ARCADIS
Infrastructure, environment, buildings

Imagine the result

Chevron Environmental Management Company

Source Control Evaluation Report

Former Chevron Willbridge Asphalt Plant No. 209293

5501 NW Front Avenue Portland, Oregon

May 2009

ARCADIS

Grant V. Sprick, P.E.
Senior Project Manager

Brooke Bonkoski, P.E.
Staff Sediment Specialist

Source Control Evaluation Report

Former Chevron Willbridge Asphalt Plant No. 209293

Prepared for:
Chevron Environmental Management Company

Prepared by:
ARCADIS
111 Southwest Columbia Street
Suite 725
Portland
Oregon 97201
Tel 503.220.8201
Fax 503.220.8209

Our Ref.:
B0045449.0003

Date:
May 2009

g:\projects\chevron mbu\209293 willbridge asphalt\storm water investigation\sce\209293 sce report_rev051409.doc

Tables

Figures

Attachments

Acronyms and Abbreviations

API	American Petroleum Institute
bbl	barrel
bgs	below ground surface
BMP	Best Management Practice
CCS	Cowlitz Clean Sweep
CEMC	Chevron Environmental Management Company
CFR	Code of Federal Regulations
COD	chemical oxygen demand
COP	City of Portland
COPC	constituent of potential concern
cy	cubic yard
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DEQ	Oregon Department of Environmental Quality
Ecology	Washington Department of Ecology
FHA	Federal Housing Authority
FRP	Facility Response Plan
ft^2	square foot/feet
HAZWOPER	Hazardous Waste and Emergency Response Standard

HI	Heavy Industry
HYDRA	Hydrologic Data Retrieval and Acquisition
JSCS	Joint Source Control Strategy
LWG	Lower Willamette Group
MDL	method detection limit
mg/kg	milligrams per kilogram
NPDES	National Pollutant Discharge Elimination System
OC	organochlorine
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
POTW	publicly owned treatment works
PPC	Paramount Petroleum Corporation
QA/QC	quality assurance and quality control
RCRA	Resource Conservation and Recovery Act
report	*Source Control Evaluation Report*
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SAIC	Science Applications International Corporation
site	former Chevron Willbridge Asphalt Plant No. 209293

SLV	screening-level value
SPCC	Spill Prevention Control and Countermeasure Plan
SPH	separate-phase hydrocarbon
SWPCP	Stormwater Pollution Control Plan
SVOC	semivolatile organic compounds
SWPCP	Stormwater Pollution Control Plan
TERC	Transportation Environmental Resource Center
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TPH-D	total petroleum hydrocarbons as diesel
TPH-O	total petroleum hydrocarbons as heavy oil
TSS	total suspended solid
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VCP	Voluntary Cleanup Program
VOC	volatile organic compound
XPA	expanded preliminary assessment

Executive Summary

On behalf of Chevron Environmental Management Company (CEMC), ARCADIS has prepared this *Source Control Evaluation Report* (report) for the former Chevron Willbridge Asphalt Plant No. 209293, located at 5501 NW Front Avenue, in Portland, Oregon (the site; Figure 1). The current owner and operator of the site is Paramount Petroleum Corporation (PPC).

The goal of the Portland Harbor Joint Source Control Strategy (JSCS) is to identify, evaluate and control sources of contamination that may have the potential to reach the Willamette River. The source control decision process is intended to help evaluate if source control measures are required at the site. This decision is ultimately based on whether the contaminant release or potential for contaminant release has a current or reasonably likely future adverse effect on water or sediment quality in the Willamette River.

The types of contaminant migration pathways identified in the JCSC include:

- *Direct discharges*. Pollutants from commercial, industrial, private or municipal outfalls may be directly discharged to the Portland Harbor Superfund Site, including permitted discharges such as stormwater runoff.
- *Groundwater*. Contaminated groundwater may enter directly into the Portland Harbor Superfund Site via discharge through sediments, bank seeps or it may infiltrate into storm drains/pipes, ditches or creeks that discharge to the Willamette River.
- *Erosion/leaching*. River bank soil, contaminated fill, waste piles, landfills and surface impoundments may release contaminants directly to the Portland Harbor Superfund Site through erosion, via soil erosion to stormwater or by leaching to groundwater.
- *Overwater activities*. Contaminants from overwater activities at riverside docks, wharves or piers; discharges from vessels; fuel releases; and spills may impact the Portland Harbor Superfund Site (DEQ 2008).

The following contaminant migration pathways were determined to be complete at the site:

- *Direct discharge*: Under a NPDES permit, stormwater is discharged from the site and flows to one of two outfalls that discharge into the Portland Harbor.

- *Groundwater*: Groundwater does not directly discharge to the river from the site through sediments, bank seeps or infiltration into ditches or creeks. The only pontentially complete groundwater pathway at the site is groundwater infiltration into stormwater conveyance lines that flow to one of two outfalls and discharge into the Portland Harbor, or through preferential pathways along utility corridors along NW Front Avenue.

In support of the source control decision process, a source control evaluation was completed for the site. The source control evaluation consisted of the following elements:

- review of site operations, both historic and current
- evaluation of current site source control measures such as Best Management Practices
- implementing additional source control measures, such as storm line and catch basin cleanouts
- investigation of all onsite storm lines and mapping of the onsite storm water network, including identification of active lines and historic lines that have been abandoned
- evaluation of potential for groundwater infiltration into onsite storm lines
- collection and analysis of onsite catch basin sediment samples
- collection and analysis of storm water samples from site storm water discharge points

The conclusion of the source control evaluation is that the site is not a significant source of contamination to the Willamette River. Selected constituents, particularly metals and PAHs, were detected above SLVs in storm water and catch basin samples at the site. Source control measures currently in use at the site are effective at targeting these constituents. In addition to maintaining the current source control measures in use at the site, additional stormwater management measures can be implemented to further address these constituents. These additional measures include regular cleaning and maintenance of storm water vaults, proper visual inspections

before storm water discharge, street sweeping, and additional storm line sediment cleanout activities, as warranted.

1. Introduction

On behalf of Chevron Environmental Management Company (CEMC), ARCADIS has prepared this *Source Control Evaluation Report* (report) for the former Chevron Willbridge Asphalt Plant No. 209293, located at 5501 NW Front Avenue, in Portland, Oregon (the site; Figure 1). The current owner and operator of the site is Paramount Petroleum Corporation (PPC).

The goal of the Portland Harbor Joint Source Control Strategy (JSCS) is to identify, evaluate and control sources of contamination that may have the potential to reach the Willamette River. This report, along with the Storm Water Sampling Plan (ARCADIS BBL 2007a) and the three technical memos presenting the results of the stormwater and catch basin sampling for the site (ARCADIS BBL 2007b, 2008a, 2008b) satisfy the goals and objectives of the JSCS.

1.1 Purpose

The source control decision process is intended to help evaluate if source control measures are required at the site. This decision is ultimately based on whether the contaminant release or potential for contaminant release has a current or reasonably likely future adverse effect on water or sediment quality in the Willamette River.

The source control evaluation was undertaken for the site to evaluate current or reasonably likely future adverse affect. Upland sources that have complete migration pathways were screened against JSCS screening-level values (SLVs). Exceedance of an SLV does not necessarily indicate that the upland source poses an unacceptable risk to human health or the environment. It does, however, indicate that the source requires further consideration of the need for source control using a weight-of-evidence evaluation, which is presented in Section 5.

1.2 Regulatory Framework

The United States Environmental Protection Agency (USEPA) conducted a preliminary assessment at the site in 1983; as a result, a No Further Remedial Action Planned designation was issued by the USEPA in 1984. In 1994, Chevron signed a letter agreement with the Oregon Department of Environmental Quality (DEQ) and the site was transferred into the DEQ Voluntary Cleanup Program (VCP). In 1995, Chevron chose to proceed independently with site investigations and terminated the VCP letter agreement.

In 2002, the DEQ prepared a strategy recommendation letter for the site. The letter recommended conducting an expanded preliminary assessment (XPA) at the site. Chevron signed a DEQ VCP letter agreement and conducted the XPA. The XPA report was published in 2004 (Science Applications International Corporation [SAIC] 2004). In 2005, Chevron sold the property to PPC. During the property transfer from Chevron to PPC, the DEQ VCP letter agreement was terminated and Chevron signed a new letter agreement on June 22, 2006 to cover only the JSCS source control evaluation. PPC is the current owner and operator of the site; however, Alon USA Energy, Inc. acquired PPC in 2006.

The DEQ published a Milestone Report in September 2008, which prioritized sites located within the Portland Harbor that are undergoing source control evaluations. The Former Chevron Willbridge Asphalt Plant was identified as a "low-priority" site in the Milestone Report (DEQ 2008). Low-priority pathways and sites are those where upland data indicate, based on an initial evaluation of key source control prioritization factors, that the site likely poses a low threat to the river (e.g., concentrations are near or below SLVs). Source control measures will not be required at low-priority sites unless determined necessary by the results of the Portland Harbor remedial investigation/ feasibility study (RI/FS) or Record of Decision (ROD; USEPA/DEQ 2005). Upon DEQ acceptance of the Source Control Evaluation, the DEQ will submit a source control decision memorandum to the USEPA. Following consideration of USEPA's comments and possible modifications to the source control memorandum, the DEQ will issue a source control evaluation completion letter to CEMC.

1.3 Organization

This document is organized into the following sections:

- Section 2 – Site Description and History. This section describes the site features, current and historical site operations, and the contaminant migration pathways for the site.
- Section 3 – Stormwater Control Measures. This section describes the stormwater control measures and Best Management Practices (BMPs) that are currently employed at the site to manage stormwater runoff.
- Section 4 – Stormwater Sampling Events. This section summarizes the sampling events undertaken as a part of the stormwater source control evaluation, including catch basin and stormwater sampling.

- Section 5 – Data Summary and Evaluation. This section uses a weight-of-evidence evaluation by analyzing the frequency, location and magnitude of SLV exceedances for catch basin sediment, stormwater discharges, and groundwater infiltration.
- Section 6 – Effectiveness Evaluation. This section uses the weight-of-evidence evaluation in conjunction with historical site knowledge and the site BMPs to determine if additional source control measures should be employed at the site.

2. Site Description and History

2.1 Site Description

The site consists of 31.3 acres located at 5501 NW Front Avenue in Portland, Multnomah County, Oregon, in the northwestern portion of the Guilds Lake Industrial District. The site is listed with Multnomah County as Tax Lot 400, Township 1 North, Range 1 East, Section 19 (NW ¼). The site is bounded to the northwest by the ConocoPhillips Willbridge Terminal, to the northeast by NW Front Avenue, to the southeast by Kittridge Business Park and to the southwest by the Burlington Northern Santa Fe Railroad tracks. The area is zoned Heavy Industrial (HI). There are no residential areas within ¼ mile of the site. Figure 1 presents the site location.

2.1.1 Site Geology and Hydrology

The site is located in the northern area of the Portland Basin, in the Willamette River floodplain. The site is bounded to the southwest by a relatively steep bedrock escarpment consisting of the Colombia River Basalt and to the northwest by the Willamette River. The basin is filled with recent alluvium and Pleistocene cataclysmic flood deposits, underlain by Holocene to Eocene sedimentary and volcanic rocks.

Based on an 1897 map, Kittridge Lake existed in the same location as the Chevron Asphalt Refinery Site. The lake was filled with dredge spoils from the Willamette River. The results of a subsurface exploration in 1985 indicate that the central refinery area and crude oil tank yard (northern yard) are generally underlain by 5 to 15 feet of loose to medium dense, relatively clean (few fines) sand fill overlying sandy silt and silt. Soil underlying the southern two-thirds of the Guilds Lake tank yard (southern yard) consists of loose sandy silt and silty sand.

The first occurring groundwater is in the fill material and Holocene sediments. Historical groundwater levels in site monitoring wells have generally ranged from 4 to 17 feet below ground surface (bgs). Based on historical groundwater elevations, the groundwater flow direction has been generally to the north to northeast, toward the Willamette River. The observed groundwater flow direction is consistent with the anticipated northerly regional flow direction. Groundwater gradients have ranged from approximately 0.02 foot/foot at the south and north ends of the site to approximately 0.04 foot/foot in the central area of the site. A comparison of the groundwater elevation in well W-12 with groundwater elevations in adjacent wells (W-11, A-8 and A-10)

indicates that the groundwater elevation in well W-12 has been anomalously high since groundwater measurements were implemented in 1992. The location of well W-12 can be seen on Figure 20.

2.1.2 Site Features

The site contains 91 aboveground product storage tanks. Ten of these have a capacity of 80,000 barrels (bbls) or greater. Containment for the tanks consists of concrete walls and earthen berms with a total capacity of 1,642,600 bbls. Tanks have a single-bottom metal construction. No underground storage tanks are present at the site. In addition to the tanks, eight truck loading racks and one rail car loading rack are present on site. Site features are shown on Figure 2.

The crude oil tank yard, located on the western portion of the site, consists of tanks for crude oil and asphalt products. The Guilds Lake tank yard, located in the southern portion of the site, stores asphalt products and aviation fuel for the Chevron Willbridge Light Products Terminal. Product is transferred from the Guilds Lake tank yard area through dedicated piping. No loading or unloading of product requiring connection or disconnection occurs in the Guilds Lake tank yard.

The site has approximately 238,630 square feet (ft^2) of paved roadways and rooftops. In addition, there is approximately 170,000 ft^2 of surface area on the top of the tanks at the site which drain to the ground surface. The total impervious area at the site is approximately 409,630 ft^2.

2.1.3 Current and Historical Site Operations

The former Chevron Willbridge Asphalt Plant was constructed in 1947 and has been in continuous operation since that time. During World War II, the undeveloped lot southeast of the refinery, labeled “Undeveloped Property” on Figure 2, was developed by the Federal Housing Authority (FHA) to be used as shipyard worker housing.

The current processes and operations at the site include asphalt refining, emulsions manufacturing and asphalt blending. The refinery produces asphalt, asphalt emulsions, modified asphalt emulsions for roofing products, vacuum gas oil for gasoline refinery feedstock, kerosene, naphtha and middle distillates. Figure 2 shows the location of various processes and the location of material storage tanks on site.

2.1.3.1 Materials Used On Site

Crude oil, charge stocks and bulk compounding stocks for the refining process are received by tanker shipments at the Chevron Willbridge Distribution Center dock (located at 5924 NW Front Avenue) and by tank car or transport trucks. Crude oil and light petroleum products are transported to and from the site to the Chevron dock via aboveground and underground pipelines. Asphalt, vacuum gas oils, fuel oil and naphtha are shipped by barge and tanker from the Willbridge Distribution Center dock, as well as by tank car, pipeline and tank truck from the site.

Caustic soda and hydrochloric acid are stored in aboveground tanks in the refinery and emulsions tank yard area, as shown on Figure 2. These materials are used in the manufacturing of emulsified asphalt. Each tank is surrounded by a dedicated containment area separated by a concrete wall that has been treated to resist high- and low-pH materials in case of a spill. Both containment basins drain to the oil/water separator. A small tank of caustic soda is located next to the emulsions warehouse, shown on Figure 2, which is used to raise the pH of wastewater discharging to the publicly owned treatment works (POTW). This caustic tank is filled using a similar sized tank that is loaded from the large caustic tank in the emulsions tank yard area and transferred to a pump-off station located outside of the containment wall by fork truck. The pump-off point has its own containment and the caustic tank is self-contained.

