Lower Duwamish Waterway
RM 2.0–2.3 East
(Slip 3 to Seattle Boiler Works)

Source Control Action Plan
Final Report

April 2009

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Source Control Action Plan
Final Report

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Executive Summary

The purpose of this Source Control Action Plan (SCAP) is to identify potential contamination sources and the actions necessary to keep sediments along the Lower Duwamish Waterway (LDW) from becoming contaminated again after any cleanup occurs. This SCAP focuses on the River Mile (RM) 2.0–2.3 East Source Control Area and it is based on a thorough review of information pertinent to sediment recontamination as presented in *Lower Duwamish Waterway, RM 2.0–2.3 East (Slip 3 to Seattle Boiler Works), Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

The LDW, located in Seattle, Washington, was added to the National Priorities List (Superfund) by the U.S. Environmental Protection Agency (EPA) on September 13, 2001. The Washington State Department of Ecology (Ecology) added the site to the Washington State Hazardous Sites List on February 26, 2002. Contaminants of concern (COCs) found in LDW sediments include polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), mercury and other metals, and phthalates. These COCs may pose threats to people, fish, and wildlife.

In December 2000, EPA and Ecology entered into an order with King County, the Port of Seattle, the city of Seattle, and The Boeing Company to perform a Remedial Investigation (RI) and Feasibility Study (FS) of sediment contamination in the waterway. EPA is the lead agency for the RI/FS. Ecology is the lead agency for controlling current sources of pollution to the site, in cooperation with the city of Seattle, King County, the Port of Seattle, the city of Tukwila, and EPA.

Phase 1 of the RI/FS, published in July 2003 (Windward 2003a), used existing data to identify potential human health and ecological risks, information needs, and high priority areas for cleanup. Seven candidate early action areas (EAAs, or "Tier 1" source control areas) were identified (Windward 2003b). Data collected during Phase 2 of the RI were used to identify additional sites where long-term cleanup actions may be necessary. The RM 2.0–2.3 East Source Control Area was identified as one of these "Tier 2" source control areas.

As part of the source control efforts in the LDW, Ecology works with other members of the Source Control Work Group (SCWG) and its consultants to develop SCAPs for areas of sediment contamination that will or may require cleanup (Figure 1). The SCAP for each of these sediment areas identifies potential sources of sediment contaminants that could recontaminate sediments after cleanup. In addition, the SCAPs describe source control actions that are planned or currently underway, and sampling and monitoring that will be conducted to identify possible additional sources.

Sections 1 and 2 of this SCAP provide background information about the LDW site and the RM 2.0–2.3 East Source Control Area (Figure 2). Metals, PAHs, PCBs, total petroleum hydrocarbons (TPHs), and semi-volatile organic compounds (SVOCs) are the main COCs in sediments adjacent to the RM 2.0–2.3 East Source Control Area. In upland media, COCs include metals, TPHs, chlorinated solvents, pentachlorophenol (PCP), chlorinated dioxins and furans, methylene chloride, and 1,4-dichlorobenzene (1,4-DCB) in addition to the COCs found in

sediments.[1] While this SCAP focuses on these COCs, other contaminants that could result in sediment recontamination will be addressed as sources are identified.

Section 3 describes potential upland sources of contaminants that may affect sediments adjacent to the RM 2.0–2.3 East Source Control Area, including direct discharge of stormwater and/or storm drain solids from outfalls, discharge of groundwater, soil erosion from the shoreline banks, surface runoff, and contamination that may result from spills. Section 3 also describes the significance of these potential sources and identifies actions that are planned or are underway to control potential contaminant sources. Section 4 discusses monitoring activities that will be conducted to observe known sources, identify additional sources, support remedial action decisions, and assess progress. Section 5 describes how source control efforts will be tracked and reported.

A notable feature of the RM 2.0–2.3 East Source Control Area is the Brighton Street Combined Sewer Overflow (CSO) and Storm Drain (SD), owned by the city of Seattle. Under normal conditions this CSO/SD only serves as a stormwater discharge point for a portion of the RM 2.0–2.3 East Source Control Area on the West side of East Marginal Way South (Figure 3). In the case of a large storm event, the Brighton Street CSO/SD can also discharge combined sanitary sewage and stormwater from the King County interceptor that conveys untreated sanitary and stormwater to the West Point Waste Water Treatment Plant (WWTP). Further details about the Brighton Street CSO/SD are discussed in Sections 2 and 3.

The Executive Summary Table lists the source control actions that have been identified for the RM 2.0–2.3 East Source Control Area. The table describes potential contaminant sources for each property, source control activities to be conducted, priority level for each action item, parties involved in source control actions for each property or task, and milestone/target dates for completion of the identified actions. The milestones and targets are best-case scenarios based on consultation with the identified agencies or facilities. They reflect reasonably achievable schedules, and include the time required for planning, contracting, field work, laboratory analysis, and activities dependent on weather.

[1] Although not explicitly addressed in the SMS, VOCs in pore water may cause adverse effects on benthic invertebrates and other aquatic biota, and are therefore considered COCs for source control efforts in the LDW.

Executive Summary Table

Source Control Facility/Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
South Brighton Street CSO/SD	Conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the South Brighton Street CSO/SD.	High	SPU	Planned	June 2009
	If COCs are found within the South Brighton Street CSO/SD, conduct source tracing to identify sources of contaminants.	High	SPU and Ecology	As Necessary	October 2009
	Review any available Voluntary Cleanup Program (VCP) files pertaining to the four former facilities of concern (Arrow Transportation, Inland Transportation Company, Ben's Truck Repair, and Hat n' Boots Gas Station).	Medium	Ecology	Planned	June 2009
	Based on the review of VCP files investigate, if necessary, the South Seattle Community College property to determine what cleanup actions may have been conducted during development, and whether potential sources of sediment recontamination may remain onsite from the four former facilities of concern.	Medium	Ecology	As Necessary	August 2011
South River Street SD	Conduct in-line storm drain sampling in the South River Street SD to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the South River Street SD.	High	SPU	Planned	June 2009
	If COCs are found within the South River Street SD, conduct source tracing to identify sources of contaminants.	High	SPU and Ecology	As Necessary	October 2009
Adjacent Facilities					
SCS Refrigerated Services	Review the PRP response to the 104(e) letters sent to "SCS Holding LLC" and "SCS Refrigerated Services LLC" on March 25, 2008, and evaluate whether further site investigation is necessary.	Low	Ecology	Planned	June 2010
	Conduct a source control inspection at the facility, to include the following: • Confirm that the NPDES permit and SWPPP are up-to-date. A SWPPP was not available in Ecology's files. • Confirm that the SWPPP includes a clear description of the facility storm drain system. • Determine the discharge point of storm drain lines located along the northern and western edges of the facility. • Confirm whether the facility discharges to the LDW through Outfall #2024. • Ensure that concerns and recommendations identified during the May 2007 Stormwater Compliance Inspection have been addressed.	High	SPU and Ecology	Planned	June 2009

Source Control Facility/Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
Seattle Distribution Center	Review the PRP response to the 104(e) letter sent to "CLPF Seattle Distribution" on March 25, 2008, and evaluate whether further site investigation is necessary.	Low	Ecology	Planned	June 2010
	Conduct a source control inspection at the facility, to include the following: • Because this facility does not operate under a NPDES permit, but discharges stormwater to the LDW, determine whether the Seattle Distribution Center should be required to operate under a NPDES permit. • Confirm that the facility discharges to the LDW in multiple locations, including Outfall #2025 and an additional private storm drain, as depicted in Figure 3. Confirm or rule out the presence of these storm drains.	High	SPU and Ecology	Planned	June 2009
Glacier Marine Services	Review the PRP response to the 104(e) letter sent to "Northland Services, Inc." on March 25, 2008; and to the 104(e) letters sent to "Fox Avenue LLC," "Seatac Marine Properties," "Evergreen Marine Leasing," and Fox Avenue Warehouse" on July 17, 2008. Following review of the PRP response, evaluate whether further site investigation is necessary.	Low	Ecology	Planned	September 2010
	Conduct a source control inspection at the facility, to include the following: • Confirm that the NPDES permit and SWPPP are up-to-date. A SWPPP was not available in Ecology's files. • Confirm that the SWPPP includes a clear description of the facility storm drain system. • Determine whether the facility currently discharges through the historical storm drain lines labeled "004," "005," and "006" in Figure 8. • Determine if the storm drain labeled "003" in Figure 8 correlates with Outfall #2025, shown in Figure 3. • Investigate the location in Figure 3 referred to as "Outfall #2025 and Seep," and determine whether Glacier Marine Services is the source of the seep. • Verify the facility's connection to the sanitary sewer system. According to the 2001 SWPPP, vehicle maintenance work such as fluids changing is conducted over pits in the maintenance building. Fluids are then pumped through an oil/water separator and discharged to the sanitary sewer system. The facility's connection to the sanitary	High	SPU and Ecology	Planned	September 2009

Source Control Facility/Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
	sewer system is not indicated in the files available for review and should be clarified. • Determine whether Glacier Marine Services currently performs sanding, scraping, or sandblasting to prepare barges and ships for painting, and whether waste materials are handled and disposed of properly. According to the 2001 SWPPP, touch-up painting of barges is conducted at the facility. Historically, sandblasting was performed at the property and sandblast grit was illegally disposed of in the LDW. Whether sanding, scraping, or sandblasting is currently performed at the facility is not mentioned in the SWPPP and should be clarified. • Conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the Glacier Marine Services storm drain system.				
Upland Facilities					
V. Van Dyke	Review the PRP response to the 104(e) letter sent to "V. Van Dyke, Inc." on March 25, 2008, and evaluate whether further site investigation is necessary.	Low	Ecology	Planned	October 2010
	Determine whether a UST may have been removed from the property without a proper closure. According to Ecology's UST List, six USTs have been removed from the V. Van Dyke property; however, only five USTs were documented as removed from the property based on information available for review, three in 1988, and two (by Glacier Environmental) in 2002. This discrepancy should be resolved to assure an additional UST was not removed from the property without clean closure.	Medium	Ecology	Planned	October 2009

Source Control Facility/Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
	Conduct a source control inspection at the facility, to include the following: • Confirm that the NPDES permit and SWPPP are up-to-date. • Confirm that the SWPPP includes a clear description of the facility storm drain system. • Ensure that the facility has remained in compliance. Stormwater concerns have been identified at the facility in the past. • Investigate the facility's connection to the city storm drain system. Only one catch basin is depicted in Figure 3, and according to the 1993 SWPPP, there are four stormwater catch basins, and one catch basin that discharges to the sanitary sewer system. • Conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the V. Van Dyke storm drain system.	High	SPU and Ecology	Planned	October 2009
	Obtain any additional reports from V. Van Dyke that may be missing from Ecology's files. Available information does not confirm that the extent of soil and groundwater contamination has been defined, or that the additional groundwater and tidal monitoring suggested by Adapt has been completed.	Medium	Ecology	Planned	October 2011
	Work with V. Van Dyke to complete quarterly groundwater or other monitoring suggested by Adapt, if needed.	Medium	Ecology	Planned	October 2013
Riverside Industrial Park	Review the PRP response to the 104(e) letters sent to "Riverside Industrial Park" on March 25, 2008, and "Big John's Truck Repair" on July 17, 2008, and evaluate whether further site investigation is necessary.	Low	Ecology	Planned	October 2010
	Conduct a source control inspection at the facility, to include the following: • Confirm that the former two shop building floor drains were connected to the sanitary sewer rather than the city storm drain system. • Determine whether the storm drain lines shown in Figure 3, between the shop building and office building, pass through areas where contaminated soil has been excavated. • Conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the Riverside Industrial Park storm drain system.	High	SPU and Ecology	Planned	October 2009

Source Control Facility/Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
	Determine the status of cleanup at the facility and determine whether to pursue additional investigation and cleanup under administrative order. Available information indicates that additional groundwater monitoring is needed.	Medium	Ecology	Planned	November 2009
Shultz Distributing	Conduct a source control inspection at the facility, to include the following: • Confirm that the NPDES permit and SWPPP are up-to-date. • Confirm that the SWPPP includes a clear description of the facility storm drain system. • Investigate the facility's connection to the city storm drain and sanitary sewer systems. • Determine whether the storm drain lines shown in Figures 3 and 14 pass through the area of chlorinated solvent groundwater contamination near the tank farm, and discharge to the LDW via the South Brighton Street CSO/SD. • Confirm that the pump was removed from the oil/water separator, and that stormwater now discharges to the city storm drain system. • Ensure that the facility has remained in compliance. Stormwater concerns have been identified at the facility in the past. • Conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the Shultz Distributing storm drain system.	High	SPU and Ecology	Planned	November 2009
	Review AGI's results and conclusions and determine whether additional investigations should be conducted at the Shultz Distributing property.	Medium	Ecology	Planned	November 2009
Cascade Columbia Distribution	Review the PRP response to the 104(e) letter sent to "Great Western Chemical Company" on July 17, 2008, and evaluate whether further site investigation is necessary.	Low	Ecology	Planned	November 2010
	Coordinate any source control to be implemented at Cascade Columbia Distribution with the work that is to be conducted under the new 2009 Agreed Order.	Medium	Ecology	Planned	November 2009
	Verify that the source of the "NW Corner Plume" will be investigated under the new Agreed Order. The source of the plume was unknown in 2000, but appeared to be near or upgradient of MW B-54.	Medium	Ecology	Planned	November 2009

Source Control Facility/Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
Potential Additional Facilities					
Bunge Foods	Review the PRP response to the 104(e) letter sent to "Bunge Foods Processing LLC" on July 17, 2008, and evaluate whether the Bunge Foods facility should be investigated for potential sources of sediment recontamination. Bunge Foods is identified as a facility of concern in Table 1, and its location is depicted in Figure 2. No information pertaining to this facility was found within the scope of this report.	Medium	Ecology	Planned	November 2009
Muckleshoot Seafood Products	Review the PRP response to the 104(e) letter sent to "Silver Bay Logging" on March 25, 2008, and evaluate whether this facility should be investigated for potential sources of sediment recontamination. This facility is currently in operation as Muckleshoot Seafood Products. The Muckleshoot Seafood Products facility is identified as a facility of concern in Table 1, and its location is depicted in Figure 2. No information pertaining to this facility was found within the scope of this report.	Medium	Ecology	Planned	November 2009
Rainier Petroleum	Review the PRP response to the 104(e) letter sent to "Rainier Petroleum Corporation" on July 17, 2008, and evaluate whether the Rainier Petroleum facility should be investigated for potential sources of sediment recontamination. Rainier Petroleum is identified as a facility of concern in Table 1, and its location is depicted in Figure 2. No information pertaining to this facility was found within the scope of this report.	Medium	Ecology	Planned	November 2009
Morton Marine Equipment	Review the PRP response to the 104(e) letter sent to "Morton Marine Equipment, Inc." on March 25, 2008, and evaluate whether the Morton Marine Equipment facility should be investigated for potential sources of sediment recontamination. Morton Marine Equipment was identified as a possible source of sediment recontamination through the review of an informal summary of available information pertaining to the Glacier Marine Services facility. This informal summary of information was received by Ecology and reviewed late in the report-writing process; therefore, the Morton Marine Equipment facility could not be further evaluated for inclusion in this report. According to the informal summary of information, the Morton Marine Equipment facility was located on the northwest shore of Slip 3, and facility stormwater was discharged to the LDW through the South River Street SD, which discharges within RM 2.0–2.3 East (shown in Figure 3 and discussed in Section 3.1.2).	Medium	Ecology	Planned	November 2009

Source Control Facility/Outfall	Action Item	Priority	Responsible Party	Status	Estimated Completion Date
	The Morton Marine Equipment facility repaired steel and aluminum hulls and removed and installed engines. Complaint files for MP&E included an oil spill complaint at Morton Marine Equipment. The location of the Morton Marine Equipment facility and its period of operation are not clearly known.				
R.A. Barnes	Evaluate whether the R.A. Barnes facility should be investigated for potential sources of sediment recontamination. R.A. Barnes was identified as a possible source of sediment recontamination through the review of an informal summary of available information pertaining to the Glacier Marine Services facility. This informal summary of information was received by Ecology and reviewed late in the report-writing process; therefore, the R.A Barnes facility could not be further evaluated for inclusion in this report. According to the informal summary of information, the R.A. Barnes facility discharged its stormwater to the LDW through the South River Street SD, which discharges within RM 2.0–2.3 East (shown in Figure 3 and discussed in Section 3.1.2). The informal summary of information stated that the R.A. Barnes facility supplied sandblasting materials ("Tuff-Kut") to shipyards and other industries. R.A. Barnes received at least three complaints of sandblast grit being spilled or washed into catch basins. "Tuff-Kut" is a copper slag grit with metals levels of 90-120 mg/kg arsenic, 3,200-7,000 mg/kg chromium, 4,400-5,000 mg/kg copper, 400-1,000 mg/kg lead, and 7,000-12,000 mg/kg zinc. The location of the R.A. Barnes facility and its period of operation are not known; the facility should be further investigated as a potential source of sediment recontamination.	Medium	Ecology	Planned	November 2009
General					
	On the basis of Ecology's recommendation, once the Remedial Investigation report is finalized, Risk Based Threshold Concentrations (RBTCs) and Applicable or Relevant and Appropriate Requirements (ARARs) will be reviewed for any relevant impacts on the RM 2.0–2.3 East Source Control Area upland contaminant concentrations.	Medium	Ecology	Planned	March 2011

Priority:
High = High priority action item – to be completed prior to sediment cleanup.
Medium = Medium priority action item – to be completed prior to or concurrent with sediment cleanup.
Low = Low priority action item – ongoing actions or actions to be completed as resources become available.

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Acronyms/Abbreviations

Adapt	LSI Adapt
AET	Apparent Effects Threshold
AGI	AGI Technologies, Inc.
ARAR	Applicable or Relevant and Appropriate Requirement
AST	aboveground storage tank
BEHP	bis(2-ethylhexyl)phthalate
bgs	below ground surface
BMP	best management practice
BTEX	benzene, toluene, ethylbenzene and total xylenes
city	city of Seattle
COC	contaminant of concern
county	King County
CSCSL	Confirmed and Suspected Contaminated Site List
CSL	Cleanup Screening Level
CSO	combined sewer overflow
DCA	dichloroethane
DCB	dichlorobenzene
DCE	dichloroethene
DMR	discharge monitoring report
DNAPL	dense non-aqueous phase liquid
DW	dry weight
EAA	Early Action Area
EAI	Environmental Associates, Inc.
Ecology	Washington Department of Ecology
E & E	Ecology and Environment, Inc.
EF	exceedance factor
EOF	emergency overflow
EPA	U.S. Environmental Protection Agency
ERD	Enhanced Reductive Dechlorination
ERM	Environmental Resources Management, Inc.
ESA	Environmental Site Assessment
FS	Feasibility Study
GIS	Geographic Information System
GWC	Great Western Chemical
GWI	Great Western International
JPHC	James P. Hurley Company
KCIA	King County International Airport
KCIWP	King County Industrial Waste Program
LAET	Lowest Apparent Effects Threshold
2LAET	Second Lowest Apparent Effects Threshold
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
LUST	leaking underground storage tank
METRO	Municipality of Metropolitan Seattle

Acronyms/Abbreviations (Cont.)

mg/kg	milligrams per kilogram
mgy	million gallons per year
MH	manhole
MP&E	Marine Power & Equipment
MTCA	Model Toxics Control Act
MW	monitoring wells
NFA	No Further Action
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
OC	organic carbon
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PCP	pentachlorophenol
ppb	parts per billion
ppm	parts per million
PRA	Preliminary Risk Assessment
RBTC	Risk Based Threshold Concentration
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RM	river mile
ROD	Record of Decision
SCAP	Source Control Action Plan
SCS	Seattle Cold Storage
SCWG	Source Control Work Group
SD	storm drain
SH	silt horizon
SMS	Washington State Sediment Management Standards
SPU	Seattle Public Utilities
SQS	Sediment Quality Standards
SRI/FS	Supplemental Remedial Investigation/Feasibility Study
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
SWPPP	Stormwater Pollution Prevention Plan
TCA	trichloroethane
TCE	trichloroethene
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TPH-D	total petroleum hydrocarbons in the diesel range
TPH-G	total petroleum hydrocarbons in the gasoline range
TPH-O	total petroleum hydrocarbons in the heavy-oil range
TRI	Toxics Release Inventory
UNIMAR	United Marine Shipbuilding
UST	underground storage tank
VC	vinyl chloride

Acronyms/Abbreviations (Cont.)

VCP	Voluntary Cleanup Program
VOC	volatile organic compound
WBZ	water bearing zone
WSDOH	Washington State Department of Health
WWTP	wastewater treatment plant

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1.0 Introduction

This Source Control Action Plan (SCAP) describes potential sources of contaminants that may affect sediments adjacent to the River Mile (RM) 2.0–2.3 East Source Control Area.[2] This area is one of several source control areas identified as part of the overall cleanup process for the Lower Duwamish Waterway (LDW) Superfund Site (Figure 1). The Washington State Department of Ecology (Ecology) defined the properties within the RM 2.0–2.3 East Source Control Area as properties that can discharge stormwater to the sediments associated with the RM 2.0–2.3 East Source Control Area. The properties within this source control area are collectively referred to as the "RM 2.0–2.3 East Drainage Basin"[3] (Figures 1 and 2).

The purpose of this plan is to evaluate the significance of these sources and to determine what actions are needed to minimize the potential for recontamination of sediments adjacent to the RM 2.0–2.3 East Source Control Area after any proposed cleanup. In addition, this SCAP describes:

- Source control actions/programs that are planned or currently underway,
- Sampling and monitoring activities that will be conducted to identify additional sources and assess progress, and
- How these source control efforts will be tracked and reported.

The information in this document was obtained from various sources, including the following documents:

- *Lower Duwamish Waterway, RM 2.0–2.3 East (Slip 3 to Seattle Boiler Works), Summary of Existing Information and Identification of Data Gaps Report*, Ecology and Environment, Inc. (E & E), June 2008, on the Washington State Department of Ecology (Ecology) website at: http://www.ecy.wa.gov/programs/tcp/sites/lower_duwamish/sites/slip3_rm2-0_2-3/slip3.htm
- *Lower Duwamish Waterway Source Control Strategy*, Washington State Department of Ecology, January 2004, on the Ecology website at: http://www.ecy.wa.gov/pubs/0409043.pdf

1.1 Organization of Document

Section 1 of this SCAP describes the LDW Superfund Site, the strategy for source control, the responsibilities of the public agencies involved in source control for the LDW, and the scope and limitations of this report. Section 2 provides background information on the RM 2.0–2.3 East Source Control Area, including a description of the contaminants of concern (COCs) for sediments associated with this Source Control Area. Section 3 provides an overview of potential sources of contaminants that may affect sediments adjacent to the RM 2.0–2.3 East Source Control Area, including storm drain (SD) and combined sewer overflow (CSO) outfalls and

[2] This SCAP incorporates data published through July 1, 2008. Section 5, Tracking and Reporting of Source Control Activities, describes how newer data will be disseminated.

[3] The area referred to herein as the "RM 2.0-2.3 East Drainage Basin" is actually a sub-drainage basin of the LDW valley. The LDW valley drainage basin has been divided into the sub-drainage basins, defined tentatively by storm water collection systems and outfalls, as shown in Figure 1.

properties within the RM 2.0–2.3 East Source Control Area. Section 3 also describes actions planned or currently underway to control potential sources of contaminants. Sections 4 and 5 describe monitoring and tracking/reporting, respectively. References are listed in Section 6, and figures and tables are presented at the end of the document.

As new information about the sites and potential sources discussed in this document becomes available and as source control progress is made, Ecology will update the information in this SCAP as needed. The status of source control actions is summarized in the LDW Source Control Status Reports (Ecology 2007a, Ecology 2008a, Ecology 2008c, and as updated).

1.2 Lower Duwamish Waterway Site

The LDW is the downstream portion of the Duwamish River, extending from the southern tip of Harbor Island to just south of Turning Basin 3 (Figure 1). It is a major shipping route for bulk and containerized cargo. Most of the upland areas adjacent to the LDW have been developed for industrial and commercial operations. These include cargo handling and storage, marine construction, boat manufacturing, marina operations, concrete manufacturing, paper and metals fabrication, food processing, and airplane parts manufacturing. In addition to industrial uses, the river is also used for fishing, recreation, and wildlife habitat. Residential areas near the LDW include the South Park and Georgetown neighborhoods. Beginning in 1913, this portion of the Duwamish River was dredged and straightened to promote navigation and industrial development, resulting in the river's current form. Shoreline features within the LDW include constructed bulkheads, piers, wharves, buildings extending over the water, and steeply sloped banks armored with riprap or other fill materials (Weston 1999). This development left intertidal habitats dispersed in relatively small patches, with the exception of Kellogg Island, which is the largest contiguous area of intertidal habitat remaining along the Duwamish River (Tanner 1991). Over the past 20 years, public agencies and volunteer organizations have worked to restore intertidal and subtidal habitat within the river. Some of the largest restoration projects are at Herring House Park/Terminal 107, Turning Basin 3, Hamm Creek, and Terminal 105.

The presence of chemical contamination in the LDW has been recognized since the 1970s (Windward 2003a). In 1988, the United States Environmental Protection Agency (EPA) investigated sediments in the LDW as part of the Elliott Bay Action Program. Contaminants identified by the EPA study included metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), phthalates, and other organic compounds. In 1999, EPA completed a study of approximately 6 miles of the LDW, from the southern tip of Harbor Island to just south of the turning basin near the Norfolk CSO (Weston 1999). This study confirmed the presence of PCBs, PAHs, phthalates, mercury, and other metals that may pose threats to people, fish, and wildlife.

In December 2000, EPA and Ecology signed an agreement with King County (county), the Port of Seattle, the city of Seattle (city), and The Boeing Company, collectively known as the Lower Duwamish Waterway Group (LDWG). Under the agreement, the LDWG is conducting a Remedial Investigation (RI) and Feasibility Study (FS) of the LDW to assess risks to human health and the environment and to evaluate cleanup alternatives. The RI for the site is being done in two phases. Results of Phase 1 were published in July 2003 (Windward 2003a). The Phase 1 RI used existing data to describe the nature and extent of chemical distributions in LDW sediments, develop preliminary risk estimates, and identify candidate sites for early cleanup action. The Phase 2 RI is currently underway and is designed to fill critical data gaps identified

in Phase 1. Based on the results of the Phase 2 RI, additional areas for cleanup may be identified. During Phase 2, an FS is being conducted that will address cleanup options for contaminated sediments in the LDW.

On September 13, 2001, EPA added the LDW to the National Priorities List. This is EPA's list of hazardous waste sites that warrant further investigation and cleanup under Superfund. Ecology added the site to the Washington State Hazardous Sites List on February 26, 2002.

An interagency Memorandum of Understanding, signed by EPA and Ecology in April 2002 and updated in April 2004, divides responsibilities for the site (EPA and Ecology 2002; EPA and Ecology 2004). EPA leads the RI/FS, while Ecology leads source control issues.

In June 2003, the *Technical Memorandum: Data Analysis and Candidate Site Identification* (Windward 2003b) was issued. Seven candidate sites for early action [Early Action Areas (EAAs), or "Tier 1" sites] were recommended (Figure 1). The "Tier 1" source control areas include:

- EAA-1: Duwamish/Diagonal CSO and SD
- EAA-2: West side of the LDW, just south of the First Avenue S. Bridge, approximately 2.2 miles from the south end of Harbor Island
- EAA-3: Slip 4, approximately 2.8 miles from the south end of Harbor Island
- EAA-4: South of Slip 4, on the east side of the LDW, just offshore of the Boeing Plant 2 and Jorgensen Forge properties, approximately 2.9 to 3.7 miles from the south end of Harbor Island
- EAA-5: Terminal 117 and adjacent properties, approximately 3.6 miles from the south end of Harbor Island, on the west side of the LDW
- EAA-6: East side of the LDW, approximately 3.8 miles from the south end of Harbor Island
- EAA-7: Norfolk CSO/SD, on the east side of the LDW, approximately 4.9 to 5.5 miles from the south end of Harbor Island

Of the seven recommended EAAs, five either had sponsors to begin investigations or were already under investigation by an LDWG member or group of members. These five sites are EAAs 1, 3, 4, 5, and 7. EPA leads cleanup at two areas, EAAs 3 and 5. The other three EAA cleanup projects were begun before the current LDW RI/FS was initiated. Cleanup at EAA-4, under EPA Resource Conservation and Recovery Act (RCRA) management, is in the planning stage. The EAA-1 and EAA-7 cleanups are under King County management as part of the Elliott Bay–Duwamish Restoration Program. Cleanup at EAA-1 was partially completed in March 2004, and a partial sediment cleanup was conducted at EAA-7 in 1999. Early action cleanups may involve members of the LDWG or other parties as appropriate. Planning and implementation of early action cleanups are concurrent with the Phase 2 investigation.

Further information about the LDW can be found on Ecology's website:

http://www.ecy.wa.gov/programs/tcp/sites/lower_duwamish/lower_duwamish_hp.html

and on EPA's website: http://yosemite.epa.gov/r10/cleanup.nsf/sites/lduwamish.

1.3 Lower Duwamish Waterway Source Control Strategy

The Lower Duwamish Waterway Source Control Strategy (Ecology 2004) describes the process for identifying source control issues and implementing effective source controls for the LDW.

The goal of the strategy is to minimize the potential for recontamination of sediments to levels exceeding the LDW sediment cleanup goals and the Washington State Sediment Management Standards (SMS). The goal is based on the principles of source control for sediment sites described in EPA's *Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites; February 12, 2002* (EPA 2002), and the Washington State SMS (WAC 173-204). The first principle is to control sources early, starting with identifying all ongoing sources of contaminants to the site. EPA's Record of Decision (ROD) for the site will require that sources of sediment contamination to the entire LDW site be evaluated, investigated, and controlled as necessary. Dividing source control work into specific SCAPs and prioritizing those plans to coordinate with sediment cleanups will address the guidance and regulations and will be consistent with the selected remedial actions in the EPA ROD.

The source control work will be identified in a series of detailed, area-specific SCAPs, which will be prioritized to coordinate with sediment cleanups. The SCAPs will document what is known about each source control area, the potential sources of recontamination, past cleanup actions taken to address them, and actions necessary to achieve adequate source control for an area. Because the scope of source control for each site will vary, it will be necessary to adapt each plan to its respective area.

The success of this strategy depends on the coordination and cooperation of all public agencies with responsibility for source control in the LDW area, as well as prompt compliance by the businesses and property owners that must make changes necessary to control releases from their properties. Existing Administrative and legal authorities will be used to perform inspections and require necessary source control actions. Source control priorities are divided into four tiers. Tier 1 consists of source control actions associated with the EAAs. Tier 2 consists of source control actions associated with any final, long-term sediment cleanup actions identified through the Phase 2 RI and the EPA ROD. Tier 3 consists of source identification and potential source control actions in areas of the LDW that are not identified for cleanup, but where source control may be needed to prevent future contamination. Tier 4 consists of source control work identified by post-cleanup sediment monitoring (Ecology 2004). This document is a SCAP for a Tier 2 source control area.

The Lower Duwamish Waterway Source Control Strategy can be found on Ecology's website:

http://www.ecy.wa.gov/programs/TCP/sites/lower_duwamish/source_control/sc.html

Further information about Lower Duwamish Waterway source control can be found at Ecology's Lower Duwamish Source Control website:

http://www.ecy.wa.gov/programs/tcp/sites/lower_duwamish/lower_duwamish_hp.html

and at the King County/Seattle Public Utilities (SPU) Joint Business Inspection website:

http://www.dnr.metrokc.gov/wlr/indwaste/duwamish.htm.

1.4 Source Control Work Group

The primary public agencies responsible for source control for the LDW are Ecology, the city of Seattle, King County, the Port of Seattle, the city of Tukwila, and EPA. All of these agencies, except for the Port of Seattle and the city of Tukwila, are directly involved in source control for the RM 2.0–2.3 East Source Control Area.

To coordinate among these agencies, Ecology formed the Source Control Work Group (SCWG) in January 2002. The purpose of the SCWG is to share information, discuss strategy, actively participate in developing SCAPs, jointly implement source control measures, and share progress reports on source control activities for the LDW area. Ecology chairs the monthly SCWG meetings. All final decisions on source control actions and completeness will be made by Ecology, in consultation with EPA, as outlined in the April 2004 Ecology/EPA Lower Duwamish Waterway Memorandum of Understanding (EPA and Ecology 2004).

Other public agencies with relevant source control responsibilities include the Washington State Department of Transportation, Puget Sound Clean Air Agency, and the Seattle/King County Department of Public Health. These agencies are invited to participate in source control with the SCWG as appropriate (Ecology 2004).

1.5 Scope of Document

The scope of this document is geographically limited to the upland area within the RM 2.0–2.3 East Source Control Area (Figure 2) and discharge points into the LDW along the waterfronts of the properties within this boundary.

This report addresses seven main facilities of concern within the RM 2.0–2.3 East Drainage Basin: SCS Refrigerated Services, Seattle Distribution Center, Glacier Marine Services, V. Van Dyke, Riverside Industrial Park, Shultz Distributing, and Cascade Columbia Distribution. Table 1 lists the potential facilities of concern within the RM 2.0–2.3 East Source Control Area and summarizes why each was included or excluded for analysis in this report.

This report summarizes the COCs that have been identified in the sediments adjacent to the RM 2.0–2.3 East Source Control Area and identifies potential sources of recontamination within upland media. Atmospheric deposition of air pollution, although a potential source of contamination, is discussed here only briefly (Section 3.4); it is a concern for the wider LDW region. Ecology will review atmospheric deposition work being conducted by the Washington State Department of Health (WSDOH) and planned by the Puget Sound Partnership. Ecology plans to hire a contractor to develop options and recommendations for addressing actions relating to air pollution.

Data on existing sediment contamination associated with the RM 2.0–2.3 East Source Control Area are summarized in Section 2. However, source control actions in this report focus only on upland sources within the RM 2.0–2.3 East Source Control Area that have the potential to recontaminate sediments in the vicinity of the RM 2.0–2.3 East Source Control Area if sediment remediation is required. Other potential sources of recontamination upstream of the RM 2.0–2.3 East Source Control Area might, via the LDW, impact sediments adjacent to the RM 2.0–2.3 East Source Control Area, but these have been or will be addressed in other reports. This report does not include actions that may be necessary to prevent contaminants in capped sediments from contaminating capping material if this remedial option is selected. It will be important to address any contaminated sediments left in place or upstream contaminants as part of remedial option selection for sediments in the vicinity of the RM 2.0–2.3 EastSource Control Area.

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2.0 RM 2.0–2.3 East Source Control Area

The RM 2.0–2.3 East Source Control Area is located along the eastern side of the LDW Superfund Site between 2.0 and 2.3 miles from the southern tip of Harbor Island (Figure 2). This section describes the history and current conditions of the RM 2.0–2.3 East Source Control Area. Sediments located adjacent to the RM 2.0–2.3 East Source Control Area have accumulated chemical contaminants from numerous sources, both historical and potentially ongoing. These chemicals may have entered the LDW through direct discharges, spills, bank erosion, groundwater discharges, surface water runoff, atmospheric deposition, or other non-point source discharges.

Historically, the Duwamish River meandered through the mud flats of the river delta. In the late 1800s and early 1900s, extensive modifications were made to straighten the Duwamish River to create a navigable channel. Many of the current slips are remnants of old river meanders. Dredged material, in addition to imported fill, was likely used to fill in the upland areas near the Slip 3 inlet.

The RM 2.0–2.3 East Source Control Area has been industrialized since the 1920s. Historical and current commercial and industrial operations within the RM 2.0–2.3 East Source Control Area include cargo transport, barge berthing, general warehousing, cold storage, shipbuilding, auto repair, and boat storage.

Seven main facilities of concern were identified within the RM 2.0–2.3 East Source Control Area. Facilities adjacent to the LDW include SCS Refrigerated Services, Seattle Distribution Center and Glacier Marine Services; these facilities are discussed in Section 3.2. Facilities upland of the LDW include V. Van Dyke, Riverside Industrial Park, Shultz Distributing, and Cascade Columbia Distribution; these facilities are discussed in Section 3.3.

The RM 2.0–2.3 East Source Control Area shoreline consists of various materials, including sheet pile bulkheads, riprap, fill material, and natural vegetation. As described further in Section 3, three storm drain outfalls and one CSO/SD outfall currently discharge to sediments associated with the RM 2.0–2.3 East Source Control Area. Two of these storm drains discharge within the Slip 3 inlet, one discharges north of the inlet, and the CSO/SD discharges south of the inlet.

Groundwater within the Duwamish Valley alluvium is typically encountered under unconfined conditions within approximately 10 feet (3 meters) of the ground surface. Groundwater in this unconfined aquifer is found within the fill material and native alluvial deposits. The direction of groundwater flow in the unconfined aquifer is generally toward the LDW. However, the direction may vary locally depending on the nature of subsurface material, and temporally due to tidal influence of the LDW. The upland area affected by tidal fluctuations is generally within 300 to 500 feet (100 to 150 meters) of the LDW (Windward 2003a) and varies depending on location.

2.1 RM 2.0–2.3 East Drainage Basin

The RM 2.0–2.3 East Source Control Area is made up of the drainage basin for this area. This drainage basin encompasses stormwater drainage under normal conditions for approximately 40 acres of commercial and industrial properties between the LDW and East Marginal Way South. The RM 2.0–2.3 East Source Control Area also includes the 34-acre South Brighton Street CSO

Drainage Basin. This combined sewer service area, which is east of East Marginal Way South, is a potential source area whenever a CSO event occurs. However, there have been no CSO events from this area since recording began in March of 2000 (see Table 2). Both the stormwater drainage basin and the CSO drainage basin are shown in Figure 3.

The seven main facilities of concern identified for the RM 2.0–2.3 East Source Control Area, discussed in Sections 3.2 and 3.3, discharge some or all of their stormwater to the LDW under normal conditions. In addition to the main seven facilities of concern, four former facilities of concern were identified within the South Brighton Street CSO Drainage Basin: Arrow Transportation, Inland Transportation Company, Ben's Truck Parts, and the Hat n' Boots Gas Station. These four facilities have been removed and the property is now occupied by a new South Seattle Community College Campus (Figures 2 and 3). As discussed in Section 2.1.1, facilities within the South Brighton Street CSO Drainage Basin only discharge stormwater to the LDW in the event of a CSO. The South Brighton Street CSO/SD system and the four former facilities of concern identified within its drainage basin are described in further detail in Section 3.1. Table 1 summarizes the identification process for these facilities of concern and for the seven main facilities of concern outlined above.

2.1.1 Lower Duwamish Waterway Drainage Basin Storm Drain, Sanitary Sewer, and Combined Sewer Systems

The LDW area is served by both combined sewer systems and separated storm drain/sanitary sewer systems. Storm drains in separated areas convey stormwater runoff directly to the LDW. Most of the waterfront properties are served by separated storm drain/sanitary systems that discharge stormwater directly to the Duwamish Waterway, while sanitary sewage and industrial wastewater are discharged into the combined system that normally discharges to Puget Sound after being treated at a regional waste water treatment plant. Both private and city storm drain systems serve upland areas of the LDW drainage basin.

Some areas in the vicinity of the LDW 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 than separate storm and sanitary systems. Under normal rainfall conditions, wastewater and stormwater are conveyed through this combined sewer pipe to the West Point Wastewater Treatment Plant (WWTP). During large storms, however, the total volume of wastewater and stormwater can 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 CSO outfalls. Although CSO outfalls prevent the combined sewer system from backing up and creating flooding, untreated municipal/industrial wastewater and stormwater can be discharged during CSOs to the LDW.

