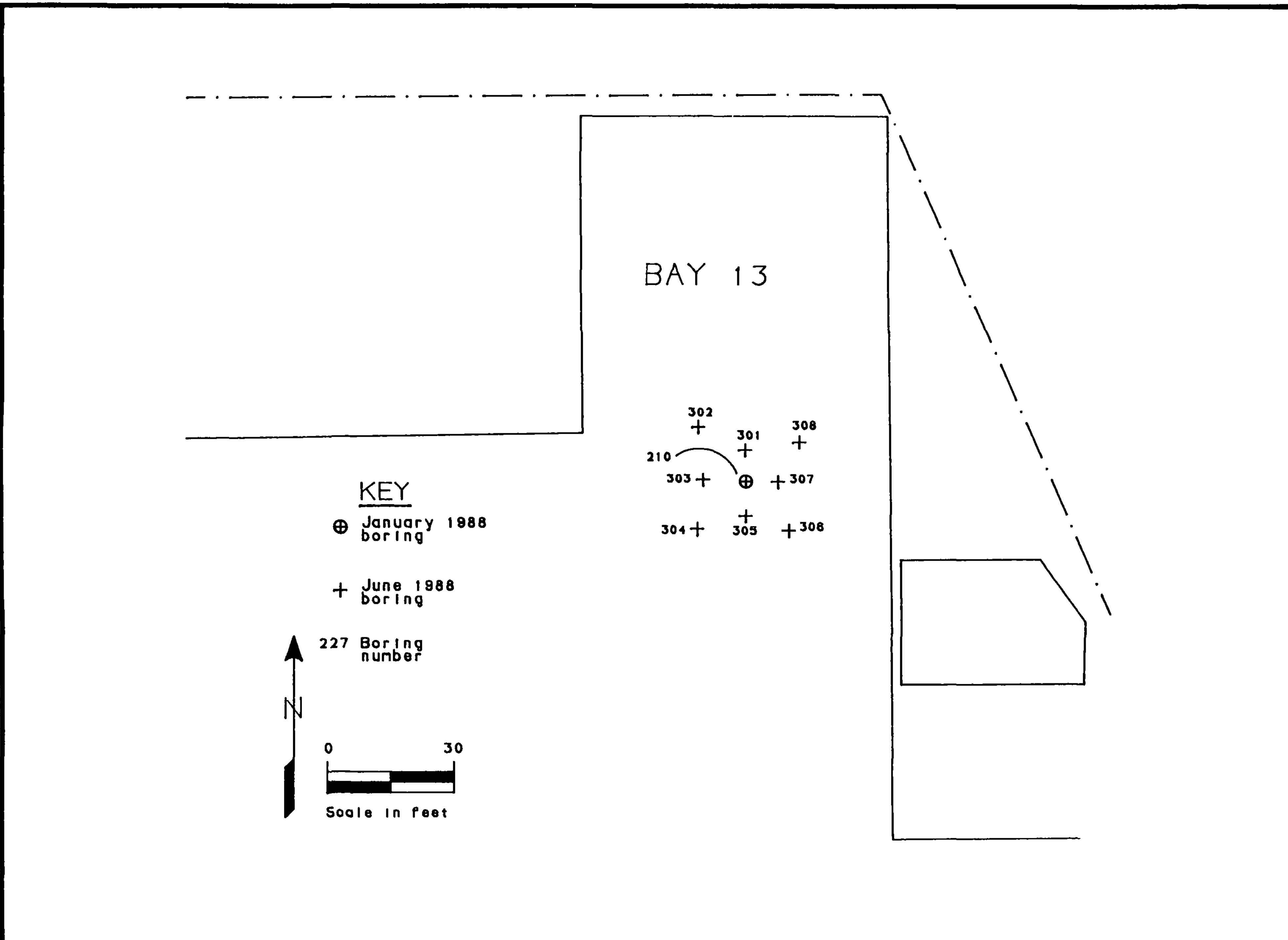
Prepared for

The Boeing Company

Prepared by

Landau Associates, Inc.

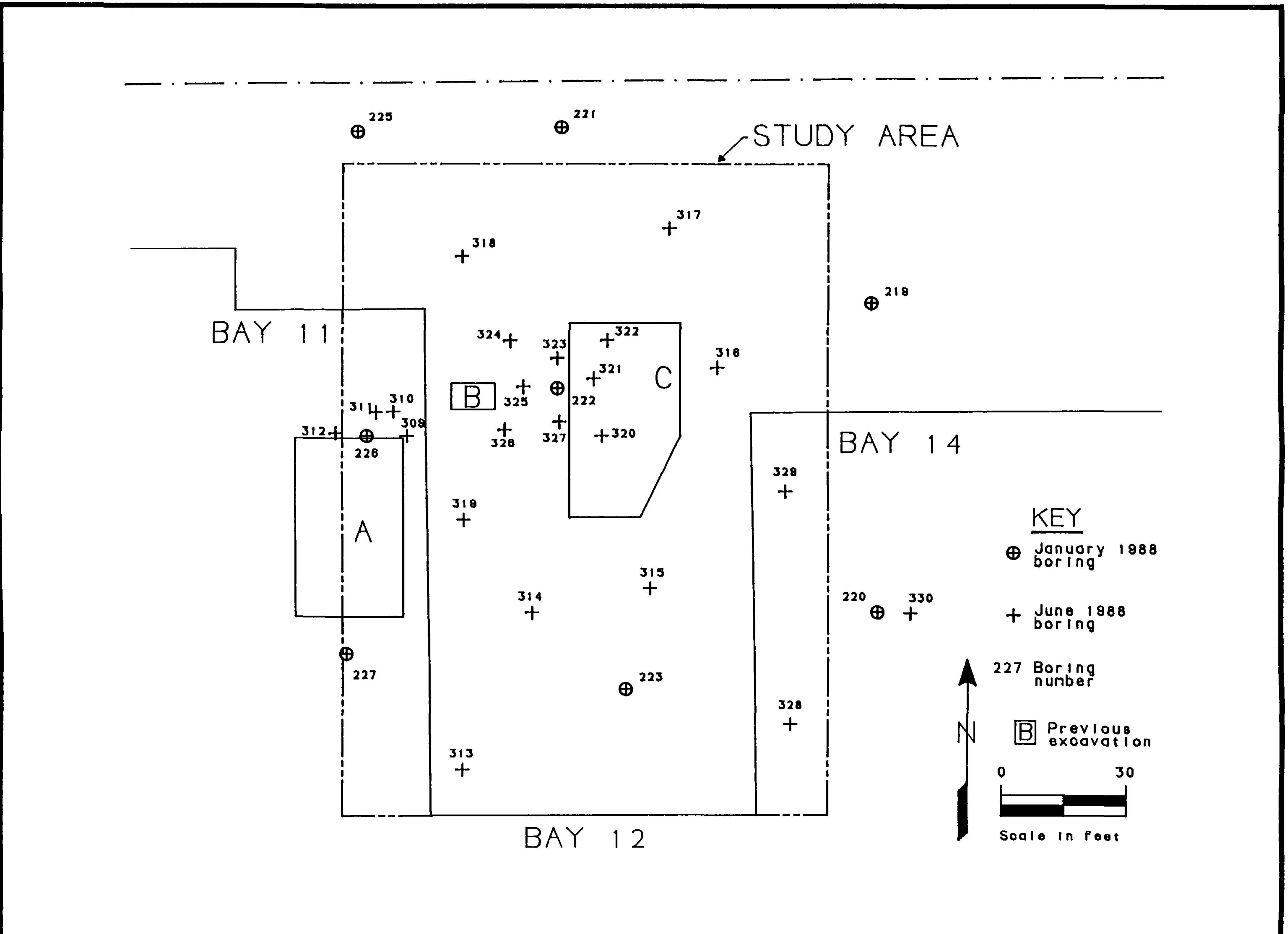
July 8, 1988



LANDAU ASSOCIATES, INC.

Boring Locations
Bay 13

Figure 1

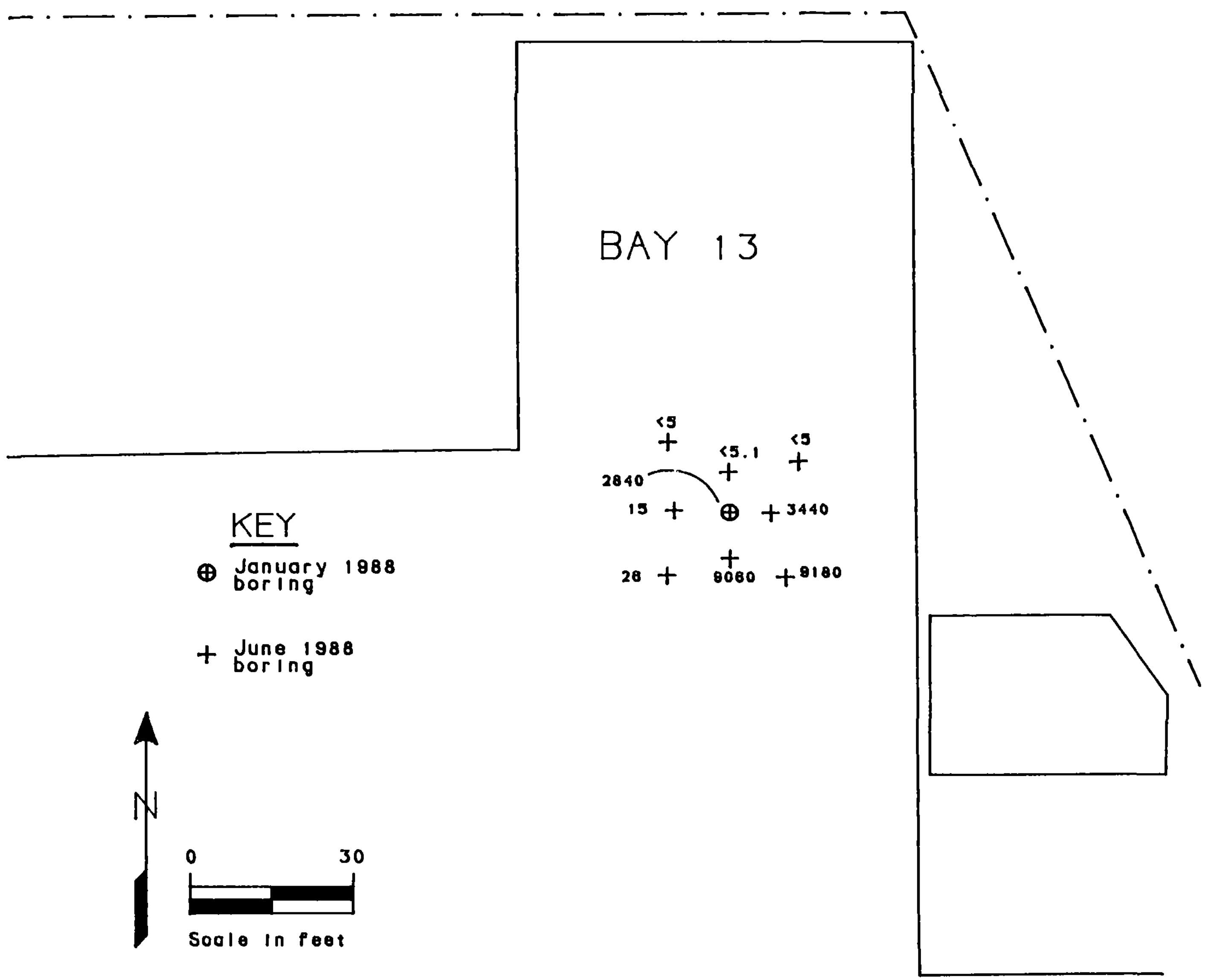


LANDAU ASSOCIATES, INC.

Boring Locations
Vicinity of Bays 11, 12, and 14

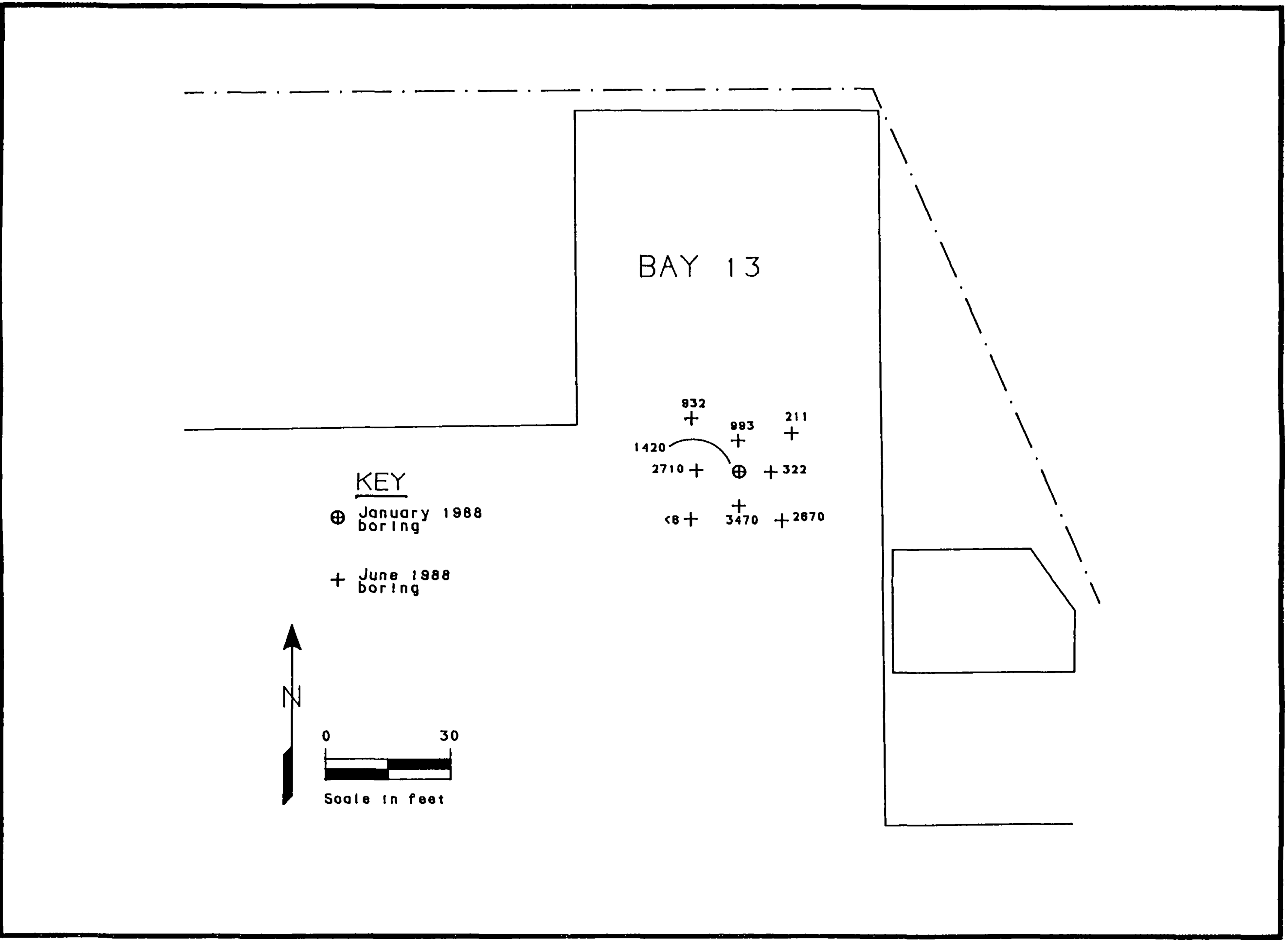
Figure 2

LANDAU ASSOCIATES, INC.



Soil Arsenic Concentrations (mg/Kg)
0 to 5 Feet Depth, Bay 13

Figure 3

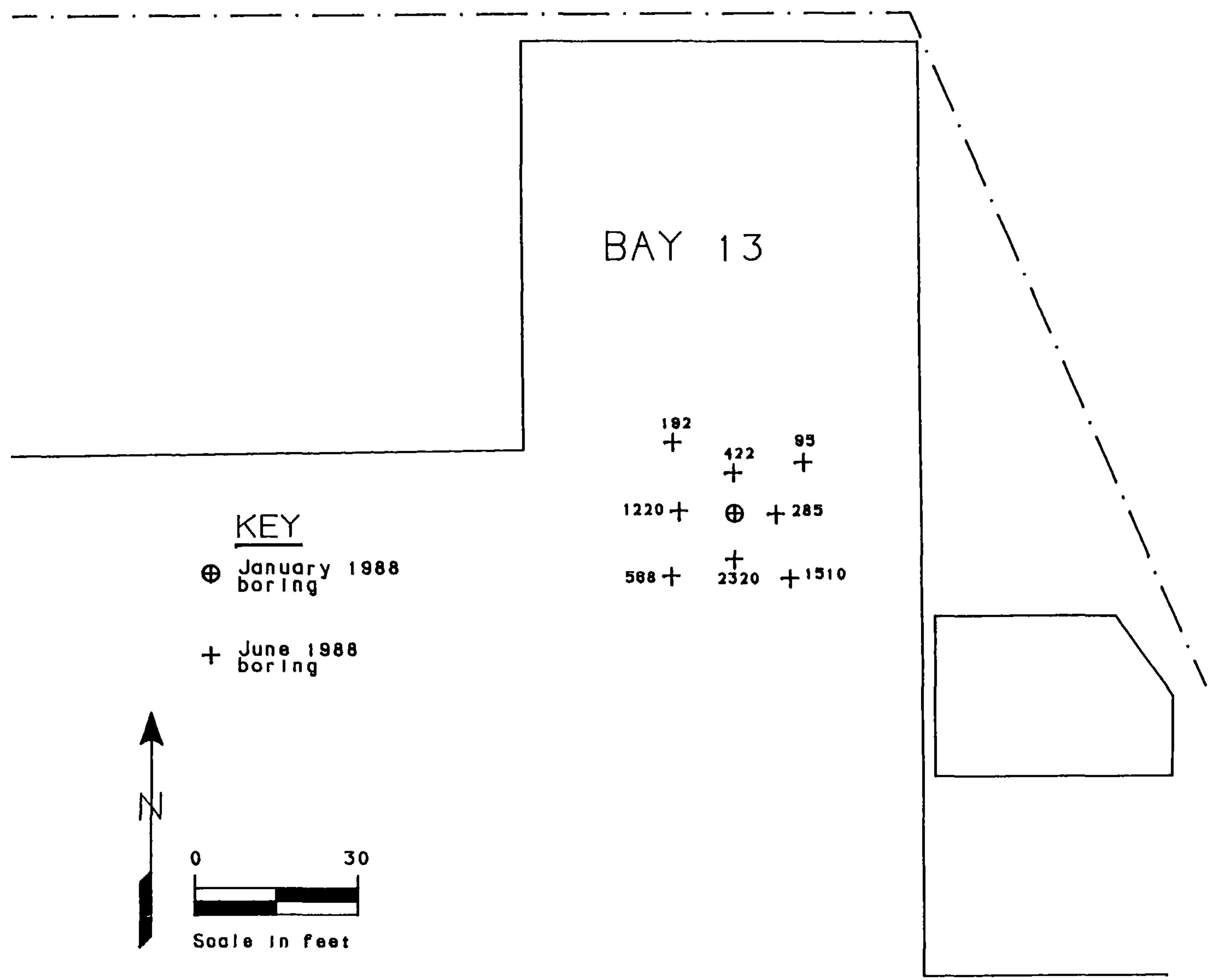


LANDAU ASSOCIATES, INC.

Soil Arsenic Concentrations (mg/Kg)
5 to 8 Feet Depth, Bay 13

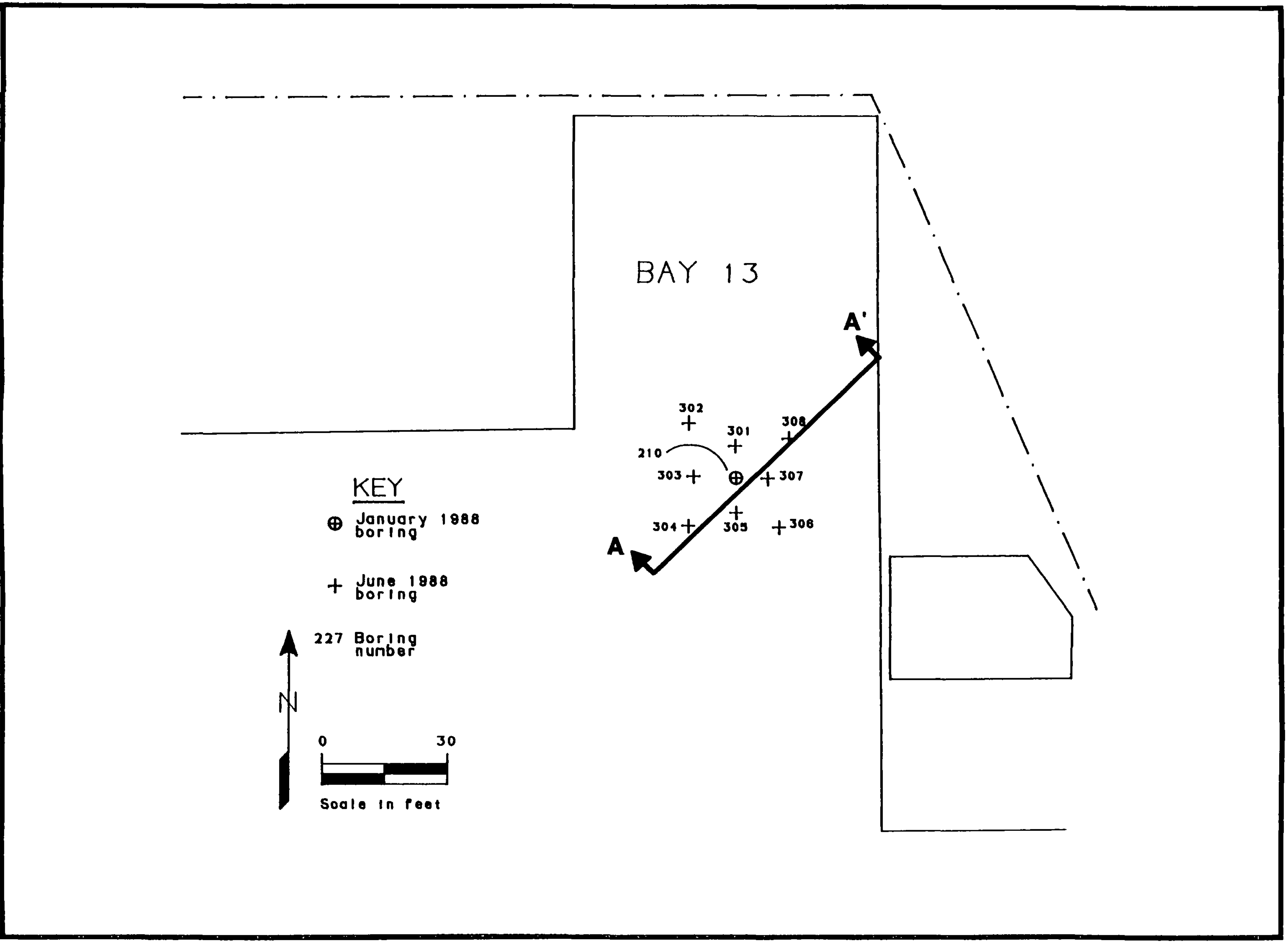
Figure 4

LANDAU ASSOCIATES, INC.



Soil Arsenic Concentrations (mg/Kg)
8 to 11 Feet Depth, Bay 13

Figure 5

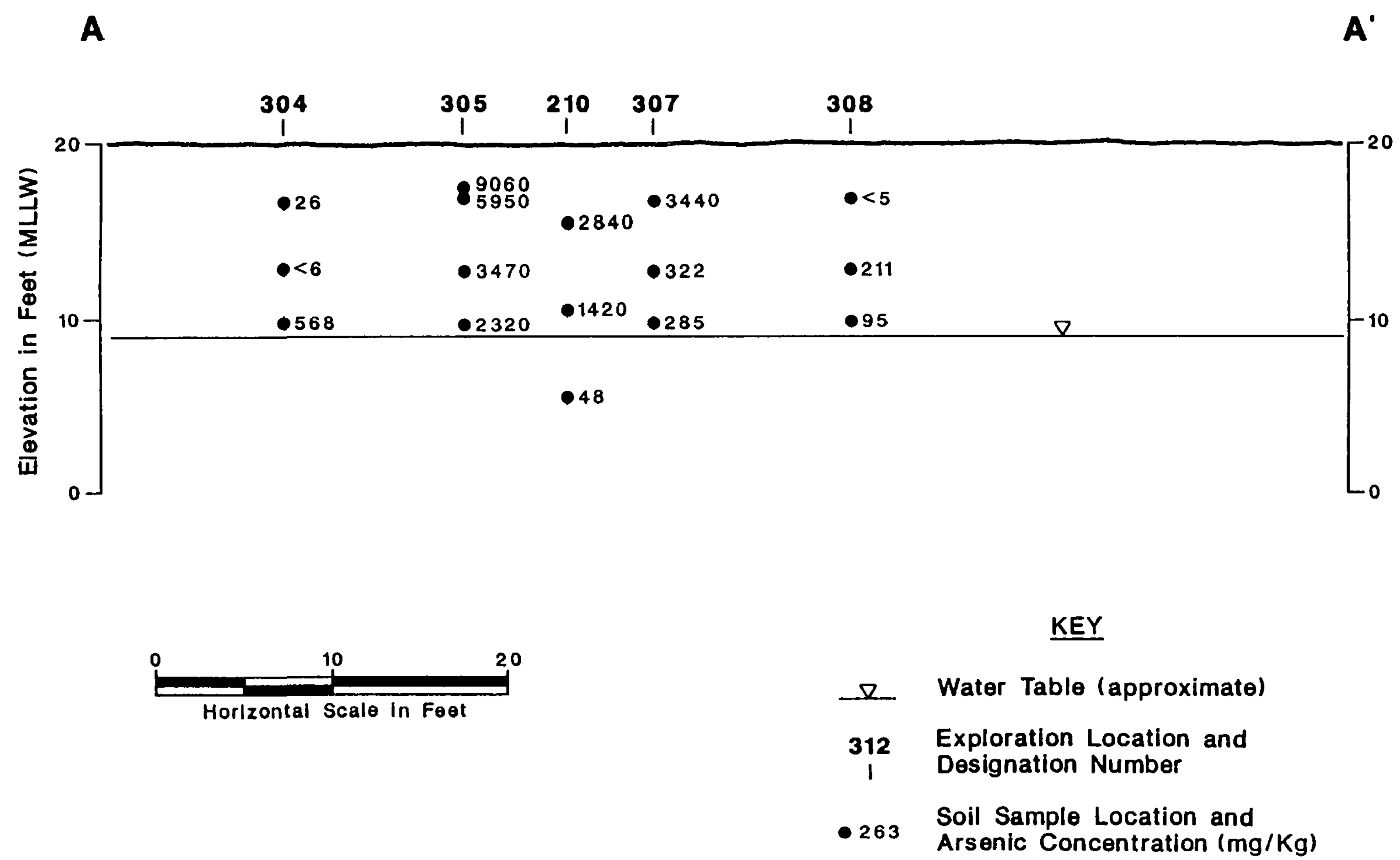


LANDAU ASSOCIATES, INC.

Location of Cross-Section
Bay 13

Figure 6

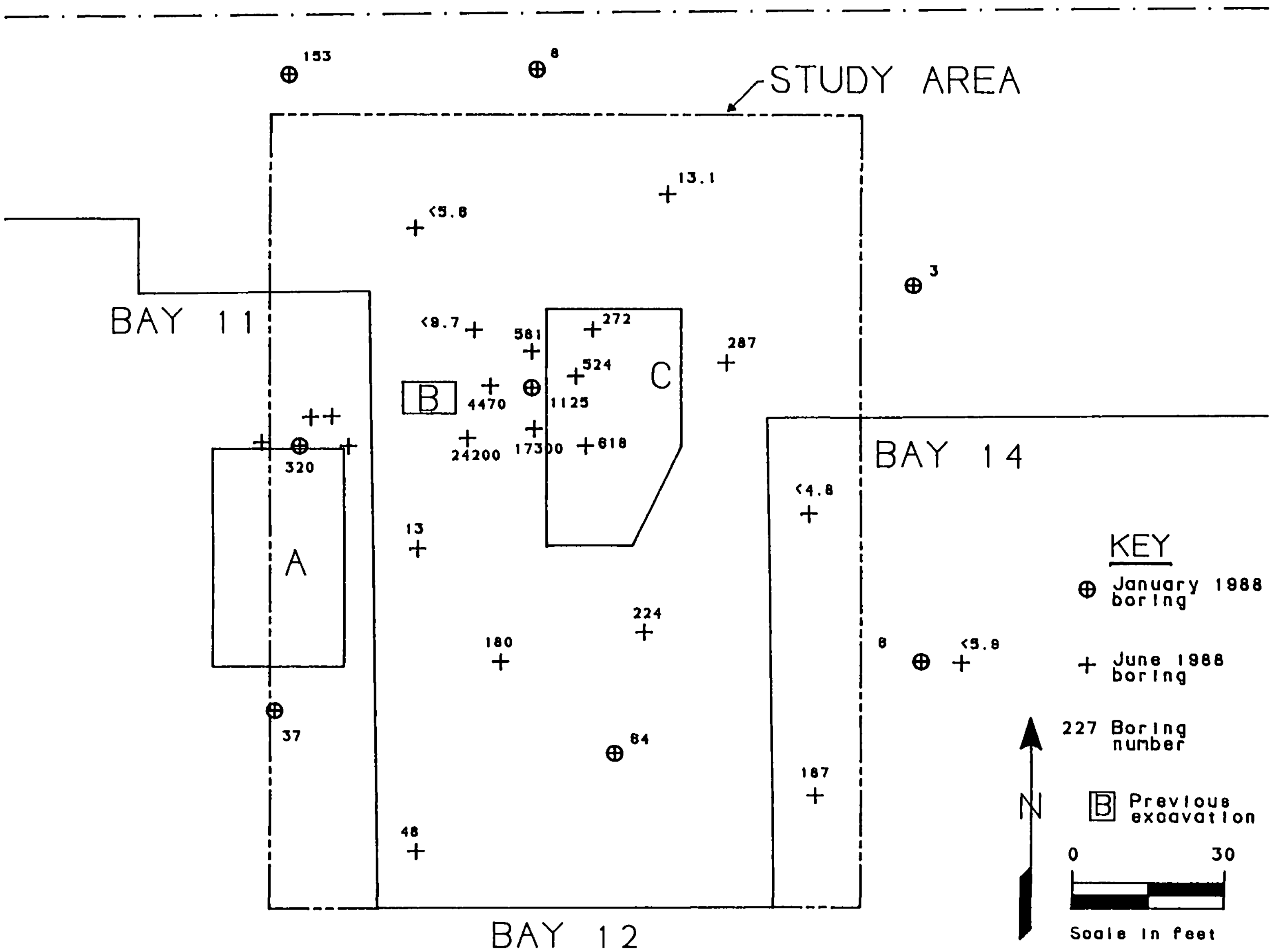
LANDAU ASSOCIATES, INC.



Arsenic Cross-Section A-A'

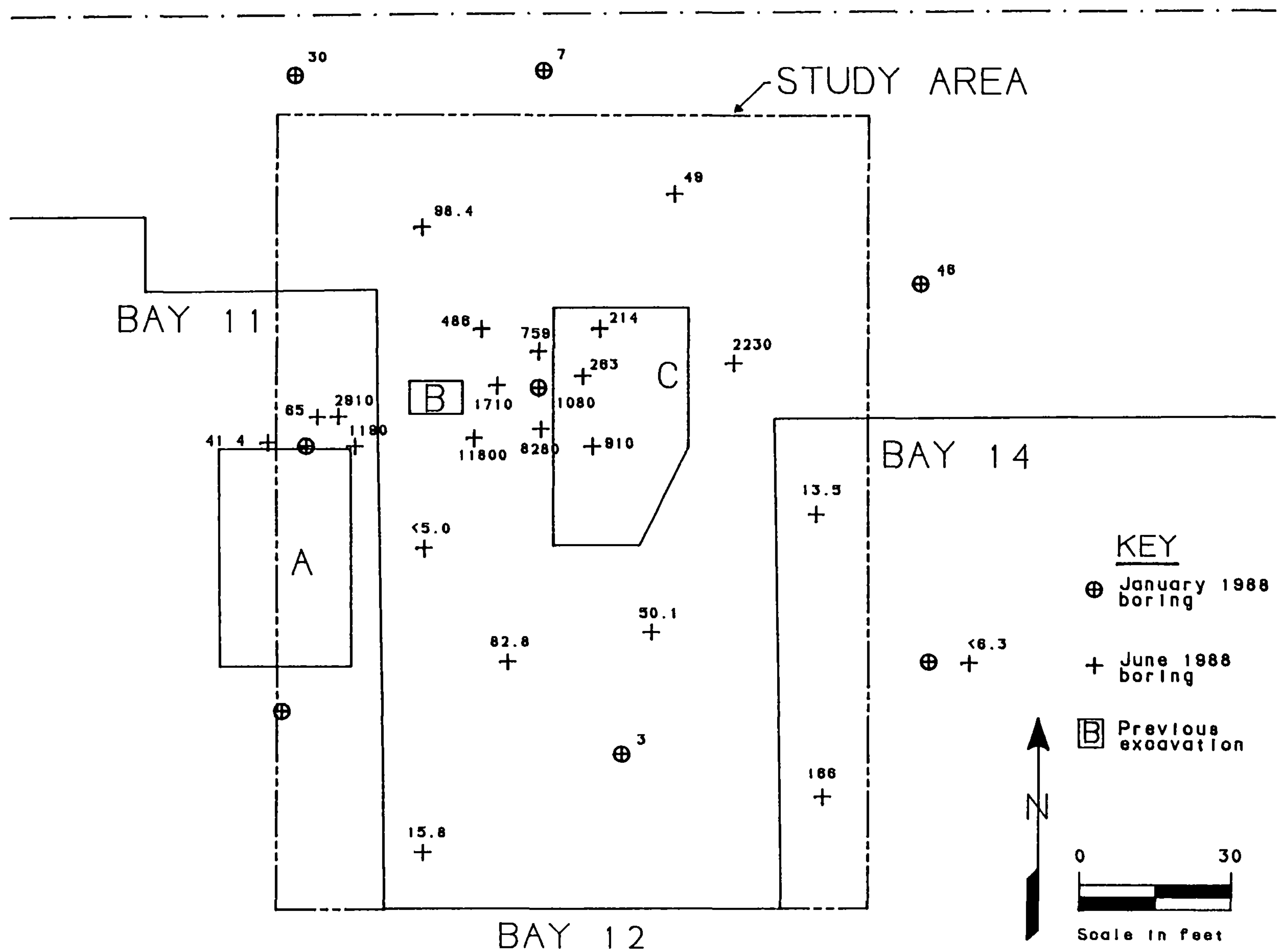
Figure 7

LANDAU ASSOCIATES, INC.



Soil Arsenic Concentrations (mg/Kg)
0 to 5 Feet Depth, Vicinity of Bays 11, 12, and 14

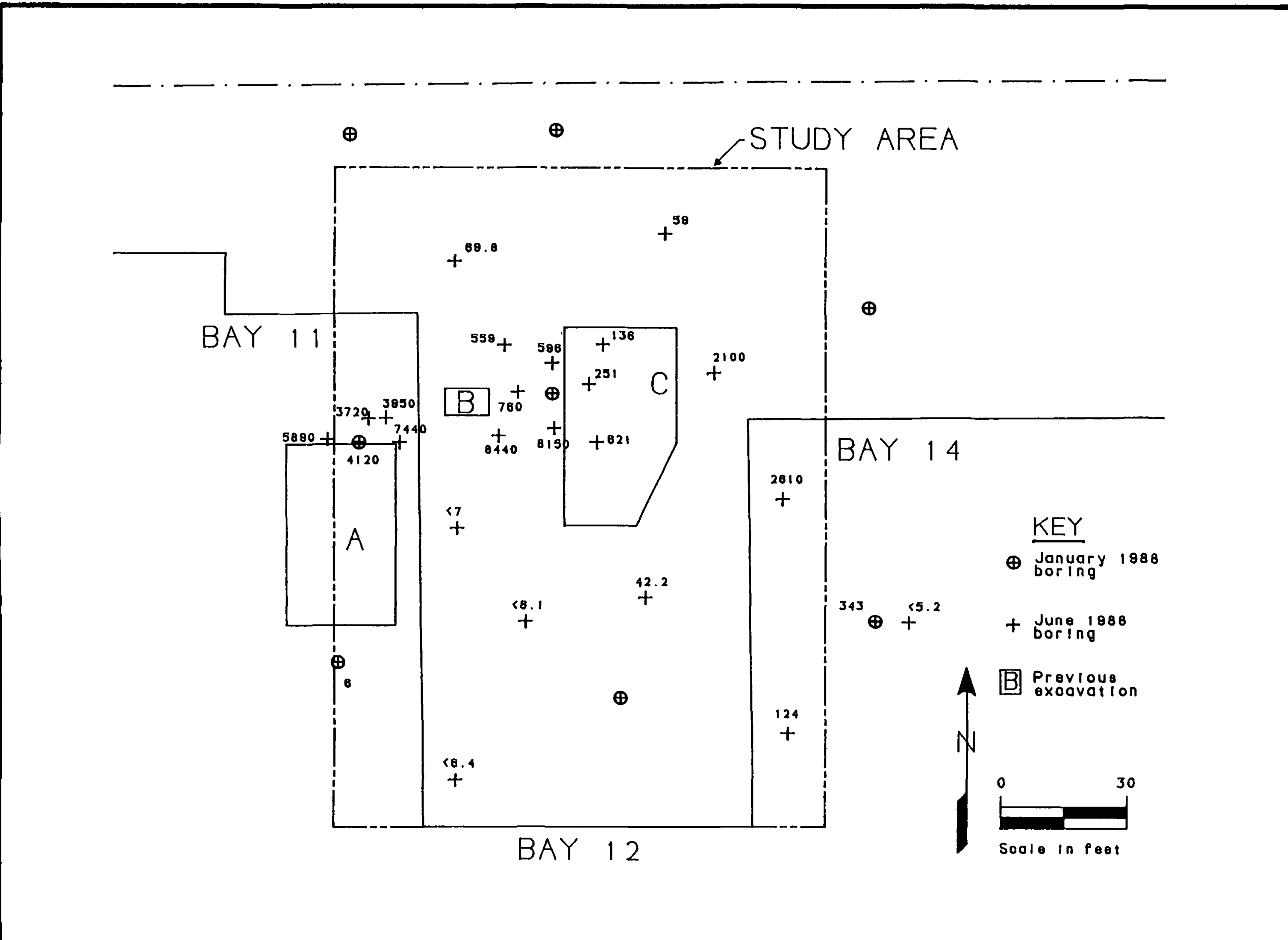
Figure 8



LANDAU ASSOCIATES, INC.

Soil Arsenic Concentrations (mg/Kg)
5 to 8 Feet Depth, Vicinity of Bays 11, 12, and 14

Figure 9

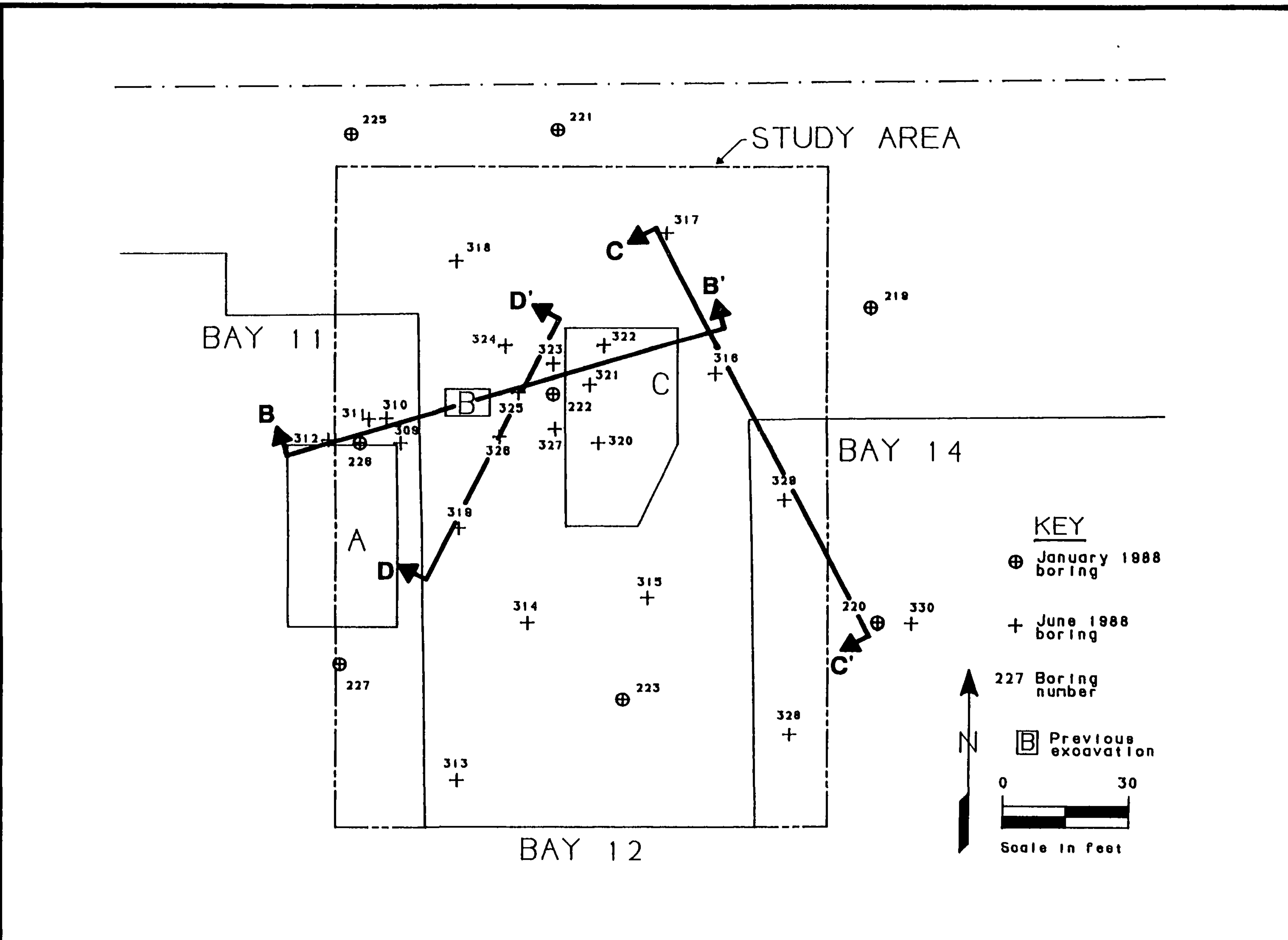


LANDAU ASSOCIATES, INC.