Historically, ferric chloride was used in manufacturing at the site. It is no longer used, but the tank and its containment remain in place for potential use in the future.

Currently, no polychlorinated biphenyl (PCB) transformers are present on site. Historically, PCB transformers were present on site; however, they were all removed prior to 1996. The specific location and details of the removal of historical PCB transformers are unknown.

2.1.3.2 Waste Management

The site is a small quantity generator of hazardous wastes. All wastes from the site are stored properly and removed from the site using appropriate waste manifest procedures. Historically, hazardous waste was stored to the west of tank T-100, as indicated on Figure 3. Currently, hazardous waste is stored in the maintenance warehouse, which is a closed building with standard roof drainage that leads to stormwater catch basins. The current location of hazardous waste storage is shown on Figure 3.

The site has a National Pollutant Discharge Elimination System (NPDES) general permit for stormwater and an air discharge permit.

2.1.3.3 API Separator

The following onsite water drains to American Petroleum Institute (API) separator:

- on-site strip drains
- drains inside buildings and warehouses
- water draws on the crude and light products tanks
- pump cooling water
- boiler blow-down
- truck loading and unloading areas
- pipe trenches
- pump containment pads

The API separator is followed by on-site treatment and discharge to the sanitary sewer. The on-site wastewater collection system is shown on Figure 4. The API separator serves to separate oil, wastewater and sediments from wastewater. Oil rises to the top of the API separator and is skimmed off for reprocessing. Sediments settle to the bottom and are cleaned out with a sludge pump. The wastewater is discharged to on-site treatment for further removal of residual oil.

2.1.4 Historical Spills

Historical spills were identified from site records and previous reports. Spills for which the location was identified appear on Figure 3. Site spill incidents are summarized in the XPA (SAIC 2004) and in DEQ Spill Database records, with the exception of the most recent spill (July 1, 2008), which is described below.

On July 1, 2008, approximately 840 gallons of crude oil was spilled in the crude products tank yard while transferring crude oil from tank T-104 to tank T-105. The DEQ

was notified, and participated in the spill response actions conducted by PPC. The spill did not occur near any stormwater catch basins, and no oil entered the on-site stormwater system. Some of the oil collected in wastewater catch basin WWCB-62, which drains to the on-site API oil-water separator.

2.1.5 Results From Previous Groundwater Investigations

Groundwater samples were collected in 2003 as a part of the XPA conducted by SAIC. This is the most recent site-wide groundwater sampling event. Analytical results from this investigation indicated that dissolved-phase benzene, naphthalene, polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) in groundwater occur primarily within the central portion of the site. Excluding well W-4, the extent of these constituents in groundwater is delineated to below laboratory reporting limits by the wells located along the northern (downgradient) site boundary. These results indicate that off-site migration has not occurred.

2.1.6 Results from Previous Separate-Phase Hydrocarbon Investigations

Separate-phase hydrocarbons (SPHs) have been detected in the following wells at the site:

- well A-3, in the central area of the crude oil tank yard
- wells A-5 and A-10, in the crude oil tank yard near the southwestern site boundary
- well A-6, near the distillation area and lab
- well A-7, in the vicinity of the refining/distillation area
- well W-14, located adjacent to the oil collector in the Guilds Lake tank yard

An SPH monitoring and recovery program was implemented in October 2001. Since that time, select monitoring wells are gauged monthly. Only minor volumes of SPH have been recovered since October 2001. Three of the wells (A-3, A-6 and A-7) currently have a regularly measurable thickness of SPH. Because of the viscous nature of the SPH and its limited extents on site, the potential for off-site migration of SPH is considered negligible.

2.2 Contaminant Migration Pathways

The Portland Harbor conceptual site model presented in the Programmatic Work Plan (Lower Willamette Group [LWG] 2004a, 2004b) identifies potential upland contaminant migration pathways that may impact the river, such as:

- *Direct discharges*. Pollutants from commercial, industrial, private or municipal outfalls may be directly discharged to the Portland Harbor Superfund Site, including permitted discharges such as stormwater runoff.
- *Groundwater*. Contaminated groundwater may enter directly into the Portland Harbor Superfund Site via discharge through sediments, bank seeps or it may infiltrate into storm drains/pipes, ditches or creeks that discharge to the Willamette River.
- *Erosion/leaching*. River bank soil, contaminated fill, waste piles, landfills and surface impoundments may release contaminants directly to the Portland Harbor Superfund Site through erosion, via soil erosion to stormwater or by leaching to groundwater.
- *Overwater activities*. Contaminants from overwater activities at riverside docks, wharves or piers; discharges from vessels; fuel releases; and spills may impact the Portland Harbor Superfund Site (DEQ 2008).

2.2.1 Direct Discharge Pathway

Under a NPDES permit, stormwater is discharged from the site and flows to one of two outfalls that discharge into the Portland Harbor. Therefore, the direct discharge pathway is complete, and is evaluated in this report.

2.2.2 Groundwater Pathway

Due to the distance from the site to the Willamette River, groundwater does not directly discharge to the river from the site through sediments, bank seeps or infiltration into ditches or creeks. The only potentially complete groundwater pathway at the site is groundwater infiltration into stormwater conveyance lines that flow to one of two outfalls and discharge into the Portland Harbor, or through preferential pathways along utility corridors along NW Front Avenue. These groundwater pathways are complete and are evaluated as a part of the direct discharge stormwater pathway in this report.

2.2.3 Erosion Pathway

NW Front Avenue bounds the site directly to the east, and additional industrial sites are located across NW Front Avenue between the site and the Willamette River. The eastern edge of the site is approximately 0.2 miles from the river. Therefore, the direct erosion of soil, fill or surface impoundments from the site to the river is incomplete. The only complete erosion pathway at the site is erosion of site soils into stormwater, which is evaluated as part of the direct discharge stormwater pathway in this report.

2.2.4 Overwater Activities Pathway

There are no dock areas at the site, and operations at the site do not engage in any of the overwater activities listed above. The overwater activities associated with crude oil transfer at the Chevron Willbridge Distribution Center dock are covered in the Willbridge Terminal source control evaluation.

2.2.5 DEQ Milestone Report Pathways

Table 1 of the Milestone Report (DEQ 2008) lists the sites undergoing source control evaluation in the Portland Harbor. The table identifies the pathways that the DEQ has determined to be complete for each site. The pathways identified in this reportare consistent with the pathways identified in the Milestone Report (DEQ 2008).

2.3 Facility Stormwater System

2.3.1 Drainage Basins

Stormwater is discharged from the site through two stormwater line systems. These stormwater systems are shown on Figure 6. The Outfall V39 stormwater system collects surface water from Area 1 (the Guilds Lake tank yard) directs it through a shutoff valve designated as “Outfall V39,” exits the site to the east and eventually discharges to City of Portland (COP) Outfall 19, located to the southeast of the site, and the Willamette River. The V-33 stormwater system collects surface water from the Areas 2, 3 and 4 at the site, directs it through a shutoff valve vault designated as “Outfall V33,” and exits the site to the northeast along Front Avenue. This flow eventually discharges to COP Outfall 22, located northeast of the site, and the Willamette River. Stormwater vaults at Outfalls V39 and V33 are the site’s designated NPDES stormwater discharge sampling locations.

Figure 5 shows the sub-basins of interest at the site, which are labeled by activity:

- Area 1: Guilds Lake Tank Yard
- Area 2: Equipment Storage and Parking
- Area 3: Refinery and Emulsion Tank Yard
- Area 4: Crude Oil Tank Yard
- Area 5: Parking Lot and Rail Line

All catch basins on site are regulated by stormwater valves, with the exception of one catch basin (which is located in Area 2, downstream of the valve at Outfall V39). These valves remain in the closed position until stormwater accumulation on site requires opening the valves. The system facilitates inspection and regulation of stormwater prior to discharge from the site.

The overland flow of stormwater to the Willamette River does not occur at the site. The refinery and tank yards are contained within walls and berms. All refinery storage tanks are located within secondary containment. The majority of the undeveloped area to the south of the site consists of pervious gravel and vegetation. However, a small section of the undeveloped area is impervious and drains to the stormwater line downstream of Outfall V39 through the catch basin in Area 2.

2.3.2 Stormwater Line Video Survey Results

Two historical video surveys of the on-site storm lines were conducted by others in 2002 and 2005, and were presented in the Storm Water Sampling Plan (ARCADIS BBL 2007a). The lines were resurveyed during data collection for this source control evaluation, as described in Sections 2.3.2.1 and 2.3.2.2.

2.3.2.1 ARCADIS BBL 2007 Video Surveys and Dye Test

Video surveys of various on-site storm lines, connections from the site to COP storm lines and the historical FHA storm lines were conducted by ARCADIS BBL at the site from February 19 to February 22, 2007,June 27, 2007, and October 1, 2007. These surveys were conducted to evaluate the condition of various storm lines, to verify the location of unknown lines and to observe potential inflow from groundwater or other sources into the storm lines. An overview of the locations of the video-surveyed storm lines is presented on Figure 6. Zoomed-in views of the video survey runs, including

labels of the runs and indications of sediment accumulation and line cleanout are presented on Figures 7, 8, 9 and 10. Results of these video surveys and a detailed summary of the field events were presented in the Storm Water Sampling Plan (ARCADIS BBL 2007a). The results of the survey are discussed below. Further detail is provided in Table 1, including length of lines surveyed, pipe construction and size, laterals observed, leaks or cracks observed and pipe cleanouts performed.

2.3.2.2 February 19 to February 22, 2007 Field Activities

Video surveys were conducted from February 19 to February 22, 2007 by ARCADIS BBL and Cowlitz Clean Sweep (CCS). The video surveys were conducted during a wet period. The COP Hydrologic Data Retrieval and Acquisition (HYDRA) Network rainfall records at the NW Yeon Avenue gauge recorded the following total rainfall amounts for the days prior to and during which the surveys were conducted:

- February 18, 2007: 0.03 inch
- February 19, 2007: 0.14 inch
- February 20, 2007: 0.69 inch
- February 21, 2007: 0.2 inch
- February 22, 2007: 0.13 inch

Cleanouts using a jet router and vacuum truck were generally conducted prior to the video survey. On-site line cleanouts were not previously conducted at the site. Approximately 0.75 cubic yard (cy) of sediment was removed from the lines indicated in Table 1 and placed into three 55-gallon drums. Sediment accumulation and line cleanout locations are presented on Figures 7, 8, 9 and 10. Seventeen video survey runs were made during the February investigations. No sheen or SPH was observed in any lines.

2.3.2.2.1 Survey of FHA Lines

Video runs to document FHA lines included Runs 1 through 10 and Runs 14 through 25. Selected existing on-site FHA lines were incorporated into the site stormwater conveyance lines, where site development overlapped the historical on-site FHA development. Attachment 1 provides the 1945 as-built drawing, showing all on-site and off-site FHA lines. Figure 6 shows the approximate historical location of the on-site FHA lines. As shown on Figure 6, the location of certain FHA lines was confirmed during the survey; however, not all of these lines could be surveyed with video

equipment because many of the junctions do not have manholes or have manholes or catch basins that cannot be located. It is likely that, due to the age of these lines, many of the manholes or catch basins were abandoned and have been paved, built or graded over. The video survey camera has limited turning ability, so laterals cannot be accessed if there is not an accessible manhole at the junction between the laterals. All accessible on-site FHA lines were surveyed.

Small cracks where water was observed seeping in were observed along the main lateral line downstream of Outfall V39. This water does not contribute to major flow in the lines. The water could potentially be from groundwater infiltration. Groundwater infiltration as a source is discussed and evaluated in Section 5.2. From the video survey results, it was confirmed that all FHA lines that were accessed have been capped or backfilled with material, with the exception of segments of line that were incorporated into on-site storm lines. These include the following segments:

- line between the stormwater valve at Outfall V39; and manholes AAP821, 822, 823, 825 and 917, which are used for the discharge line from the stormwater valve at Outfall V39
- line between manholes AAP819, 820 and 821, which has one active catch basin on its upstream end
- line between manholes AND864 and AAP809, which has one stormwater manhole with holes in the cover in the site parking area, but is not designed or sloped for stormwater capture

For the remainder of the on-site FHA lines, stormwater is not entering the site system from any catch basins, manholes or other historical stormwater collection basins associated with the historical lines. The only historical off-site connections for FHA lines located within the site boundary to the COP system were at AAP917 and AAP912, which are the same points at which the current system connects to the COP system on the south end of the site.

Based on the results of the FHA stormwater line video survey, the on-site FHA storm lines that appear on the 1945 as-built drawing (Attachment 1) could be correlated to the location of storm lines observed in the field. Figure 6 shows the approximate historical location of these lines.

The orange lines on Figure 6 represent lines that were accessed using video surveys, where the line and the laterals off of the line could be confirmed with a camera. The

green dashed segments represent lines that were not directly surveyed by video because they could not be accessed, but could be placed in relation to the video surveyed lines based on the 1945 as-built drawing (Attachment 1). For instance, at manhole AAP825, a lateral was observed on the video survey coming in at an angle from the north. This area was compared to the 1945 as-built drawing, and the existence of that lateral on the 1945 as-built drawing was confirmed. From this lateral, the as-built drawing shows the line extending north with three additional laterals coming off of the line. The additional lines were added to scale in green dashed line type to the drawings. The only area of the site where verification of the existing historical storm lines against the 1945 as-built drawing was not possible was along the line connecting manholes AAP809, AAP907, AAP911 and AAP912 because access to the line was limited by construction of an active rail line over the manholes. Evaluation of this portion of line is discussed in Section 5.2.2.

2.3.2.2.2 Survey of On-site Lines Upstream of Outfall V39

The lines surveyed upstream of Outfall V39 included Runs 18, 19 and 20. The lines that were videoed on site did not show evidence of cracks or water leaking into the system, with the exception of Run 20 near SW MH-11. Water was observed flowing in this line, but the source of this water could not be identified. The water could potentially be from groundwater infiltration. Groundwater infiltration as a source is discussed and evaluated in Section 5.2.

2.3.2.2.3 Survey of Off-site Connections

Three video surveys were conducted along the northeast side of the site along NW Front Avenue to confirm that there are no connections from the site to the main COP stormwater line, except the connection from Outfall V33 to the COP stormwater line. These lines are designated as Runs 11, 12 and 13 on Figure 8, and details of these runs are provided in Table 1.

A video survey was conducted from manhole AAM084 upstream to confirm that a historical connection to the site had been abandoned and capped off. This run is labeled Run 11 on Figure 8 and on Table 1. The video survey confirmed that this stormwater line is capped approximately 29 feet upstream of its junction with the COP stormwater line. A screen snapshot of the video survey showing the concrete cap is provided on Figure 11. The original video survey for this line was provided as an attachment to the Storm Water Sampling Plan (ARCADIS BBL 2007a). The line was observed to be dry, despite having heavy rain during the investigation. No flow or inline solids were observed in the line, and the nature of the cap confirmed that flow will not occur from this line in the future.

No off-site flow is occurring from the north side of the site, with the exception of the regulated discharge point Outfall V33. No inline sediments were observed in the downstream section of line connecting V33 to the COP storm line that runs down NW Front Avenue.