Typically the city of Seattle owns and operates the local sanitary sewer collectors and main lines, while King County owns and operates the larger interceptor lines that transport flow from the local systems to the West Point WWTP. The city's combined sewer network has its own National Pollution Discharge Elimination System (NPDES) permit for CSO outfalls; CSO outfalls from the county's interceptor lines are administered under the NPDES permit established for the West Point WWTP.

An Emergency Overflow (EOF) is a discharge that can occur from either the combined or sanitary sewer systems. EOFs are not necessarily related to storm conditions and/or system

capacity limitations. They typically occur as a result of mechanical issues such as 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 2. Of the county CSO outfalls along the LDW, the Michigan CSO, South Brandon Street CSO, and Hanford No. 1 (discharging via the city's Diagonal Avenue South 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, while CSOs only occur when storm events 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 2007a)[4].

To minimize the frequency and volume of CSO events, the county uses various CSO control strategies to maximize system capacity. An automated control system manages flows through the King County interceptor system so the maximum amount is contained in pipelines and storage facilities until it can be conveyed to a regional wastewater treatment plant for secondary treatment. In some areas of the system, when flows cannot be conveyed to the plant they 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 2007b)[5].

As a result, some areas of the CSO drainage basins may discharge to different outfalls at different times, depending on the route 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.

2.1.2 RM 2.0–2.3 East Drainage Basin Storm Drain System

The RM 2.0–2.3 East Source Control Area is served by a combination of separated storm drain and sanitary sewer systems as well as a combined sewer system. There are both public and private storm drain systems. Within the RM 2.0–2.3 East Source Control Area, most of the facilities adjacent to the LDW are served by privately owned systems that discharge directly to the LDW. The upland facilities are served by a combination of private and publicly owned systems.

Figure 3 illustrates known storm drain system lines and outfalls within the RM 2.0–2.3 East Drainage Basin. The South Brighton Street CSO/SD and South River Street SD are owned and operated by the city of Seattle. Private storm drain outfalls include Outfall #2024 and Outfall #2025 (referred to collectively as the "Slip 3 Outfalls"). Figure 3 depicts the drainage areas that make up the RM 2.0–2.3 East Drainage Basin: Direct Drainage to LDW, Drainage to Slip 3

[4] Stormwater discharges are regulated under a separate NPDES permit.
[5] City of Seattle CSOs are generally smaller and flows are not treated prior to discharge.

Outfalls, South River Street Stormwater Drainage Basin, South Brighton Street Stormwater Drainage Basin, and the South Brighton Street CSO Drainage Basin.

The South Brighton Street CSO/SD outfall serves as both a storm drain and a CSO outfall. Stormwater and wastewater from the South Brighton Street CSO Drainage Basin normally discharge to the King County sanitary sewer system. However, if a CSO occurs, this basin can discharge to the LDW through the South Brighton Street CSO/SD. Under normal conditions, stormwater from the South Brighton Street Stormwater Drainage Basin, west of East Marginal Way South, discharges through the South Brighton Street CSO/SD.

2.1.3 National Pollution Discharge Elimination System Permits

Six types of NPDES permits cover various discharges to the LDW. However, only three types apply to the RM 2.0–2.3 East Source Control Area: the Phase I Municipal Stormwater Permit, the Industrial Stormwater General Permit, and an individual NPDES permit. Permits that do not apply to the RM 2.0–2.3 East Source Control Area include the Phase II Municipal Stormwater Permit, the Boatyard General Permit, and the Sand and Gravel General Permit.

Phase I Municipal Stormwater Permit

Stormwater runoff into municipal separated storm sewers that discharge to surface waters must have a NPDES permit under the Federal Clean Water Act. Phase I of the municipal stormwater program went into effect in 1990 and applies to municipalities with populations of more than 100,000, including the city of Seattle and King County. Within the RM 2.0–2.3 East Source Control Area, this permit covers the South River Street SD outfall, at the north end of the 1st Avenue South Bridge (Figures 2 and 3).

The original Phase I permit was issued in 1995 and reissued on January 17, 2007. The new permit represents a significant shift in approach to stormwater monitoring. The new permit requires monitoring of in-line water and storm drain solids, during both wet and dry seasons. Contaminants to be monitored include the state's SMS list of compounds, as well as toxicity testing for effluent and receiving sediments. The permit requires that all permittees characterize stormwater quality at three different locations within their storm drain system. Each location is designed to represent a unique land use (e.g., commercial, industrial, and high or low density residential). Different permittees have been assigned different land use types. Monitoring may be conducted at an outfall or within the drainage basin to isolate the specific type of land use. Complete monitoring requirements are in Special Condition S.8 of the permit, which is available online at:

http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phase_I_permit/ph_i-permit.html.

In addition to the expanded monitoring described above, the Phase I permit also contains more traditional requirements such as system maintenance, best management practices (BMPs), and business inspections. In addition, the Phase I permit contains programmatic requirements in the areas of education/outreach, illicit discharge detection and elimination, and development of municipal stormwater regulations/code.

Before this permit was reissued, the city of Seattle and King County formed a joint program to conduct source control inspection throughout the 20,000 acres of the LDW drainage basin. The city's source control authority comes from the city's Stormwater, Grading, and Drainage Control Code (SMC 22.800), which was established in part to meet the requirements of its NPDES

municipal stormwater permit. King County's source control authority, associated with the joint program, stems from its authorized pretreatment program and attendant industrial and hazardous waste management programs. Source control authority for King County storm drain outfalls comes from the county's Water Quality Code (Chapter 9.12 KCC).

There are a number of ongoing source control programs that help reduce the amount of pollution entering public storm drains and sanitary/combined sewer systems that discharge to the LDW. These programs are conducted by the city, county, and Ecology (for example, the 2003-2005 city/county joint inspection program, ongoing SPU program, ongoing King County Industrial Waste Program (KCIWP), Ecology Urban Waters Initiative, and coordination with city/county). LDW source control generally goes beyond what is required under the NPDES program. In particular, the source tracing and characterization these programs conduct exceeds NPDES requirements.

Industrial Stormwater General Permit

The Industrial Stormwater General Permit covers 112 industries within the LDW drainage basin. Coverage under the Industrial Stormwater General Permit requires a facility to monitor its stormwater discharge for copper, zinc, oils, and total suspended solids. Development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) is also required under the permit. Within the RM 2.0–2.3 East Source Control Area, facilities covered under the Industrial Stormwater General Permit include SCS Refrigerated Services, Glacier Marine Services, V. Van Dyke, and Shultz Distributing.

Individual Permits

An individual NPDES permit covers a specific discharge to surface waters at a specific location. This kind of NPDES permit is highly tailored to regulate the pollutants specific to the process that generates the discharge. Within the RM 2.0–2.3 East Source Control Area, the city of Seattle's South Brighton Street CSO/SD outfall (Figures 2 and 3) is covered by an individual NPDES permit issued by Ecology to the city.

King County also individually permits businesses that connect to the sanitary sewer system. This arrangement can be confusing but is important to keep in mind. Ecology authorized this function to King County in 1981 as part of the "pre-treatment" program for the Municipality of Metropolitan Seattle (METRO) treatment works (e.g., West Point WWTP). The King County pre-treatment permits are generally known as "local permits" and are meant to control contamination of the sanitary sewer flow going into the publicly-owned sewage treatment plant.

2.2 Contaminants of Concern

2.2.1 Contaminants of Concern in Sediments

Several environmental investigations from 1998 to 2006 have included sampling in sediments adjacent to the RM 2.0–2.3 East Source Control Area. These investigations include the National Oceanic and Atmospheric Administration (NOAA) Duwamish Waterway Characterization Study in 1998 (NOAA 1998), the EPA Site Inspection of the Lower Duwamish River in 1999 (Weston 1999), and investigations conducted between 2005 and 2007 for the Lower Duwamish Waterway Phase 2 RI (Windward 2005a, 2005b, 2007a, 2007b, and 2007c). Analytical results from these

investigations are compiled in a sediment database created by the LDWG and can be accessed at www.ldwg.org.

A total of 29 surface sediment samples and five subsurface sediment samples have been collected within sediments associated with the RM 2.0–2.3 East Source Control Area at the locations depicted in Figure 4. Appendix A of the *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008) summarizes all of the data from each location.

Analytical results from the sediment investigations were compared to SMS, which include both the Sediment Quality Standards (SQS) and Cleanup Screening Levels (CSL) (WAC 173-204). Sediments that meet the SQS criteria have a low likelihood of adverse effects on benthic organisms. However, exceeding the SQS criteria does not necessarily lead to adverse effects or toxicity, and the SQS exceedance factor does not correspond to the level of sediment toxicity. The CSL is defined as the maximum chemical concentration and level of biological effects permissible at a cleanup site, to be achieved by year 10 after cleanup has been completed. The CSL is greater than or equal to the SQS and represents a higher level of risk to benthic organisms than SQS levels. SQS and CSL values provide a basis for identifying sediments that may pose a risk to some ecological receptors. The SMS for most organic compounds are based on total organic carbon (TOC)-normalized concentrations. However, comparison to TOC-normalized concentrations is only effective at predicting adverse effects in sediments with TOC content within the range of 0.5 to 4.0 percent. For samples with TOC concentrations outside of the applicable range, concentrations of organic compounds were compared to Puget Sound Apparent Effects Threshold (AET) values. The AET values are the functional equivalent of the SQS and CSL values, only they are expressed on a dry-weight basis. The lowest AET (LAET) was used as the equivalent of the SQS, and the second-lowest AET (2LAET) was used in place of the CSL. Analytical results that exceed SQS and CSL are presented in Tables 3 and 4.

COCs in sediments were identified from analyses of samples collected from the sediments associated with the RM 2.0–2.3 East Source Control Area. The sediment COCs are those contaminants that exceed the SQS in at least one sample. At each sediment sampling location for which a contaminant was detected with an SQS Exceedance Factor (EF) ≥ 1, Figure 4 lists the contaminants and the associated maximum SQS EF out of all samples collected at that location. The following are the COCs identified in sediments adjacent to the RM 2.0–2.3 East Source Control Area:

Contaminant of Concern (COC)	Surface Sediment		Subsurface Sediment	
	> SQS	> CSL	> SQS	> CSL
Metals				
Arsenic	●		●	●
Copper			●	●
Lead			●	●
Mercury			●	
Zinc			●	●
PAHs				
Acenaphthene			●	
Benzo(a)anthracene			●	
Benzo(a)pyrene			●	
Benzo(g,h,i)perylene			●	
Benzofluoranthenes (total)			●	
Chrysene			●	
Dibenzo(a,h)anthracene			●	
Dibenzofuran			●	
Fluoranthene	●		●	
Fluorene			●	
Indeno(1,2,3-cd)pyrene			●	
Phenanthrene			●	
Total HPAH			●	
PCBs				
PCBs (total)	●		●	
TPHs				
1,2,4-trichlorobenzene			●	●
1,2-dichlorobenzene			●	●
Other SVOCs				
Benzyl alcohol	●	●		

Key:
Shaded cells indicate the COCs exceeded both SQS and CSL.

Note:
This table includes data published through March 12, 2007.
Source: Lower Duwamish Waterway Group Website sediment database (www.ldwg.org).

2.2.1.1 Metals

Metals exceeded SQS at one surface sediment sampling location (LDW-SS77) and one subsurface sediment sampling location (LDW-SC37), both located in the Slip 3 inlet adjacent to Glacier Marine Services. Arsenic was detected at LDW-SS77 at 80.9 milligrams per kilogram (mg/kg) dry weight (DW), which exceeded SQS by a factor of 1.4. Arsenic was also detected at LDW-SC37 at concentrations ranging from 121 to 2,000 mg/kg DW, with SQS exceedance factors ranging from 2.1 to 35, and CSL exceedance factors ranging from 1.3 to 22. Additionally, copper, lead, mercury, and zinc exceeded SQS at LDW-SC37. Copper was detected at 2,940 mg/kg DW, with an SQS exceedance factor of 7.5 and a CSL exceedance factor of 7.5. Lead was detected at 3,520 mg/kg DW, with an SQS exceedance factor of 7.8 and a CSL exceedance factor of 6.6. Mercury was detected at 0.45 mg/kg DW, which exceeded SQS by a factor of 1.1. Zinc was detected at 490 mg/kg DW (SQS exceedance factor of 1.2) at a 1-2 foot depth, and 4,720 mg/kg DW at a 2-4 foot depth (SQS exceedance factor of 12 and CSL exceedance factor of 4.9).

2.2.1.2 PAHs

One PAH exceedance was detected in surface sediment at DR112, adjacent to Glacier Marine Services to the west; and several PAHs exceeded SQS in subsurface sediment at LDW-SC37, located in the Slip 3 inlet adjacent to Glacier Marine Services. At DR112, fluoranthene exceeded SQS by a factor of 1.3 at 5.3 mg/kg DW [200 mg/kg organic carbon (OC)]. At LDW-SC37, the highest exceedances included fluoranthene at 13 mg/kg DW (580 mg/kg OC), which exceeded SQS by a factor of 3.6, and phenanthrene at 7.5 mg/kg DW (330 mg/kg OC), which exceeded SQS by a factor of 3.3.

2.2.1.3 PCBs

Total PCBs exceeded SQS at four surface sediment sampling locations (DR111, DR148, B6b and LDW-SS329) and one subsurface sediment sampling location (LDW-SC37). DR111, DR148, B6b and LDW-SC37 are near Glacier Marine Services, and LDW-SS329 is at the northern edge of the sediments associated with the RM 2.0–2.3 East Source Control Area. Total PCBs were detected in surface sediment at concentrations ranging from 0.124 mg/kg DW (12.8 mg/kg OC) at LDW-SS329 to 0.42 mg/kg DW (14 mg/kg OC) at B6b. These concentrations exceeded SQS by factors of 1.1 and 1.2, respectively.

2.2.1.4 TPHs

TPHs exceeded SQS in subsurface sediment at LDW-SC37, located in the Slip 3 inlet adjacent to Glacier Marine Services. 1,2,4-trichlorobenzene was detected at 0.046 mg/kg DW (2.1 mg/kg OC), with an SQS exceedance factor of 2.6 and a CSL exceedance factor of 1.2. In addition, 1,2-dichlorobenzene was detected at 0.15 mg/kg DW (6.7 mg/kg OC), with an SQS exceedance factor of 2.9 and a CSL exceedance factor of 2.9.

2.2.1.5 Other SVOCs

One semi-volatile organic compound (SVOC) exceedance was detected in surface sediment at LDW-SS73, which is in the Slip 3 inlet adjacent to SCS Refrigerated Services. Benzyl alcohol

was detected at 150 µg/kg DW, which exceeded LAET by a factor of 2.6 and 2LAET by a factor of 2.1.

2.2.2 Contaminants of Concern in Upland Media

Several environmental investigations and cleanup activities have been conducted at facilities of concern within the RM 2.0–2.3 East Source Control Area to address contamination of upland media (including stormwater, storm drain solids, groundwater, seeps, and soil). These investigations are summarized in Section 3.

Facility of Concern	Contaminant of Concern[6] (COC)	Media	Potential Pathway to LDW Sediments
Adjacent Facilities of Concern			
SCS Refrigerated Services	Copper and zinc	Stormwater discharge	Stormwater
Glacier Marine Services	Arsenic, chromium, cadmium, copper, mercury, lead, zinc, and oil & grease	Storm drain solids, surface runoff, and sediment	Stormwater
Upland Facilities of Concern			
V. Van Dyke	Petroleum hydrocarbons (TPH-G and benzene)	Soil and groundwater	Stormwater and groundwater
	Zinc and oil & grease	Stormwater discharge	Stormwater
Riverside Industrial Park	Petroleum hydrocarbons (TPH-G, benzene, ethylbenzene, and xylenes)	Groundwater	Stormwater and groundwater
Shultz Distributing	Chlorinated solvents (PCE)	Groundwater	Stormwater and groundwater
Cascade Columbia Distribution	Chlorinated solvents (PCE, TCE, VC, cis-1,2-DCE); petroleum hydrocarbons (TPH, benzene, and toluene); PCP; chlorinated dioxins and furans; and methylene chloride	Soil	Stormwater and groundwater
	Chlorinated solvents (PCE, TCE, VC, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, 1,1,1-TCA, and 1,2-DCA); petroleum hydrocarbons (TPH, benzene, toluene, and ethylbenzene); PCP; chlorinated dioxins and furans; methylene chloride; and 1,4-DCB	Groundwater	Stormwater and groundwater

[6] Although not explicitly addressed in the SMS, VOCs in pore water may cause adverse effects on benthic invertebrates and other aquatic biota, and are therefore considered COCs for source control efforts in the LDW.

A COC was identified in upland media whenever a contaminant was detected above an applicable screening level in one or more samples of upland media, even if not detected in samples collected from the sediments adjacent to the RM 2.0–2.3 East Source Control Area. Applicable screening level criteria included Model Toxics Control Act (MTCA) Method A cleanup levels for soil and groundwater, Ecology stormwater compliance benchmark levels for facilities covered under the Industrial Stormwater General Permit for stormwater discharge, and SMS criteria for both storm drain solids and sediments sampled within the LDW in association with a facility of concern.

Following the identification of COCs in upland media, a screening tool developed by Ecology was used in an attempt to rule out COCs that may have been identified in upland media, but are not considered a concern to LDW sediments. However, the screening tool did not apply to any of the COCs identified for the RM 2.0–2.3 Source Control Area, either because the COCs were not SMS compounds, or because the compound was found in media other than soil or groundwater (e.g., storm drain solids, storm water). Ecology's screening tool is described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

The potential pathways for contamination to reach LDW sediments, as described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008), were evaluated for each facility of concern where COCs were identified in upland media. The table above summarizes COCs in upland media determined on the basis of the applicable screening level criteria, and identifies potential pathways for these COCs to reach LDW sediments.

3.0 Potential Sources of Sediment Recontamination

Potential sources of sediment recontamination include discharges from public and private storm drain systems and direct and/or indirect discharges from facilities that are within the RM 2.0–2.3 East Source Control Area, both adjacent to and upland from the LDW. These outfalls and facilities of concern are illustrated in Figures 2 and 3. The four outfalls known to discharge directly to the LDW from the RM 2.0–2.3 East Source Control Area (South Brighton Street CSO/SD, South River Street SD, Outfall #2024, and Outfall #2025) are discussed in Section 3.1. For each of the seven main facilities of concern within the RM 2.0–2.3 East Source Control Area (SCS Refrigerated Services, Seattle Distribution Center, Glacier Marine Services, V. Van Dyke, Riverside Industrial Park, Shultz Distributing, and Cascade Columbia Distribution), Sections 3.2 and 3.3 summarize current and historical land uses, the results of environmental investigations and cleanup activities, and actions necessary to achieve reasonable source control. Atmospheric deposition is discussed in Section 3.4.

3.1 Storm Drain and Combined Sewer Overflow Outfalls

A wide range of contaminants may become dissolved or suspended in runoff as rain or snow melt flows over the land. Urban areas may accumulate particulates, dust, oil, asphalt, rust, rubber, metals, exposed soil, fertilizers, pesticides, detergents, or other materials as a result of urban activities. In addition to rain or snow melt storm drains can also convey contaminants in runoff from businesses or residences resulting from vehicle washing or illegally dumped materials. Runoff can discharge directly to the LDW via outfalls from properties adjacent to the river or from municipal storm drain systems. Some of these direct discharges are authorized by Ecology through various types of NPDES permits, discussed in Section 2.1.3. Stormwater from businesses, roads, and residential areas upland of the river is typically regulated by the public utilities agencies of Seattle, Tukwila, or King County, depending on the exact location and type of land use.

As discussed in Section 2.1.1 combined sewer systems carry both stormwater and municipal/industrial wastewater in a single pipe. During large storm events, the volume of stormwater can sometimes exceed the capacity of the combined sewer system, resulting in a release of mixed of stormwater and sanitary sewage to the LDW. While Ecology-issues NDPES permits for discharges to surface waters of the state, KCIWP permits limit the contaminants a user may contribute to the sanitary sewer system. These permits also authorize King County to conduct regular business inspections.

3.1.1 South Brighton Street CSO/SD

The South Brighton Street CSO/SD system is shown in Figure 3. The South Brighton Street CSO/SD outfall serves both as a combined sewer overflow and as a storm drain. As noted in Table 2, the South Brighton Street CSO/SD discharges at approximately RM 2.1 East. The RM 2.0–2.3 East Drainage Basin and combined sewer systems are discussed in Section 2.1.

The South Brighton Street CSO Drainage Basin, or combined sewer service area, is east of East Marginal Way South, and covers approximately 34 acres. During normal conditions, stormwater

and sanitary sewage are collected in the city trunk lines, then discharged to the King County interceptor and transported to the West Point WWTP. Under CSO conditions, excess flow from the South Brighton Street CSO Drainage Basin can be discharged to the LDW via the South Brighton Street CSO/SD outfall. However, no overflows have been recorded at the South Brighton Street CSO/SD since SPU began monitoring the system in 1999.

The South Brighton Street Stormwater Drainage Basin is on the west side of East Marginal Way South and covers approximately 18 acres. This system collects stormwater from Fox Avenue South and South Brighton Street as well as adjacent private properties. Stormwater from portions of the following properties discharges to the South Brighton Street storm drain system: Seattle Distribution Center, Glacier Marine Services, Shultz Distributing, and Cascade Columbia Distribution. Other areas that may drain to the South Brighton Street storm drain system include portions of Bunge Foods, Seattle Boiler Works, and the Whitehead Property. Further investigation of the onsite drainage systems on these properties is needed to confirm whether they discharge stormwater to the South Brighton Street storm drain system, to private drainage systems with separate outfalls to the LDW, to the nearby combined sewer system, or some combination of these pathways.

Land use in the South Brighton Street CSO and stormwater drainage basins is summarized in the following table:

Land Use	CSO Drainage Basin		Stormwater Drainage Basin	
	(Acres)	(%)	(Acres)	(%)
Commercial	6.5	18	0.005	≤ 1
Industrial	17.3	48	13.3	75
Multi-family	1.7	5	-	-
Single Family	1.7	5	-	-
Right-of-Way	8.8	24	4.5	25
Total	36	100	17.8	100

3.1.1.1 Sampling

In 1988, the EPA evaluated potential contaminant sources to the Elliott Bay through the Elliot Bay Action Program. The primary objective of the Elliott Bay Action Program was to identify contamination and appropriate corrective actions in the Elliott Bay and LDW. Evaluation of potential contaminant sources included identifying and ranking CSOs and storm drains based on the concentrations of chemical contaminants measured in solids collected from the storm drains (Tetra Tech 1988).

Storm drain solids sampling was conducted in September and October of 1985. Problem chemicals in each drain were identified using the following criteria (Tetra Tech 1988):

- Exceedance of highest AET value for chemicals where AET values have been derived, or
- Exceedance of the 90th percentile concentration (the concentration above which 10 percent of the observations fall) measured during the source survey.

Storm drains for which solids exceeded a high AET value or a 90th percentile concentration for at least one chemical were identified as potential problem drains (Tetra Tech 1988).

Out of the 7 CSOs, 20 storm drains, and 15 CSO/SDs sampled, the largest number of problem chemicals was observed in the "Fox Street CSO/SD," now referred to as the South Brighton Street CSO/SD. The problem chemicals identified in this CSO/SD are listed in the following table (Tetra Tech 1988). Chemical concentrations from this study are not provided here since the data is considerably dated. E & E compared the 1988 problem chemicals with the COCs identified in either sediments or upland media in Section 2.2; the 1988 problem chemicals shown below in italics have also been identified as COCs for the RM 2.0–2.3 East Source Control Area. There are no known detections of the remaining problem chemicals shown below in any other media, including sediments or upland media; therefore, these chemicals are not presently considered to be COCs for the RM 2.0–2.3 East Source Control Area.

arsenic	anthracene	*indeno(1,2,3-cd)pyrene*
copper	*fluoranthene*	*benzofluoranthenes*
lead	*benzo(a)anthracene*	*chrysene*
zinc	*benzo(a)pyrene*	1-methylphenanthrene
antimony	*acenapthene*	2-methylphenanthrene
4-methylphenol	*dibenzo(a,h)anthracene*	3-methylphenanthrene
napthalene	*dibenzofuran*	1,1-dichloroethane
fluorene	2-methylnapthalene	*vinyl chloride*
phenanthrene	1,1-biphenyl	*trans-1,2-dichloroethene*

The city of Seattle has only recently begun to characterize the quality of discharges from its CSOs as required by its NPDES permit; however, the South Brighton Street CSO/SD is not included in the city's ongoing CSO characterization program. In 2000, as part of its CSO program, the city compiled existing sediment chemistry data in areas near its CSOs to evaluate potential impacts on sediment quality. The study identified five sediment sampling stations located within 250 feet of the South Brighton Street CSO/SD. None of the stations closest to the outfall exceeded the CSL for any chemical. Only the PCBs concentration at the farthest station (75 mg/kg OC), located 249 feet from the outfall, exceeded the CSL for total PCBs (65 mg/kg OC) (EVS 2000).

3.1.1.2 Facilities of Concern

The sub-sections below summarize the information available for review pertaining to the four facilities of concern associated with the South Brighton Street CSO Drainage Basin (see Section 2.1). It is unclear whether any residual contamination from these four facilities exists or whether such contamination could be a threat to LDW sediments. Potential pathways for such contamination could be either directly by groundwater to the LDW or by groundwater to a combined sewer to the LDW during a CSO event.

South Seattle Community College

The South Seattle Community College facility is on the east side of East Marginal Way South at the corner of Corson Avenue South and East Marginal Way South, in the South Brighton Street CSO Drainage Basin (see Figure 3).

Facility Summary: South Seattle Community College	
Address	6737 Corson Avenue South
Property Owner	Buttleman, Kurt R./South Seattle Community College
Former/Alternative Property Names	Arrow Transportation Inland Transportation Company Ben's Truck Parts Hat n' Boots Gas Station
Former/Alternative Addresses	See Ben's Truck Parts and Hat n' Boots Gas Station sections below
Former/Alternative Lessee/Operator Names	N/A
Tax Parcel No.	0001800137
Parcel Size	7.03 acres
NPDES Permit No.	N/A
EPA RCRA ID No.	See Arrow Transportation section below
EPA TRI Facility ID No.	N/A
Ecology Facility/Site ID No.	See each former facility section below
Ecology UST Site ID No.	See Arrow Transportation, Ben's Truck Parts, and Hat n' Boots Gas Station sections below
Ecology LUST Release ID No.	N/A
Listed on CSCSL	No

According to King County tax records, Washington State Department of Transportation purchased the property from Washington State Department of Natural Resources on April 29, 2004. The current taxpayer is listed as Buttleman, Kurt R./South Seattle Community College. There are two buildings on the property: a 54,035-square-foot building built in 2007 (called "Building E" with predominant use listed as "Vocational School"), and a 13,450-square-foot building built in 2007 (predominant use listed as "College") (King County 2007a).

The four former facilities of concern identified within the South Brighton Street CSO Drainage Basin are Arrow Transportation, Inland Transportation, Ben's Truck Parts, and Hat n' Boots Gas Station. All four facilities were formerly on tax parcel no. 0001800137. The new South Seattle Community College Campus now occupies the entire property.

Site information from Ecology, EPA, and King County online databases and permits is summarized in the table below for South Seattle Community College. This site information and

further details are described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

Available information from Ecology, EPA, and King County online databases and permits is summarized in the following sub-sections for the four former facilities of concern. In addition to online database information, one file was available for review in Ecology's files pertaining to Inland Transportation Company (see below). In general, very little information was available pertaining to site use or potential residual contamination at the four former facilities.

Arrow Transportation

Arrow Transportation, at 6737 Corson Avenue South, is listed in Ecology's Facility/Site Database, with Facility/Site ID No. 69693852 (Ecology 2007b). The facility is also listed on Ecology's Hazardous Waste Facility Search Database with RCRA Site ID No. WAD007942733 (inactive since 12/31/1991) (Ecology 2007d).

Arrow Transportation is on Ecology's Underground Storage Tank (UST) List with UST Site ID No. 1940. Four USTs were removed from the site; one contained used oil/waste oil, and contents of the other three are not known. UST removal dates are not listed (Ecology 2007e).

Inland Transportation Company

Inland Transportation Company is listed in the Ecology Facility/Site Database with an address of 6737 Corson South and Facility/Site ID No. 2134 (Ecology 2007b).

On March 12, 1985, Ecology performed a "Potential Hazardous Waste Site Preliminary Assessment" for the property. According to Ecology, Inland Transportation was a contract hauler of petroleum and chemical products and wastes, and the facility was used for truck storage, maintenance, and washing. Offices were also present at the facility. The facility handled many different chemicals and petroleum wastes, none stored on-site except the wastes remaining in trucks after deliveries. Other wastes at the site, mainly oils and pre-treatment sludges, resulted from truck maintenance and repair. According to Ecology, all wastes appeared to be properly handled and disposed. Runoff was collected and treated by an oil/water separator prior to discharge to the sanitary sewer, and trucks were kept in "dedicated service," carrying only one type of chemical to lessen the frequency of tank cleaning (Ecology 1985).

According to Ecology, past practices at the Inland Transportation Company facility in the 1970s had resulted in contaminant discharges to the LDW. Apparently an inspection performed by King County METRO observed truck cleaning at the site, during which 5-10 gallons of waste oil, some perchloroethylene, and other materials were discharged to the LDW. According to the 1985 inspection performed by Ecology, wastes were managed appropriately in 1985, and Ecology concluded it unlikely that any residual contamination remained on-site (Ecology 1985).

Ben's Truck Parts

Ben's Truck Parts is listed in Ecology's Facility/Site Database with an address of 6655 Corson Avenue South and Facility/Site ID No. 74169521 (Ecology 2007b).

The facility is on Ecology's UST List with UST Site ID No. 396593. One UST that had stored leaded gasoline was removed from the site. The UST removal date is not listed (Ecology 2007e).

Hat n' Boots Gas Station

Hat n' Boots Gas Station is listed in Ecology's Facility/Site Database as "WA DNR Corson Ave Site Hat Boots" at 6800 East Marginal Way South, with Facility/Site ID No. 61845527 (Ecology 2007b). The actual location was determined to be southeast of the address listed, at approximately the intersection of East Marginal Way South and Corson Avenue South.

The Hat n' Boots Gas Station is on Ecology's UST List with UST Site ID No. 8914. Three USTs containing diesel oil, unleaded gasoline, and leaded gasoline were removed from the site on unlisted dates (Ecology 2007e).

3.1.1.3 Source Control Actions

Regular stormwater discharge, and the infrequent sanitary sewage discharge from the South Brighton Street CSO Drainage Basin, through the South Brighton Street CSO/SD may be a source of COCs to sediments associated with the RM 2.0–2.3 East Source Control Area. To minimize the potential for discharge of COCs from the South Brighton Street CSO/SD, the following source control actions will be conducted:

- SPU will conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the South Brighton Street CSO/SD.
- If COCs are found within the South Brighton Street CSO/SD, SPU and Ecology will conduct source tracing to identify sources of contaminants. The most current data are from 1985.
- Ecology will review any available Voluntary Cleanup Program (VCP) files pertaining to the four former facilities of concern (Arrow Transportation, Inland Transportation Company, Ben's Truck Repair, and Hat n' Boots Gas Station).
- Based on the review of VCP files, if necessary, Ecology will investigate the South Seattle Community College property to determine what cleanup actions may have been conducted during development, and whether potential sources of sediment recontamination may remain onsite from the four former facilities of concern.

3.1.2 South River Street SD

The South River Street storm drain system is shown in Figure 3. The storm drain system within the RM 2.0–2.3 East Drainage Basin is discussed in Section 2.1.2. The approximately 7.6-acre South River Street Stormwater Drainage Basin collects stormwater from South River Street, Occidental Avenue South, 2nd Avenue South, and 3rd Avenue South, as well as from the properties north of South River Street, including V. Van Dyke and Riverside Industrial Park. Properties south of South River Street, including SCS Refrigerated Services, Muckleshoot Seafood Products, and Rainier Petroleum are indicated in Figure 3 as discharging either directly to the LDW or through a private storm drain system.

3.1.2.1 Sampling

Storm drain solids were also sampled within the South River Street SD during the sampling performed for the EPA's Elliott Bay Action Program described in Section 3.1.1.1. Lead was the only problem chemical identified for the South River Street SD (Tetra Tech 1988).

3.1.2.2 Source Control Actions

Stormwater discharge from the South River Street SD may represent an ongoing source of COCs to sediments associated with the RM 2.0–2.3 East Source Control Area. To minimize the potential for discharge of COCs from the South River Street SD, the following source control actions will be conducted:

- SPU will conduct in-line storm drain sampling in the South River Street SD to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the South River Street SD.
- If COCs are found within the South River Street SD, SPU and Ecology will conduct source tracing to identify sources of contaminants.

3.1.3 Private Storm Drain Outfalls and Direct Drainage

Properties directly adjacent to the LDW (discussed in Section 3.2) generally discharge to the LDW via private storm drain systems or direct drainage (sheet flow). Known private storm drains that discharge to the LDW from the RM 2.0–2.3 East Source Control Area include one private storm drain belonging to SCS Refrigerated Services (Outfall #2024) and one belonging to Glacier Marine Services (Outfall #2025). These two outfalls can be seen in Figures 2 and 3, and are discussed in Sections 3.2.1 and 3.2.3. Figure 3 illustrates areas of direct drainage to the LDW (approximately 2.8 acres) and drainage to Slip 3 Outfalls #2024 and #2025 (approximately 4.4 acres).

3.2 Adjacent Facilities of Concern

3.2.1 SCS Refrigerated Services

SCS Refrigerated Services is adjacent to the LDW on the east side between RM 2.0 and 2.1. The property is bordered on the south by the Slip 3 inlet. The Seattle Distribution Center facility is adjacent to the property to the east and the Rainier Petroleum facility is adjacent to the property to the west. The SCS Refrigerated Services property is bordered on the north by South River Street. The Riverside Industrial Park property is across South River Street from SCS Refrigerated Services.

According to King County tax records, SCS Holdings LLC purchased the property from Schnitzer Investment Corporation on January 15, 1998. The one building on the property is a 71,718-square-foot cold storage warehouse built in 1969 (King County 2007a).

According to Ecology's Facility/Site Database, the SCS Refrigerated Services facility, listed as SCS Industries, operates under Industrial Stormwater General Permit No. SO3005565 (Ecology 2007b). According to the November 2007 *Lower Duwamish Waterway Phase 2 Remedial Investigation Draft Report* (Windward 2007a), the facility discharges to the LDW through a private storm drain designated Outfall #2024, depicted in Figures 2 and 3. The outfall is 12 inches in diameter. Three outfalls are covered under the facility's NPDES permit; from Figure 3, it appears that the three outfalls discharge to the LDW through Outfall #2024 (Windward 2007a).

Facility Summary: SCS Refrigerated Services	
Address	303 South River Street
Property Owner	SCS Holdings LLC
Former Property Owners	Schnitzer Investment Corporation Farwest Capitol Company E.C. Perkins S.S. Mullen, Inc.
Former/Alternative Property Names	Seattle Cold Storage (SCS) SCS Industries SCS Holdings FEI Refrigerated Services
Former/Alternative Addresses	173 South River Street 203 South River Street 315 South River Street 205 South River Street
Former/Alternative Lessee/Operator Names	Paragon Boat Company Northland Services Puget Sound Ice Manufacturing
Tax Parcel No.	5367204100
Parcel Size	3.58 acres
NPDES Permit No.	SO3005565
EPA RCRA ID No.	N/A
EPA TRI Facility ID No.	N/A
Ecology Facility/Site ID No.	34383748
Ecology UST Site ID No.	N/A
Ecology LUST Release ID No.	N/A
Listed on CSCSL	No

Available information from Ecology, EPA, and King County online databases and permits is summarized in the table below. This site information and further details are described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

3.2.1.1 Current Site Use

According to the SCS Refrigerated Services website, the SCS Refrigerated Services facility provides cold storage in a refrigerated warehouse space and distribution in the Puget Sound area (SCS 2009). The facility can be seen in Figure 5, an aerial photo of the Slip 3 inlet area taken in July 2006.

Storm Drain System

As shown in Figure 3, stormwater from the SCS Refrigerated Services property is collected in a private storm drain system. Stormwater discharges to the LDW from the eastern portion of the SCS Refrigerated Services facility through Outfall #2024. Figure 3 depicts storm drain lines around the northern and western edges of the facility, but the discharge point is not shown. The facility may connect to the city storm drain system and discharge to the LDW through the South River Street SD. Also, from Figure 3 it appears there may be an outfall to Slip 3 on the west side of the SCS Refrigerated Services property; the existence of this outfall should be confirmed.

3.2.1.2 Past Site Use

According to King County tax records, a boat shop and shed were constructed on the property in 1919, and in 1937 the sign on the boat shop read "Paragon Boat Company." In 1939, a shed was constructed on the property to cover a drag saw (used to saw large logs). A log chute on piling extending into the LDW was also present on this portion of the property, but was removed by 1950. A concrete block factory was constructed on the property in the 1940s and was torn down in 1967.

The existing warehouse building was constructed in 1968 and 1969. According to the SCS Refrigerated Services webpage, the SCS Refrigerated Services facility began operations in 1969 under the name of Seattle Cold Storage (SCS 2009).

According to King County tax records, Farwest Capitol Company sold the property to Schnitzer Investment Corporation on October 10, 1969. Under Schnitzer Investment Corporation, lessees and operators at the facility included Puget Sound Ice Manufacturing 1992-1993, Northland Services 1996-2001, and SCS Holdings beginning in January 1998. SCS Refrigerated Services changed its name to FEI Refrigerated Services in December 1997.

3.2.1.3 Environmental Investigations and Cleanup Activities

No environmental investigations or cleanup activities are known to have occurred at the SCS Refrigerated Services facility.

3.2.1.4 Facility Inspections

Ecology conducted a Stormwater Compliance Inspection at the SCS Refrigerated Services facility on May 30, 2007 prompted by 2005 zinc, copper, and turbidity monitoring data that exceeded benchmark and/or action levels, according to the Industrial Stormwater General Permit requirements. The monitoring data are described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

As a result of the inspection, Ecology recommended that the SCS Refrigerated Services facility clean up all areas that had an accumulation of solids and inspect, clean, and remove solids from all catch basins.

EPA sent 104(e) (Request for Information) letters to "SCS Holding LLC" and "SCS Refrigerated Services LLC" on March 25, 2008 (EPA 2008d and 2008e).

3.2.1.5 Potential Contaminant Sources

No soil or groundwater contamination is known to exist at the SCS Refrigerated Services facility. However, as discussed in Section 2.2.2, copper and zinc were found in stormwater discharge at the SCS Refrigerated Services facility; stormwater is the potential pathway for these COCs to reach LDW sediments.

The following potential contaminant sources have been identified for SCS Refrigerated Services:

Stormwater

As indicated in Figure 3, stormwater discharges to the LDW from SCS Refrigerated Services via Outfall #2024. The facility may also discharge stormwater from the South River Street SD or from a potential private storm drain outfall on the west side of the SCS Refrigerated Services property. The SCS Refrigerated Services facility's stormwater discharge is authorized under the Industrial Stormwater General Permit. Compliance with the facility's SWPPP should minimize the potential for contaminants to migrate to the LDW via stormwater; however, a SWPPP was not on file. The facility's stormwater discharge has exceeded permit benchmark values for copper, zinc and turbidity in the past; and a Stormwater Compliance Inspection conducted in May 2007 identified catch basins with accumulations of solids requiring cleaning. It is not clear from the information reviewed if benchmark values are no longer exceeded or catch basins are now kept clean; therefore, copper and zinc are included in Section 2.2.2 as COCs.