Soil Arsenic Concentrations (mg/Kg)
8 to 11 Feet Depth, Vicinity of Bays 11, 12, and 14

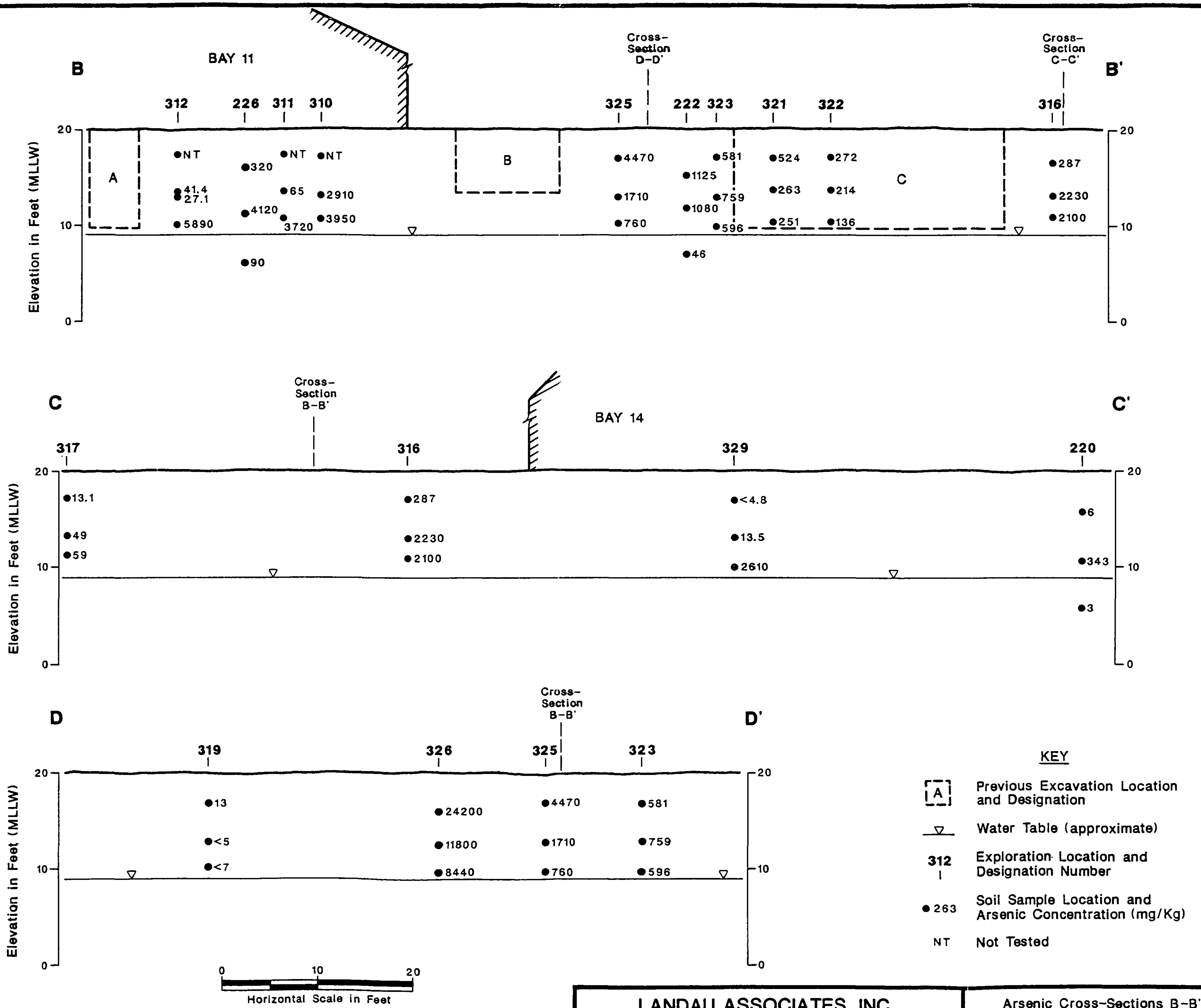
Figure 10

LANDAU ASSOCIATES, INC.



Locations of Cross-Sections
Vicinity of Bays 11, 12, and 14

Figure 11



LANDAU ASSOCIATES, INC.

Arsenic Cross-Sections B-B', C-C', and D-D'

Figure 12

Appendix C-5

Landau 1990: Thompson-Isaacson Site, Soil Remedial Action Plan

Thompson-Isaacson Site
Soil Remedial Action Plan

December 17, 1990

Prepared for

The Boeing Company

Prepared by

Landau Associates, Inc.
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(206) 778-0907

and

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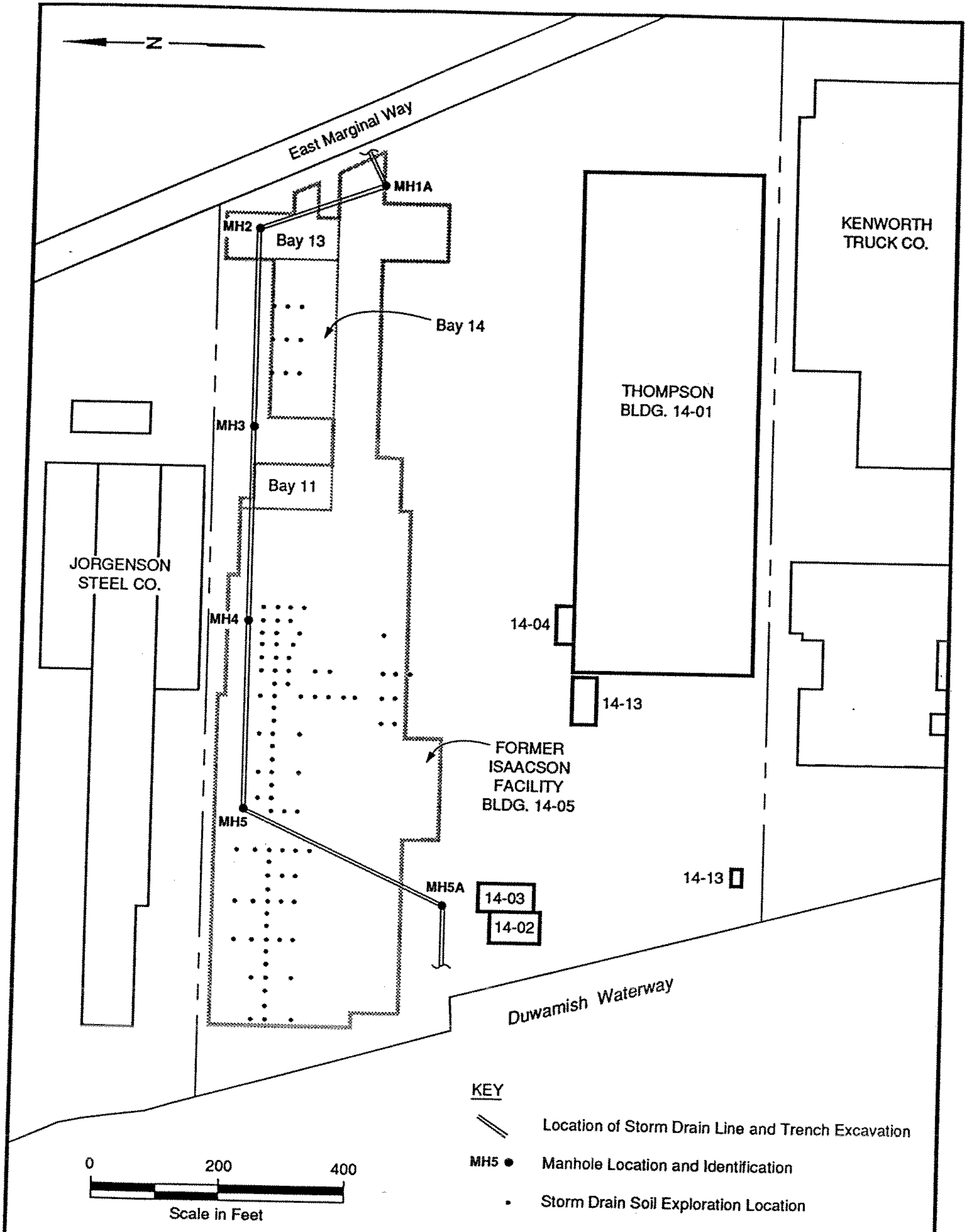
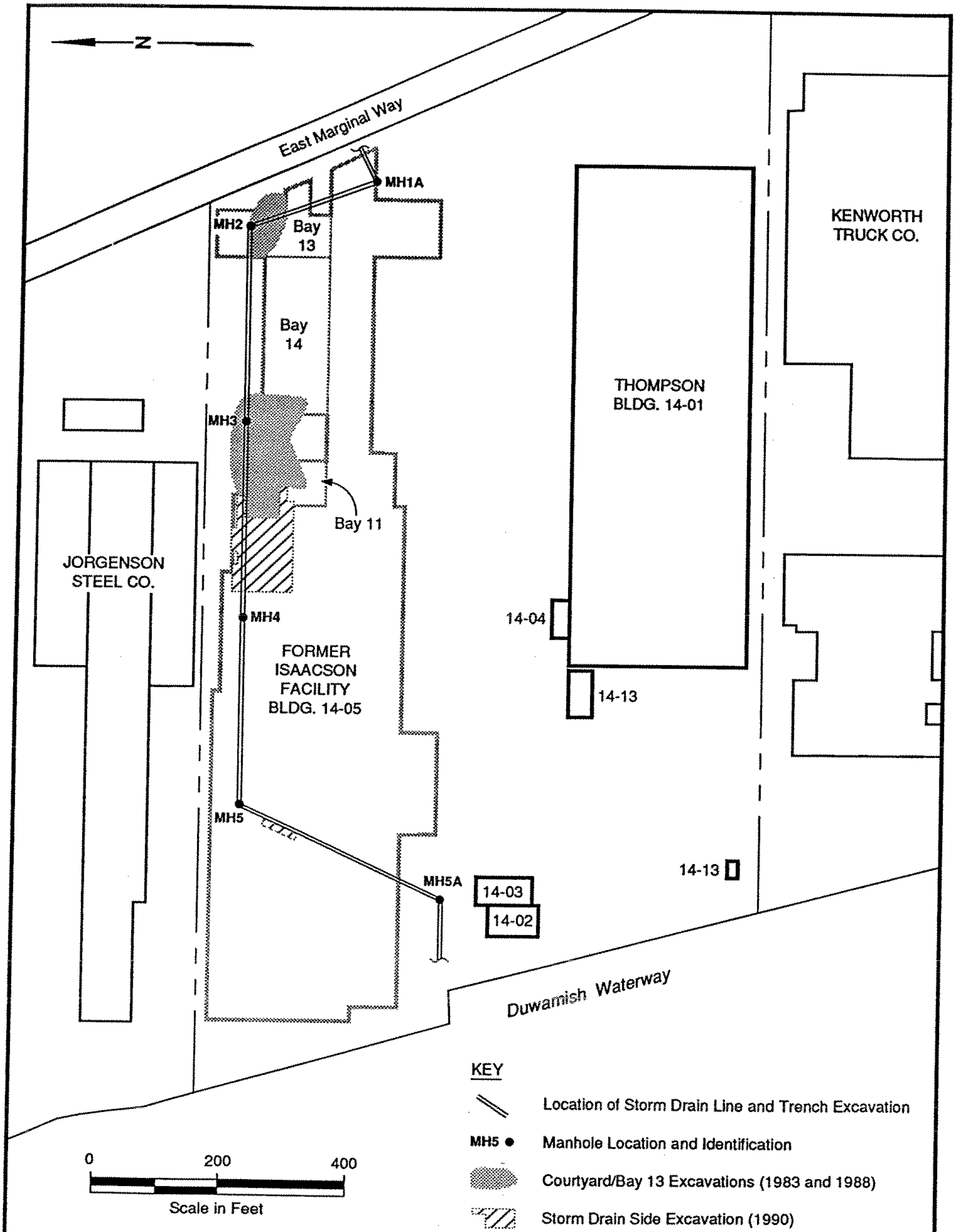
Bellevue, WA 98005
(206) 455-2550



LANDAU ASSOCIATES, INC. | Locations of Storm Drain Soil Explorations

25-26.30 Boeing/Thompson-Isaacson Site/Soil Remedial Action Plan 12/90

Figure 5

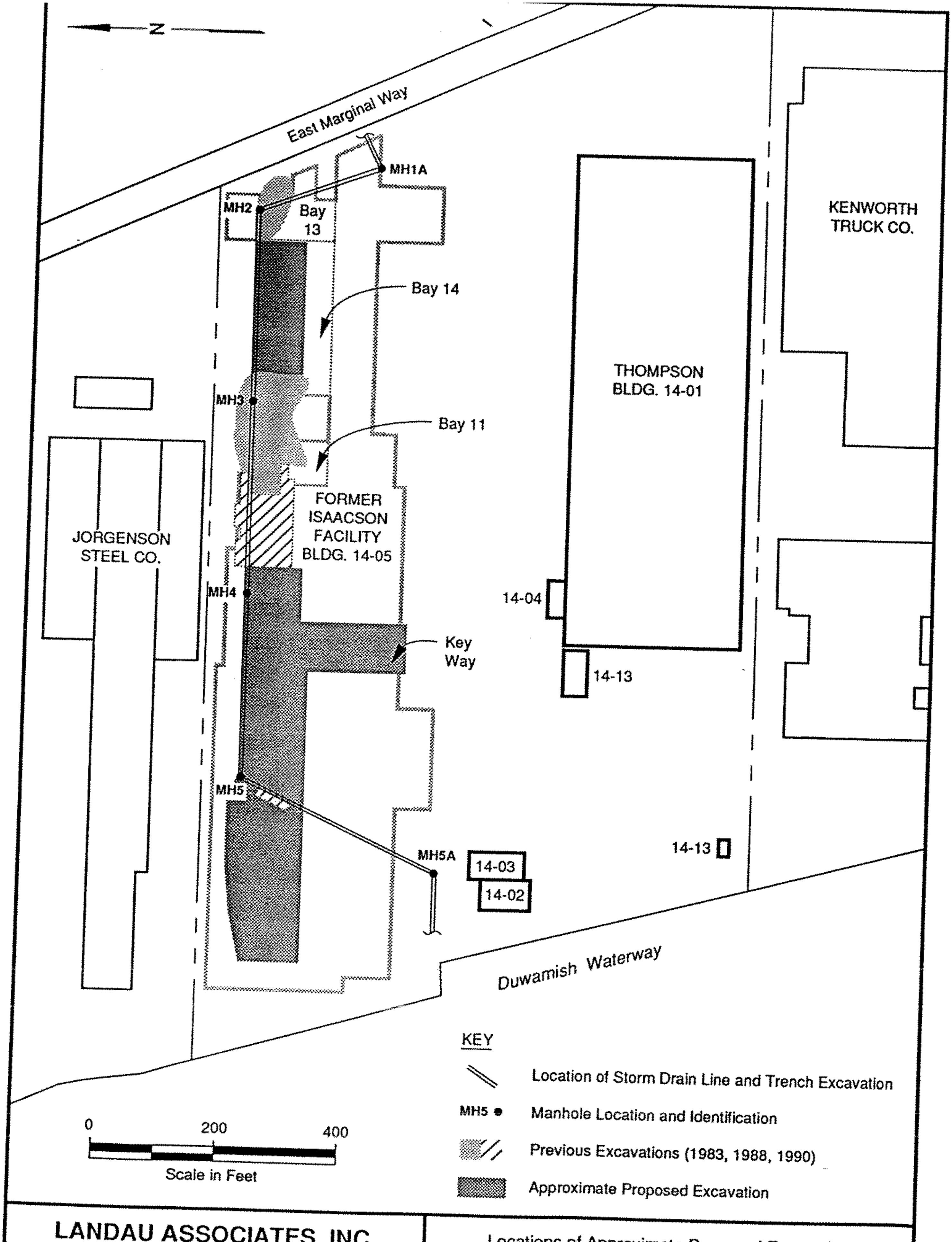


LANDAU ASSOCIATES, INC.

Locations of Previous Remedial Actions

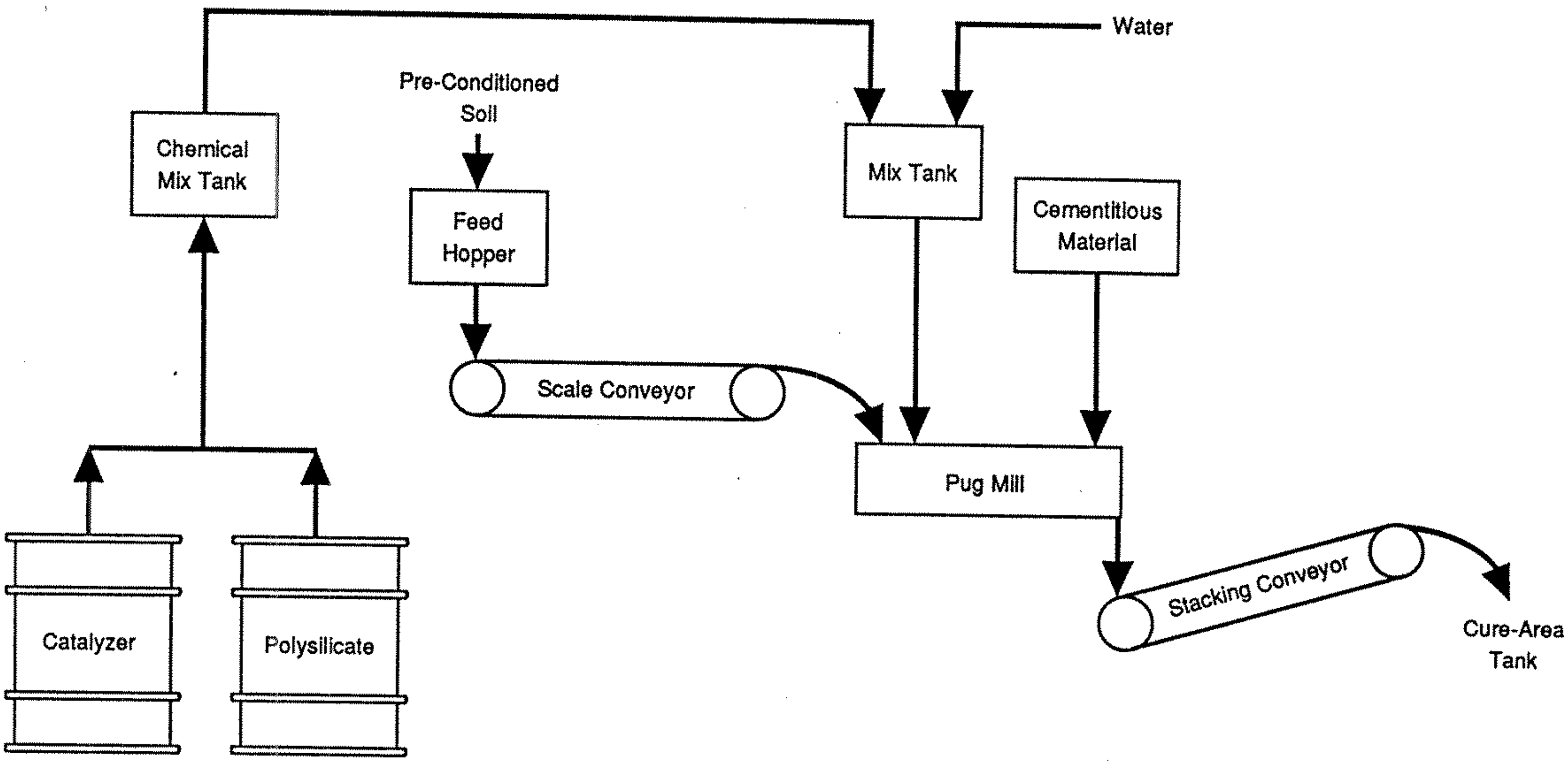
Figure 6

86-20.30 Boeing/Thompson-Isaacson Site/Soil Remedial Action Plan 12/90



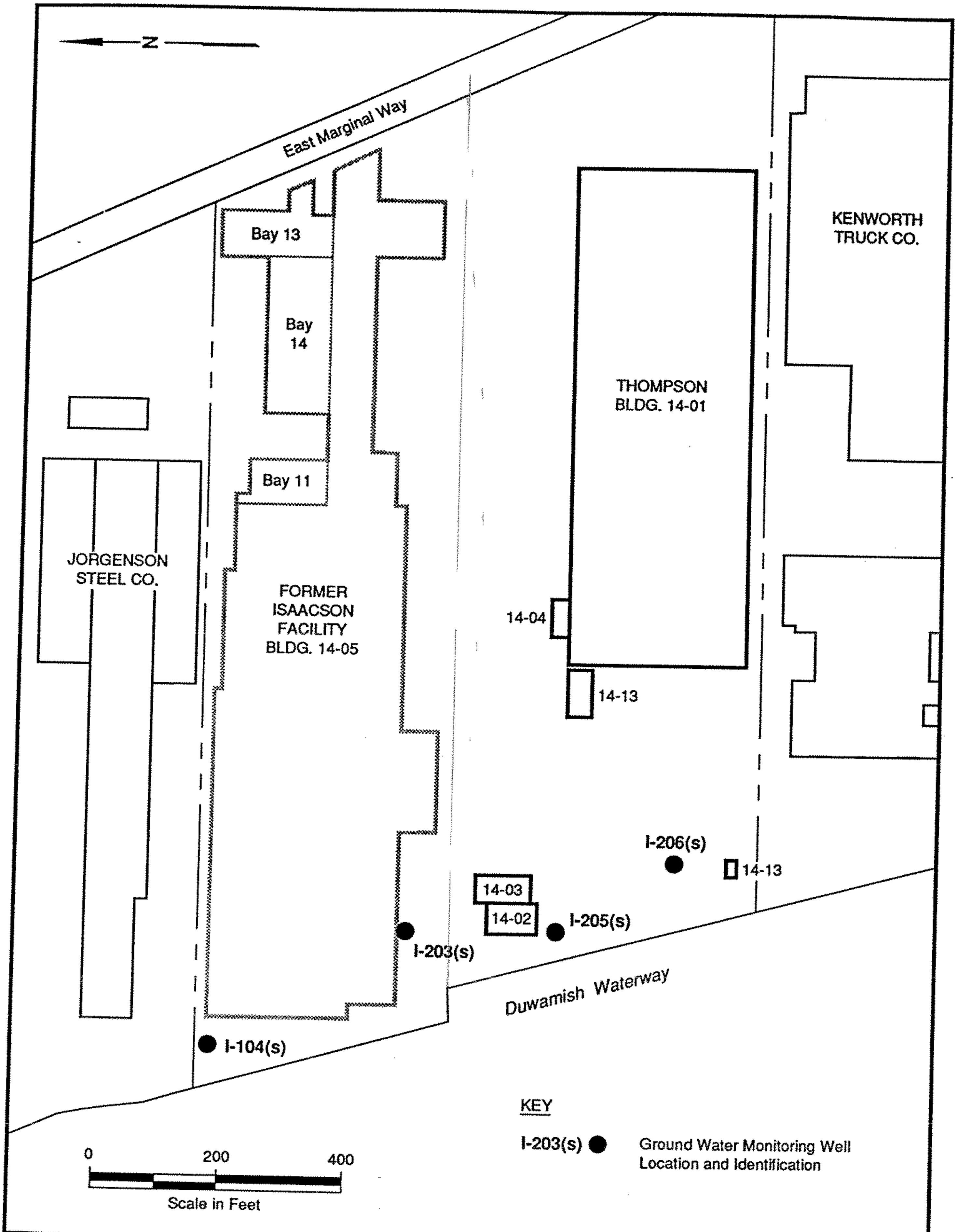
LANDAU ASSOCIATES, INC. | Locations of Approximate Proposed Excavations

Figure 7



LANDAU ASSOCIATES, INC. | Process Flow Diagram

Figure 8



LANDAU ASSOCIATES, INC. | Locations of Long-Term Ground Water Monitoring Wells

Figure 9

25-26.30 Boeing/Thompson-Isaacson Site/Soil Remedial Action Plan 12/90

Appendix C-6

Technical Dryer 1991: Thompson-Isaacson Site, Storm Drain Line and Soil Core Sampling, Summary Report

THOMPSON-ISAACSON SITE
STORM DRAIN LINE
AND SOIL CORE SAMPLING

SUMMARY REPORT

MARCH 6, 1991

Prepared for

Boeing Environmental Affairs

Prepared by

Technical Dryer, Inc.
24104 11 Ave. South
Des Moines, Washington 98198

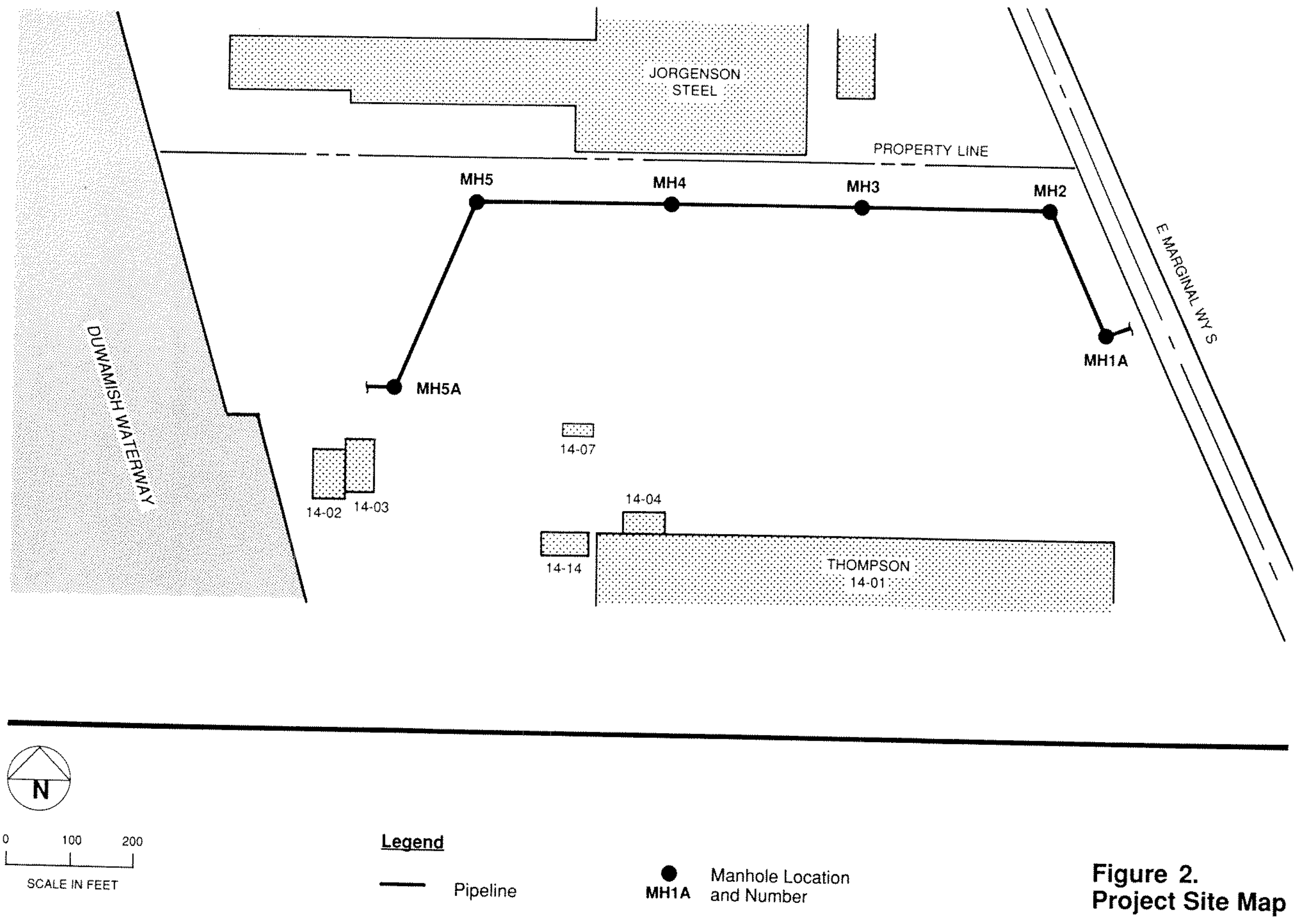


Figure 2. Project Site Map

TABLE 1

ARSENIC VALUES FOR FIELD TEST
ISAACSON SITE

SAMPLE PILES

SAMPLE NUMBER	PILE SIZE	FIELD ARSENIC PPM AS IS	AVERAGE FOR 10 YD PILES	LAUCK'S As PPM DRY WGT.	DISPOSITION
1	50 YARDS	25			SITE BACK FILL
2	50 YARDS	< 25			SITE BACK FILL
3	50 YARDS	25			SITE BACK FILL
4	50 YARDS	< 25			SITE BACK FILL
5	50 YARDS	< 25			SITE BACK FILL
6	50 YARDS	< 25			SITE BACK FILL
7	50 YARDS	< 25			SITE BACK FILL
8	50 YARDS	< 25			SITE BACK FILL
9	50 YARDS	< 25			SITE BACK FILL
10	50 YARDS	< 25			SITE BACK FILL
11	50 YARDS	< 25			SITE BACK FILL
12	50 YARDS	< 10			SITE BACK FILL
13	50 YARDS	10			SITE BACK FILL
14	50 YARDS	< 10			SITE BACK FILL
15	50 YARDS	140			SITE BACK FILL
16	50 YARDS	30			SITE BACK FILL
17	50 YARDS	10			SITE BACK FILL
18	50 YARDS	10			SITE BACK FILL
19	50 YARDS	< 10			SITE BACK FILL
20	50 YARDS	< 10			SITE BACK FILL
20 DUP	50 YARDS	< 10		< 50	
21	50 YARDS	30			SITE BACK FILL
22	50 YARDS	40			SITE BACK FILL
23	50 YARDS	1,900			CLASS I LANDFILL
24	50 YARDS	3,000			CLASS I LANDFILL
25	50 YARDS	1,900			CLASS I LANDFILL
26-A	10 YARDS	2,100			CLASS I LANDFILL
26-B	10 YARDS	2,200			CLASS I LANDFILL
26-C	10 YARDS	1,900	1,502		CLASS I LANDFILL
26-D	10 YARDS	1,300			CLASS I LANDFILL
26-E	10 YARDS	< 10			CLASS I LANDFILL
27-A	10 YARDS	400			CLASS I LANDFILL
27-B	10 YARDS	1,400			CLASS I LANDFILL
27-C	10 YARDS	800	900		CLASS I LANDFILL
27-D	10 YARDS	1,100			CLASS I LANDFILL
27-E	10 YARDS	800			CLASS I LANDFILL
28-A	10 YARDS	1,000			CLASS I LANDFILL
28-B	10 YARDS	< 10			CLASS I LANDFILL
28-B DUP	10 YARDS	< 10	260	< 50	
28-C	10 YARDS	< 10			CLASS I LANDFILL
28-D	10 YARDS	140			CLASS I LANDFILL
28-E	10 YARDS	140			CLASS I LANDFILL

TABLE 1

ARSENIC VALUES FOR FIELD TEST
ISAACSON SITE

SAMPLE PILES

SAMPLE NUMBER	PILE SIZE	FIELD ARSENIC PPM AS IS	AVERAGE FOR 10 YD PILES	LAUCK'S As PPM DRY WGT.	DISPOSITION
29-A	10 YARDS	1,000			CLASS I LANDFILL
29-B	10 YARDS	80			CLASS I LANDFILL
29-C	10 YARDS	1,000	588		CLASS I LANDFILL
29-D	10 YARDS	400			CLASS I LANDFILL
29-E	10 YARDS	140			CLASS I LANDFILL
30-A	10 YARDS	400			CLASS I LANDFILL
30-B	10 YARDS	400	316		CLASS I LANDFILL
30-B DUP	10 YARDS	400		260	
30-C	10 YARDS	200			CLASS I LANDFILL
30-D	10 YARDS	180			CLASS I LANDFILL
30-E	10 YARDS	400			CLASS I LANDFILL
31-A	10 YARDS	400			SITE BACKFILL
31-B	10 YARDS	600			CLASS I LANDFILL
31-C	10 YARDS	190	348		SITE BACKFILL
31-D	10 YARDS	150			SITE BACKFILL
31-E	10 YARDS	400			SITE BACKFILL
32	50 YARDS	400		590	CLASS I LANDFILL
33	50 YARDS	400		570	CLASS I LANDFILL
34	50 YARDS	210			SITE BACKFILL
35	50 YARDS	160			SITE BACKFILL
36	50 YARDS	170			SITE BACKFILL
37	50 YARDS	120			SITE BACKFILL
38	50 YARDS	110			SITE BACKFILL
39	50 YARDS	220			SITE BACKFILL
40	50 YARDS	400		570	CLASS I LANDFILL
41	50 YARDS	400		350	SITE BACKFILL
42	50 YARDS	300		370	SITE BACKFILL
43	50 YARDS	300		220	SITE BACKFILL
44	50 YARDS	180			SITE BACKFILL
45	50 YARDS	60			SITE BACKFILL
45-DUP	50 YARDS	50		< 60	
46	50 YARDS	50			SITE BACKFILL
47	50 YARDS	600			CLASS I LANDFILL
48	50 YARDS	400		680	CLASS I LANDFILL
49	50 YARDS	300			SITE BACKFILL
50	50 YARDS	500			CLASS I LANDFILL
51	50 YARDS	200			SITE BACKFILL
52	50 YARDS	200			SITE BACKFILL
53	50 YARDS	200			SITE BACKFILL
54	50 YARDS	500			CLASS I LANDFILL
55	50 YARDS	200			SITE BACKFILL

TABLE 1

ARSENIC VALUES FOR FIELD TEST
ISAACSON SITE

SAMPLE PILES

SAMPLE NUMBER	PILE SIZE	FIELD ARSENIC PPM AS IS	AVERAGE FOR 10 YD PILES	LAUCK'S As PPM DRY WGT.	DISPOSITION
56-A	10 YARDS	170			SITE BACKFILL
56-B	10 YARDS	600			CLASS I LANDFILL
56-C	10 YARDS	500	394		CLASS I LANDFILL
56-D	10 YARDS	300			SITE BACKFILL
56-E	10 YARDS	400			SITE BACKFILL
57-A	10 YARDS	200			SITE BACKFILL
57-B	10 YARDS	200			SITE BACKFILL
57-C	10 YARDS	200	280		SITE BACKFILL
57-D	10 YARDS	200			SITE BACKFILL
57-D DUP	10 YARDS	200		200	
57-E	10 YARDS	600			CLASS I LANDFILL
58-A	10 YARDS	210			CLASS I LANDFILL
58-B	10 YARDS	600			CLASS I LANDFILL
58-C	10 YARDS	600	502		CLASS I LANDFILL
58-D	10 YARDS	500			CLASS I LANDFILL
58-E	10 YARDS	600			CLASS I LANDFILL
					CLASS I LANDFILL
59-A	10 YARDS	600			CLASS I LANDFILL
59-B	10 YARDS	900	750		CLASS I LANDFILL
					CLASS I LANDFILL
60	50 YARDS	5,000			CLASS I LANDFILL
61	50 YARDS	2,000			CLASS I LANDFILL
62	50 YARDS	1,900			CLASS I LANDFILL
63	50 YARDS	1,500			CLASS I LANDFILL
64	50 YARDS	650			CLASS I LANDFILL
65	50 YARDS	850			CLASS I LANDFILL
66	50 YARDS	350			SITE BACKFILL
67	50 YARDS	650			CLASS I LANDFILL

PILES 68 TO 78 CONSIST OF BACKFILL FROM PREVIOUSLY EXCAVATED COURTYARD AREA AND THUS WERE NOT SAMPLED

SAMPLE NUMBER	PILE SIZE	FIELD ARSENIC PPM AS IS	AVERAGE FOR 10 YD PILES	LAUCK'S As PPM DRY WGT.	DISPOSITION
79	50 YARDS	50			SITE BACKFILL
80	50 YARDS	50			SITE BACKFILL
81	50 YARDS	80			SITE BACKFILL
82	50 YARDS	120			SITE BACKFILL
83	50 YARDS	90		190	SITE BACKFILL
83 DUP	50 YARDS	80			
84	50 YARDS	70			SITE BACKFILL
85	50 YARDS	170			SITE BACKFILL
86	50 YARDS	70			SITE BACKFILL
87	50 YARDS	20			SITE BACKFILL

TABLE 1

ARSENIC VALUES FOR FIELD TEST
ISAACSON SITE

SAMPLE PILES

SAMPLE NUMBER	PILE SIZE	FIELD ARSENIC PPM AS IS	AVERAGE FOR 10 YD PILES	LAUCK'S As PPM DRY WGT.	DISPOSITION
88-A	10 YARDS	< 10			SITE BACKFILL
88-B	10 YARDS	40			SITE BACKFILL
88-C	10 YARDS	90	46		SITE BACKFILL
88-D	10 YARDS	30			SITE BACKFILL
88-E	10 YARDS	60			SITE BACKFILL
89-A	10 YARDS	140			SITE BACKFILL
89-B	10 YARDS	60			SITE BACKFILL
89-C	10 YARDS	40	70		SITE BACKFILL
89-D	10 YARDS	60			SITE BACKFILL
89-E	10 YARDS	50			SITE BACKFILL
*90-A	10 YARDS	90			SITE BACKFILL
91	50 YARDS	50			SITE BACKFILL
92	50 YARDS	50			SITE BACKFILL
93	50 YARDS	100			SITE BACKFILL
94	50 YARDS	110			SITE BACKFILL
95	50 YARDS	100			SITE BACKFILL
96	50 YARDS	80			SITE BACKFILL
97	50 YARDS	110			SITE BACKFILL
98	50 YARDS	70			SITE BACKFILL
99	50 YARDS	70			SITE BACKFILL
100	50 YARDS	70			SITE BACKFILL
100 DUP	50 YARDS	80		210	

PILES 101 THROUGH 111 CONSIST OF BACKFILL FROM THE PREVIOUSLY EXCAVATED BAY 13 AREA AND THUS WERE NOT SAMPLED.