2.3.2.2.4 Data Gaps from February Surveys

Two specific video surveys could not be conducted during the February investigation due to site conditions during the video survey. The stormwater line from manhole AAP825 downstream to manhole AAP917 was not videoed because neither of these manholes could be located. Without access to these manholes, the video survey system could not continue downstream through the stormwater line remotely. The stormwater line on site from Outfall V39 upstream toward manhole AAP 818 (PPC manhole SW MH-11) could not be videoed due to excessive flows in the storm lines in this area. To gather information in these areas, additional investigations were implemented in June (as discussed in Section 2.3.2.3), during dry weather conditions, to survey the on-site stormwater line and to conduct dye testing to confirm the connection between Outfall V39 and the COP stormwater line.

2.3.2.3 June 27, 2007 Field Activities

Additional video surveys and a dye test were conducted on June 27, 2007, based on the results of the February investigation. The investigations were conducted during a dry period. Based on data from the COP HYDRA Network, no rainfall was measured at the NW Yeon Avenue gauge the day of the investigation and for 2 days prior to the investigation.

Four video survey runs and one dye test were conducted during the June investigations. Table 1 provides details regarding each of the runs. Cleanout of one line was conducted during the investigation. Sediment accumulation and line cleanout locations are presented on Figures 7 and 9.

2.3.2.3.1 Dye Test Results

Upon completion of the February investigations, ARCADIS BBL determined that dye testing was necessary to confirm the connection from Outfall V39 on site to the point at which stormwater leaves the site in the southeast corner adjacent to NW Front Avenue. The dye testing was necessary because one section of this stormwater line could not be accessed with the stormwater line video survey system. Weather conditions during and after the February investigation were such that dye testing could not be conducted because of excessive rain.

On June 27, 2007, ARCADIS BBL conducted a dye test. The water and red dye used for the test were introduced into the storm line at manhole AAP821 (PPC SW MH-17). The video camera used for the video survey was then hung into the line entering manhole AAP912. Approximately 45 minutes passed before the dye was observed at manhole AAP912. This indicates that the line connects as indicated on Figure 6 and does not lose substantial flow volume along the length, but it does not provide additional information regarding the condition of the storm line between manhole AAP825 and manhole AAP 917.

2.3.2.4 October 1, 2007 Field Activities

Additional video surveys were completed on October 1, 2007 by ARCADIS BBL. CCS was contracted to conducted video surveys and storm line cleanout with a vacuum truck where necessary.

Manhole AAP825, downstream of the valve at Outfall V39, was located using a remote-sensing device to track the subsurface location of the storm line, and an excavator. A cleanout and video survey of the line from manholes AAP825 to AAP917, which was previously unreachable, was completed. Cleanouts and additional video surveys of the lines extending from manholes AAP827 to AAP829 and from manhole AAP827 upstream were also completed. These lines had not been cleaned out previously. Sediment accumulation and line cleanout locations are presented on Figures 7, 9 and 10. The camera was able to continue past the extent of the previous surveys, which clarified some of the former FHA connections by comparing the video survey results to the 1945 as-built drawings (Attachment 1).

3. Stormwater Control Measures

Stormwater control measures are used on site to regulate flow and to prevent site material from entering the stormwater system. These measures include both written plans and physical installations. This section discusses both ongoing site stormwater source control measures and source control measures implemented during the source control evaluation.

3.1.1 Stormwater Pollution Control Plan

A Stormwater Pollution Control Plan (SWPCP) has been developed for the site. The plan is reviewed and modified accordingly every 5 years, or after stormwater permit benchmark limits have been exceeded. The current plan was provided in the Storm Water Sampling Plan (ARCADIS BBL 2007a). It presents the details of the control measures discussed in Sections 3.1.2 through 3.1.5.

3.1.2 Stormwater Best Management Practices

The SWPCP describes the BMPs currently implemented and maintained at the site. The BMPs include structural and engineered controls, and operational controls. The site BMPs are listed below:

- *Stormwater valves*. Stormwater valves are used across the site to prevent unintended discharge of materials or polluted stormwater from the site. The stormwater valve locations are shown on Figure 6. These valves are kept shut until storm events require that the valves be opened to discharge stormwater from the site. Prior to discharge, stormwater is visually inspected to prevent sheen and oils from discharging with the stormwater.
- *Stormwater discharge regulation*. Prior to opening the valve at Outfall V33 or the valve at Outfall V39 to drain on-site stormwater, the vault around the valve is visually checked for sheen. If sheen is observed, sorbent pads are used to remove the sheen from the water before the valve is opened. In addition, sorbent booms are permanently installed in the valve vaults. Monthly inspections of the two vaults are conducted to inspect for oily sheen and suspended solids, to check that the inlet and outlet valves are functioning properly, and to assess the condition of the booms to determine if replacements are needed.

- *Containment*. All on-site drain valves are kept in the closed position to prevent unwanted material from flowing into the stormwater system. Refinery tanks and chemicals stored on site are kept in secondary containment. The main tank yards (Guilds Lake and crude oil) are walled and bermed. Each tank yard is capable of containing the entire volume of its largest tank in case of a failure. The eight tank truck loading racks are either bermed or have areas around them to contain spills.
- *On-site API separator*. All on-site strip drains, drains inside buildings and warehouses, water draws on the light product and crude tanks, pump cooling water, boiler blow-down, truck loading and unloading areas, pipe trenches, and pump containment pads drain to the API separator, followed by on-site treatment and discharge to the sanitary sewer.
- *Runoff protection*. Boiler houses, pump houses, laboratories, emulsion manufacturing, warehouses and the maintenance shop are covered with roof structures. Other chemicals at the refinery (i.e., emulsifying chemicals) are stored inside a warehouse and protected from stormwater contact. Empty drums are placed in the drum storage area, which is surrounded by strip drains leading to the API separator.
- *Erosion control*. Catch basins, in areas with unpaved surfaces with greater potential for erosion, are equipped with Dandy Bags®, or filters, which retain dust and other materials on the surface of the filter while stormwater passes through. Drain webs are installed on catch basins in paved high-truck-traffic areas.
- *Housekeeping*. Monthly visual checks of Dandy Bags and drain webs are conducted as part of regular maintenance activities at the site. Dandy Bags are inspected annually and cleaned or replaced as needed. Drain webs are inspected semiannually. Sorbent booms are changed periodically. Materials and waste stored on site are kept in warehouses or sheltered areas to prevent them from coming into contact with stormwater.
- *On-site management plans*. Plans have been developed and are maintained on site for emergency preparedness and response, spill control and countermeasures, regional spill response, and management of hazardous waste.
- *Training*. All operations and maintenance employees are Hazardous Waste Operations and Emergency Response standard (HAZWOPER) First Responder Operations (Level 2), or higher, trained and recertified as defined by the Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.120 each year. Operations and maintenance personnel are trained on aspects of the SWPCP annually as a part of the site environmental

compliance training. Additionally, annual training is provided for both spill response measures and housekeeping procedures. Truck drivers undergo training before they are allowed to self-load at the site loading racks to help reduce spills and truck boil-over during loading.

3.1.3 Stormwater Source Control Measures Implemented During Source Control Evaluation

3.1.3.1 Catch Basin Cleanouts

On August 22, 23 and 24, 2007, ARCADIS BBL conducted catch basin sampling at the site. The sampling is discussed in detail in Section 4.1. The sampling was performed in conjunction with the annual catch basin cleanout as a part of regular on-site maintenance activities. CCS performed the cleanout activities, which involved using a vacuum truck to remove accumulated sediments and any standing water from the catch basins. The catch basin Dandy Bags were also hosed off as a part of the cleanout. The sediment was then placed into drums and was taken by CCS to the Waste Management Hillsboro Landfill for disposal.

3.1.3.2 Storm Line Cleanouts

Video surveys were conducted from February 19 to February 22, 2007 by ARCADIS BBL and CCS. Cleanouts using a jet router and vacuum truck were generally conducted prior to the video survey. If excessive sediment was observed during the video survey, or if sediment impeded the progress of the survey, additional cleanouts were conducted. Figures 7, 8 and 9 indicate whether or not sediment was observed in the line, and whether the line was cleaned out. No sheen or SPH was observed in any lines. After cleanout, the collected solids were allowed to settle out in the vacuum truck, and the decant water was drained off into the on-site API sump. In-line sediments collected during the storm line cleanouts were placed in 55-gallon drums and sampled. The material was taken by CCS to the Waste Management Hillsboro Landfill for disposal.

Additional video surveys were completed on June 27 and October 1, 2007 by ARCADIS BBL. CCS was contracted to conduct video surveys and storm line cleanout with a vacuum truck where necessary. The same line cleanout procedure used during these surveys was also used during the February surveys, as described above. Figures 7, 8 and 9 indicate whether or not sediment was observed in the line, and whether the line was cleaned out. No sheen or SPH was observed in any lines.

Video survey and cleanout of the line along NW Front Avenue from manhole AAM084 to manhole AAP799 was not conducted during the field investigations. This line cleanout will be conducted as a part of the Source Control Evaluation action items.

Generally, sediment accumulations were observed in historical FHA lines that have likely never been cleaned out. On-site lines that actively receive stormwater flow did not have significant accumulations of sediment. The only exception is the line downstream of Outfall V39, which conveys stormwater from the on-site vault to the COP line to the south. This is a historical FHA line that was incorporated into the current site stormwater system. The line had significant accumulation of sediment, likely because it had never been cleaned out. Section 6 presents a recommendation for future observation and cleanout (if necessary) of this line.

3.1.4 Spill Prevention and Response Procedures

The site maintains the following plans, which detail spill response measures:

- *Spill Prevention Control and Countermeasure Plan (SPCC)*. The main control plan for prevention of spills at the site.
- *Resource Conservation and Recovery Act (RCRA) Contingency Plan*. Per 40 CFR 264.52 and 265.52, covering responses in the case of a hazardous waste spill, fire at the site or general emergency to minimize hazards to human health and the environment.
- *Facility Response Plan (FRP)*. This plan addresses all types of emergencies that may potentially arise at the site, and specifically discusses site spill management equipment and mutual aid available to the site. One hands-on FRP drill is performed annually.
- *Regional Oil Spill Contingency Plan*. This plan addresses the handling of spills into the Willamette River, as well as cleanup processes.

3.1.5 System Operation and Maintenance Records

The site operations personnel complete a monthly check of all stormwater equipment and controls to provide that they are suitable for service as a part of regular monthly maintenance activities. PPC performs semiannual inspections of the stormwater catch basins and drain webs in the high-traffic areas of the site. PPC conducts annual inspections of the stormwater catch basins and Dandy Bags in the unpaved areas of

the site. Maintenance is conducted on the system when necessary. Inspections include:

- observations of the condition of the catch basin filters
- observations for oil or debris in the catch basin
- amount of sediment buildup in the filter and catch basin
- general comments regarding the condition of the catch basin and filter
- date of the last inspection
- date of the last replacement of the filter

In addition to regular inspections, cleanout of the catch basins in high-traffic areas is performed annually, usually in August or September. Cleanout of the catch basins in the unpaved, low-traffic areas (such as the tank yards) is conducted once every 4 years on average. Catch basins in unpaved areas that are observed to have high rates of sediment accumulation are cleaned out more regularly. Historical PPC stormwater inspection records were provided in the Storm Water Sampling Plan (ARCADIS BBL 2007a).

4. Sampling Events

As a part of the stormwater source control evaluation, one catch basin sampling event and four stormwater sampling events were conducted at the site. The data from these events, along with historical NPDES sampling data, are summarized by constituent in Tables 2 through 20.

4.1 August 2007 Catch Basin Sampling

On August 22, 23 and 24, 2007, ARCADIS BBL conducted catch basin sampling at the site. The sampling was performed in conjunction with the annual catch basin cleanout as a part of regular on-site maintenance activities. CCS performed the cleanout activities. A detailed description of the catch basin sampling event was presented in the Storm Water Sampling Technical Memorandum No. 1 (ARCADIS BBL 2007b).

Sediment collected during this cleanout was segregated into five operational areas:

- Area 1: Guilds Lake tank yard catch basin composite
- Area 2: Equipment storage area catch basin composite
- Area 3A: Refinery and emulsion tank yard catch basin composite
- Area 3B: Refinery and emulsion tank yard (within the tank yard footprint) catch basin composite
- Area 4: Crude Oil tank yard catch basin composite.

These five catch basin composite locations are shown on Figure 12.

Area 3 was divided into two areas because the catch basins in Area 3A are cleaned out annually and represent accumulation from regular truck traffic and operations at the site. PPC did not have a record of the last cleanout of the catch basins in Area 3B, which are located within the emulsion tank yard area. These catch basins are not readily accessible, and primarily represent runoff from within the emulsion tank yard footprint.

Results of the catch basin sampling are presented in Tables 2, 3, 6, 8, 10, 12, 13, 15, 16, 18 and 19.

4.2 Stormwater Sampling

4.2.1 Previous Stormwater Investigations

Limited stormwater investigations were undertaken as a part of the XPA Report (SAIC 2004). These investigations are described in the Storm Water Sampling Plan (ARCADIS BBL 2007a) for the site. The data from these sampling events were not within the scope of the 2007 Storm Water Sampling Plan, and were therefore not used in this source control evaluation.

4.2.2 Historical Stormwater Sampling

Stormwater sampling is conducted at the site under the NPDES General Stormwater Permit Number 16055 (1200-Z Stormwater Discharge Permit). Outfalls V33 and V39, shown on Figure 7, are the sampling points for discharge samples. These samples are analyzed for:

- metals (copper, lead and zinc)
- total oil and grease
- pH
- total suspended solids (TSSs)

Samples have also been analyzed for total organic carbon (TOC), chemical oxygen demand (COD), arsenic, chromium, mercury and nickel at various times throughout the sampling record. The results of the NPDES stormwater sampling for constituents screened in the source control evaluation are presented in Table 5.

4.2.3 JSCS Stormwater Source Control Evaluation Stormwater Sampling

Four sampling events were conducted under the JSCS source control evaluation. Samples were collected from the stormwater valve at Outfall V33 and at manhole AAP825 downstream of the stormwater valve at Outfall V39 during each event. Stormwater manhole AND864 was also checked by sampling personnel during each sampling event to observe active stormwater flow in the line. Stormwater flow was not observed at that location during any of the four events. Photos of the stormwater sampling locations are provided on Figures 13, 14 and 15. Catch basin and storm line cleanouts were completed prior to stormwater sampling; therefore, the stormwater data is representative of the post-cleanout condition of the lines.

These events were conducted in accordance with the Storm Water Sampling Plan (ARCADIS BBL 2007a) developed for the stormwater source control evaluation. The stormwater valves remained closed until sampling personnel were on site to collect samples, so the samples were collected from within 30 minutes to 3 hours of stormwater runoff. When a decision was made that a storm event would meet sampling criteria, ARCADIS personnel notified on-site PPC personnel and instructed them to wait until ARCADIS personnel arrived on site to open the stormwater valves. Once on site, PPC personnel opened the stormwater valves at Outfalls V39 and V33. ARCADIS personnel proceeded with sampling Outfall V33 first during each event. Each location was sampled using a grab sampler on a pole affixed with a dedicated, stainless steel sampling device that was decontaminated between sample locations. At Outfall V33, the grab sampler was lowered into the stormwater vault into the line of active flow at the vault outlet. At manhole AAP825, the sampling location downstream of the stormwater valve at Outfall V39, the grab sampler was lowered into the midpoint of active flow in the pipe. Grab samples were collected until all of the sample bottles were filled. One final sample was then collected to measure water quality parameters, such as dissolved oxygen and turbidity.