Spills

Little is known about current operations at the SCS Refrigerated Services facility and no documentation pertaining to spills was found in the files available for review; however, since distribution of products requires trafficking by truck and railcar, spills are a potential contaminant source. Spills could migrate to the LDW both through the facility's storm drain system and through surface runoff, since the facility is directly adjacent to the LDW.

3.2.1.6 Source Control Actions

The following source control actions will be conducted for SCS Refrigerated Services:

- Ecology will review the PRP response to the 104(e) letters sent to "SCS Holding LLC" and "SCS Refrigerated Services LLC" on March 25, 2008, and evaluate whether further site investigation is necessary.
- SPU and Ecology will conduct a source control inspection at the facility, to include the following:
    - Confirm that the NPDES permit and SWPPP are up-to-date. A SWPPP was not available in Ecology's files.
    - Confirm that the SWPPP includes a clear description of the facility storm drain system.
    - Determine the discharge point of storm drain lines located along the northern and western edges of the facility.
    - Confirm whether the facility discharges to the LDW through Outfall #2024.
    - Ensure that concerns and recommendations identified during the May 2007 Stormwater Compliance Inspection have been addressed.

3.2.2 Seattle Distribution Center

The Seattle Distribution Center is adjacent to the LDW on the east side at approximately RM 2.2. The property is bordered on the west by the SCS Refrigerated Services facility, the Slip 3 inlet, and the Glacier Marine Services facility; on the northeast by East Marginal Way South; and on the south by South Brighton Street. The property is across South Brighton Street from the Shultz Distributing facility.

Facility Summary: Seattle Distribution Center	
Address	6701 East Marginal Way South
Property Owner	CLPF-Seattle Distribution Center LP
Former Property Owners	Schnitzer Investment Company Farwest Capitol Company King County Seattle Retail Lumber Company
Former/Alternative Property Names	N/A
Former/Alternative Addresses	6749 East Marginal Way South 6797 East Marginal Way South
Former/Alternative Lessee/Operator Names	See Sections 3.2.2.1 and 3.2.2.2
Tax Parcel No.	5367204080
Parcel Size	6.96 acres
NPDES Permit No.	N/A
EPA RCRA ID No.	N/A
EPA TRI Facility ID No.	N/A
Ecology Facility/Site ID No.	N/A
Ecology UST Site ID No.	N/A
Ecology LUST Release ID No.	N/A
Listed on CSCSL	No

According to King County tax records, CLPF-Seattle Distribution Center LP purchased the property from Schnitzer Investment Corporation on August 25, 2004. The two buildings on the property are a 124,472-square-foot and a 50,065-square-foot distribution warehouse, both built in 1967 (King County 2007a).

Available information from Ecology, EPA, and King County online databases and permits is summarized in the table below. This site information and further details are described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

3.2.2.1 Current Site Use

The Seattle Distribution Center facility provides warehouses for distribution of products and houses a number of different tenants. The facility can be seen in Figure 5. According to Ecology's records, in April 2002, a sign posted outside the Seattle Distribution Center listed tenants as Fujitec America, FSI (a Division of MBI Systems), Longview Fibre, Kasen Motorsports, Food Buying Service, Rosella's Fruit & Produce, Summit Brokerage, Hoa Ying Trading Corp., SCS Refrigerated Services, and Campbell Chain/Cooper Tools.

Storm Drain System

As shown in Figure 3, stormwater from the Seattle Distribution Center property is collected in a private storm drain system. The northwest end of the property appears to discharge to the Slip 3 inlet via the private storm drain Outfall #2024. Roof drains from the westernmost building on the property appear to drain to another private storm drain outfall in Slip 3; the existence of this outfall should be confirmed. The southeast end of the property discharges to the South Brighton Street CSO/SD.

3.2.2.2 Past Site Use

According to King County tax records, a two-story warehouse owned by Seattle Retail Lumber Company was constructed on the Seattle Distribution Center property in 1915. Seattle Retail Lumber Company also used a small house and garage constructed in 1937 and an existing frame warehouse remodeled in 1944. A three-story mill was also built in the 1940s. In 1969, all of these buildings were torn down.

According to King County tax records, the Seattle Distribution Center property was owned by King County 1943 through 1945; lessees and operators at the property included B.W. Lockwood and Seattle Lumber Retail Company. Entities listed in association with the Seattle Distribution Center property include Alice L. Lockwood and Nellum Investment Corporation in 1966, and Schnitzer Investment Company apparently purchased the property from Farwest Capitol Company on October 10, 1969. Under Schnitzer Investment Company, Puget Sound Ice Manufacturing is listed in 1992–1993 records and D&J Property LLC is listed in 2004 in association with the property. CLPF-Seattle Distribution Center purchased the property from Schnitzer Investment Company in 2004.

3.2.2.3 Environmental Investigations and Cleanup Activities

No environmental investigations or cleanup activities are known to have occurred at the Seattle Distribution Center facility.

3.2.2.4 Facility Inspections

No facility inspections are known to have been conducted at the Seattle Distribution Center facility.

EPA sent a 104(e) (Request for Information) letter to "CLPF Seattle Distribution" on March 25, 2008 (EPA 2008a).

3.2.2.5 Potential Contaminant Sources

No soil or groundwater contamination is known to exist at the Seattle Distribution Center facility. The facility does not operate under a Industrial Stormwater General Permit and is not required to maintain a SWPPP; therefore, the facility's operations presumably are not of concern to stormwater discharge. However, since little is known regarding the facility's operations, the following potential contaminant sources have been identified for the Seattle Distribution Center:

Stormwater

As indicated in Figure 3, stormwater discharges to the LDW via three outfalls: Outfall #2024, an additional private storm drain outfall, and the South Brighton Street CSO/SD outfall. However, information on existing contamination or operations at the facility that may create stormwater pollution was not found in the files available for review.

Spills

Little is known about current operations at the Seattle Distribution Center facility and no documentation pertaining to spills was found in the files available for review; however, since distribution of products requires trafficking by truck and railcar, spills are a potential contaminant source. Spills could migrate to the LDW both through the facility's storm drain system and through surface runoff, since the facility is directly adjacent to the LDW.

3.2.2.6 Source Control Actions

The following source control actions will be conducted for the Seattle Distribution Center:

- Ecology will review the PRP response to the 104(e) letter sent to "CLPF Seattle Distribution" on March 25, 2008, and evaluate whether further site investigation is necessary.
- SPU and Ecology will conduct a source control inspection at the facility, to include the following:
    - Because this facility does not operate under a NPDES permit, but discharges stormwater to the LDW, determine whether the Seattle Distribution Center should be required to operate under a NPDES permit.
    - Confirm that the facility discharges to the LDW in multiple locations, including Outfall #2025 and an additional private storm drain, as depicted in Figure 3. Confirm or rule out the presence of these storm drains.

3.2.3 Glacier Marine Services

Glacier Marine Services is adjacent to the LDW on the east side, at approximately RM 2.2. The property is bordered on the north by the Slip 3 inlet and on the west by the main channel of the LDW. Bunge Foods is immediately adjacent to the Glacier Marine Services property to the south. Fox Avenue South bounds the property on the east. East of Fox Avenue South is the Seattle Distribution Center and the Shultz Distributing facility. South Brighton Street intersects Fox Avenue South on the east side of the property; the South Brighton Street CSO/SD runs beneath the Glacier Marine Services property along the dividing line between the north and south

parcels of the property, and discharges to the LDW below the dock of the Glacier Marine Services property.

Facility Summary: Glacier Marine Services	
Address	6701 Fox Avenue South
Property Owner	Seatac Marine Properties LLC
Former Property Owners	See Section 3.2.3.2
Former/Alternative Property Names	Northland Services United Marine International (UNIMAR) United Marine Shipbuilding United Marine Tug & Barge Evergreen Marine Leasing Marine Power & Equipment (MP&E) Reliable Transfer & Storage Peter Pan Seafoods
Former/Alternative Lessee/Operator Names	Johnson Manufacturing
Tax Parcel No.	0001800104 (north) 0001800128 (south)
Parcel Size	5.85 acres (north) 5.24 acres (south)
Former/Alternative Addresses	6751 Fox Avenue South (Parcel 0001800104) 6809 Fox Avenue South (Parcel 0001800128) 6803 Fox Avenue South (Parcel 0001800128)
NPDES Permit No.	SO3000962
EPA RCRA ID No.	WAD980977128 (inactive since 12/31/2004)
EPA TRI Facility ID No.	98108NTDMR6701F
Ecology Facility/Site ID No.	22653378
Ecology UST Site ID No.	11256
Ecology LUST Release ID No.	N/A
Listed on CSCSL	No

According to King County tax records, the Glacier Marine Services property encompasses two tax parcels, 0001800104 and 0001800128. An address is not listed for parcel 0001800104; parcel 0001800128 is listed under the facility address of 6701 Fox Avenue South. Seatac Marine Properties LLC purchased both parcels from Fox Avenue LLC on December 29, 2004. Two structures are listed as located on tax parcel 0001800128: a 44,100-square-foot industrial manufacturing building built in 1976 and a 2,112-square-foot office building built in 1994. No structures are listed for tax parcel 001800104 (King County 2007a).

Available information from Ecology, EPA, and King County online databases and permits is summarized in the table below. This site information and further details are described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

Relevant current site use, past site use, environmental investigation, cleanup action, and facility inspection information is summarized in the sections below to provide background for potential contaminant sources and source control actions identified for the Glacier Marine Services facility.

3.2.3.1 Current Site Use

Glacier Marine Services currently operates at the Seatac Marine Properties LLC-owned property. The facility can be seen in Figures 5 and 6- aerial photos of the Slip 3 inlet area taken in July 2006. The most current facility layout is illustrated in Figure 7.

The most recent information reviewed that describes current site use at the facility is from the 2001 SWPPP and Ecology's February 2002 Hazardous Waste Compliance Inspection Report. The SWPPP and inspection report were written when the facility was in operation as Northland Services. Ownership of Industrial Stormwater General Permit No. SO3000962 was transferred from Northland Services to Seatac Marine Services LLC in 2005. An updated SWPPP for Glacier Marine Services was not found in the files available for review; however, information reviewed indicated that operations under Glacier Marine Services may be similar to Northland Services' past operations, which are summarized below in Section 3.2.3.2.

3.2.3.2 Past Site Use

According to King County tax records, a shop building was constructed on tax parcel 0001800104 in 1926, and an office building was constructed in 1944. A machine shop was constructed on parcel 0001800104 in 1943 and remodeled in 1970. Ownership of the property at the time is not known; however, the office building and machine shop were leased by Johnson Manufacturing Company starting in 1944 and ending sometime in the late 1960s or early 1970s.

According to King County tax records, a concrete and aluminum building was constructed on tax parcel 0001800128 in 1910. The building had an address of 6809 Fox Avenue South, and served as a paint factory. An industrial manufacturing building was built on the parcel in 1976.

MP&E purchased parcel 0001800104 from Peter Pan Seafoods on October 6, 1977. Available information does not indicate when ownership under Peter Pan Seafoods began. At the time of purchase by MP&E, old shipways, a dock, an old manufacturing building, and cranes were present on-site. Parcel 0001800128 was purchased from Reliable Transfer & Storage by MP&E on February 16, 1978. At the time of purchase, an old brick building was on-site (DMC 1979).

MP&E repaired and constructed ships on the property. According to Ecology's records, between 1981 and 1985, while MP&E was in operation at the property, at least 10 complaints were received in response to the facility shoveling, washing, or dumping sandblasting grit (possibly containing copper) into the river. The design of the drydock allowed blasting grit to enter the water regardless of tarping.

According to Ecology's records, in 1985, EPA Criminal Investigators conducted an investigation into practices at the MP&E facility. Surveillance was conducted over several months, and deliberate disposal of sandblasting grit into the LDW was identified. On April 10, 1987, MP&E,

its president, and two vice presidents were sentenced in Federal court. The criminal investigation report was not in the files available for review.

According to Ecology, MP&E filed for bankruptcy in 1986, and was reorganized by WFI Industries in August 1988. Under the reorganization plan, United Marine International, Inc. (UNIMAR) became the new parent company of and successor in interest to WFI Industries. All former subsidiaries, including MP&E, were consolidated into two new subsidiaries of UNIMAR: United Marine Shipbuilding, Inc. and United Marine Tug & Barge (Cargill 2000).

In 1991, the Federal Maritime Administration repossessed the assets of United Marine Tug & Barge when the company defaulted on its bonds. First Interstate Bank managed the assets repossessed from UNIMAR. United Marine Shipbuilding, Inc. filed for bankruptcy on January 21, 1994 (Cargill 2000). According to King County tax records, Northland Services purchased both tax parcels 0001800104 and 0001800128, on June 16, 1992. On April 7, 2004, Northland Services sold the two tax parcels to Fox Avenue LLC, and on December 29, 2004, Fox Avenue LLC sold both tax parcels to Seatac Marine Properties LLC (King County 2007a).

Northland Services – Facility Operations

The Northland Services facility operated a marine shipping business, which moved cargo to and from destinations in southeastern Alaska, Anchorage, and western Alaska. The facility operations commonly included transporting fishing industry supplies, construction materials and equipment, and general re-supply items such as groceries, hardware, and vehicles. The facility also shipped frozen fish products from Alaska to Northland Services (Ecology 2002).

According to the 2001 SWPPP, most of the 9-acre site was paved. A 43,000-square-foot building housed most of the vehicle maintenance activities conducted on-site. As part of its operations, Northland Services conducted on-site fueling for its forklifts, which moved containers to and from the barges. Northland Services' fuel station was in the north central portion of the site and was supplied by two, single-compartment, 550-gallon aboveground storage tanks (ASTs) containing diesel fuel. Kerosene was also stored at the fuel island in a 55-gallon aboveground drum (Anchor 2001).

According to the 2001 SWPPP, facility operations that were a potential source of stormwater pollutants included vehicle fluids handling and cleaning, refrigerator repair and maintenance, generator repair, touch-up painting of barges and containers, barge handrail welding, and fueling (Anchor 2001).

Northland Services – Storm Drain System

Figure 8 illustrates the site layout, including facility storm drains and the city storm drain (South Brighton Street CSO/SD) lines, when the facility was owned and operated by MP&E (between 1977 and 1988). Catch basin locations are shown in Figure 7. In 2001, a portion of the facility was built over the LDW. According to the 2001 SWPPP, stormwater from the western and eastern portions of the site flows into numerous collection points on-site and discharges directly into the LDW through the South Brighton Street CSO/SD line shown in Figures 3 and 8. Stormwater from the eastern portion of the site is also channeled directly into the LDW through the MP&E storm drain line labeled "003" in Figure 8. Figure 8 also shows stormwater from the northeastern portion of the site discharging directly to the LDW through the MP&E storm drain lines labeled "004," "005," and "006," at the eastern end of the synchrolift. The labels "001" and

"002" on the lower left apparently indicate general sheet runoff into the LDW (not storm drain lines). Figure 3 shows that Outfall #2025 may correlate with the "003" storm drain line; however, this has not been confirmed. Northland Services' standard indoor plumbing and water discharge from its oil/water separator were known to connect to the local sanitary sewer system (Anchor 2001).

3.2.3.3 Environmental Investigations and Cleanup Activities

The following investigations have been conducted at the Glacier Marine Services facility:

- Fox Street/Slip 3 Sampling and Analysis, conducted in 1984 by METRO (Hubbard 1984)
- Storm Drain and Sediment Sampling, conducted in 1986 by METRO (Sample 1986)
- EPA Dive Survey and Sediment Sampling, conducted in 1987 by EPA (Matta 1987)
- UST Removal and Site Assessment, conducted in 1993 by James P. Hurley Company for Northland Services (JPHC 1993)

These investigations are described in detail in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008). That report includes (1) analytical results for storm drain solids, dock runoff, drydock solids, and soil at the facility; (2) analytical results for sediment and water from the LDW next to the facility; and (3) figures showing sample locations.

In 1984, Coast Guard personnel sampled storm drain solids, dock runoff, and drydock solids at the MP&E facility, and sediment and water from the LDW next to the MP&E facility, as part of the Duwamish Monitoring Program to investigate heavy metal contamination in the vicinity of Slip 3. Samples were turned over to Tom Hubbard of METRO to be analyzed for lead, arsenic, zinc, copper, cadmium, nickel, chromium, mercury, and oil & grease (Hubbard 1984).

Due to unclear data presentation in the *Fox Street/Slip 3 Sampling and Analysis Report*, sampling results from that report are discussed here only qualitatively; further analysis of the data or comparison of sample results to SMS values could not be performed with available information. Heavy metals and oil & grease were found in the storm drain system, and runoff and drydock materials were found to be adversely impacting the LDW. The report stated that further sampling was necessary to determine the source of heavy metals and oil & grease (Hubbard 1984).

In 1986, METRO sampled storm drain solids from storm drains in the vicinity of the MP&E facility, and sediment from the LDW. Storm drain solids were collected at 12 locations and sediment was sampled at five locations. Samples were analyzed for arsenic, cadmium, chromium, copper, mercury, nickel, lead, and zinc (Sample 1986).

An analysis of the 1986 storm drain solids and sediment sampling results was not included in available information, but available information indicated that the MP&E facility was determined to be the main source of contamination to storm drains and sediment in the vicinity of Slip 3. Based on METRO's conclusions about the 1986 sampling results, this report compares those results to SQS values (SMS values are technically not applicable to storm drain solids since they are not considered sediments until washed out into the LDW, but the comparison puts the sample results into context). Arsenic, cadmium, copper, mercury, lead, and zinc were found in MP&E storm drains at concentrations exceeding SQS values. Arsenic, mercury, and zinc were found at concentrations above SQS values in sediment samples collected adjacent to MP&E.

In 1987, EPA divers collected sediment samples from the LDW in the vicinity of the MP&E facility, and investigated the amount and extent of sandblasting debris on the river bottom in the

vicinity of the MP&E facility. Sediment samples were collected at four locations, and analyzed for arsenic, cadmium, chromium, copper, lead, zinc, tin, iron, and mercury. In addition, a bioassay was conducted on sediments collected at each sample location (Matta 1987).

Laboratory analytical results were provided for the 1987 sediment samples, but an analysis or conclusions were not provided in available information; therefore, sediment sample results are compared to SQS values. Cadmium, copper, lead, and zinc were detected at concentrations that exceed the SQS values.

The 1987 bioassay test is not standard compared to current methods, and an interpretation of the raw data was not provided in available information. Results from the EPA dive survey of the river bottom in the vicinity of the MP&E facility stated that over the entire area investigated, only a light "dusting" of sandblasting grit was found near the west end of the synchrolift and drydock. EPA determined that, given the small amount of sandblasting grit found, removal was not necessary (Matta 1987).

In 1993, West Pac Environmental removed three USTs from the Northland Services facility and James P. Hurley Company (JPHC) prepared a *UST Site Assessment Report*. A 1,000-gallon gasoline UST, a 1,000-gallon diesel UST, and a 500-gallon heating fuel UST were removed from the north yard of the property because they were no longer needed for operations. Thirteen soil samples were collected from the UST excavations and spoil piles and analyzed for TPH.

One soil sample collected from the excavated spoil pile in the vicinity of the gasoline and diesel USTs yielded a TPH concentration in the heavy oil range (TPH-O) of 220 parts per million (ppm), which was above the 1993 MTCA Method A cleanup level for TPH-O of 200 ppm (the current MTCA Method A cleanup level for industrial soil for TPH-O is 2,000 ppm). As a result, West Pac Environmental isolated approximately 10 cubic yards of impacted soil for off-site disposal. The remaining stockpiled soil was used to backfill the excavation. JPHC stated that the source of the TPH-O contamination was unknown; due to the condition of the USTs and the absence of free product or petroleum staining in the soil surrounding the former USTs, JPHC concluded that the source of contamination was unrelated to the USTs. Groundwater was not encountered within the limits of the UST excavation (JPHC 1993).

3.2.3.4 Facility Inspections

Ecology performed a Hazardous Waste Compliance Inspection at the Glacier Marine Services facility (UNIMAR at that time) on March 28, 1989. Follow-up inspections were conducted on April 26, May 2, May 23, and May 24 of 1989. The 1989 Hazardous Waste Compliance Inspections identified numerous cleanup actions to be taken at the facility to address accumulations of sandblast grit, contaminated stormwater, spilled oil, improperly stored drums, and so forth.

Ecology conducted another Hazardous Waste Compliance Inspection at the facility on July 6, 1989, at the request of First Interstate Bank to determine what had been done to address the issues identified during the inspections described above and what remained to be accomplished. Apparently some oil-contaminated soil, small piles of grit, and improperly stored drums containing petroleum products remained at the property. First Interstate Bank and Ecology discussed cleaning the storm drains and catch basins, and methods of collecting sediment and wastewater to prevent discharge to the LDW. The inspection report was not found in the files available for review.

On February 21, 2002, Ecology performed another Hazardous Waste Compliance Inspection at the facility. No major issues were identified by Ecology during the inspection.

EPA sent both 107(a) (General Notice) and 104(e) (Request for Information) letters to "Northland Services, Inc." on March 25, 2008 (EPA 2008c). EPA also sent 107(a) and 104(e) letters to "Fox Avenue LLC," "Seatac Marine Properties," and "Evergreen Marine Leasing" on July 17, 2008 (EPA 2008j, EPA 2008k and EPA 2008p). In addition, EPA sent a 104(e) letter only to "Fox Avenue Warehouse" on July 17, 2008 (EPA 2008l).

3.2.3.5 Potential Contaminant Sources

Historical and potentially ongoing storm drain solids contamination has been identified within the Glacier Marine Services facility storm drain system. Arsenic, chromium, cadmium, copper, mercury, lead, zinc, and oil & grease are identified in Section 2.2.2 as COCs found in storm drain solids, surface runoff, and sediment at the Glacier Marine Services facility; stormwater is listed as the potential pathway for these COCs to reach LDW sediments.

Geographic Information System (GIS) data provided by SPU from September 9, 2003, identified a seep at the location in Figure 3 labeled "Outfall 2025 and Seep," which is in the vicinity of the historical drydock at the facility and may correlate to the outfall from the storm drain line labeled "003" in Figure 8.

LDW sediment sampling (discussed in Section 2.2.1) identified several COCs in the vicinity of Glacier Marine Services (LDW-SC37 and LDW-SS77, depicted in Figure 4). Most of the COCs identified for the RM 2.0–2.3 East Source Control Area were found in subsurface sediment at LDW-SC37, which is adjacent to the Glacier Marine Services facility to the north. This area is in the vicinity of the historical drydock, the outfall from the storm drain line labeled as "003" on Figure 8, and the "Outfall 2025 and Seep" location shown in Figure 3. COCs identified at LDW-SC37 include arsenic, copper, lead, mercury, and zinc, which were also identified in the Glacier Marine Services storm drain system, suggesting that the source of heavy metals at this location could be stormwater discharge from Glacier Marine Services. Furthermore, arsenic was also found in exceedance in surface sediment at LDW-SS77, in the vicinity of the historical drydock, at the outfall from the storm drain line labeled as "003" on Figure 8, and at the "Outfall 2025 and Seep" location shown in Figure 3.

The following potential contaminant sources have been identified for Glacier Marine Services:

Storm Drain Solids Contamination

Environmental investigations conducted at the facility while in operation as MP&E identified high concentrations of heavy metals (arsenic, chromium, cadmium, copper, mercury, lead, and zinc), and oil & grease in the facility's storm drain system. High concentrations of the same heavy metals were also present in dock runoff and sediments beneath the drydock and synchrolift. Inspections conducted following MP&E's operations at the facility identified several environmental concerns, including accumulations of sandblast grit, contaminated stormwater, spilled oil, improperly stored and labeled drums and containers, and so forth. These findings illustrate the significant role that stormwater pathways have had in the past for contaminants at the site to reach LDW sediments.

Ecology identified several cleanup actions to be taken at the site in 1989, including storm drain system cleaning. Although no major issues were identified during the February 2002 Hazardous

Waste Compliance Inspection, documentation pertaining to the completion of the cleanup actions was not found in the files available for review; most notably, it is not known whether the facility's storm drain system was cleaned.

Unless the storm drain system has been cleaned, this storm drain solids contamination could reach LDW sediments via the stormwater pathway. Figure 7 illustrates facility catch basin locations in 2001, when the facility was in operation as Northland Services, and Figure 8 illustrates storm drain lines at the facility in 1989, when the facility was in operation as MP&E. Figure 8 shows that the facility discharged most of its stormwater directly to the LDW through the South Brighton Street CSO/SD, and some stormwater through the storm drain lines labeled "003," "004," "005," and "006." Figure 3 indicates that "Outfall 2025 and Seep" may correlate to MP&E's storm drain "003."

Stormwater

As indicated in Figure 3, stormwater discharges to the LDW from Glacier Marine Services via the South Brighton Street CSO/SD and direct drainage (i.e., sheet flow and potentially through historical storm drains). Glacier Marine Services discharges stormwater under the Industrial Stormwater General Permit. Compliance with the SWPPP maintained by the facility will minimize the potential for contaminants to migrate to the LDW via stormwater; however, a current SWPPP was not available for review. Even if the storm drain solids contamination discussed above has been cleaned from the storm drain system, current facility operations could generate spills or solids that could migrate to the LDW via stormwater.

Spills

Little is known about current operations at the Glacier Marine Services facility and no documentation pertaining to spills was found in the files available for review; however, the most recent operations known to have taken place at the facility (2001) included vehicle fluids handling and cleaning, refrigerator repair and maintenance, generator repair, touch-up painting of barges and containers, welding of handrails on barges, and fueling, all of which have the potential to generate spills that could migrate to the LDW both through the facility's storm drain system and through surface runoff, since the facility is directly adjacent to the LDW.

3.2.3.6 Source Control Actions

The following source control actions will be conducted for Glacier Marine Services:

- Ecology will review the PRP response to the 104(e) letter sent to "Northland Services, Inc." on March 25, 2008; and to the 104(e) letters sent to "Fox Avenue LLC," "Seatac Marine Properties," "Evergreen Marine Leasing," and Fox Avenue Warehouse" on July 17, 2008. Following review of the PRP response, Ecology will evaluate whether further site investigation is necessary.
- SPU and Ecology will conduct a source control inspection at the facility, to include the following:
    - Confirm that the NPDES permit and SWPPP are up-to-date. A SWPPP was not available in Ecology's files.
    - Confirm that the SWPPP includes a clear description of the facility storm drain system.

- Determine whether the facility currently discharges through the historical storm drain lines labeled "004," "005," and "006" in Figure 8.
- Determine if the storm drain labeled "003" in Figure 8 correlates with Outfall #2025, shown in Figure 3.
- Investigate the location in Figure 3 referred to as "Outfall #2025 and Seep," and determine whether Glacier Marine Services is the source of the seep.
- Verify the facility's connection to the sanitary sewer system. According to the 2001 SWPPP, vehicle maintenance work such as fluids changing is conducted over pits in the maintenance building. Fluids are then pumped through an oil/water separator and discharged to the sanitary sewer system. The facility's connection to the sanitary sewer system is not indicated in the files available for review and should be clarified.
- Determine whether Glacier Marine Services currently performs sanding, scraping, or sandblasting to prepare barges and ships for painting, and whether waste materials are handled and disposed of properly. According to the 2001 SWPPP, touch-up painting of barges is conducted at the facility. Historically, sandblasting was performed at the property and sandblast grit was illegally disposed of in the LDW. Whether sanding, scraping, or sandblasting is currently performed at the facility is not mentioned in the SWPPP and should be clarified.
- Conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the Glacier Marine Services storm drain system.

3.3 Upland Facilities of Concern

3.3.1 V. Van Dyke

V. Van Dyke is located upland, on the east side of the LDW, at approximately RM 2.0. The property is bordered on the north by South Michigan Street, on the east by a building on the adjacent P.F. Industries property, on the south by South River Street, and on the west by Occidental Avenue. On the south side of South River Street is a gravel lot under the 1st Avenue South Bridge; the lot is also used by V. Van Dyke.

According to King County tax records, Doris Van Dyke has owned the property since at least 1989. According to King County tax records there are only two structures on the property: a 1,100-square-foot office building built in 1955 and a 2,800-square-foot equipment shed built in 1974. There are no structures on the gravel lot across Occidental Avenue under the 1st Avenue South Bridge (King County 2007a). The gravel lot is owned by V. Van Dyke, Inc., and is sub-leased to Pile Contractors (SPU 2007b).

Available information from Ecology, EPA, and King County online databases and permits is summarized in the table below. This site information and further details are described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

Facility Summary: V. Van Dyke	
Address	150 South River Street
Property Owner	V. Van Dyke, Inc./Doris Van Dyke
Former Property Owners	N/A
Former/Alternative Property Names	N/A
Former/Alternative Lessee/Operator Names	Mitchell Bros. Terminal Co. Pile Contractors, Inc. (gravel lot)
Tax Parcel No.	N/A
Parcel Size	5367202270 5367202400 (gravel lot)
Former/Alternative Addresses	0.77 acres 0.21 acres (gravel lot)
NPDES Permit No.	SO3000453
EPA RCRA ID No.	WAD988516779
EPA TRI Facility ID No.	N/A
Ecology Facility/Site ID No.	68427684
Ecology UST Site ID No.	12577
Ecology LUST Release ID No.	N/A
Listed on CSCSL	No

Relevant current site use, past site use, environmental investigation, cleanup action, and facility inspection information is summarized in the sections below to provide background for potential contaminant sources and source control actions identified for the V. Van Dyke facility.

3.3.1.1 Current Site Use

V. Van Dyke is a trucking facility, mainly providing heavy hauling, truck storage, and maintenance. The most current available facility layout is illustrated in Figure 9, and a portion of the facility can be seen in Figure 5- an aerial photo of the Slip 3 inlet area taken in July 2006. The property has an office building, two shop buildings, and a vehicle wash pad area. The large shop building is used for vehicle maintenance and repair, and the small shop building is used as a welding shop, sub-leased by Pile Contractors. The small shop building had been used to store waste, such as used oil (labeled "haz mat area" in Figure 10). Scrap metal is stored outside in containment and under cover (V. Van Dyke 1993 and SPU 2006c).

V. Van Dyke stores trailers and other equipment, and conducts some maintenance in a gravel lot under 1st Avenue South Bridge, on the south side of Occidental Avenue South. Pile Contractors also sub-leases a portion of the gravel lot to store equipment parts and perform some repairs (Ecology 2006b and SPU 2007c).

V. Van Dyke's 1993 SWPPP identifies potential stormwater pollutants, their locations of use within the facility, and their associated activity. Potential stormwater pollutants used at the

facility include acid, alkaline or corrosive battery fluid, antifreeze, battery acid, catalyst, cleaning solvents, lubricating oils, paint (or varnish) remover or stripper, paint thinner, detergent, waste (or slop) oil, and weed killer. Activities that require use of BMPs include uncovered vehicle parking for 20 or more vehicles; washing or steam cleaning vehicles or equipment; fueling vehicles or equipment; storing raw materials, byproducts, or products of a manufacturing process outdoors; using pesticides, herbicides, or fertilizers; accumulating or managing used oil; and maintaining storm drains (V. Van Dyke 1993).

Storm Drain System

V. Van Dyke's 1993 SWPPP does not include a description of the facility's storm drain system; however, Figure 10 depicts four catch basins (referred to as "storm drains" in the SWPPP) and a vehicle wash pad catch basin (referred to as a "drain" in the SWPPP). These five catch basins are depicted in Figure 10 as dark rectangles. The vehicle wash pad catch basin is directly north of "Storage," in the mid-western portion of the facility. According to V. Van Dyke's 1993 SWPPP, the two catch basins on the eastern portion of the site have unknown discharge points (V. Van Dyke 1993). The vehicle wash pad catch basin drains to the sanitary sewer system (Ecology 1999). SPU discovered an additional catch basin on the west side of the "Haz Mat Area" (small shop building; see Figure 10) (Ecology 2007c). SPU gave V. Van Dyke permission to cap the catch basin (SPU 2007c), but whether the catch basin was actually capped is not known. Figure 3 indicates that the facility storm drain system connects to the city's storm drain system and discharges to the LDW via the South River Street SD. According to SPU, although stormwater from most of the property is collected and discharged to the storm drain on South River Street, one catch basin on the north side of the property is connected to the storm drain on South Michigan Street, which discharges to the LDW underneath the 1st Avenue South Bridge.

3.3.1.2 Past Site Use

A trucking facility has occupied the site since approximately 1955 (Adapt 2002). King County tax records show Doris Van Dyke has owned the property since at least 1989; it appears that Doris Van Dyke owned the property before 1989, but it is not known for how long. Mitchell Bros. Terminal Co. occupied the property until 2002, but the years of tenancy are not known (King County 2007a). Review of available information did not identify uses or ownership of the property prior to 1955.

3.3.1.3 Environmental Investigations and Cleanup Activities

The following investigations have been conducted at the V. Van Dyke facility:

- Phase I Environmental Site Assessment, conducted in 2002 by LSI Adapt (described in Adapt 2002)
- Limited Phase II Environmental Site Assessment, conducted in 2002 by LSI Adapt (Adapt 2002)
- Groundwater Monitoring Well Installation and 1st Quarter Groundwater Quality Monitoring, conducted in 2003 by LSI Adapt (Adapt 2003)

These investigations are described in detail in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008); the report includes analytical results for soil and groundwater at the facility and figures showing sample locations with associated analytical results.

In September 2002, LSI Adapt (Adapt) conducted a *Phase I Environmental Site Assessment* (ESA). The *Phase I ESA* revealed that three USTs were reportedly removed from the V. Van Dyke property in 1988. The approximate location of the former USTs is shown in Figure 9. The company that removed the USTs reportedly did not observe any contamination, and no soil sampling was conducted. The USTs were removed prior to current regulations requiring soil sampling to confirm a clean closure. Adapt stated that an undocumented release from the former USTs could have occurred unobserved during removal. Adapt also noted that there was an oil/water separator in the vehicle wash area, and that workers discovered heavy staining adjacent to the catch basin in the northeastern portion of the site. Adapt recommended that additional subsurface information be collected to evaluate the environmental liability associated with the former USTs, oil/water separator, and observed stained area near the catch basin (Adapt 2002).

In October 2002, Adapt conducted a *Limited Phase II ESA* to screen soil and groundwater beneath the property to verify the observed contaminants associated with past activities from former USTs and the fueling system and oil/water separator, and to verify the staining adjacent to the catch basin. Adapt advanced five borings (P-1 through P-5) at locations shown in Figure 9. Soil and groundwater samples were collected at each location and analyzed for TPH in the gasoline-, diesel- and heavy-oil-range (TPH-G, TPH-D and TPH-O, respectively), with additional analysis for benzene, toluene, ethylbenzene, and total xylenes (BTEX) gasoline constituents. One soil sample (collected from P-3) was also analyzed for lead. Groundwater samples were additionally analyzed for volatile organic compounds (VOCs) (Adapt 2002).

Limited Phase II ESA sampling results revealed TPH-G and benzene at concentrations above MTCA Method A cleanup levels in soil and groundwater samples collected from P-3, which is in the area of the former dispenser island and USTs. Adapt concluded it likely that petroleum hydrocarbons had been released to on-site soil and groundwater in the vicinity of the former dispenser island and USTs. Impacted groundwater appeared to be localized to the vicinity of the former dispenser island and USTs; however, impacted groundwater may have migrated beneath the office and carport. Adapt recommended additional subsurface characterization to evaluate downgradient migration of petroleum-impacted groundwater off-site (Adapt 2002).

During the *Limited Phase II ESA,* Adapt was given anecdotal information about two additional USTs that were closed in place beneath the southern shop building, and Adapt observed two holes in the floor of the southern shop building. According to V. Van Dyke, the two USTs were closed in place beneath the shop building by Glacier Environmental on September 24, 2002. The USTs were reportedly used for lubricating and waste oil storage. Analytical results from the soil sampling beneath the USTs after they were cleaned and rinsed indicated that diesel- and heavy-oil-range petroleum hydrocarbons and noncarcinogenic polynuclear hydrocarbons were detected in the soil samples, but the concentrations did not exceed MTCA Method A cleanup levels. Adapt concluded that no further actions were warranted regarding the two decommissioned USTs (Adapt 2002).

In December 2002, Adapt installed groundwater monitoring wells (MWs) MW-1 through MW-4 at locations depicted in Figure 9. Adapt sampled the wells to evaluate the potential for observed on-site petroleum hydrocarbons in soil and groundwater to migrate off-site, and to delineate the lateral extent of the observed petroleum impacts. Soil and groundwater samples were collected at each location and analyzed for gasoline-range petroleum hydrocarbons and BTEX (Adapt 2003).

Gasoline-range hydrocarbons and BTEX compounds were not exhibited above laboratory detection levels in any of the soil samples collected. In addition, no gasoline-range hydrocarbons or BTEX compounds were detected above standard laboratory reporting limits in any of the four

monitoring well groundwater samples. The petroleum hydrocarbon contamination identified in the vicinity of the former UST pit did not appear to have migrated off-site. Adapt suggested continued quarterly groundwater monitoring to develop a remediation strategy and to prepare for requesting site closure from Ecology. Also as a result of the 2002 groundwater monitoring, Adapt determined that the groundwater flow direction appeared to fluctuate toward the north, northeast, and east. Based on observed water levels and the close proximity to the LDW, Adapt determined the groundwater flow direction to likely be tidally influenced (Adapt 2003).

3.3.1.4 Facility Inspections

Ecology performed a Stormwater Compliance Inspection at the V. Van Dyke facility on June 15, 1999. Ecology noted that the property was orderly in general; however, some improperly stored drums, leaking equipment, and oil-stained soil were identified. Ecology directed V. Van Dyke to address its concerns.

On December 1, 2006, SPU performed a Joint Inspection and Ecology performed a Stormwater Compliance Inspection. Follow-up inspections were conducted on February 16 and March 7 of 2007. As part of the Stormwater Compliance Inspection, Ecology reviewed the facility's discharge monitoring reports (DMRs) and discovered that in 2005, zinc, oil & grease, and turbidity had exceeded benchmark and/or action levels designated in the Industrial Stormwater General Permit requirements. Additionally, V. Van Dyke had improperly used the "No Qualifying Event" classifier in some of its DMRs. The inspections identified multiple stormwater concerns such as unkempt storm drains, oil sheens, accumulations of solids, improperly stored drums, and leaking equipment. SPU and Ecology identified several corrective actions to address stormwater concerns, and during the March 7 follow-up inspection, SPU concluded that the V. Van Dyke facility was in compliance.

On March 7, 2007, SPU performed a Joint Inspection of Pile Contractors, following discovery during the Joint Inspection at V. Van Dyke that in addition to sub-leasing space in the gravel lot under 1st Avenue South Bridge to store equipment parts and perform some repairs, Pile Contractors also sub-leased the small shop building on V. Van Dyke's main property for welding. A follow-up inspection was conducted on April 13, 2007. A few administrative concerns were identified by SPU at Pile Contractors, none of which affected stormwater quality.

EPA sent 107(a) (General Notice) and 104(e) (Request for Information) letters to "V. Van Dyke, Inc." on March 25, 2008 (EPA 2008g).

3.3.1.5 Potential Contaminant Sources

Historical petroleum hydrocarbon (TPH-G and benzene) contamination has been identified in soil and groundwater near the former dispenser island and USTs at the V. Van Dyke facility; therefore, TPH-G and benzene are identified in Section 2.2.2 as COCs, with potential pathways to reach LDW sediments via stormwater and groundwater.