SAMPLE NUMBER	PILE SIZE	FIELD ARSENIC PPM AS IS	AVERAGE FOR 10 YD PILES	LAUCK'S As PPM DRY WGT.	DISPOSITION
112	50 YARDS	70			SITE BACKFILL
113	50 YARDS	10			SITE BACKFILL
114	50 YARDS	< 10			SITE BACKFILL
115	50 YARDS	< 10			SITE BACKFILL
116	50 YARDS	< 10			SITE BACKFILL
117	50 YARDS	< 45			SITE BACKFILL
118	50 YARDS	< 45			SITE BACKFILL
119	50 YARDS	< 45			SITE BACKFILL
120	50 YARDS	< 45			SITE BACKFILL
121	50 YARDS	< 45			SITE BACKFILL
122	50 YARDS	<10			SITE BACKFILL
123	50 YARDS	<10			SITE BACKFILL
124	50 YARDS	<10		77	SITE BACKFILL
125	50 YARDS	<10			SITE BACKFILL
126	50 YARDS	<10			SITE BACKFILL

* ONE TEN CUBIC YARD PILE REMAINING FROM 89

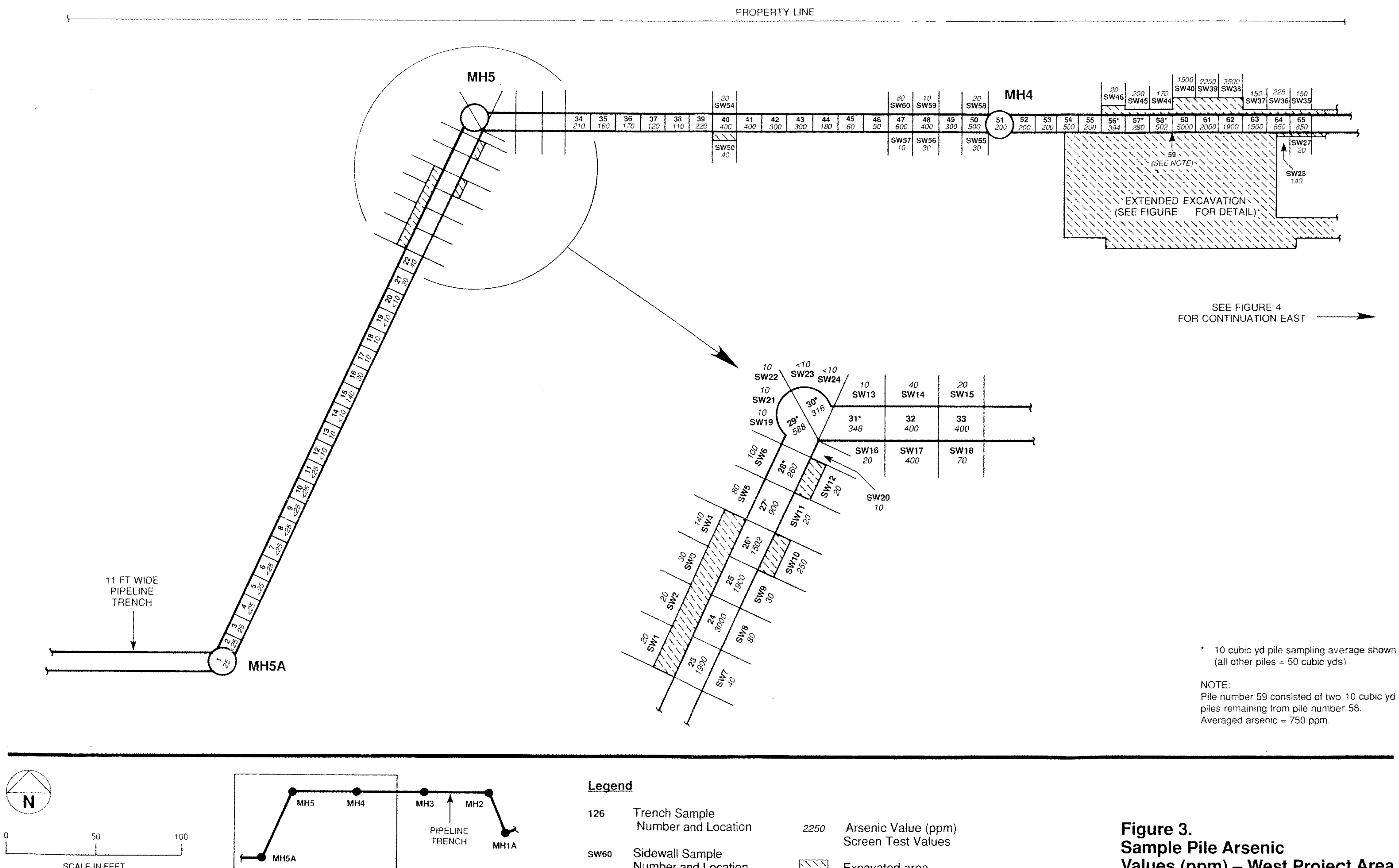
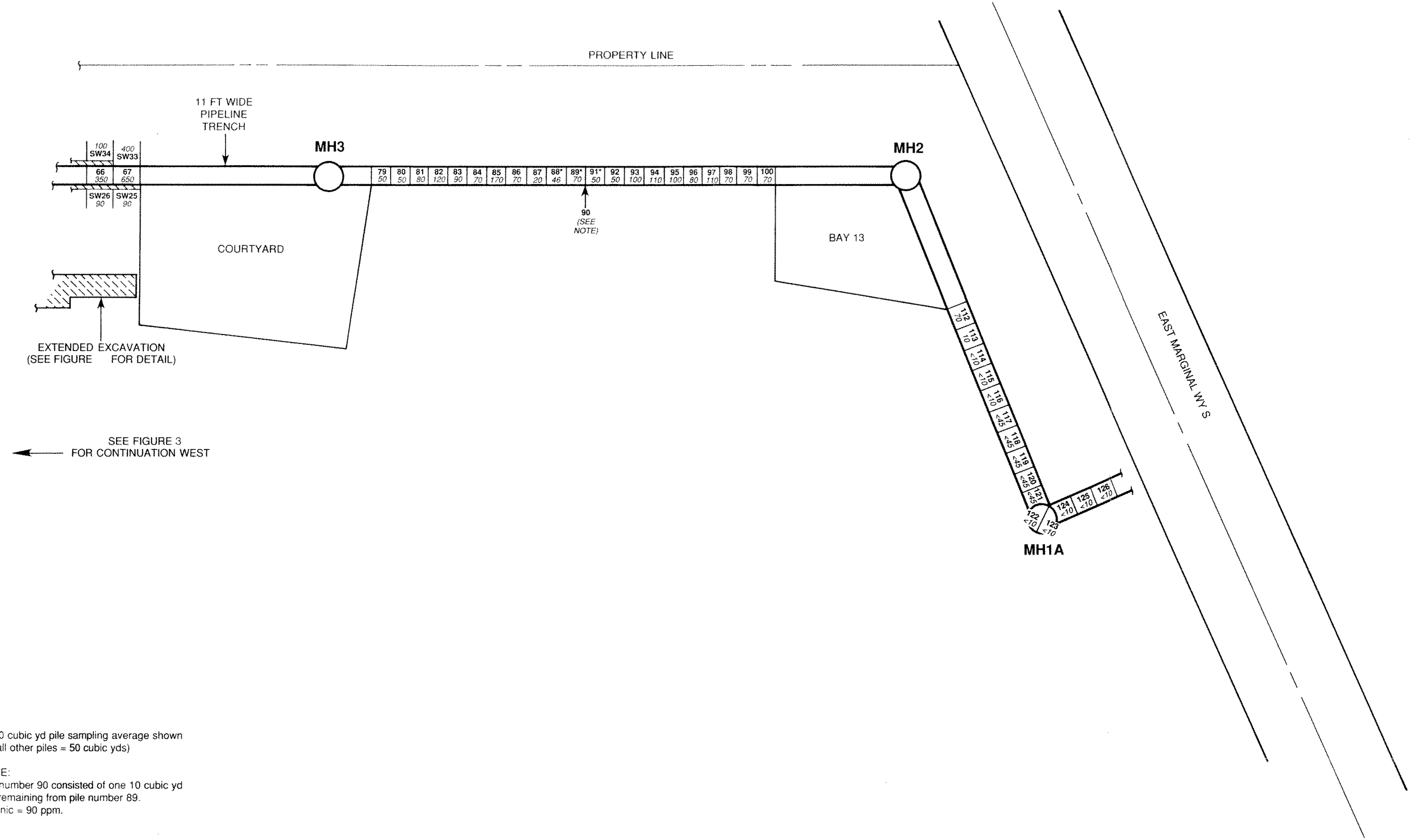
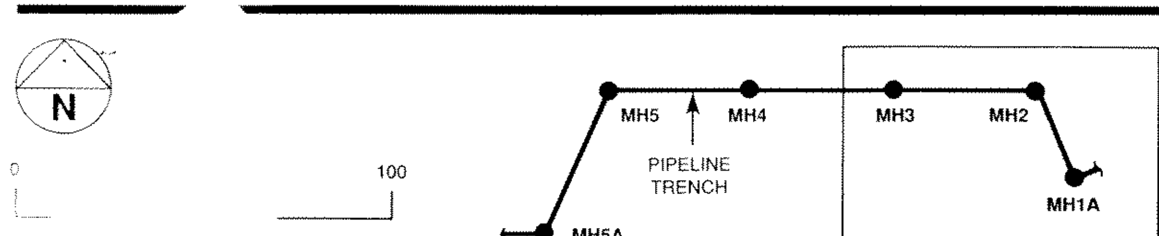


Figure 3. Sample Pile Arsenic Values (ppm) – West Project Area



* 10 cubic yd pile sampling average shown (all other piles = 50 cubic yds)

NOTE:
Pile number 90 consisted of one 10 cubic yd pile remaining from pile number 89.
Arsenic = 90 ppm.



Legend

26	Trench Sample Number and Location
SW33	Sidewall Sample Number and Location
2250	Arsenic Value (ppm) Screen Test Values
(hatched)	Excavated area

Figure 4.
Sample Pile Arsenic Values (ppm) – East Project Area

TABLE 2

PIPELINE
SIDEWALL SAMPLES
ARSENIC VALUES

SIDEWALL SAMPLE NUMBER	ASSOCIATED PILE # WALL SIDE	PRIMARY SERIES ARSENIC PPM AS IS	-A SERIES 5 FT ADD'N ARSENIC PPM AS IS	PRIMARY SERIES LAUCK'S As PPM DRY
SW1	23W	20		
SW2	24W	1,750	20	
SW3	25W	2,500	30	3,300
SW4	26W	2,750	140	4,000
SW5	27W	80		
SW6	28W	100		
SW7	23E	40		
SW7 DUP	23E	40		180
SW8	24E	80		
SW9	25E	30		
SW10	26E	2,750	250	3,000
SW11	27E	20		
SW12	28E	1,200	20	
SW13	31N	10		
SW14	32N	40		
SW15	33N	20		
SW16	31S	20		
SW17	32S	400		270
SW18	33S	70		
SW19	30N	10		
SW20	30N	10		
SW21	29W	10		
SW22	29W	10		
SW23	30N	< 10		
SW24	30N	< 10		

UNLESS OTHERWISE SPECIFIED, THE ARSENIC VALUES ARE THE FIELD TEST VALUES.

"PRIMARY SERIES" ARE THE ARSENIC VALUES FOR THE ORIGINAL SIDEWALL.

"-A SERIES" COLUMN ARE THE ARSENIC VALUES AFTER FIVE FEET OF SOIL HAD BEEN EXCAVATED.

SAMPLES 1 TO 24 ARE FOR PILES 23 TO 33. BEGINNING 66 FEET SOUTH OF MANHOLE 5 PROCEEDING NORTH AND FOLLOWING THE TRENCH AROUND THE MANHOLE. SIDEWALL LENGTHS ARE TEN FEET EACH.

SAMPLES SW19 TO SW24 WERE TAKEN FROM THE WALL AROUND MANHOLE 5.

TABLE 2

PIPELINE
SIDEWALL SAMPLES
ARSENIC VALUES

SIDEWALL SAMPLE NUMBER	ASSOCIATED PILE # WALL SIDE	PRIMARY SERIES ARSENIC PPM AS IS	-A SERIES 3 FT ADD'N ARSENIC PPM AS IS	PRIMARY SERIES LAUCK'S AS PPM DRY
SW25	67 S	250	90	
SW26	66 S	1,000	90	
SW27	65 S	600	20	
SW28	64 S	500	140	
SW29	63 S	2,000	2,000	
SW30	62 S	2,000	1,500	
SW31	61 S	2,500	1,500	
SW32	60 S	1,750	7,500	
SW33	67 N	400	-	
SW34	66 N	550	100	
SW35	65 N	450	150	
SW36	64 N	300	225	
SW37	63 N	700	150	
SW38	62 N	1,350	1,500	
SW39	61 N	950	1,580	
SW40	60 N	750	1,750	
SW40 DUP	60 N	750	-	1,200
SW41	58 S	1,250	1,500	
SW42	57 S	1,250	3,000	
SW43	56 S	600	<10	
SW44	58 N	250	170	
SW45	57 N	300	200	
SW46	56 N	400	680	
SW47	43 S	-	-	
SW48	42 S	-	-	
SW49	41 S	-	-	
SW50	40 S	1,300	40	
SW54	40 N	20		
SW51	43 N	-	-	
SW52	42 N	-	-	
SW53	41 N	-	-	
SW55	50 S	30	-	
SW56	48 S	30	-	< 60
SW57	47 S	10	-	
SW58	50 N	20	-	
SW59	48 N	10	-	
SW60	47 N	80	-	

SIDEWALL SAMPLE NUMBER 25 BEGINS 106 FEET WEST OF MANHOLE 3. SIDEWALL SAMPLE MEASUREMENT LOCATIONS FOR SAMPLE NUMBERS 25 THROUGH 60 ARE BASED ON THIS INITIAL POINT. SIDEWALL LENGTHS ARE 12 FEET.

SAMPLES SW47 TO SW49 AND SW51 TO SW53, WERE NOT ANALYSED AS THE ASSOCIATED PILE HAD ASENIC VALUES BELOW THE THRESHOLD VALUE.

TABLE 3

EXTENDED EXCAVATION
SIDEWALL ARSENIC VALUES

SIDEWALL SAMPLE NUMBER	ASSOCIATED PILE # WALL SIDE	PRIMARY SERIES ARSENIC PPM AS IS	3 FT ADD'N -A SERIES ARSENIC PPM AS IS	5 FT ADD'N -B SERIES ARSENIC PPM AS IS	10 FT ADD'N -C SERIES ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.
SW25	67 S	250	90	--	--	
SW26	66 S	1,000	90	--	--	
SW27	65 S	600	20	--	--	
SW28	64 S	500	140	--	--	
SW29	63 S	2,000	2,000	2,750	3,500	
SW30	62 S	2,000	1,500	2,500	3,000	
SW31	61 S	2,500	1,500	2,500	4,250	
SW32	60 S	1,750	7,500	1,750	750	
SW32-C DUP		--	--	--	750	
SW41	58 S	1,250	2,750	1,500	1,250	
SW42	57 S	1,250	750	3,000	600	
SW43	56 S	600	950	<10	--	
SW33	67 N	400	--	--	--	
SW34	66 N	550	100	--	--	
SW35	65 N	450	150	--	--	
SW34-A DUP	65 N	--	135	--	--	380
SW36	64 N	300	225	--	--	
SW37	63 N	700	150	--	--	
SW38	62 N	1,350	1,500	2,500	3,500	
SW39	61 N	950	1,580	1,750	2,250	
SW40	60 N	750	1,750	4,250	1,500	
SW40 DUP		750	--	--	--	1,200
SW44	58 N	250	170	--	--	
SW45	57 N	300	200	--	--	
SW46	56 N	400	680	20	--	

UNLESS OTHERWISE SPECIFIED, THE ARSENIC VALUES ARE THE FIELD TEST VALUES.

TABLE 3

EXTENDED EXCAVATION
SIDEWALL ARSENIC VALUES

SIDEWALL SAMPLE NUMBER	-D SERIES 6 Ft Add'n ARSENIC PPM AS IS	-E SERIES 6 Ft Add'n ARSENIC PPM AS IS	-F SERIES 6Ft Add'n ARSENIC PPM AS IS	-G SERIES 6Ft Add'n ARSENIC PPM AS IS	-H SERIES 6Ft ADD'N ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.
SW29	1,750	3,500	3,500	1,000	550	
SW30	2,500	1,750	3,500	8,750	1,750	
SW30-H DUP	--	--	--	--	1,500	1,200
SW31	4,750	3,250	10,000	6,250	1,500	
SW32	4,500	3,750	7,500	10,000	2,000	
SW41	2,750	3,500	6,250	1,000	3,500	
SW42	2,000	4,500	6,250	12,500	6,250	
SW42-F DUP	--	--	7,500	--	--	8,300
SW43 *	--	--	3,500	5,000	6,250	

SIDEWALL SAMPLE NUMBER	-I SERIES 6 FT ADD'N. ARSENIC PPM AS IS	-I SERIES LAUCK'S As PPM DRY WGT.
SW28	70	220
SW29	300	320
SW30	200	270
SW31	250	290
SW32	400	550
SW41	300	450
SW41-I DUP	300	500
SW42	200	490
SW43	200	330
SW61	1,500	-
SW62	800	-

61-I AND 62-I ARE THE SOUTH WALL SAMPLES AFTER THIS AREA WAS EXPOSED BY FURTHER REMOVAL OF THE WEST WALL ON 2/19/90. 61-I IS ADJACENT TO 43-I AND PROCEEDS WEST.

* ONE-HALF WALL LENGTH.

TABLE 3

EXTENDED EXCAVATION
NORTH AND SOUTH WALLS
FINGER PIT
SIDEWALL ARSENIC VALUES

SIDEWALL SAMPLE No.	-H SERIES ARSENIC PPM AS IS	-H SERIES LAUCK'S As PPM DRY	-EE SERIES ARSENIC PPM AS IS	-EE SERIES LAUCK'S As PPM DRY
SW25	350	730	110	400
SW26	190	770	450	1,600
SW27	400	800	130	620
SW28	3,250	--	120	870

"-H SERIES" IS THE SOUTH WALL OF THE TRENCH, EXTENDING EAST OF THE MAIN EXCAVATION. #28 IS ADJACENT TO THE MAIN EXCAVATION, WITH #25 BEING THE FARTHEST EAST.
THIS TRENCH CORRESPONDS TO THE E-400 SERIES.

"-EE SERIES" IS THE NORTH WALL OF THE ABOVE DESCRIBED TRENCH FINGER.

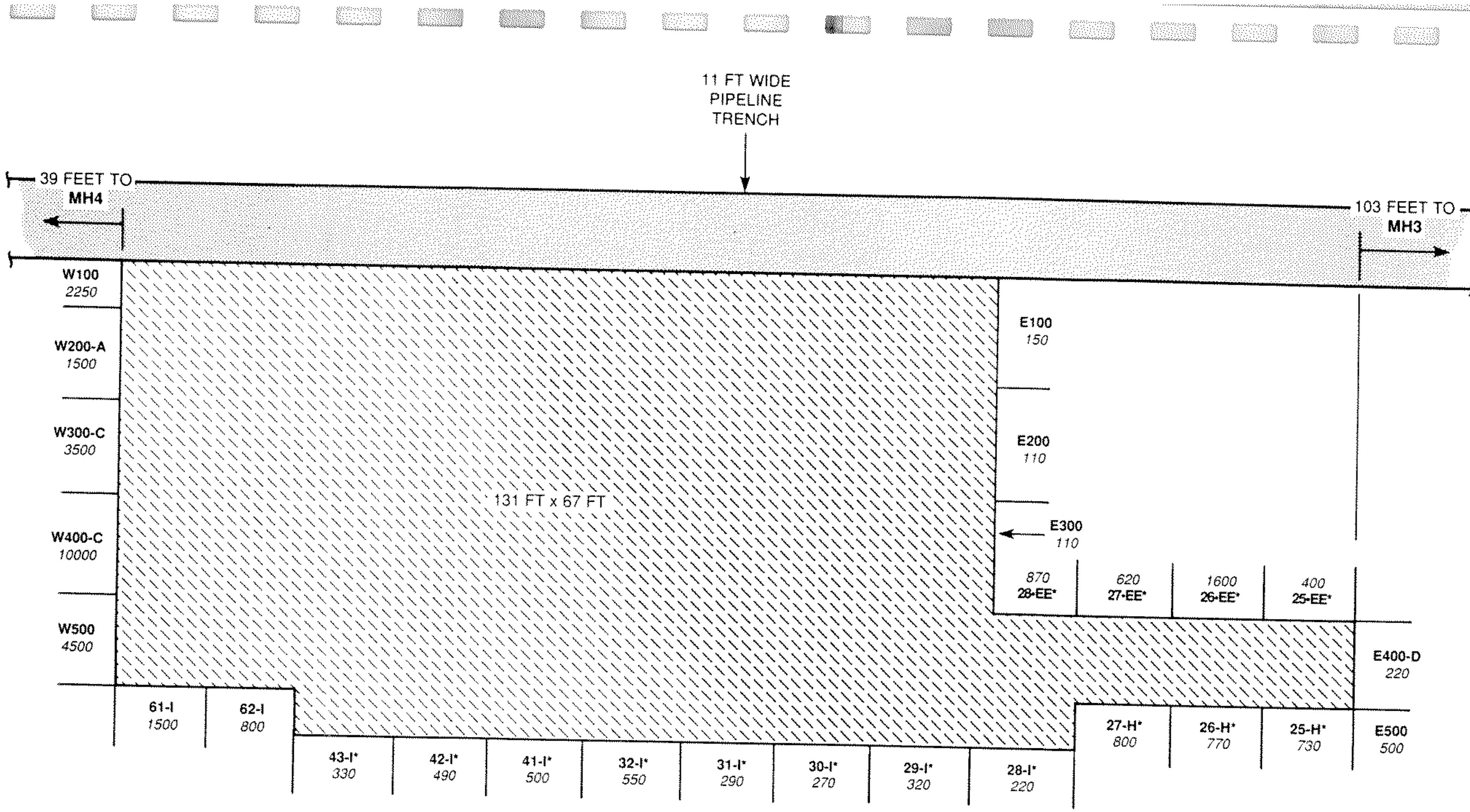
PLEASE REFER TO FIGURE 6 FOR CLARIFICATION OF LOCATIONS.

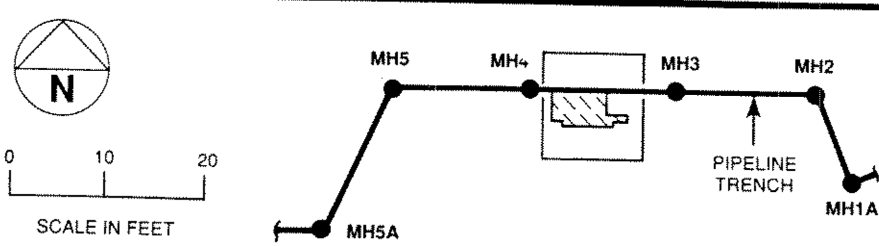
TABLE 3

EXTENDED EXCAVATION
EAST AND WEST WALLS
SIDEWALL ARSENIC VALUES

SIDEWALL SAMPLE No.	INITIAL & PARTIAL DUG ARSENIC PPM AS IS	-D SERIES 5 Ft ADD'N ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.
SW E-100	150		
SW E-200	110		
SW E-300	110		
SW E-400C	3,000	220	
SW E-500	500		
SW W-100	1,050	2,250	
SW W-200A	1,500	1,500	
SW W-300C	5,250	3,500	
SW W-400C	5,000	10,000	
SW W-400C DUP	5,000	--	8,900
SW W-500	11,250	4,500	

THE EAST AND WEST WALLS ARE DESIGNATED BY AN "E" OR "W" SUFFIX RESPECTIVELY.





Legend

W100 Sample Number

2250 Arsenic Value (ppm) Screen Test Values

* Lauck's Arsenic Value (ppm)

Excavated area

Figure 6. Excavation Detail

TABLE 4

TEST PITS
ARSENIC VALUES

-AA SERIES ARE COMPOSITES OF 1 TO 3 FOOT DEPTH
-A SERIES ARE COMPOSITES OF 3 TO 5 FOOT DEPTH
-B SERIES ARE COMPOSITES OF 5 TO 9 FOOT DEPTH

TEST PIT NUMBER	FIELD ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.	SOIL PROFILE DESCRIPTION
1A-A	300		GREY/BLACK CLAY WOOD BARK BENEATH
1A-B	3,250		HARD SAND, GREY MOTTLED CLAY BENEATH
1B-A	8,750		SIMILAR TO 1A
1B-B	13,750	16,000	SIMILAR TO 1A
1C-A	1,750		SIMILAR TO 1A
1C-B	250		SIMILAR TO 1A
1D-A	140		COARSE BROWN SAND
1D-B	400	680	GREY MOTTLED CLAY
2A-A	750		SIMILAR TO 1A
2A-B	3,250		SIMILAR TO 1A
2B-A	1,000		SIMILAR TO 1A
2B-B	11,250	16,000	SIMILAR TO 1A
2C-A	130		SIMILAR TO 1A
2C-B	20		SIMILAR TO 1A
3A-A	80		SIMILAR TO 1A
3A-B	3,250		SIMILAR TO 1A
3B-A	1,750		SIMILAR TO 1A
3B-B	10,000		SIMILAR TO 1A
3C-A	60		SIMILAR TO 1A, BLACK CLAY THINNER
3C-B	<10	110	GREY MOTTLED CLAY, NO HARD SAND
3I-AA	30		FINE BROWN SAND
3I-A	20		SAND AND DIRT
3I-B	10	60	DIRT AND GRAVEL, NO CLAY
4A-A	400		SIMILAR TO 1A
4A-B	3,750		SIMILAR TO 1A
4B-A	3,500		SIMILAR TO 1A
4B-B	15,000		SIMILAR TO 1A
4B-B DUP	15,000		SIMILAR TO 1A
4C-A	<10		SIMILAR TO 3C
4C-B	<10		SIMILAR TO 3C
5A-A	110		SIMILAR TO 1A
5A-B	5,250		SIMILAR TO 1A
5B-A	7,500		SIMILAR TO 1A
5B-B	12,500		SIMILAR TO 1A
5C-A	350		SIMILAR TO 3C
5C-B	450		SIMILAR TO 3C
6A-A	3,000		SIMILAR TO 1A
6A-B	450		SIMILAR TO 1A
6B-A	200	390	SIMILAR TO 1A
6B-B	12,500		SIMILAR TO 1A

TABLE 4

TEST PITS
ARSENIC VALUES

-AA SERIES ARE COMPOSITES OF 1 TO 3 FOOT DEPTH
-A SERIES ARE COMPOSITES OF 3 TO 5 FOOT DEPTH
-B SERIES ARE COMPOSITES OF 5 TO 9 FOOT DEPTH

TEST PIT NUMBER	FIELD ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.	SOIL PROFILE DESCRIPTION
6C-A	2,500	3,500	SIMILAR TO 1A
6C-B	120		SIMILAR TO 1A
6E-AA	50		COARSE BROWN SAND
6E-A	450		BROWN SAND
6E-B	3,500		SAND AND MOTTLED CLAY BENEATH
6F-AA	60		SAND
6F-A	90		THIN BLACK CALY BAND, SAND BENEATH
6F-B	10	98	SAND, MOTTLED CLAY BENEATH
6I-AA	300		SAND AND GRAVEL
6I-A	10		SAND, THIN LAYER BLACK CLAY BENEATH
6I-B	20	<60	SAND, MOTTLED CLAY BENEATH
6J-AA	<20		SAND
6J-A	120		SAND, GRAVEL
6J-B	4,000		SAND, GRAVEL, IRON CABLE
6K-AA	<10		SAND
6K-A	<10		SAND, DIRT
6K-B	<10	<60	DIRT, GRAVEL
7A-A	NOT SAMPLED		
7B-A	450		GREY/BLACK CLAY, WOOD BARK BENEATH
7B-B	10,000		HARD SAND, GREY MOTTLED CLAY BENEATH
7C-A	2,500		SIMILAR TO 7B
7C-B	1,000		SIMILAR TO 7B
8A-AA	10		COARSE BROWN SAND
8A-A	400		GREY/BLACK CLAY, WOOD BARK BENEATH
8A-B	5,000		HARD LIGHT BROWN SAND
8B-A	450		SIMILAR TO 7B
8B-B	13,750		SIMILAR TO 7B
8C-	NOT SAMPLED		
8D-AA	50	180	BROWN SAND AND CLAY
8D-A	850		BROWN SAND AND CLAY
8D-B	200		BROWN SAND AND CLAY
8E-AA	40		SAND
8E-A	4,250		GREY/BALCK CLAY NO BARK
8E-B	2,500	4,000	GREY MOTTLED LIGHT BROWN CLAY
8F-AA	20		COARSE BROWN SAND
8F-A	550		SAND, GREY/BALCK CLAY
8F-B	6,000		GREY MOTTLED LIGHT BROWN CLAY
8G-AA	150		GRAVEL, SAND
8G-A	750		SAND, LIGHT GREY CLAY
8G-B	1,100		SAND, GREY MOTTLED BROWN CLAY

TABLE 4

TEST PITS
ARSENIC VALUES

-AA SERIES ARE COMPOSITES OF 1 TO 3 FOOT DEPTH
-A SERIES ARE COMPOSITES OF 3 TO 5 FOOT DEPTH
-B SERIES ARE COMPOSITES OF 5 TO 9 FOOT DEPTH

TEST PIT NUMBER	FIELD ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.	SOIL PROFILE DESCRIPTION
8H-AA	250		SAND, GRAVEL
8H-A	30		SAND, GREY CLAY, GREY/BLACK CLAY
8H-B	2,500		BLACK CLAY, GREY MOTTLED CLAY
8I-AA	500		SAND, GRAVEL
8I-A	650		SAND
8I-B	2,000	3,300	SAND, GREY MOTTLED CALY
8J-AA	<20		COARSE AND FINE BROWN SAND
8J-A	<20		SAND, GRAVEL, SLAG
8J-B	20		SAND, BROKEN BRICK, SLAG
9B-A	210	330	GREY/BALCK GLAY
9B-B	13,000		HARD SAND, GREY MOTTLED CLAY
10B-A	50		SIMILAR TO 9B
10B-B	13,750		SIMILAR TO 9B
10I-AA	30		COARSE BROWN SAND
10I-A	--		UNABLE TO SAMPLE
10I-B	--		SOLELY SLAG & BRICK.
10J-AA	<20		COARSE AND FINE GRAVEL
10J-A	<20		SLAG AND BRICK PIECES
10J-B	<20		SLAG AND BRICK PIECES
11A-AA	30		SAND
11A-A	30		GREY/BALCK CLAY
11A-B	4,500		GREY MOTTLED LIGHT BROWN CALY
11B-A	90		GREY/BALCK GLAY
11B-B	12,500		HARD SAND, GREY MOTTLED CLAY
11D-AA	30	150	SAND
11D-A	20		GREY/BALCK CLAY
11D-A DUP	10	150	
11D-B	20	<60	GREY FINE LOOSE SAND
12B-A	300	550	GREY/BALCK CLAY
12B-B	12,500	23,000	HARD TAN SAND
13B-A	300	890	SIMILAR TO 12B
13B-B	20,000	24,000	SIMILAR TO 12B
14A-AA	15		SAND
14A-A	10		GREY/BLACK CLAY
14A-B	5,000		GREY MOTTLED LIGHT BROWN CLAY
14B-A	1,500		SIMILAR TO 12B
14B-B	15,000		SIMILAR TO 12B

TABLE 4

TEST PITS
ARSENIC VALUES

-AA SERIES ARE COMPOSITES OF 1 TO 3 FOOT DEPTH
-A SERIES ARE COMPOSITES OF 3 TO 5 FOOT DEPTH
-B SERIES ARE COMPOSITES OF 5 TO 9 FOOT DEPTH
XN- SERIES WERE SAMPLED NORTH OF THE PIPELINE.

TEST PIT NUMBER	FIELD ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.	SOIL PROFILE DESCRIPTION
14D-AA	<10		DARK CALY
14D-A	20		SAND, DARK CLAY
14D-B	170	360	SIMILAR TO 12B
15B-A	3,500		SIMILAR TO 12B
15B-B	15,000		SIMILAR TO 12B
16A-AA	50		SIMILAR TO 12B
16A-A	20		SIMILAR TO 12B
16A-B	3,250		SIMILAR TO 12B
16B-A	350		SIMILAR TO 12B
16B-B	650		SIMILAR TO 12B
17B-A	16,250		GREY/BLACK CLAY, BARK BENEATH
17B-B	16,250		GREY MOTTLED CLAY, SAND
17C-AA	70		COARSE BROWN SAND
17C-A	20		GREY CALY
17C-B	<10	99	SAND
17D-AA	<10		BROWN SAND
17D-A	20		SAND
17D-B	40	180	DARK GREY CLAY
18A-AA	<10		SAND
18A-AA DUP	<10	130	
18A-A	20		GREY/BLACK CLAY
18A-B	4,200	5,000	GREY MOTTLED CALY
18B-AA	10		SIMILAR TO 18A
18B-A	80	290	SIMILAR TO 18A
18B-B	2,250		SIMILAR TO 18A
18C-AA	<10		SIMILAR TO 18A
18C-A	10		SIMILAR TO 18A
18C-B	1,750		SIMILAR TO 18A
18D-AA	<10		SIMILAR TO 18A
18D-A	10		SIMILAR TO 18A
18D-B	3,250		SIMILAR TO 18A
18E-AA	10		SAND
18E-A	20		GREY MOTTLED CLAY
18E-B	100	200	GREY SANDY SOIL
18N-AA	<10		SAND
18N-A	30		SAND, BLACK CLAY
18N-B	350	310	BALCK CLAY, GREY MOTTLED CLAY

TABLE 4

TEST PITS
ARSENIC VALUES

-AA SERIES ARE COMPOSITES OF 1 TO 3 FOOT DEPTH
-A SERIES ARE COMPOSITES OF 3 TO 5 FOOT DEPTH
-B SERIES ARE COMPOSITES OF 5 TO 9 FOOT DEPTH
XN- SERIES WERE SAMPLED NORTH OF THE PIPELINE.

TEST PIT NUMBER	FIELD ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.	SOIL PROFILE DESCRIPTION
19B-AA	10		SIMILAR TO 18A
19B-A	30		SIMILAR TO 18A
19B-B	2,000		SIMILAR TO 18A
20B-AA	10		SAND, BROWN CLAY
20B-A DUP	10	110	
20B-A	20		GREY/BLACK CLAY
20B-B	2,000		HARD SAND, GREY MOTTLED CLAY
20C-AA	<10		SAND
20C-A	20		GREY/BALCK CLAY
20C-B	350	840	GREY MOTTLED CLAY, SAND
20D-AA	<10		BROWN SAND
20D-A	10		GREY SAND
20D-B	170	290	GREY MOTTLED CLAY
21B-AA	10		COARSE BROWN SAND
21B-A	30	140	SIMILAR TO 20B
21B-B	5,250		SIMILAR TO 20B
22A-AA	20		SAND
22A-AA DUP	10	160	
22A-A	<10		GREY/BLACK CLAY
22A-B	980	1,100	GREY/BLACK CLAY, GREY MOTTLED CLAY
22B-AA	10		SIMILAR TO 21B
22B-A	10		SIMILAR TO 21B
22B-B	4,000		SIMILAR TO 21B
22C-AA	<10		SAND
22C-A	<10		SOLID AND BROKEN SLAG
22C-B	500		GREY MOTTLED CLAY
22C-B DUP	450	1,000	
22D-AA	<10		SAND
22D-A	10		SAND, CLAY
22D-B	70	290	GREY/BALCK CLAY,DARK GREY SAND
22N-AA	<10		COARSE SAND
22N-A	40		SAND, GREY/BLACK CLAY
22N-B	10	150	GREY/BLACK CLAY, GREY MOTTLED CLAY
23B-AA	10		SIMILAR TO 21B
23B-A	10	180	SIMILAR TO 21B
23B-B	2,750		SIMILAR TO 21B
24B-AA	10		SIMILAR TO 21B
24B-A	50		SIMILAR TO 21B
24B-B	2,250		SIMILAR TO 21B

TABLE 4

TEST PITS
ARSENIC VALUES

-AA SERIES ARE COMPOSITES OF 1 TO 3 FOOT DEPTH
-A SERIES ARE COMPOSITES OF 3 TO 5 FOOT DEPTH
-B SERIES ARE COMPOSITES OF 5 TO 9 FOOT DEPTH
XN- SERIES WERE SAMPLED NORTH OF THE PIPELINE.

TEST PIT NUMBER	FIELD ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.	SOIL PROFILE DESCRIPTION
25A-AA	<10		BROWN SAND
25A-A	<10		GREY/BLACK CALY
25A-B	160	460	DARK GREY MOTTLED CALY
25B-AA	<10		SIMILAR TO 21B
25B-A	10		SIMILAR TO 21B
25B-B	950		SIMILAR TO 21B
25C-AA	<10		SIMILAR TO 21B
25C-A	<10		SIMILAR TO 21B
25C-B	1,500		SIMILAR TO 21B
25D-AA	<10		SIMILAR TO 25A
25D-A	<10		SIMILAR TO 25A
25D-B	130	410	SIMILAR TO 25A
25N-AA	50		SIMILAR TO 22N
25N-A	<10		SIMILAR TO 22N
25N-B	30	120	SIMILAR TO 22N
26B-AA	<10		COARSE BROWN SAND
26B-A	<10		GREY/BALCK CLAY
26B-B	2,500		SAND & SLAG
27B-AA	<10		BROWN & ORANGE SAND
27B-A	650	90	GREY/BLACK CLAY
27B-B	2,000		GREY MOTTLED BROWN CLAY
28A-AA	10		BROWN SAND
28A-A	40		SAND, GREY/BLACK CLAY
28A-B	100	280	GREY/BLACK CLAY, GREY MOTTLED CLAY
28B-AA	<10		BROWN COARSE SAND
28B-A	<10		BROWN SAND
28B-B	100		GREY/BLACK CLAY, GREY MOTTLED CLAY
28D-AA	20		SAND, SLAG LAYER
28D-A	10		BROWN SAND
28D-B	40	200	GREY MOTTLED BROWN CLAY

TABLE 4

TEST PITS
ARSENIC VALUES

-AA SERIES ARE COMPOSITES OF 1 TO 3 FOOT DEPTH
-A SERIES ARE COMPOSITES OF 3 TO 5 FOOT DEPTH
-B SERIES ARE COMPOSITES OF 5 TO 9 FOOT DEPTH
XN- SERIES WERE SAMPLED NORTH OF THE PIPELINE.