The sampling events were detailed in the following technical memoranda:

- Storm Water Sampling Technical Memorandum No. 1, Former Chevron Willbridge Asphalt Plant No. 209293 (ARCADIS BBL 2007b)

- Storm Water Sampling Technical Memorandum No. 2, Former Chevron Willbridge Asphalt Plant No. 209293 (ARCADIS BBL 2008a)

- Storm Water Sampling Technical Memorandum No. 3, Former Chevron Willbridge Asphalt Plant No. 209293 (ARCADIS BBL 2008b)

These events are summarized in Sections 4.2.3.1 through 4.2.3.4. The results of these sampling events, summarized by constituent, are presented in Tables 2 through 4, and Tables 6 through 20.

4.2.3.1 October 2, 2007

The first stormwater sampling event was conducted on October 2, 2007. During the 24 hours preceding the sampling event, the NW Yeon Avenue rain gauge received 0.01 inch of rain, which met the dry weather conditions established in the JSCS (USEPA/DEQ 2005) and defined in the Storm Water Sampling Plan (ARCADIS BBL

2007a). During the storm event, the gauge received 0.34 inch of rain. The storm event lasted approximately 5 hours. Sampling was initiated within 3 hours of the start of the storm event. The sampling was conducted during a storm event as defined by the Storm Water Sampling Plan (ARCADIS BBL 2007a) and the JSCS. A hydrograph of the storm event is provided on Figure 16. The “Sample Event” points on the hydrograph represent the actual sample times at each of the three locations.

4.2.3.2 January 14, 2008

The second stormwater sampling event at the site was conducted on January 14, 2008 by ARCADIS personnel. During the 24 hours preceding the event, the NW Yeon Avenue rain gauge received no rainfall, which met the required dry weather conditions. During the storm event, the gauge received 0.31 inch of rain during a 3-hour period. Sampling was initiated within 3 hours of the start of the storm event. The sampling was conducted during a qualifying storm event. A hydrograph of the storm event is provided on Figure 17. The “Sample Event” points on the hydrograph represent the actual sample times at each of the three locations.

4.2.3.3 January 26, 2008

The third stormwater sampling event at the site was conducted on January 26, 2008 by ARCADIS personnel. During the 24 hours preceding the event, the NW Yeon Avenue rain gauge received no rainfall, which met the required dry weather conditions. During the storm event, the gauge received 0.66 inch of rain during a 12-hour period. Sampling was initiated within 3 hours of the start of the storm event. The sampling was conducted during a qualifying storm event. A hydrograph of the storm event is provided on Figure 18. The “Sample Event” points on the hydrograph represent the actual sample times at each of the three locations.

4.2.3.4 March 28, 2008

The fourth stormwater sampling event at the site was conducted on March 28, 2008 by ARCADIS personnel. During the 24 hours preceding the event, the NW Yeon Avenue rain gauge received 0.05 inch of rainfall, which met the dry weather conditions established in the JSCS and defined in the Storm Water Sampling Plan (ARCADIS BBL 2007). During the storm event, the gauge received 0.29 inch of rain during a 6-hour period. Sampling was initiated within 3 hours of the start of the storm event. The sampling was conducted during a qualifying storm event. A hydrograph of the event is presented on Figure 19. The “Sample Event” points on the hydrograph represent the

actual sample times at each of the three locations.

5. Data Summary and Evaluation

This section summarizes the data collected throughout the source control evaluation, and evaluates the frequency and magnitude of detected constituents.

As stated in the JCSC, source control prioritization may include an evaluation of the following key factors:

- complete (known or potentially complete) contaminant migration pathway from the uplands to the Willamette River)
- magnitude by which the SLV was exceeded and the number of contaminant exceedances for site-specific constituents of potential concern (COPCs)
- location, extent and duration of SLV exceedances from COPCs

This section summarizes the data collected in support of the source control evaluation and evaluates the data for the criteria listed above.

5.1 Direct Discharge Stormwater Pathway

This section summarizes the analytical results of the catch basin sampling and stormwater sampling, discussed by analyte. Catch basin and storm line cleanouts were completed prior to stormwater sampling; therefore, the stormwater data is representative of the post-cleanout condition of the stormwater lines. Tables 2 through 20 present the catch basin and stormwater analytical results. The analytical data packages and quality assurance and quality control (QA/QC) summaries from the laboratory were provided in the technical memoranda (ARCADIS BBL 2007b, 2008a, 2008b). Each analytical result was screened against the JSCS stormwater and sediment SLV for toxicity and bioaccumulation, presented in Table 3-1 of the JSCS (USEPA/DEQ 2005).

5.1.1 Metals

5.1.1.1 Catch Basin Results

Catch basin results for metals are presented in Table 2. The following constituents were detected above the bioaccumulation or toxicity SLV, or both, in catch basin composite samples from the drainage areas indicated, which are identified on Figure 7:

- arsenic (Areas 2, 3B and 4)
- cadmium (Areas 2 and 4)
- copper (Area 4)
- mercury (Areas 3A, 3B and 4)
- lead (Areas 1, 2, 3A and 4)

Follow-up analyses were run on individual catch basin samples from Areas 3A, 3B and 4 to attempt to identify potential on-site source areas for these constituents. Results of the follow-up analyses are presented in Table 3. Analytical results from the individual catch basins detected the listed metals at concentrations above the method detection limit (MDL) in all of the samples analyzed. These results indicate that the metals detected in on-site catch basin sediments are most likely site-wide COPCs and are not limited to a targeted source area.

5.1.1.2 Stormwater Results

Stormwater results for metals are presented in Table 4. The following constituents were detected above the SLV in stormwater samples from the sample locations and dates indicated, which are identified on Figure 7:

Outfall V33:

- *Dissolved:*
  - cadmium (October 2 and March 28)
  - copper (October 2 and March 28)
  - zinc (October 2, January 26 and March 28)

- *Total:*
  - aluminum (January 14 and January 26)
  - cadmium (March 28)
  - copper (January 26 and March 28)
  - lead (January 26)
  - zinc (January 26 and March 28)

Outfall V39:

- *Dissolved:*
  - copper (October 2 and March 28)
  - zinc (October 2 and January 26)
- *Total*
  - aluminum (January 14)
  - copper (January 14 and March 28)
  - lead (January 14 and January 26, March 28)
  - zinc (January 14 and January 26)

5.1.1.3 NPDES Sampling Results

Historical NPDES sampling results from 1995 to 2006 are presented in Table 5. NPDES samples were analyzed for total metals. The following constituents were detected at the frequency indicated above the SLV in stormwater samples from the stormwater valve locations indicated, which are identified on Figure 6:

Outfall V33:

- copper (22 of 29 sampling events)
- lead (nine of 16 sampling events)
- mercury (one of four sampling events)
- zinc (29 of 32 sampling events)

Outfall V39:

- copper (26 of 29 sampling events)
- lead (13 of 16 sampling events)
- mercury (one of four sampling events)
- zinc (23 of 32 sampling events)

5.1.2 Polychlorinated Biphenyls

5.1.2.1 Catch Basin Results

Catch basin results for PCBs are presented in Table 6. PCBs were not detected above the toxicity SLVs in any catch basin composite samples. The only bioaccumulation SLV for PCBs is for total PCBs. Total PCBs represent a summation of all of the individual Aroclors. Nondetects are included at one-half of the detection limit. The total PCB number was above the bioaccumulation SLV for total PCBs in all of the catch basin composite samples. The individual Aroclor MDL was one order of magnitude higher than the total PCB bioaccumulation SLV in all catch basin samples.

5.1.2.2 Stormwater Results

Stormwater results for PCBs are presented in Table 7. PCBs were not detected above the MDL in any of the stormwater samples collected during any of the sampling events. For the October 2, 2007 stormwater sampling event, the laboratory MDL was greater than the SLV for all of the Aroclors analyzed except Aroclor 1016. After this sampling event, ARCADIS worked with *Lancaster Laboratories and* the DEQ to attempt to bring the MDL for PCBs below the SLV. For subsequent sampling events, with the exception of Aroclor 1232, the MDL was below the SLV for all Aroclors. For these events, the MDL for Aroclor 1232 was within 0.007 microgram per liter (µg/L), and on average was within 0.0046 µg/L.

5.1.3 Volatile Organic Compounds

5.1.3.1 Catch Basin Results

Catch basin VOC results are presented in Table 8. None of VOC detections in any of the catch basin composite samples were above the toxicity SLV. There are no bioaccumulation SLVs for VOC.

5.1.3.2 Stormwater Results

Stormwater VOC results are presented in Table 9. None of the VOC detections in any of the stormwater samples collected during the stormwater sampling events were detected above the SLV.

5.1.4 Polycyclic Aromatic Hydrocarbons

5.1.4.1 Catch Basin Results

Catch basin PAH results are presented in Table 10. The following constituents were detected above the toxicity SLV in catch basin composite samples from the drainage areas indicated, which are identified on Figure 7:

- benzo(a)pyrene (Area 3B)
- benzo(g,h,i)perylene (Area 3B)
- chrysene (Area 3B)
- dibenz(a,h)anthracene (Area 3B)
- indeno(1,2,3-cd)pyrene (Areas 1, 2, 3A and 3B)
- phenanthrene (Area 3B)
- pyrene (Area 3B)

5.1.4.2 Stormwater Results

PAH results are presented in Table 11. The following constituents were detected above the SLV in stormwater samples from the sample locations and on the dates indicated, which are identified on Figure 7:

Outfall V33:

- acenaphthene (January 14)
- benzo(a)anthracene (January 14)
- benzo(a)pyrene (January 14)
- benzo(b)fluoranthene (October 3 and January 14)

- benzo(k)fluoranthene (January 14)
- chrysene (October 3 and January 14)
- fluorene (January 14)
- indeno(1,2,3-cd)pyrene (January 14)
- phenanthrene (March 28)

Outfall V39:

- acenaphthene (January 26)
- acenaphthylene (January 26)
- anthracene (January 26)
- benzo(a)anthracene (January 14 and January 26)
- benzo(a)pyrene (January 14 and January 26)
- benzo(b)fluoranthene (January 14 and January 26)
- benzo(k)fluoranthene (January 14 and January 26)
- chrysene (January 14 and January 26)
- fluorene (January 26)
- indeno(1,2,3-cd)pyrene (January 14 and January 26)
- phenanthrene (January 26)

5.1.5 Phthalate Esters

5.1.5.1 Catch Basin Results

Phthalate ester results are presented in Table 12. The following constituents were detected above the toxicity and bioaccumulation SLVs in catch basin composite samples from the drainage areas indicated, which are identified on Figure 7:

- bis(2-ethylhexyl)phthalate (Areas 2, 3A, 3B and 4)

Follow-up analyses were run on the individual catch basin samples from Areas 2, 3A, 3B and 4 to attempt to identify a potential on-site source area for bis(2-

ethylhexyl)phthalate. Follow-up results are presented in Table 13. Analytical results from the individual catch basins detected bis(2-ethylhexyl)phthalate above the toxicity and bioaccumulation SLVs in all of the follow-up analyses, with the exception of one catch basin within Area 3A in which bis(2-ethylhexyl)phthalate was not detected above the MDL. These results indicate that the bis(2-ethylhexyl)phthalate is most likely a site-wide COPC, and is not limited to a targeted source area.

5.1.5.2 Stormwater Results

Phthalate ester results are presented in Table 14. The following constituents were detected above the SLV in stormwater samples from the sample locations and on the dates indicated, which are identified on Figure 7:

Outfall V33:

- bis(2-ethylhexyl)phthalate (January 14 and March 28)

5.1.6 Semivolatile Organic Compounds

5.1.6.1 Catch Basin Results

Semivolatile organic compound (SVOC) results are presented in Table 15. SVOCs were not detected above the toxicity or bioaccumulation SLVs.

5.1.7 Organochlorine Pesticides

5.1.7.1 Catch Basin Results

OC pesticide results are presented in Table 16. The following constituents were detected above the bioaccumulation SLVs in catch basin composite samples from the drainage areas indicated, which are identified on Figure 7:

- total DDT (Areas 1, 2, 3A, 3B and 4)

5.1.7.2 Stormwater Results

OC pesticide results are presented in Table 17. The following constituents were detected above the SLV in stormwater samples from the sample locations and on the dates indicated, which are identified on Figure 7:

Outfall V33:

- aldrin (March 28)
- dieldrin (March 28)
- heptachlor (October 2)
- total dichlorodiphenyldichloroethylene (DDE) (March 28)
- total dichlorodiphenyltrichloroethane (DDT) (January 14)

Outfall V39:

- total DDT (January 14)
- dieldrin (January 26)
- heptachlor (January 26)

5.1.8 Total Petroleum Hydrocarbons

There are no SLVs for TPH. TPH catch basin results are presented in Table 18. Follow-up analyses were run on individual catch basin samples from Area 3A because of the magnitude of the detection in that composite sample. Follow-up results are presented in Table 19. Detections of heavy oil range organics were above 1,000 milligrams per kilogram (mg/kg) in all of the individual catch basin samples for Area 3A. Detections of diesel range organics were above 500 mg/kg in four individual catch basin samples. The four individual catch basins were located in high-traffic areas. These results indicate that heavy oil is likely a site-wide COPC, but diesel may be limited to areas with high-truck traffic.

TPH stormwater results are presented in Table 20.

5.2 Groundwater Infiltration to Storm Lines Pathway

Groundwater infiltration into stormwater conveyance lines is a potential source to the stormwater pathway, which required evaluation for three areas on site:

- northeast edge of the site near the NW Front Avenue utility corridors

- former FHA storm line along the northeastern edge of the site, which was not documented by video survey
- vicinity of the valve at Outfall V39 and the storm line extending downstream to the southeast from the valve at Outfall V39 to its connection with the off-site conveyance line to Outfall V19, due to the cracks and leakages noted along this line and in lines within the vicinity of the valve at Outfall V39

5.2.1 NW Front Avenue Utility Corridors

The historical groundwater depths in wells along the northeastern gradient edge of the site were compared to the depth of the utility corridors below NW Front Avenue presented in the XPA (SAIC 2004). Data from the following wells were reviewed:

- A-1
- A-2
- W-3
- W-4

The historical groundwater depths are presented in Table 21. The groundwater depths in these wells range between 12 feet and 20.1 feet bgs, with an average depth of 15.1 feet bgs. The following utilities were identified in the XPA as being located under NW Front Avenue, with their respective invert depths bgs (utility elevations were not provided):

- natural gas (6⅝ inches): 5.5 feet bgs
- natural gas (8 inches): 5.5 feet bgs
- natural gas pipeline (20 inches): 6 feet bgs
- two Olympic pipelines (14 inches): 6 feet bgs
- storm sewer line (8 inches): 5 feet bgs
- sanitary sewer line (54 inches): 15 feet bgs

Based on this comparison, the groundwater depth in the downgradient site wells is below the constructed depth of the NW Front Avenue utilities; therefore, this portion of the groundwater pathway is incomplete.