In addition, zinc and oil & grease are identified in Section 2.2.2 as COCs found in stormwater discharge at the V. Van Dyke facility; stormwater is the potential pathway for these COCs to reach LDW sediments.

The following potential contaminant sources have been identified for V. Van Dyke:

Soil and Groundwater Contamination

Environmental investigations at the V. Van Dyke facility identified petroleum hydrocarbon contamination (TPH-G and benzene) in soil and groundwater near the former dispenser island and USTs (Figure 9). Although groundwater monitoring in 2002 did not indicate that groundwater contamination is migrating off-site, it is not certain this remains true. Continued quarterly groundwater monitoring was recommended by Adapt in 2003, but whether it was completed and what the results were are not known.

Groundwater at the property has not been documented to flow toward the LDW, but groundwater has been documented to flow toward the LDW at nearby properties. Groundwater flowing from the V. Van Dyke property most likely migrates to the LDW at least occasionally depending on tidal influences. Therefore, groundwater contamination could discharge to the LDW within RM 2.0–2.3 East via the groundwater pathway.

V. Van Dyke facility catch basins are illustrated in Figure 10. Figure 3 indicates that the storm drain system connects to the city's storm drain system and discharges to the LDW via the South River Street SD. V. Van Dyke's storm drain system does not appear to pass through the petroleum hydrocarbon soil and groundwater contamination that exists in the vicinity of the former dispenser island and USTs (Figure 9). Figure 3 indicates that storm drain lines at the facility pass to the east and north of the former dispenser island and USTs; however, according to the *Limited Phase II ESA*, the extent of soil and groundwater contamination is not clearly defined, and the facility's storm drain system is not clearly understood; at least two storm drains have unknown discharge points, and one storm drain may or may not have been taken offline. Therefore, soil and groundwater contamination at the property could infiltrate the storm drain system and discharge to the LDW within RM 2.0–2.3 East via the stormwater pathway.

Stormwater

As indicated in Figure 3, stormwater discharges to the LDW from the V. Van Dyke facility via the South River Street SD. The V. Van Dyke facility's stormwater discharge is authorized under the Industrial Stormwater General Permit. Compliance with the SWPPP maintained by the facility will minimize the potential for contaminants to migrate to the LDW via stormwater. However, a current SWPPP was not on file, and the facility's stormwater discharge has exceeded permit benchmark values for zinc, oil & grease and turbidity in the past. In addition, inspections conducted at the facility in 1999 and 2007 identified several stormwater concerns. The last inspection conducted at the facility in March 2007 determined that V. Van Dyke was in compliance; however, information was not available for review to determine whether benchmark values are no longer exceeded. Therefore, zinc and oil & grease are included in Section 2.2.2 as COCs. Current facility operations could generate spills or solids that could migrate to the LDW via stormwater.

Spills

Operations at the V. Van Dyke facility could result in spills. However, since the facility is not adjacent to the LDW, spills could only reach the LDW via stormwater or groundwater. As discussed in the June 15, 1999, Stormwater Compliance Inspection report, a spill of a diesel/oil-water mixture was discovered at the gravel lot across from the main V. Van Dyke property.

However, the spill was apparently from overnight dumping, and existing information indicates the spill was handled properly.

3.3.1.6 Source Control Actions

The following source control actions will be conducted for V. Van Dyke:

- Ecology will review the PRP response to the 104(e) letter sent to "V. Van Dyke, Inc." on March 25, 2008, and evaluate whether further site investigation is necessary.
- V. Van Dyke and Ecology will determine whether a UST may have been removed from the property without a proper closure. According to Ecology's UST List, six USTs have been removed from the V. Van Dyke property; however, only five USTs were documented as removed from the property based on information available for review, three in 1988, and two (by Glacier Environmental) in 2002. This discrepancy should be resolved to assure an additional UST was not removed from the property without clean closure.
- SPU and Ecology will conduct a source control inspection at the facility, to include the following:
    - Confirm that the NPDES permit and SWPPP are up-to-date.
    - Confirm that the SWPPP includes a clear description of the facility storm drain system.
    - Ensure that the facility has remained in compliance. Stormwater concerns have been identified at the facility in the past.
    - Investigate the facility's connection to the city storm drain system. Only one catch basin is depicted in Figure 3, and according to the 1993 SWPPP, there are four stormwater catch basins, and one catch basin that discharges to the sanitary sewer system.
    - Conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the V. Van Dyke storm drain system.
- Ecology will obtain any additional reports from V. Van Dyke that may be missing from Ecology's files. Available information does not confirm that the extent of soil and groundwater contamination has been defined, or that the additional groundwater and tidal monitoring suggested by Adapt has been completed.
- Ecology will work with V. Van Dyke to complete quarterly groundwater or other monitoring suggested by Adapt, if needed.

3.3.2 Riverside Industrial Park

The Riverside Industrial Park property is upland on the east side of the LDW at approximately RM 2.0. The property is bordered on the north by an asphalt-paved, fenced-in parking lot, and Rosa's Apparel Manufacturing is north of the parking lot. An unpaved extension of 3rd Avenue South bounds the property to the east; across this road is a fenced-in storage yard containing truck trailers and steel beams. South River Street bounds the property to the south; across this road is the SCS Refrigerated Services property. A warehouse occupied by Elegant Stone, a building stone distributor, is immediately west of the southern portion of the Riverside Industrial Park property and south of the northwestern portion of the property. The northwestern portion of the property is bounded by 2nd Avenue South; across this road is a warehouse occupied by P.F. Industries and the J. L. Henderson Company (EAI 1999c).

According to King County tax records, Riverside Industrial Park LLC purchased the property from Carmody, W.F. and Patricia B., on January 5, 2000. The two structures on the property include a 6,764-square-foot manufacturing (shop) building and an 8,640-square-foot office building, both built in 1957 (King County 2007a).

Facility Summary: Riverside Industrial Park	
Address	6533 3rd Avenue South (shop building) 220 South River Street (office building)
Property Owner	Riverside Industrial Park LLC
Former Property Owners	Leon Cohen W.F. and Patricia B. Carmody Theodore B. Mullen
Former/Alternative Property Names	Carmody Property
Former/Alternative Lessee/Operator Names	LK Comstock Lion Trucking Dispatch (mezzanine) Big John's Truck Repair Highway Enterprises Royal Truck Repair Kurt's Enterprises Vacuum Truck Services
Tax Parcel No.	N/A
Parcel Size	5367202200
Former/Alternative Addresses	0.54 acres
NPDES Permit No.	N/A
EPA RCRA ID No.	WAD988519781 (inactive since 12/31/1998) and WAD021817796 (inactive since 4/18/1988)
EPA TRI Facility ID No.	N/A
Ecology Facility/Site ID No.	44383713 and 37289288
Ecology UST Site ID No.	97212
Ecology LUST Release ID No.	499583
Listed on CSCSL	Yes
Ecology VCP ID No.	NW1946 NW0350 (old)

Big John's Truck Repair (Facility Site ID No. 44383713) was entered into Ecology's Confirmed and Suspected Contaminated Site List (CSCSL) on October 18, 1999, and has confirmed groundwater and soil contamination (Ecology 2007e). The Big John's Truck Repair facility was registered in the Voluntary Cleanup Program (VCP), and an Opinion Letter was issued by

Ecology in 2000. However, under revised guidelines, Ecology has since rescinded the letter, resulting in further action required at the facility (EPA 2007 and Trejo 2000).

Available information from Ecology, EPA, and King County online databases and permits is summarized in the table below. This site information and further details are described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

Relevant current site use, past site use, environmental investigation, cleanup action, and facility inspection information is summarized in the sections below to provide background for potential contaminant sources and source control actions identified for the Riverside Industrial Park facility.

3.3.2.1 Current Site Use

The most current available facility map, including excavation and monitoring well locations, is illustrated in Figure 11. A portion of the facility can be seen in Figure 5- an aerial photo of the Slip 3 inlet area taken in July 2006. As of May 1999, the shop building was vacant, other than commercial use by Lion Trucking Dispatch in the mezzanine. The office building was used commercially by the manufacturing representatives of Carmody Co. and Hardesty & Co. (EAI 1999c).

LK Comstock, a subcontractor for Seattle's Sound Transit Light Rail System Project, occupied the shop building at 6533 3rd Avenue South (presumably the mezzanine portion) as of May 2008. The former owner of the facility, Mr. Leon Cohen, submitted a new VCP application for LK Comstock, which created the new VCP ID No. NW1946. The VCP application is currently in review by Ecology (Hickey 2008). Whether the main area of the shop building is still vacant or the office building is still used commercially by the manufacturing representatives of Carmody Co. and Hardesty & Co. is not known.

According to the *Phase I Environmental Audit and Limited Sampling Report*, storm drain service is provided to the office building at 220 South River Street, but not to the shop building at 6533 3rd Avenue South, which reportedly connected to the sanitary sewer when the shop building was in operation (EAI 1997).

Storm Drain System

As shown in Figure 3, the southern portion of the Riverside Industrial Park property is served by a private storm drain system that connects to the city's storm drain system and discharges to the LDW via the South River Street SD.

3.3.2.2 Past Site Use

The Riverside Industrial Park property was commercially developed in 1957, the year that the office building and manufacturing (shop) building were built (EAI 1997).

According to the *Phase I Environmental Audit and Limited Sampling Report,* Theodore B. Mullen purchased the property in 1956 and ownership changed in 1974, when W.F. and Patricia B. Carmody purchased the property. Several businesses have operated out of the shop building and/or office building since 1957, and are summarized in the table below through 1999. As of May 1999, Lion Trucking Dispatch occupied the mezzanine of the shop building, and residents of the office building included the manufacturer's representatives of Carmody Co. and Hardesty

& Co. Property use since 1999 is not known, other than LK Comstock's current occupation of the the shop building (presumably the mezzanine). In the table below, some businesses listed under the office address appear to have actually operated out of the shop building. The shop building appears to have been vacant until at least 1981-1983, when apparently Kurt's Enterprises (truck repair) and/or Vacuum Truck Services (cleaner of ships) occupied the property. Kurt's Enterprises was listed as occupying the property in 1986, Royal Truck Repair was listed in 1990, and Highway Enterprises was listed in 1994 (EAI 1997).

Historical Businesses: Riverside Industrial Park		
Year	**Address**	**Businesses Listed**
1958 and 1960	6533 3rd Avenue South 220 South River Street	Vacant S.S. Mullen, Inc., building contractors
1965 and 1970	220 South River Street	S.S. Mullen, Inc.
1975	220 South River Street	Carmody Company, manufacturer's representative
1980	220 South River Street	Carmody Co. Hardesty & Company, manufacturer's representative Pacer Corporation, manufacturer's representative
1981 and 1983	220 South River Street	Carmody Co. Hardesty & Co. Kurt's Enterprises, truck repair H.R. Zilmer Distributors, manufacturer's representative Stars on the Sea, fire alarm sales Vacuum Truck Service, cleaner of ships McGrane Electrical, sales Cassidy Associates, Inc., manufacturer's representative
1986	220 South River Street	Carmody Co. Hardesty & Co. Kurt's Enterprises H.R. Zilmer Distributors Tool Engineering Company Jackson Willis Company
1990	220 South River Street	Carmody Co. Hardesty & Co. H.R. Zilmer Distributors Gifford and Associates, food manufacturers B.A. Barnes, Inc., accounting M.D. Fabre & Associates, architects and engineering Royal Truck Repair, Inc.
1994	6533 3rd Avenue South 220 South River Street	Highway Enterprises, Inc., trucking company Big John's Truck Repair Carmody Co. Hardesty & Co. Gifford and Associates
1999	6533 3rd Avenue South 220 South River Street	Vacant (shop area) Lion Trucking Dispatch (mezzanine) Carmody Co. Hardesty & Co.

Also according to the *Phase I Environmental Audit and Limited Sampling Report,* three 1,000-gallon diesel fuel USTs were closed in place east of the shop building in 1988. In February 1994, Big John's Truck Repair (formerly Highway Enterprises) was a registered generator of mineral

spirits, oil, cadmium, and lead, and the estimated quantity of wastes generated was 134 pounds per month (EAI 1997).

Review of available reports indicates that Big John's Truck Repair was in operation at the Riverside Industrial Park shop building beginning in 1994 and vacated the building sometime in 1998. According to the table below, prior lessees of the shop building included Highway Enterprises, Royal Truck Repair, Kurt's Enterprises, and Vacuum Truck Services. However, site addresses for the shop and office buildings have been intermixed and the years of operation under each lessee is unclear. Other than LK Comstock's current occupation of the shop building, businesses in operation at the Riverside Industrial Park property since 1999 are not known.

3.3.2.3 Environmental Investigations and Cleanup Activities

The following investigations and cleanup actions have been conducted at the Riverside Industrial Park facility:

- Phase I Environmental Audit and Limited Sampling, conducted in 1997 by Environmental Associates, Inc. (EAI 1997)
- Phase II Subsurface Exploration, conducted in 1998 by Geotech Consultants (Geotech 1998)
- Tank Removal, Site Assessment, and Cleanup, conducted 1998 through 1999 by Environmental Associates, Inc. (EAI 1999c)
- Phase II Subsurface Soil and Groundwater Investigation, conducted in 1999 by PBS Environmental, Inc. (PBS 1999)
- 2nd and 3rd Quarter Groundwater Sampling and Testing, conducted in 1999 by Environmental Associates, Inc. (EAI 1999b and EAI 1999a)

These investigations are described in detail in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008). This report includes analytical results for soil and groundwater at the facility and figures showing sample locations.

In December 1997, Environmental Associates, Inc. (EAI) conducted a *Phase I Environmental Audit and Limited Sampling* of the Riverside Industrial Park property to evaluate its potential sale. To make a preliminary evaluation of subsurface conditions at the property, three soil/floor drain solids samples were obtained, one from each of the two floor drains in the shop building, and one from approximately 4 feet northwest of the diesel fuel AST on the west side of the shop building at a depth of approximately 6 inches. Each sample was analyzed for TPH-G, TPH-D, TPH-O, and BTEX gasoline constituents. Analysis was also conducted for the presence of halogenated VOCs (also referred to as chlorinated solvents) in each sample (EAI 1997).

Sample results identified concentrations of TPH-D and TPH-O above MTCA Level A cleanup levels for industrial soil in all three samples. TPH-G, ethylbenzene, total xylenes, trichloroethene (TCE), and tetrachloroethene (PCE) were also detected in the floor drain solids at concentrations above or equivalent to MTCA Method A cleanup levels[7]. In addition to the diesel fuel AST and two floor drains, EAI identified several other concerns at the property, including three diesel fuel USTs closed in place east of the shop building, several 55-gallon drums, and surficial oil stains on soil and on the concrete floor in the shop building. EAI concluded that the extent of

[7] Although MTCA Method A clean up levels technically do not apply to catch basin solids they provide an indication of concern for the detected analytes.

contamination was unknown and suggested additional subsurface sampling to define lateral and vertical extents of contamination (EAI 1997).

In April 1998, Geotech Consultants conducted a *Phase II Subsurface Exploration* of the property for the property owner at the time (Mr. Thomas Carmody) to further assess contamination discovered during the *Phase I Environmental Audit and Limited Sampling*. Geotech Consultants completed seven soil borings across the property. Soil samples were collected at each location and groundwater samples were collected where groundwater was encountered. Each sample was analyzed for TPH-G, TPH-D, TPH-O, and BTEX gasoline constituents (Geotech 1998).

Sample results indicated that soil downgradient from the three inactive USTs contained TPH-G, TPH-D, and TPH-O as well as BTEX compounds (benzene and xylenes) above MTCA Method A cleanup levels for industrial soil. Groundwater was discovered in this area at approximately 7 feet below ground surface (bgs) and appeared to be similarly contaminated. Geotech Consultants determined that the contaminated soil extended from near the ground surface to approximately 7 to 9 feet in depth, covered roughly 30 feet (north-south) wide, and might extend beneath the shop building. Geotech Consultants recommended excavating contaminated soils and disposing them off-site (Geotech 1998).

Soil analyzed in the vicinity of the two floor drains and in the outdoor storage area contained no detectable concentrations of petroleum or halogenated hydrocarbons. Geotech Consultants noted that previously identified contamination was most likely limited to solids inside the floor drains and to stained soils near the surface in the outdoor storage area. Geotech Consultants recommended the floor drains be cleaned out by a licensed disposal company, and that an inspection be completed to check for ruptures or breaks in the drain walls and to confirm the drains' connection to the sanitary sewer (Geotech 1998).

In October 1998, to address the contamination discovered through the Phase I and II investigations described above, EAI completed removal of the three approximately 1,000-gallon gasoline and diesel fuel USTs, an associated fuel dispenser island, the two shop floor drains, a floor drain outfall, and the approximately 500-gallon heating oil AST. Petroleum-contaminated soil was excavated and disposed of off-site, and excavation floor and sidewall sampling was performed. Figure 11 illustrates the extent of each of the excavations. Samples collected from the floors and sidewalls of the excavations indicated that the soil remaining in the excavations contained no detectable concentrations of petroleum contaminants exceeding MTCA Method A cleanup levels for gasoline, BTEX, diesel & oil, total lead, or halogenated organic compounds (EAI 1999c).

An undetermined volume of petroleum-contaminated soil was left in-place below the east and west foundations of the shop structure and below the northeast corner of the adjacent Elegant Stone warehouse structure due to concerns about the proximity of the excavation sidewalls to the building foundation walls. EAI determined that the remaining contaminated soil posed little or no threat to human health or the environment because current site use did not permit exposure, the soil was encapsulated by the shop building and warehouse building, and groundwater monitoring was planned (EAI 1999c).

In February 1999, EAI completed four groundwater monitoring wells (MW-1 through MW-4) and performed groundwater sampling. Groundwater samples were collected from each well and sampled for TPH-G, BTEX gasoline constituents, TPH-D, and TPH-O. Figure 11 illustrates the locations of the groundwater monitoring wells (EAI 1999c).

Measurements of the groundwater table following the installation of monitoring wells revealed that shallow groundwater was present at approximately 5 to 6 feet bgs, and that the gradient was very gentle (approximately 0.2 percent) with inferred groundwater flow from the north-northeast toward the south-southwest. Concentrations of TPH-G, benzene, ethylbenzene, and xylenes were detected above MTCA Method A cleanup levels for groundwater at MW-1. EAI determined that this gasoline-contaminated groundwater most likely would not migrate off-site, as groundwater sampled from MW-2 (downgradient from MW-1) did not reveal the presence of gasoline-range petroleum hydrocarbons or gasoline-associated BTEX constituents. However, EAI recommended sampling and testing groundwater for at least three more quarters to assess overall stability and trends (EAI 1999c).

In June 1999, PBS Environmental, Inc., completed a subsurface investigation of the property to identify the approximate lateral and vertical extent of potential petroleum-contaminated soil and groundwater remaining beneath the concrete slab of the shop building. PBS Environmental completed seven borings (SB-1 through SB-7) shown in Figure 11. Soil samples were collected at each location and two groundwater samples were collected (from SB-3 and SB-6). Each sample was analyzed for gasoline, stoddard solvent/mineral spirits, kensol (a series of refined petroleum products), kerosene/jet fuel, diesel/fuel oil, bunker C, and heavy oil. Petroleum hydrocarbons were not detected in any soil or groundwater sample. PBS Environmental stated that the residual diesel-range contamination that remained in the sidewall of the former UST pit adjacent to the building did not appear to have migrated a significant distance beneath the shop building, and that continued quarterly monitoring of the existing wells would assess the groundwater quality for overall stability and trends (PBS 1999).

In May and October 1999, EAI sampled the four existing monitoring wells in a second and third quarter of groundwater sampling, as was recommended during the Tank Removal, Site Assessment, and Cleanup to assess the groundwater quality for overall stability and trends. As in the first quarter (conducted during the Tank Removal, Site Assessment, and Cleanup), groundwater samples were collected from each well (MW-1 through MW-4) and analyzed for TPH-G, BTEX gasoline constituents, TPH-D, and TPH-O (EAI 1999b and EAI 1999a).

Shallow groundwater was encountered at approximately 3 feet bgs during both the second and third quarters. Groundwater appeared to be flowing generally from the north-northeast toward the south-southwest during both quarters, as was found during the first quarter. During the second quarter, a concentration of benzene was detected above the MTCA Method A cleanup level for groundwater at MW-2. During the third quarter, no concentrations of gasoline-range petroleum hydrocarbons or associated BTEX constituents or diesel/oil-range petroleum contaminants were detected in groundwater from monitoring wells MW-1 through MW-4 at concentration levels exceeding the MTCA Method A cleanup levels (EAI 1999b and EAI 1999a).

In December 1999, Ecology visited the Riverside Industrial Park property to observe site conditions and reviewed the reports discussed above. Ecology determined that a No Further Action (NFA) determination could be issued for soil and groundwater if two additional rounds of groundwater samples collected from MW-2 showed that contaminant levels were below MTCA Method A groundwater cleanup levels, demonstrating that groundwater had not been adversely affected by the soil contamination remaining near the former fuel USTs and dispenser island. A restrictive covenant prepared by Ecology would also need to be filed with the King County Tax Assessor's Office. In addition to the groundwater sampling and restrictive covenant, the owners of the adjacent Elegant Stone warehouse would need to be notified that contaminant

concentrations above MTCA Method A cleanup levels for petroleum hydrocarbons were discovered underneath the northern portion of their warehouse (Trejo 2000). According to Ecology, an NFA has not been issued, and further action is required at the facility (EPA 2007).

3.3.2.4 Facility Inspections

No facility inspections are known to have been conducted at the Riverside Industrial Park facility.

EPA sent 107(a) (General Notice) and 104(e) (Request for Information) letters to "Riverside Industrial Park" on July 17, 2008 (EPA 2008o). EPA also sent a 104(e) letter to "Big John's Truck Repair" on July 17, 2008 (EPA 2008h).

3.3.2.5 Potential Contaminant Sources

Historical petroleum hydrocarbon contamination was identified in soil and groundwater near the three former USTs and fuel dispenser island in 1997. The contaminated soil was excavated in 1998 where possible; however, groundwater contamination (TPH-G, benzene, ethylbenzene, and xylenes) appears to remain. TPH-G, benzene, ethylbenzene, and xylenes are identified in Section 2.2.2 as COCs, with potential pathways to reach LDW sediments listed as stormwater and groundwater.

The following potential contaminant sources have been identified for Riverside Industrial Park:

Soil and Groundwater Contamination

Environmental investigations at the Riverside Industrial Park facility identified petroleum hydrocarbon contamination in soil and groundwater. Contaminated soil was excavated in October 1998 from the locations shown in Figure 11. However, an undetermined volume of petroleum-contaminated soil was left in-place below the east and west foundations of the shop structure and below the northeast corner of the adjacent "Elegant Stone" warehouse structure.

Concentrations of TPH-G, benzene, ethylbenzene, and xylenes were detected above MTCA Method A cleanup levels at MW-1 in the first quarter of groundwater monitoring performed in February 1999. In May 1999, benzene was detected at a concentration above MTCA Method A cleanup levels at MW-2. However, in June 1999, no concentrations of petroleum hydrocarbons were detected in groundwater from monitoring wells MW-1 through MW-4 at levels exceeding the MTCA Method A cleanup levels.

In December 1999, Ecology determined that an NFA could be issued for soil and groundwater if two additional rounds of groundwater samples collected from MW-2 showed contaminant levels below MTCA Method A cleanup levels. Whether this groundwater monitoring was conducted is not known.

Groundwater was typically encountered at the Riverside Industrial Park facility between 3 and 7 feet bgs, flowing generally from the north-northeast to the south-southwest. Therefore, groundwater contamination could discharge to the LDW within RM 2.0–2.3 East via the groundwater pathway.

The city storm drain system is known to serve the Riverside Industrial Park office building at 220 South River Street. Figure 3 indicates that storm drain lines run between the shop building and the office building, possibly through areas where contaminated soil has been excavated, and

discharge to the LDW via the South River Street SD. Petroleum-contaminated soil and groundwater remaining at the property could infiltrate the storm drain system and discharge to the LDW within RM 2.0–2.3 East via the stormwater pathway.

Floor Drains

As discussed above, in 1997, two floor drains were identified in the shop building that lacked oil/water separators. Floor drain solids samples were collected from each floor drain, and concentrations of TPH-G, TPH-D, TPH-O, ethylbenzene, total xylenes, TCE and PCE were found in exceedance of MTCA Method A cleanup levels for industrial soil in one or both samples. Reportedly, the shop building was connected to the sanitary sewer system rather than the storm drain system; however, Big John's Truck Repair could not confirm that the two floor drains were connected to the sanitary sewer.

The floor drains were excavated, and soil samples collected from the excavation indicated that the previously identified contamination was most likely limited to solids inside the floor drains. Geotech Consultants recommended the floor drains be cleaned out by a licensed disposal company and that an inspection be completed to check for rupture or breaks in the drain walls and to confirm the drains' connection to the sanitary sewer.

Contaminated floor drain solids may have migrated to the LDW within RM 2.0–2.3 East if the former shop building floor drains were connected to the storm drain system rather than the sanitary sewer system. If the floor drains were not cleaned out and confirmed to connect to the sanitary sewer as recommended, contaminated floor drain solids could discharge to the LDW within RM 2.0–2.3 East via the stormwater pathway.

3.3.2.6 Source Control Actions

The following source control actions will be conducted for Riverside Industrial Park:

- Ecology will review the PRP response to the 104(e) letters sent to "Riverside Industrial Park" on March 25, 2008, and "Big John's Truck Repair" on July 17, 2008, and evaluate whether further site investigation is necessary.
- SPU and Ecology will conduct a source control inspection at the facility, to include the following:
    - Confirm that the former two shop building floor drains were connected to the sanitary sewer rather than the city storm drain system.
    - Determine whether the storm drain lines shown in Figure 3, between the shop building and office building, pass through areas where contaminated soil has been excavated.
    - Conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the Riverside Industrial Park storm drain system.

Ecology will determine the status of cleanup at the facility and determine whether to pursue additional investigation and cleanup under administrative order. Available information indicates that additional groundwater monitoring is needed.

3.3.3 Shultz Distributing

The Shultz Distributing property is upland on the east side of the LDW at approximately RM 2.3. The property is bordered on the north by South Brighton Street, north of which is the Seattle Distribution Center property, and on the south by South Willow Street, across from which is the Cascade Columbia Distribution property. East Marginal Way South bounds the property to the east, and Fox Avenue South bounds the property to the west. Railroad tracks run adjacent to the facility to the east and west. The Glacier Marine Services property is west of the Shultz Distributing facility, separating the Shultz Distributing facility from the LDW.

Facility Summary: Shultz Distributing	
Address	6851 East Marginal Way South
Property Owner	Emerson Enterprises LLC
Former Property Owners	Delbert M. and Veronica Emerson
Former/Alternative Property Names	Emerson GM Diesel
Former/Alternative Lessee/Operator Names	N/A
Tax Parcel No.	N/A
Parcel Size	0001800159
Former/Alternative Addresses	2.79 acres
NPDES Permit No.	SO3002346
EPA RCRA ID No.	WAD009492877 (inactive since 12/31/2003)
EPA TRI Facility ID No.	N/A
Ecology Facility/Site ID No.	95498891
Ecology UST Site ID No.	1391
Ecology LUST Release ID No.	N/A
Listed on CSCSL	No

The property was leased to Shultz Distributing in 1996. Shultz Distributing installed multiple ASTs on the property (Terra Vac and Floyd|Snider 2000). According to King County tax records, Emerson Enterprises LLC purchased the property from Delbert M. and Veronica Emerson on May 22, 1998. Four structures are on the property: a 27,800-square-foot industrial manufacturing building built in 1965, a 9,585-square-foot industrial manufacturing building built in 1940, a 19,092-square-foot industrial manufacturing building built in 1922, and a 3,750-square-foot industrial manufacturing building built in 1974 (King County 2007a).

Available information from Ecology, EPA, and King County online databases and permits is summarized in the table below. This site information and further details are described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

Relevant current site use, past site use, environmental investigation, cleanup action, and facility inspection information is summarized in the sections below to provide background for potential contaminant sources and source control actions identified for the Shultz Distributing facility.

3.3.3.1 Current Site Use

Shultz Distributing is a bulk oil storage and distributing company. The most current available facility layout is illustrated in Figure 12, and a portion of the facility can be seen in Figure 6- an aerial photo of the Slip 3 inlet area taken in July 2006. Petroleum products, solvents, and antifreeze are delivered to the facility by truck and railcar and are either transferred to storage tanks or stored in the warehouse facility in 55-gallon drums. There are 26 ASTs with a total storage capacity of 250,900 gallons; 21 tanks are in the recessed tank farm on the south side of the property and five are in the northwest corner of the property. The tanks range from 6,000 to 11,900 gallons and most contain lube oil; one tank contains diesel. Tank locations are illustrated in Figure 13 (ERM 2001).

Shultz Distributing's 2001 SWPPP identifies potential sources of pollution at the facility and the BMPs employed to control them. Potential sources of pollution include hazardous and non-hazardous materials storage, loading/unloading operations, equipment failure, and spills. BMPs employed at the Shultz Distributing facility include inspections, training, record keeping and reporting, housekeeping, preventive maintenance, spill prevention and response, runoff management, and sediment and erosion prevention (ERM 2001).

Storm Drain System

Stormwater is collected in catch basins at various locations throughout the facility (Figures 12 and 13) (ERM 2001). Figure 3 indicates that the Shultz Distributing storm drain system connects to the city's storm drain system and discharges to the LDW via the South Brighton Street CSO/SD. SPU inspectors confirmed that most stormwater from the property is discharged to the LDW via the South Brighton Street CSO/SD. However, stormwater from the tank area, rail tank car area, and loading dock area discharges to the impound basin, from which stormwater can discharge to either the city storm drain system or the sanitary sewer system. In August 2006, the impound basin was pumped and the material was disposed of by an outside company. A locked valve was in place and could be used to discharge the stormwater in the impound basin to an oil/water separator, from which stormwater could discharge to the city storm drain system. Conversely, a sump pump in the oil/water separator could be used to pump stormwater to the sanitary sewer system (Ecology 2006a and SPU 2007a). In August 2006, SPU told Shultz Distributing to remove the pump from the oil/water separator because it had no use and was not allowing proper settling; reportedly the pump had been used to discharge vehicle wash water to the sanitary sewer system in the past, but vehicles were no longer washed at the property. According to Ecology and SPU, with proper settling occurring in the oil/water separator, the stormwater could be discharged to the city storm drain system (Ecology 2006a and SPU 2006b). The review of files did not find any confirmation that the pump was removed from the oil/water separator or that stormwater now discharges to the city storm drain system.

3.3.3.2 Past Site Use

The Shultz Distributing property was developed in the 1920s for the Gypsum Products Corporation. From the late 1930s until the 1960s, Federal Pipe manufactured wood pipes and

tanks on the property. Operations included a dip tank, drying kilns, and warehouse space. In 1964, a group of individuals, including members of the Emerson family, purchased the property. Emerson GM Diesel leased the property in the 1960s and maintained and repaired diesel motors and trucks on the property. Pacific Detroit Diesel occupied the property between 1989 and 1997 (Terra Vac and Floyd|Snider 2000).

3.3.3.3 Environmental Investigations and Cleanup Activities

The following investigations have been conducted at the Shultz Distributing facility:

- Environmental Consultation, conducted in 1999 by AGI Technologies (AGI 1999)
- Monitoring Well Installation and Sampling, conducted in 1999 by AGI Technologies (AGI 2000)
- Storm Drain System Investigation, conducted in 2001 by Shultz Distributing (described in ERM 2001)

These investigations are described in detail in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008); the report includes analytical results for soil and groundwater at the facility and figures showing sample locations.

In November 1999, AGI Technologies (AGI) provided environmental consultation to Shultz Distributing regarding an accusation by the owners of the adjacent Cascade Columbia Distribution (formerly Great Western Chemical Company) property that the Shultz Distributing property was the source of a chlorinated solvent plume discovered on Cascade Columbia Distribution's property. The *Northwest Corner Investigation,* conducted at the Cascade Columbia Distribution property in 1999 and discussed in Section 3.3.4, confirmed the plume had migrated from the Shultz Distributing property. However, AGI reviewed available information on the two properties and concluded that Shultz Distributing was unlikely to be the source of the plume for the following reasons (AGI 1999):

1. No chlorinated solvents such as PCE or TCE had been stored or used on the Shultz Distributing property, and no evidence existed suggesting they had been released to the environment on the property.
2. The *Northwest Corner Investigation* report stated that the investigation was undertaken to investigate the source of chlorinated solvents detected in wells B-13 and B-22, which can be seen in Figure 14 on the west side of the Cascade Columbia Distribution property (labeled "Great Western Chemical Company Site" in Figure 14). A groundwater sample collected from well B-13 in 1990 contained 9,000 parts per billion (ppb) PCE. This result indicated that the "secondary source" was present in 1990, and therefore was not the result of a recent release. The contamination was not previously identified as a separate source in 1990 and not investigated as such until the *Northwest Corner Investigation* in 1999. Furthermore, the highest groundwater concentrations were at well B-13 and not in any of the wells closer to the Shultz Distributing property; thus, the data indicated that the chlorinated solvent plume did not originate from the Shultz Distributing property.
3. AGI developed a groundwater elevation contour map using data from the *Northwest Corner Investigation* report and determined a westerly groundwater flow direction, which suggested that the contamination identified in the investigation was from a source west of well B-13.

AGI's review indicated that groundwater contamination from the Cascade Columbia Distribution property could have contaminated the Shultz Distributing property. However, no evidence was

provided to indicate that the chlorinated solvents plume could have originated from a source on the Shultz Distributing property. AGI recommended installing monitoring wells and collecting groundwater samples on the property to determine the extent of groundwater contamination (AGI 1999).

In December 1999, AGI installed three monitoring wells to investigate groundwater contamination at the Shultz Distributing property and to support AGI's conclusion that the Shultz Distributing property could not have been the source of the chlorinated solvent plume discovered on the adjacent Cascade Columbia Distribution property. Monitoring wells MW-1 through MW-3 were installed at locations shown in Figure 14. One soil sample collected above the water table from each soil boring, and groundwater samples collected from each well, were analyzed for halogenated VOCs including trans-1,2-dichloroethene (trans-1,2-DCE), 1,1-dichloroethane (1,1-DCA), cis-1,2-DCE, 1,1,1-trichloroethane (1,1,1-TCA), TCE, and PCE (AGI 2000).

In all three borings, groundwater was encountered at approximately 10 feet bgs; the groundwater flow direction was to the southwest (Figure 15). Contaminants were not detected above MTCA Method A cleanup levels in any of the soil samples. However, all three groundwater samples contained chlorinated solvents, primarily PCE and TCE. The MTCA Method A cleanup level for PCE was exceeded in all three groundwater samples. Based on sample results, AGI concluded that groundwater contamination beneath the Shultz Distributing property was part of the chlorinated solvent plume emanating from the adjacent Cascade Columbia Distribution property. AGI determined that both the absence of chlorinated solvents in soil above the water table and the relatively low concentrations in groundwater at the Shultz Distributing property indicated that Shultz Distributing was not the source of the chlorinated solvents plume (AGI 2000).

According to the 2001 SWPPP for Shultz Distributing, a "September 2001 Site Investigation" was performed by Shultz Distributing, which involved a review of the city of Seattle Department of Engineering records on storm drain and/or sanitary sewer system connections at the facility, investigation of the piping in catch basins, and a dye tracer test. The dye tracer test was inconclusive because the city sewer and storm drain lines could not be accessed during the test. A request was made to the city of Seattle to confirm connections to the sanitary sewer and/or storm drain system (ERM 2001).

According to the 2001 SWPPP, stormwater that fell in the area of the tank farm was collected in the impound basin and routed through the oil/water separator system west of the tank farm. The oil/water separator system was believed to discharge to the sanitary sewer system. However, the point of discharge from the catch basin in the recessed truck unloading area in the north central portion of the site could not be determined. The discharge from the oil/water separator near the offices, however, had been confirmed to be connected to the sanitary sewer by review of the city of Seattle's Department of Engineering records (ERM 2001).

3.3.3.4 Facility Inspections

On January 27, 2006, SPU and King County performed a Joint Inspection. Follow-up inspections were conducted on March 31, July 5, and August 21 of 2006, and on January 4, 2007. A Stormwater Compliance Inspection performed by Ecology coincided with the follow-up Joint Inspection conducted on August 21. Several stormwater concerns were identified at the Shultz Distributing property, including accumulations of solids in catch basins, oil/water separators requiring cleaning, oil-stained soil, and so forth. During the July 5 inspection, SPU found that

Shultz Distributing had complied with the corrective actions outlined to address the stormwater concerns; however, SPU became concerned about the sump pump outside of the tank area, which apparently pumped to an oil/water separator and then to a catch basin that discharged to the sanitary system during low flows and the storm drain system during high flows (SPU 2006a).

The Joint and Stormwater Compliance Inspections performed on August 21 were to address the uncertainty of the facility's connection to the storm drain and/or sanitary sewer system. According to Ecology, all stormwater from the tank area, rail tank car area, and loading dock area entered a large concrete vault (labeled "impound basin" in Figures 12 and 13). A locked valve could be used to discharge the stormwater in the vault to an oil/water separator, which was no longer operational. A sump pump in the oil/water separator could be used to pump stormwater from the oil/water separator to a manhole near the street (Ecology 2006a).

SPU performed a dye test to determine whether stormwater from the facility discharged to the LDW. The dye test was performed at the connection between the sump pump and the manhole (MH) located in South Brighton Street (top of Figure 12). Dye was added to the oil/water separator, the sump pump was turned on, and dye was seen entering the manhole near the street. The dye was then observed in the street storm drain system, which ultimately discharges to the LDW through the South Brighton Street CSO/SD. Stormwater from areas other than the tank, rail, and loading dock areas also drain to the street storm drain system (Ecology 2006a).

A pump was observed in the manhole on the street, but it was no longer operational. The pump appeared to discharge to the sanitary sewer. Shultz Distributing stated that the pump was probably used to discharge vehicle wash water to the sanitary sewer, but vehicles were no longer washed at the property. Because the oil/water separator was no longer operational and the stormwater could be contaminated with oil & grease from the tank area, Ecology informed Shultz Distributing it was never to discharge stormwater from the vault to the street storm drain system with the oil/water separator in that condition. Shultz Distributing replied that it used a company to pump the contaminated stormwater out and dispose of it properly. King County told Shultz Distributing that it could obtain a permit from King County to discharge the vault stormwater to the sanitary sewer, but Shultz Distributing would need to repair the oil/water separator. Shultz Distributing opted to continue pumping and disposing of the vault stormwater (Ecology 2006a).

SPU directed Shultz Distributing to have the pump removed from the oil/water separator because it is not allowing proper settling and is thus negating the intended beneficial effects of the treatment system. SPU also asked that Shultz Distributing fix the pump by the yard entrance to allow confirmation of discharge to the sanitary sewer system (SPU 2006b). Ecology required that the valve not be opened to discharge stormwater from the vault to the manhole near the street (Ecology 2006a). During the January 4 follow-up inspection, SPU concluded that Shultz Distributing was in compliance. The pump by the yard entrance had been fixed and it was confirmed that when the pump turned on, water discharged to the sanitary system. When the pump was not on, water discharged to the storm drain system (SPU 2007a).

During the August 21 Stormwater Compliance Inspection, Ecology stated that no stormwater DMRs were submitted for 2005 or for the first quarter of 2006, and requested that Shultz Distributing submit the required DMRs as soon as possible (Ecology 2006a).