TEST PIT NUMBER	FIELD ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.	SOIL PROFILE DESCRIPTION
29B-AA	<10		COARSE BROWN SAND & SALG
29B-A	<10		SIMILAR TO 28B
29B-B	3,500		SIMILAR TO 28B
30B-AA	<10		BROWN SAND & SLAG LAYER
30B-A	<10	270	BROWN SAND
30B-B	280	400	GREY MOTTLED CLAY
31A-AA	10		BROWN SAND, SLAG LAYER
31A-A	10		GREY/BLACK CLAY
31A-B	10	140	GREY/BLACK CLAY, GREY MOTTLED CLAY
31B-AA	<10		COARSE BROWN SAND
31B-A	<10	270	COARSE BROWN SAND
31B-A DUP	<10		
31B-B	10	330	COARSE BROWN SAND, GREY MOTTLED CLAY
31D-AA	10		BROWN SAND, SLAY LAYER
31D-A	20		BROWN COARSE SAND
31D-B	170		GREY MOTTLED BROWN CLAY

TABLE 4

TEST PITS
ARSENIC VALUES

-AA SERIES ARE COMPOSITES OF 1 TO 3 FOOT DEPTH
-A SERIES ARE COMPOSITES OF 3 TO 5 FOOT DEPTH
-B SERIES ARE COMPOSITES OF 5 TO 9 FOOT DEPTH

TEST PIT NUMBER	FIELD ARSENIC PPM AS IS	LAUCK'S As PPM DRY WGT.	SOIL PROFILE DESCRIPTION
101A-AA	45		COARSE BROWN SAND
101A-A	2,200		BROWN & YELLOW SAND
101A-B	1,900	1,600	BROWN CLAY, SAND, LOAM
101B-AA	250		COARSE BROWN SAND, WHITE SAND
101B-A	15		BROWN LOAM, BROWN SAND
101B-B	3,200	3,100	BROWN CLAY

101C SERIES NOT SAMPLED.
CONCRETE SLAB 2 FEET DOWN

102A-AA	35		COARSE BROWN SAND
102A-A	8		YELLOW AND RUST COLORED SAND
102A-B	1,400		BROWN CLAY, BROWN SAND
102B-AA	40		COARSE BROWN SAND
102B-A	<10		COARSE BROWN SAND, WHITE SAND
102B-B	100	160	ROSE BROWN CLAY, SAND
102C-AA	25		COARSE BROWN SAND
102C-A	20		WHITE, YELLOW, & RUST SAND
102C-B	20	82	ROSE BROWN SAND, CONCRETRE SLAB
103A-AA	250		COARSE BROWN SAND
103A-A	30		YELLOW & RUST SAND
103A-B	2,800	2,900	BROWN CLAY, GREY MOTTLED CLAY
103B-AA	10		COARSE BROWN SAND
103B-A	15		RUST COLORED SAND
103B-B	110	220	BROWN CLAY, BROWN SAND
103C-AA	10		SIMILAR TO 103B
103C-A	10		SIMILAR TO 103B
103C-B	250	350	SIMILAR TO 103B

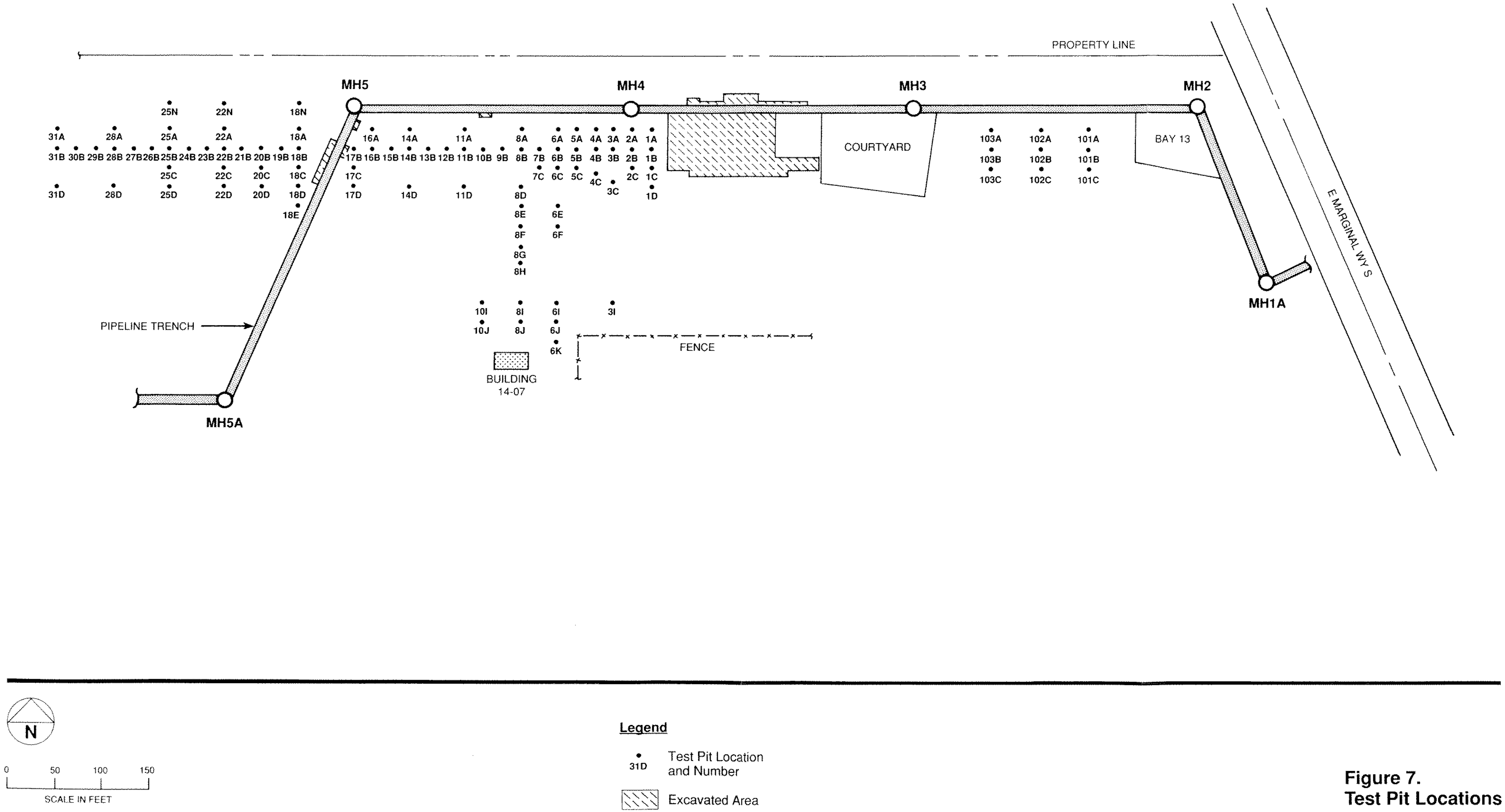
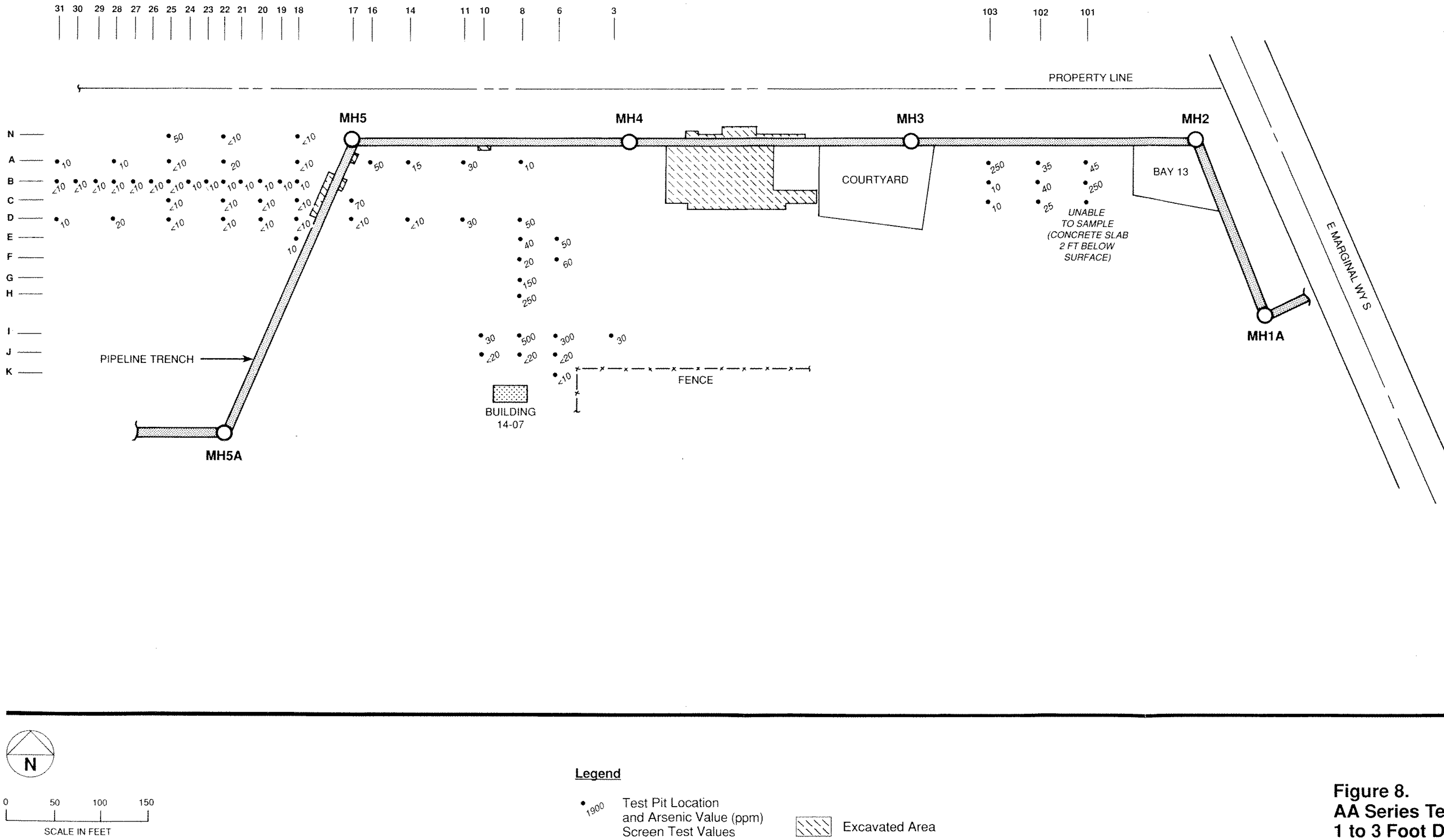


Figure 7.
Test Pit Locations

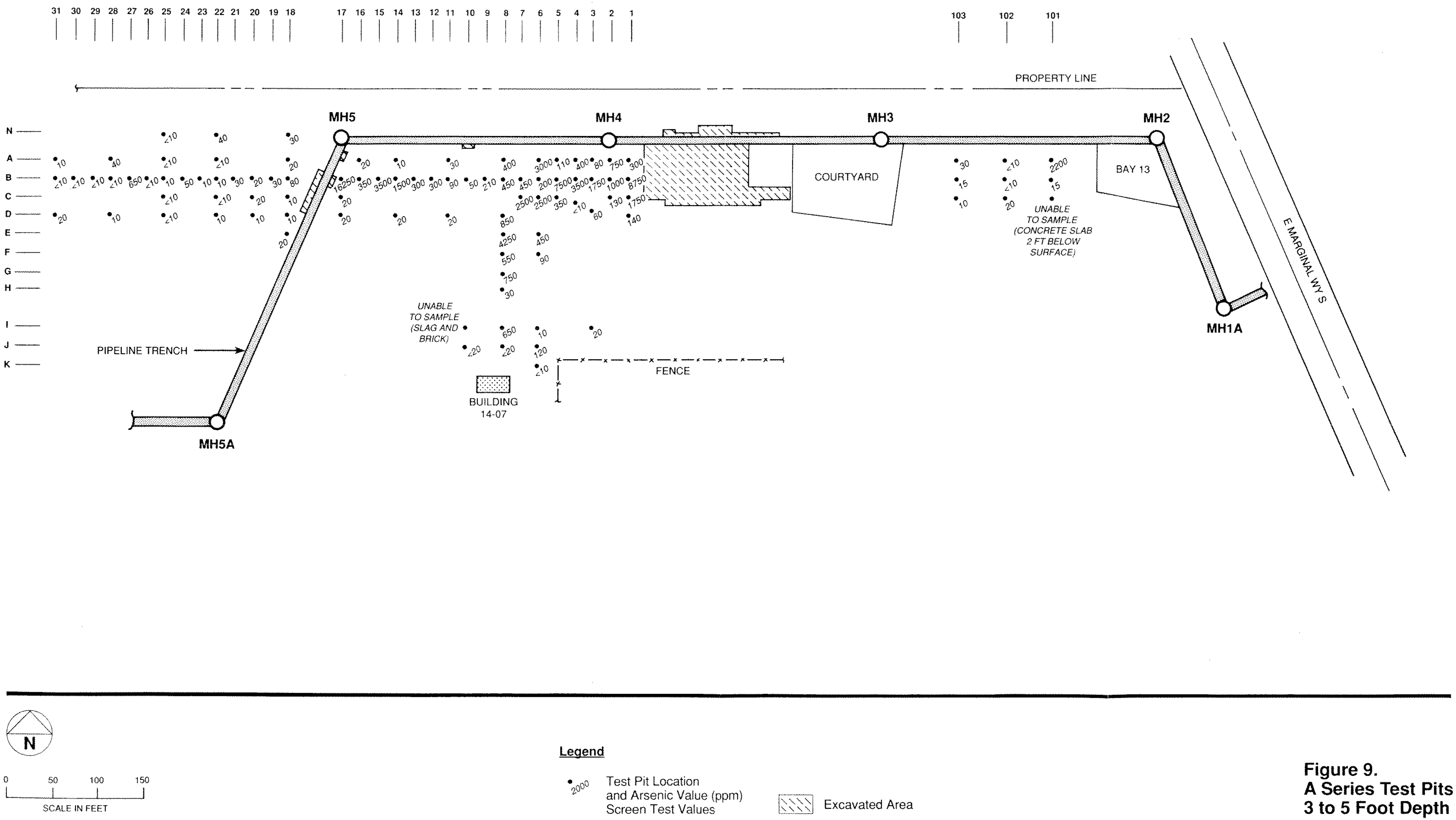


Legend

• 1900 Test Pit Location and Arsenic Value (ppm) Screen Test Values

Excavated Area

Figure 8. AA Series Test Pits 1 to 3 Foot Depth

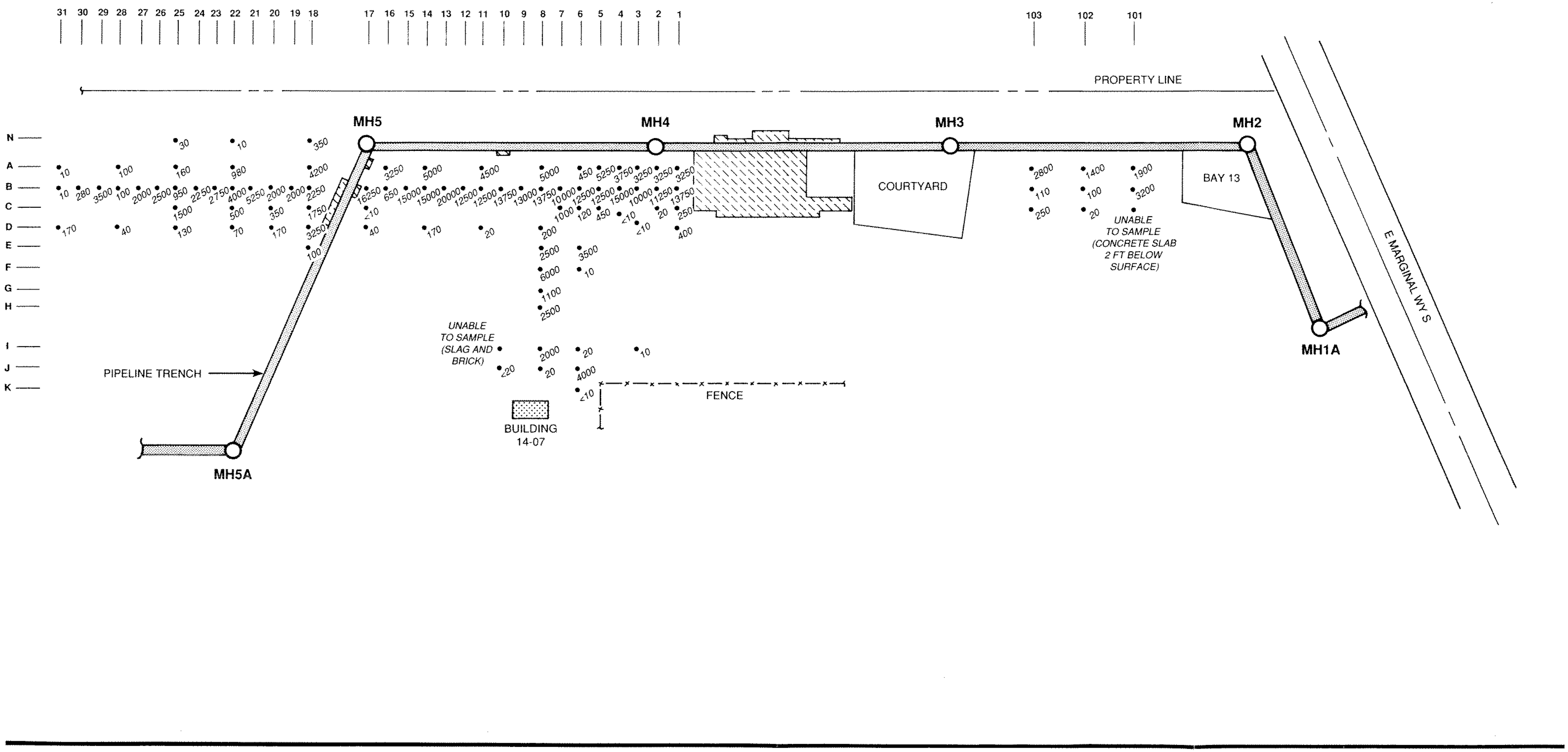


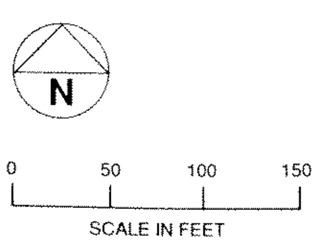
Legend

2000 Test Pit Location and Arsenic Value (ppm) Screen Test Values

Excavated Area

Figure 9.
A Series Test Pits 3 to 5 Foot Depth



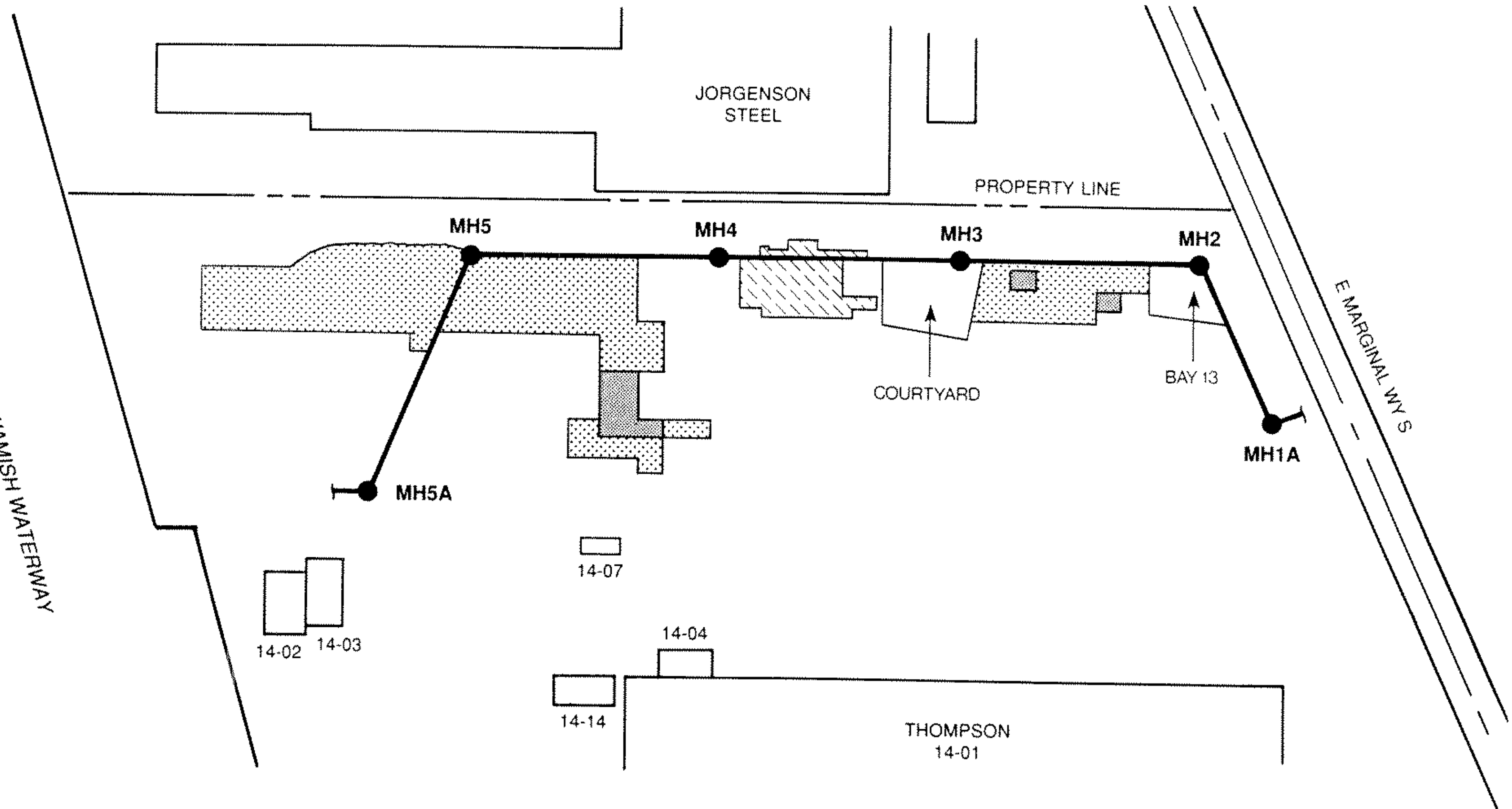


Legend

• 3000 Test Pit Location and Arsenic Value (ppm) Screen Test Values

Excavated Area

Figure 10.
B Series Test Pits
5 to 9 Foot Depth



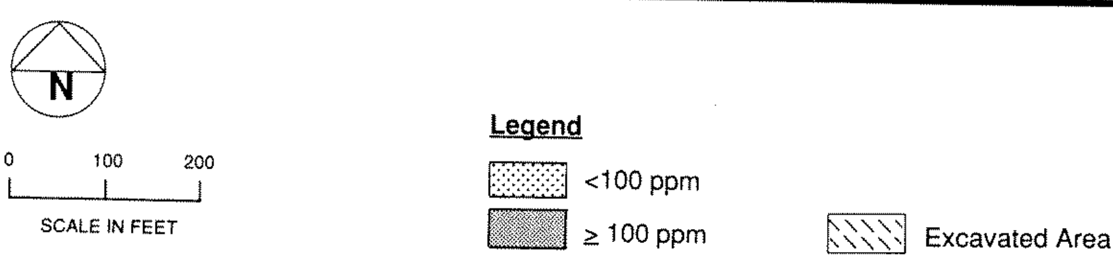
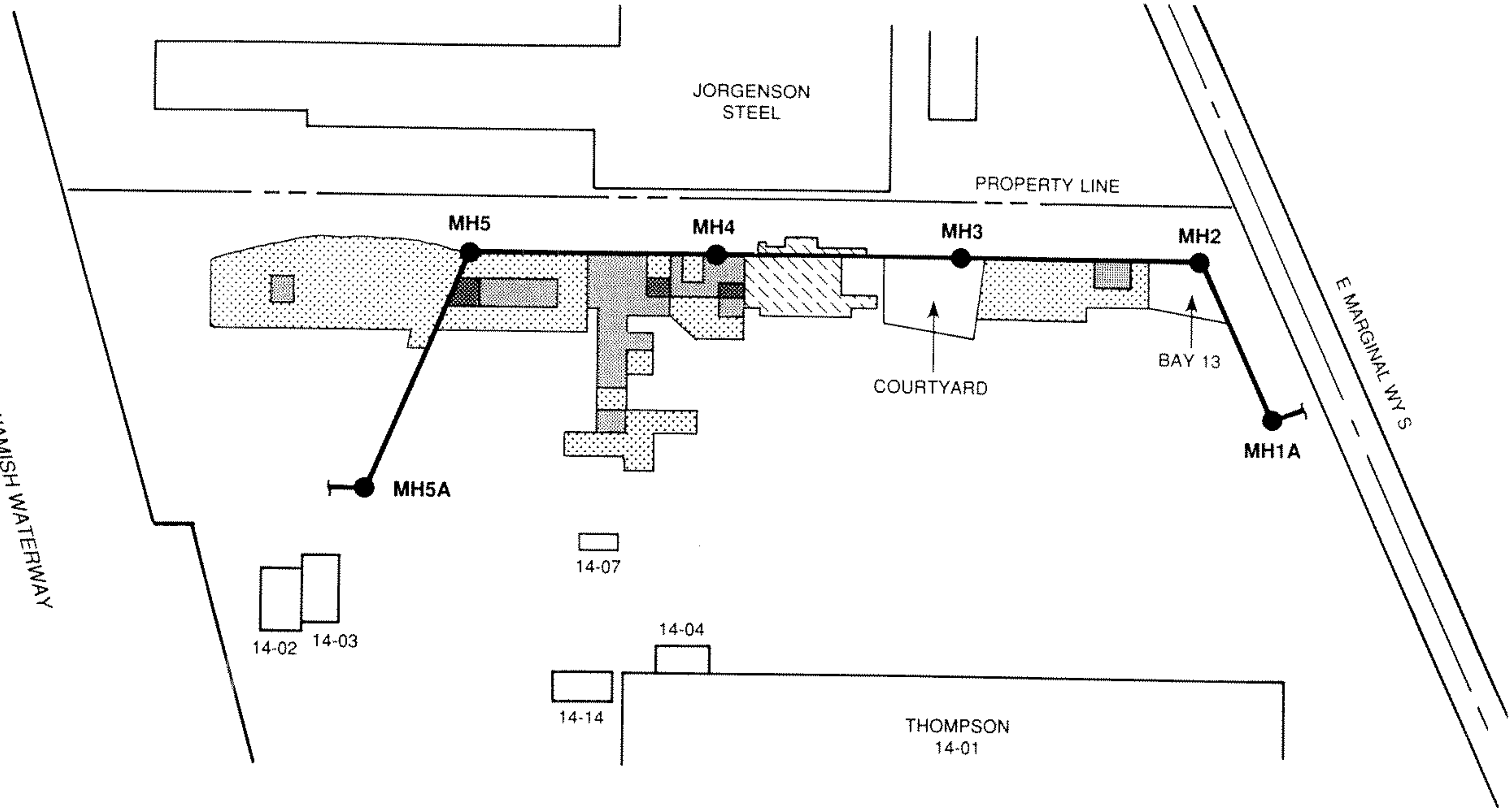
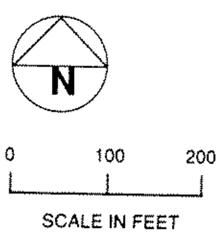


Figure 11.
Arsenic Concentration Contours
1-3 Foot Depth





Legend

- <200 ppm
- ≥ 200 ppm to 5,000ppm
- > 5,000 ppm
- Excavated area

Figure 12.
Arsenic Concentration Contours
3-5 Foot Depth

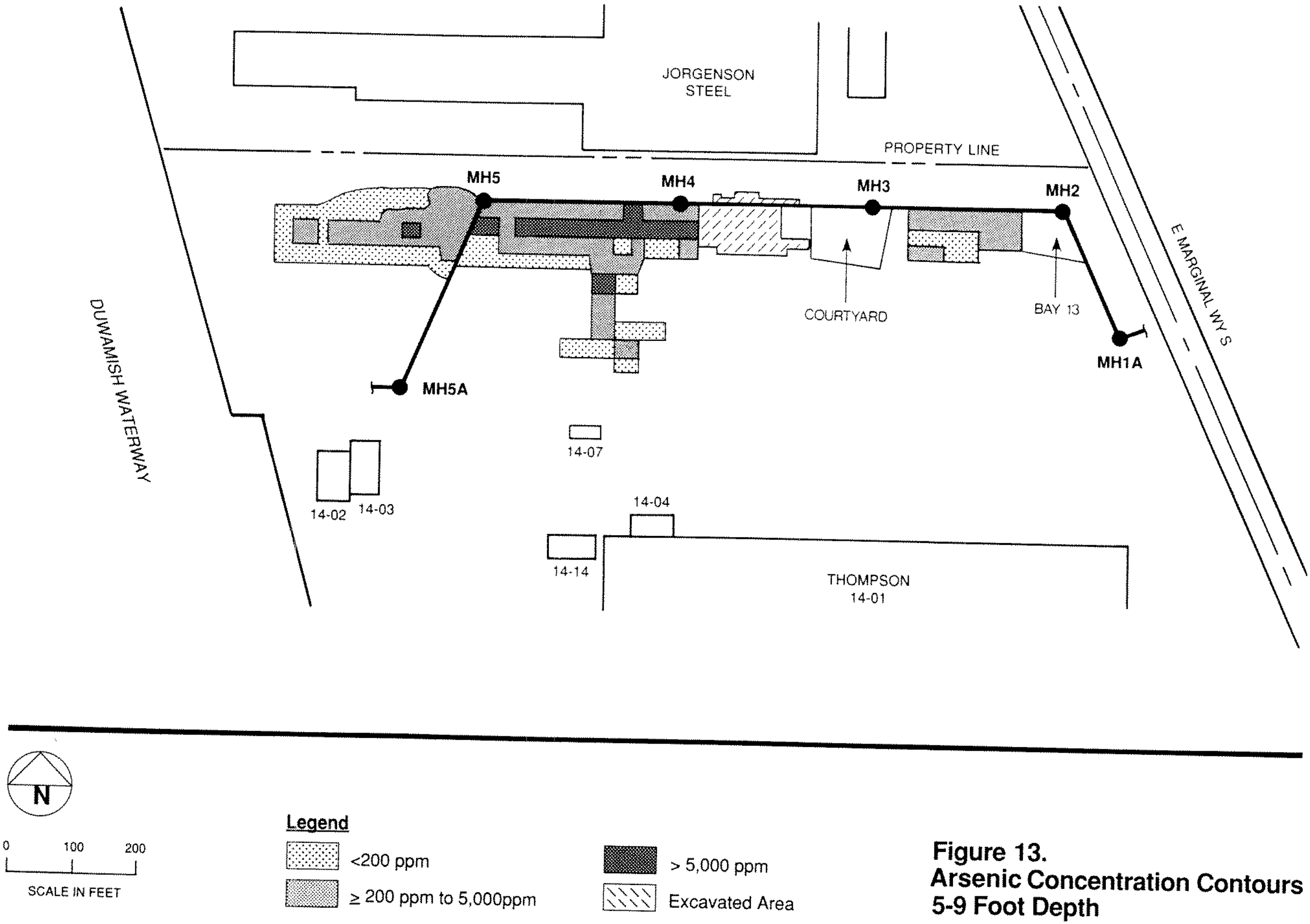


Figure 13.
Arsenic Concentration Contours
5-9 Foot Depth

Appendix C-7

Landau 1992: Thompson-Isaacson Site, Full-Scale Soil Stabilization Program, Summary Report

Final Report

Thompson-Isaacson Site
Full-Scale Soil Stabilization Program
Summary Report

Volume I of III

April 27, 1992

Prepared for

The Boeing Company

Prepared by

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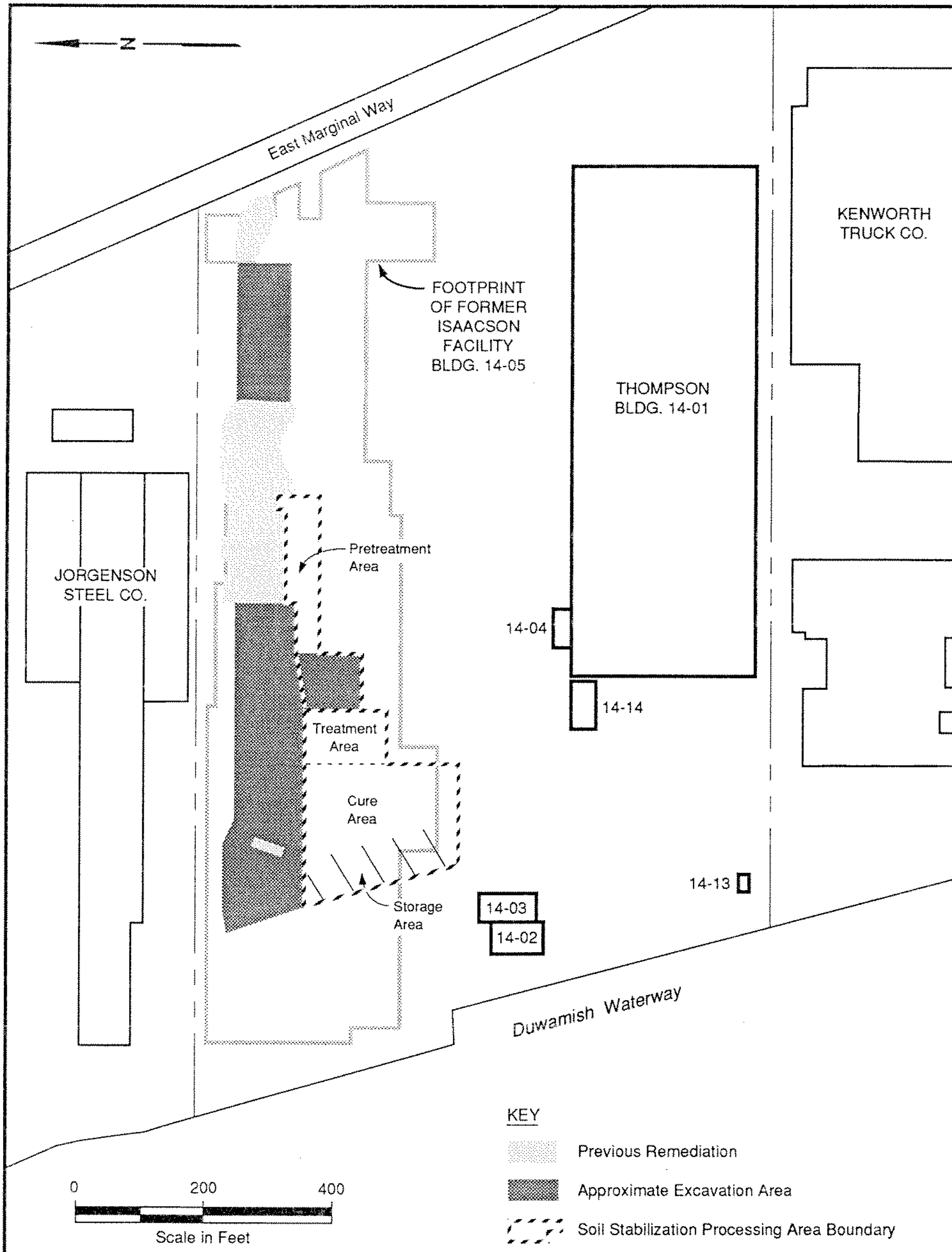

LANDAU ASSOCIATES, INC.

Pilot Test Site Layout

Figure 3

TABLE 2
Summary of Pre–Treatment, Post–Treatment, and Cure Area Samples
TCLP Metals

Pre–Treatment

Analyte	Number of Samples Undetected	Number of Samples Detected	Conc Range (a) (mg/L)	Avg Conc (a) (mg/L)
Arsenic	6	87	0.20–11	2.76
Barium	89	4	0.20–4.8	1.37
Chromium	93	0	-	-
Copper	3	90	0.10–9.2	2.26
Lead	91	2	0.97–11	5.99
Nickel	88	5	0.16–0.26	0.19
Zinc	2	91	0.22–53	4.45

Post– Treatment

Analyte	Number of Samples Undetected	Number of Samples Detected	Conc Range (a) (mg/L)	Avg Conc (a) (mg/L)
Arsenic	337	49	0.20–0.61	0.26
Barium	386	0	-	-
Chromium	360	26	0.10–0.15	0.11
Copper	85	301	0.10–0.42	0.22
Lead	386	0	-	-
Nickel	386	0	-	-
Zinc	378	4	0.10–2.2	0.65

Cure Area

Analyte	Number of Samples Undetected	Number of Samples Detected	Conc Range (a) (mg/L)	Avg Conc (a) (mg/L)
Arsenic (b)	39	22	0.21–3.1	0.65
Barium	64	0	-	-
Chromium	64	0	-	-
Copper	5	59	0.10–0.61	0.30
Lead	64	0	-	-
Nickel	64	0	-	-
Zinc	60	4	0.10–0.21	0.13

(a) The concentration range and average concentration are for detected analytes only.
(b) These results do not include the three samples which exceeded hazardous waste levels. Soil representing those samples was reprocessed and analytical results indicated no exceedance of hazardous waste levels.

01/27/92
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APPENDIX A
SIDEWALL SAMPLING
BOEING THOMPSON/ISAACSON SITE

INTRODUCTION

This appendix presents the sampling plan that GeoEngineers used during collection of soil samples from the sidewalls of the remedial excavation at the Boeing Thompson/Isaacson site. The locations from which the soil samples were collected are shown in Plates A1, A2 and A3. The soil samples were submitted to Tech Dryer (Technical Dryer Corporation) for chemical analysis of arsenic using a screening technique. The screening was used to determine if soil with elevated concentrations of arsenic had been successfully removed from the excavation.

Soil samples were submitted for arsenic screening and chemical analysis according to the following sequence:

1. Obtain soil sample from the limits of the excavation.
2. Submit the soil sample to Tech Dryer for screening.
3. If screening detected arsenic at concentrations exceeding 175 ppm (parts per million), the sidewall was excavated an additional 12 feet and then resampled for screening by Tech Dryer. Excavated soil was treated using the soil stabilization treatment process.
4. If screening detected arsenic at concentrations less than 175 ppm, the sample was submitted to Laucks (Laucks Testing Laboratory) for confirmation using EPA Method 6010.

SAMPLING PROGRAM

GENERAL

Tech Dryer screened soil samples for the presence of arsenic between August 16 and November 26, 1991. Laucks analyzed soil samples for the presence of arsenic using EPA Method 6010. Soil sampling locations are shown in Plates A2 and A3. The chemical analytical results are presented in Table A1. Laboratory reports are presented in Appendix E.1.

SOIL SAMPLE COLLECTION

The surface of the proposed excavation was divided into 12-foot cells referenced to manholes of the storm sewer line bordering the northern edge of the excavation. The manholes were labeled 1 through 5 from east to west. The 12-foot cells were labeled sequentially from number 1 proceeding westward from each manhole. The proposed excavation was 85 feet wide in the north-south direction.

Samples obtained from the north and south sidewalls were labeled with the manhole number followed by the cell number and an "N" or "S" to designate the direction of the sidewall. For example, a soil sample obtained from the north sidewall west of manhole number 3 in cell 17 was

TABLE A1
SUMMARY OF ARSENIC ANALYSIS--SOIL SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Number	Date Sampled	Time Sampled	Quadrants Sampled	Total Arsenic: Screen Test[2] (ppm)	Total Arsenic: Analytical Results[3] (ppm)
M5W-14-N	8/19/91	1030	3,2	81	96
M5W-14-S	8/19/91	1355	3,2	85	110
M5W-13-N	8/20/91	1230	1,4	172	180
M5W-13-S	8/21/91	0845	1,4	85	120
M5W-12-S	8/21/91	0850	3,2	51	62
M5W-12-N	8/21/91	0900	1,4	23	21
M5W-11-S	8/21/91	1255	3,2	294	--
M5W-11-N	8/21/91	1310	3,2	45	67
M5W-10-N	8/22/91	1015	1,4	788	--
M5W-10-S	8/22/91	1330	3,2	189	240
M5W-9-N	8/22/91	1340	3,2	319	--
M5W-9-S	8/23/91	1030	1,3	94	140
M5W-8-N	8/23/91	1040	3,2	305	--
M5W-7-N	8/26/91	1105	2,4	294	--
M5W-7a-N[4]	8/26/91	1110	seam[5]	43	37
M5W-8-S	8/26/91	1120	3,2	62	150
M5W-7-S	8/27/91	0640	1,4	550	--
M5W-6-N	8/27/91	0650	2,4	1700	--
M5W-5-N	8/27/91	1120	3,2	174	290
M5W-6-S	8/27/91	1130	1,4	84	120
M5W-5-S	8/27/91	1445	2,4	53	82
M5W-4-N	8/28/91	0800	2,3	1480	--
M5W-3-N	8/28/91	0805	1,3	965	--
M5W-2-S[6]	8/29/91	0650	1,4	40	60
M5W-1-S	9/3/91	0900	1,3	23	24
M4W-25-S	9/3/91	0905	2,3	15	49
M4W-25-N	9/3/91	0910	1,3	1900 (2040)	--
M4W-24-N	9/3/91	0915	1,4	1940	--
M4W-23-N[7]	9/4/91	0700	2,3	1440	--
M4W-24-S[8]	9/4/91	0705	1,3	20	24
M4W-23-S[9]	9/4/91	0710	2,3	16 (19)	20
M4W-22-N[10]	9/4/91	0715	2,3	39	58
M4W-22-S	9/4/91	1415	1,3	2520	--
M4W-21-N	9/4/91	1420	1,4	1210	--
M4W-20-N	9/4/91	1425	2,3	1100	--
M4W-21-S	9/5/91	1015	1,4	17	11
M4W-21-S-D[11]	9/5/91	1015	1,4	18	7
M4W-19-N	9/5/91	1020	2,3	2460 (2680)	--
M4W-20-S	9/5/91	1400	1,3	40	47
M4W-18-N	9/5/91	1405	1,4	1230	--

Notes:
[1] Sampling locations are shown in Plates A2 and A3.
[2] Arsenic screen test conducted by Technical Dryer Corporation. Results of duplicate test shown in parentheses. Screening results are presented in Appendix E.1.
[3] Arsenic chemical analysis (EPA Method 6010) conducted by Laucks Testing Laboratory. Laboratory reports are included in Appendix E.1.
[4] Sample identification is reported as M5W-7A-N in Laucks' laboratory report.
[5] Sample was collected from a seam of black silt at a depth of 4.5 to 5 feet.
[6] Sample identification is reported as MSW-2-S in Laucks' laboratory report.
[7] Sample identification is reported as M4W-23-S in Tech Dryer's and Laucks' laboratory reports.
[8] Sample identification is reported as M4W-24-N in Tech Dryer's and Laucks' laboratory report.
[9] Sample identification is reported as M4W-23-N in Tech Dryer's and Laucks' laboratory reports.
[10] Sample identification is reported as M4W-22-S in Tech Dryer's and Laucks' laboratory reports.
[11] Duplicate of M4W-21-S.