5.2.2 Former FHA Line

The Storm Water Sampling Plan (ARCADIS BBL 2007a) included stormwater manhole AAP911 as a sampling location to evaluate stormwater contributions from Area 5 to the former FHA stormwater line along the northeastern edge of the site. The location of this line and manhole AAP911 are shown on Figure 5. This sampling location was inaccessible due to its location in the footprint of an active rail line. In addition, the stormwater line was inaccessible for video surveying due to the alignment of the active rail line over manholes AAP809 and AAP907, and inaccessibility of the line via manhole AAP912 at the southern end of the line. A surface reconnaissance was conducted in the vicinity of the line, and it was determined that there are no active catch basins or inlets to the line. To document potential contributions to the line, stormwater manhole AND864 in the parking area within Area 5 was inspected for active stormwater flow during each stormwater sampling event. Stormwater flow was not observed during any of the stormwater sampling events. ARCADIS concluded that the stormwater pathway via overland flow to the former FHA line is incomplete.

Because the line could not be video surveyed, the condition of the line and the potential for groundwater infiltration to the line was undocumented. To evaluate groundwater infiltration as a source to the line, the most current round of groundwater analytical data was screened against the JSCS SLVs for stormwater. Groundwater results in monitoring wells U-North, U-South, A-8 and W-1 were screened for contributions to the former FHA line. The groundwater monitoring well locations are shown on Figure 20. The groundwater analytical results are presented in Table 22. The following constituents have been sampled in groundwater at the site:

- metals, including arsenic, cadmium, chromium, copper, lead, mercury, selenium, silver and zinc (analyzed in October 2003 only)
- PAHs (analyzed sporadically between 1993 and 2003)
- VOCs, including benzene, toluene, ethylbenzene and xylenes (analyzed sporadically between 1993 and 2003)

The constituents listed above were not detected above the SLV in the groundwater samples; therefore, groundwater infiltration is not a source for the former FHA stormwater line along the northeastern edge of the site.

5.2.3 Outfall V39 Line

To evaluate groundwater infiltration as a source to the line, the most current round of groundwater analytical data was screened against the JSCS SLVs for stormwater. Groundwater results in monitoring wells A-10 and W-12 were screened for contributions to the Outfall V39 line. The groundwater monitoring well locations are shown on Figure 20. The groundwater analytical results are presented in Table 22. The following constituents have been sampled in groundwater at the site:

- metals, including arsenic, cadmium, chromium, copper, lead, mercury, selenium, silver and zinc (analyzed in October 2003 only)
- PAHs (analyzed sporadically between 1993 and 2003)
- VOCs, including benzene, toluene, ethylbenzene and xylenes (analyzed sporadically between 1993 and 2003)

Arsenic was detected above SLVs in monitoring wells A-10 and W-12. Copper was detected above SVLs in monitoring well W-12. The remaining constituents were not detected above the SLV in the groundwater samples. The copper detections are included in the data evaluation discussion in Section 5.3.

5.3 Naturally Occurring Background Levels of Arsenic

Arsenic is a naturally occurring heavy metal in soils within the Willamette Basin. Although arsenic can be anthropogenic in origin, naturally occurring background levels due to geologic processes such as volcanic activity can exceed SLVs. Two studies of background levels of arsenic have been completed within the Lower Willamette region. The first was conducted by the Washington Department of Ecology (Ecology) and established a state-wide naturally occurring background concentration of arsenic in soils of 7 mg/kg (Ecology 1994). The second was conducted by the United States Geological Survey (USGS) in conjunction with the Oregon Water Resources Department, and found that arsenic occurrence in groundwater was not consistent with anthropogenic sources, but was closely related to aquifer geology (Hinkle and Polette 1999).

In addition to these studies, ARCADIS reviewed available soil data in the XPA (SAIC 2004). The soil data was collected in 1993, 1994 and 2003 from locations across the site. Arsenic was detected in all of the 70 soil samples collected, at an average concentration of 7.5 mg/kg. The XPA reported that 48 out of 70 samples exceeded the

screening level of 3 mg/kg. SAIC (2004) concluded that these statistics suggested that the background arsenic at the site exceeded the screening level for arsenic.

These lines of evidence suggest that on-site arsenic groundwater concentrations are likely linked to regional geography, as opposed to on-site anthropogenic sources. The site is therefore not considered a source of arsenic to the Willamette River.

5.4 Data Evaluation

As stated in the JSCS, "Exceedance of an SLV does not necessarily indicate the upland source poses an unacceptable risk to human health or the environment, but does require further consideration of the need for source control using a weight-of-evidence evaluation" (USEPA/DEQ 2005). Data screened against SLVs were evaluated to determine location, frequency and magnitude of SLV exceedances to determine COPCs for additional source control measures.

The following constituents were detected in both the catch basin sediment and stormwater samples from multiple sampling events at the site:

- cadmium
- copper
- lead
- Eleven PAHs, including acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluorene, indeno(1,2,3-cd)pyrene and phenanthrene
- total DDT
- bis(2-ethylhexyl)phthalate

Zinc and aluminum were detected above the SLV in multiple stormwater samples, but were not detected above SLVs in the catch basin samples. Arsenic was detected in groundwater at two wells near Outfall V39 in historical data and in three catch basin samples, but was not detected in any of the stormwater samples above the MDL.

Naturally occurring background levels of arsenic at the site are discussed in Section 5.3.

Table 23 summarizes the frequency that the COPCs were detected above SLVs in the catch basin and stormwater samples, and in groundwater samples (where applicable). Table 23 also provides a ratio of the SLV exceedances to the SLVs to determine the magnitude of SLV exceedances for the COPCs. This table is used to determine if there are specific COPCs at the site that are consistently being detected in multiple events, or being detected regularly within a particular operational area.

5.4.1 Metals

The following metals exceeded their respective SLVs by the largest magnitude:

- aluminum (8.9 times the SLV, January 26, 2008 Outfall V39 stormwater sample)
- lead (10 times the SLV, January 14, 2008 Outfall V39 stormwater sample)

The remaining metals exceedances ranged between 1.1 and 3.4 times the SLV.

5.4.2 PAHs

The following PAHs exceeded their respective SLVs by the largest magnitude:

- benzo(b)fluoranthene (11.7 times the SLV,January 14, 2008 V33 stormwater sample)
- chrysene (11.7 times the SLV, January 14, 2008 V33 stormwater sample)
- phenanthrene (18 times the SLV, January 14, 2008 V33 stormwater sample)
- phenanthrene (15 times the SLV, March 28, 2008 V33 stormwater sample)

The remaining PAH exceedances ranged between 1.1 and 9.3 times the SLV.

5.4.3 OC Pesticides

The following OC pesticides exceeded their respective SLVs by the largest magnitude:

- total DDT (90 times the SLV, Area 3B catch basin sample)

- total DDT (86.7 times the SLV, Area 3A catch basin sample)

The remaining total DDT exceedances ranged between 8.1 and 43.3 times the SLV.

5.4.4 Phthalate Esters

Bis(2-ethylhexyl)phthalate exceeded its SLVs by the largest magnitude for the following samples:

- bis(2-ethylhexyl)phthalate (23.6 times the SLV, Area 3A catch basin sample)
- bis(2-ethylhexyl)phthalate (21.5 times the SLV, Area 3B catch basin sample)

The remaining exceedances ranged between 1.6 and 9.8 times the SLV.

6. Effectiveness Evaluation

6.1 Site COPCs

The site COPCs result from site operations, as described in Section 2, and from on-site traffic. The primary COPCs from these on-site activities are PAHs and metals. These COPCs are consistent with the COPCs identified in the XPA report for the site (SAIC 2004). The DEQ requested that the full suite of COPCs for the Portland Harbor Superfund Site be tested at the site during the stormwater evaluation; therefore, the list of potential COPCs evaluated for the site is as follows:

- metals
- VOCs
- PAHs
- TPH
- OC pesticides
- PCB Aroclors
- phthalate esters

6.2 Existing and Potential Sources and Pathways

As discussed in Section 2.2, the following existing and potential pathways from the site to the Willamette River are as follows:

- direct discharge via stormwater
- groundwater, via infiltration to on-site stormwater lines

6.3 Summary of Sampling Events

One catch basin sampling event was conducted in August 2007, as described in Section 4.1, in accordance with the Storm Water Sampling Plan (ARCADIS BBL 2007a).

Four stormwater sampling events were conducted on the following dates, as described in Section 4.2:

- October 2, 2007
- January 14, 2008
- January 26, 2008
- March 28, 2008

These events were conducted in accordance with the Storm Water Sampling Plan (ARCADIS BBL 2007a), as described in Section 4.2.

6.4 Contaminants Exceeding JSCS Screening Criteria

As discussed in Section 5.3, the following contaminants exceeded the JSCS screening criteria in catch basin samples and regularly in stormwater samples at the site:

- cadmium
- copper
- lead
- PAHs
- total DDT
- bis(2-ethylhexyl)phthalate

The constituents with the greatest magnitude of SLV exceedances (total DDT and bis(2-ethylhexyl)phthalate) are site wide and persistent in the environment, and are not related to site operations. For instance, DDT has been banned since 1972 and DDT was not used in any process operations at the site. The use of OC Pesticides to control pests, principally insects, weeds, fungi, and nematodes, has been an integral part of food production and disease control in the United States since the late 1930s. The large-scale intentional use of these pesticides resulted in the widespread presence of their residues in the environment.

When detected, metals detections in stormwater and catch basin samples generally exceeded the SLVs by less than three orders of magnitude, with few exceptions. Detections of PAHs generally exceeded the SLVs by less than four orders of magnitude, with few exceptions. Metals and PAHs were not detected consistently on site within any specific operation area that could be acting as a source.

Arsenic was detected above the SLV in groundwater samples. Naturally occurring background sources of arsenic are discussed in Section 5.3. Arsenic was not detected above the MDL in any stormwater samples. This indicates that, although arsenic may be present in the groundwater within the vicinity of the Outfall V39 stormwater lines, groundwater is not contributing to the stormwater flow in the lines and therefore is not a source.

6.5 Site Stormwater Management Measures, Implemented Source Control Measures and Proposed Future Source Control Measures

Ongoing site stormwater management measures are discussed in Section 3.1.2. The source control measures implemented as a part of the source control evaluation process are discussed in Section 3.1.3. The effectiveness of these measures is discussed in Sections 6.5.1 and 6.5.2. The proposed future source control measures are presented in Section 6.7.

6.5.1 Catch Basin BMP Effectiveness

Metals, bis(2-ethylhexyl)phthalate and total DDT were consistently detected above the SLV in the catch basin samples, but with less frequency in the stormwater samples. Exceedances of these constituents were greatest in the catch basin samples and significantly less in the stormwater samples. This indicates that the catch basins are serving their intended purpose to retain the significant mass of suspended solids in the basins and minimize their transport into the stormwater conveyance lines.

Performing regular cleanout and maintenance of the catch basins and catch basin Dandy Bag filters, as required by the site SWPCP, is the most effective way to minimize transport of sediments into stormwater. To further reduce sediment loading to the catch basins, the addition of a street vacuum sweeping BMP to the site SWPCP is recommended for collecting fine particulates.

Additionally, during video survey reconnaissance of the on-site lines, solids accumulation was observed in the storm line extending from Outfall V39 to manhole AAP917 at the off-site connection located on the south side of the site. Site historical maintenance records indicated that this line had not been cleaned in the past. Cleanout of this line is recommended to minimize migration of solids to the river and to monitor the amount of sediment accumulation that is occurring in the line. Annual cleanout and recording of the volume of sediment cleaned out of the line for 2 years is

recommended. If sediment accumulation in the line is less than 0.3 cy (one 55-gallon drum) each year, line cleanout should be reduced to once every 5 years.

6.5.2 Stormwater BMP Effectiveness

PAHs were generally not detected above the SLV in the catch basin samples, but were consistently detected above the SLV in stormwater samples. The primary exception was in Area 3b, where samples were collected from catch basins within the refinery and the emulsion tank yard (shown on Figure 2). The refinery and the emulsion tank yard are the primary processing areas on site, and catch basins within the emulsion tank yard had not been cleaned out on a regular basis. Therefore, the accumulation of sediment in the catch basins within this area may not be representative of annual accumulation and properly implemented BMPs.

PAH detections exceeding the SLV in stormwater samples (and not in catch basin samples) indicates that the constituent is mobile in the stormwater runoff, and is not effectively managed by catch basins and Dandy Bag filters. PAHs may be targeted by better site housekeeping and BMPs so that PAHs do not reach the stormwater drains, and by providing that stormwater collected from on-site vaults does not have sheen on the surface before opening the valve to release the stormwater.

The BMPs that have been identified in the site SWPCP adequately target PAHs by draining process areas to oil/water separators, requiring visual observation for sheen in the stormwater vaults before discharging and requiring the use of hydrophobic pads to remove sheen from the stormwater vaults (if observed). Exceedances of PAHs in stormwater may be attributed to inappropriate vault maintenance and inadequate visual observations prior to stormwater discharge, resulting in BMPs that are not as protective as they are designed to be. To improve site stormwater practices, ARCADIS recommends that the Operations personnel who directly handle stormwater discharges and NPDES sampling at the site participate in annual online or classroom training. Proper visual inspection should be reinforced so that stormwater that contains sheens is not being discharged, and instead is being pumped into on-site oil/water separators. Regular cleaning of the vaults at Outfalls V33 and V39 should also be reinforced, as sheens can build up on the sides of the vault and in the boom within the vault and create a source during subsequent storm events.

The training should include the following elements:

- sources of pollution

- problems caused by polluted stormwater runoff
- elements of an SWPCP
- BMPs and their application
- proper implementation of an SWPCP and BMPs

This type of training is offered through the Transportation Environmental Resource Center (TERC) http://isu1.indstate.edu/terc/stormwater/.

In addition, the Environmental Compliance Specialist should attend an offsite training conducted by a stormwater specialist so that he or she is adequately prepared to provide Operations personnel information about stormwater management decisions and is able to conduct the annual stormwater training for Operations personnel or advise the training coordinator on appropriate stormwater training elements to include in the required annual training.

6.6 Recommendations

Based on data collected during the source control evaluation, and ongoing stormwater BMPs on site, ARCADIS does not consider the site a significant source of ongoing contamination to the COP storm drain system, or to the Willamette River. In addition to maintaining the ongoing stormwater source control measures in place at the site, the following additions to stormwater management at the site are recommended:

- Cleanout the line along NW Front Avenue from AAM084 to AAP799. This line was not cleaned out during the field investigations, and accumulation in this line could migrate to the river if not removed.
- Increase catch basin and drain web inspection frequency in high-traffic, paved areas of the site to quarterly from semiannually.
- Increase catch basin and Dandy Bag inspection frequency in unpaved, low-traffic areas of the site to semiannually from annually.
- Perform an annual storm line cleanout in the line extending from Outfall V39 to manhole AAP917 for 2 years, in conjunction with the annual catch basin cleanout performed during the third quarter before the wet season begins. Record the volume of sediment cleaned out of the lines. If the volume of sediment removed from the lines is less than 0.3 cy (one 55-gallon drum) each year, after 2 years

reduce the line cleanout frequency to once every 5 years. Maintain records of the storm line cleanout and sediment accumulation with the stormwater BMP records.