3.3.3.5 Potential Contaminant Sources

Chlorinated solvents contamination (PCE) was identified in groundwater at the southern portion of the property in the vicinity of the tank farm. This contamination has been concluded to be part of the chlorinated solvent plume emanating from the adjacent Cascade Columbia Distribution property. PCE was identified in Section 2.2.2 as a COC, with potential pathways to reach LDW sediments listed as stormwater and groundwater.

The following potential contaminant sources have been identified for Shultz Distributing:

Groundwater Contamination

Environmental investigations at the Shultz Distributing facility identified chlorinated-solvent-contaminated groundwater.

Concentrations of PCE above MTCA Method A cleanup levels were detected in groundwater collected from MW-1, MW-2, and MW-3 (locations shown in Figure 14) in December 1999. TCE was also detected in each well, but at concentrations below MTCA Method A cleanup levels. Based on sampling results and a review of existing information on Shultz Distributing and Cascade Columbia Distribution, AGI determined that this groundwater contamination was most likely part of the chlorinated solvent plume emanating from the adjacent Cascade Columbia Distribution property. However, only three monitoring wells were installed at the property, and groundwater direction appeared to flow toward, not away from, the Cascade Columbia Distribution property (Figure 15). Relatively high concentrations of PCE, TCE, and vinyl chloride (VC) were also found at the eastern end of the Shultz Distributing property in well B-1, as shown in Figure 14.

Since groundwater was encountered at the Shultz Distributing facility at approximately 10 feet bgs, flowing toward the southwest, groundwater contamination could discharge to the LDW via the groundwater pathway.

Shultz Distributing's storm drain system is shown in Figures 12 and 13. Figure 3 shows that the storm drain system connects to the city's storm drain system and discharges to the LDW via the South Brighton Street CSO/SD. Shultz Distributing's storm drain system appears to pass through the area of chlorinated solvent groundwater contamination near the tank farm (Figure 14). Therefore, groundwater contamination at the property could infiltrate the storm drain system and discharge to the LDW within RM 2.0–2.3 East via the stormwater pathway.

Stormwater

As indicated in Figure 3, stormwater discharges to the LDW from Shultz Distributing via the South Brighton Street CSO/SD. The Shultz Distributing facility's stormwater discharge is authorized under the Industrial Stormwater General Permit. Compliance with the SWPPP maintained by the facility will minimize the potential for contaminants to migrate to the LDW via stormwater. In addition, several inspections performed at the facility by SPU in 2006 addressed multiple stormwater concerns. However, a current SWPPP was not available for review, and whether the facility's discharge has been in compliance with permit benchmark values since 2005 has not been confirmed. Current facility operations could generate spills or solids that could migrate to the LDW via stormwater.

3.3.3.6 Source Control Actions

The following source control actions will be conducted for Shultz Distributing:

- SPU and Ecology will conduct a source control inspection at the facility, to include the following:
    - Confirm that the NPDES permit and SWPPP are up-to-date.
    - Confirm that the SWPPP includes a clear description of the facility storm drain system.
    - Investigate the facility's connection to the city storm drain and sanitary sewer systems.
    - Determine whether the storm drain lines shown in Figures 3 and 14 pass through the area of chlorinated solvent groundwater contamination near the tank farm, and discharge to the LDW via the South Brighton Street CSO/SD.
    - Confirm that the pump was removed from the oil/water separator, and that stormwater now discharges to the city storm drain system.
    - Ensure that the facility has remained in compliance. Stormwater concerns have been identified at the facility in the past.
    - Conduct in-line storm drain sampling to evaluate whether COCs are migrating to sediments associated with the RM 2.0–2.3 East Source Control Area via the Shultz Distributing storm drain system.
- Ecology will review AGI's results and conclusions and determine whether additional investigations should be conducted at the Shultz Distributing property.

3.3.4 Cascade Columbia Distribution

Cascade Columbia Distribution is located upland on the east side of the LDW between RM 2.3 and 2.4. The property is bordered on the east by an empty lot referred to as "Lot 11" (shown in Figure 2). East of Lot 11 is East Marginal Way South. South Willow Street borders the property to the north. North of South Willow Street is Shultz Distributing. The property is bounded on the west by Fox Avenue South. West of Fox Avenue South is the Bunge Foods property. Finally, the Cascade Columbia Distribution property is bordered on the south by the former South Frontenac Street and the "Whitehead Property," which historically was occupied by the Tyee Lumber Company.

According to King County tax records, Fox Avenue Building LLC purchased the Cascade Columbia Distribution property from Marian Properties LLC on May 8, 2003, after Great Western Chemical (GWC) Company filed for bankruptcy protection in 2001. The two structures on the property include a 38,650-square-foot distribution warehouse built in 1959 and a 4,000-square-foot distribution warehouse built in 1929 (King County 2007a).

Fox Avenue Building LLC purchased Lot 11 from GWC Properties LLC on February 18, 2005 (King County 2007a). Buildings on Lot 11 were demolished in 1969, and since that time the property has been used by a truck and heavy equipment recycler and for parking and container storage (Terra Vac and Floyd|Snider 2000).

According to Ecology's UST List, 20 USTs were removed and six USTs were closed in-place when the facility was in operation as GWC. UST removal dates are not listed (Ecology 2007e).

The Cascade Columbia Distribution property was entered into Ecology's CSCSL on October 11, 1990, and is listed as having confirmed groundwater and soil contamination. Contaminants in groundwater and soil are identified as halogenated organic compounds, petroleum products, non-halogenated solvents, and PAHs (Ecology 2007e).

Facility Summary: Cascade Columbia Distribution	
Address	6900 Fox Avenue South
Property Owner	Fox Avenue Building LLC
Former Property Owners	Marian Properties LLC GWC Properties LLC
Former/Alternative Property Names	Fox Avenue Building Great Western International (GWI) Great Western Chemical Company (GWC) Republic Steel Round-Seattle Chain Company Seattle Chain and Manufacturing Co.
Former/Alternative Lessee/Operator Names	Tyee Lumber Company Campbell Chain Company Western Salvage Company (Lot 11) Nelson Trucking (Lot 11)
Tax Parcel No.	N/A
Parcel Size	0001800087 0001800089 (Lot 11; no longer considered part of main property)
Former/Alternative Addresses	2.53 acres 1.19 acres (Lot 11)
NPDES Permit No.	N/A
EPA RCRA ID No.	WAD008957961
EPA TRI Facility ID No.	98108CSCDC69FXA (2005) 98108GRTWS6900F (1998 and 1999)
Ecology Facility/Site ID No.	2282
Ecology UST Site ID No.	3803
Ecology LUST Release ID No.	N/A
Listed on CSCSL	Yes

GWC entered into Agreed Order No. DE TC91-N203 with Ecology effective September 30, 1991 (Terra Vac and Floyd|Snider 2000). GWI agreed to conduct a RI/FS, and the resulting document, *Remedial Investigation and Preliminary Risk Assessment Report* (RI/PRA), was completed in 1993. In 2000, a document titled *Supplemental Remedial Investigation and Feasibility Study* (SRI/FS) (Terra Vac and Floyd|Snider 2000) was completed to document information gathered and work conducted at the site since the RI/PRA.

Ecology entered into a new Agreed Order with Fox Avenue Building LLC, the current owner of the facility, in January 2009. The new Agreed Order requires Fox Avenue Building LLC to implement an interim action, conduct a supplemental evaluation of remediation alternatives, prepare and submit a Supplemental Feasibility Study, and prepare and submit a draft Cleanup Action Plan (Ecology 2009a and 2009b). The new Agreed Order is discussed in further detail in Section 3.3.4.3.

Available information from Ecology, EPA, and King County online databases and permits is summarized in the table below. This site information and further details are described in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008).

Relevant current site use, past site use, environmental investigation, cleanup action, and facility inspection information is summarized in the sections below to provide background for potential contaminant sources and source control actions identified for the Cascade Columbia Distribution facility.

3.3.4.1 Current Site Use

A chemical distribution facility called Cascade Columbia Distribution currently occupies the property, which is owned and operated by Fox Avenue Building LLC (ERM 2003). The most current available facility map, which is from 2003, is included as Figure 16.

During the July 17, 2008 Dangerous Waste Compliance Inspection, Ecology observed that the chemical storage pad at the facility had been rebuilt with a secondary containment system throughout the liquid product storage, product repackaging, and product tanker delivery areas. All drains had shutoff valves to isolate one section of storage from another and prevent acids from mixing with caustics if a spill occurred. Ecology noted that the chemical storage pad was rebuilt with a secondary containment barrier below the concrete to ensure nothing would penetrate the ground (Jeffers 2008).

The inspection report noted that the facility has a water treatment system used to neutralize drum washing wastewater, stormwater collected within the secondary containment, and product tank spillage. The neutralization wastewater is contained in a below-ground vault that discharges to the sanitary sewer system. KCIWP is updating its discharge authorization for this wastewater discharge to the sanitary sewer; the facility has notified Ecology that the wastewater is being treated in accordance with the Permit-by-Rule in the Dangerous Waste Regulations WAC 173-303-802 (Jeffers 2008).

Storm Drain System

Figure 16 illustrates the most current site configuration. A storm drain system is not depicted and a description of the facility's current storm drain system was not found in the files reviewed. Figure 3 indicates that the facility's storm drain system connects to the city's storm drain system in the southwest corner of the property, and discharges to the LDW via the South Brighton Street CSO/SD. The onsite drainage system on the east side of the property ties into the sanitary sewer system on South Willow Street. According to Ecology and Floyd|Snider, all of the facility's stormwater is discharged to the sanitary sewer system, with the exception of a single catch basin located in the southwest corner of the property (Cargill 2009 and Floyd|Snider 2008).

3.3.4.2 Past Site Use

The Cascade Columbia Distribution property and the property labeled "Lot 11" in Figure 2 were first developed for industrial use in 1918 by the Seattle Chain and Manufacturing Company, which leased the property from King County from 1918 until purchasing the property in 1937. Seattle Chain and Manufacturing Company and its successor companies operated coke-fired and oil-fired furnaces and warehouses. Ownership of Seattle Chain and Manufacturing Company was transferred in the late 1940s and the company was renamed the Round-Seattle Chain Company. This company was purchased in 1954 by Republic Steel. Republic Steel sold the property to Marian Enterprises in 1956, though Republic Steel continued operations in a warehouse on the northern part of the facility via a lease-back agreement (Terra Vac and Floyd|Snider 2000).

GWI began leasing property from Marian Enterprises in 1956. Initially, GWI operations took place in portions of the former Seattle Chain and Manufacturing Company main building, and at a drumming dock located parallel to a road spur along the former South Frontenac Street (shown in Figure 2), which had originally served Seattle Chain and Manufacturing Company. GWI constructed a new warehouse and office building on the west end of the property in 1959. A sump in the drumming area was connected to a subsurface drain pipe that ran to the southern edge of the dock (Terra Vac and Floyd|Snider 2000).

Other lessees of the property during the 1950s and 1960s included Campbell Chain Company, which leased and used a warehouse in the northern part of the facility abutting South Willow Street, and Tyee Lumber Company, which leased parts of Lot 11 and the Seattle Chain and Manufacturing Company building for storage and product assembly (Terra Vac and Floyd|Snider 2000).

GWI completed major facility modifications in the 1960s and 1970s, including replacement of and upgrades to existing structures, installation of a concrete AST pad east of the warehouse/office, and replacement of the sump and drain system in the drumming area. In 1976, both the tank and the drumming facilities were expanded considerably, including the construction in the dock area of two concrete and metal sheds for drum storage. The dock area itself was also enlarged at that time, to the configuration that existed in 2000, which is shown in Figure 17 (Terra Vac and Floyd|Snider 2000).

In 1969, the former Seattle Chain and Manufacturing Company buildings present on Lot 11 were demolished, and Tyee Lumber Company's operations terminated. The property was cleared and leased in the 1970s and early 1980s by Western Salvage Company, a truck and heavy equipment recycler. The property was subsequently leased to Nelson Trucking as a parking area, and in 2000 it was used for container storage (Terra Vac and Floyd|Snider 2000).

In 1989, GWI began renovations to the GWI facility. These renovations included decommissioning and closure of all USTs, reconditioning of ASTs, a partial demolition of the north warehouse, and a subsequent repaving of the north warehouse area for use as a truck loading and unloading area. In 1990, the main tank farm area USTs were removed (see Figure 17) (Terra Vac and Floyd|Snider 2000).

Materials Handled at the Facility

The GWI facility had been used since 1956 for storage, repackaging, and distribution of chemical and petroleum products. Until the late 1980s, GWI supplied chemicals and supplies to

the laundry and dry cleaning industry. This aspect, as well as most of its petroleum product handling, was phased out by 1990 (Terra Vac and Floyd|Snider 2000).

Materials at GWI were received, handled, and shipped in drums, in bulk for storage tank transfer, and as packaged dry chemical products. Both rail and truck transport was used at the facility. GWI transferred and drummed products principally in the vicinity of the drum shed (see Figure 17). Pump lines from USTs and ASTs in the drumming area ran above and under the ground. GWI handled the following chemical classes and product types at the property: ketones (methyl ethyl ketone, methyl *iso*-butyl ketone, and acetone), monocyclic aromatic solvents (toluene and xylenes), alcohols and glycols (isopropyl alcohol, ethyl alcohol, methyl alcohol, ethylene glycol, and propylene glycol), mineral spirits/petroleum solvents (kerosene and Chevron solvents 325, 350-B, 410, and 450), chlorinated compounds [methylene chloride, PCE, pentachlorophenol (PCP), TCE, and 1,1,1-TCE], acids [nitric, sulfuric, and muriatic (hydrochloric) acids], dry products (phosphates, soda ash, titanium dioxide, borax, and boric acid), and miscellaneous (ferric and ammonium chloride etchants, phenols, hydrogen peroxide, and linseed oil) (Terra Vac and Floyd|Snider 2000).

GWI began handling PCP on the property in 1966. Product was stored in one of the 12,000-gallon tank compartments. For one to two years, PCP was blended with Stoddard solvents or mineral spirits in a small AST north and west of the drum shed. From 1969 until the late 1970s or early 1980s, GWI purchased mixed PCP in drums from outside vendors. Product was delivered to customers in vendor-packaged drums or transferred to a tanker truck and delivered in bulk (Terra Vac and Floyd|Snider 2000).

In 2000, GWI warehoused liquid and dry products, including vendor pre-packaged containers and GWI-packaged containers. Inventory included hazardous products and non-hazardous products, including food products. Products were stored according to hazard class, product type, and chemical compatibility. The facility packaged liquid chemical products into containers (drums or totes) from tanker trucks. Products transferred in this manner included sodium chlorate, sulfuric acid, hydrochloric acid, methyl iso-butyl ketone, ferric chloride, potassium carbonate, and caustic soda (Terra Vac and Floyd|Snider 2000).

Facility Underground and Aboveground Storage Tanks

GWI had historically used a variety of USTs and ASTs at the facility. Figure 17 identifies the sizes and locations of all known USTs in 2000 and the dates of their installation, decommissioning, and removal (where known). Most USTs and ASTs were used for a variety of products, depending on demand (Terra Vac and Floyd|Snider 2000).

The six original USTs at the facility, installed in 1956, were 10,000-gallon, single-compartment tanks, located beneath the drum shed along the former South Frontenac Street. These tanks, referred to as the "old" tank farm, were decommissioned in 1989. They remain in place beneath a concrete pad under the drum shed in the southeastern corner of the facility. In 1976, 10 double-compartment USTs, each with a 12,000-gallon capacity, were installed in the central part of the facility. These tanks, which formed the "main" tank farm, remained in use until they were decommissioned in 1989 and removed in fall 1990. A 1,000-gallon UST near the Fox Avenue South loading dock area was used for storing diesel fuel; it was decommissioned in-place in 1989. A 500-gallon heating oil UST, installed in the northwestern portion of the property during the early years of GWI's operations, remained in use in 2000 (Terra Vac and Floyd|Snider 2000).

In 1959, GWI installed an AST in the southwestern corner of the loading dock area to store sulfuric acid. Two smaller 1,000-gallon aboveground "wing tanks" were also used historically on the loading dock; one contained PCE and the other stored methanol. Portable vertical ASTs called "tote bins" used for product storage were stored on pallets in the vicinity of the old tank farm. In 1976, GWI constructed a bermed AST acid storage area, with sumps, adjacent to the warehouse/office. Five ASTs were installed in this area by 1980. In the 1970s and 1980s, GWI used three blending and/or storage ASTs located near the main tank farm (Terra Vac and Floyd|Snider 2000).

3.3.4.3 Environmental Investigations and Cleanup Activities

Several environmental investigations and cleanup activities have been conducted at the Cascade Columbia Distribution property since 1989. Major investigations and cleanup activities are summarized in a timeline provided as Figure 18. Environmental investigations and cleanup activities are described in detail in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008); the report includes analytical results for soil and groundwater at the facility, and figures showing sample locations. A summary of site geology and hydrology is also provided, including descriptions of the silt horizons and water bearing zones, which is necessary for understanding contaminant migration at the site.

Environmental investigations conducted at the property have identified several contaminants in soil and groundwater at the Cascade Columbia Distribution property and at locations to the south and west. This contamination is attributed to GWI's handling and storage of materials at the site, prior to the Fox Avenue Building LLC ownership. The primary contaminants found in soil and groundwater are chlorinated solvents (PCE and TCE), their associated degradation products (1,2-DCE and VC), PCP, and petroleum hydrocarbons (ERM 2003).

Soil contamination was discovered in the main tank farm area of the facility from 1989 to 1990 during GWI facility renovations and the removal of USTs from the main tank farm area (see Figure 17). Subsequent soil and groundwater borings encountered contamination near the loading dock UST and the USTs under the drum shed, as well as at other locations around the facility. Additional investigations were undertaken to determine the nature and extent of contamination at the GWI property; adjacent and nearby properties have also been investigated to determine the nature and extent of contamination beyond the GWI property. Several interim remedial measures have been conducted at and around the Cascade Columbia Distribution property since 1989. Figure 17 illustrates where interim remedial measures have been performed, and Figure 19 depicts locations of soil sampling, a groundwater monitoring well, and soil vapor sampling.

Following the initial UST removal in 1990, Hart Crowser conducted multiple investigations at the GWI facility and surrounding area to establish the nature and extent of contamination. GWI retained Terra Vac in 1997 to conduct interim remedial measures, evaluate remedial alternatives, and assist GWI in selecting a preferred alternative for site cleanup. Terra Vac continued the annual groundwater, surface water, and mussel tissue monitoring program initiated by Hart Crowser and initiated additional discreet investigations to fill critical data gaps concerning the nature and extent of contamination and evaluate remedial alternatives (Terra Vac and Floyd|Snider 2000).

Environmental Resources Management, Inc., (ERM) performed *in situ* chemical oxidation and soil vapor extraction (SVE) system pilot studies from 2003 through 2004 for groundwater

remediation of chlorinated solvents (ERM 2003 and 2004). An expanded SVE pilot study was designed in May 2005. The study examined whether or not a combination of an SVE and a large-scale permanganate injection program was a feasible cleanup method for the site (ERM 2005).

In December 2007, ERM, on behalf of Fox Avenue Building LLC, submitted to Ecology the *Draft Fox Avenue Expanded Pilot Study Phase III Memorandum*. Ecology reviewed the memorandum and accepted it as concluding the expanded SVE pilot study in a letter dated January 30, 2008. In the letter, Ecology agreed that the three year long pilot test demonstrated that the in situ chemical oxidation technology was not likely to be effective in permanently reducing to the maximum extent practicable the solvent concentration and would not be selected as the permanent cleanup alternative for the site (Ecology 2009b).

In March 2008, Ecology and Fox Avenue Building LLC, with its environmental consultant Floyd|Snider, met and discussed how to proceed at the Fox Avenue Building Site. Ecology agreed that Fox Avenue Building LLC would proceed with a groundwater Enhanced Reductive Dechlorination (ERD) interim action and would conduct additional evaluation of source controls in a Supplemental Feasibility Study (Ecology 2009b).

In January 2009, Ecology entered into a new Agreed Order with Fox Avenue Building LLC, as mentioned previously. The new Agreed Order requires Fox Avenue Building LLC to perform the following actions, as outlined on Ecology's website (Ecology 2009a):

1. Conduct an interim cleanup action (ERD) to address contamination reaching the LDW.
2. Do a source area silts data gap investigation.
3. Collect vapor samples to find whether PCE vapors from the subsurface are reaching the office portion of the facility at concentrations of concern.
4. Evaluate restarting the existing SVE system if a vapor pathway into the facility warehouse still exists.
5. Prepare a Supplemental Feasibility Study to evaluate cleanup action alternatives for the Site and enable Ecology to select a cleanup action that will attain cleanup levels under state law within a reasonable restoration time frame.
6. Prepare a draft Cleanup Action Plan for Ecology approval that details the proposed cleanup actions to address the contamination at the Site.

3.3.4.4 Facility Inspections

On April 11, 2001, Ecology performed a Dangerous Waste Compliance Inspection at the Cascade Columbia Distribution facility, which at the time was in operation as GWC. Ecology noted that 108 55-gallon drums of Dangerous Waste (soil borings and water samples from monitoring wells) from the facility's MTCA cleanup were being stored on-site, apparently from as far back as 1992. Ecology's Area of Contamination policy allows for storage of contaminated soil and debris on-site without triggering Dangerous Waste regulations as long as the wastes are stored within the Area of Contamination (the portion of the site that contains continuous contamination). No major concerns were identified (Ecology 2001).

On July 17, 2008, Ecology performed a Dangerous Waste Compliance Inspection at the Cascade Columbia Distribution facility. Ecology noted that two pallets of hazardous materials/waste were located outside of the concrete secondary containment system. Ecology directed the facility to keep liquid dangerous wastes within secondary containment. Additionally, Ecology directed the facility to keep bungs in drums and caps on containers when dispensing or filling is not in

process, to prevent accidental spills and exposure to harmful and flammable vapors. No major concerns were identified (Ecology 2008b).

EPA sent 107(a) (General Notice) and 104(e) (Request for Information) letters to "Great Western Chemical Company" on July 17, 2008 (EPA 2008m).

3.3.4.5 Potential Contaminant Sources

Extensive contamination (primarily chlorinated solvents) was identified in soil and groundwater across the site, as described below. COCs identified in Section 2.2.2 as a result of this contamination include chlorinated solvents (PCE, TCE, VC, cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, 1,1,1-TCA, and 1,2-DCA); petroleum hydrocarbons (TPH, benzene, toluene, and ethylbenzene); PCP; chlorinated dioxins and furans; methylene chloride; and 1,4-dichlorobenzene (1,4-DCB). Potential pathways for these COCs to reach LDW sediments are listed as stormwater (discharging within RM 2.0–2.3 East or RM 2.3-2.8 East) and groundwater (discharging within RM 2.3-2.8 East).

The following potential contaminant sources have been identified for Cascade Columbia Distribution:

Soil and Groundwater Contamination

Chlorinated solvents contamination appears to have originated in the area of the former main USTs and the location of the drum shed, old tank farm, and associated underground piping near South Frontenac Street, illustrated as the "original source area" in Figure 20. Historical releases at the facility appear to have contributed to a secondary source area beneath the facility in the vicinity of MW B-12 (Figure 20). Solvent leaks from the original source area on the property appear to have resulted in "streamers" of residual dense non-aqueous phase liquid (DNAPL) sinking through the 1st water bearing zone (WBZ) and encountering the 1st silt horizon (SH). The product slowly saturated parts of the silt horizon, especially in the topographic depression in the SH near MW B-12 (Terra Vac and Floyd|Snider 2000).

More recently, a second plume of chlorinated solvents was identified at the site, referred to as the "NW Corner Plume" because it is in the northwest corner of the GWI facility. Existing data indicate the plume is limited to the 1st WBZ. Its source area appears to be near or upgradient of MW B-54. The source itself is unknown; however, it appears to be unrelated to the plume originating around MW B-12 (Terra Vac and Floyd|Snider 2000).

Figures 21 and 22 show the migration and degradation of PCE in groundwater at the site in the 1st and 2nd WBZs. These figures are taken from *Fox Avenue Pilot Study* (ERM 2003), and are more recent than the concentration maps provided in *SRI/FS*. Concentration maps from both *Fox Avenue Pilot Study* and the SRI/FS are provided in *RM 2.0–2.3 East Summary of Existing Information and Identification of Data Gaps Report* (E & E 2008) for PCE, TCE, 1,2-DCE, and VC, in the 1st and 2nd WBZs. In general, the TCE, 1,2-DCE and VC plumes follow a pattern similar to the PCE plume pattern.

Methylene chloride is found associated with the chlorinated solvents. This association is probably due to similar historical handling and storage practices on-site and to methylene chloride's chemical properties and behavior in the environment. It is not a parent or a product of PCE degradation, but it is co-located with the plume of PCE and its degradation products (Terra Vac and Floyd|Snider 2000).

Petroleum hydrocarbon contamination appears to have originated in the old tank farm area. Gasoline, diesel, and a variety of petroleum solvents were stored in the USTs in this area at various times prior to their decommissioning. Additionally, a small leaking heating oil tank was located near B-10A. All the USTs in the former tank farm areas have been removed or decommissioned. Based on product usage, the most likely petroleum products released would have been heating oil (a light-end petroleum product similar to kerosene) and various petroleum solvents. In addition to the petroleum products, toluene and xylenes were handled at the GWI facility and stored in various USTs. Consequently, they may be present in soil and/or groundwater either because they were stored and handled as products themselves or because of their presence in light-end petroleum products. Petroleum contamination of groundwater at the GWI facility follows a pattern similar to that seen for chlorinated solvents (Terra Vac and Floyd|Snider 2000).

Two original source areas were identified for PCP. The first is in the south central portion of the GWI facility adjacent to the South Frontenac Street right-of-way. The source includes the PCP storage and handling areas at GWI and the adjacent swale along South Frontenac Street. PCP handling at the GWI facility began in approximately 1966 and ended in the early 1980s. The second PCP source area is outside of the GWI site and was identified during installation of the groundwater wells B-38 and B-39. This second area is near the dip tank that was present at the former Tyee Lumber facility adjacent to South Myrtle Street (Figure 2). The area includes the previous location of a wood-treating dip-tank in which lumber was "dipped" into the PCP/mineral spirits treating solution to preserve the wood. Additionally, the area included a UST for stored PCP that was removed from the former Tyee Lumber facility in 1986 (Terra Vac and Floyd|Snider 2000).

Three soil samples collected from within the PCP original source areas were analyzed for dioxins and furans, by-products of PCP manufacturing. PCP was detected above the MTCA Method B screening level in one of the soil samples (Terra Vac and Floyd|Snider 2000). However, according to Floyd|Snider, PCP and dioxins and furans have only been detected in subsurface soil beneath paved areas, and there is no known pathway for these contaminants to reach the LDW (Floyd|Snider 2008).

The source for DCBs at the facility is unknown, but likely was associated with the location of the drum shed and associated underground piping near South Frontenac Street. 1,4-DCB exceeded the MTCA Method B screening level in groundwater at MW B-42; it is assumed that the area near MW B-42 represents a residual source of 1,4-DCB to groundwater (Terra Vac and Floyd|Snider 2000).

In 1959, during the construction of a new warehouse and office building on the west end of the property, GWI connected a sump in the drumming area to a subsurface drain pipe that ran to the southern edge of the dock. According to the 2000 *SRI/FS*, during facility modifications that were made in the 1960s and 1970s, the sump and drain system in the drumming area was replaced (Terra Vac and Floyd|Snider 2000). However, the historical location of the sump and drain system was not identified, and details pertaining to the replacement of this system were not provided in the files reviewed. According to Floyd|Snider, since the drumming area was located near the old warehouse, and the old warehouse was completely rebuilt, it is likely that the sump and drain system were abandoned during reconstruction. In addition, extensive exploration in the old warehouse did not reveal any contamination; therefore, it is unlikley that the historical sump and drain system serves as a conduit for contamination to reach LDW sediments. Floyd|Snider added that in general, the potential for buried utilities to act as conduits or preferential pathways

for groundwater or soil vapor is not likely, based on elevation data, tests and inspections (Floyd|Snider 2008).

Groundwater contamination at the Cascade Columbia Distribution facility has been determined to reach LDW sediments in the vicinity of the Myrtle Street Embayment (shown in Figure 2). The Myrtle Street Embayment is within the RM 2.3-2.8 East Source Control Area, so the groundwater pathway and relevant source control actions are summarized in that area's SCAP.

According to Floyd|Snider, under the new Agreed Order, the Supplemental Feasibility Study will examine the degree to which the technologies to be evaluated can reduce all of the site contaminants of concern (Floyd|Snider 2008).

Stormwater

According to Ecology and Floyd|Snider, all of the facility's stormwater is discharged to the sanitary sewer system, with the exception of the single catch basin (depicted in Figure 3) located in the southwest corner of the property; therefore, stormwater is not a likely pathway for contamination to reach the LDW within RM 2.0–2.3 East.

3.3.4.6 Source Control Actions

The following source control actions will be conducted for Cascade Columbia Distribution. Since it has been determined that groundwater reaches LDW sediments in the vicinity of the Myrtle Street Embayment south of the RM 2.0–2.3 East Source Control Area, source control actions pertaining to the groundwater pathway are identified in that source control area's SCAP.

- Ecology will review the PRP response to the 104(e) letter sent to "Great Western Chemical Company" on July 17, 2008, and evaluate whether further site investigation is necessary.
- Ecology will coordinate any source control to be implemented at Cascade Columbia Distribution with the work that is to be conducted under the new 2009 Agreed Order.
- Ecology will verify that the source of the "NW Corner Plume" will be investigated under the new Agreed Order. The source of the plume was unknown in 2000, but appeared to be near or upgradient of MW B-54.

3.4 Atmospheric Deposition

Atmospheric deposition occurs when air pollution deposits enter the LDW directly or through stormwater. Such deposits can become a possible source of contamination to sediments associated with the RM 2.0–2.3 East Source Control Area. Air pollution is generated from air emissions that can be either from a point source or widely dispersed. Examples of point source emissions include paint overspray, sand-blasting, industrial smokestacks, and fugitive dust and particulates from loading/unloading of raw materials (sand, gravel, and concrete). Examples of widely dispersed emissions include vehicle emissions and aircraft exhaust.

None of the properties within the RM 2.0–2.3 East Source Control Area have current operations with known point source emissions of air pollution that may contribute contaminants to sediments adjacent to the RM 2.0–2.3 East Source Control Area. Air traffic at KCIA may result in significant emissions, but this pertains to the entire airfield operations and lies outside the scope of this report.

WSDOH hired a consultant to model air emissions from multiple sources in south Seattle. The objective of the multiple-source air modeling project in the Duwamish valley was to identify air pollutants, key air pollution sources affecting residential areas of south Seattle, and the geographic areas of south Seattle that are affected by air pollutants. This effort is an initial step to identify priorities for future work in the area. A report was published by WSDOH in 2008, summarizing key findings of the modeling effort and recommending future actions (WSDOH 2008). A study on atmospheric deposition planned by the Puget Sound Partnership has not been funded yet and no schedule has been developed. Ecology will continue to monitor these efforts (Cargill 2008).

Out of concern for phthalate recontamination at sediment cleanup sites in the larger Puget Sound region, the Sediment Phthalates Work Group was formed in 2006. To meet its goal of better understanding the sources of phthalates in sediments, the work group reviewed existing information about all possible pathways to sediments, including stormwater and atmospheric deposition. The group concluded that phthalates reach sediments via a complex pathway involving off-gassing to air followed by attachment to particulates, deposition to the ground, and transport to sediments through stormwater (Sediment Phthalates Work Group 2007).

King County conducted atmospheric deposition sampling in the LDW area to assess whether atmospheric deposition is a potential source of phthalates and selected PAHs and PCBs (King County 2008).

Analyte	Range of Air Deposition Flux (ug/m^2/day)	Location of Highest Values
Butyl benzyl phthalate	0.163 to 7.007	South Park
Bis(2-ethylhexyl)phthalate	0.261 to 12.240	Duwamish Valley
Benzo(a)pyrene	0.008 to 2.225	KCIA
Pyrene	0.035 to 4.652	KCIA
Aroclor 1254	<0.011 to 0.044	Georgetown
Aroclor 1260	<0.011 to 0.034	Georgetown

Based on comparison to results from other atmospheric deposition networks that employed high-volume air sampling techniques to collect gaseous and particulate phase air samples, the total deposition results from this study are likely to be biased low for the lighter phthalates, low- to mid-range PAH compounds, and low- to mid-range PCB congeners. Because side-by-side comparison sampling of the passive atmospheric deposition samplers with high-volume air samplers was not conducted, it is not possible to assess the degree of bias (King County 2008).

The sampling stations were located at Beacon Hill, Duwamish Valley, Georgetown, KCIA, and South Park Community Center. The following range of atmospheric deposition flux values was observed (King County 2008):

Detailed results are provided in King County's *Monitoring Report – October 2005 to April 2007* (King County 2008).

3.4.1 Source Control Actions

Atmospheric deposition should be further evaluated to assess this pathway as a potential source of phthalates (particularly BEHP) and other contaminants, such as PCBs, in stormwater discharge. However, at this time, there are no available resources to address this issue.

Because air pollution is a concern for the greater Puget Sound region, Ecology is planning to review work being conducted by and/or planned by WSDOH and the Puget Sound Partnership regarding atmospheric deposition. Based on their actions or recommendations, the LDW source control team will develop options for addressing air pollution.

3.5 General Source Control Actions

The following source control actions will be conducted for the RM 2.0–2.3 East Source Control Area in general, in addition to the source control actions identified specifically for the South Brighton Street CSO/SD, South River Street SD, and facilities of concern. The following source control actions will be completed:

- Ecology will review the PRP response to the 104(e) letter sent to "Bunge Foods Processing LLC" on July 17, 2008 (EPA 2008i), and evaluate whether the Bunge Foods facility should be investigated for potential sources of sediment recontamination. Bunge Foods is identified as a facility of concern in Table 1, and its location is depicted in Figure 2. No information pertaining to this facility was found within the scope of this report.
- Ecology will review the PRP response to the 104(e) letter sent to "Silver Bay Logging" on March 25, 2008 (EPA 2008f), and evaluate whether this facility should be investigated for potential sources of sediment recontamination. This facility is currently in operation as Muckleshoot Seafood Products. The Muckleshoot Seafood Products facility is identified as a facility of concern in Table 1, and its location is depicted in Figure 2. No information pertaining to this facility was found within the scope of this report.
- Ecology will review the PRP response to the 104(e) letter sent to "Rainier Petroleum Corporation" on July 17, 2008 (EPA 2008n), and evaluate whether the Rainier Petroleum facility should be investigated for potential sources of sediment recontamination. Rainier Petroleum is identified as a facility of concern in Table 1, and its location is depicted in Figure 2. No information pertaining to this facility was found within the scope of this report.
- Ecology will review the PRP response to the 104(e) letter sent to "Morton Marine Equipment, Inc." on March 25, 2008 (EPA 2008b), and evaluate whether the Morton Marine Equipment facility should be investigated for potential sources of sediment recontamination. Morton Marine Equipment was identified as a possible source of sediment recontamination through the review of an informal summary of available information pertaining to the Glacier Marine Services facility. This informal summary of information was received by Ecology and reviewed late in the report-writing process; therefore, the Morton Marine Equipment facility could not be further evaluated for inclusion in this report. According to the informal summary of information, the Morton Marine Equipment facility was located on the northwest shore of Slip 3, and facility stormwater was discharged to the LDW through the South River Street SD, which discharges within RM 2.0–2.3 East (shown in Figure 3 and discussed in Section 3.1.2). The Morton Marine Equipment facility repaired steel and aluminum hulls and removed

and installed engines. Complaint files for MP&E included an oil spill complaint at Morton Marine Equipment. The location of the Morton Marine Equipment facility and its period of operation are not known.

- Ecology will evaluate whether the R.A. Barnes facility should be investigated for potential sources of sediment recontamination. R.A. Barnes was identified as a possible source of sediment recontamination through the review of an informal summary of available information pertaining to the Glacier Marine Services facility. This informal summary of information was received by Ecology and reviewed late in the report-writing process; therefore, the R.A Barnes facility could not be further evaluated for inclusion in this report. According to the informal summary of information, the R.A. Barnes facility discharged its stormwater to the LDW through the South River Street SD, which discharges within RM 2.0–2.3 East (shown in Figure 3 and discussed in Section 3.1.2). The informal summary of information stated that the R.A. Barnes facility supplied sandblasting materials ("Tuff-Kut") to shipyards and other industries. R.A. Barnes received at least three complaints of sandblast grit being spilled or washed into catch basins. "Tuff-Kut" is a copper slag grit with metals levels of 90-120 mg/kg arsenic, 3,200-7,000 mg/kg chromium, 4,400-5,000 mg/kg copper, 400-1,000 mg/kg lead, and 7,000-12,000 mg/kg zinc. The location of the R.A. Barnes facility and its period of operation are not known; the facility should be further investigated as a potential source of sediment recontamination.
- On the basis of Ecology's recommendation, once the Remedial Investigation report is finalized, Risk Based Threshold Concentrations (RBTCs) and Applicable or Relevant and Appropriate Requirements (ARARs) will be reviewed for any relevant impacts on the RM 2.0–2.3 East Source Control Area upland contaminant concentrations.

4.0 Monitoring

Monitoring efforts by SPU, Ecology, KCIWP, and Puget Sound Clean Air Agency will continue to assist in identifying and tracing ongoing sources of COCs present in LDW sediments or in upland media. This information will be used to focus source control efforts on specific problem areas within the RM 2.0–2.3 East Source Control Area and to track the progress of the source control program. The following types of samples will continue to be collected:

- in-line sediment trap samples from storm drain systems,
- on-site catch basin sediment samples, and
- soil and groundwater samples as necessary.

If monitoring data indicate that additional sources of sediment recontamination are present, then Ecology will identify additional source control activities as appropriate.

Because source control is an iterative process, monitoring is necessary to identify trends in concentrations of COCs. Monitoring is anticipated to continue for some years. Any decisions to discontinue monitoring will be made jointly by Ecology and EPA, based on the evidence. At this time, Ecology plans to review the progress and data associated with the source control actions for each SCAP annually, and this information will be updated in the Source Control Status Report, which is scheduled for publication twice a year. In addition, Ecology may prepare Technical Memoranda to update the SCAPs, as needed.

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5.0 Tracking and Reporting of Source Control Activities

Ecology will lead tracking, documenting, and reporting the status of source control to EPA and the public. Each agency performing source control work will document its source control activities and provide regular updates to Ecology. Ecology will update information in the SCAPs in the Source Control Status Reports that are published twice a year.

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6.0 References

AGI Technologies (AGI). 2000. Monitoring Well Installation. Prepared for Shultz Distributing, Inc. January 3, 2000.

_____. 1999. Environmental Consultation. Prepared for Shultz Distributing, Inc. November 4, 1999.

Anchor Environmental, L.L.C. (Anchor). 2001. Storm Water Pollution Prevention Plan. Washington Department of Ecology Permit No. SO3-000962. Prepared for Northland Services, Inc. Updated September 2001.

Cargill, Dan. 2009. Telecommunication between Dan Cargill, Washington State Department of Ecology and Vanessa Rayner, Ecology and Environment, Inc. February 23, 2009.

_____. 2008. Electronic communication between Dan Cargill, Washington State Department of Ecology and Steve Siefert, Ecology and Environment, Inc. May 20, 2008.