TABLE A1
SUMMARY OF ARSENIC ANALYSIS--SOIL SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Number	Date Sampled	Time Sampled	Quadrants Sampled	Total Arsenic: Screen Test[2] (ppm)	Total Arsenic: Analytical Results[3] (ppm)
M4W-19-S	9/6/91	0800	2,3	59 (49)	63
M4W-17-N	9/6/91	0805	1,3	1530	--
M4W-18-S	9/6/91	1340	2,3	114	78
M4W-17-S	9/6/91	1345	1,4	37	41
M4W-16-N	9/9/91	0815	2,3	1520	--
090991-D[4]	9/9/91	0815	2,3	1590	--
M4W-15-N	9/9/91	0830	1,4	1540	--
M4W-16-S	9/9/91	1040	1,4	88	92
M4W-15-S	9/9/91	1050	2,4	137 (117)	150
M4W-14-N	9/10/91	0640	2,3	1420	--
M4W-13-N	9/10/91	0645	2,3	1650 (1520)	--
M4W-14-S	9/10/91	1315	2,3	161	160
M4W-13-S	9/10/91	1320	1,3	83	73
M4W-12-S	9/10/91	1330	3,4	137	510
M4W-12-N	9/10/91	1340	2,3	992	--
M4W-11-N	9/10/91	1350	2,3	2150	--
M4W-10-N	9/11/91	1130	2,3	264	--
M4W-9-N	9/11/91	1135	2,3	1620 (1640)	--
M4W-8-N	9/12/91	0800	1,3	1850 (1890)	--
M4W-7-N	9/12/91	0810	1,4	1920	--
M4W-6-N	9/13/91	0850	2,4	1740 (1900)	--
M4W-5-N	9/13/91	0900	2,3	50	50
M4W-6-S	9/13/91	0910	2,3	1090	--
M4W-5-S	9/13/91	1225	1,4	841	--
M4W-4-N	9/13/91	1235	2,4	46	29
M4W-4-S	9/16/91	0830	1,4	26	27
M4W-3-S	9/16/91	0840	2,3	104	160
M4W-3-N	9/16/91	0854	1,4	45	56
M4W-2-N	9/16/91	1450	1,4	56	66
M4W-1-N	9/16/91	1500	1,3	1270	--
M4W-2-S	9/16/91	1515	2,3	24	15
910916-D1[5]	9/16/91	1535	1,4	28	27
910916-D2[6]	9/16/91	1540	1,4	52	62
M4W-1-S	9/17/91	1310	1,4	171	160
M3W-16-S	9/17/91	1320	2,4	74	81
M3W-16-N	9/17/91	1330	1,4	514 (517)	--
M3W-15-N	9/17/91	1340	2,3	1380	--
M3W-14-N	9/18/91	0720	1,3	659	--
M3W-13-N	9/18/91	0735	1,4	1380	--
M3W-15-S	9/18/91	0800	1,4	133	150
M3W-14-S	9/18/91	1430	1,3	155 (102)	91
M3W-13-S	9/18/91	1440	1,4	90	94
M3W-13-E1	9/18/91	1450	note[7]	829	--

Notes:
[1] Sampling locations are shown in Plates A2 and A3.
[2] Screen test conducted by Technical Dryer Corporation. Results of duplicate test are shown in parentheses. Screening results are included in Appendix E.1.
[3] Arsenic chemical analysis (EPA Method 6010) conducted by Laucks Testing Laboratory. Laboratory reports are included in Appendix E.1.
[4] Duplicate of M4W-4-S.
[5] Duplicate of M4W-16-N.
[6] Duplicate of M4W-3-N.
[7] Sample was composited from 6 to 8 sampling locations on sidewall approximately 8 feet by 12 feet.

TABLE A1
SUMMARY OF ARSENIC ANALYSIS--SOIL SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Number	Date Sampled	Time Sampled	Quadrants Sampled	Total Arsenic: Screen Test[2] (ppm)	Total Arsenic: Analytical Results[3] (ppm)
M3W-13-E2	9/18/91	1455	note[4]	4080	--
M3W-13-E3	9/18/91	1500	note[4]	3440	--
M3W-12-S	9/19/91	0930	1,4	105	110
M3W-12-S	9/19/91	0930	1,4	105	110
M3W-11-S	9/19/91	0940	2,3	62 (52)	49
M3W-10-S	9/19/91	0950	2,3	336	--
M3W-10-N	9/19/91	1000	1,4	1060 (2490)	--
M3W-11-N	9/19/91	1010	2,3	3160 (8370)	--
M3W-8-N	9/19/91	1335	2,3	658	--
M3W-9-N	9/19/91	1340	1,3	290	--
M3W-9-S	9/19/91	1345	1,4	258	--
M3W-8-S	9/19/91	1350	2,3	91	83
M3W-7-N	9/19/91	1355	1,4	291 (307)	--
M3W-7-S	9/19/91	1400	2,3	238	--
M3W-6-S	9/20/91	0900	2,3	306	--
M3W-6-N	9/20/91	0905	2,3	28	23
M3W-5-N	9/20/91	0910	1,4	125	150
M3W-5-S	9/20/91	0915	1,4	220	--
M3W-4-N	9/20/91	0920	2,3	20	12
M3W-4-S	9/20/91	0925	1,4	240	--
910920-D1[5]	9/20/91	0935	2,3	22	12
M3W-12-N	9/20/91	1345	1,4	175	200
M3W-12-E1	9/20/91	1350	1,4	287	--
M3W-12-E2[6]	9/20/91	1355	2,3	190	220
M3W-10A-N	9/20/91	1400	2,3	225	--
M3W-11A-N	9/20/91	1545	1,4	294	--
M3W-9A-N	9/20/91	1550	2,3	270	--
M3W-8A-N	9/20/91	1555	2,4	337	270
M3W-7A-N	9/20/91	1600	2,3	484	--
M3W-3-N	9/23/91	0900	1,4	74	93
M3W-3-S	9/23/91	0905	2,3	368	--
M3W-2-N	9/23/91	0910	2,3	101	120
M3W-2-S	9/23/91	0915	1,4	216	--
M3W-1-N	9/23/91	0920	2,4	119	100
M3W-1-S	9/23/91	0925	2,3	207	--
M3W-0-N	9/23/91	0930	1,4	93	110
M3W-0-S	9/23/91	0935	1,4	262	--
M3W-11B-NW	9/24/91	0820	1,4	151	210
M3W-10B-NW	9/24/91	0825	2,3	639	--
M3W-9B-NW	9/24/91	0830	2,3	130	200
M3W-8B-NW	9/24/91	0835	1,4	216	--
M3W-7B-NW	9/24/91	1130	1,3	119	140
M3W-7-E1	9/24/91	1135	1,4	141	200
M3W-7-E2	9/24/91	1140	2,3	88	140

Notes:
[1]Sampling locations are shown in Plates A2 and A3.
[2]Screen test conducted by Technical Dryer Corporation. Results of duplicate test are shown in parentheses. Screening results are presented in Appendix E.1.
[3]Arsenic chemical analysis (EPA Method 6010) conducted by Laucks Testing Laboratory. Laboratory reports are included in Appendix E.1.
[4]Sample was composited from 6 to 8 sampling locations on sidewall approximately 8 feet by 12 feet.
[5]Duplicate of M3W-4-N.
[6]Sample identification is reported as M3W-12-EZ in Laucks' laboratory report.

TABLE A1
SUMMARY OF ARSENIC ANALYSIS--SOIL SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Number	Date Sampled	Time Sampled	Quadrants Sampled	Total Arsenic: Screen Test[2] (ppm)	Total Arsenic: Analytical Results[3] (ppm)
M3W-7-E3	9/24/91	1145	2,3	397	--
M3W-0-E1	9/25/91	0715	2,3	146	170
M2W-1-E1	9/25/91	0720	2,3	26	26
M2W-1-E2	9/25/91	0725	1,4	432	--
M2W-1-E3	9/25/91	0730	1,4	515	--
M2W-1-E4	9/25/91	0735	2,3	840	--
M2W-1-E5[4]	9/25/91	0740	1,4	112	110
M2W-1-N	9/25/91	0745	2,4	586	--
M2W-1-S	9/95/91	0750	2,4	18	<5
M2W-2-S	9/25/91	0755	1,3	71	74
M2W-3-S	9/25/91	1200	1,4	74	69
M2W-4-S	9/25/91	1205	1,4	229	--
M2W-2-N	9/25/91	1220	1,3	649	--
M2W-3-N	9/25/91	1225	1,3	601	--
M3W-7-E3A	9/25/91	1535	2,3	3000	--
M2W-4-N	9/26/91	0730	2,3	396	--
M2W-5-N	9/26/91	0735	2,4	96	94
M2W-5-S	9/26/91	0740	2,3	105	110
M2W-6-N	9/26/91	1515	1,4	134	140
M2W-6-S	9/26/91	1520	2,3	433	--
M2W-7-S	9/26/91	1525	1,4	75	73
M2W-8-S	9/26/91	1530	2,3	21	20
M2W-7-N	9/26/91	1535	2,3	133	120
910926-D1[5]	9/26/91	1540	2,3	29	18
M3W-5-E4	9/27/91	0940	1,4	128	110
M3W-5-E3	9/27/91	0945	2,3	267	--
M3W-6A-NW	9/27/91	0950	2,3	58	66
M3W-5A-NW	9/27/91	0955	2,3	102 (113)	120
M3W-5-E1	9/27/91	1000	1,4	120	96
M3W-5-E2[6]	9/27/91	1005	1,4	160	150
M2W-8-N	9/30/91	0745	2,3	663	--
910930-D1[7]	9/30/91	0745	2,3	709	--
M2W-9-S	9/30/91	0750	2,3	33 (30)	26
M2W-10-S	9/30/91	0755	1,4	16	17
M3W-3A-NW	9/30/91	1545	1,4	132	210
M3W-4A-NW	9/30/91	1547	1,4	126	200
M3W-3-E1	9/30/91	1550	2,3	463	--
M3W-3-E2[8]	9/30/91	1552	1,4	129	200
M3W-3-E3	9/30/91	1555	2,3	493	--
M3W-3-E4	9/30/91	1557	1,4	159	230
M2W-9-N	10/1/91	0800	1,3	229	--
M2W-10-N	10/1/91	0805	1,4	655	--

Notes:
[1]Sampling locations are shown in Plates A2 and A3.
[2]Screen test conducted by Technical Dryer Corporation. Results of duplicate test are shown in parentheses. Screening results are presented in Appendix E.1.
[3]Arsenic chemical analysis (EPA Method 6010) conducted by Laucks Testing Laboratory. Laboratory reports are included in Appendix E.1.
[4]Sample identification is reported as M2W-1-ES in Laucks' laboratory report.
[5]Duplicate of M2W-8-S.
[6]Sample identification is reported as M3W-5-EZ in Laucks' laboratory report.
[7]Duplicate of M2W-8-N.
[8]Sample identification is reported as M3W-3-EZ in Laucks' laboratory report.

TABLE A1
SUMMARY OF ARSENIC ANALYSIS--SOIL SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Number	Date Sampled	Time Sampled	Quadrants Sampled	Total Arsenic	
				Screen Test[2] (ppm)	Analytical Results[3] (ppm)
M2W-11-S	10/1/91	0810	1,4	23	7
M2W-12-S	10/1/91	0815	2,3	45	26
M2W-11-N	10/1/91	1415	1,4	20	10
M2W-12-N	10/1/91	1420	2,4	621	--
M2W-13-S	10/1/91	1425	2,3	782	--
M2W-14-S	10/1/91	1430	1,4	26 (36)	16
M2W-15-S	10/2/91	0845	1,4	21	16
M2W-13-N	10/2/91	0850	2,3	980	--
M2W-14-N	10/2/91	0855	2,3	858	--
M2W-15-N	10/2/91	1355	2,4	604 (609)	--
M2W-16-N	10/2/91	1400	2,3	171	200
M2W-16-S	10/2/91	1405	1,4	68	54
M2W-17-N	10/3/91	0750	1,3	1760	--
M2W-17-W1	10/3/91	0755	2,3	73	65
M2W-17-W2[4]	10/3/91	0800	2,3	148 (145)	130
M2W-17-W3	10/3/91	0805	1,4	214	--
M2W-17-W4	10/3/91	0810	1,4	96	86
M2W-17-S	10/3/91	0815	2,3	177	190
M3W-0-NW	10/4/91	1005	1,4	259	--
M3W-1-NW	10/4/91	1008	1,3	204	--
M3W-2NW	10/4/91	1012	2,3	851	--
M3W-0-E1	10/4/91	1015	1,4	230	--
M3W-0-E2	10/4/91	1018	1,4	91	120
M3W-0-E3	10/4/91	1022	2,4	203 (206)	--
M3W-0-E4	10/4/91	1025	2,3	227	--
M5W-10AN-W	10/7/91	1435	1,4	460	--
M5W-10A-N	10/7/91	1440	2,3	67 (78)	100
M5W-7A-N	10/8/91	0920	1,4	46 (51)	51
M5W-8A-N	10/8/91	0925	2,3	50	52
M5W-9A-N	10/8/91	0930	2,3	30	40
M5W-11A-N	10/9/91	1145	2,3	45	44
M5W-11AN-W	10/9/91	1150	2,3	190	300
M5W-6A-N	10/9/91	1155	1,4	147	200
M5W-5A-N	10/9/91	1200	2,3	27	23
M5W-4A-N	10/9/91	1205	1,4	92	120
M5W-3A-N	10/9/91	1410	1,4	48	53
M5W-3AN-E	10/9/91	1420	1,4	45	62
911009-D1[5]	10/9/91	1430	1,4	44	55
911009-D2[6]	10/9/91	1440	1,4	53	46
M2W-18-W3	10/10/91	0830	2,3	108	81
M2W-18-S	10/10/91	0835	1,4	198	--
M2W-18-N	10/10/91	0840	2,4	83	92
M2W-18-W4	10/10/91	0845	1,4	201 (236)	--
M2W-18A-E	10/14/91	1535	2,3	262	--

Notes:
[1]Sampling locations are shown in Plates A2 and A3.
[2]Screen test conducted by Technical Dryer Corporation. Results of duplicate test are shown in parentheses. Screening results are presented in Appendix E.1.
[3]Arsenic chemical analysis (EPA Method 6010) conducted by Laucks Testing Laboratory. Laboratory reports are included in Appendix E.1.
[4]Sample identification is reported as M2W-17-WZ in Laucks' laboratory report.
[5]Duplicate of M5W-3AN-E.
[6]Duplicate of M5W-3A-N.

TABLE A1
SUMMARY OF ARSENIC ANALYSIS--SOIL SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Number	Date Sampled	Time Sampled	Quadrants Sampled	Total Arsenic: Screen Test[2] (ppm)	Total Arsenic: Analytical Results[3] (ppm)
M2W-18A-S	10/14/91	1540	1,4	111	110
M2W-19-S	10/14/91	1545	1,4	154	180
M2W-19-W4	10/14/91	1550	1,4	261	--
M2W-19-N	10/14/91	1555	1,4	147	160
M5W-14A-N	10/15/91	1110	2,4	28	28
M5W-13A-N	10/15/91	1115	1,4	16	12
M5W-12A-N	10/15/91	1120	1,4	34	44
911015-1[4]	10/15/91	1125	1,4	15	12
M34-1-S	10/15/91	1400	1,3	112 (134)	140
M34-2-N	10/15/91	1405	2,3	200	--
M34-1-N	10/15/91	1410	1,2	249	--
M34-2-E1	10/15/91	1415	1,4	167	240
M34-1-E4	10/15/91	1420	2,3	86	97
M34-2-E2	10/15/91	1425	2,3	91	120
M34-1-E3	10/15/91	1430	1,4	282	114
M3W-2A-S	10/16/91	1100	1,3	166	280
M3W-1A-S	10/16/91	1105	1,4	175	150
M34-2E3-N	10/16/91	1430	2,4	117	150
M34-2-E3	10/16/91	1435	2,3	82	90
M34-2E3-S	10/16/91	1440	1,4	114	110
M3W-0A-S	10/16/91	1445	2,3	500	--
M34-1A-S	10/16/91	1450	1,4	124	150
M34-1AS-E	10/16/91	1455	2,3	183 (199)	250
911016-1[5]	10/16/91	1540	2,3	198	270
M23-1-N	10/17/91	1230	1,4	460	--
M23-2-N	10/17/91	1235	2,3	424	--
M23-2-E1	10/17/91	1240	2,3	372 (374)	--
M23-2-E2	10/17/91	1245	2,3	61 (52)	46
M23-2-E3	10/18/91	0920	1,4	53	62
M23-2-E4	10/18/91	0925	2,3	38	59
M23-2-E5	10/18/91	0930	2,3	14	6
M23-2-S	10/18/91	0935	1,4	76	86
M23-1-S	10/18/91	0940	2,3	28 (33)	30
911018-1[6]	10/18/91	1005	2,3	6	9
M3W-0B-W	10/18/91	1305	2,3	141	150
M3W-0B-S[7]	10/18/91	1310	2,3	158	190
M3W-0B-E	10/18/91	1315	2,3	122 (99)	130
M34-2A-S	10/18/91	1320	1,4	315	--
M34-2A-E	10/18/91	1325	1,4	135	160
M34-2AS-N	10/18/91	1330	2,3	32 (24)	36
M2W-13AS-E	10/18/91	1415	1,4	66	60
M2W-13A-S	10/18/91	1420	2,3	72	79
M2W-13-AS-W	10/18/91	1425	2,3	48	46

Notes:
[1]Sampling locations are shown in Plates A2 and A3.
[2]Screen test conducted by Technical Dryer Corporation. Results of duplicate test are shown in parentheses. Screening results are presented in Appendix E.1.
[3]Arsenic chemical analysis (EPA Method 6010) conducted by Laucks Testing Laboratory. Laboratory reports are included in Appendix E.1.
[4]Duplicate of M5W-13A-N.
[5]Duplicate of M34-1AS-E.
[6]Duplicate of M23-2-E5.
[7]Sample identification is reported as M34-0B-S in Laucks' laboratory report.

TABLE A1
SUMMARY OF ARSENIC ANALYSIS--SOIL SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Number	Date Sampled	Time Sampled	Quadrants Sampled	Total Arsenic: Screen Test[2] (ppm)	Total Arsenic: Analytical Results[3] (ppm)
M2W-6AS-E	10/18/91	1430	2,3	42	45
M2W-6AS-S	10/18/91	1435	1,4	57	43
M2W-6AS-W	10/18/91	1440	2,3	71	78
M2W-4AS-W	10/18/91	1445	1,4	39 (40)	33
M2W-4AS-S	10/18/91	1450	2,3	39 (39)	33
M2W-4AS-E	10/18/91	1455	2,3	18	11
911018-2[4]	10/18/91	1500	1,4	33	31
M2W-17AS-E	10/18/91	1605	1,4	53	47
M2W-17AS-S	10/18/91	1610	2,3	41 (34)	41
M3W-2B-S	10/21/91	1315	1,3	66	71
M3W-2B-W	10/21/91	1320	2,4	276	--
M34-1B-S	10/21/91	1325	2,3	46	44
M34-2B-S	10/21/91	1330	1,4	20	17
M34-2B-E	10/21/91	1335	1,4	109	130
M2W-20A-S	10/21/91	1340	2,3	223 (244)	--
M2W-20A-W	10/21/01	1345	2,3	326	--
M34-3E1-N	10/22/91	0930	2,3	399	--
M34-3E1-E	10/22/91	0935	1,4	440	--
M34-3E1-S	10/22/91	0940	2,4	108	110
M2W-20-W	10/22/91	0945	2,3	67 (69)	64
M2W-20-N	10/22/91	0950	1,3	66	63
M2W-19A-S	10/22/91	0955	1,4	226	--
M23-3E1-N	10/22/91	1005	1,4	76	64
M23-3E1-E	10/22/91	1010	1,4	97	77
M23-3E1-S	10/22/91	1015	1,3	165	150
M34-8A-S	10/22/91	1455	2,3	155	170
M34-8A-W	10/22/91	1500	1,4	152	150
M34-8A-N	10/22/91	1505	1,4	350	--
M5W-11A-S	10/24/91	1000	1,4	55	90
M5W-10A-S	10/24/91	1005	1,3	65 (62)	62
M5W-7A-S	10/25/91	0955	2,3	59	110
M4W-22A-S	10/25/91	1000	1,4	40	45
M4W-12A-S	10/25/91	1005	1,3	45 (46)	53
TM3W-9A-S	10/28/91	1100	1,3	316	--
TM3W-7A-S	10/28/91	1105	1,4	548	--
TM3W-6A-S	10/28/91	1110	2,3	318	--
TM3W-5A-S	10/28/91	1115	1,4	288	--
TM3W-4A-S	10/28/91	1120	2,4	117	120
TM3W-3A-S	10/28/91	1125	1,4	159 (173)	180
911028-D[5]	10/28/91	1125	1,4	183	200
TM3W-10A-S	10/28/91	1500	1,4	273	--
TM3W-6A-S2	10/31/91	1355	1,3	85	94
TM3W-5A-S2[6]	10/31/91	1400	2,3	40	44
TM3W-10A-S2	11/01/91	1315	1,4	185	190

Notes:
[1]Sampling locations are shown in Plates A2 and A3.
[2]Screen test conducted by Technical Dryer Corporation. Results of duplicate test are shown in parentheses. Screening results are presented in Appendix E.1.
[3]Arsenic chemical analysis (EPA Method 6010) conducted by Laucks Testing Laboratory. Laboratory reports are included in Appendix E.1.
[4]Duplicate of M2W-4AS-W.
[5]Duplicate of TM3W-3A-S.
[6]Sample identification is reported as TM3W-5A-52 on Laucks' laboratory report.

TABLE A1
SUMMARY OF ARSENIC ANALYSIS--SOIL SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Number	Date Sampled	Time Sampled	Quadrants Sampled	Total Arsenic Screen Test[2] (ppm)	Total Arsenic Analytical Results[3] (ppm)
TM3W-9A-S2	11/01/91	1320	2,3	183	270
TM3W-7A-S2	11/01/91	1325	1,4	200	230
TM3W-8A-S	11/04/91	1105	1,4	171	220
TM4W-5D-E	11/04/01	1110	1,4	140	170
TM4W-5E-E	11/04/91	1115	2,3	282	–
TM4W-5F-E	11/04/91	1120	2,3	10	11
M34-3E1-S2	11/04/91	1415	1,4	104	140
M34-3E1-E2	11/04/91	1420	2,3	104	110
M34-3E1-N2	11/04/91	1425	2,3	180 (175)	230
M34-8B-N	11/05/91	0920	2,3	81	96
M34-8B-W	11/05/91	0925	1,4	107 (133)	150
TM4W-5A-E	11/06/91	1100	2,3	49	61
TM4W-5B-E	11/06/91	1105	1,4	73	85
TM4W-5B-S	11/06/91	1110	2,3	14	17
911106-D[4]	11/06/91	1230	2,3	55	67
TM4W-4E-E	11/06/91	1415	2,3	133	590
TM4W-4E-S	11/06/91	1420	2,3	10	5
TM4W-4E-N	11/06/91	1425	2,3	510	–
M2W-19B-E	11/07/91	1240	1,4	43	22
M2W-19B-S	11/07/91	1245	1,4	26	22
M2W-20B-S	11/07/91	1250	2,3	43	28
M2W-20B-W	11/07/91	1255	2,3	31	26
TM3W-7B-E	11/08/91	0840	1,4	101	130
TM3W-7B-S	11/08/91	0845	2,3	83	91
TM3W-8B-S	11/08/91	0850	2,3	68	73
TM3W-9B-S	11/08/91	0855	2,3	63 (70)	67
TM3W-9B-W	11/08/91	0900	2,3	28	22
TM4W-4D-E	11/08/91	1040	1,4	359	–
TM4W-4D-N	11/08/91	1045	2,3	335	–
911108-D[5]	11/08/91	1045	2,3	422	–
TM4W-4C-W	11/11/91	1310	2,3	503	–
TM4W-4C-N	11/11/91	1315	1,4	605	–
TM4W-4C-E	11/11/91	1320	1,4	241 (258)	–
TM4W-3D-N	11/11/91	1325	1,4	1020	–
TM4W-3D-E	11/11/91	1330	2,3	609	–
TM4W-3D-S	11/11/91	1335	1,4	343	–
911112-1[6]	11/12/91	1105	east end	582	–
911112-2[6]	11/12/91	1108	center	449	–
911112-3[6]	11/12/91	1110	west end	194	–
911112-4[6]	11/12/91	1112	east end	883	–
911112-5[6]	11/12/91	1115	center	232	–
911112-6[6]	11/12/91	1118	west end	145	210
911112-7[6]	11/12/91	1120	center	623	–

Notes:
[1]Sampling locations are shown in Plates A2 and A3.
[2]Screen test conducted by Technical Dryer Corporation. Results of duplicate test are shown in parentheses. Screening results are presented in Appendix E.1.
[3]Arsenic chemical analysis (EPA Method 6010) conducted by Laucks Testing Laboratory. Laboratory reports are included in Appendix E.1.
[4]Duplicate of TM4W-5A-E.
[5]Duplicate of TM4W-4D-N.
[6]The 911112 sample identification series were obtained for a characterization study of the soil type and corresponding arsenic concentration from cells TM4W-3D and -4C. Sample locations are not shown in Plates A2 and A3.

TABLE A1
SUMMARY OF ARSENIC ANALYSIS--SOIL SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Number	Date Sampled	Time Sampled	Quadrants Sampled	Total Arsenic Screen Test[2] (ppm)	Total Arsenic Analytical Results[3] (ppm)
911112-8[4]	11/12/91	1123	east end	3580	--
911112-9[4]	11/12/91	1125	center	1070	--
911112-10[4]	11/12/91	1128	west end	1260	--
911112-11[4]	11/12/19	1130	center	511	--
911112-12[4]	11/12/91	1140	east end	323	--
911112-13[4]	11/12/91	1145	west end	195	--
911112-14[4]	11/12/91	1150	center	404	--
TM4W-3E-S	11/14/91	1400	1,4	22	18
TM4W-3E-E	11/14/91	1405	2,3	19	11
TM4W-2D-S	11/14/91	1410	2,3	213	--
TM4W-2D-E	11/14/91	1415	1,4	208	--
TM4W-2D-N	11/14/91	1420	2,3	1260	--
TM4W-3C-E	11/14/91	1425	1,4	356	--
TM4W-3C-N	11/14/91	1430	1,4	957	--
911114-D[5]	11/14/91	1510	1,4	28	19
TM4W-4C2-E	11/15/91	1230	1,4	281	--
TM4W-13.5K-W	11/18/91	1320	2,3	58	150
TM4W-13.5J[6]	11/18/91	1325	2,4	83	180
TM4W-13H-W	11/19/91	0930	2,3	226	--
TM4W-13G-W	11/19/91	0935	2,3	964	--
TM4W-13F-W	11/19/91	1245	1,4	181	240
TM4W-13E-W	11/19/91	1250	2,3	199	220
TM4W-2C-E	11/20/91	1250	1,4	681	--
TM4W-2C-N	11/20/91	1255	2,3	102	200
TM4W-3C2-N	11/20/91	1300	2,3	30	42
TM4W-3C2-E	11/20/91	1305	1,4	33	54
TM4W-1C-S	11/21/91	0940	1,4	115	170
TM4W-1C-E	11/21/91	0945	1,4	100	140
TM4W-1C-N	11/21/91	0950	2,3	89	130
TM4W-13.5G-W	11/21/91	0955	2,3	429	--
TM4W-13.5H-W	11/21/91	1000	2,3	290	--
911121-1[7]	11/21/91	1030	1,4	143	140
TM4W-14H-S	11/25/91	1020	2,4	162	200
TM4W-14H-W	11/25/91	1025	1,4	141	160
TM4W-14G-W	11/25/91	1030	2,3	243	--
TM4W-14G-N	11/25/91	1035	1,3	20	17
TM4W-13.5F-W	11/25/91	1040	1,4	135	170
TM4W-13.5E-W	11/25/91	1045	2,3	35	37
TM4W-2.5D-E	11/25/91	1250	2,3	117	140
TM4W-3E1-S	11/25/91	1255	1,4	168	180
TM4W-14.5G-S	11/26/91	1000	2,4	96	120
TM4W-14.5G-W	11/26/91	1005	2,3	65	77
TM4W-14.5G-N	11/26/91	1015	1,3	36	32

Notes:
[1]Sampling locations are shown in Plates A2 and A3.
[2]Screen test conducted by Technical Dryer Corporation. Screening results are included in Appendix E.1.
[3]Arsenic chemical analysis (EPA Method 6010) conducted by Laucks Testing Laboratory. Laboratory reports are included in Appendix E.1.
[4]The 911112 sample identification series were obtained for a characterization study of the soil type and corresponding arsenic concentration from cells TM4W-3D and -4C. Sample locations are not shown in Plates A2 and A3.
[5]Duplicate of TM4W-3E-S.
[6]Sample identification is reported as M4W-13.5J in Laucks' laboratory report.
[7]Duplicate of TM4W-1C-S.

TABLE B-2
Summary of Post-Treatment Results
TCLP Metals (mg/L)

Sample Number	Date Collected	Arsenic	Barium	Chromium	Copper	Nickel	Lead	Zinc
BIP-913-1	09/13/91	0.33	1.0 U	0.10 U	0.37	0.10 U	0.20 U	0.10 U
BIP-913-2	09/13/91	0.20 U	1.0 U	0.10 U	0.29	0.10 U	0.20 U	0.10 U
BIP-913-3	09/13/91	0.20 U	1.0 U	0.10 U	0.25	0.10 U	0.20 U	0.10 U
BIP-913-4	09/13/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-913-5	09/13/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-913-6	09/13/91	0.20 U	1.0 U	0.10 U	0.25	0.10 U	0.20 U	0.10 U
BIP-913-7	09/13/91	0.20 U	1.0 U	0.10 U	0.29	0.10 U	0.20 U	0.10 U
BIP-913-8	09/13/91	0.20 U	1.0 U	0.10 U	0.31	0.10 U	0.20 U	0.10 U
BIP-913-9	09/13/91	0.20 U	1.0 U	0.10 U	0.29	0.10 U	0.20 U	0.10 U
BIP-913-D	09/13/91	0.20 U	1.0 U	0.10 U	0.21	0.10 U	0.20 U	0.10 U
BIP-916-1	09/16/91	0.20 U	1.0 U	0.10 U	0.28	0.10 U	0.20 U	0.10 U
BIP-916-2	09/16/91	0.20 U	1.0 U	0.10 U	0.26	0.10 U	0.20 U	0.10 U
BIP-916-3	09/16/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-916-4	09/16/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIP-916-5	09/16/91	0.20 U	1.0 U	0.10 U	0.26	0.10 U	0.20 U	0.10 U
BIP-916-6	09/16/91	0.20 U	1.0 U	0.10 U	0.32	0.10 U	0.20 U	0.10 U
BIP-916-7	09/16/91	0.20 U	1.0 U	0.10 U	0.29	0.10 U	0.20 U	0.10 U
BIP-916-8	09/16/91	0.20 U	1.0 U	0.10 U	0.23	0.10 U	0.20 U	0.10 U
BIP-916-9	09/16/91	0.20 U	1.0 U	0.10 U	0.23	0.10 U	0.20 U	0.10 U
BIP-916-D	09/16/91	0.21	1.0 U	0.10 U	0.25	0.10 U	0.20 U	0.10 U
BIP-917-1	09/17/91	0.23	1.0 U	0.10 U	0.35	0.10 U	0.20 U	0.10 U
BIP-917-2	09/17/91	0.20 U	1.0 U	0.10 U	0.28	0.10 U	0.20 U	0.10 U
BIP-917-3	09/17/91	0.23	1.0 U	0.10 U	0.32	0.10 U	0.20 U	0.10 U
BIP-917-4	09/17/91	0.20 U	1.0 U	0.10 U	0.24	0.10 U	0.20 U	0.10 U
BIP-917-5	09/17/91	0.20 U	1.0 U	0.10 U	0.23	0.10 U	0.20 U	0.10 U
BIP-917-6	09/17/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIP-917-7	09/17/91	0.20 U	1.0 U	0.10 U	0.29	0.10 U	0.20 U	0.10 U
BIP-917-8	09/17/91	0.20 U	1.0 U	0.10 U	0.31	0.10 U	0.20 U	0.10 U
BIP-917-9	09/17/91	0.27	1.0 U	0.10 U	0.30	0.10 U	0.20 U	0.10 U
BIP-917-D	09/17/91	0.20 U	1.0 U	0.10 U	0.26	0.10 U	0.20 U	0.10 U
BIP-918-1	09/18/91	0.20	1.0 U	0.10 U	0.32	0.10 U	0.20 U	0.10 U
BIP-918-2	09/18/91	0.20 U	1.0 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIP-918-3	09/18/91	0.24	1.0 U	0.10 U	0.32	0.10 U	0.20 U	0.10 U
BIP-918-4	09/18/91	0.20 U	1.0 U	0.10 U	0.28	0.10 U	0.20 U	0.10 U
BIP-918-5	09/18/91	0.20 U	1.0 U	0.10 U	0.23	0.10 U	0.20 U	0.10 U
BIP-918-6	09/18/91	0.20 U	1.0 U	0.10 U	0.21	0.10 U	0.20 U	0.10 U
BIP-918-7	09/18/91	0.20 U	1.0 U	0.10 U	0.26	0.10 U	0.20 U	0.10 U
BIP-918-8	09/18/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIP-918-9	09/18/91	0.21	1.0 U	0.10 U	0.29	0.10 U	0.20 U	0.10 U
BIP-918-D	09/18/91	0.20 U	1.0 U	0.10 U	0.24	0.10 U	0.20 U	0.10 U
BIP-919-1	09/19/91	0.20 U	1.0 U	0.10 U	0.27	0.10 U	0.20 U	0.10 U
BIP-919-2	09/19/91	0.20 U	1.0 U	0.10 U	0.21	0.10 U	0.20 U	0.10 U
BIP-919-3	09/19/91	0.20 U	1.0 U	0.10 U	0.23	0.10 U	0.20 U	0.10 U
BIP-919-4	09/19/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIP-919-5	09/19/91	0.20 U	1.0 U	0.10 U	0.26	0.10 U	0.20 U	0.10 U
BIP-919-6	09/19/91	0.20 U	1.0 U	0.10 U	0.27	0.10 U	0.20 U	0.10 U
BIP-919-7	09/19/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-919-8	09/19/91	0.20 U	1.0 U	0.10 U	0.18	0.10 U	0.20 U	0.10 U
BIP-919-9	09/19/91	0.20 U	1.0 U	0.10 U	0.18	0.10 U	0.20 U	0.10 U
BIP-919-D	09/20/91	0.20 U	1.0 U	0.10 U	0.25	0.10 U	0.20 U	0.10 U
BIP-920-1	09/20/91	0.20 U	1.0 U	0.10 U	0.16	0.10 U	0.20 U	0.10 U
BIP-920-2	09/20/91	0.20 U	1.0 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIP-920-3	09/20/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-920-4	09/20/91	0.20 U	1.0 U	0.10 U	0.18	0.10 U	0.20 U	0.10 U
BIP-920-5	09/20/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-920-6	09/20/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-920-7	09/20/91	0.20 U	1.0 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIP-920-8	09/20/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIP-920-9	09/20/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-920-D	09/20/91	0.20 U	1.0 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U

TABLE B-2
Summary of Post-Treatment Results
TCLP Metals (mg/L)

Sample Number	Date Collected	Arsenic	Barium	Chromium	Copper	Nickel	Lead	Zinc
BIP-923-1	09/23/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-923-2	09/23/91	0.20 U	1.0 U	0.10 U	0.19	0.10 U	0.20 U	0.10 U
BIP-923-3	09/23/91	0.20 U	1.0 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U
BIP-923-4	09/23/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-923-5	09/23/91	0.20 U	1.0 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIP-923-6	09/23/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-923-7	09/23/91	0.20 U	1.0 U	0.10 U	0.18	0.10 U	0.20 U	0.10 U
BIP-923-8	09/23/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-923-9	09/23/91	0.20 U	1.0 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIP-923-D	09/23/91	0.20 U	1.0 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIP-924-1	09/24/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIP-924-2	09/24/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-924-3	09/24/91	0.20 U	1.0 U	0.10 U	0.18	0.10 U	0.20 U	0.10 U
BIP-924-4	09/24/91	0.20 U	1.0 U	0.10 U	0.18	0.10 U	0.20 U	0.10 U
BIP-924-5	09/24/91	0.20 U	1.0 U	0.10 U	0.18	0.10 U	0.20 U	0.10 U
BIP-924-6	09/24/91	0.20 U	1.0 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIP-924-7	09/24/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-924-8	09/24/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-924-9	09/24/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-924-D	09/24/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-926-1	09/26/91	0.20 U	1.0 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIP-926-2	09/26/91	0.20 U	1.0 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIP-926-3	09/26/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-926-4	09/26/91	0.20 U	1.0 U	0.10	0.15	0.10 U	0.20 U	0.10 U
BIP-926-5	09/26/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-926-6	09/26/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-926-7	09/26/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-926-8	09/26/91	0.20 U	1.0 U	0.11	0.11	0.10 U	0.20 U	0.10 U
BIP-926-9	09/26/91	0.20 U	1.0 U	0.11	0.10 U	0.10 U	0.20 U	0.10 U
BIP-926-D	09/26/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-927-1	09/27/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-927-2	09/27/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-927-3	09/27/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-927-4	09/27/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-927-5	09/27/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-927-6	09/27/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-927-7	09/27/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-927-8	09/27/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-927-9	09/27/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-927-D	09/27/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-930-1	09/30/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-930-2	09/30/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-930-3	09/30/91	0.20 U	1.0 U	0.11	0.10	0.10 U	0.20 U	0.10 U
BIP-930-4	09/30/91	0.20 U	1.0 U	0.12	0.10 U	0.10 U	0.20 U	0.10 U
BIP-930-5	09/30/91	0.20 U	1.0 U	0.11	0.10 U	0.10 U	0.20 U	0.10 U
BIP-930-6	09/30/91	0.20 U	1.0 U	0.10	0.12	0.10 U	0.20 U	0.10 U
BIP-930-7	09/30/91	0.20 U	1.0 U	0.10	0.11	0.10 U	0.20 U	0.10 U
BIP-930-8	09/30/91	0.20 U	1.0 U	0.11	0.12	0.10 U	0.20 U	0.10 U
BIP-930-9	09/30/91	0.20 U	1.0 U	0.10	0.10	0.10 U	0.20 U	0.10 U
BIP-930-D	09/30/91	0.20 U	1.0 U	0.10	0.10	0.10 U	0.20 U	0.10 U
BIP-101-1	10/01/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-101-2	10/01/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-101-3	10/01/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-101-4	10/01/91	0.20 U	1.0 U	0.10 U	0.19	0.10 U	0.20 U	0.10 U
BIP-101-5	10/01/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-101-6	10/01/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-101-7	10/01/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-101-8	10/01/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-101-9	10/01/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-101-D	10/01/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U

TABLE B-2
Summary of Post-Treatment Results
TCLP Metals (mg/L)

Sample Number	Date Collected	Arsenic	Barium	Chromium	Copper	Nickel	Lead	Zinc
BIP-102-1	10/02/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-102-2	10/02/91	0.20 U	1.0 U	0.10	0.11	0.10 U	0.20 U	0.10 U
BIP-102-3	10/02/91	0.20 U	1.0 U	0.10	0.10 U	0.10 U	0.20 U	0.10 U
BIP-102-4	10/02/91	0.20 U	1.0 U	0.10	0.10 U	0.10 U	0.20 U	0.10 U
BIP-102-5	10/02/91	0.20 U	1.0 U	0.10	0.10 U	0.10 U	0.20 U	0.10 U
BIP-102-6	10/02/91	0.20 U	1.0 U	0.10	0.13	0.10 U	0.20 U	0.10 U
BIP-102-7	10/02/91	0.20 U	1.0 U	0.10	0.13	0.10 U	0.20 U	0.10 U
BIP-102-8	10/02/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-102-9	10/02/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-102-D	10/02/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-103-1	10/03/91	0.20 U	1.0 U	0.10 U	0.21	0.10 U	0.20 U	0.10 U
BIP-103-2	10/03/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIP-103-3	10/03/91	0.20 U	1.0 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIP-103-4	10/03/91	0.20 U	1.0 U	0.10 U	0.16	0.10 U	0.20 U	0.10 U
BIP-103-5	10/03/91	0.20 U	1.0 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIP-103-6	10/03/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-103-7	10/03/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-103-8	10/03/91	0.20 U	1.0 U	0.10 U	0.16	0.10 U	0.20 U	0.10 U
BIP-103-9	10/03/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-103-D	10/03/91	0.20 U	1.0 U	0.10 U	0.19	0.10 U	0.20 U	0.10 U
BIP-104-1	10/04/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-104-2	10/04/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIP-104-3	10/04/91	0.20 U	1.0 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U
BIP-104-4	10/04/91	0.20 U	1.0 U	0.10 U	0.19	0.10 U	0.20 U	0.10 U
BIP-104-5	10/04/91	0.20 U	1.0 U	0.10 U	0.16	0.10 U	0.20 U	0.10 U
BIP-104-6	10/04/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-104-7	10/04/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-104-8	10/04/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-104-9	10/04/91	0.20 U	1.0 U	0.10 U	0.18	0.10 U	0.20 U	0.10 U
BIP-104-D	10/04/91	0.21	1.0 U	0.10 U	0.18	0.10 U	0.20 U	0.10 U
BIP-107-1	10/07/91	0.20 U	1.0 U	0.15	0.10	0.10 U	0.20 U	0.10 U
BIP-107-2	10/07/91	0.20 U	1.0 U	0.12	0.11	0.10 U	0.20 U	0.10 U
BIP-107-3	10/07/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-107-4	10/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-107-5	10/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-107-6	10/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-107-7	10/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-107-8	10/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-107-9	10/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-107-D	10/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-109-1	10/09/91	0.20 U	1.0 U	0.10 U	0.26	0.10 U	0.20 U	0.10 U
BIP-109-2	10/09/91	0.20 U	1.0 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U
BIP-109-3	10/09/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-109-4	10/09/91	0.20 U	1.0 U	0.10 U	0.25	0.10 U	0.20 U	0.10 U
BIP-109-5	10/09/91	0.20 U	1.0 U	0.10 U	0.27	0.10 U	0.20 U	0.10 U
BIP-109-D	10/09/91	0.20 U	1.0 U	0.10 U	0.24	0.10 U	0.20 U	0.10 U
BIP-1010-1	10/10/91	0.20 U	1.0 U	0.10 U	0.32	0.10 U	0.20 U	0.10 U
BIP-1010-2	10/10/91	0.20 U	1.0 U	0.10 U	0.31	0.10 U	0.20 U	0.10 U
BIP-1010-3	10/10/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-1010-4	10/10/91	0.20 U	1.0 U	0.10 U	0.25	0.10 U	0.20 U	0.10 U
BIP-1010-5	10/10/91	0.20 U	1.0 U	0.10 U	0.27	0.10 U	0.20 U	0.10 U
BIP-1010-6	10/10/91	0.20 U	1.0 U	0.10 U	0.26	0.10 U	0.20 U	0.10 U
BIP-1010-7	10/10/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-1010-8	10/10/91	0.20 U	1.0 U	0.10 U	0.23	0.10 U	0.20 U	0.10 U
BIP-1010-9	10/10/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIP-1010-D	10/10/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U

TABLE B–2
Summary of Post–Treatment Results
TCLP Metals (mg/L)

Sample Number	Date Collected	Arsenic	Barium	Chromium	Copper	Nickel	Lead	Zinc
BIP-1014-1	10/14/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-1014-2	10/14/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIP-1014-3	10/14/91	0.20 U	1.0 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U
BIP-1014-4	10/14/91	0.20 U	1.0 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIP-1014-5	10/14/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1014-6	10/14/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-1014-7	10/14/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1014-8	10/14/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1014-9	10/14/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-1014-D	10/14/91	0.20 U	1.0 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U
BIP-1015-1	10/15/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-1015-2	10/15/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-1015-3	10/15/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1015-4	10/15/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1015-5	10/15/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1015-6	10/15/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1015-7	10/15/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-1015-8	10/15/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-1015-9	10/16/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-1015-D	10/16/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1016-1	10/16/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-1016-2	10/16/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-1016-3	10/16/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-1016-4	10/16/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-1016-5	10/16/91	0.20 U	0.10 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIP-1016-6	10/16/91	0.20 U	0.10 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U
BIP-1016-7	10/16/91	0.20 U	0.10 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIP-1016-8	10/16/91	0.20 U	0.10 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1016-9	10/16/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1016-D	10/16/91	0.20 U	1.0 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U
BIP-1018-1	10/18/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1018-2	10/18/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1018-3	10/18/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-1018-4	10/18/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-1018-5	10/18/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1018-6	10/18/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-1018-7	10/18/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1018-8	10/18/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1018-9	10/18/91	0.20 U	1.0 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIP-1018-D	10/18/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIP-1021-1	10/21/91	0.20 U	1.0 U	0.10	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1021-2	10/21/91	0.20 U	1.0 U	0.11	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1021-3	10/21/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1021-4	10/21/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1021-5	10/21/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1021-D	10/21/91	0.20 U	1.0 U	0.12	0.13	0.10 U	0.20 U	0.10 U
BIP-1022-1	10/22/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1022-2	10/22/91	0.20 U	1.0 U	0.11	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1022-3	10/22/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1022-4	10/22/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1022-5	10/22/91	0.20 U	1.0 U	0.12	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1022-D	10/22/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U

TABLE B-2
Summary of Post-Treatment Results
TCLP Metals (mg/L)

Sample Number	Date Collected	Arsenic	Barium	Chromium	Copper	Nickel	Lead	Zinc
BIP-1023-1	10/23/91	0.20 U	1.0 U	0.13	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1023-2	10/23/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-1023-3	10/23/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-1023-4	10/23/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1023-5	10/23/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1023-D	10/23/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1024-1	10/24/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-1024-2	10/24/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-1024-3	10/24/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-1024-4	10/24/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-1024-5	10/24/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1024-D	10/24/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-1028-1	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-2	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-3	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-4	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-5	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-6	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-7	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-8	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-9	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-10	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-11	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1028-D	10/28/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1106-1	11/06/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1106-2	11/06/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1106-3	11/06/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-1	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-2	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-3	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-4	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-5	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-6	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-7	11/07/91	0.20 U	1.0 U	0.10	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-8	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-9	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-10	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1107-11	11/07/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-1107-D	11/07/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIP-1108-1	11/08/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIP-1108-2	11/08/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1108-3	11/08/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1108-4	11/08/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIP-1108-5	11/08/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1108-6	11/08/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1108-7	11/08/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIP-1108-8	11/08/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U

(a) BIP-909-1 and BIP-909-2 are the same sample.
U Compound analyzed for but not detected at the given detection limit.