- Perform site-wide street sweeping annually on impervious surfaces with routine traffic flow at the site. Street sweeping will be performed in conjunction with the annual catch basin cleanout performed in the third quarter, before the wet season begins. Maintain records of the street sweeping with the stormwater BMP records.
- Require the site Environmental Compliance Specialist to attend an off-site stormwater management class prepared by a stormwater specialist. Any new personnel taking over this position will attend the same training. Operations personnel who make the decision to open on-site stormwater valves when stormwater has collected will complete annual stormwater awareness online or classroom training held at the site as a part of their annual training requirements.

In addition, the BMPs identified in the SWPCP will continue to be employed at the site.

7. References

ARCADIS BBL. 2007a. Storm Water Sampling Plan, Former Chevron Willbridge Asphalt Plant No. 209293. August 3.

ARCADIS BBL. 2007b. Storm Water Sampling Technical Memorandum No. 1, Former Chevron WIllbridge Asphalt Plant No. 2098293. November 28.

ARCADIS BBL. 2008a. Storm Water Sampling Technical Memorandum No. 2, Former Chevron Willbridge Asphalt Plant No. 209293. April 18.

ARCADIS BBL. 2008b. Storm Water Sampling Technical Memorandum No. 3, Former Chevron Willbridge Asphalt Plant No. 209293. May 21.

Hinkle, Stephen and Danial Polette. 1999. Arsenic in Ground Water of the Willamette Basin, Oregon. USGS Water-Resources Investigations Report 98-4205.

Lower Willamette Group, 2004a. Portland Harbor RI/FS - Programmatic Work Plan (Volumes 1 through 3). Prepared by Integral Consulting, Inc., Windward Environmental, L.L.C., Kennedy/Jenks Consultants, Anchor Environmental L.L.C., and Groundwater Solutions, Inc. April 23.

Lower Willamette Group, 2004b. Portland Harbor RI/FS – Draft Conceptual Site Model Update (Volumes 1 through 3). Prepared by Integral Consulting, Inc. and Groundwater Solutions, Inc. September 17.

Oregon Department of Environmental Quality. 2008. Milestone Report for Upland Source Control at the Portland Harbor Superfund Site. September.

Science Applications International Corporation. 2004. Expanded Preliminary Assessment Report. February 12.

United States Environmental Protection Agency/Oregon Department of Environmental Quality. 2005. Portland Harbor Joint Source Control Strategy. December. Revised July 16, 2007.

Washington State Department of Ecology. 1994. Natural Background Soil Metals Concentrations in Washington State, Publication 94-115. Toxics Cleanup Program. October.

ARCADIS

Tables

TABLE 1
SUMMARY OF VIDEO SURVEYS

SOUCE CONTROL EVALUATION REPORT
FORMER CHEVRON ASPHALT PLANT NO. 209293
5501 NW FRONT AVENUE
PORTLAND, OREGON

Run #	Date	Start Manhole		End Manhole		Line Cleanout Performed	Camera Direction	Total Length (ft)	Pipe Size (in)	Pipe Construction[1]	Location Relative to Onsite SW Valves	Laterals Observed	General Observations
		COP ID	Paramount ID	COP ID	Paramount ID								
1	2/21/07 8:51	AAP821	SW MH-17	AAP818	SW MH	Yes	Upstream (northwest)	102.7	15	RCP	Line not connected to Valve 39 (historic FHA line)	58.2 ft lateral left 94.6 ft top tee (capped)	Crack observed in pipe at 99.1 ft; 102 ft camera could not continue due to accumulated sediment in line; video shows line is dry at point of sediment accumulation; no inflow into pipe
2	2/21/07 9:09	AAP821	SW MH-17	Valve 39	SWV 39	Yes	Upstream (southwest)	73.3	15	RCP	Downstream of Valve 39	None	Cracks observed in pipe at 59.7 ft and 66.5 ft
3	2/21/07 9:19	AAP821	SW MH-17	AAP820	SW MH-16	Yes	Upstream (northwest)	51.9	15	RCP	Downstream of Valve 39	None	15.9 ft offset joint observed; no flow into pipe through joint
4	2/21/07 9:32	AAP821	SW MH-17	AAP822 (labeled 882 in the record sheet)	SW MH-18	Yes	Downstream (northeast)	123.8	24	RCP	Downstream of Valve 39	58.4 ft lateral right	Joints along length of pipe are leaking
5	2/21/07 10:13	AAP820	SW MH-16	AAP819	SW MH	Yes	Upstream (north)	120	15	RCP	Downstream of Valve 39	None	None
6	2/21/07 10:42	AAP822	SW MH-18	AAP828	SW MH	Yes	Upstream	155.4	15	RCP	Downstream of Valve 39	126.3 ft lateral right	Joints along length of pipe are leaking; 155.4 ft camera could not continue due to rocks in the line; appears they came into line from lateral right when it was abandoned
7	2/21/07 11:40	AAP822	SW MH-18	AAP823	SW MH-19	Yes	Downstream (east)	67	24	RCP	Downstream of Valve 39	None	Joints along length of pipe are leaking
8	2/21/07 12:12	AAP822	SW MH-18	MH-Unknown	MH-Unknown	Yes	Upstream (north)	12.3	8	RCP	Downstream of Valve 39	9 ft lateral right 11.5 ft lateral left	12.3 ft line abandoned and capped
9	2/21/07 12:56	AAP823	SW MH-19	MH-Unknown	MH-Unknown	Yes	Upstream (south)	91	8	RCP	Downstream of Valve 39	30.6 ft lateral left 33.6 ft lateral right 47.8 ft lateral left 51.1 ft lateral right 68.9 ft lateral left 72.1 ft lateral right 87.4 ft lateral left 90.1 ft lateral right	Joints along length of pipe are leaking; 91 ft line abandoned and capped
10	2/21/07 13:34	AAP823	SW MH-19	AAP825	SW MH	Yes	Downstream (east)	303.9	24	RCP	Downstream of Valve 39	117.8 ft lateral right 140.1 ft lateral right 281.1 ft lateral right 303 ft lateral right (at manhole junction)	Joints along length of pipe are leaking; sediment accumulation observed downstream of AAP825; downstream manhole AAP825 could not be located from surface

TABLE 1
SUMMARY OF VIDEO SURVEYS

SOUCE CONTROL EVALUATION REPORT
FORMER CHEVRON ASPHALT PLANT NO. 209293
5501 NW FRONT AVENUE
PORTLAND, OREGON

Run #	Date	Start Manhole		End Manhole		Line Cleanout Performed	Camera Direction	Total Length (ft)	Pipe Size (in)	Pipe Construction[1]	Location Relative to Onsite SW Valves	Laterals Observed	General Observations
		COP ID	Paramount ID	COP ID	Paramount ID								
11	2/22/07 11:08	AAM084	N/A	MH-Unknown	MH-Unknown	No	Upstream (south)	29	6	RCP	Line not connected to Valve 33 (historic abandoned line)	None	29 ft line abandoned and capped; no inflow observed into line; line observed to be dry. Line cleanout not necessary because no sediment in line; however sediment was cleaned out of bottom of manhole AAP084 to get appropriate confined space and camera access. Initial attempt to survey line made on 2/20/07 08:30 but camera malfunctioned. Tape footage of this line is last segment on DVD and is only identified verbally (not visually onscreen).
12	2/22/07 9:03	AAP800	N/A	AAP799[2]	N/A	No	Downstream (west)	172.8	18	RCP	Downstream of Valve 33	61.9 ft lateral left 68.4 ft lateral right 163.8 ft manhole AAP799 164.5 ft lateral right 164.8 ft lateral left filled with gravel appears to have been abandoned 168.6 ft lateral right 168.6 ft lateral left	Line cleanout not necessary because no sediment in line; 172.8 ft end of run due to debris preventing camera from continuing down line
13	2/22/07 9:37	AAP800	N/A	Valve 33	SWV 33	No	Upstream (south)	113.4	10	RCP	Downstream of Valve 33	95.8 ft top tee with no inflow; appears to be capped	Line cleanout not necessary because no sediment in line
14	2/22/07 10:09	AAP827	SW MH-9	MH-Unknown	MH-Unknown	No	Upstream (north)	10.4	10	RCP	Upstream of Valve 39	None	Run stopped at 10.4 feet due to sediment buildup in line; line cleanout not performed because vac truck could not access manhole
15	2/22/07 11:17	AAP827	SW MH-9	AAP829	SW MH	No	Downstream (east)	116.3	8	RCP	Line possibly not connected to Valve 39 (historic FHA line); could not be confirmed	None	Line cleanout not performed because vac truck could not access manhole but sediment observed in line
16	2/22/07 13:18	AAP819	SW MH	AAP837	SW MH	Yes	Upstream (east)	101.9	8	RCP	Downstream of Valve 39	40.9 ft lateral right 43.6 ft lateral left 62 ft lateral right 83.2 ft lateral right 101.2 ft lateral right	101.9 ft end of line

TABLE 1
SUMMARY OF VIDEO SURVEYS

SOUCE CONTROL EVALUATION REPORT
FORMER CHEVRON ASPHALT PLANT NO. 209293
5501 NW FRONT AVENUE
PORTLAND, OREGON

Run #	Date	Start Manhole		End Manhole		Line Cleanout Performed	Camera Direction	Total Length (ft)	Pipe Size (in)	Pipe Construction[1]	Location Relative to Onsite SW Valves	Laterals Observed	General Observations
		COP ID	Paramount ID	COP ID	Paramount ID								
17	2/22/07 14:51	AAP819	SW MH	AAP811	SW MH	Yes	Upstream (west)	17.2	8	RCP	Downstream of Valve 39	None	Initial attempt was made before line cleanout performed; rocks in line obstructed camera progress, so cleanout was performed and line re-run; 16.7 ft cracked pipe observed; 17.2 ft pipe cracked entire circumference of pipe, camera could not continue
18	6/27/07 10:12	AAP816 (titled Run A in video)	SW MH-11	N/A (titled Run B in video)	SW CB-8	No	Upstream (south)	30.4	18	STL	Upstream of Valve 39	None	30.4 ft line turns 45 degrees; camera could not continue past bend in line
19	6/27/07 11:16	AAP816 (titled Run A in video)	SW MH-11	Valve 39 (titled Run C in video)	SWV 39	Yes	Downstream (northeast)	64.2	18	STL	Upstream of Valve 39	22 ft two top tees 48.1 ft top tee	23.1 ft cracked pipe observed; 62.4 ft rocks and debris in line immediately upstream of valve vault which could not be cleaned out with jet router due to large size and weight; 64.2 ft run stopped due to debris but could see valve in background
20	6/27/07 11:35	AAP816	SW MH-11	N/A	N/A	No	Upstream (southeast)	N/A	8	RCP	Upstream of Valve 39	None	Line capped with gravel but constant flow observed, could not continue upstream with camera due to capped line, only held camera in one place and documented the gravel cap
21	6/27/07 11:30	AAP912 (titled Run E in video)	SW MH	AAP917 (titled Run F in video)	SW MH	No	Upstream (south)	244.3	48	RCP	Downstream of Valve 39	244.3 ft lateral left (appears material was dumped into lateral)	10.3 ft water dripping from top of the pipe observed, 57.3 ft and 78.0 ft bubbling groundwater observed on floor of pipe, 244.3 ft could not continue because of hardened material in line from lateral; rocks and debris observed collecting behind hardened material
Dye Test	6/27/07 14:05	AAP821	SW MH-17	AAP912	SW MH	No	N/A	N/A	24	RCP	Downstream of Valve 39	N/A	Red dye mixed with water flushed into upstream manhole; red dye observed at dowstream manhole approximately 45 minutes later in plug flow
22	10/1/07 8:59	AAP827	SW MH-9	AAP829	SW MH	Yes	Downstream (east)	277.6	12	RCP	Downstream of Valve 39	141.2 ft lateral left	Run ended at manhole; could not continue because camera would get caught in manhole shaft if it went over edge of pipe and into manhole opening.
23	10/1/07 10:10	AAP827	SW MH-9	MH-Unknown	MH-Unknown	Yes	Upstream (north)	42.4	8	RCP	Downstream of Valve 39	19.4 ft lateral left 37.5 ft lateral right 42.4 ft lateral left	Run ended because line was full of rocks/backfill material; appears it could have been placed there intentionally to block off pipe
24	10/1/07 10:21	AAP825	SW MH	AAP917	SW MH	Yes	Downstream (east)	372.2	24	RCP	Downstream of Valve 39	187.3 ft lateral left (capped) 187.3 ft lateral right	Leaky joints observed along length of line; 187.3 ft entered manhole shaft, appears manhole is buried from surface because no light shining through, slight flow into manhole from right hand lateral; 318.4 ft weeds observed growing through crack in pipe

TABLE 1
SUMMARY OF VIDEO SURVEYS

SOUCE CONTROL EVALUATION REPORT
FORMER CHEVRON ASPHALT PLANT NO. 209293
5501 NW FRONT AVENUE
PORTLAND, OREGON

Run #	Date	Start Manhole		End Manhole		Line Cleanout Performed	Camera Direction	Total Length (ft)	Pipe Size (in)	Pipe Construction[1]	Location Relative to Onsite SW Valves	Laterals Observed	General Observations
		COP ID	Paramount ID	COP ID	Paramount ID								
25	10/1/07 13:58	AND864	SW MH	AAP-809	SW MH	No	Downstream (north)	119.7	12	RCP	Connected to historic FHA line	13.5 ft lateral left 16.6 ft lateral right 31.4 ft lateral right 37.4 ft lateral left 52.1 ft lateral right 64.4 ft lateral left 70.5 ft lateral right 88.2 ft lateral left	Flow and rocks observed coming into line at 52.1 ft; all other laterals were dry. No sediment observed in line. No line cleanout needed.
--	10/1/07 13:47	AND864	SW MH	--	--	No	Upstream (south)	--	12	RCP	Connected to historic FHA line	--	Camera was aimed in upstream direction with intent of surveying to upstream end of pipe. At the manhole, there was a significant accumulation of hardened grout-like material, possibly intended as backfill. It appears that the pipe was intentionally backfilled to block off pipe

Notes:

"SW MH" = Paramount generic designation for unlabeled or unidentified manholes

"MH-Unknown" = ARCADIS BBL designation for end of lines without a COP or Paramount identified manhole

N/A = Manhole does not have an associated Paramount ID because manhole is located off site

Observation distances are measured from start manhole

Camera directions relative to Plant North as indicated on site figures

1. Pipe Constructions: RCP = Reinforced Concrete Pipe; STL = Steel Pipe

2. Video survey continued downstream from MH AAP799 as far as camera could continue

Table 2
Catch Basin Analtyical Results – Metals

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID **Lab Sample ID** **Sample Date**			**Area 1** **5138784** **8/24/2007**	**Area 2** **5138786** **8/24/2007**	**Area 3A** **5138150** **8/22/2007**	**Area 3B** **5138782** **8/23/07**	**Area 4** **5140084** **8/28/07**
Metals (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**					
Mercury	1.06	0.07	**0.0879**	0.0697	**0.995**	**0.15**	**0.320**
Aluminum	NA	NA	11,400	10,400	9,670	11,100	16,100
Antimony	64	NA	0.203	2.35	0.751	1.07	0.645
Arsenic	33	7	3.07	**11.9**	3.61	**15.9**	**15.8**
Cadmium	4.98	1	0.402	**2.17**	0.844	2.01	**2.27**
Chromium	111	NA	21	41.4	55.6	44.2	61.5
Lead	128	17	**42.5**	***135***	**122**	***146***	**110**
Nickel	48.6	NA	20.4	29.9	38.2	29.5	*52.3*
Selenium	5	2	0.921 U	0.93 U	0.903 U	0.903 U	1.17 U
Copper	149	NA	49.4	*248*	78.7	119	*268*
Silver	5	NA	0.17 U	0.234	0.165 U	0.168 U	0.526
Zinc	459	NA	269	*864*	*489*	*724*	*949*
Total cyanide (solid)	NA	NA	0.18 U	0.18 U	0.17 U	0.18 U	0.23

Notes:
U = Analyte not detected above indicated detection limit.
NA = No screening-level value (SLV) available.
mg/kg = Milligrams per kilogram.
Italic font indicates exceedance of toxicity SLVs.
Bold font indicates exceedance of bioaccumluative SLVs.
Toxicity SLV = Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs.
Bioaccumulation SLV = Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.
USEPA Method 7471A used for analysis of mercury.
USEPA Method 6010b used for analysis of aluminium, copper, silver and zinc.
USEPA Method 6020 used for analysis of antimony, arsenic, cadmium, chromium, lead, nickel and selenium.
Performed follow-up analyses for this constituent on individual catch basin archive samples.