_____. 2000. Early Notice Letter, Marine Power & Equipment. Letter from Dan Cargill, Washington State Department of Ecology, to Susan Lee, Washington State Department of Ecology. July 28, 2000.

_____. 1989. Letter from Dan Cargill, Washington State Department of Ecology, to Dan Kistler, United Marine Shipbuilding, Inc., re: Violations of NPDES Permit Conditions and Violations of Dangerous Waste Regulations at the UNIMAR Fox Avenue Facility. May 24, 1989.

DMC. 1979. General Appraisal Report, 6701 and 6803 Fox Avenue South, Seattle, WA.

Ecology and Environment, Inc. (E & E). 2008. Lower Duwamish Waterway, RM 2.0–2.3 East (Slip 3 to Seattle Boiler Works), Summary of Existing Information and Identification of Data Gaps Report. Prepared for the Washington State Department of Ecology. June 2008.

Environmental Associates, Inc. (EAI). 1999a. 3rd Quarter Groundwater Sampling and Testing. Prepared for Carmody Property, 6533 3rd Avenue South, Seattle, WA. October 22, 1999.

_____. 1999b. 2nd Quarter Groundwater Sampling and Testing. Prepared for Carmody Property, 6533 3rd Avenue South, Seattle, WA. June 3, 1999.

_____. 1999c. Tank Removal, Site Assessment and Cleanup. Prepared for Carmody Property (Former Truck Repair Facility), 6533 3rd Avenue South, Seattle, WA. May 10, 1999.

_____. 1997. Phase 1 Environmental Audit and Limited Sampling. Prepared for Carmody Property (Two Parcels), 220 and 306 River Street, Seattle, WA. December 23, 1997.

Environmental Resources Management, Inc. (ERM). 2005. Final Fox Avenue Expanded Pilot Study Work Plan Addendum No. 1. Prepared for Fox Avenue Building, LLC. May 2005.

_____. 2004. Fox Avenue Expanded Pilot Study Work Plan. Prepared for Fox Avenue Building, LLC. December 2004.

_____. 2003. Fox Avenue Pilot Study Work Plan. Prepared for Fox Avenue Building, LLC. October 2003.

_____. 2001. Shultz Distributing Storm Water Pollution Prevention Plan. Washington Department of Ecology Permit No. SO3-002346. Prepared for Shultz Distributing, Inc. October 2001.

EVS Environment Consultants (EVS). 2000. Report of Findings, City of Seattle, Seattle Public Utilities CSO Characterization Project. Prepared for Seattle Public Utilities.

Floyd|Snider. 2008. Memorandum Re: Slip 3 Source Control Action Plan Questions. Prepared for Cascade Columbia in response to Sunny Becker, Washington Department of Ecology. November 12, 2008.

Geotech Consultants, Inc. (Geotech). 1998. Phase II Subsurface Exploration, Carmody Property, 6533 3rd Avenue South. Prepared for Thomas Carmody, Seattle, WA. May 13, 1998.

Hickey, Joe. 2008. Electronic communication between Joe Hickey, Washington State Department of Ecology and Sarah Good, Washington State Department of Ecology, forwarded to Vanessa Rayner, Ecology and Environment, Inc. May 29, 2008.

Hubbard, Tom. 1984. Fox Street/Slip 3 Sampling and Analysis, Fourth Draft. August 14, 1984.

James P. Hurley Co. (JPHC). 1993. UST Site Assessment Report. Prepared for Northland Services, Inc. October 20, 1993.

Jeffers, Mike. 2008. Electronic communication between Mike Jeffers, Washington State Department of Ecology and Sarah Good, Washington State Department of Ecology, forwarded to Steve Siefert, Ecology and Environment, Inc. September 5, 2008.

King County. 2008. Passive Atmospheric Deposition Sampling, Lower Duwamish Waterway Monitoring Report, October 2005 to April 2007. King County Department of Natural Resources and Parks, Industrial Waste Program. March 2008.

_____. 2007a. Online Geographic Information System Center Parcel Viewer and Property Tax Records. http://www.metrokc.gov/GIS/mapportal/PViewer_main.htm. 2009 Update to http://www.kingcounty.gov/operations/GIS/PropResearch/ParcelViewer. Accessed October 2007.

_____. 2007b. Combined Sewer Overflow Control Program, 2006-2007 Annual Report. King County Department of Natural Resources and Parks, Wastewater Treatment Division. October 2007.

LSI Adapt (Adapt). 2003. Groundwater Monitoring Well Installation and 1st Quarter Groundwater Quality Monitoring. Prepared for V. Van Dyke, Inc. January 10, 2003.

_____. 2002. Limited Phase II Environmental Site Assessment. Prepared for V. Van Dyke, Inc. October 21, 2002.

Matta, Michael. 1987. Letter (no date) from Michael Matta, United States Environmental Protection Agency, to Ruth Nelson, Marine Power & Equipment, re: EPA Dive Survey performed on April 6, 1987, and Sediment Sampling performed on February 6, 1987, with report attached (no title or date).

National Oceanographic and Atmospheric Administration (NOAA). 1998. Duwamish Waterway Sediment Characterization Study Report.

PBS Environmental (PBS). 1999. Phase II Subsurface Soil and Groundwater Investigation. Prepared for Leon Cohen of the property located at 6533 3rd Avenue South, Seattle, WA. October 1999.

Sample, Timothy. 1986. Letter from Timothy Sample, Municipality of Metropolitan Seattle (METRO), to Gerd Hatwig, United States Environmental Protection Agency, re: Storm Drain and Sediment Sampling performed at Marine Power & Equipment, with sampling results attached. June 13, 1986.

SCS Refrigerated Services (SCS). 2009. About SCS. http://www.scs-ref.com/about.html. Accessed March 2009.

Seattle Public Utilities (SPU). 2007a. Joint Inspection (Follow-Up) Report, Shultz Distributing, Inc. January 4, 2007.

_____. 2007b. Joint Inspection (Follow-Up) Report, V. Van Dyke, Inc. March 7, 2007.

_____. 2007c. Joint Inspection Report, Pile Contractors. March 7, 2007.

_____. 2006a. Joint Inspection (Follow-Up) Report, Shultz Distributing, Inc. July 5, 2006.

_____. 2006b. Joint Inspection (Follow-Up) Report, Shultz Distributing, Inc. August 21, 2006.

_____. 2006c. Joint Inspection Report, V. Van Dyke, Inc. December 1, 2006.

Sediment Phthalates Work Group. 2007. Summary of Findings and Recommendations. Prepared by City of Tacoma, City of Seattle, King County, Washington State Department of Ecology and United States Environmental Protection Agency. September 2007.

Tanner, C. 1991. Potential Intertidal Habitat Restoration Sites in the Duwamish River Estuary. EPA 910/9-91-050. Prepared for Port of Seattle Engineering Department and United States Environmental Protection Agency.

Terra Vac and Floyd|Snider, Inc. 2000. Supplemental Remedial Investigation and Feasibility Study. Prepared for Great Western (GW) International. October 2000.

Tetra Tech, Inc. 1988. Elliott Bay Action Program: Evaluation of Potential Contaminant Sources. Prepared for the United States Environmental Protection Agency. September 1988.

Trejo, Barbara. 2000. Letter from Barbara Trejo, Washington State Department of Ecology, to Harry Goren, PBS Environmental, re: Assistance for Former Truck Repair Facility. January 21, 2000.

United States Environmental Protection Agency (EPA). 2008a. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of CLPF-Seattle Distribution Center LP, re: Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. March 25, 2008.

_____. 2008b. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Morton Marine Equipment, Inc., re: General Notice of Potential Liability Pursuant to Section 107(a) and Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. March 25, 2008.

_____. 2008c. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Northland Services, Inc., re: General Notice of Potential Liability

Pursuant to Section 107(a) and Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. March 25, 2008.

_____. 2008d. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of SCS Holdings LLC, re: Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. March 25, 2008.

_____. 2008e. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of SCS Refrigerated Services LLC, re: Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. March 25, 2008.

_____. 2008f. Letter from Sheila Eckman, United States Environmental Protection Agency, to Dick Buhler, Silver Bay Logging, Inc., re: Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. March 25, 2008.

_____. 2008g. Letter from Sheila Eckman, United States Environmental Protection Agency, to Cliff Bates, V. Van Dyke, Inc., re: General Notice of Potential Liability Pursuant to Section 107(a) and Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. March 25, 2008.

_____. 2008h. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Big John's Truck Repair, re: Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. July 17, 2008.

_____. 2008i. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Bunge Foods Processing LLC, re: Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. July 17, 2008.

_____. 2008j. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Evergreen Marine Leasing, re: General Notice of Potential Liability Pursuant to Section 107(a) and Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. July 17, 2008.

_____. 2008k. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Fox Avenue LLC, re: General Notice of Potential Liability Pursuant to Section 107(a) and Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. July 17, 2008.

_____. 2008l. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Fox Avenue Warehouse Corporation, re: Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. July 17, 2008.

_____. 2008m. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Great Western Chemical Company, re: General Notice of Potential Liability Pursuant to Section 107(a) and Request for Information Pursuant to Section

104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. July 17, 2008.

_____. 2008n. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Rainier Petroleum Corporation, re: Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. July 17, 2008.

_____. 2008o. Letter from Sheila Eckman, United States Environmental Protection Agency, to Leon Cohen, Riverside Industrial Park LLC, re: General Notice of Potential Liability Pursuant to Section 107(a) and Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. July 17, 2008.

_____. 2008p. Letter from Sheila Eckman, United States Environmental Protection Agency, to Representative of Seatac Marine Properties LLC, re: General Notice of Potential Liability Pursuant to Section 107(a) and Request for Information Pursuant to Section 104(e) of CERCLA for the Lower Duwamish Waterway Site, Seattle, Washington. July 17, 2008.

_____. 2007. Online Envirofacts Warehouse Database. http://www.epa.gov/enviro/. Accessed November 2007.

_____. 2002. Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites. OSWER Directive 9285.6-08. United States Environmental Protection Agency. February 12, 2002.

United States Environmental Protection Agency and Washington State Department of Ecology (EPA and Ecology). 2004. Lower Duwamish Waterway Site Memorandum of Understanding between United States Environmental Protection Agency and the Washington State Department of Ecology. April 2004.

_____. 2002. Lower Duwamish Waterway Site Memorandum of Understanding between United States Environmental Protection Agency and the Washington State Department of Ecology. April 2002.

V. Van Dyke, Inc. 1993. Storm Water Pollution Prevention Plan. Washington Department of Ecology Permit No. SO3-000453. Prepared by Douglas Buss, V. Van Dyke, Inc. November 18, 1993.

Washington State Department of Ecology (Ecology). 2009a. Lower Duwamish Waterway Source Control Investigation, Fox Avenue Building LLC Site. http://www.ecy.wa.gov/programs/tcp/sites/foxAve/foxAve_hp.html. Accessed March 9, 2009.

_____. 2009b. Agreed Order with Fox Avenue Building LLC. January 2009.

_____. 2008a. LDW Source Control Status Report. July 2007 to March 2008. Washington State Department of Ecology. Publication No. 08-09-063. May 2008.

_____. 2008b. Dangerous Waste Compliance Inspection Report, Cascade Columbia Distribution. July 17, 2008.

_____. 2008c. LDW Source Control Status Report. April 2008 to August 2008. Washington State Department of Ecology. Publication No. 08-09-068. October 2008.

_____. 2007a. Lower Duwamish Waterway Source Control Status Report. 2003 to June 2007. Washington State Department of Ecology. Publication No. 07-04-064. July 2007.

_____. 2007b. Online Facility/Site Database. http://www.ecy.wa.gov/fs/. Accessed October 2007.

_____. 2007c. Online NPDES and State Waste Discharge Permit Database. http://www.ecy.wa.gov/programs/wq/permits/northwest_permits.html. Accessed October 2007.

_____. 2007d. Online Washington Hazardous Waste Facility Search Database. https://fortress.wa.gov/ecy/hwfacilitysearch/. Accessed October 2007.

_____. 2007e. Online Integrated Site Information System (ISIS). https://fortress.wa.gov/ecy/tcpwebreporting/reports.aspx. Accessed October 2007.

_____. 2006a. Stormwater Compliance Inspection Report, Shultz Distributing, Inc. August 21, 2006.

_____. 2006b. Stormwater Compliance Inspection Report, V. Van Dyke, Inc. December 1, 2006.

_____. 2004. Lower Duwamish Source Control Strategy. Publication No. 04-09-043. January 2004.

_____. 2002. Dangerous Waste Compliance Evaluation Inspection Report, Northland Services, Inc. March 21, 2002.

_____. 2001. Dangerous Waste Compliance Evaluation Inspection Report, Great Western Chemical Company. April 11, 2001.

_____. 1999. Stormwater Compliance Inspection Report, V. Van Dyke, Inc. June 15, 1999.

_____. 1985. Potential Hazardous Waste Site Preliminary Assessment, Inland Transportation Company. March 12, 1985.

Washington State Department of Health (WSDOH). 2008. Summary of Results of the Duwamish Valley Regional Modeling and Health Risk Assessment, Seattle, Washington. July 2008.

Weston. 1999. Site Inspection Report, Lower Duwamish River, RM 2.5 – 11.5. Volumes 1 and 2. Prepared for United States Environmental Protection Agency by Roy F. Weston, Inc. April 1999.

Windward Environmental, L.L.C. (Windward). 2007a. Lower Duwamish Waterway Phase 2 Remedial Investigation Report, Draft. Prepared for Lower Duwamish Waterway Group. November 2007.

_____. 2007b. Lower Duwamish Waterway Phase 2 Remedial Investigation, Data Report: Round 3 Surface Sediment Sampling for Chemical Analyses. Prepared for Lower Duwamish Waterway Group. March 12, 2007.

_____. 2007c. Lower Duwamish Waterway Phase 2 Remedial Investigation, Data Report: Subsurface Sediment Sampling for Chemical Analyses. Prepared for Lower Duwamish Waterway Group. January 29, 2007.

_____. 2005a. Lower Duwamish Waterway Phase 2 Remedial Investigation, Data Report: Chemical Analyses of Benthic Invertebrate and Clam Tissue Samples and Co-located Sediment Samples. Prepared for Lower Duwamish Waterway Group. May 20, 2005.

_____. 2005b. Lower Duwamish Waterway Phase 2 Remedial Investigation, Data Report: Round 1 Surface Sediment Sampling for Chemical Analyses and Toxicity Testing. Prepared for Lower Duwamish Waterway Group. October 21, 2005.

_____. 2005c. Lower Duwamish Waterway Phase 2 Remedial Investigation, Data Report: Round 2 Surface Sediment Sampling for Chemical Analyses and Toxicity Testing. Prepared for Lower Duwamish Waterway Group. December 9, 2005.

_____. 2003a. Phase I Remedial Investigation Report, Final. Prepared for Lower Duwamish Waterway Group. July 2003.

_____. 2003b. Technical Memorandum: Data Analysis and Candidate Site Identification. Prepared for Lower Duwamish Waterway Group. June 2003.

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7.0 Tables

Table 1
Facilities of Concern Identification
RM 2.0-2.3 East Source Control Area

Facility Identified	Identification Source	Facility Address[1]	Facility/Site ID No.	Included/Excluded	Updates and Corrections Needed
Big John's Truck Repair	Ecology's files and Facility/Site Database	6533 3rd Ave. S, Seattle, WA, 98108	44383713	Included as Riverside Industrial Park.	
Evergreen Marine Leasing - Parcel E	Ecology's files and Facility/Site Database	7343 E Marginal Way S, Seattle, WA, 98108	2462	Excluded because located outside of RM 2.0-2.3 East, at approximately RM 2.9.	The map location shown in the Facility/Site Database appears to be incorrect. The facility was determined to be located on tax parcel 2924049043, owned by Emerald Services. Ecology's files for this facility were intermixed with files for Northland Services because Evergreen Marine Leasing is a former owner of the Northland Services property.
Fox Avenue Building	Ecology's files and Facility/Site Database	6900 Fox Ave. S, Seattle, WA, 98108	2282	Included as Cascade Columbia Distribution.	The map location shown in the Facility/Site Database appears to be incorrect. Cascade Columbia Distribution was determined to be located south of S Willow Street and east of Fox Avenue S, on tax parcel 0001800087.
Northland Services	Ecology's files and Facility/Site Database	6701 Fox Ave. S, Seattle, WA, 98108	22653378	Included as Glacier Marine Services.	
Shultz Distributing	Ecology's files and Facility/Site Database	6851 E Marginal Way S, Seattle, WA, 98108	95498891	Included.	The map location shown in the Facility/Site Database appears to be incorrect. Shultz Distributing was determined to be located between S Brighton Street and S Willow Street, with Fox Avenue S bordering the facility to the west and East Marginal Way S bordering the property to the east.
United Marine Shipbuilding	Ecology's files and Facility/Site Database	5055 E Marginal Way, Seattle, WA, 98108	1523145	Excluded because located outside of RM 2.0-2.3 East, between RM 0.6 and 0.9.	
V. Van Dyke	Ecology's files and Facility/Site Database	150 S River St., Seattle, WA, 98108	68427684	Included.	The map location shown in the Facility/Site Database appears to be incorrect. V. Van Dyke was determined to be located just east of Occidental Avenue S and north of S River Street, on tax parcel 5367202270.
Bunge Foods	Based on vicinity to LDW from figures and maps reviewed			Included as a data gap in Section 4.4 because no information pertaining to the site was found for review.	
Silver Bay Logging (now known as Muckleshoot Seafood Products)	Nov 2007 LDW RI Report			Included as a data gap in Section 4.4 because no information pertaining to the site was found for review.	
Rainier Petroleum Corporation	Nov 2007 LDW RI Report			Included as a data gap in Section 4.4 because no information pertaining to the site was found for review.	
Seattle Cold Storage Company	Nov 2007 LDW RI Report			Included as SCS Refrigerated Services.	
Seattle Distribution Center	Nov 2007 LDW RI Report			Included.	
Glacier Marine Services	Nov 2007 LDW RI Report			Included.	
Seatac Marine Services	Nov 2007 LDW RI Report			Included as Glacier Marine Services; also same facility as Northland Services.	
Remarkable Tire	Facility/Site Database	7115 East Marginal Way S, Seattle, WA, 98108	65141181	Excluded because actually located south of RM 2.0-2.3 East.	The map location shown in the Facility/Site Database appears to be incorrect. Remarkable Tire was determined to be located at approximately the intersection of S Myrtle Street and East Marginal Way S.
Vacuum Truck Services	Facility/Site Database	220 S River Street, Seattle, WA, 98108	37289288	Included as Riverside Industrial Park; also same facility as Big John's Truck Repair.	Vacuum Truck Services and Big John's Truck Repair appear to be the same facility, entered into the Facility/Site Database twice; the facility was formerly known as Vacuum Truck Services and appeared to be listed under the office building address rather than the shop building address, as Big John's Truck Repair was.

Table 1
Facilities of Concern Identification
RM 2.0-2.3 East Source Control Area

Facility Identified	Identification Source	Facility Address[1]	Facility/Site ID No.	Included/Excluded	Updates and Corrections Needed
WA DNR Corson Ave Site Hat Boots	Facility/Site Database	6800 East Marginal Way S, Seattle, WA 98108	61845527	Included as Hat n' Boots, but as a facility of concern located within the South Brighton Street CSO Basin.	The map location shown in the Facility/Site Database appears to be incorrect. Hat n' Boots was determined to actually be located within the South Brighton Street CSO Basin, at approximately the intersection of East Marginal Way S and Corson Ave. S.
South Brighton Street CSO Basin Facilities of Concern					
Arrow Transportation	Facility/Site Database	6737 Corson Ave. S, Seattle, WA, 98108	69693852	Included as former facility at South Seattle Community College Property.	
Ben's Truck Parts	Facility/Site Database	6655 Corson Ave. S, Seattle, WA, 98108	74169521	Included as former facility at South Seattle Community College Property.	Ben's Truck Parts appeared to be located on the same tax parcel as Arrow Transportation and Inland Transportation Company, which is now occupied by South Seattle Community College.
Inland Transportation Company	Facility/Site Database	6737 Corson S, Seattle, WA, 98108	2134	Included as former facility at South Seattle Community College Property.	Inland Transportation Company and Arrow Transportation appear to have the same address and to be located on the same tax parcel, which is now occupied by South Seattle Community College; whether they are the same facility or were just located on the same tax parcel is unknown.
Hat n' Boots Gas Station	Facility/Site Database	6800 East Marginal Way S, Seattle, WA 98108	61845527	Included as former facility at South Seattle Community College Property.	The map location shown in the Facility/Site Database appears to be incorrect. Hat n' Boots was determined to actually be located within the South Brighton Street CSO Basin, at approximately the intersection of East Marginal Way S and Corson Ave. S.

Notes:

1. Addresses were not provided in the November 2007 Lower Duwamish Waterway Phase 2 Remedial Investigation Draft Report (Windward 2007) for facilities that were listed as primary upland properties in the vicinity of the RM 2.0-2.3 East Source Control Area.

Table 2
CSO/EOF Discharges to the Lower Duwamish Waterway
RM 2.0-2.3 East Source Control Area

Outfall	Type (Owner)	Discharge Serial Number	Location	Average Overflow Frequency (events/year) 2000 to 2007	Annual average volume (mgy) 2000 to 2007
Diagonal Avenue S.[a]	CSO (SPU) SD (SPU)	NA	RM 0.5 E	20.1	15.8[b]
Hanford No. 1[c]	CSO (King County)	31	RM 0.5 E	9	18.75
Duwamish pump station East	CSO (King County)	35	RM 0.5 E	<1.0	0.51
Duwamish pump station West	CSO (King County)	34	RM 0.5 W	<1.0	0.6
S. Brandon Street	CSO (King County)	41	RM 1.1 E	23	31.63
Terminal 115	CSO (King County)	38	RM 1.9 W	3	3.52
S. Brighton Street	CSO (SPU) SD (SPU)	NA	RM 2.1 E	NA[g]	NA
King County Airport SD#3/PS44 EOF[d]	SD (King County) EOF (SPU)	NA	RM 2.8 E	NA	NA
E. Marginal Way S. pump station	EOF (King County)	43	RM 2.8 E	None recorded	NA
8th Avenue S.	CSO (King County)	40	RM 2.8 W	0	0
King County Airport SD#2/PS78 EOF[e]	SD (King County) EOF (SPU)	NA	RM 3.8 E	NA	NA
Michigan Street	CSO (King County)	39	RM 1.9 E	11	17.58
W. Michigan	CSO (King County)	42	RM 2.0 W	4	1.23
Norfolk	CSO (King County) SD (King County) EOF (SPU)[f]	44	RM 4.8 E	4	0.28

Notes:

a - 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.

b - 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.

c - Hanford No. 1 discharges to the LDW through the Diagonal Avenue S. SD.

d – SPU Pump Station 44 discharges via EOF No. 117 to King County Airport SD#3 at Slip 4.

e – SPU Pump Station 78 discharges via EOF No. 156 to King County Airport SD#2, near Boeing Isaacson.

f – SPU Pump Station 17 discharges to the Norfolk CSO/SD.

g – Has not overflowed since monitoring began in March 2000.

mgy – million gallons per year

NA – Not available

Table 3
Contaminants Above Screening Levels in Surface Sediment
RM 2.0-2.3 East Source Control Area

Sample Location Name	Sample River Mile Location	Sampling Event	Sample Collection Date	Contaminant	Concentration Value	Concentration Units		TOC % DW	Concentration (mg/kg OC)	SQS[1]	CSL[1]	SQS/CSL Units	SQS Exceedance Factor[2]	CSL Exceedance Factor[2]
Metals and Trace Elements														
LDW-SS77	2.2	LDWRI-SurfaceSedimentRound2	3/14/2005	Arsenic	80.9	mg/kg dw		2.08		57	93	mg/kg dw	1.4	
PAHs														
DR112	2.1	EPA SI	8/19/1998	Fluoranthene	5.3	mg/kg dw		2.64	200	160	1200	mg/kg OC	1.3	
PCBs														
DR111	2.1	EPA SI	8/19/1998	PCBs (total calc'd)	0.311	mg/kg dw		2.26	13.8	12	65	mg/kg OC	1.2	
DR148	2.1	EPA SI	8/18/1998	PCBs (total calc'd)	279	ug/kg dw	J	4.51		130	1000	ug/kg dw	2.1	
B6b	2.2	LDWRI-Benthic	9/18/2004	PCBs (total calc'd)	0.42	mg/kg dw		2.96	14	12	65	mg/kg OC	1.2	
LDW-SS329	2	LDWRI-SurfaceSedimentRound3	10/2/2006	PCBs (total calc'd)	0.124	mg/kg dw		0.972	12.8	12	65	mg/kg OC	1.1	
Other SVOCs														
LDW-SS73	2.1	LDWRI-SurfaceSedimentRound2	3/7/2005	Benzyl alcohol	150	ug/kg dw		2.43		57	73	ug/kg dw	2.6	2.1

Key:
DW - Dry weight
CSL - Cleanup Screening Level
PAH - Polynuclear aromatic hydrocarbon
PCB - Polychlorinated biphenyl
OC - Organic carbon
TOC - Total organic carbon
SQS - Sediment Quality Standard
SVOC - Semivolatile organic compound

Notes:
1. SQS and CSL values are substituted with AET values for dry weight comparison where organic compounds are not OC-normalized (when TOC % DW is outside of the 0.5-4.0% range).
2. Exceedance factors are the ratio of the detected concentration to the CSL or SQS (or to AET values where applicable); exceedance factors are shown only if they are greater than 1.

Source:
Lower Duwamish Waterway Group, 2007. Online Lower Duwamish Waterway Group Draft Remedial Investigation Report (November 2007) Database. http://www.ldwg.org.

Table 4
Contaminants Above Screening Levels in Subsurface Sediment
RM 2.0-2.3 East Source Control Area

Sample Location Name	Sample River Mile Location	Sample Depth Interval (ft)	Sampling Event	Sampling Event Year	Contaminant	Concentration Value	Concentration Units		TOC % DW	Concentration (mg/kg OC)	SQS[1]	CSL[1]	SQS/CSL Units	SQS Exceedance Factor[2]	CSL Exceedance Factor[2]
Metals and Trace Elements															
LDW-SC37	2.1	0 to 1	LDW Subsurface Sediment 2006	2006	Arsenic	150	mg/kg dw		2.25		57	93	mg/kg dw	2.6	1.6
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Arsenic	121	mg/kg dw		2.67		57	93	mg/kg dw	2.1	1.3
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Arsenic	2000	mg/kg dw		2.24		57	93	mg/kg dw	35	22
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Copper	2940	mg/kg dw		2.24		390	390	mg/kg dw	7.5	7.5
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Lead	3520	mg/kg dw	J	2.24		450	530	mg/kg dw	7.8	6.6
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Mercury	0.45	mg/kg dw	J	2.67		0.41	0.59	mg/kg dw	1.1	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Zinc	490	mg/kg dw		2.67		410	960	mg/kg dw	1.2	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Zinc	4720	mg/kg dw		2.24		410	960	mg/kg dw	12	4.9
PAHs															
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Acenaphthene	0.62	mg/kg dw		2.24	28	16	57	mg/kg OC	1.8	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Benzo(a)anthracene	3.1	mg/kg dw		2.67	120	110	270	mg/kg OC	1.1	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Benzo(a)anthracene	4.5	mg/kg dw		2.24	200	110	270	mg/kg OC	1.8	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Benzo(a)pyrene	5.3	mg/kg dw		2.67	200	99	210	mg/kg OC	2.0	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Benzo(a)pyrene	4	mg/kg dw		2.24	180	99	210	mg/kg OC	1.8	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Benzo(g,h,i)perylene	1	mg/kg dw		2.67	37	31	78	mg/kg OC	1.2	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Benzo(g,h,i)perylene	0.83	mg/kg dw		2.24	37	31	78	mg/kg OC	1.2	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Benzofluoranthenes (total-calc'd)	10.2	mg/kg dw		2.67	380	230	450	mg/kg OC	1.7	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Benzofluoranthenes (total-calc'd)	9.1	mg/kg dw		2.24	410	230	450	mg/kg OC	1.8	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Chrysene	4.8	mg/kg dw		2.67	180	110	460	mg/kg OC	1.6	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Chrysene	5	mg/kg dw		2.24	220	110	460	mg/kg OC	2.0	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Dibenzo(a,h)anthracene	0.36	mg/kg dw		2.67	13	12	33	mg/kg OC	1.1	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Dibenzofuran	0.57	mg/kg dw		2.24	25	15	58	mg/kg OC	1.7	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Fluoranthene	4.5	mg/kg dw		2.67	170	160	1200	mg/kg OC	1.1	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Fluoranthene	13	mg/kg dw		2.24	580	160	1200	mg/kg OC	3.6	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Fluorene	0.75	mg/kg dw		2.24	33	23	79	mg/kg OC	1.4	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Indeno(1,2,3-cd)pyrene	1.5	mg/kg dw		2.67	56	34	88	mg/kg OC	1.6	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Indeno(1,2,3-cd)pyrene	1.2	mg/kg dw		2.24	54	34	88	mg/kg OC	1.6	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Phenanthrene	7.5	mg/kg dw		2.24	330	100	480	mg/kg OC	3.3	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	Total HPAH (calc'd)	40	mg/kg dw		2.67	1500	960	5300	mg/kg OC	1.6	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Total HPAH (calc'd)	47	mg/kg dw		2.24	2100	960	5300	mg/kg OC	2.2	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	Total LPAH (calc'd)	10.5	mg/kg dw	J	2.24	470	370	780	mg/kg OC	1.3	
PCBs															
LDW-SC37	2.1	0 to 1	LDW Subsurface Sediment 2006	2006	PCBs (total calc'd)	0.45	mg/kg dw		2.25	20	12	65	mg/kg OC	1.7	
LDW-SC37	2.1	1 to 2	LDW Subsurface Sediment 2006	2006	PCBs (total calc'd)	0.95	mg/kg dw	J	2.67	36	12	65	mg/kg OC	3.0	
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	PCBs (total calc'd)	0.55	mg/kg dw		2.24	25	12	65	mg/kg OC	2.1	
TPHs															
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	1,2,4-Trichlorobenzene	0.046	mg/kg dw		2.24	2.1	0.81	1.8	mg/kg OC	2.6	1.2
LDW-SC37	2.1	2 to 4	LDW Subsurface Sediment 2006	2006	1,2-Dichlorobenzene	0.15	mg/kg dw		2.24	6.7	2.3	2.3	mg/kg OC	2.9	2.9

Key:
DW - Dry weight
CSL - Cleanup Screening Level
PAH - Polynuclear aromatic hydrocarbon
PCB - Polychlorinated biphenyl
OC - Organic carbon
TOC - Total organic carbon
TPH - Total petroleum hydrocarbon
SQS - Sediment Quality Standard
SVOC - Semivolatile organic compound

Notes:
1. SQS and CSL values are substituted with AET values for dry weight comparison where organic compounds are not OC-normalized (when TOC % DW is outside of the 0.5-4.0% range).
2. Exceedance factors are the ratio of the detected concentration to the CSL or SQS (or to AET values where applicable); exceedance factors are shown only if they are greater than 1.

Source:
Lower Duwamish Waterway Group, 2007. Online Lower Duwamish Waterway Group Draft Remedial Investigation Report (November 2007) Database. http://www.ldwg.org.

8.0 Figures

RM 0 - 0.1 East
Spokane St. to Ash Grove Cement

EAA-1
RM 0.1-0.9 East
Duwamish/Diagonal Way

RM 0 - 1.0 West
Spokane St. to Kellogg Island

RM 0.9 - 1.0 East
Slip 1

RM 1.0-1.2 East
KC lease parcels

RM 1.0-1.3 West
Kellogg Island to Lafarge Cement

RM 1.2-1.7 East
St. Gobain to Glacier Northwest

RM 1.3 - 1.6 West
Glacier Bay

RM 1.7 - 2.0 East
Slip 2 to Slip 3

RM 1.6 - 2.1 West
Terminal 115

RM 2.0 - 2.3 East
Slip 3 to Seattle Boiler Works

RM 2.3 - 2.8 East
Seattle Boiler Works to Slip 4

EAA - 2
RM 2.1 - 2.2 West
Trotsky Inlet

EAA - 3
RM 2.8 East
Slip 4

EAA-4
RM 2.8-3.7 East
Boeing Plant 2 to Jorgensen Forge

RM 2.2 - 3.4 West
Riverside Drive

EAA-6
RM 3.7-3.9 East
Boeing Isaacson/Central KCIA

EAA - 5
RM 3.4 - 3.8 West
Terminal 117

RM 3.9 - 4.3 East
Slip 6

RM 3.8 - 4.2 West
Sea King Industrial Park

RM 4.3 to 4.9 East
Boeing Developmental Center

RM 4.2 - 4.8 West
Restoration Areas

EAA -7
RM 4.9 East
Norfolk CSO/SD

C/LDW Maps /Scap Location 17 June 08

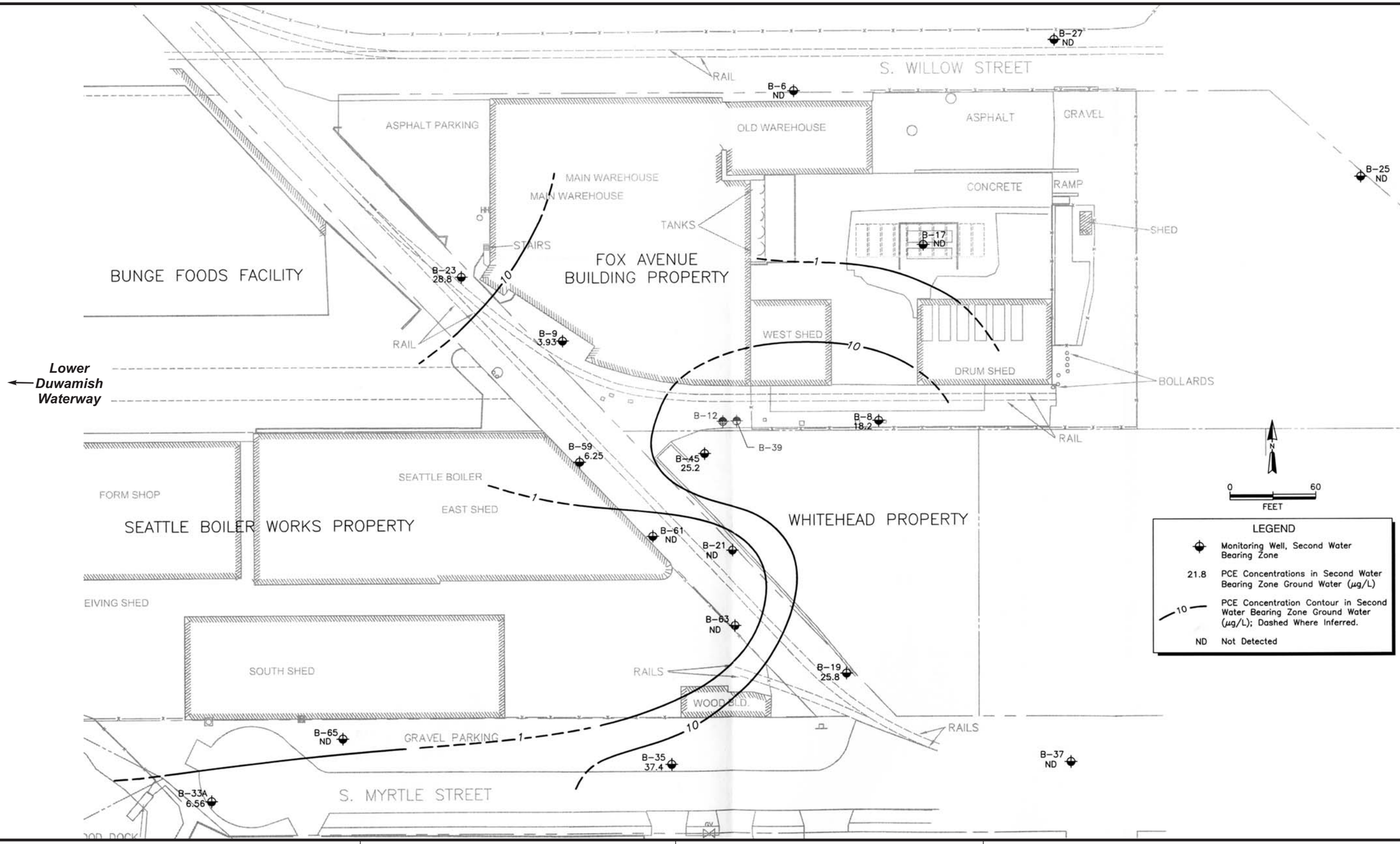
DEPARTMENT OF
ECOLOGY
State of Washington

SCAP Locations (October 2008)

0 0.25 0.5 1 Miles

The SCAP area boundaries are an approximation. Final boundaries will be determined jointly by the EPA and Ecology.
Drainage basins leading to these areas will be defined in the future.

ecology and environment, inc. International Specialists in the Environment Seattle, Washington	LOWER DUWAMISH WATERWAY RM 2.0-2.3 EAST Tukwila, Washington	Figure 1 SOURCE CONTROL AREAS		
	Base Map Reference: Department of Ecology, 2008.	Date: 3/16/09	Drawn by: AES	10:002330WD1403\fig 1



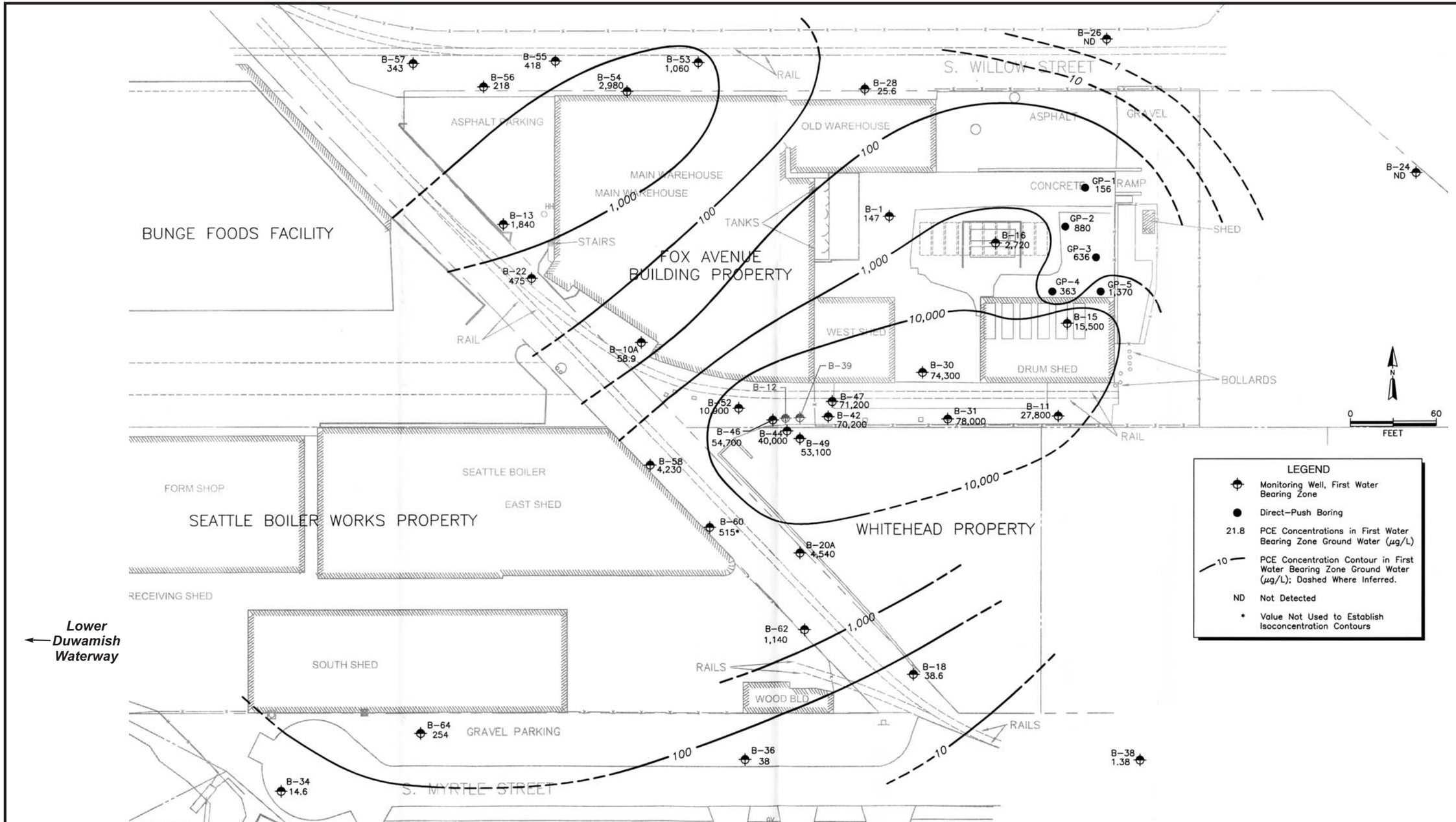
ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Base Map Reference:
Environmental Resources Management (ERM), 2003.