NOTES:
Samples analyzed by Chempro.

01/27/92
file: bip.wk1

TABLE B-3
Summary of Cure Area Results
TCLP Metals (mg/L)

Sample Number	Date Collected	Arsenic	Barium	Chromium	Copper	Nickel	Lead	Zinc
BIC-822-1	08/24/91	0.20 U	1.0 U	0.10 U	0.22	0.10 U	0.20 U	0.10 U
BIC-823-1	08/26/91	0.20 U	1.0 U	0.10 U	0.27	0.10 U	0.20 U	0.10 U
BIC-826-1(a)	08/27/91	5.4	1.0 U	0.10 U	0.27	0.10 U	0.20 U	0.10 U
BIC-826-2	08/29/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.12
BIC-827-1	08/27/91	3.1	1.0 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIC-827-2	08/29/91	0.20 U	1.0 U	0.10 U	0.24	0.10 U	0.20 U	0.10
BIC-828-1	08/29/91	0.20 U	1.0 U	0.10 U	0.28	0.10 U	0.20 U	0.10 U
BIC-829-1	08/30/91	0.20 U	1.0 U	0.10 U	0.25	0.10 U	0.20 U	0.10 U
BIC-903-1	09/05/91	0.20 U	1.0 U	0.10 U	0.32	0.10 U	0.20 U	0.10 U
BIC-904-1	09/06/91	1.5	1.0 U	0.10 U	0.45	0.10 U	0.20 U	0.10 U
BIC-904-2	09/09/91	0.30	1.0 U	0.10 U	0.48	0.10 U	0.20 U	0.10 U
BIC-905-1	09/06/91	0.21	1.0 U	0.10 U	0.34	0.10 U	0.20 U	0.10 U
BIC-906-1	09/09/91	0.26	1.0 U	0.10 U	0.42	0.10 U	0.20 U	0.10 U
BIC-909-1(b)	09/11/91	7.3	1.0 U	0.10 U	0.52	0.10 U	0.20 U	0.10 U
BIC-909-1D	09/11/91	7.7	1.0 U	0.10 U	0.50	0.10 U	0.20 U	0.10 U
BIC-909-2(b)	09/12/91	0.70	1.0 U	0.10 U	0.43	0.10 U	0.20 U	0.10 U
BIC-909-3	09/25/91	0.24	1.0 U	0.10 U	0.44	0.10 U	0.20 U	0.10 U
BIC-909-4-1	09/25/91	0.46	1.0 U	0.10 U	0.45	0.10 U	0.20 U	0.10
BIC-909-4-2	09/25/91	0.59	1.0 U	0.10 U	0.47	0.10 U	0.20 U	0.10 U
BIC-909-4-3	09/25/91	0.50	1.0 U	0.10 U	0.53	0.10 U	0.20 U	0.21
BIC-909-4-4	09/25/91	0.54	1.0 U	0.10 U	0.55	0.10 U	0.20 U	0.10 U
BIC-909-4-5	09/25/91	0.42	1.0 U	0.10 U	0.48	0.10 U	0.20 U	0.10 U
BIC-909-4-6	09/25/91	0.66	1.0 U	0.10 U	0.53	0.10 U	0.20 U	0.10 U
BIC-909-4-7	09/25/91	0.56	1.0 U	0.10 U	0.48	0.10 U	0.20 U	0.10 U
BIC-909-4-8	09/25/91	0.87	1.0 U	0.10 U	0.53	0.10 U	0.20 U	0.10 U
BIC-909-4-D	09/25/91	0.52	1.0 U	0.10 U	0.53	0.10 U	0.20 U	0.10 U
BIC-910-1	09/13/91	0.22	1.0 U	0.10 U	0.44	0.10 U	0.10 U	0.10 U
BIC-911-1	09/14/91	0.20 U	1.0 U	0.10 U	0.39	0.10 U	0.10 U	0.10 U
BIC-912-1	09/16/91	0.54	1.0 U	0.10 U	0.61	0.10 U	0.20 U	0.10 U
BIC-913-1	09/16/91	0.23	1.0 U	0.10 U	0.40	0.10 U	0.20 U	0.10 U
BIC-916-1	09/18/91	0.20 U	1.0 U	0.10 U	0.31	0.10 U	0.20 U	0.10 U
BIC-917-1	09/19/91	0.20 U	1.0 U	0.10 U	0.19	0.10 U	0.20 U	0.10 U
BIC-918-1	09/20/91	0.25	1.0 U	0.10 U	0.32	0.10 U	0.20 U	0.10 U
BIC-919-1	09/21/91	0.20 U	1.0 U	0.10 U	0.28	0.10 U	0.20 U	0.10 U
BIC-920-1	09/23/91	0.20 U	1.0 U	0.10 U	0.24	0.10 U	0.20 U	0.10 U
BIC-923-1	09/24/91	0.20 U	1.0 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U
BIC-924-1	09/25/91	0.20 U	1.0 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIC-926-1	09/28/91	0.20 U	1.0 U	0.10 U	0.21	0.10 U	0.20 U	0.10 U
BIC-927-1	09/30/91	0.45	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U
BIC-930-1	10/01/91	0.20 U	1.0 U	0.10 U	0.15	0.10 U	0.20 U	0.10 U
BIC-101-1	10/02/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIC-102-1	10/03/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIC-103-1	10/04/91	0.20 U	1.0 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIC-104-1	10/07/91	1.1	1.0 U	0.10 U	0.14	0.10 U	0.20 U	0.10 U
BIC-104-2-1	10/09/91	0.20 U	1.0 U	0.10 U	0.19	0.10 U	0.20 U	0.10 U
BIC-104-2-2	10/09/91	0.20 U	1.0 U	0.10 U	0.16	0.10 U	0.20 U	0.10 U
BIC-104-2-3	10/09/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U
BIC-104-2-4	10/09/91	0.20 U	1.0 U	0.10 U	0.21	0.10 U	0.20 U	0.10 U
BIC-104-2-5	10/09/91	0.20 U	1.0 U	0.10 U	0.20	0.10 U	0.20 U	0.10 U

TABLE B–3
Summary of Cure Area Results
TCLP Metals (mg/L)

Sample Number	Date Collected	Arsenic	Barium	Chromium	Copper	Nickel	Lead	Zinc
BIC-107-1	10/08/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIC-109-1	10/11/91	0.20 U	1.0 U	0.10 U	0.26	0.10 U	0.20 U	0.10 U
BIC-1010-1	10/14/91	0.20 U	1.0 U	0.10 U	0.29	0.10 U	0.20 U	0.10 U
BIC-1014-1	10/15/91	0.20 U	1.0 U	0.10 U	0.17	0.10 U	0.20 U	0.10 U
BIC-1015-1	10/16/91	0.20 U	1.0 U	0.10 U	0.10	0.10 U	0.20 U	0.10 U
BIC-1016-1	10/17/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIC-1018-1	10/19/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.20 U	0.10 U
BIC-1021-1	10/23/91	0.20 U	1.0 U	0.10 U	0.13	0.10 U	0.10 U	0.10 U
BIC-1022-1	10/24/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIC-1023-1	10/25/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIC-1024-1	10/26/91	0.20 U	1.0 U	0.10 U	0.11	0.10 U	0.20 U	0.10 U
BIC-1028-1	10/30/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIC-1106-1	11/07/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIC-1107-1	11/08/91	0.20 U	1.0 U	0.10 U	0.10 U	0.10 U	0.20 U	0.10 U
BIC-1108-1	11/11/91	0.20 U	1.0 U	0.10 U	0.12	0.10 U	0.20 U	0.10 U

(a) Sample label reads BIC-827-1.
(b) BIC-909-1 and BIC-909-2 are the same sample.
U Compound analyzed for but not detected at the given detection limit.

NOTES:
Samples analyzed by Chempro.

01/27/92
file: bic.wk1

APPENDIX C
OVERBURDEN SOIL STOCKPILE SAMPLING
BOEING THOMPSON/ISAACSON SITE

INTRODUCTION

This appendix presents the plan that GeoEngineers used during collection of soil samples from the stockpile of overburden soil at the Boeing Thompson/Isaacson site. The stockpile consisted of approximately 9,000 cubic yards of overburden soil that was removed from the vicinity of the remedial excavation. The locations from which soil samples were collected are shown in Figure C1. The soil samples were submitted for chemical analysis of priority pollutant metals and metals by TCLP (toxicity characteristic leaching procedure).

Soil in which arsenic was detected at concentrations exceeding 200 ppm (parts per million) was removed from the stockpile and treated using the soil stabilization treatment process. Three cells were excavated to remove the soil with elevated concentrations (>200 ppm) of arsenic. The resulting sidewalls of the excavated cells were resampled to confirm that soil with elevated concentrations of arsenic was removed. Chemical analytical data are presented in Table C1. Laboratory reports are included in Appendix E.3.

SAMPLING PROCEDURE

GENERAL

Sixty-five soil samples were collected from the soil stockpile between September 30 and October 16, 1991. Forty-four discrete soil samples were collected from a grid pattern established prior to sample collection. The 44 discrete samples were analyzed by ARI (Analytical Resources, Inc.). Twenty-one composite soil samples were collected from the sidewalls of each excavated cell after soil containing elevated levels of arsenic was removed. These samples were analyzed by Tech Dryer (Technical Dryer Corporation) and by Laucks (Laucks Testing Laboratory, Inc.).

SAMPLING GRID

A grid pattern was established on the surface of the stockpile before the initial soil samples were collected. The stockpile was divided into cells 25 feet wide by 37 feet long by 12 feet deep. The cells were labeled alphanumerically with a number designation from north to south and an alphabetic designation from east to west as shown in Figure C1.

SOIL SAMPLE COLLECTION AND EXCAVATION

A minimum of two discrete soil samples were collected from a test pit excavated in each cell using a trackhoe-type excavator operated by SME (SME Corporation). The soil samples were collected directly from the excavator bucket and placed in sample containers provided by the

TABLE C1
SUMMARY OF METALS ANALYSIS[1]
SOIL SAMPLES FROM OVERBURDEN STOCKPILE
BOEING THOMPSON/ISAACSON SITE

Soil Sample Number	Depth of Sample (feet)	Priority Pollutant Metals (milligrams/kilogram-dry)												
		Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
SP-A1-1	5	ND	26	0.3	0.5	78.6	58.2	848	0.06	38	ND	ND	8	1,660
SP-A1-2	10	ND	32	0.3	0.6	32.1	53.6	163	0.08	44	ND	ND	5	669
SP-A2-1	4	ND	20	0.3	0.3	28.5	45.1	139	0.05	35	ND	ND	ND	1,000
SP-A2-2	7	ND	222	0.3	1.0	29.7	162	98	0.13	26	ND	ND	5	358
SP-A2-3	composite	--	150(181)[2]	--	--	--	--	--	--	--	--	--	--	--
SP-A2-4	composite	--	140(141)[2]	--	--	--	--	--	--	--	--	--	--	--
SP-A2-5	composite	--	120(119)[2]	--	--	--	--	--	--	--	--	--	--	--
SP-A2-6	composite	--	43(174)[2]	--	--	--	--	--	--	--	--	--	--	--
SP-A3-1	3	ND	23	0.3	0.3	31.0	38.6	118	0.06	38	ND	ND	7	669
SP-A3-2	8	6	29	0.3	0.6	45.1	68	144	0.17	34	ND	ND	ND	289
SP-A4-1	5	40	39	0.3	0.6	32.6	56.1	182	0.11	41	ND	ND	6	489
SP-A4-2	8	ND	28	0.3	0.8	41.6	74.2	101	0.18	39	ND	ND	8	288
SP-B1-1	5	12	266	0.3	0.9	38.4	141	106	0.27	39	ND	ND	7	326
SP-B1-2	9	ND	156	0.2	0.8	31	103	146	0.31	33	ND	ND	ND	300
SP-B1-3	composite	--	150(180)[2]	--	--	--	--	--	--	--	--	--	--	--
SP-B1-4	composite	--	130(151)[2]	--	--	--	--	--	--	--	--	--	--	--
SP-B1-5	composite	--	100(98)[2]	--	--	--	--	--	--	--	--	--	--	--
SP-B1-6	composite	--	40(47)[2]	--	--	--	--	--	--	--	--	--	--	--
SP-B1-7	composite	--	130(135)[2]	--	--	--	--	--	--	--	--	--	--	--
911011-D1[3]	composite	--	130(149)[2]	--	--	--	--	--	--	--	--	--	--	--
SP-B2-1	4	ND	168	0.3	0.6	27.3	175	66	0.32	39	6	ND	ND	188
SP-B2-2	7	8	192	0.3	0.6	29.8	125	104	0.21	68	5	ND	9	252
SP-B2-3	11	27	120	0.3	1.2	44.3	120	119	0.41	39	ND	ND	12	494

Notes:
[1]Soil samples were analyzed by Analytical Resources, Inc. except where noted. Laboratory reports are presented in Appendix E.3.
[2]Chemical analyses conducted by Laucks Testing Laboratory. Technical Dryer arsenic screening results are in parentheses. Laboratory reports are presented in Appendix E.3.
[3]Duplicate of SP-B1-7.
"ND" = not detected
"--" = not tested

TABLE C1
SUMMARY OF METALS ANALYSIS[1]
SOIL SAMPLES FROM OVERBURDEN STOCKPILE
BOEING THOMPSON/ISAACSON SITE

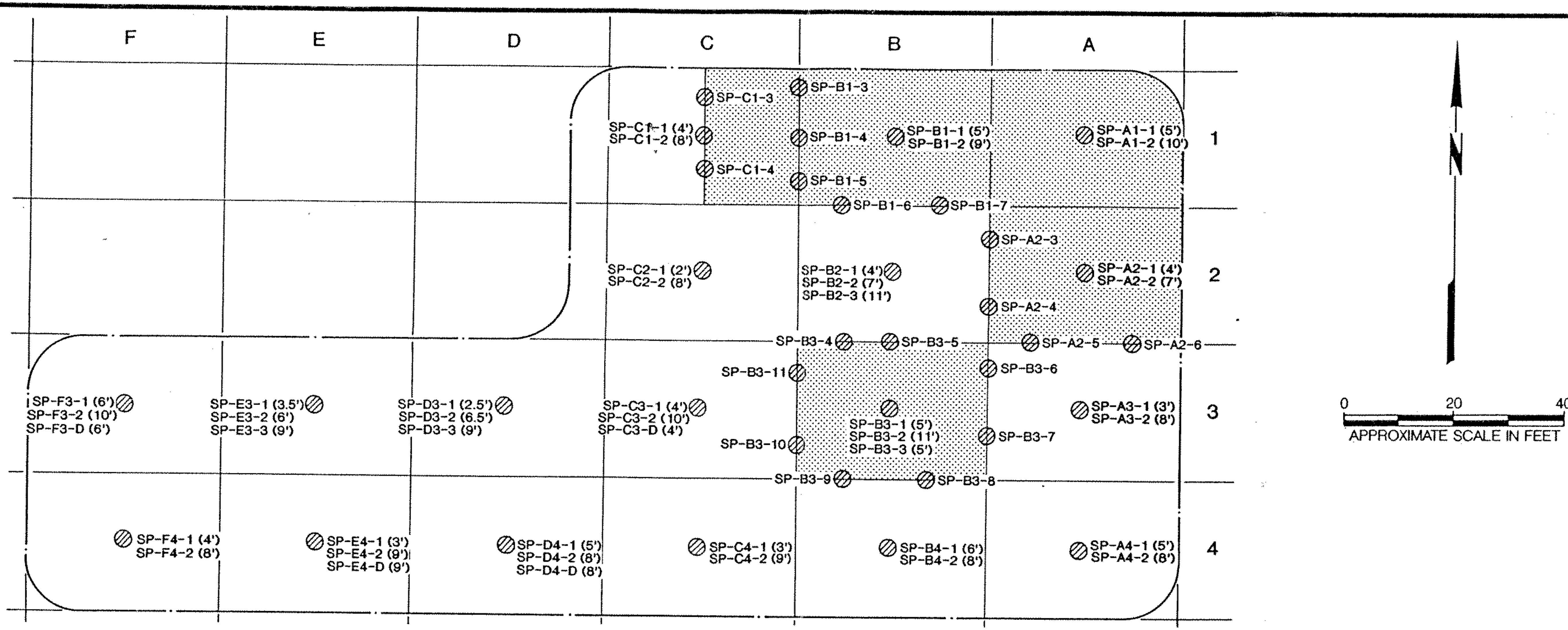
Soil Sample Number	Depth of Sample (feet)	Priority Pollutant Metals (milligrams/kilogram-dry)												
		Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
SP-B3-1	5	ND	99	0.4	0.7	39.1	113	96	0.55	37	ND	ND	ND	314
SP-B3-2	11	ND	115	0.3	0.8	22.2	96.7	173	0.3	31	ND	ND	4	276
SP-B3-3[2]	5	6	283	0.3	0.4	27.4	161	107	0.2	41	ND	ND	8	203
SP-B3-4	composite	--	56(46)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-B3-5	composite	--	94(96)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-B3-6	composite	--	42(66)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-B3-7	composite	--	90(183)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-B3-8	composite	--	210(127)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-B3-9	composite	--	130(128)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-B3-10	composite	--	77(83)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-B3-11	composite	--	160(140)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-B3-12	composite	--	54(56)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-B4-1	6	8	127	0.2	0.5	24.3	95.9	142	0.42	31	ND	ND	ND	238
SP-B4-2	8	ND	131	0.3	0.9	25.7	127	107	0.36	40	ND	ND	7	354
SP-C1-1	4	ND	157	0.3	0.7	33.5	95	117	0.16	27	ND	ND	6	310
SP-C1-2	8	ND	100	0.3	0.6	33.5	70.5	142	0.09	33	ND	ND	ND	582
SP-C1-3	composite	--	130(177)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-C1-4	composite	--	100(110)[3]	--	--	--	--	--	--	--	--	--	--	--
SP-C2-1	2	ND	10	0.3	0.3	30	43.9	193	0.09	41	ND	ND	ND	1,110
SP-C2-2	8	ND	42	0.3	0.3	27.4	50.4	88	0.07	36	ND	ND	7	471
SP-C3-1	4	ND	24	0.3	0.4	24.9	58.2	117	0.13	33	ND	ND	6	492
SP-C3-2	10	ND	39	0.3	0.4	26.2	93.5	102	0.17	64	ND	ND	8	252
SP-C3-D[4]	4	ND	ND	0.3	0.3	19.8	34.8	75	0.09	20	ND	ND	ND	144

Notes:
[1]Soil samples were analyzed by Analytical Resources, Inc. except where noted. Laboratory reports are presented in Appendix E.3.
[2]Duplicate of SP-B3-1.
[3]Chemical analyses conducted by Laucks Testing Laboratory. Technical Dryer arsenic screening results are in parentheses. Laboratory reports are presented in Appendix E.3.
[4]Duplicate of SP-C3-1.
"ND" = not detected
"--" = not tested

TABLE C1
SUMMARY OF METALS ANALYSIS[1]
SOIL SAMPLES FROM OVERBURDEN STOCKPILE
BOEING THOMPSON/ISAACSON SITE

Soil Sample Number	Depth of Sample (feet)	Priority Pollutant Metals (milligrams/kilogram-dry)												
		Antimony	Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
SP-C4-1	3	ND	38	0.4	1	85.7	92.1	221	0.14	103	ND	ND	ND	515
SP-C4-2	9	6	54	0.3	0.7	29	71.6	178	0.22	32	ND	ND	6	303
SP-D3-1[6]	2.5	ND	112	0.3	0.5	104	109	80	0.2	77	ND	ND	5	184
SP-D3-2	6.5	6	97	0.3	0.3	68.2	117	92	0.23	200	ND	ND	10	193
SP-D3-3	9	ND	118	0.3	0.4	36.6	98.3	77	0.26	144	ND	ND	ND	193
SP-D4-1	5	7	25	0.3	1.7	66.3	116	983	0.3	86	ND	ND	9	889
SP-D4-2[7]	8	6	60	0.4	1	72.7	96.1	184	0.19	59	ND	ND	12	385
SP-D4-D[8]	8	5	58	0.3	1.1	66.7	145	190	0.23	63	ND	ND	ND	1,510
SP-E3-1	3.5	13	38	0.6	2.1	888	365	3,000	0.06	2,170	ND	0.7	7	2,530
SP-E3-2	6	4	46	0.2	0.7	111	75.8	378	0.11	80	ND	ND	4	529
SP-E3-3	9	8	137	0.2	0.5	22	79	57	0.19	22	ND	ND	ND	235
SP-E4-1	3	11	30	0.5	1.3	153	226	285	0.21	276	ND	ND	9	1,360
SP-E4-2	9	ND	13	0.3	ND	29	41.5	47	ND	41	4	ND	ND	361
SP-E4-D[9]	9	ND	9	0.3	0.8	35.5	29	140	0.05	41	ND	ND	ND	462
SP-F3-1	6	7	30	0.3	2	117	92.9	287	0.16	63	ND	ND	7	583
SP-F3-2	10	5	76	0.2	0.6	25.7	66.6	48	0.34	23	ND	ND	ND	164
SP-F-D[10]	6	7	32	0.4	2.8	72.8	98.9	492	0.18	85	ND	ND	9	1,120
SP-F4-1	4	6	21	0.4	2.2	83.3	98.8	1,550	0.29	70	ND	ND	9	859
SP-F4-2	8	6	34	0.3	1.8	136	135	804	0.29	208	ND	ND	6	698

Notes:
[1]Soil samples were analyzed by Analytical Resources, Inc. except where noted. Laboratory reports are presented in Appendix E.3.
[4]Sample was also analyzed for metals using TCLP. Arsenic (0.28 mg/l), barium (0.689 mg/l), cadmium (0.010 mg/l), and lead (0.12 mg/l) were detected in the sample.
[6]Sample was also analyzed for metals using TCLP. Barium (0.965 mg/l), cadmium (0.012 mg/l), and lead (0.58 mg/l) were detected in the sample.
[7]Sample was also analyzed for metals using TCLP. Barium (0.835 mg/l), cadmium (0.13 mg/l), and lead (0.04 mg/l) were detected in the sample.
[8]Duplicate of SP-D4-2.
[9]Duplicate of SP-E4-2.
[10]Duplicate of SP-F3-1.
'--' = not tested
'ND' = not detected



EXPLANATION:

SP-A1-1 (5') APPROXIMATE SOIL SAMPLING LOCATION AND NUMBER (DEPTH IN FEET)

SOIL TREATED BY SOIL STABILIZATION TREATMENT PROCESS

NOTE: AVERAGE THICKNESS OF STOCKPILE IS 12 FEET.

GeoEngineers

OVERBURDEN SOIL STOCKPILE
BOEING THOMPSON/ISAACSON SITE

FIGURE C1

0120-116-R14 #JN:BDH 11.20.91

APPENDIX D
SECONDARY CONTAINMENT CLOSURE FIELD ACTIVITIES
ASPHALT SAMPLING
BOEING THOMPSON/ISAACSON SITE

INTRODUCTION

This appendix presents a summary of GeoEngineers' field activities during sampling of the asphalt concrete pavement in the secondary containment area used during the soil stabilization treatment process. The secondary containment area was cleaned with a pressure washer to remove residual soil from the surface of the asphalt pavement. The wastewater was collected in a sump, pumped into Baker tanks located on site, and sampled and submitted for chemical analysis. Chemical Processors Inc. removed the water from the Baker tanks and transported it to Boeing's wastewater treatment facility. The top 2 inches of asphalt was removed from the secondary containment area and transported to the landfill operated by Chem Security Systems Inc. (CSSI) in Arlington, Oregon. The surface of the remaining 6-inch-thick layer of asphalt was sampled and submitted for chemical analysis of arsenic. The asphalt sampling locations are shown in Plate D1. The chemical analytical data are summarized in Table D1. Laboratory reports are included in Appendix E.4.

The containment area wall consisting of jersey barriers lined with 40 millimeter plastic and hay bales was removed at the completion of asphalt sampling. The plastic liner and hay bales were transported to the CSSI landfill in Arlington, Oregon. The jersey barriers were pressure washed and returned to Woodworth and Company, Inc. of Tacoma, Washington. Catch basins bordering the containment area were removed and transported to the CSSI landfill in Arlington, Oregon. The resulting excavations were backfilled by SME Corporation with sand and crushed rock.

SAMPLING PROCEDURE

GENERAL

Sixty asphalt samples were collected from the secondary containment area between December 4 and 23, 1991. The samples were analyzed for arsenic by ARI (Analytical Resources Inc.).

TABLE D1
SUMMARY OF ANALYTICAL RESULTS--ASPHALT SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Identification[2]	Date Sampled	Time Sampled	Arsenic Concentration EPA Method 6010 (milligrams/kilogram-dry)
AC-10A-1	12/4/91	13:35	5 ND
AC-9A-1	12/4/91	13:40	6
AC-9B-1	12/4/91	13:45	4 ND
AC-8A-1	12/4/91	13:50	5
AC-8B-1	12/4/91	13:55	5 ND
AC-7B-1	12/4/91	14:05	5
AC-7A-1	12/4/91	14:08	5 ND
AC-6B-1	12/5/91	10:35	5 ND
AC-5B-1	12/5/91	10:40	6 ND
AC-4B-1	12/5/91	10:45	6 ND
AC-911204[3]	12/5/91	10:55	6
AC-3B-1	12/5/91	11:00	6 ND
AC-2B-1	12/5/91	11:15	7
AC-1B-1	12/5/91	13:55	6
AC-11E-1	12/10/91	10:55	9
AC-11D-1	12/10/91	11:00	7
AC-11C-1	12/10/91	11:05	8
AC-11B-1	12/10/91	11:10	5
AC-12E-1	12/10/91	14:05	17
AC-12D-1	12/10/91	14:12	14
AC-12C-1	12/10/91	14:15	13
AC-911210[4]	12/10/91	14:20	13
AC-12B-1	12/10/91	14:25	11
AC-12A-1	12/10/91	14:30	6
AC-11A-1	12/10/91	14:35	15
AC-13E-1	12/12/91	11:30	7
AC-13D-1	12/12/91	11:36	5 ND
AC-13C-1	12/12/91	11:41	4 ND
AC-13B-1	12/12/91	11:46	4 ND
AC-13A-1	12/12/91	11:51	7

Notes:
[1]Chemical analyses conducted by Analytical Resources Inc. Laboratory reports are included in Appendix E.4.
[2]Sample locations are shown in Plate D1.
[3]Duplicate of AC-4B-1.
[4]Duplicate of AC-12C-1.
"ND" = Arsenic was not detected at the given concentration limit.

TABLE D1
SUMMARY OF ANALYTICAL RESULTS--ASPHALT SAMPLES[1]
BOEING THOMPSON/ISAACSON SITE

Sample Identification[2]	Date Sampled	Time Sampled	Arsenic Concentration EPA Method 6010 (milligrams/kilogram-dry)
AC-14A-1	12/17/91	--	4 ND
AC-14B-1	12/17/91	--	4 ND
AC-15A-1	12/17/91	--	5 ND
AC-15B-1	12/17/91	--	5 ND
AC-16A-1	12/17/91	--	5 ND
AC-16B-1	12/17/91	--	4 ND
AC-911217[3]	12/17/91	--	4 ND
AC-14A-2	12/18/91	--	6
AC-17A-1	12/18/91	--	7
AC-17B-1	12/18/91	--	5 ND
AC-16C-1	12/20/91	11:15	4 ND
AC-17C-1	12/20/91	11:20	4 ND
AC-16D-1	12/20/91	11:25	5 ND
AC-17D-1	12/20/91	11:30	4 ND
AC-911220-1[4]	12/20/91	11:35	5 ND
AC-18B-1	12/20/91	11:40	5 ND
AC-18A-1	12/20/91	11:45	4 ND
AC-19A-1	12/20/91	11:55	4 ND
AC-19B-1	12/20/91	14:00	5 ND
AC-19B-2	12/20/91	14:05	12
AC-19C-1	12/20/91	14:15	5 ND
AC-19C-2	12/20/91	14:20	5 ND
AC-911220-2[5]	12/20/91	14:25	4 ND
AC-18C-1	12/20/91	14:30	5 ND
AC-18D-1	12/20/91	14:35	5 ND
AC-19D-1	12/20/91	14:40	4 ND
AC-16E-1	12/23/91	11:40	5 ND
AC-17E-1	12/23/91	11:45	4 ND
AC-18E-1	12/23/91	11:50	4 ND
AC-19E-1	12/23/91	11:55	4 ND

Notes:
[1]Chemical analyses conducted by Analytical Resources Inc. Laboratory reports are included in Appendix E.4.
[2]Sample locations are shown in Plate D1.
[3]Duplicate of AC-16A-1.
[4]Duplicate of AC-17D-1.
[5]Duplicate of AC-18C-1.
"--" = sample collection time was not recorded
"ND" = Arsenic was not detected at the given concentration limit

Appendix C-8

ERM 2000a: Conceptual Proposal for No Further Action Determination at the Boeing Isaacson Property

ENVIRONMENTAL RESOURCES MANAGEMENT

FINAL TECHNICAL MEMORANDUM

The Boeing Company

Conceptual Proposal For No Further Action Determination at the Boeing Isaacson Property

April 2000

Environmental Resources Management
915 118th Avenue S.E., Suite 130
Bellevue, WA 98005

ERM

Drawn By: J. Estrada | Date: 03/06/00 | Project No. 4108.02

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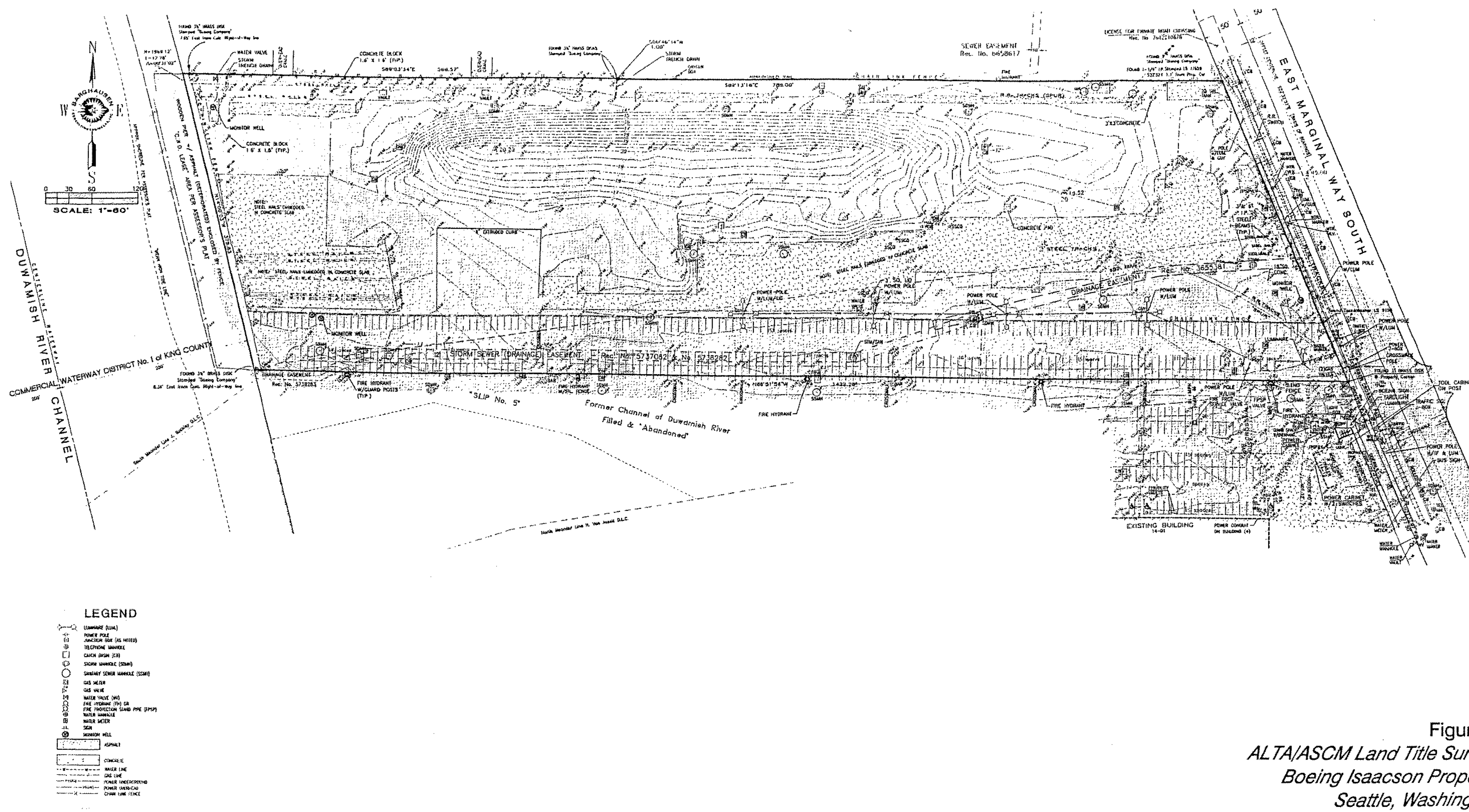


Figure 3

ALTA/ASCM Land Title Survey

Boeing Isaacson Property

Seattle, Washington

ERM 03/00

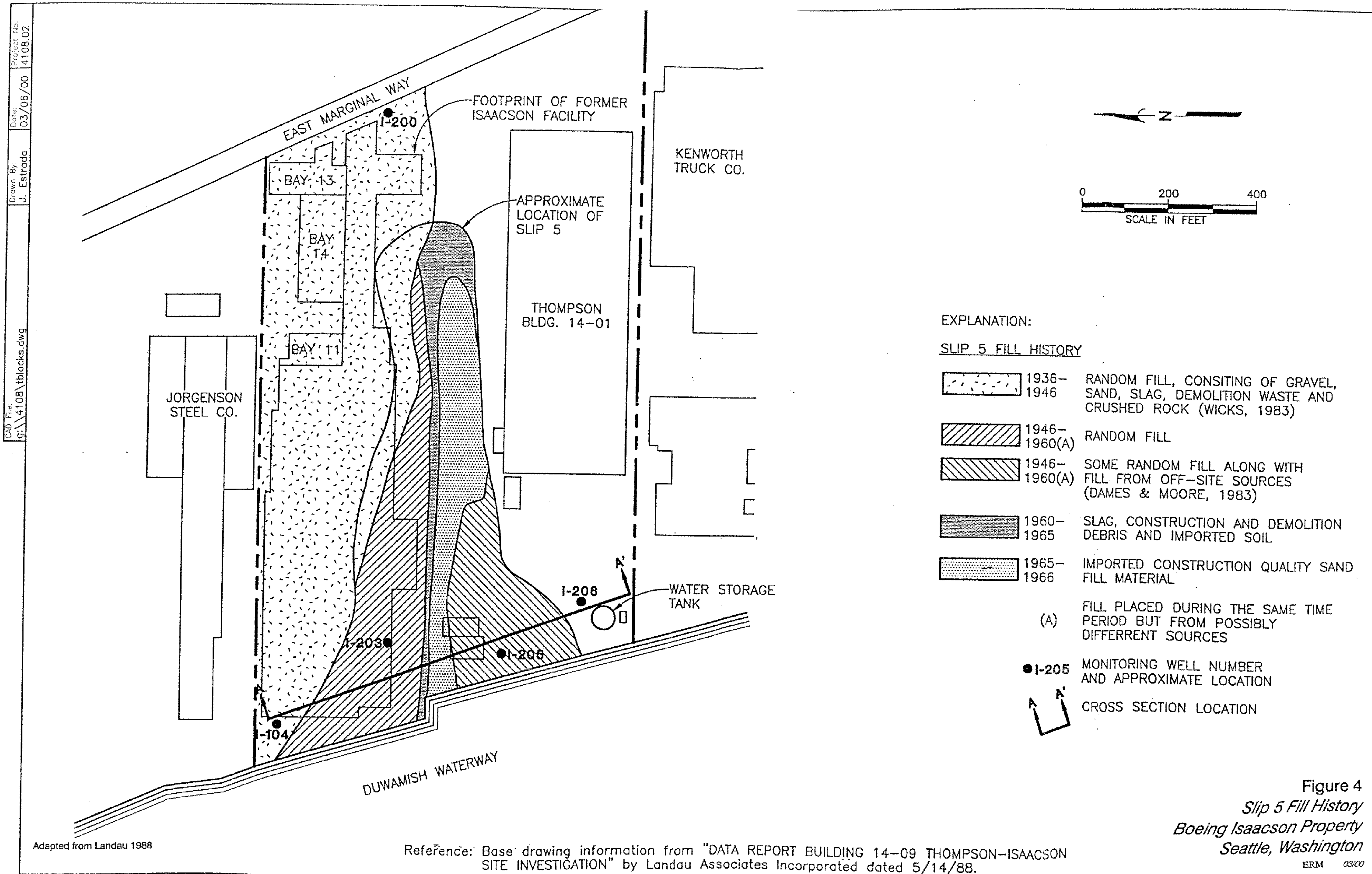
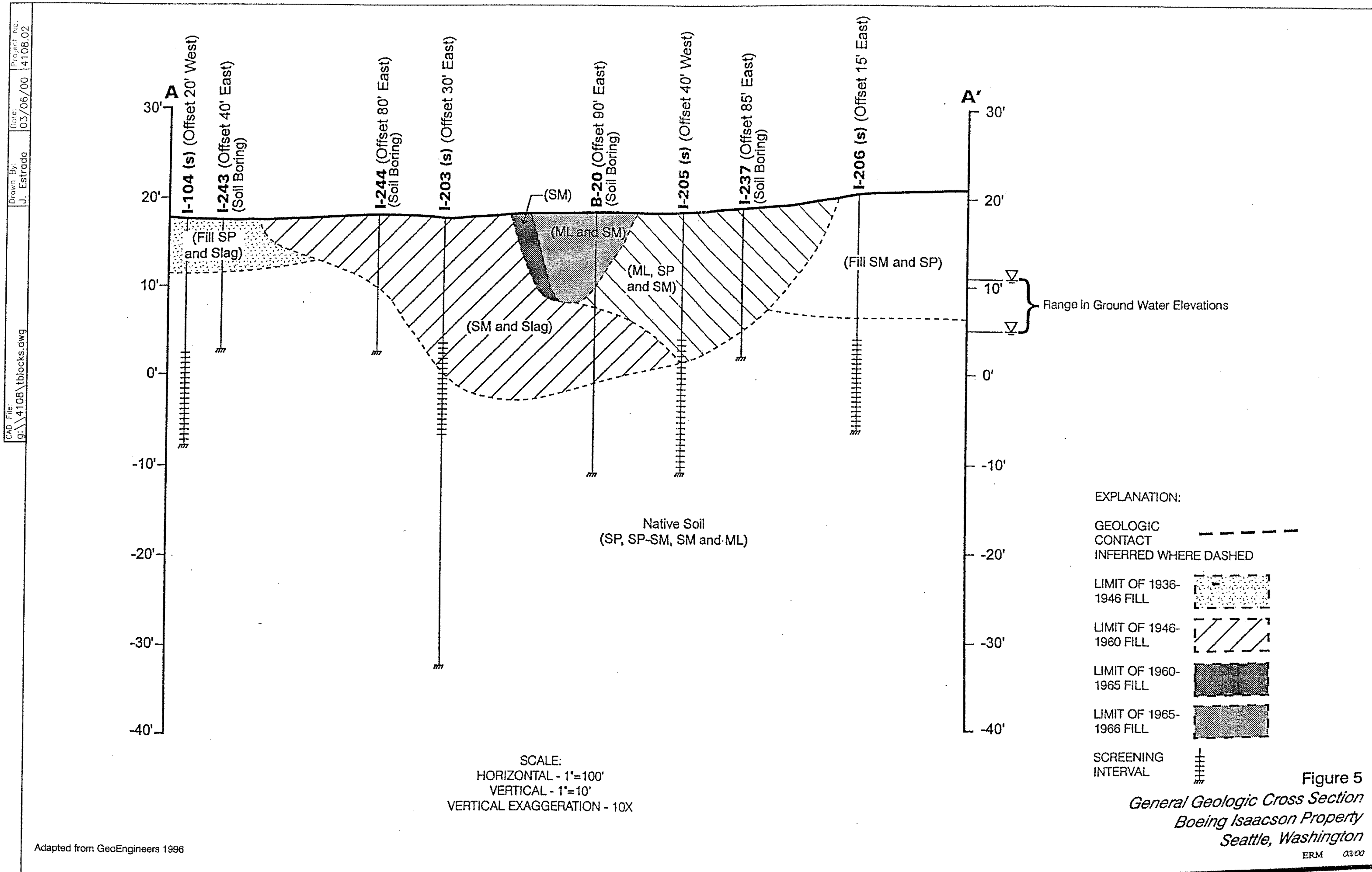