Table 3
Individual Catch Basin Follow-up Analytical Results – Metals

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**SWCB-25**	**SWCB-26**	**SWCB-27**	**SWCB-29**	**SWCB-30**	**SWCB-31**	**SWCB-32**	**SWCB-33**	**SWCB-34**	**SWCB-35**	**SWCB-37**
Lab Sample ID			**5157924**	**5157925**	**5157926**	**5157927**	**5157928**	**5157929**	**5157930**	**5157931**	**5157932**	**5157933**	**5157934**
Composite Sample ID			**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**
Sample Date			**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**
Metals (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**											
Mercury	1.06	0.07	0.0672	0.0158	0.0673	0.0283	**0.102**	**0.179**	***9.09***	**0.296**	**0.144**	**0.185**	***17.0***
Arsenic	33	7	--	--	--	--	--	--	--	--	--	--	--
Cadmium	4.98	1	--	--	--	--	--	--	--	--	--	--	--
Lead	128	17	**55.9**	**39.9**	**45.6**	**97.9**	**60.7**	**108**	***184***	**74.4**	**62.1**	**52.8**	***382***
Copper	149	NA	--	--	--	--	--	--	--	--	--	--	--

Sample ID			**SWCB-39**	**SWCB-40**	**SWCB-41**	**SWCB-44**	**SWCB-45**	**SWCB-48**	**SWCB-49**	**SWCB-50**
Lab Sample ID			**5157935**	**5157936**	**5157937**	**5157938**	**5157942**	**5157939**	**5157940**	**5157941**
Composite Sample ID			**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**
Sample Date			**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**
Metals (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**								
Mercury	1.06	0.07	0.0102 U	**0.0788**	**0.240**	**0.753**	**0.355**	0.0434	**0.404**	**0.0788**
Arsenic	33	7	--	--	--	--	2.76	--	--	--
Cadmium	4.98	1	--	--	--	--	--	--	--	--
Lead	128	17	**63.4**	***356***	***310***	***208***	***344***	**21.1**	**49.9**	**40.5**
Copper	149	NA	--	--	--	--	--	--	--	--

Sample ID			**SWCB-51**	**SWCB-52**	**SWCB-53**	**SWCB-54**	**SWCB-55**	**SWCB-56**	**SWCB-16**	**SWCB-20**	**SWCB-22**	**SWCB-23**
Lab Sample ID			**5157943**	**5157944**	**5157945**	**5157946**	**5157947**	**5157948**	**5157949**	**5157950**	**5157952**	**5157951**
Composite Sample ID			**3B**	**3B**	**3B**	**3B**	**3B**	**3B**	**4**	**4**	**4**	**4**
Sample Date			**8/23/07**	**8/23/07**	**8/23/07**	**8/23/07**	**8/23/07**	**8/23/07**	**8/28/07**	**8/28/07**	**8/28/07**	**8/28/07**
Metals (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**										
Mercury	1.06	0.07	**0.118**	**0.220**	0.0690	**0.111**	**0.485**	0.0417	0.0591	**0.601**	0.0143	**0.191**
Arsenic	33	7	**14.1**	5.84	**23.1**	**13.3**	**4.61**	**10.6**	**18.3**	**11.7**	**22.3**	**9.64**
Cadmium	4.98	1	--	--	--	--	--	--	0.525	0.257	2.51	1.09
Lead	128	17	**127**	**60.5**	***144***	***162***	**48.2**	***265***	**73.9**	**91.0**	***397***	**55.8**
Copper	149	NA	--	--	--	--	--	--	39.3	50.6	*596*	46.1

Notes:
U = Analyte not detected above indicated detection limit.
NA = No screening-level value (SLV) available.
-- = Sample not run for specific analyte.
mg/kg = Milligrams per kilogram.
Italic font indicates exceedance of toxicity SLVs.
Bold font indicates exceedance of bioaccumluative SLVs.
Toxicity SLV = Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs.
Bioaccumulation SLV = Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.
USEPA Method 7471A used for analysis of mercury.
USEPA Method 6010b used for analysis of aluminium, copper, silver and zinc.
USEPA Method 6020 used for analysis of antimony, arsenic, cadmium, chromium, lead, nickle and selenium.

Table 4
Stormwater Analytical Results – Metals

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID		209293-20071002-V33 (Dissolved)		209293-V33 (Total)		209293-V33 (Dissolved)		209293-V33 (Total)		209293-V33 (Dissolved)		209293-V33 (Total)		209293-V33 (Dissolved)		209293-20071002-V39 (Dissolved)		209293-V39 (Total)		209293-V39 (Dissolved)		209293-V39 (Total)		209293-V39 (Dissolved)	
Lab Sample ID		5176351		5257717		5257718		5256527		5266528		5317405		5317406		5176353		5257719		5257720		5266525		5266526		5317407		5317408	
Sample Date		10/2/2007		1/14/2008		1/14/2008		1/26/2008		1/26/2008		3/28/2008		3/28/2008		10/2/2007		1/14/2008		1/14/2008		1/26/2008		1/26/2008		3/28/2008		3/28/2008	
Metals (µg/L)	**SLV**																												
Aluminum	(50-200)	80.2	U	**170**		80.2	U	**248**		80.2	U	114		80.2	U	80.2	U	**446**		80.2	U	80.2	U	80.2	U	122		80.2	U
Antimony	6	0.20		0.14		0.081		0.13		0.082		0.30	U	0.30	U	0.40		0.18		0.11		0.42		0.37		0.35		0.32	
Arsenic	0.045	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U
Cadmium	0.094	**0.17**		0.099	U	0.099	U	0.13	U	0.099	U	**0.11**		**0.11**		0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U	0.099	U
Chromium	100	0.42	U	1.1		0.42	U	0.76		0.42	U	0.62		0.60	U	0.65		1.7		0.42	U	0.77		0.42	U	0.60	U	0.60	U
Copper	2.7	**8.8**		2.2	U	2.2		**3.6**		2.2	U	**4.9**		**4.3**		**7.2**		**5.6**		2.2	U	2.2	U	2.2	U	**4.5**		**4.7**	
Total cyanide (water)	5.2	5 [1]	U	5.0	U	-		5.0	U	-		5.0	U	-		5.0 [1]	U	5.0	U	-		5.0	U	-		5.0	U	-	
Lead	0.54	0.17		3.6		0.098		**2.9**		0.088		**1.1**		0.12		0.22		**5.4**		0.081		**0.71**		0.083		**0.89**		0.18	
Mercury	0.77	0.056	U	0.099		0.072		0.065		0.068		0.056	U	0.056	U	0.056	U	0.13		0.093		0.16		0.081		0.056	U	0.10	
Nickel	16	1.7		1.4		0.43	U	1.3		0.66		0.58		0.59		2.0		1.2		0.43	U	1.3		1.1		0.56		1.4	
Selenium	5[a]	0.53	U	0.53	U	0.53	U	0.53	U	0.53	U	0.35	U	0.35	U	0.53	U	0.53	U	0.53	U	0.53	U	0.53	U	0.35	U	0.35	U
Silver	0.12	1.6 [1]	U	1.6	U	2.2	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6 [1]	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
Zinc	36	**107**		42.8	U	1.6	U	**122**		**109**		**45.0**		**42.3**		**41.7**		**38.4**		21.4		**41**		**39.5**		19.8		18.6	
Total suspended solids	-	16,800 [1]		8,000		-		9,270,000		-		6,800		-		5,200 [1]		23,600		-		10,400		-		3,200		-	

Notes:
Samples were lab filtered to analyze dissolved fraction
U = Analyte not detected above indicated detection limit
- = No screening-level value (SLV) available or sample not analyzed
µg/L = Micrograms per liter.
Bold font indicates exceedance of SLVs.
USEPA Method 7471A used for analysis of mercury
USEPA Method 6010b used for analysis of aluminium, copper, silver and zinc
USEPA Method 6020 used for analysis of antimony, arsenic, cadmium, chromium, lead, nickel and selenium
USEPA Method SW-846 9012A used for analyses of total cyanide
SLV = DEQ/Portland Harbor Joint Source Control Strategy Screening Level Values
SLV values reflect the 7/16/07 revision table, where numbers highligted in yellow are used for initial upland source control screening evaluation for water
[a] The SLV is expressed as total recoverable metal in the water column. For this analyte, only the dissolved fraction was analyzed. The total recoverable analysis will be included in subsequent events
[1] For the 10/2/07 sampling event, the metals results were reported as metals detected in the dissolved fraction, with the exception of silver, cyanide and suspended solids, which were reported as total silver total cyanide and total suspended solids in the sample

Table 5
National Pollutant Discharge Elimination System Sampling Analytical Results

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

	Chromium (µg/L)		Copper (µg/L)		Lead (µg/L)		Mercury (µg/L)		Nickel (µg/L)		Zinc (µg/L)	
SLV (µg/L)	**100**		**2.7**		**0.54**		**0.77**		**16**		**36**	
Outfall Valve Number	**V33**	**V39**	**V33**	**V39**	**V33**	**V39**	**V33**	**V39**	**V33**	**V39**	**V33**	**V39**
Date												
3/28/1995	--	--	--	**30**	--	**20**	--	--	--	--	**70**	**130**
5/1/1995	--	--	**10**	**11**	**20**	*20 U*	--	--	--	--	**132**	**86**
6/12/1995	--	--	--	--	--	--	--	--	--	--	--	--
10/30/1995	--	--	--	--	--	--	--	--	--	--	--	--
11/6/1995	--	--	**40**	**40**	**30**	**30**	--	--	--	--	**210**	**220**
11/22/1995	--	--	**13**	--	*20 U*	--	--	--	--	--	**72**	--
3/14/1996	--	--	*20 U*	**20**	*30 U*	*30 U*	--	--	--	--	**150**	**230**
12/3/1996	--	--	**30**	**20**	*60 U*	**70**	--	--	--	--	**130**	**50**
12/10/1995	--	--	**7**	**8**	**20**	*20 U*	--	--	--	--	**75**	**437**
2/22/1997	--	--	**21**	**14**	*60 U*	*60 U*	--	--	--	--	**190**	**92**
8/28/1997	--	--	**25**	**20**	*300 U*	**300**	--	--	--	--	**229**	**57**
11/25/1997	--	--	**23**	**23**	*60 U*	*60 U*	--	--	--	--	**110**	**70**
3/3/1998	--	--	**47**	**12**	**160**	**130**	--	--	--	--	**270**	31
3/10/1998	--	--	--	--	--	--	--	--	--	--	--	--
11/6/1998	--	--	**21**	**20**	*62 U*	*62 U*	--	--	--	--	**73**	**69**
12/7/1998	--	--	*30 U*	*30 U*	*100 U*	*100 U*	--	--	--	--	**68**	*50 U*
2/9/1999	--	--	**34**	**32**	*130 U*	*130 U*	--	--	--	--	**120**	**94**
11/8/1999	--	--	**12**	**12**	*40 U*	*40 U*	--	--	--	--	**310**	**48**
12/9/1999	--	--	*30 U*	**31**	*100 U*	*100 U*	--	--	--	--	**73**	**79**
2/28/2000	--	--	*10 U*	*10 U*	*80 U*	*80 U*	--	--	--	--	**1100**	**70**
5/3/2000	--	--	*10 U*	--	*90 U*	--	--	--	--	--	**130**	--
12/15/2000	--	--	**14**	**9**	**7**	*1 U*	--	--	--	--	**150**	**60**
3/15/2001	--	--	*50 U*	*50 U*	*200 U*	*2000 U*	--	--	--	--	**419**	**158**
3/15/2001	--	--	**27**	--	*1 U*	--	--	--	--	--	**510**	--
3/16/2001	--	--	--	**20**	--	*10 U*	--	--	--	--	--	10
10/22/2001	--	--	1 U	--	*1 U*	--	--	--	--	--	**80**	--
12/13/2001	--	--	--	**10**	--	**2**	--	--	--	--	--	**140**
6/30/2002	--	--	**24**	**12**	**26**	**9**	--	--	--	--	**950**	34

Table 5
National Pollutant Discharge Elimination System Sampling Analytical Results

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

	Chromium (µg/L)		Copper (µg/L)		Lead (µg/L)		Mercury (µg/L)		Nickel (µg/L)		Zinc (µg/L)	
SLV (µg/L)	**100**		**2.7**		**0.54**		**0.77**		**16**		**36**	
Outfall Valve Number	**V33**	**V39**	**V33**	**V39**	**V33**	**V39**	**V33**	**V39**	**V33**	**V39**	**V33**	**V39**
Date												
11/12/2002	2	2	**17**	**20**	*1 U*	*1 U*	ND	ND	ND	ND	**68**	32
3/7/2003	--	--	**3.21**	**4**	**1.21**	**11**	--	--	--	--	**41.8**	**43**
4/7/2003	10	5	**18**	**13**	*1 U*	**7**	0.471	0.429	ND	8	**130**	**52**
11/19/2003	9	9	**9**	**9**	**22**	**15**	**1.8**	**4.6**	ND	8	20	ND
3/25/2004	ND	--	**7**	--	ND	--	ND	--	5	--	27	--
4/21/2004	--	ND	--	**20**	--	**5**	--	ND	--	ND	--	27
1/24/2005	--	--	**18**	**41**	ND	ND	--	--	--	--	35	**41**
3/23/2005	--	--	ND	ND	ND	ND	--	--	--	--	**230**	**220**
11/1/2005	--	--	ND	**9**	ND	**28**	--	--	--	--	**70**	**120**
4/14/2006	--	--	**11**	**12**	**6**	**13**	--	--	--	--	**110**	**51**
NPDES Permit (µg/L)	NA		100		400		NA		NA		600	

Notes:
-- = No sample for this analyte was collected during this sampling event.
ND = Nondetect; no detection limit available.
U = Analyte not detected above indicated detection limit.
NPDES Permit = National Pollutant Discharge Elimination System benchmarks from the General Stormwater Permit.
NA = No NPDES permit limit for this analyte.
SLV = Screening-level value.
Bold font indicates exceedance of SLV.
Italicized font indicates analyte not detected, but detection limit exceeds SLV.
Source: Expanded Preliminary Assessment (XPA), SAIC, February 2004, and Paramount Petroleum Company site records.