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 22
PCE IN 2nd WBZ GROUNDWATER (FOX AVENUE PILOT STUDY) - CASCADE COLUMBIA DISTRIBUTION

Date:	Drawn by:	
3/16/09	AES	10:002330WD1403\fig22



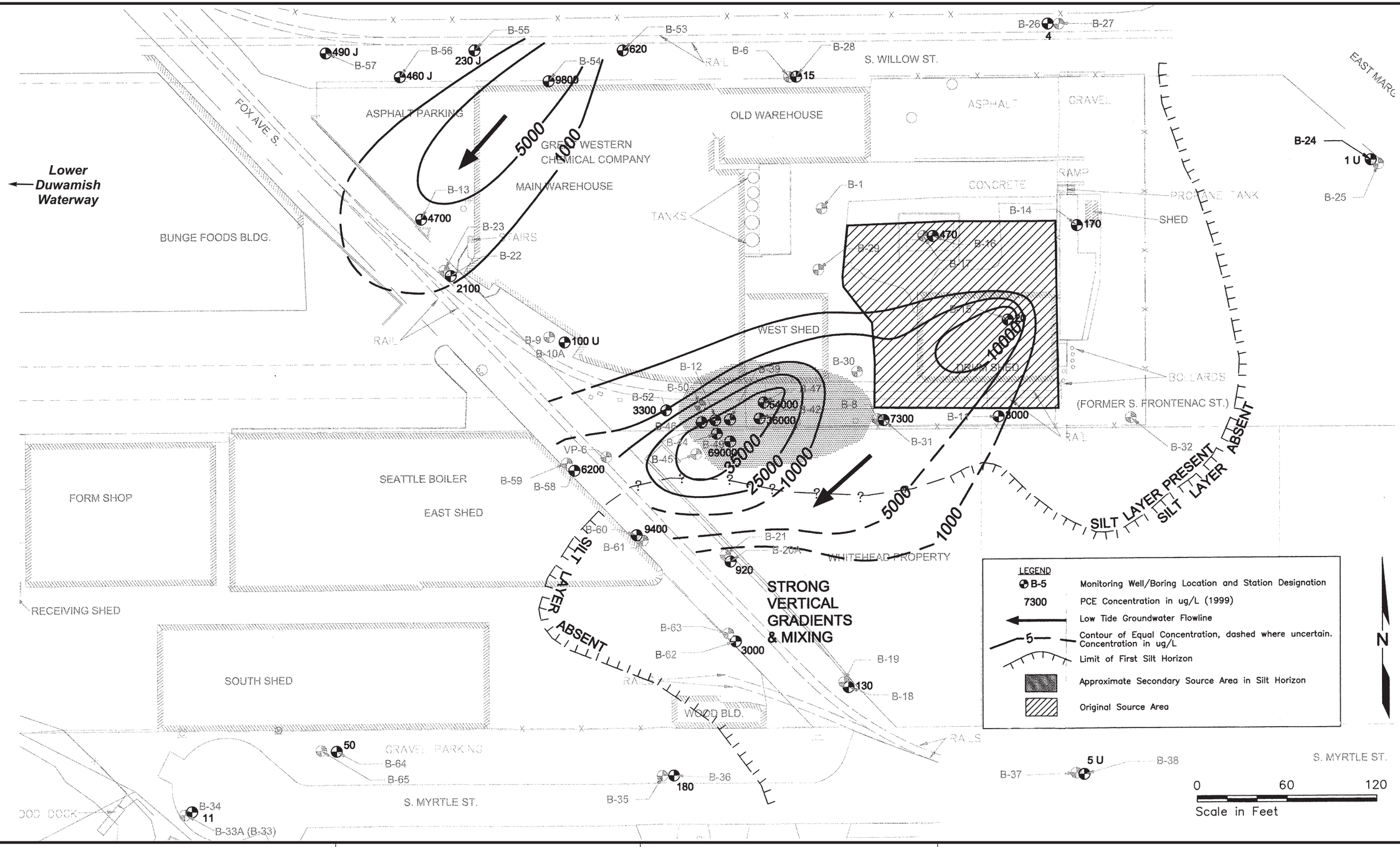
ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Base Map Reference:
Environmental Resources Management (ERM), 2003.

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 21
PCE IN 1st WBZ GROUNDWATER (FOX AVENUE PILOT STUDY) - CASCADE COLUMBIA DISTRIBUTION

Date:	Drawn by:	
3/16/09	AES	10:002330WD1403\Fig21



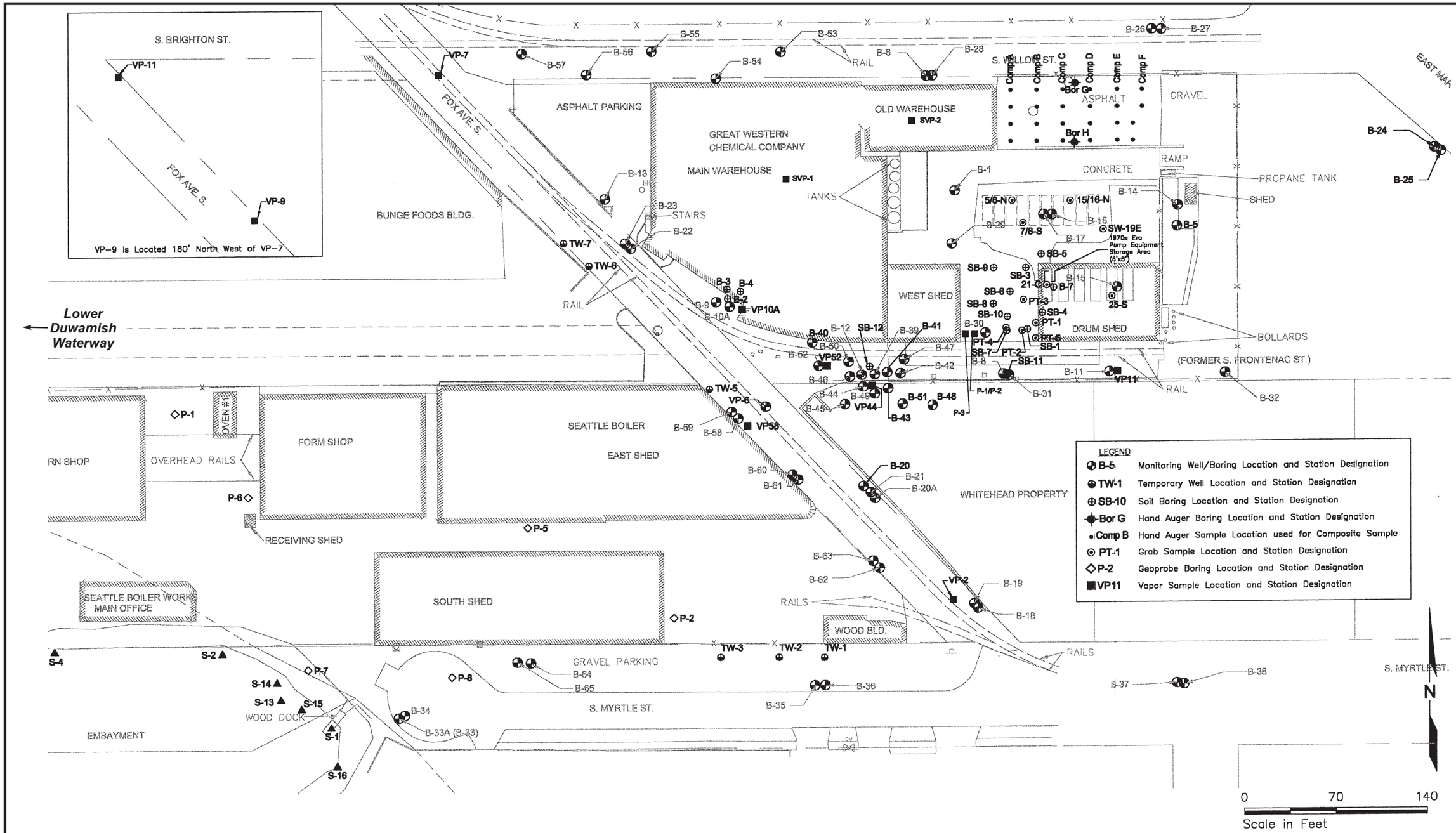
ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Base Map Reference: Floyd & Snider Inc. 2000.

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 20
PCE IN 1st WBZ (1999 SAMPLING EVENT) - CASCADE COLUMBIA DISTRIBUTION
(IN OPERATION AS GREAT WESTERN CHEMICAL)

Date:	Drawn by:	
3/16/09	AES	10:002330WD1403\fig20



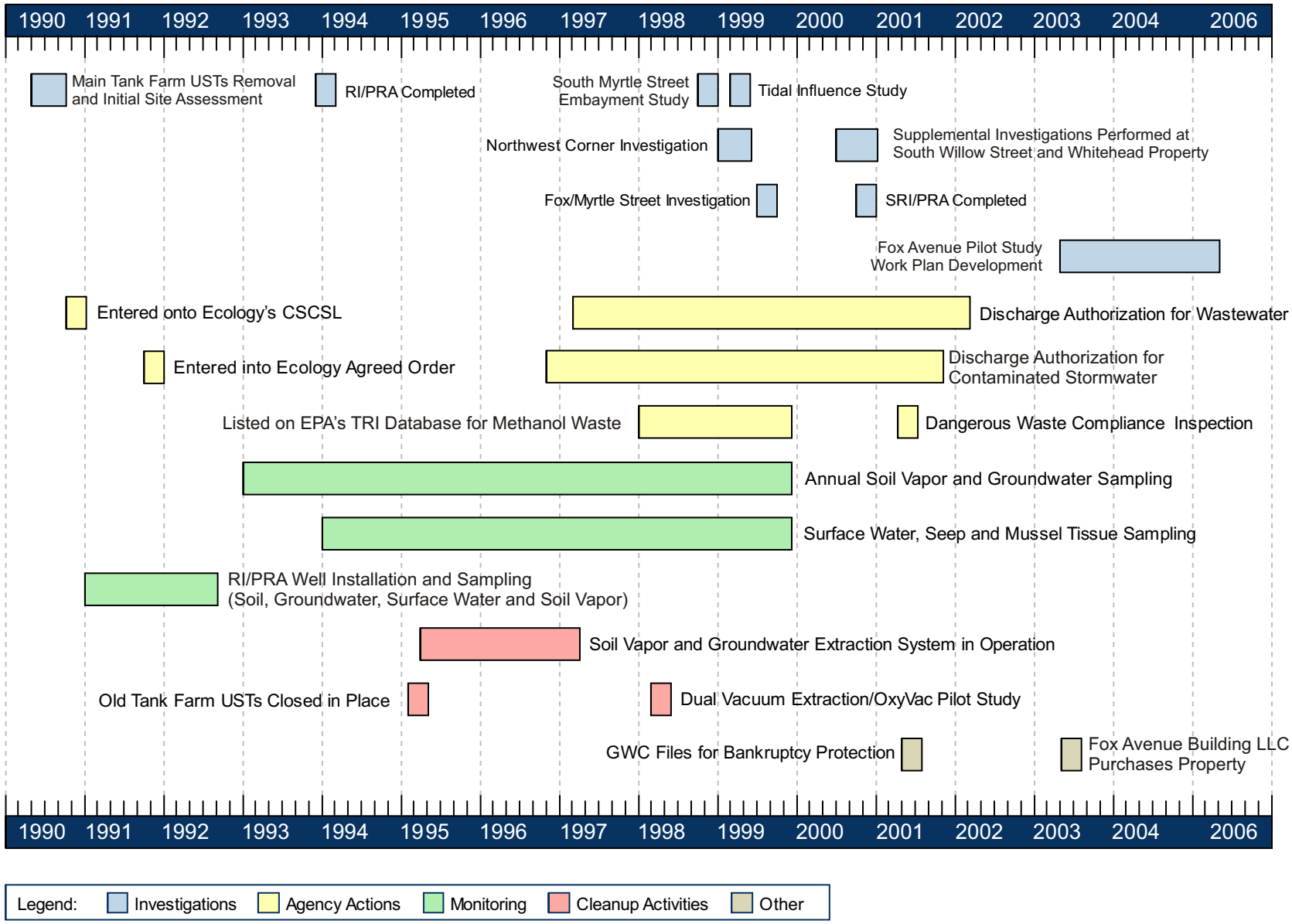
ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Base Map Reference: Floyd & Snider Inc. 2000.

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 19
SOIL SAMPLING, GROUNDWATER MONITORING WELL AND SOIL VAPOR SAMPLING LOCATIONS - CASCADE COLUMBIA DISTRIBUTION
(IN OPERATION AS GREAT WESTERN CHEMICAL)

Date:	Drawn by:	
3/16/09	AES	10:002330WD1403\fig19



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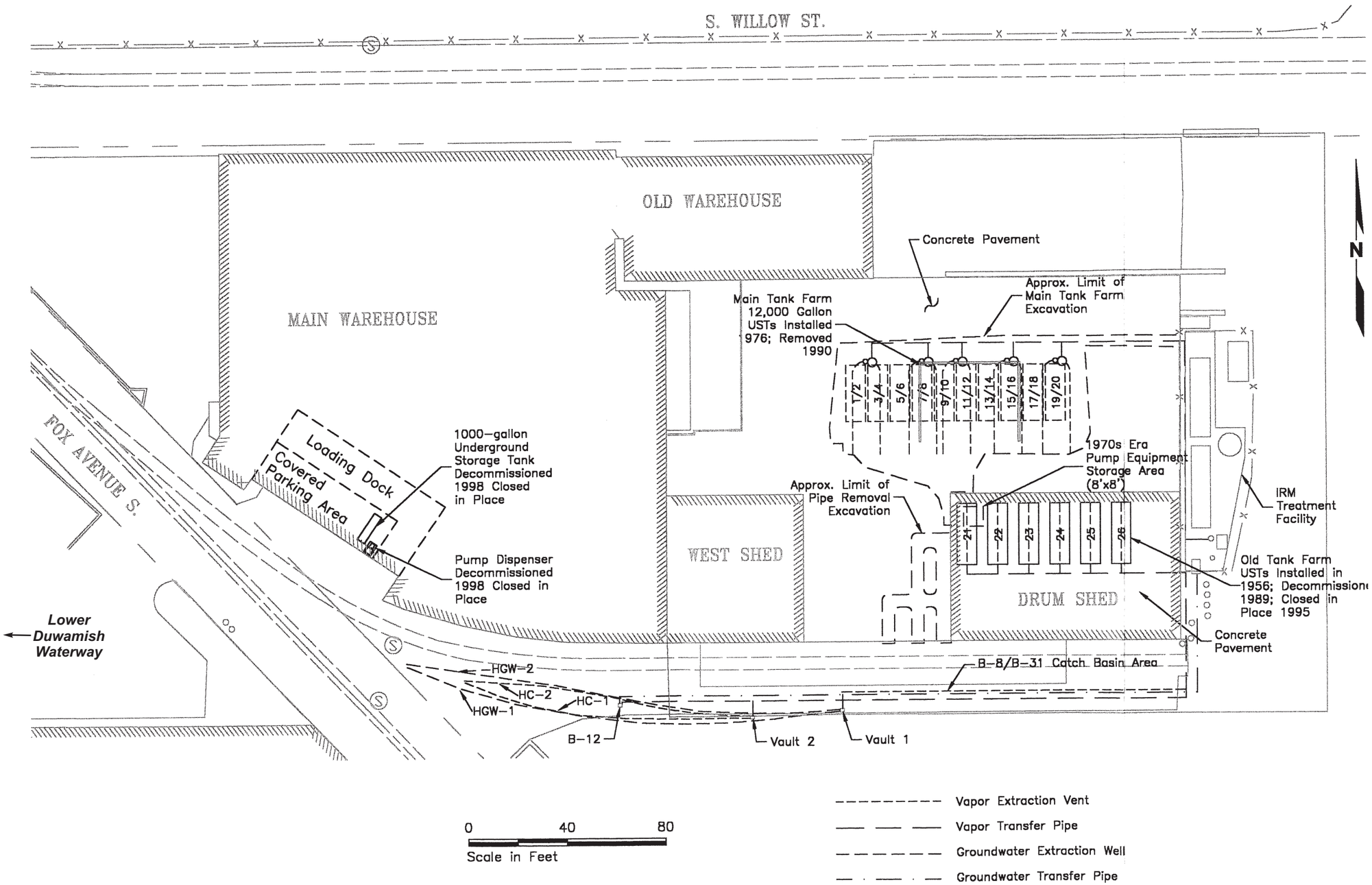
LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 18
TIMELINE - CASCADE COLUMBIA DISTRIBUTION PROPERTY

Date:	Drawn by:	
5/21/08	AES	10:002330WD1403\fig18



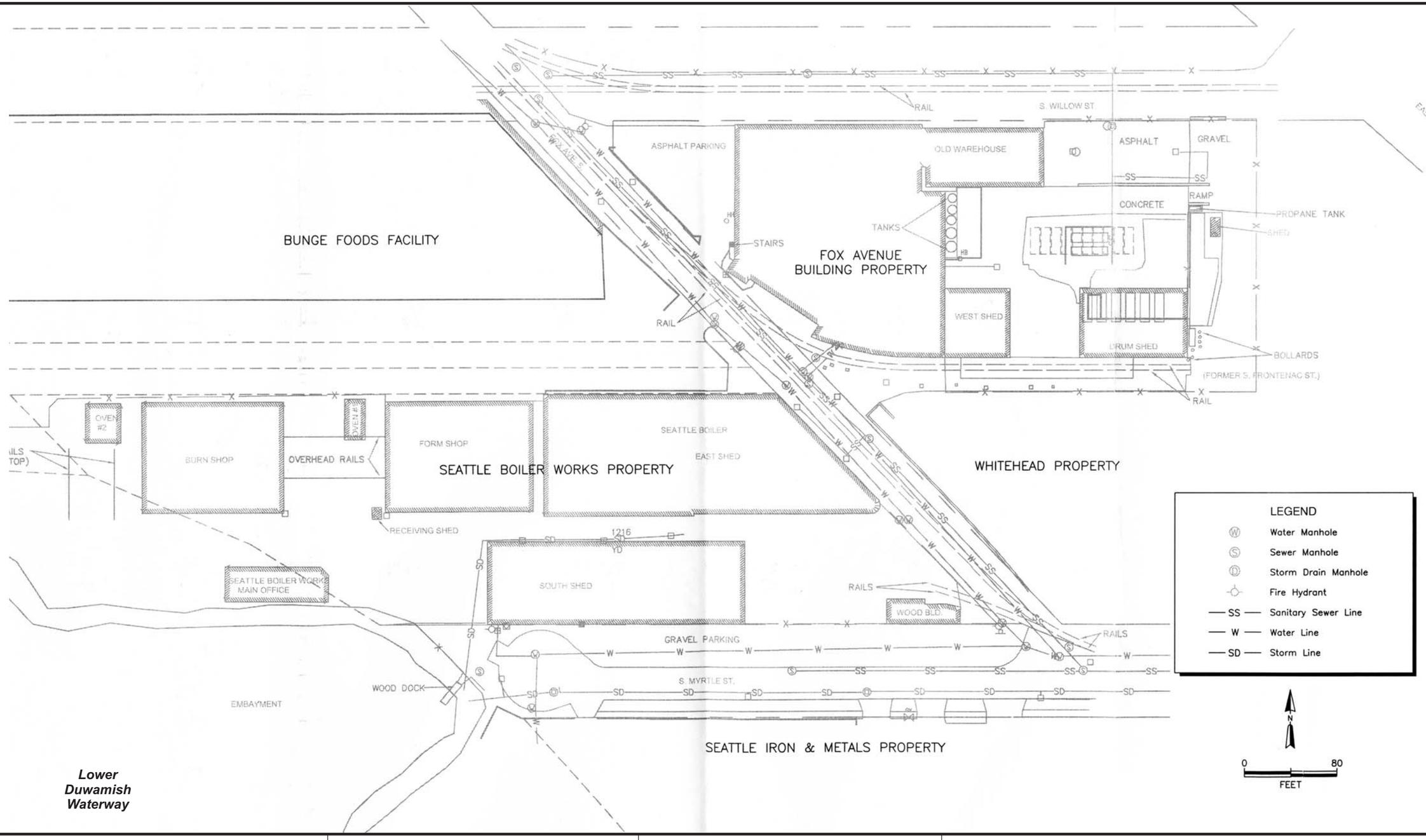
ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Base Map Reference: Floyd & Snider Inc. 2000.

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 17
INTERIM REMEDIAL MEASURES - CASCADE COLUMBIA DISTRIBUTION
(IN OPERATION AS GREAT WESTERN CHEMICAL)

Date:	Drawn by:	
3/16/09	AES	10:002330WD1403\fig17



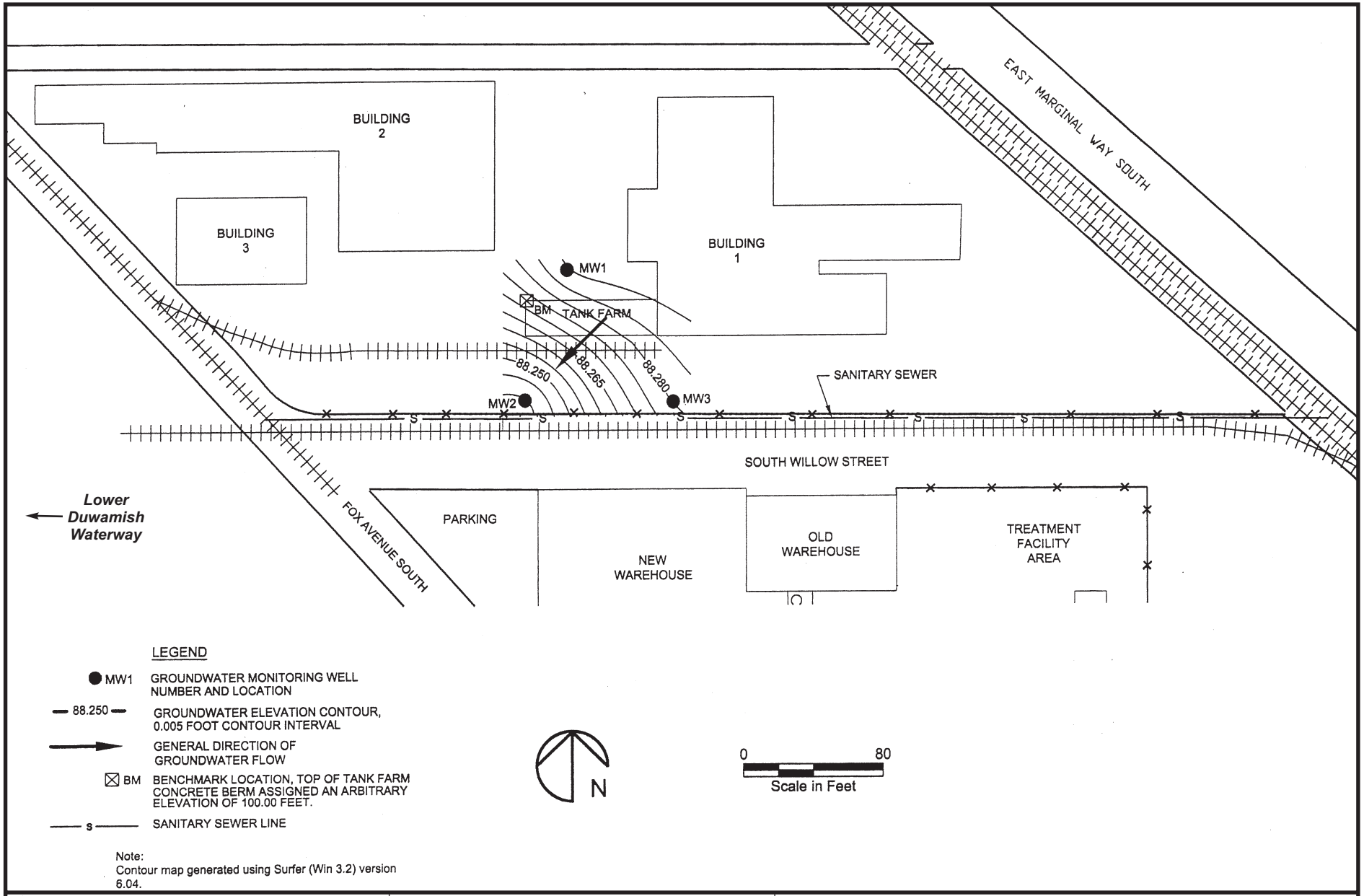
ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Base Map Reference:
Environmental Resources Management (ERM), 2003.

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 16
FACILITY MAP - CASCADE COLUMBIA DISTRIBUTION

Date:	Drawn by:	
3/16/09	AES	10:002330WD1403\fig16

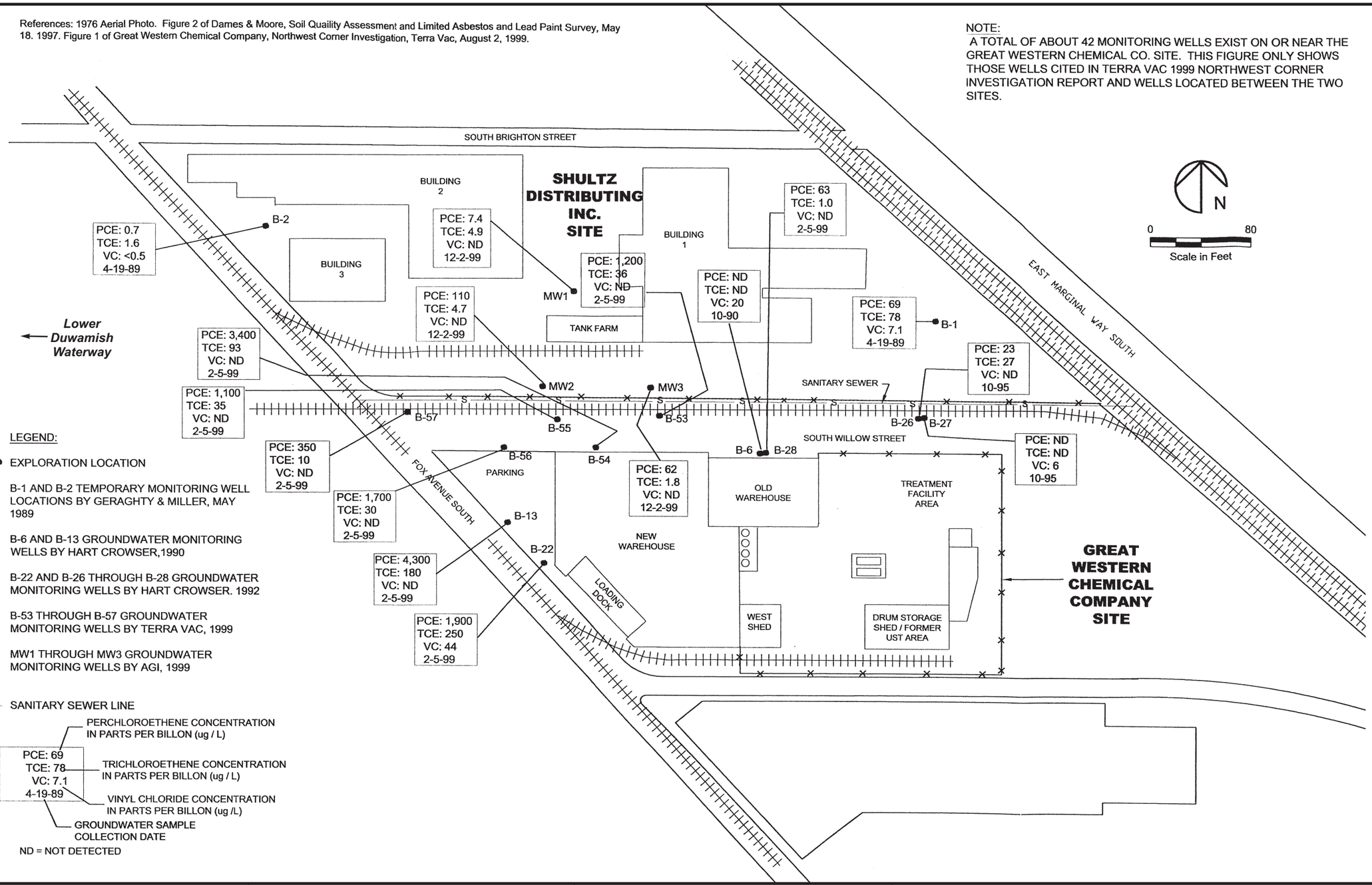


Note:
Contour map generated using Surfer (Win 3.2) version 6.04.

ecology and environment, inc. International Specialists in the Environment Seattle, Washington	LOWER DUWAMISH WATERWAY RM 2.0-2.3 EAST Seattle, Washington	Figure 15 GROUNDWATER ELEVATION CONTOUR MAP (DECEMBER 1999) - SHULTZ DISTRIBUTING		
	Base Map Reference: AGI Technologies, 1999.	Date: 3/16/09	Drawn by: AES	10:002330WD1403\fig15

References: 1976 Aerial Photo. Figure 2 of Dames & Moore, Soil Quaility Assessment and Limited Asbestos and Lead Paint Survey, May 18. 1997. Figure 1 of Great Western Chemical Company, Northwest Corner Investigation, Terra Vac, August 2, 1999.

NOTE:
A TOTAL OF ABOUT 42 MONITORING WELLS EXIST ON OR NEAR THE GREAT WESTERN CHEMICAL CO. SITE. THIS FIGURE ONLY SHOWS THOSE WELLS CITED IN TERRA VAC 1999 NORTHWEST CORNER INVESTIGATION REPORT AND WELLS LOCATED BETWEEN THE TWO SITES.



LEGEND:

- EXPLORATION LOCATION

B-1 AND B-2 TEMPORARY MONITORING WELL LOCATIONS BY GERAGHTY & MILLER, MAY 1989

B-6 AND B-13 GROUNDWATER MONITORING WELLS BY HART CROWSER,1990

B-22 AND B-26 THROUGH B-28 GROUNDWATER MONITORING WELLS BY HART CROWSER. 1992

B-53 THROUGH B-57 GROUNDWATER MONITORING WELLS BY TERRA VAC, 1999

MW1 THROUGH MW3 GROUNDWATER MONITORING WELLS BY AGI, 1999

—— S —— SANITARY SEWER LINE

PCE: 69 (PERCHLOROETHENE CONCENTRATION IN PARTS PER BILLON (ug / L))
TCE: 78 (TRICHLOROETHENE CONCENTRATION IN PARTS PER BILLON (ug / L))
VC: 7.1 (VINYL CHLORIDE CONCENTRATION IN PARTS PER BILLON (ug /L))
4-19-89 (GROUNDWATER SAMPLE COLLECTION DATE)

B-1 WATER SAMPLE LOCATION

ND = NOT DETECTED

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Seattle, Washington

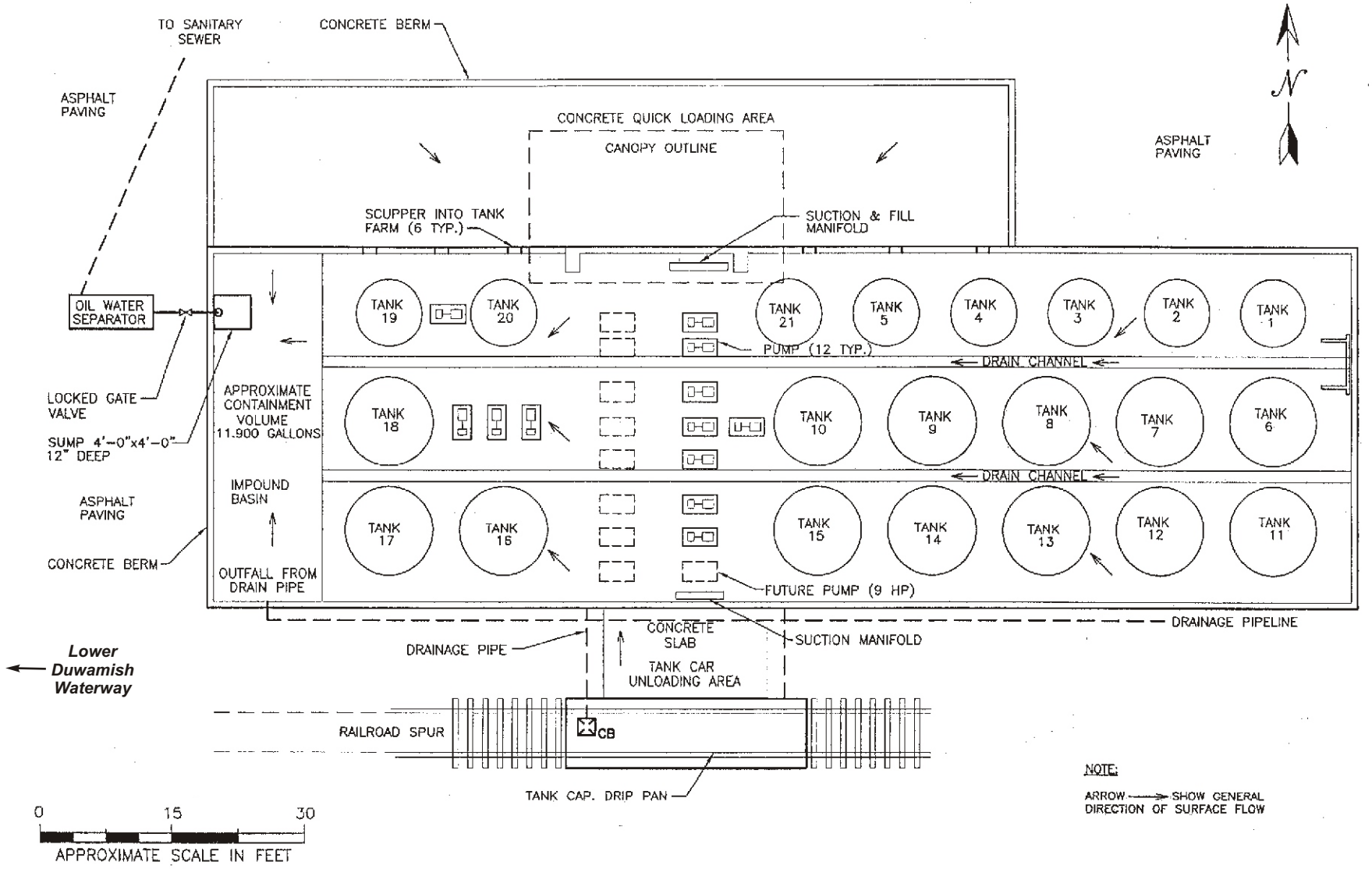
Base Map Reference: AGI Technologies, 1999.