Figure 4
Slip 5 Fill History
Boeing Isaacson Property
Seattle, Washington



Adapted from GeoEngineers 1996

Figure 5

General Geologic Cross Section
Boeing Isaacson Property
Seattle, Washington

ERM 03/00

Drawn By: J. Estrada | Date: 03/06/00 | Project No. 4108.02

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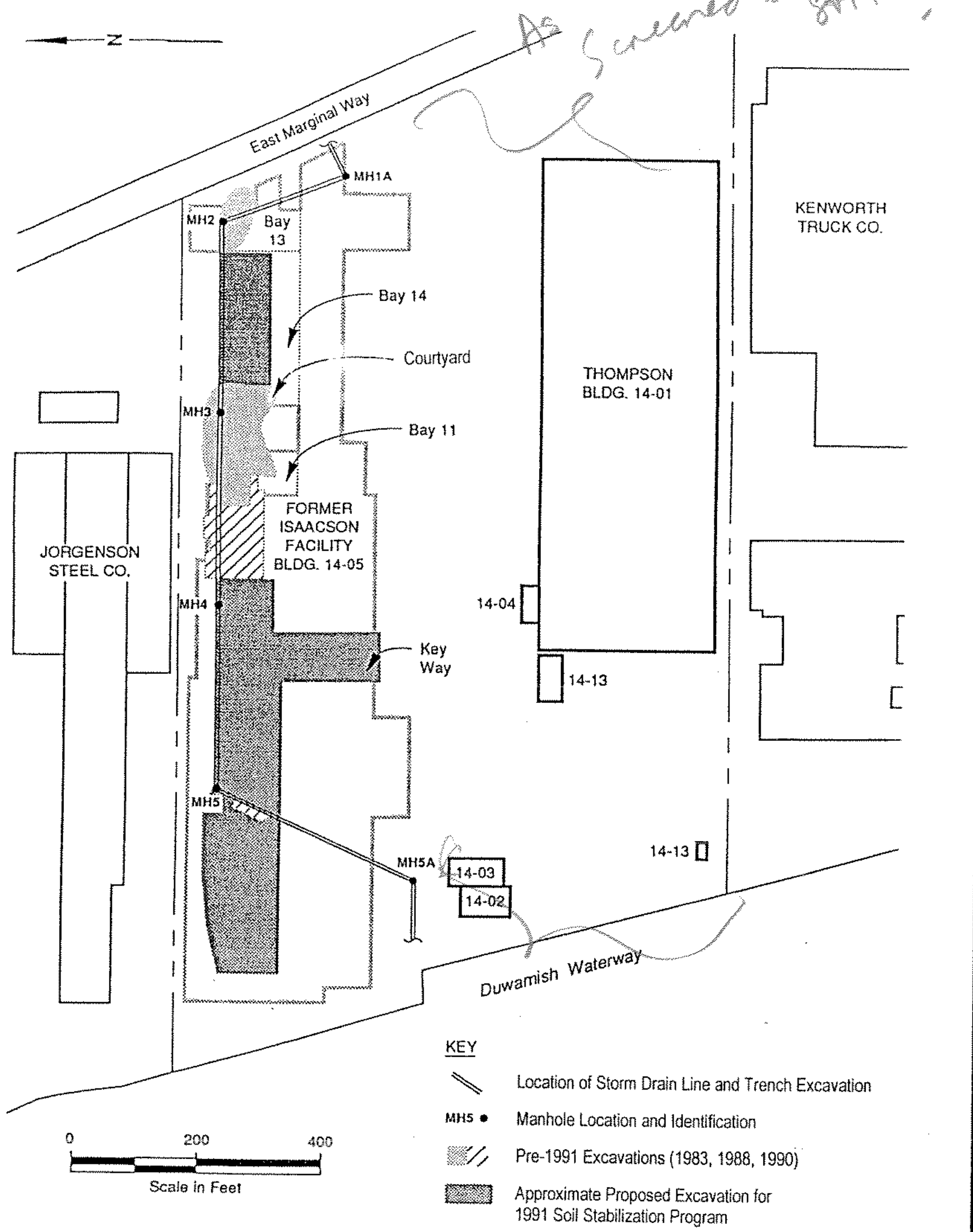
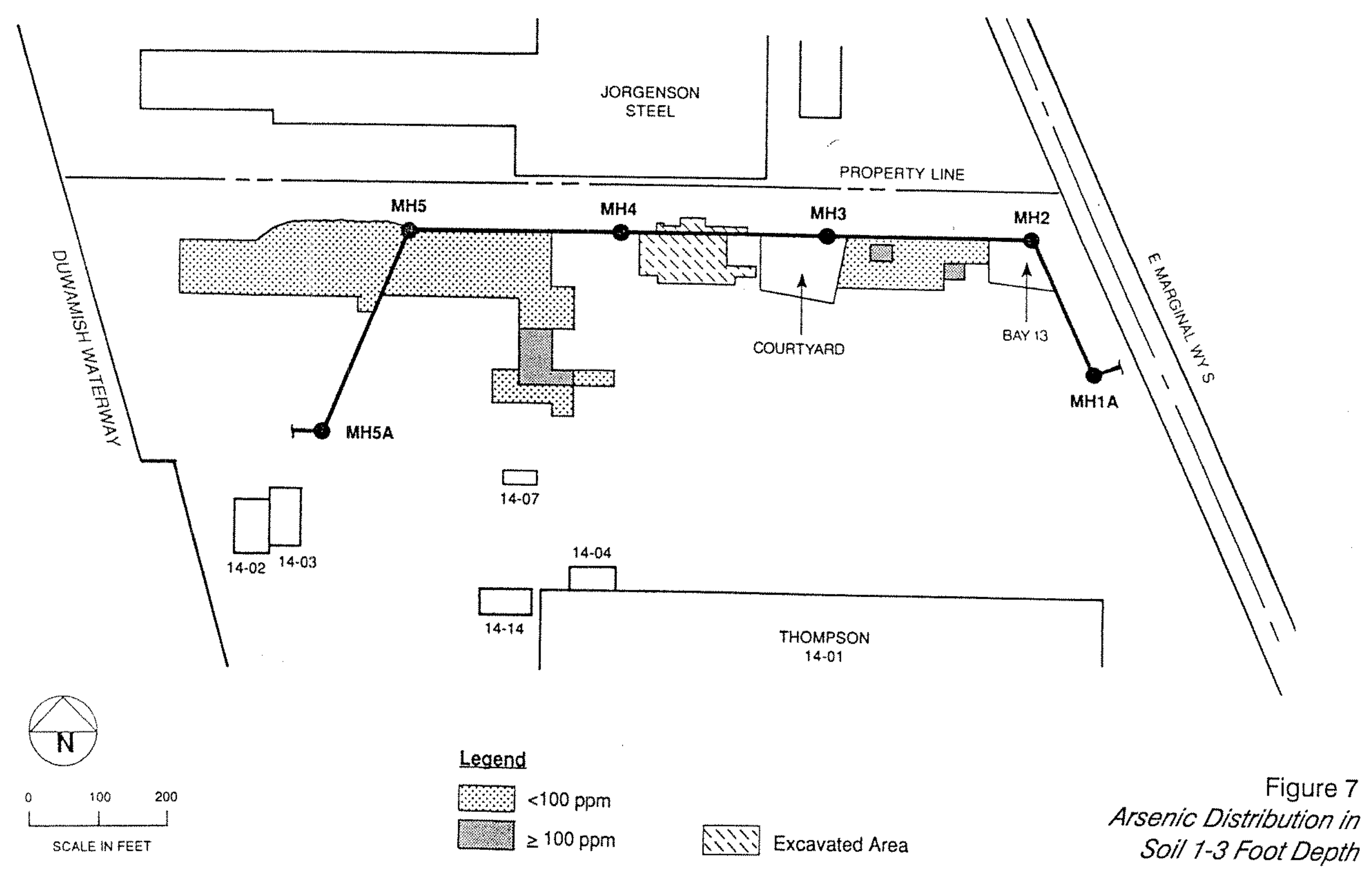


Figure 6
Location of Previous Remedial Actions
Boeing Isaacson Property
Seattle, Washington

Adapted from Landau 1990

ERM 03/00



Adapted from Landau 1990

Figure 7
Arsenic Distribution in Soil 1-3 Foot Depth Boeing Isaacson Property Seattle, Washington

ERM 03/00

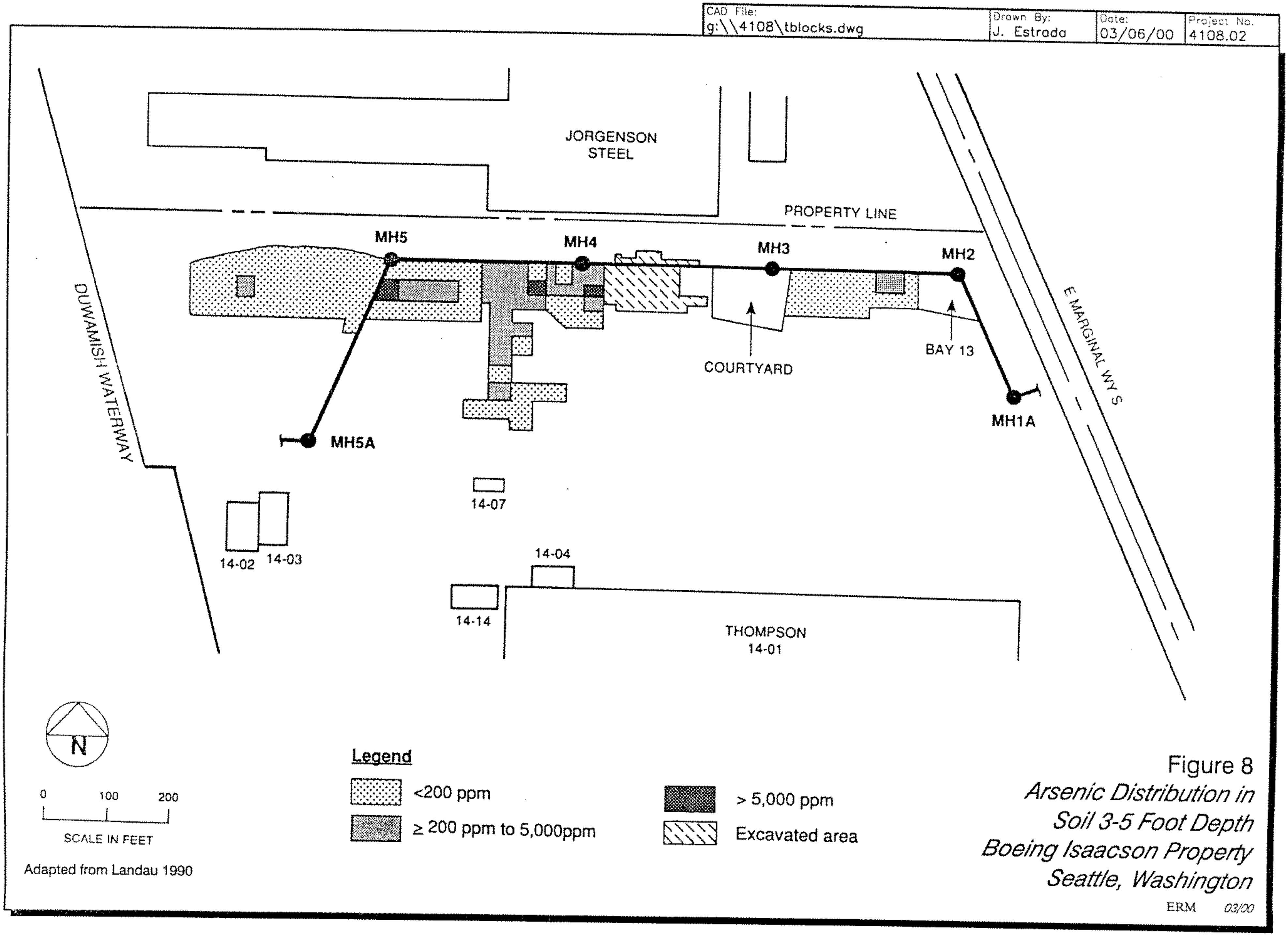
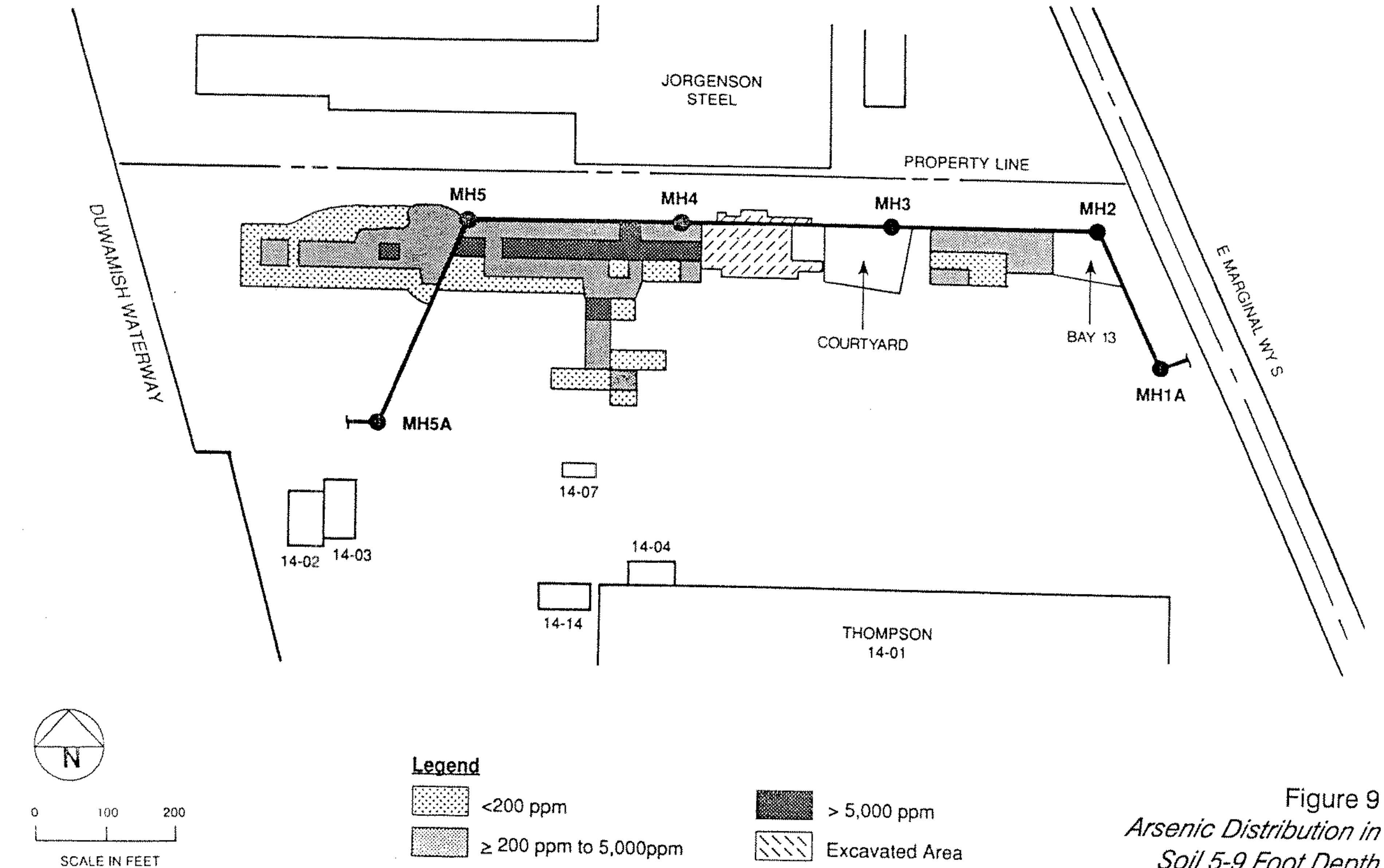


Figure 8

Arsenic Distribution in Soil 3-5 Foot Depth Boeing Isaacson Property Seattle, Washington

ERM *03/00*

CAD File:	Drawn By:	Date:	Project No.
g:\\4108\tblocks.dwg	J. Estrada	03/06/00	4108.02



Adapted from Landau 1990

Figure 9
Arsenic Distribution in Soil 5-9 Foot Depth Boeing Isaacson Property Seattle, Washington

ERM 03/00

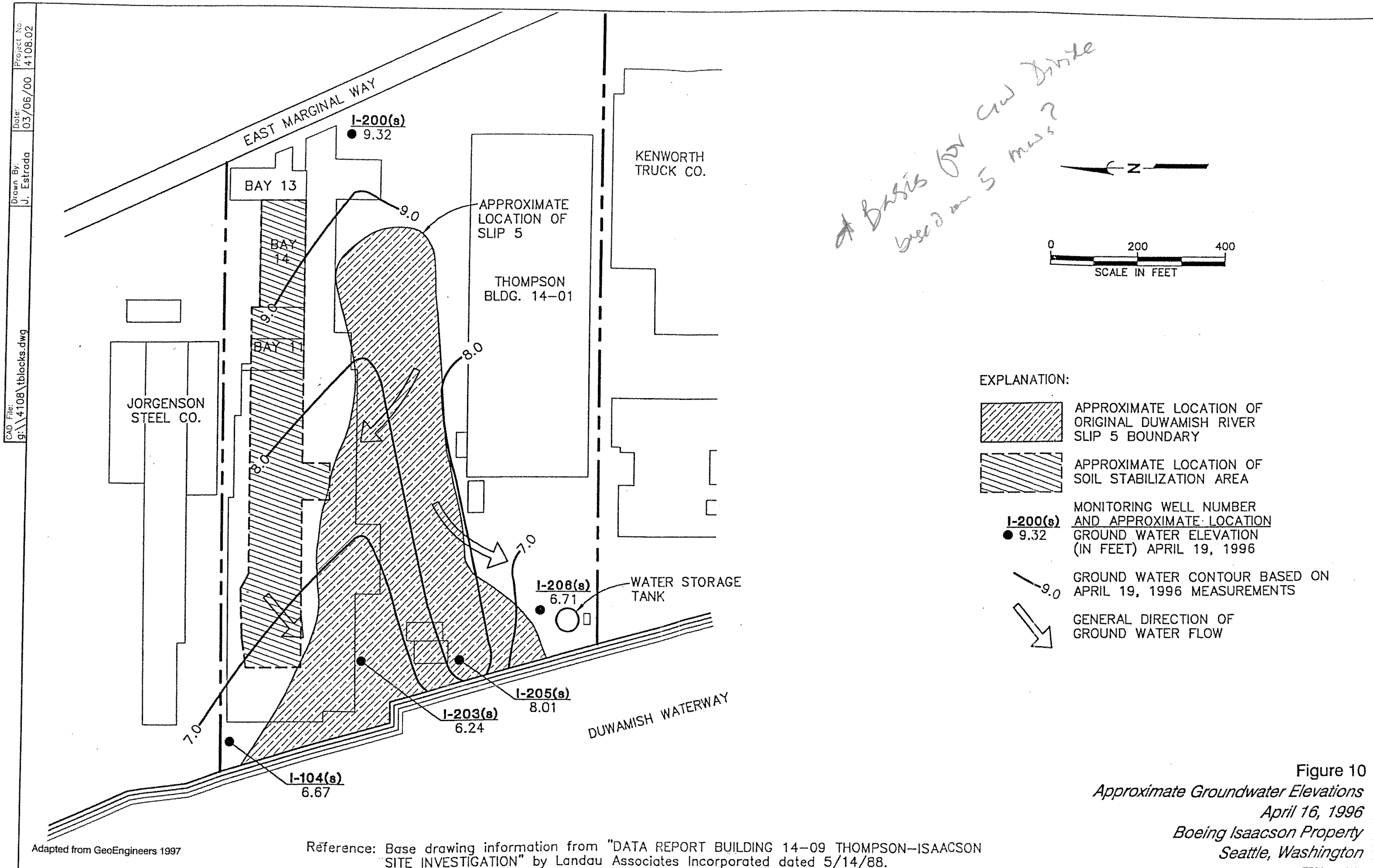


Figure 10
Approximate Groundwater Elevations
April 16, 1996
Boeing Isaacson Property
Seattle, Washington

ERM 03/00

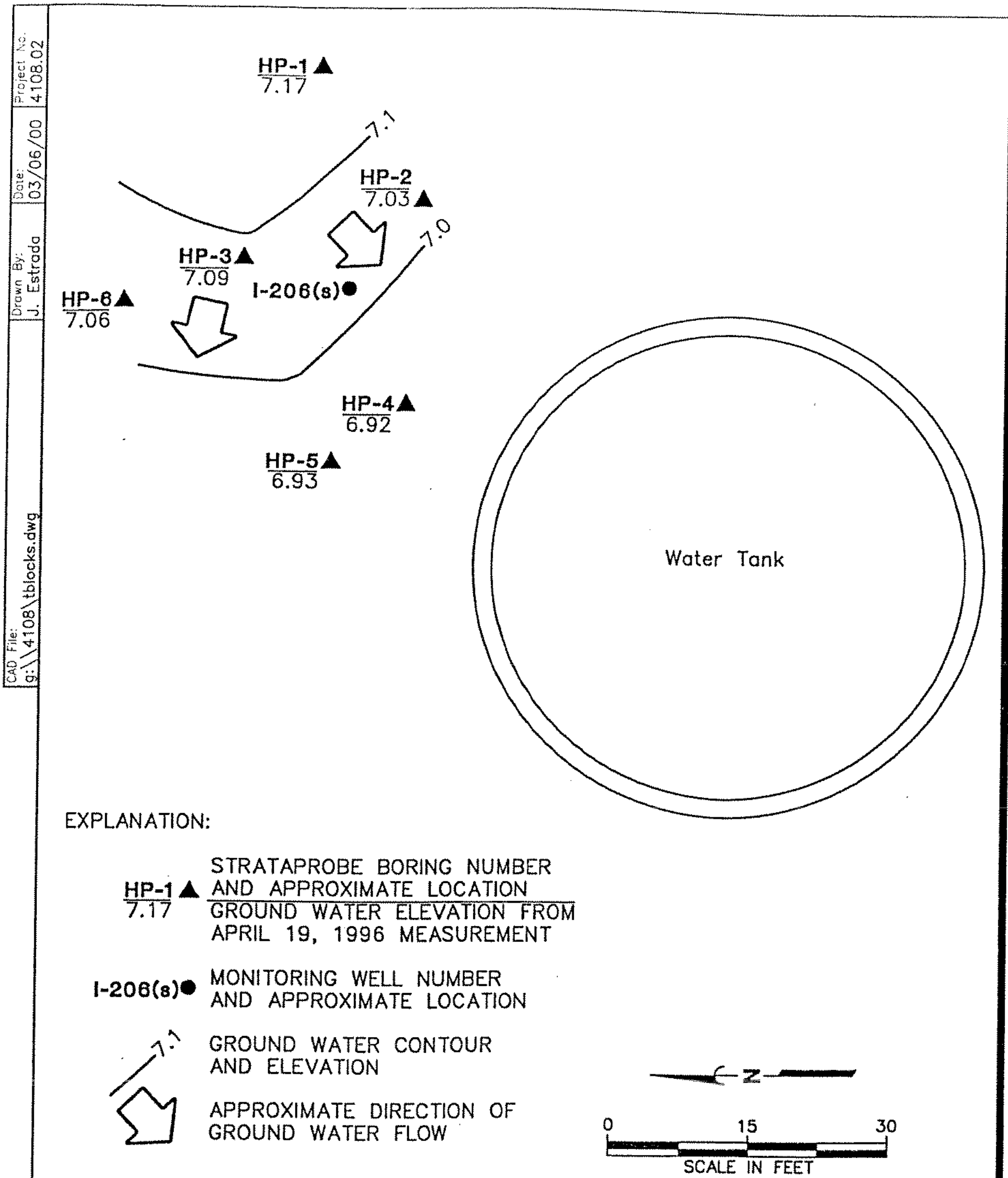


Figure 11
Site Plan Strataprobe Locations
Boeing Isaacson Property
Seattle, Washington

Adapted from GeoEngineers 1997

ERM *03/00*

Appendix C-9

ERM 2000d: Request for Groundwater NFA Determination, Hydrogeologic Investigation and Site-Specific Action Level for Arsenic in Groundwater, Boeing Isaacson Site, VCP ID# NW0453

ENVIRONMENTAL RESOURCES MANAGEMENT

DRAFT

The Boeing Company

Request for Groundwater NFA Determination Hydrogeologic Investigation and Site-Specific Action Level for Arsenic in Groundwater Boeing Isaacson Site VCP ID# NW0453

November 2000

Environmental Resources Management
915-118th Avenue S.E., Suite 130
Bellevue, WA 98005

Exponent
15375 S.E. 30th Place, Suite 250
Bellevue, WA 98007

ERM

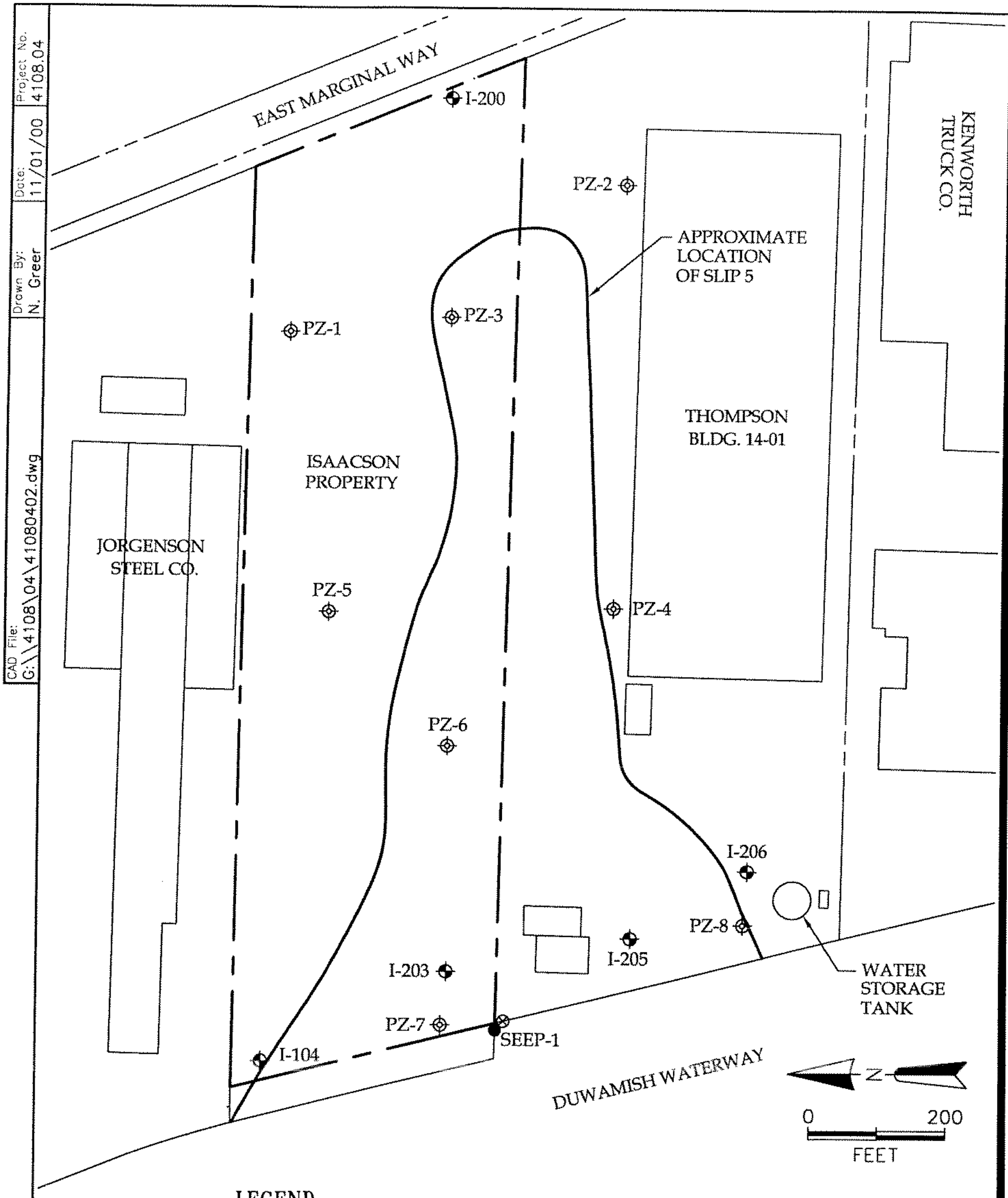


Figure 2
Site Plan Map
Boeing Isaacson Property
Seattle, Washington

ERM 09/00

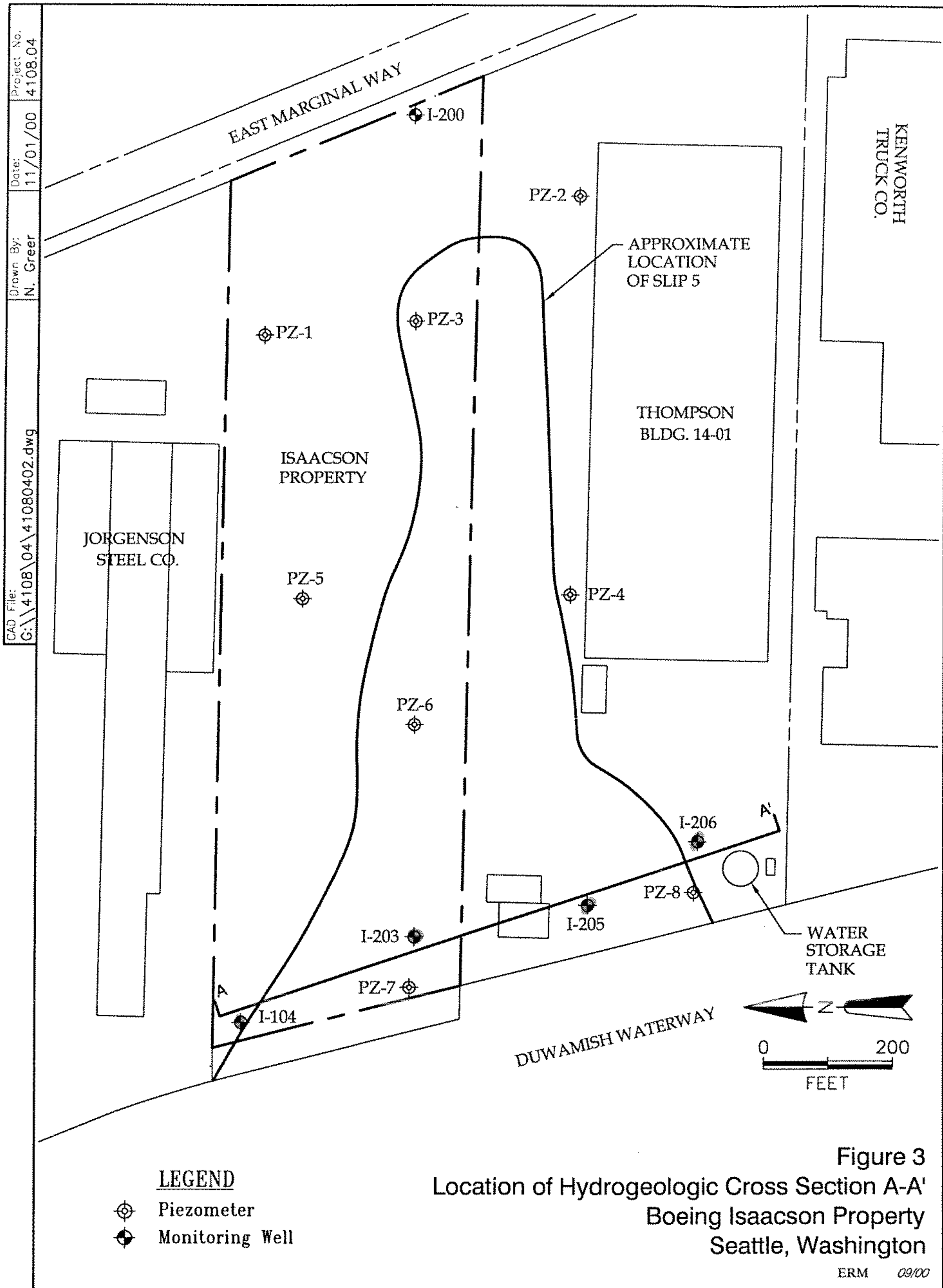


Figure 3
Location of Hydrogeologic Cross Section A-A'
Boeing Isaacson Property
Seattle, Washington

ERM 09/00

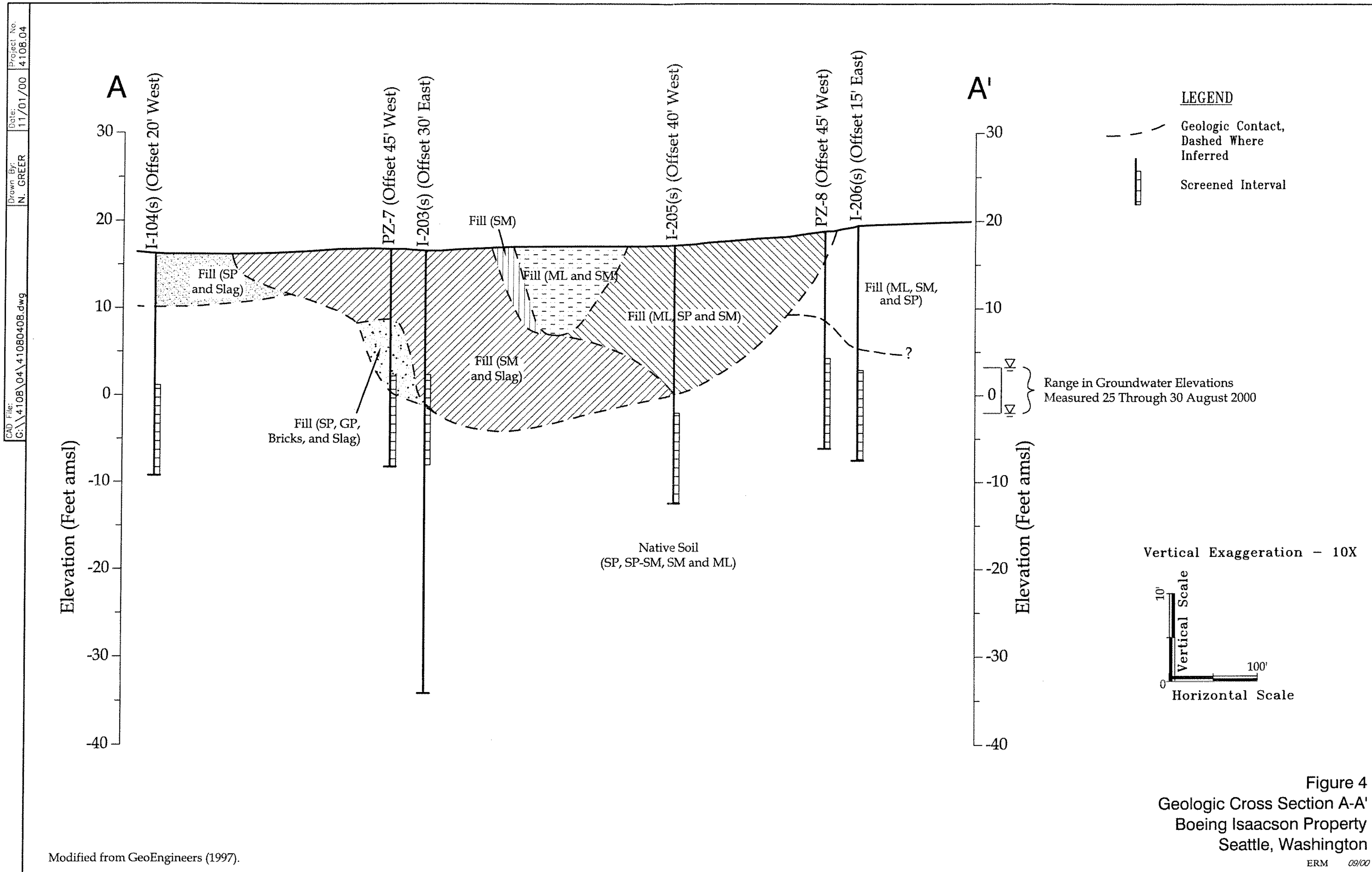


Figure 4
Geologic Cross Section A-A'
Boeing Isaacson Property
Seattle, Washington
ERM 09/00

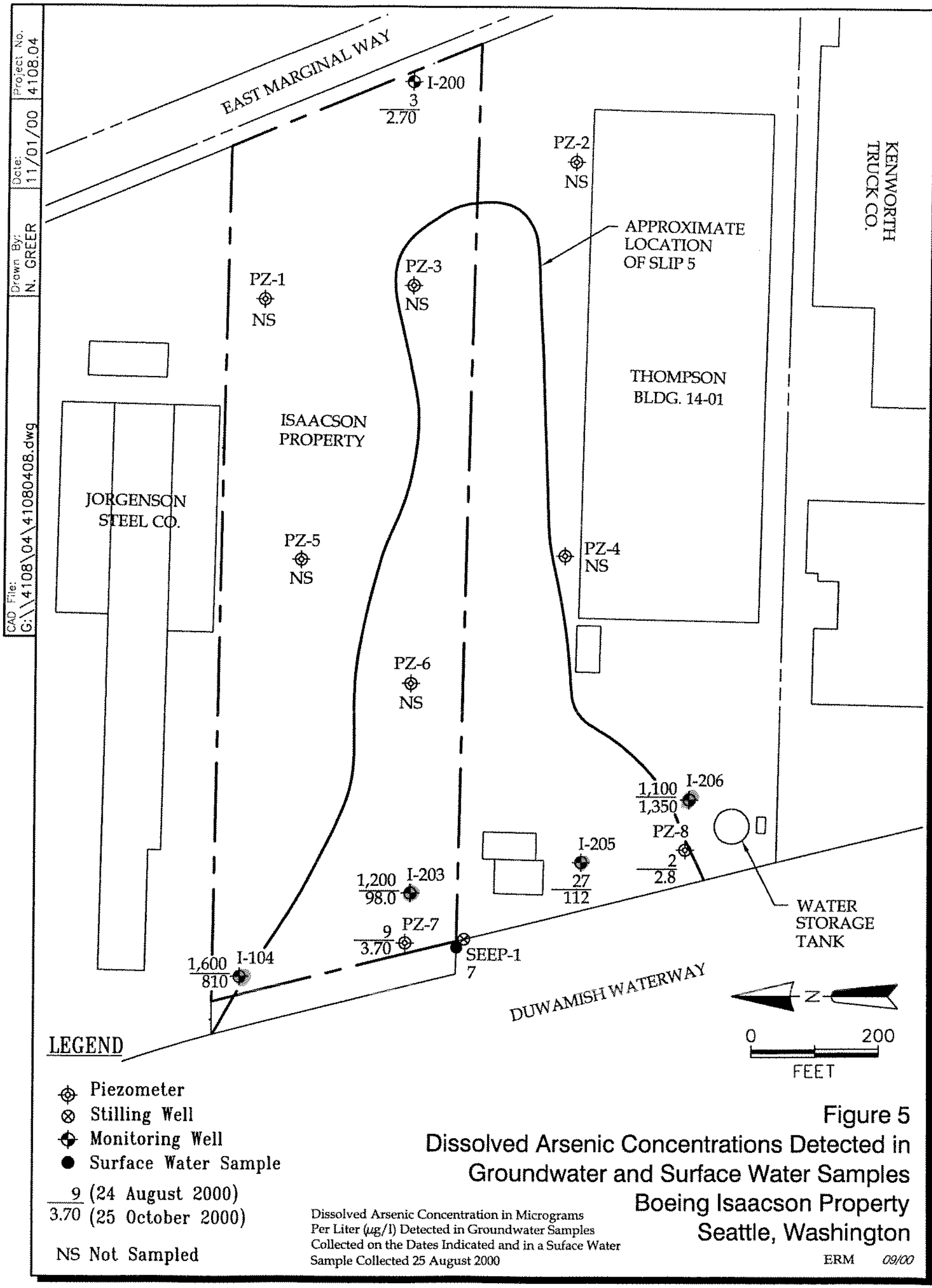
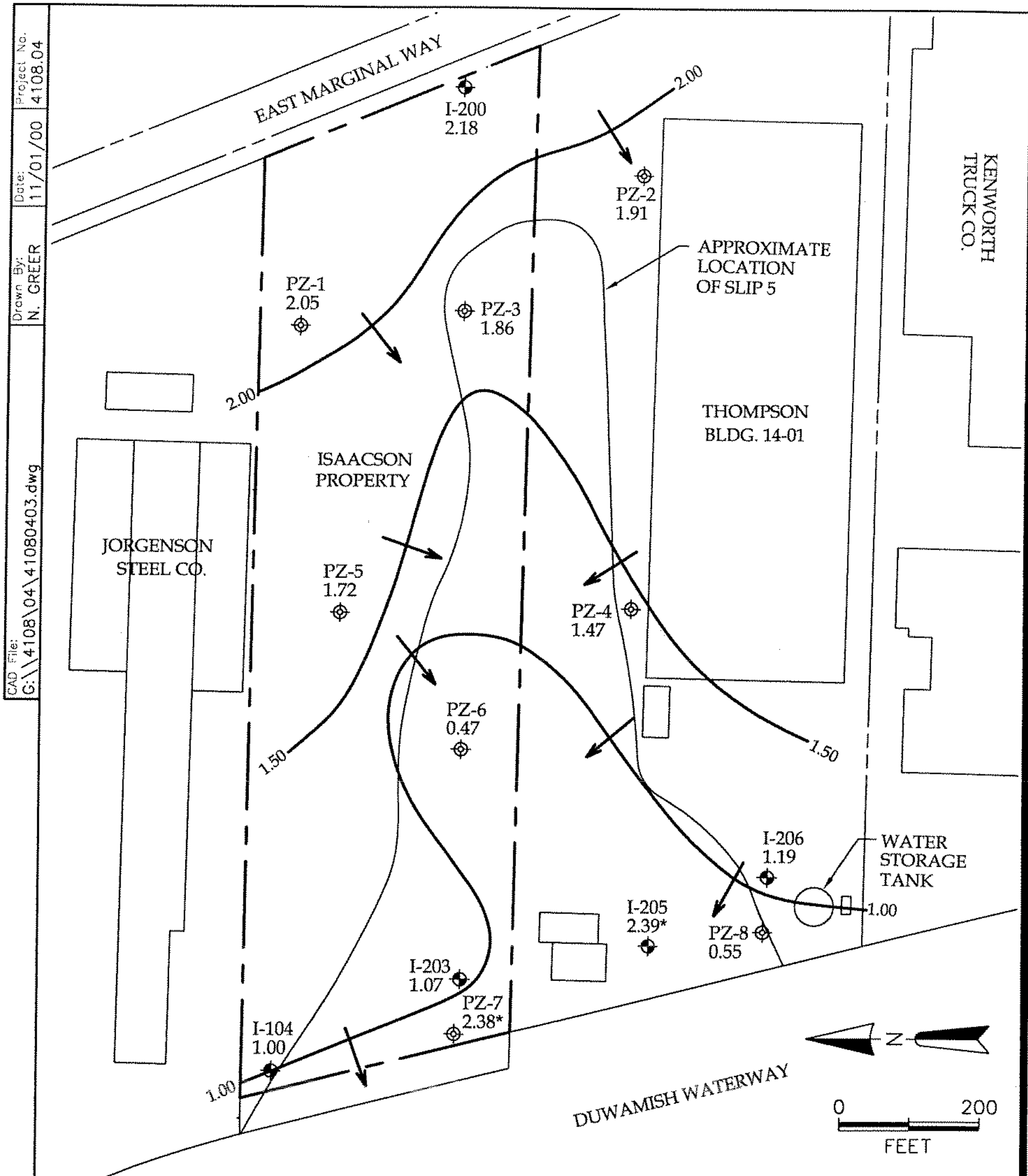


Figure 5
Dissolved Arsenic Concentrations Detected in Groundwater and Surface Water Samples
Boeing Isaacson Property
Seattle, Washington

Dissolved Arsenic Concentration in Micrograms Per Liter (µg/l) Detected in Groundwater Samples Collected on the Dates Indicated and in a Suface Water Sample Collected 25 August 2000



LEGEND

- Piezometer
- Monitoring Well
- 0.47 — Mean Groundwater Elevation in Feet Above Mean Sea Level
- 1.00 — Potentiometric Surface Contour in Feet Above Mean Sea Level
- * — Anomalous Value, Not Used for Contouring
- Inferred Mean Groundwater Flow Direction

Mean Groundwater Elevations Calculated From Water Level Data Collected From 25 to 29 August 2000.

Figure 7
Mean Groundwater Elevations
Boeing Isaacson Property
Seattle, Washington

ERM 09/00

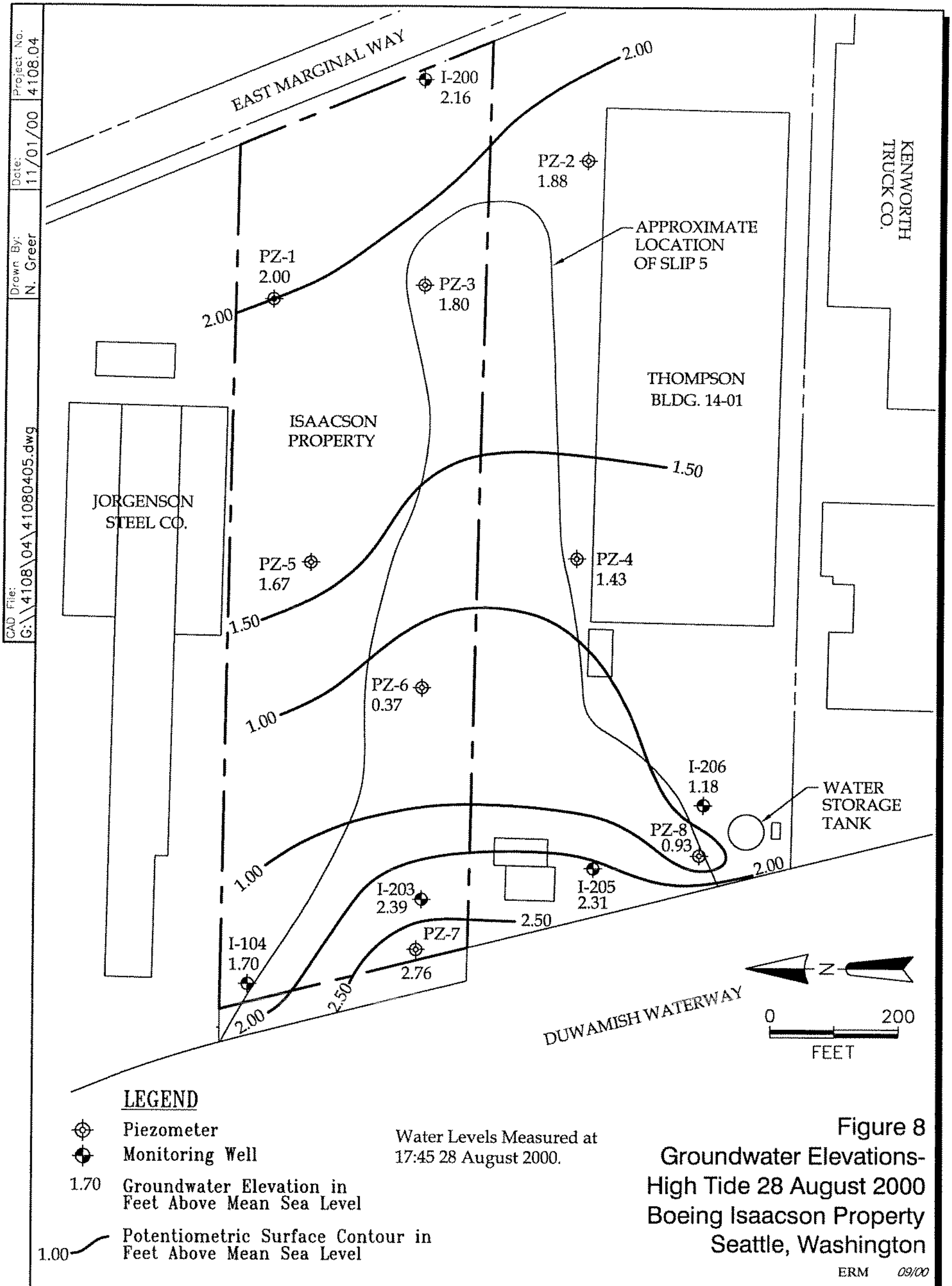


Figure 8
Groundwater Elevations-
High Tide 28 August 2000
Boeing Isaacson Property
Seattle, Washington

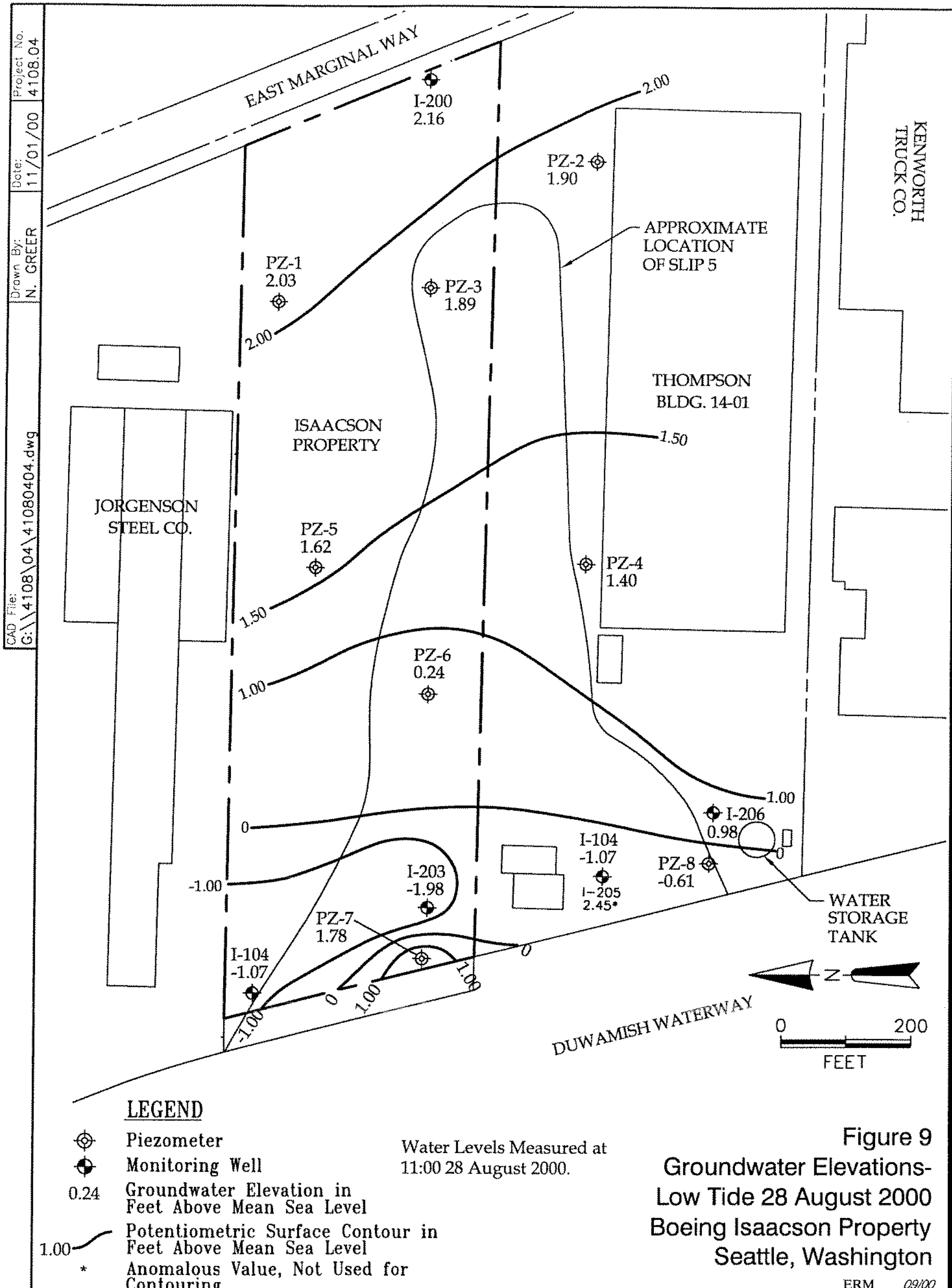


Figure 9
Groundwater Elevations-
Low Tide 28 August 2000
Boeing Isaacson Property
Seattle, Washington

ERM 09/00

DRAFT

TABLE 1

Monitoring Well and Piezometer Construction Summary
Boeing Isaacson Property
Seattle, Washington

Monitoring Well/ Piezometer	Date Completed	Top of Casing Elevation (feet amsl)	Total Borehole Depth (feet bgs)	Depth of Casing (feet btoc)	Casing Diameter/ Material	Wellhead Completion	Screen Slot Size (inches)	Screened Interval (feet bgs)
PZ-1	8/16/00	13.38	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-2	8/17/00	14.33	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-3	8/17/00	13.46	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-4	8/17/00	14.16	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-5	8/16/00	18.39	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-6	8/16/00	14.45	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-7	8/16/00	13.75	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
PZ-8	8/17/00	15.22	25.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
I-104	1984	13.67	25.5	25.0	2-inch PVC	Flush-with-grade	0.010	15.0-25.0
I-200	1988	14.12	25.0	24.0	2-inch PVC	Flush-with-grade	0.010	14.0-24.0
I-203	1988	13.62	51.0	26.5	2-inch PVC	Flush-with-grade	0.010	16.0-26.5
I-205	1988	14.64	29.5	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.5
I-206	1988	14.83	27.0	24.5	2-inch PVC	Flush-with-grade	0.010	14.0-24.5

amsl = Above mean sea level
bgs = Below ground surface
btoc = Below top of casing

TABLE 3

Summary of Water Quality Data

Boeing Isaacson Property

Seattle, Washington

Sampling Point	Date Sampled	Dissolved Arsenic[1] (µg/l)	Temperature[2] (degrees Celsius)	pH[2]	Conductivity[2] (microSiemens)	Dissolved Oxygen[2] (mg/l)	Reduction/Oxidation Potential[2] (millivolts)	Turbidity[2] (NTU)	Total Organic Carbon[3] (mg/l)	Total Iron[4] (mg/l)	Ferrous Iron[5] (mg/l)
PZ-4	8/24/00	- -	17.9	6.31	809	0.79	-59	98.4	12	- -	31
PZ-5	8/24/00	- -	17.3	6.28	817	0.24	-46	150	27	- -	44
PZ-7	8/24/00	9	16.5	9.06	12,400	0.54	-94	37.5	3.0	<0.02	3.1
	10/25/00	3.70	16.0	8.80	1,520	- -	- -	20.0	- -		- -
PZ-8	8/24/00	2	16.8	6.56	1,660	1.89	-95	38.2	7.0	12.1	12
	10/25/00	2.80	15.9	5.90	220	- -	- -	26.7	- -	- -	- -
I-104	8/24/00	1,600	19.3	6.71	811	0.77	-113	20.2	- -	11.3	- -
	10/25/00	810	15.5	6.65	59,400	- -	- -	40.2	- -	- -	- -
I-200	8/24/00	3	17.4	6.13	89.3	0.73	4	5.1	<1.5	6.32	6.7
	10/25/00	2.70	15.6	6.50	12.9	- -	- -	77.2	- -	- -	- -
I-203	8/24/00	1,200	17.8	- -	- -	0.48	- -	14.8	- -	7.73	- -
	10/25/00	98.0	13.9	6.79	465	- -	- -	5.4	- -	- -	- -
I-205	8/24/00	27	20.8	6.13	992	0.72	-60	17.2	- -	22.2	- -
	10/25/00	112	18.9	6.53	115	- -	- -	3.7	- -	- -	- -
I-206	8/24/00	1,100	19.3	6.66	839	0.89	-147	59.2	- -	24.1	- -
	10/25/00	1,350	16.13	6.34	87,300	- -	- -	31.2	- -	- -	- -
SEEP-1	8/24/00	7	- -	- -	- -	- -	- -	- -	- -	- -	- -

Notes:

[1]By USEPA Method 7060.

[2]Measured in the field using a Minisonde Water Quality Multiprobe.

[3]By USEPA Method 415.1.

[4]By USEPA Method 6010.

[5]By USEPA Method SM4500 FeD.

mg/l = Milligrams per liter

µg/l = Micrograms per liter

NTU = Nephelometric turbidity units

- - = not tested

TABLE 5

Summary of Mean Groundwater Elevation Data
Boeing Isaacson Property
Seattle, Washington

Well/Piezometer Number	Top of Casing Elevation[1] (feet)	Average Depth to Groundwater (feet below top of casing)	Mean Groundwater Elevation[2] (feet amsl)
PZ-1	13.38	11.33	2.05
PZ-2	14.33	12.42	1.91
PZ-3	13.46	11.60	1.86
PZ-4	14.16	12.69	1.47
PZ-5	18.39	16.67	1.72
PZ-6	14.45	13.98	0.47
PZ-7	13.75	11.37	2.38
PZ-8	15.22	14.67	0.55
I-104	13.67	12.67	1.00
I-200	14.12	11.94	2.18
I-203	13.62	12.55	1.07
I-205	14.64	12.25	2.39
I-206	14.83	13.64	1.19

Notes:

(1)Elevations based on a site datum referenced to mean sea level.

(2)Calculated from water level data collected 25 to 29 August 2000.

Appendix C-10

Landau 2007: Sump Removal and Soil Excavation, Boeing Isaacson Property, Seattle, Washington

TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Paul Johansen, The Boeing Company

FROM: Tim Syverson L.G., and Ken Reid, L.G.

DATE: February 5, 2007

RE: **SUMP REMOVAL AND SOIL EXCAVATION**
BOEING ISAACSON PROPERTY
SEATTLE, WASHINGTON

This technical memorandum documents activities conducted on November 30, 2006 to remove a below-grade, open-to-the-surface 55-gal drum that apparently was used as a sump along a former stormwater drainage line at the Boeing Isaacson property (subject property) in Seattle, Washington (Figure 1).

BACKGROUND

The subject property is located at 8625 East Marginal Way in Seattle, Washington (Figure 1) and is the former location of the Isaacson Steel facility. The subject property is rectangular, approximately 12.3 acres in size, and is situated between the Duwamish River on the west and East Marginal Way on the east. The property is bordered on the south by the Boeing Thompson Building and on the north by the Jorgensen Steel Company.

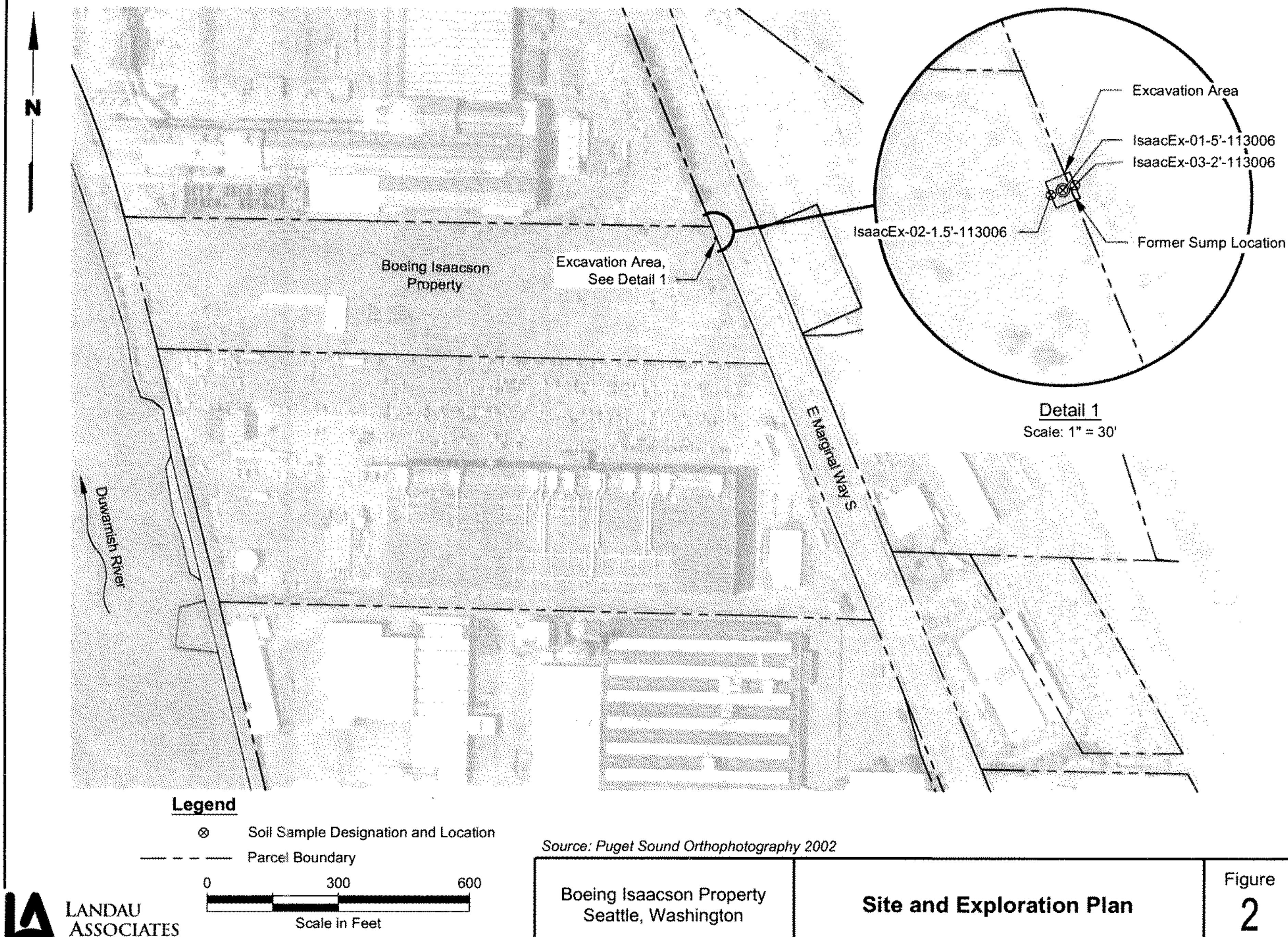
The former Isaacson Steel Company buildings have been removed and the site is completely paved with asphalt and concrete slabs. Much of the soil at the site contains elevated arsenic levels, possibly from soil that was brought in to fill the Duwamish River slip at this location in the early part of the last century. Substantial amounts of the arsenic-containing soil on the property has either been removed or chemically stabilized during various remedial actions that occurred in the early 1990's.

The open-top sump was discovered under a steel plate in the northeastern corner of the property during site reconnaissance activities in October 2006.

CHARACTERIZATION SOIL SAMPLING

Boeing initially collected two soil samples at the bottom of the sump on October 20, 2006 to assess the potential for soil contamination in the vicinity of the sump. The two discrete grab samples were collected from the bottom of the sump and placed in laboratory-supplied containers and were analyzed by Analytical Resources Inc. (ARI) in Tukwila, Washington, for diesel-range total petroleum hydrocarbons (NWTPH-Dx), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and the Resource Conservation and Recovery Act (RCRA) 8 metals [total and Toxicity

Boeing Isaacson | V:\025\173\040\D\Report\Fig-2.dwg (A) "Figure 2" 1/5/2007



Source: *Puget Sound Orthophotography 2002*

LANDAU ASSOCIATES

Boeing Isaacson Property
Seattle, Washington

Site and Exploration Plan

Figure 2

TABLE 1
SOIL ANALYTICAL RESULTS
BOEING ISAACSON

	MTCA Method A Soil Cleanup Levels (a)	MTCA Method B Soil Cleanup Levels (b) Groundwater as Drinking Water	MTCA Method B Soil Cleanup Levels (c) Direct Human Contact	Characterization Samples		Confirmation Samples		
				ISSACDRUM102006-01(E) KB96A 10/20/2006	ISSACDRUM102006-02(W) KB96B 10/20/2006	IsaacEX-01-5-113006 KH07A 11/30/2006	IsaacEx-02-1.5-113006 KH07B 11/30/2006	IsaacEx-03-2-113006 KH07C 11/30/2006
NWTPH-Dx (mg/kg)								
Diesel-Range Hydrocarbons	2,000	--	--	**340**	**240**	6.2 U	**7.3**	5.7 U
Motor Oil	2,000	--	--	**2,700**	**2,200**	12 U	**65**	**18**
VOLATILES (µg/kg)								
Method SW8260B								
Chloromethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Bromomethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Vinyl Chloride				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Chloroethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Methylene Chloride				**2.4**	2.6 U	1.6 U	1.2 U	1.3 U
Acetone	--	3,210	8,000,000	5.9 U	6.4 U	**26**	**16**	**18**
Carbon Disulfide				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,1-Dichloroethene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,1-Dichloroethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
trans-1,2-Dichloroethene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
cis-1,2-Dichloroethene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Chloroform				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,2-Dichloroethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
2-Butanone				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
1,1,1-Trichloroethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Carbon Tetrachloride				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Vinyl Acetate				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
Bromodichloromethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,2-Dichloropropane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
cis-1,3-Dichloropropene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Trichloroethene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Dibromochloromethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,1,2-Trichloroethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Benzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
trans-1,3-Dichloropropene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
2-Chloroethylvinylether				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
Bromoform				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
4-Methyl-2-Pentanone (MIBK)				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
2-Hexanone				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
Tetrachloroethene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,1,2,2-Tetrachloroethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Toluene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Chlorobenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Ethylbenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Styrene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Trichlorofluoromethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,1,2-Trichloro-1,2,2-trifluoroethane				2.4 U	2.6 U	1.6 U	1.2 U	1.3 U

TABLE 1
SOIL ANALYTICAL RESULTS
BOEING ISAACSON

	MTCA Method A Soil Cleanup Levels (a)	MTCA Method B Soil Cleanup Levels (b) Groundwater as Drinking Water	MTCA Method B Soil Cleanup Levels (c) Direct Human Contact	Characterization Samples		Confirmation Samples		
				ISSACDRUM102006-01(E) KB96A 10/20/2006	ISSACDRUM102006-02(W) KB96B 10/20/2006	IsaacEX-01-5-113006 KH07A 11/30/2006	IsaacEx-02-1.5-113006 KH07B 11/30/2006	IsaacEx-03-2-113006 KH07C 11/30/2006
m,p-Xylene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
o-Xylene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,2-Dichlorobenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,3-Dichlorobenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,4-Dichlorobenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Acrolein				59 U	64 U	40 U	30 U	32 U
Methyl Iodide				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Bromoethane				2.4 U	2.6 U	1.6 U	1.2 U	1.3 U
Acrylonitrile				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
1,1-Dichloropropene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Dibromomethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,1,1,2-Tetrachloroethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,2-Dibromo-3-chloropropane				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
1,2,3-Trichloropropane				2.4 U	2.6 U	1.6 U	1.2 U	1.3 U
trans-1,4-Dichloro-2-butene				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
1,3,5-Trimethylbenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,2,4-Trimethylbenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Hexachlorobutadiene				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
Ethylene Dibromide				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Bromochloromethane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
2,2-Dichloropropane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,3-Dichloropropane				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Isopropylbenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
n-Propylbenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
Bromobenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
2-Chlorotoluene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
4-Chlorotoluene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
tert-Butylbenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
sec-Butylbenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
4-Isopropyltoluene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
n-Butylbenzene				1.2 U	1.3 U	0.8 U	0.6 U	0.6 U
1,2,4-Trichlorobenzene				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
Naphthalene				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U
1,2,3-Trichlorobenzene				5.9 U	6.4 U	4.0 U	3.0 U	3.2 U

TABLE 1
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BOEING ISAACSON

	MTCA Method A Soil Cleanup Levels (a)	MTCA Method B Soil Cleanup Levels (b) Groundwater as Drinking Water	MTCA Method B Soil Cleanup Levels (c) Direct Human Contact	Characterization Samples		Confirmation Samples		
				ISSACDRUM102006-01(E) KB96A 10/20/2006	ISSACDRUM102006-02(W) KB96B 10/20/2006	IsaacEX-01-5-113006 KH07A 11/30/2006	IsaacEx-02-1.5-113006 KH07B 11/30/2006	IsaacEx-03-2-113006 KH07C 11/30/2006
SEMIVOLATILES (μg/kg)								
Method SW8270D								
Phenol				130 U	130 U	65 U	64 U	63 U
Bis-(2-Chloroethyl) Ether				130 U	130 U	65 U	64 U	63 U
2-Chlorophenol				130 U	130 U	65 U	64 U	63 U
1,3-Dichlorobenzene				130 U	130 U	65 U	64 U	63 U
1,4-Dichlorobenzene				130 U	130 U	65 U	64 U	63 U
Benzyl Alcohol				660 U	650 U	330 UJ	320 UJ	320 UJ
1,2-Dichlorobenzene				130 U	130 U	65 U	64 U	63 U
2-Methylphenol				130 U	130 U	65 U	64 U	63 U
2,2'-Oxybis(1-Chloropropane)				130 U	130 U	65 U	64 U	63 U
4-Methylphenol				130 U	**140**	65 U	64 U	63 U
N-Nitroso-Di-N-Propylamine				660 U	650 U	330 U	320 U	320 U
Hexachloroethane				130 U	130 U	65 U	64 U	63 U
Nitrobenzene				130 U	130 U	65 U	64 U	63 U
Isophorone				130 U	130 U	65 U	64 U	63 U
2-Nitrophenol				660 U	650 U	330 U	320 U	320 U
2,4-Dimethylphenol				130 U	130 U	65 U	64 U	63 U
Benzoic Acid				1,300 U	1,300 U	650 U	640 U	630 U
bis(2-Chloroethoxy) Methane				130 U	130 U	65 U	64 U	63 U
2,4-Dichlorophenol				660 U	650 U	330 U	320 U	320 U
1,2,4-Trichlorobenzene				130 U	130 U	65 U	64 U	63 U
Naphthalene				130 U	**160**	65 U	64 U	63 U
4-Chloroaniline				660 U	650 U	330 U	320 U	320 U
Hexachlorobutadiene				130 U	130 U	65 U	64 U	63 U
4-Chloro-3-methylphenol				660 U	650 U	330 U	320 U	320 U
2-Methylnaphthalene				130 U	**160**	65 U	64 U	63 U
Hexachlorocyclopentadiene				660 U	650 U	330 U	320 U	320 U
2,4,6-Trichlorophenol				660 U	650 U	330 U	320 U	320 U
2,4,5-Trichlorophenol				660 U	650 U	330 U	320 U	320 U
2-Chloronaphthalene				130 U	130 U	65 U	64 U	63 U
2-Nitroaniline				660 U	650 U	330 U	320 U	320 U
Dimethylphthalate				130 U	130 U	65 U	64 U	63 U
Acenaphthylene				**160**	**170**	65 U	64 U	63 U
3-Nitroaniline				660 U	650 U	330 U	320 U	320 U
Acenaphthene				**160**	**270**	65 U	64 U	63 U
2,4-Dinitrophenol				1,300 U	1,300 U	650 U	640 U	630 U
4-Nitrophenol				660 U	650 U	330 U	320 U	320 U
Dibenzofuran				130 U	**180**	65 U	64 U	63 U
2,6-Dinitrotoluene				660 U	650 U	330 U	320 U	320 U
2,4-Dinitrotoluene				660 U	650 U	330 U	320 U	320 U
Diethylphthalate				130 U	130 U	65 U	64 U	63 U
4-Chlorophenyl-phenylether				130 U	130 U	65 U	64 U	63 U

TABLE 1
SOIL ANALYTICAL RESULTS
BOEING ISAACSON

	MTCA Method A Soil Cleanup Levels (a)	MTCA Method B Soil Cleanup Levels (b) Groundwater as Drinking Water	MTCA Method B Soil Cleanup Levels (c) Direct Human Contact	Characterization Samples		Confirmation Samples		
				ISSACDRUM102006-01(E) KB96A 10/20/2006	ISSACDRUM102006-02(W) KB96B 10/20/2006	IsaacEX-01-5-113006 KH07A 11/30/2006	IsaacEx-02-1.5-113006 KH07B 11/30/2006	IsaacEx-03-2-113006 KH07C 11/30/2006
Fluorene				**160**	**260**	65 U	64 U	63 U
4-Nitroaniline				660 U	650 U	330 U	320 U	320 U
4,6-Dinitro-2-Methylphenol				1,300 U	1,300 U	650 U	640 U	630 U
N-Nitrosodiphenylamine				130 U	130 U	65 U	64 U	63 U
4-Bromophenyl-phenylether				130 U	130 U	65 U	64 U	63 U
Hexachlorobenzene				130 U	130 U	65 U	64 U	63 U
Pentachlorophenol				660 U	650 U	330 U	320 U	320 U
Phenanthrene				**1,700**	**2,600**	65 U	64 U	63 U
Carbazole				**400**	**540**	65 U	64 U	63 U
Anthracene				**420**	**620**	65 U	64 U	63 U
Di-n-Butylphthalate				130 U	**180**	65 U	64 U	63 U
Fluoranthene	--	631,000	3,200,000	**2,400**	**3,900**	65 U	**75**	**66**
Pyrene	--	655,000	2,400,000	**1,700**	**2,500**	65 U	**96**	**67**
Butylbenzylphthalate				**260**	**350**	65 U	64 U	63 U
3,3'-Dichlorobenzidine				660 U	650 U	330 U	320 U	320 U
Benzo(a)anthracene	(d)	86	137 (d)	**660**	**1,000**	65 U	64 U	63 U
bis(2-Ethylhexyl)phthalate	--	--	71,430	**4,200**	**7,500**	65 U	**520**	63 U
Chrysene	(d)	101	137 (d)	**1,300**	**1,900**	65 U	**78**	63 U
Di-n-Octyl phthalate	--	532,481,000	1,600,000	130 U	130 U	65 U	64 U	63 U
Benzo(b)fluoranthene	(d)	290	137 (d)	**1,400**	**2,100**	65 U	64 U	63 U
Benzo(k)fluoranthene	(d)	290	137 (d)	**1,000**	**1,600**	65 U	64 U	63 U
Benzo(a)pyrene	(d)	2,320	137 (d)	**1,100**	**1,600**	65 U	64 U	63 U
Indeno(1,2,3-cd)pyrene	(d)	830	137 (d)	**590**	**760**	65 U	64 U	63 U
Dibenz(a,h)anthracene	(d)	430	137 (d)	**190**	**230**	65 U	64 U	63 U
Benzo(g,h,i)perylene				**610**	**840**	65 U	64 U	63 U
cPAH TEQ (e):	100 (d)	--	137 (d)	**1554**	**2257**	0.0	**0.78**	0.0
PCBs (µg/kg)								
EPA Method 8082								
Aroclor 1016				NA	NA	33 U	33 U	32 U
Aroclor 1242				NA	NA	33 U	33 U	32 U
Aroclor 1248				NA	NA	33 U	33 U	32 U
Aroclor 1254				NA	NA	33 U	33 U	32 U
Aroclor 1260	1,000 (f)	270 (f)	500 (f)	NA	NA	33 U	**41**	32 U
Aroclor 1221				NA	NA	33 U	33 U	32 U
Aroclor 1232				NA	NA	33 U	33 U	32 U

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SOIL ANALYTICAL RESULTS
BOEING ISAACSON

	MTCA Method A Soil Cleanup Levels (a)	MTCA Method B Soil Cleanup Levels (b) Groundwater as Drinking Water	MTCA Method B Soil Cleanup Levels (c) Direct Human Contact	Characterization Samples		Confirmation Samples		
				ISSACDRUM102006-01(E) KB96A 10/20/2006	ISSACDRUM102006-02(W) KB96B 10/20/2006	IsaacEX-01-5-113006 KH07A 11/30/2006	IsaacEx-02-1.5-113006 KH07B 11/30/2006	IsaacEx-03-2-113006 KH07C 11/30/2006
TOTAL METALS (mg/kg)								
Methods 200.8/7471A								
Arsenic	20	0.34	0.667	**60.1**	**72.4**	**18.1**	**25.1**	**6.6**
Barium	--	923	5,600	**156**	**285**	**46.1**	**51.4**	**61.6**
Cadmium	2	0.69	80	**4.4**	**5.8**	0.2 U	**0.4**	**0.3**
Chromium	2,000	3,600,000 (g)	120,000 (g)	**98**	**131**	**11.2**	**23.5**	**12.1**
Lead	250	--	--	**770**	**1,250**	**4**	**85**	**27**
Mercury	2	2.09	24	**0.38**	**0.46**	0.04 U	0.05 U	**0.05**
Selenium				1 U	1 U	0.6 U	0.6 U	0.5 U
Silver				**1.2**	**0.9**	0.2 U	0.2 U	0.2 U
TCLP METALS (mg/kg)								
Method 200.8/7470A								
Arsenic				0.01 U	0.01 U	NA	NA	NA
Barium				**1.54**	**2.02**	NA	NA	NA
Cadmium				**0.07**	**0.12**	NA	NA	NA
Chromium				**0.04**	**0.04**	NA	NA	NA
Lead				**1.40**	**1.86**	NA	NA	NA
Mercury				0.0001 U	0.0001 U	NA	NA	NA
Selenium				0.02 U	0.02 U	NA	NA	NA
Silver				0.01 U	0.01 U	NA	NA	NA

U = Indicates the compound was undetected at the reported concentration.
UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.
Bold = Detected compound.
Boxed cells indicate an exceedance of one or more cleanup level criteria.
NA = Not Analyzed
-- = No cleanup level established for this compound.

(a) Model Toxics Control Act (MTCA) Method A soil cleanup levels for unrestricted land use.
(b) Model Toxics Control Act (MTCA) Method B soil cleanup levels protective of groundwater as drinking water.
(c) Model Toxics Control Act (MTCA) Method B soil cleanup levels protective of direct human contact (ingestion).
(d) MTCA cleanup levels for benzo(a)pyrene used for comparison with the calculated cPAH TEQ.
(e) cPAH Toxicity Equivalency Quotient (TEQ) calculated using individual Toxicity Equivalency Factors (TEFs) for benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene.
(f) Cleanup levels are for PCB mixtures, not specific aroclor compounds.
(g) No MTCA Method B cleanup level established for total chromium. Chromium III cleanup level used for comparison.