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

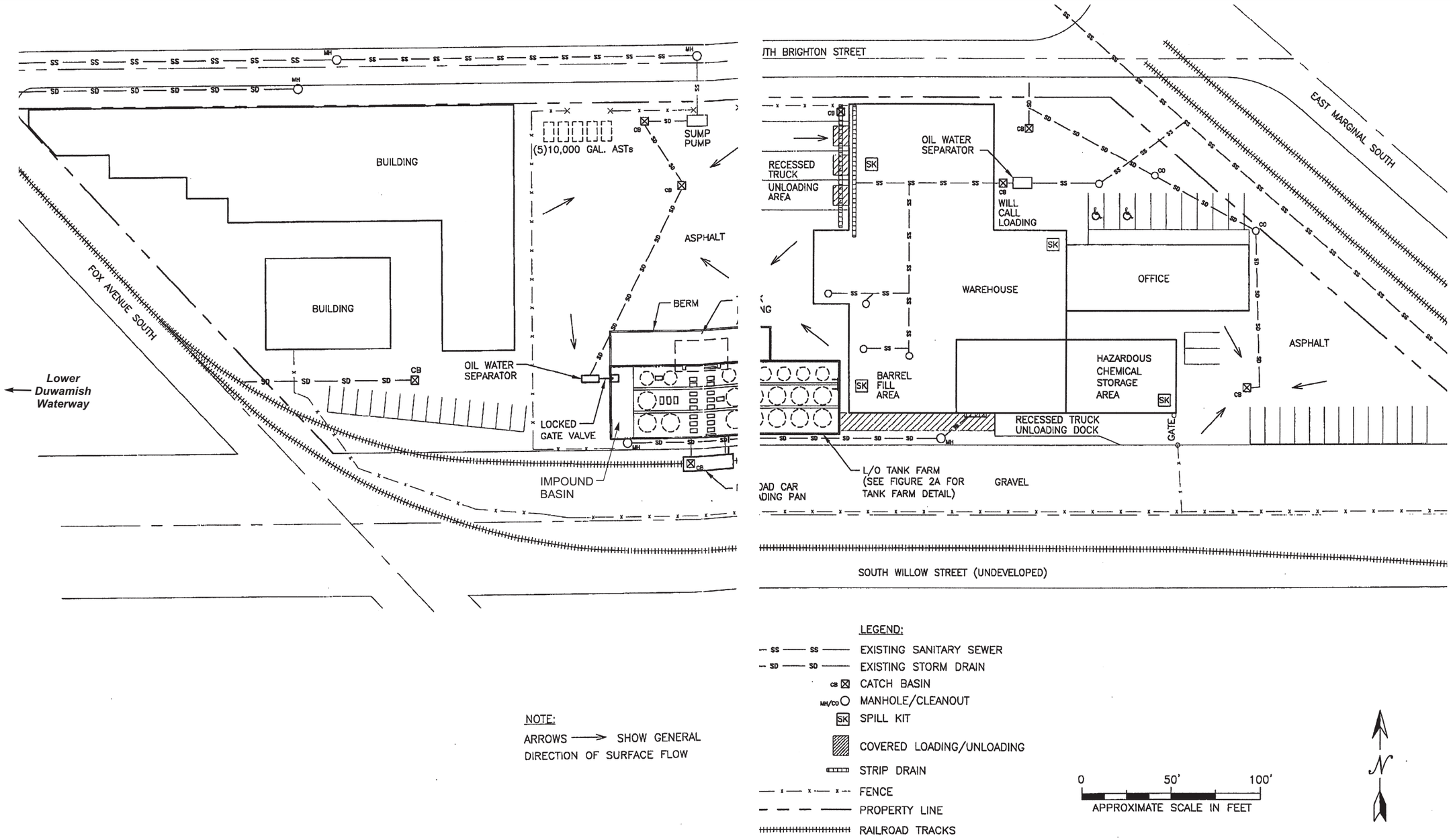
Figure 14

GROUNDWATER CHEMICAL CONCENTRATION MAP - SHULTZ DISTRIBUTING

Date:	Drawn by:	
3/16/09	AES	10:002330WD1403\fig14



ecology and environment, inc. International Specialists in the Environment Seattle, Washington	LOWER DUWAMISH WATERWAY RM 2.0-2.3 EAST Seattle, Washington	Figure 13 STORM DRAIN SYSTEM AND TANK LOCATIONS - SHULTZ DISTRIBUTING		
	Base Map Reference: EMR Incorporated.	Date: 3/16/09	Drawn by: AES	10:002330WD1403\fig13



ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

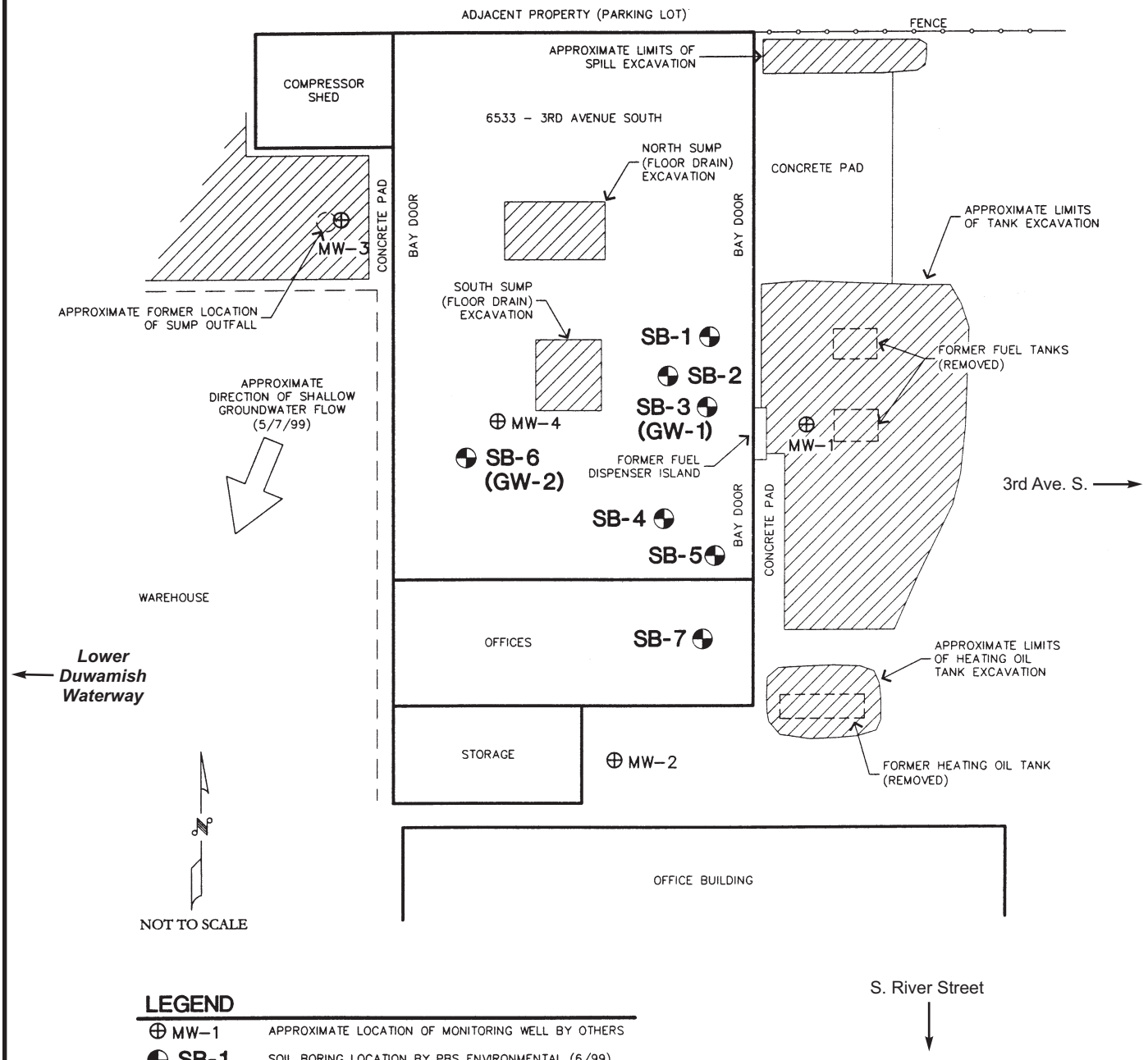
Base Map Reference: EMR Incorporated

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

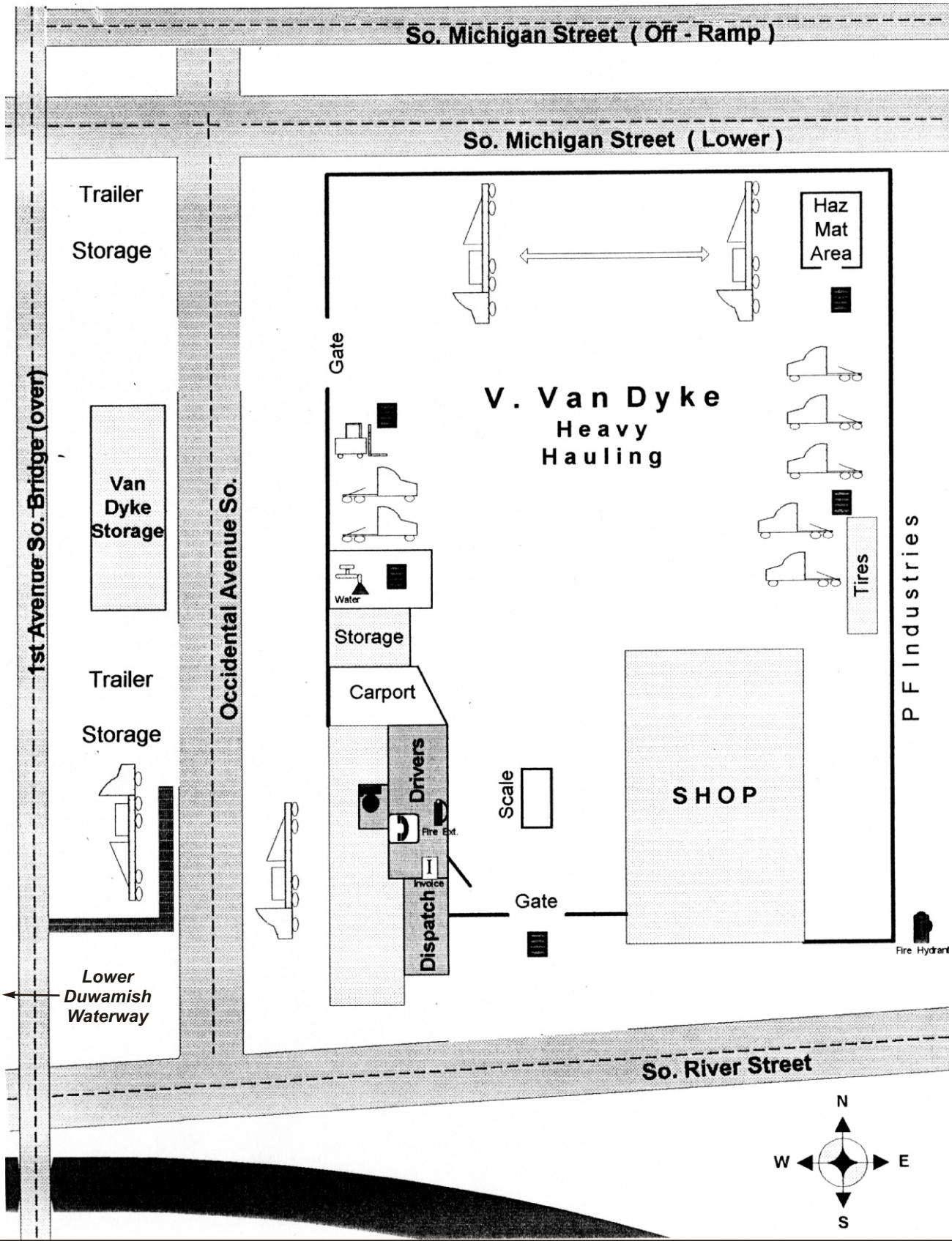
Figure 12

FACILITY MAP AND STORM DRAIN SYSTEM - SHULTZ DISTRIBUTING

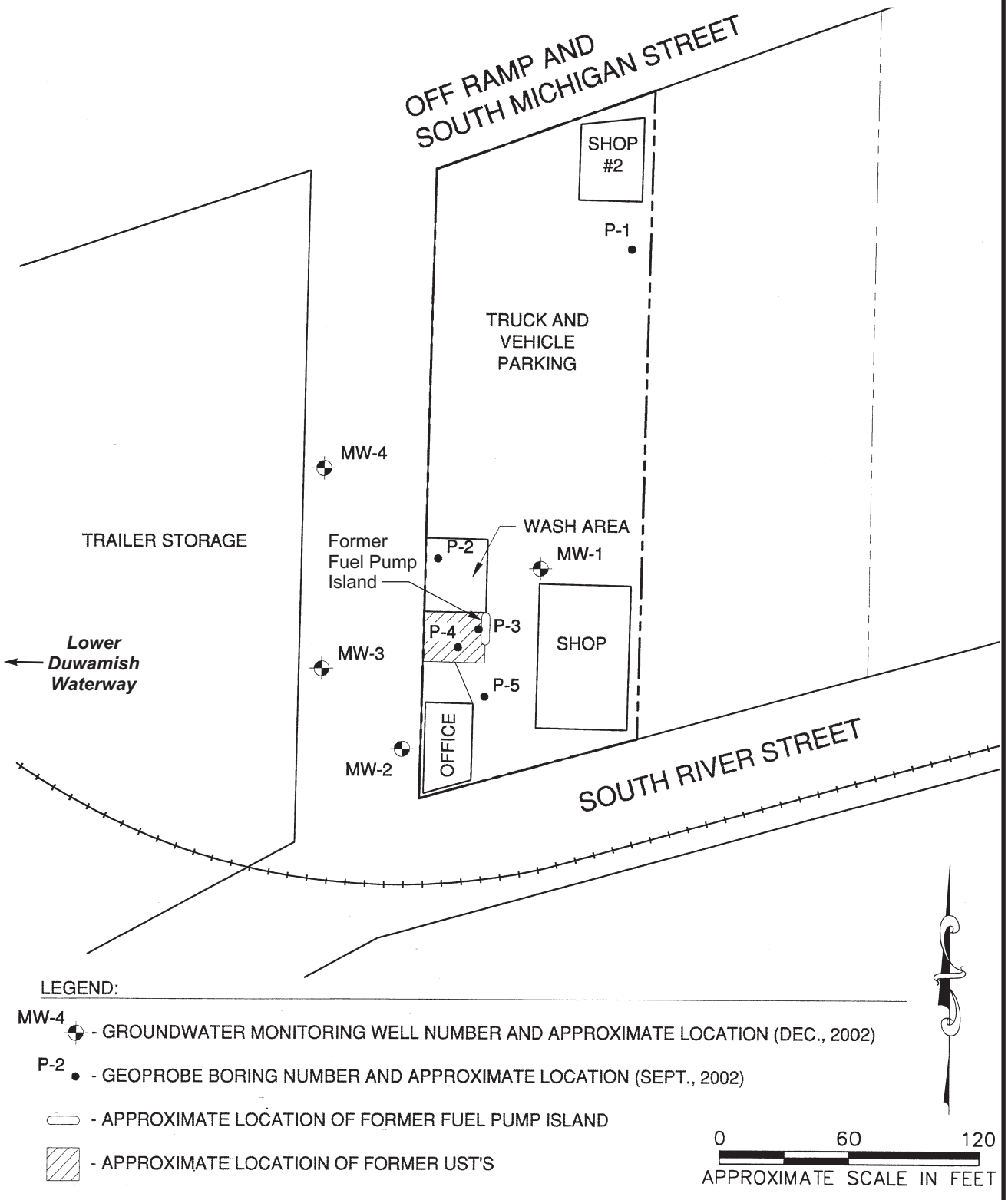
Date:	Drawn by:	
3/16/09	AES	10:002330WD1403\fig12



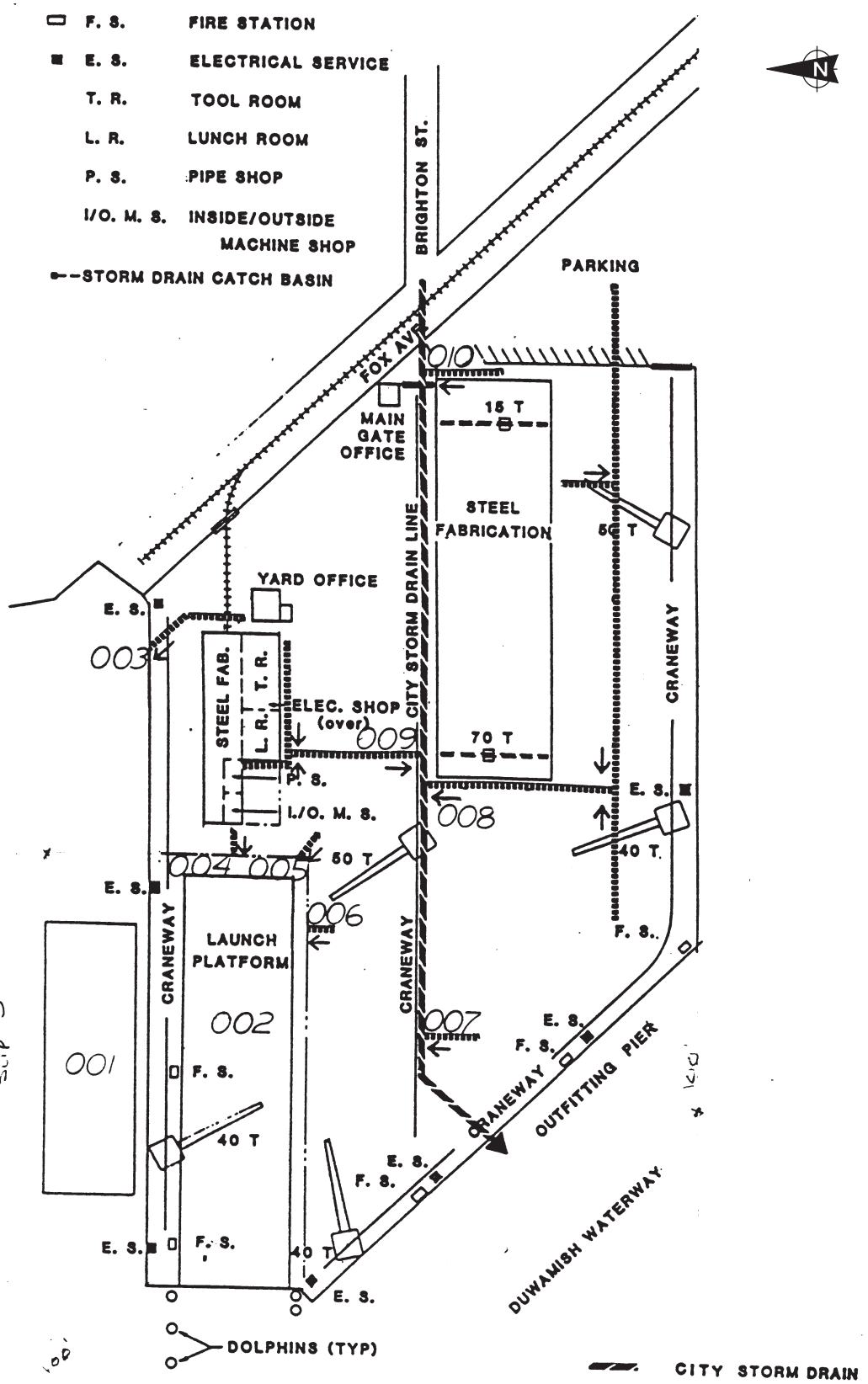
ecology and environment, inc. International Specialists in the Environment Seattle, Washington	LOWER DUWAMISH WATERWAY RM 2.0-2.3 EAST Seattle, Washington	Figure 11 1999 PHASE II SUBSURFACE EXPLORATION MAP - RIVERSIDE INDUSTRIAL PARK (IN OPERATION AS BIG JOHN'S TRUCK REPAIR)
	Base Map Reference: PBS Environmental 1999.	Date: 3-16-09 | Drawn by: AES | 10:002330WD1403\fig 11



ecology and environment, inc. International Specialists in the Environment Seattle, Washington	LOWER DUWAMISH WATERWAY RM 2.0-2.3 EAST Seattle, Washington	Figure 10 FACILITY MAP - V. VAN DYKE		
	Base Map Reference: V. Van Dyke, Inc., 1993.	Date: 3-16-09	Drawn by: AES	10:002330WD1403\fig 10

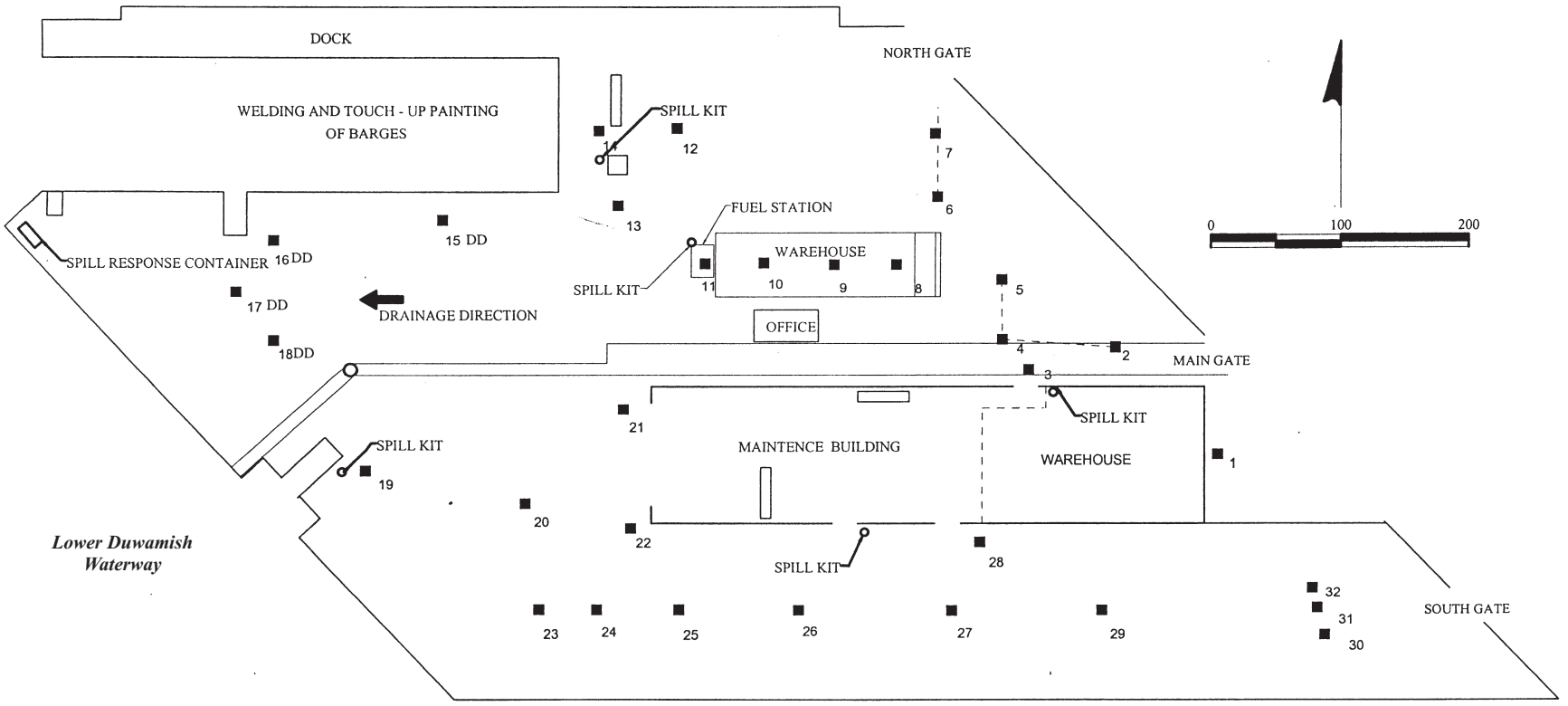


ecology and environment, inc. International Specialists in the Environment Seattle, Washington	LOWER DUWAMISH WATERWAY RM 2.0-2.3 EAST Seattle, Washington	Figure 9 FACILITY MAP AND GROUNDWATER MONITORING WELL LOCATIONS - V. VAN DYKE
Base Map Reference: LSI Adapt 2003.	Date: 3-16-09 / Drawn by: AES / 10:002330WD1403\fig 9	



Note: 001 and 002 apparently indicate general sheet runoff (not storm drain lines).

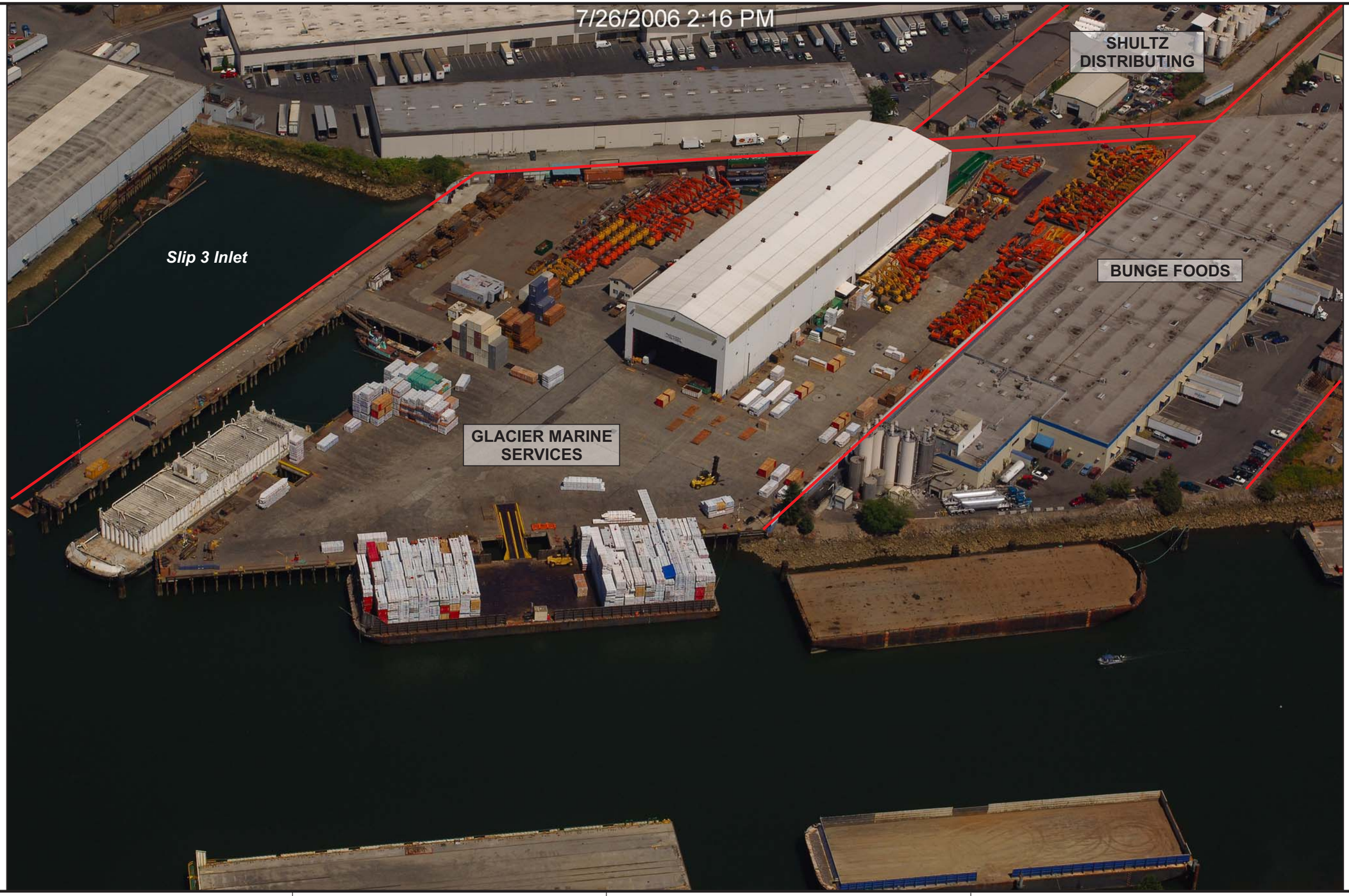
ecology and environment, inc. International Specialists in the Environment Seattle, Washington	LOWER DUWAMISH WATERWAY RM 2.0-2.3 EAST Seattle, Washington	Figure 8 FACILITY MAP - GLACIER MARINE SERVICES (IN OPERATION AS MARINE POWER & EQUIPMENT)	
	Base Map Reference: Washington State Department of Ecology, 1989.	Date: 3-16-09	Drawn by: AES	10:002330WD1403\fig 8



Northland Services Terminal
6701 Fox Ave. South

NOTE: CATCH BASIN LOCATIONS ARE NOT EXACT

ecology and environment, inc. International Specialists in the Environment Seattle, Washington	LOWER DUWAMISH WATERWAY RM 2.0-2.3 EAST Seattle, Washington	Figure 7 FACILITY MAP - GLACIER MARINE SERVICES (IN OPERATION AS NORTHLAND SERVICES)		
	Base Map Reference: Northland Services, Inc., 2001.	Date: 3/16/09	Drawn by: AES	10:002330WD1403\fig7



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Seattle, Washington

Aerial Photograph Reference: Department of Ecology.

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 6
AERIAL PHOTO OF THE SLIP 3 INLET AREA (SOUTH)

Date:	Drawn by:	
5/21/08	AES	10:002330WD1403\fig 6

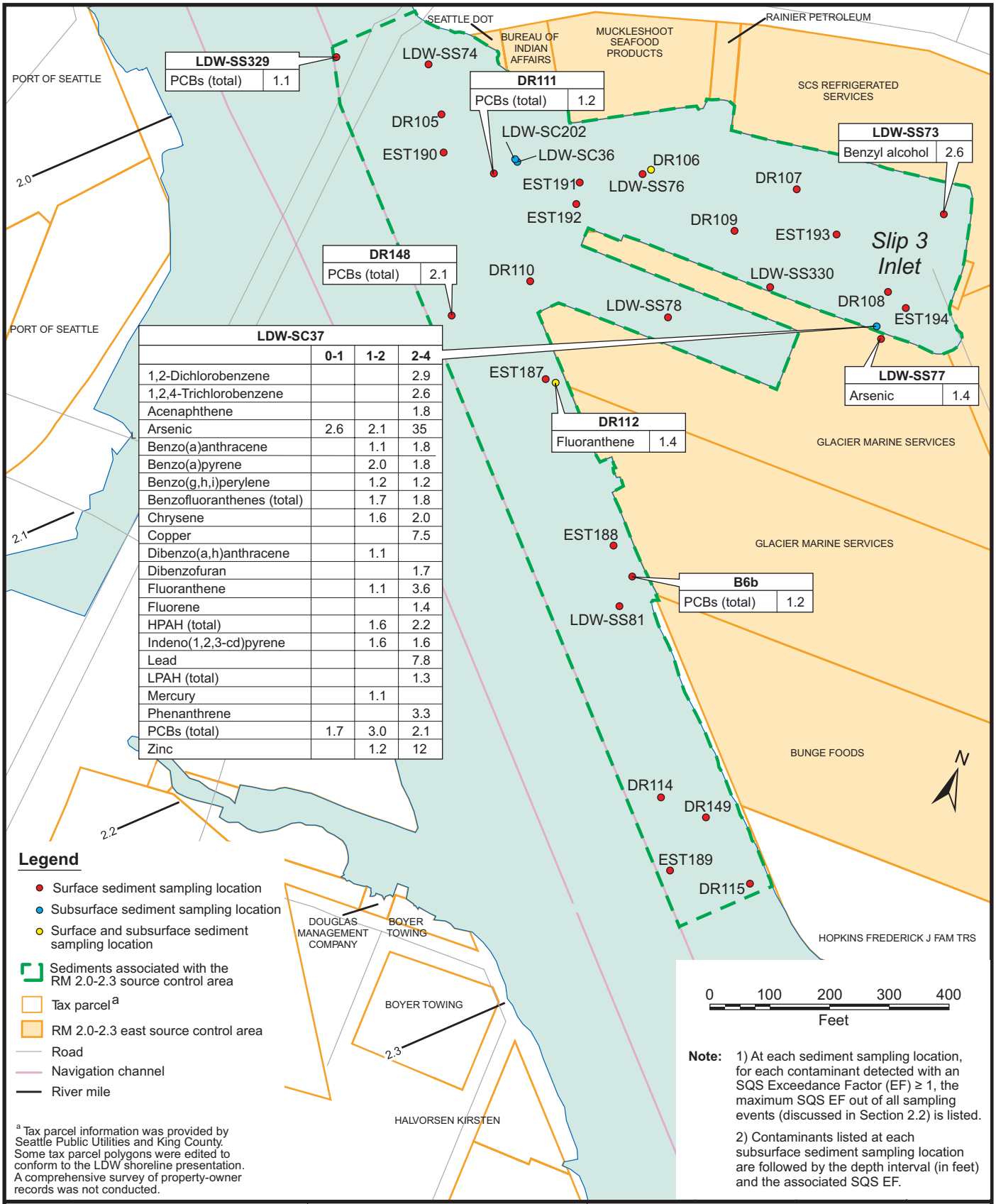
ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Aerial Photograph Reference: Department of Ecology.

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 5
AERIAL PHOTO OF THE SLIP 3 INLET AREA (NORTH)

Date:	Drawn by:	
5/21/08	AES	10:002330WD1403\fig5



LDW-SC37	0-1	1-2	2-4
1,2-Dichlorobenzene			2.9
1,2,4-Trichlorobenzene			2.6
Acenaphthene			1.8
Arsenic	2.6	2.1	35
Benzo(a)anthracene		1.1	1.8
Benzo(a)pyrene		2.0	1.8
Benzo(g,h,i)perylene		1.2	1.2
Benzofluoranthenes (total)		1.7	1.8
Chrysene		1.6	2.0
Copper			7.5
Dibenzo(a,h)anthracene		1.1	
Dibenzofuran			1.7
Fluoranthene		1.1	3.6
Fluorene			1.4
HPAH (total)		1.6	2.2
Indeno(1,2,3-cd)pyrene		1.6	1.6
Lead			7.8
LPAH (total)			1.3
Mercury		1.1	
Phenanthrene			3.3
PCBs (total)	1.7	3.0	2.1
Zinc		1.2	12

Legend

- Surface sediment sampling location
- Subsurface sediment sampling location
- Surface and subsurface sediment sampling location
- Sediments associated with the RM 2.0-2.3 source control area
- Tax parcel[a]
- RM 2.0-2.3 east source control area
- Road
- Navigation channel
- River mile

[a] Tax parcel information was provided by Seattle Public Utilities and King County. Some tax parcel polygons were edited to conform to the LDW shoreline presentation. A comprehensive survey of property-owner records was not conducted.

Note: 1) At each sediment sampling location, for each contaminant detected with an SQS Exceedance Factor (EF) ≥ 1, the maximum SQS EF out of all sampling events (discussed in Section 2.2) is listed.

2) Contaminants listed at each subsurface sediment sampling location are followed by the depth interval (in feet) and the associated SQS EF.

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Seattle, Washington

LOWER DUWAMISH WATERWAY
RM 2.0-2.3 EAST
Seattle, Washington

Figure 4
SEDIMENT SAMPLING LOCATIONS AND ASSOCIATED CONTAMINANTS DETECTED IN EXCEEDANCE OF SQS

Base Map Reference: Windward 2007.

Date: 3-16-09 | Drawn by: AES | 10:002330WD1403\fig 4

Notes:
1. This figure was created using GIS data provided by SPU.
2. Drainage areas were delineated in collaboration with SPU and Ecology.

1st Ave South Bridge SD
Michigan CSO
South River Steet SD
South Brighton Street CSO/SD
South Myrtle Street SD
Outfall #2024
Outfall #2025 and Seep
SLIP 3 INLET
LOWER DUWAMISH WATERWAY
RIVERSIDE INDUSTRIAL PARK
V. VAN DYKE
RAINIER PETROLEUM
SCS REFRIGERATED SERVICES
MUCKLESHOOT SEAFOOD PRODUCTS
SEATTLE DISTRIBUTION CENTER
GLACIER MARINE SERVICES
SHULTZ DISTRIBUTING
BUNGE FOODS
CASCADE COLUMBIA DISTRIBUTION
"LOT 11"
SEATTLE BOILER WORKS
WHITEHEAD PROPERTY (HISTORICAL TYEE LUMBER)
1.9
2.0
2.1
2.2
2.3
1ST AV S
1ST AV S BRIDGE ON RAMP
1ST AV S SOUTH BRIDGE
3RD AV S
4TH AV S
5TH AV S
5TH PL S
6TH AV S
7TH AV S
OCCIDENTAL AV S
2ND AV S
S RIVER ST
N P R R
S BRIGHTON ST
FOX AV S
E MARGINAL WY S
S WILLOW ST
FORMER S FRONTENAC ST
S MYRTLE ST
S ORCHARD ST
8TH AV S
CARLETON AV S
CORSON AV S
6TH AV S
ELLIS AV S
FLORA AV S
S EDDY ST
S ALBRO PL
S ELIZABETH ST
S WARSAW ST
SW MICHIGAN ST
1ST AV SW
2ND AV SW
HIGHLAND PARK WY SW

0 50 100 200 300 400 Feet
0 25 50 100 150 200 Meters

Outfall Type
- CSO-KC
- CSO/SD-City
- Private SD
- SD-City
- SD-WSDOT/City

- Catch Basin
- Catch Basin - Lg. Inlet
- Inlet (Street Drain)
- Sand Box

- Drainage Mainline
- Sanitary Mainline
- Combined Mainlines
- King County Mainline
- River Mile Marker

- Culverts, Inlets and Laterals
- Building
- Parcel Boundary
- Street Centerline

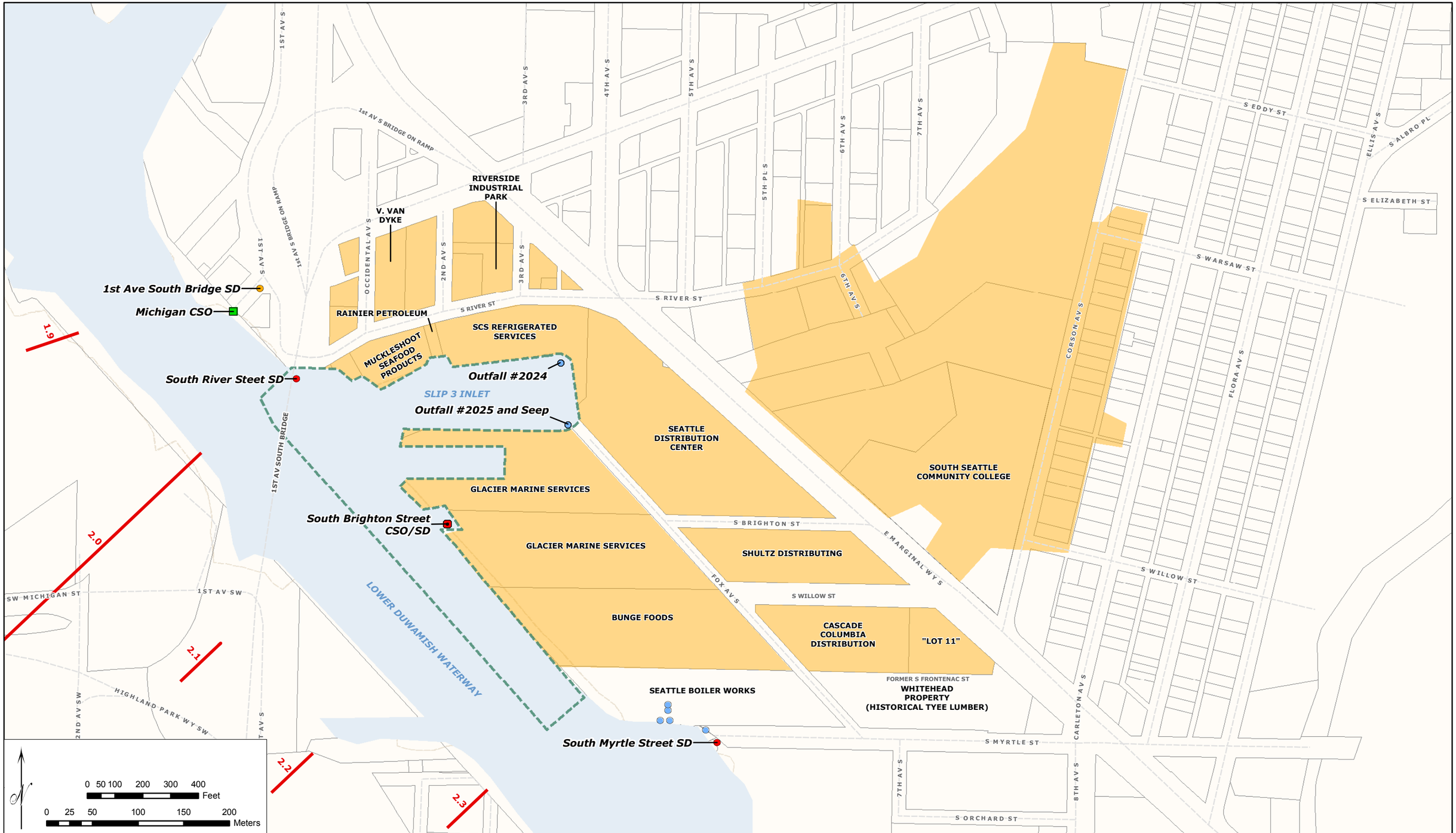
- South Brighton Street Stormwater Drainage Basin
- Drainage to Slip 3 Outfalls
- South Brighton Street CSO Drainage Basin
- South River Street Stormwater Drainage Basin
- Direct Drainage to LDW

LOWER DUWAMISH WATERWAY
RM 2.0 - 2.3 EAST
Seattle, Washington

FIGURE 3

RM 2.0-2.3 EAST DRAINAGE BASIN AND STORM DRAIN SYSTEM

Date: 10/15/2008	Drawn by: RLS	Figure 3 RM 2.0-2.3 East Drainage Basin.mxd



Outfall Type
- CSO-KC
- CSO/SD-City
- Private SD
- SD-City
- SD-WSDOT/City

- Parcel Boundary
- Street Centerline
- River Mile Marker
- RM 2.0 - 2.3 East Source Control Area
- Sediments Associated with the RM 2.0-2.3Source Control Area

LOWER DUWAMISH WATERWAY
RM 2.0 - 2.3 EAST
Seattle, Washington

FIGURE 2
RM 2.0-2.3 EAST SOURCE CONTROL AREA

Date: 10/15/2008	Drawn by: RLS	Figure 2 RM 2.0-2.3 East Control Area.mxd