Table 6
Catch Basin Analytical Results – Polychlorinated Biphenyls

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**Area 1**	**Area 2**	**Area 3A**	**Area 3B**	**Area 4**
Lab Sample ID			**5138784**	**5138786**	**5138150**	**5138782**	**5140084**
Sample Date			**8/24/2007**	**8/24/2007**	**8/22/2007**	**8/23/07**	**8/28/07**
Aroclors (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**					
Aroclor-1262	NA	NA	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0042 U
Aroclor-1268	NA	NA	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0042 U
Aroclor-1016	0.53	NA	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0042 U
Aroclor-1221	NA	NA	0.0052 U	0.0052 U	0.0052 U	0.0052 U	0.0067 U
Aroclor-1232	NA	NA	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0042 U
Aroclor-1242	NA	NA	0.0033 U	0.0033 U	0.0033 U	0.0033 U	0.0042 U
Aroclor-1248	1.5	NA	0.0033 U	0.0033 U	0.015	0.0033 U	0.0042 U
Aroclor-1254	0.3	NA	0.012	0.020	0.012	0.031	0.010
Aroclor-1260	0.2	NA	0.015	0.015	0.0084	0.023	0.010
Total PCBs	NA	0.00039	**0.027**	**0.035**	**0.046**	**0.054**	**0.020**

Notes:

U = Analyte not detected above indicated detection limit.

NA = No screening-level value (SLV) available.

mg/kg = Milligrams per kilogram.

Italic font indicates exceedance of toxicity SLVs.

Bold font indicates exceedance of bioaccumluative SLVs.

Toxicity SLV = Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs

Bioaccumulation SLV = Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.

USEPA Method 8082 used for analysis of PCBs.

Total PCB is the summation of the individual Aroclors. Nondetects are included at ½ of the detection limit.

Table 7
Stormwater Analytical Results – Polychlorinated Biphenyls

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID		209293-20071002-V33		209293-V33		209293-V33		209293-V33		209293-20071002-V39		209293-V39		209293-V39		209293-V39	
Lab Sample ID		5176350		5257717		5266525		5317405		5176352		5257719		5266527		5317407	
Sample Date		10/2/2007		1/14/2008		1/26/2008		3/28/2008		10/2/2007		1/14/2008		1/26/2008		3/28/2008	
PCBs (µg/L)	**SLV**																
Aroclor-1268	-	0.096	U	0.020	U	0.019	U	0.020	U	0.11	U	0.019	U	0.019	U	0.019	U
Aroclor-1016	0.96	0.096	U	0.020	U	0.019	U	0.020	U	0.11	U	0.019	U	0.019	U	0.019	U
Aroclor-1221	0.034	0.11	U	0.020	U	0.019	U	0.020	U	0.12	U	0.019	U	0.019	U	0.019	U
Aroclor-1232	0.034	0.096	U	0.039	U	0.038	U	0.041	U	0.11	U	0.038	U	0.038	U	0.038	U
Aroclor-1242	0.034	0.096	U	0.020	U	0.019	U	0.020	U	0.11	U	0.019	U	0.019	U	0.019	U
Aroclor-1248	0.034	0.096	U	0.020	U	0.019	U	0.020	U	0.11	U	0.019	U	0.019	U	0.019	U
Aroclor-1254	0.033	0.14	U	0.020	U	0.019	U	0.020	U	0.15	U	0.019	U	0.019	U	0.019	U
Aroclor-1260	0.034	0.096	U	0.020	U	0.019	U	0.020	U	0.11	U	0.019	U	0.019	U	0.019	U
Aroclor-1262	-	0.096	U	0.039	U	0.038	U	0.041	U	0.11	U	0.038	U	0.038	U	0.038	U
Total PCB	0.000064	0.461	U	0.109	U	0.105	U	0.111	U	0.520	U	0.105	U	0.105	U	0.105	U

Notes:
U = Analyte not detected above indicated detection limit.
- = No screening-level value (SLV) available or sample not analyzed.
µg/L = Micrograms per liter.
Bold font indicates exceedance of SLVs.
USEPA Method 8082 used for analysis of PCBs.
SLV = DEQ/Portland Harbor Joint Source Control Strategy Screening Level Values.
Total PCB is the summation of the individual Aroclors. Nondetects are included at ½ of the detection limit.

Table 8
Catch Basin Analytical Results – Volatile Organic Compounds

Source Control Evaluation Results
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**Area 1**	**Area 2**	**Area 3A**	**Area 3B**	**Area 4**
Lab Sample ID			**5138784**	**5138786**	**5138150**	**5138782**	**5140084**
Sample Date			**8/24/2007**	**8/24/07**	**8/22/2007**	**8/23/07**	**8/28/07**
VOC (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**					
1,1,1,2-Tetrachloroethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
1,1,1-Trichloroethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
1,1,2-Trichloroethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
1,1-Dichloroethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
1,1-Dichloroethene	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
1,2,3-Trichloropropane	NA	NA	0.001 U	0.001 U	--	0.001 U	0.001 U
1,2-Dichloroethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
1,2-Dichloropropane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
2-Butanone	NA	NA	0.004 U	0.017	0.053	0.011	0.016
2-Chloroethyl vinyl ether	NA	NA	0.002 U	0.002 U	0.01 U	0.002 U	0.003 U
2-Hexanone	NA	NA	0.003 U	0.003 U	0.015 U	0.003 U	0.004 U
4-Methyl-2-pentanone	NA	NA	0.003 U	0.003 U	0.015 U	0.003 U	0.004 U
Acetone	NA	NA	0.053	0.080	0.19	0.053	0.074
Acrolein	NA	NA	0.02 U	0.02 U	0.1 U	0.02 U	0.026 U
Acrylonitrile	NA	NA	0.004 U	0.004 U	0.02 U	U	0.005 U
Benzene	NA	NA	0.0005 U	0.0005 U	0.003 U	0.0005 U	0.0006 U
Bromochloromethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Bromodichloromethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Bromoform	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Bromomethane	NA	NA	0.002 U	0.002 U	0.01 U	0.002 U	0.003 U
Carbon disulfide	NA	NA	0.001 U	0.001 U	0.008	0.001	0.001 U
Carbon tetrachloride	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Chlorobenzene	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Chloroethane	NA	NA	0.002 U	0.002 U	0.01 U	0.002 U	0.003 U
Chloroform	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Chloromethane	NA	NA	0.002 U	0.002 U	0.001 U	0.002 U	0.003 U
cis-1,3-Dichloropropene	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Dibromochloromethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Dibromomethane	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Dichlorodifluoromethane	NA	NA	0.002 U	0.002 U	0.001 U	0.002 U	0.003 U
Ethylbenzene	NA	NA	0.001 U	0.002	0.005 U	0.008	0.001 U
Hexachlorobutadiene	0.6	NA	0.002 U	0.002 U	0.01 U	0.002 U	0.003 U
Isopropylbenzene	NA	NA	0.001 U	0.001 U	0.005 U	0.003	0.001 U
m,p-Xylene	NA	NA	0.001 U	0.008	0.008	0.013	0.002
Methyl iodide	NA	NA	0.003 U	0.003 U	0.015 U	0.003 U	0.004 U
Methyl tertiary butyl ether (MTBE)	NA	NA	0.0005 U	0.0005 U	0.003 U	0.0005 U	0.0006 U
Methylene chloride	NA	NA	0.002 U	0.002 U	0.019	0.002 U	0.003
Naphthalene	0.561	NA	0.001 U	0.001 U	0.015	0.003	0.001 U
o-Xylene	NA	NA	0.001 U	0.003	0.005 U	0.002	0.001 U
Styrene	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Tetrachloroethene	0.5	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Toluene	NA	NA	0.001 U	0.008	2.3	0.079	0.003

Table 8
Catch Basin Analytical Results – Volatile Organic Compounds

Source Control Evaluation Results
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**Area 1**	**Area 2**	**Area 3A**	**Area 3B**	**Area 4**
Lab Sample ID			**5138784**	**5138786**	**5138150**	**5138782**	**5140084**
Sample Date			**8/24/2007**	**8/24/07**	**8/22/2007**	**8/23/07**	**8/28/07**
VOC (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**					
trans-1,2-Dichloroethene	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
trans-1,3-Dichloropropene	NA	NA	0.001 U	0.001 U	--	0.001 U	0.001 U
trans-1,4-Dichloro-2-butene	NA	NA	0.01 U	0.01 U	0.05 U	0.01 U	0.013 U
Trichloroethene	2.1	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U
Trichlorofluoromethane	NA	NA	0.002 U	0.002 U	0.01 U	0.002 U	0.003 U
Vinyl acetate	NA	NA	0.002 U	0.002 U	0.01 U	0.002 U	0.003 U
Vinyl chloride	NA	NA	0.001 U	0.001 U	0.005 U	0.001 U	0.001 U

Notes:

U = Analyte not detected above indicated detection limit.

NA = No screening-level value (SLV) available.

mg/kg = Milligrams per kilogram.

-- = Not analyzed.

Italic font indicates exceedance of toxicity SLVs.

Bold font indicates exceedance of bioaccumluative SLVs.

Toxicity SLV = Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs

Bioaccumulation SLV = Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.

USEPA Method 8260B used for analysis of VOCs.

Table 9
Stormwater Analytical Results – Volatile Organic Compounds

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID		209293-V33		209293-V33		209293-V33		209293-V39		209293-V39		209293-V39	
Lab Sample ID		5257717		5266525		5357405		5257719		5266527		5357407	
Sample Date		1/14/2008		1/26/2008		3/28/2008		1/14/2008		1/26/2008		3/28/2008	
Volatile Organic Compounds (µg/L	**SLV**												
Methyl tertiary butyl ether	37	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dichlorodifluoromethane	390	2	U	2	U	2.	U	2	U	2	U	2	U
Chloromethane	2.1	1	U	1	U	1.	U	1	U	1	U	1	U
Vinyl chloride	0.015	1	U	1	U	1.	U	1	U	1	U	1	U
Bromomethane	8.7	1	U	1	U	1.	U	1	U	1	U	1	U
Chloroethane	23	1	U	1	U	1.	U	1	U	1	U	1	U
Trichlorofluoromethane	1,300	2	U	2	U	2.	U	2	U	2	U	2	U
Methylene chloride	8.9	2	U	2	U	2.	U	2	U	2	U	2	U
trans-1,2-Dichloroethene	110	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
1,1-Dichloroethane	47	1	U	1	U	1.	U	1	U	1	U	1	U
cis-1,2-Dichloroethene	61	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Chloroform	0.17	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Bromochloromethane	-	1	U	1	U	1.	U	1	U	1	U	1	U
1,1,1-Trichloroethane	11	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Carbon tetrachloride	0.51	1	U	1	U	1.	U	1	U	1	U	1	U
Benzene	1.2	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,2-Dichloroethane	0.73	1	U	1	U	0.5	U	1	U	1	U	1	U
Trichloroethene	0.17	1	U	1	U	1.	U	1	U	1	U	1	U
1,2-Dichloropropane	0.97	1	U	1	U	1.	U	1	U	1	U	1	U
Dibromomethane	61	1	U	1	U	1.	U	1	U	1	U	1	U
Bromodichloromethane	1.1	1	U	1	U	1.	U	1	U	1	U	1	U
Toluene	9.8	0.7	U	0.7	U	0.5	U	0.7	U	0.7	U	0.7	U
1,1,2-Trichloroethane	1.2	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Tetrachloroethene	0.12	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
Dibromochloromethane	0.79	1	U	1	U	1.	U	1	U	1	U	1	U
1,2-Dibromoethane	0.033	1	U	1	U	0.5	U	1	U	1	U	1	U
Chlorobenzene	50	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U	0.8	U
1,1,1,2-Tetrachloroethane	2.5	1	U	1	U	1.	U	1	U	1	U	1	U
Ethylbenzene	7.3	0.8	U	0.8	U	0.5	U	0.8	U	0.8	U	0.8	U
m+p-Xylene	1.8	0.8	U	0.8	U	0.5	U	0.8	U	0.8	U	0.8	U
o-Xylene	13	0.8	U	0.8	U	0.5	U	0.8	U	0.8	U	0.8	U
Styrene	100	1	U	1	U	1.	U	1	U	1	U	1	U
Bromoform	8.5	1	U	1	U	1.	U	1	U	1	U	1	U
Isopropylbenzene	660	1	U	1	U	1.	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	0.33	1	U	1	U	1.	U	1	U	1	U	1	U
1,2,3-Trichloropropane	0.0095	1	U	1	U	1.	U	1	U	1	U	1	U
Acetone	1,500	6	U	6	U	6.	U	6	U	17		6	U
Carbon disulfide	0.92	1	U	1	U	1.	U	1	U	1	U	1	U
2-Butanone	7,100	3	U	3	U	3.	U	3	U	3	U	3	U
trans-1,3-Dichloropropene	0.055	1	U	1	U	1.	U	1	U	1	U	1	U
cis-1,3-Dichloropropene	0.055	1	U	1	U	1.	U	1	U	1	U	1	U
4-Methyl-2-pentanone	170	3	U	3	U	3.	U	3	U	3	U	3	U
2-Hexanone	99	3	U	3	U	3.	U	3	U	3	U	3	U
Xylene (total)	200	0.8	U	0.8	U	0.5	U	0.8	U	0.8	U	0.8	U
Methyl iodide	-	1	U	1	U	1.	U	1	U	1	U	1	U
Acrylonitrile	0.12	4	U	4	U	4.	U	4	U	4	U	4	U
Vinyl acetate	16	2	U	2	U	2.	U	2	U	2	U	2	U
trans-1,4-Dichloro-2-butene	7,100	15	U	15	U	15.	U	15	U	15	U	15	U
Acrolein	0.042	40	U	40	U	40.	U	40	U	40	U	40	U
2-Chloroethyl vinyl ether	-	2	U	2	U	2.	U	2	U	2	U	2	U

Notes:
U = Analyte not detected above indicated detection limit.
- = No screening-level value (SLV) available.
µg/L = Micrograms per liter.
Bold font indicates exceedance of SLVs.
SLV = DEQ/Portland Harbor Joint Source Control Strategy Screening Level Values.
USEPA Method SW-846 8081A used for analysis of organochlorine pesticides.

Table 10
Catch Basin Analytical Results – Polycyclic Aromatic Hydrocarbons

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**Area 1**	**Area 2**	**Area 3A**	**Area 3B**	**Area 4**
Lab Sample ID			**5138784**	**5138786**	**5138150**	**5138782**	**5140084**
Sample Date			**8/24/2007**	**8/24/07**	**8/22/2007**	**8/23/07**	**8/28/07**
PAHs (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**					
2-Methylnaphthalene	0.2	NA	0.0067 U	0.031	0.073	0.032	0.021 U
Acenaphthene	0.3	NA	0.33 U	0.33 U	1.7 U	0.33 U	0.043 U
Acenaphthylene	0.2	NA	--	--	1.7 U	--	0.043 U
Anthracene	0.845	NA	0.030	0.060	0.13	0.27	0.013
Benzo(a)anthracene	1.05	NA	0.22	0.28	0.3	*1.4*	0.10
Benzo(a)pyrene	1.45	NA	0.33	0.44	0.3	*1.8*	0.14
Benzo(b)fluoranthene	NA	NA	0.51	0.72	0.46	2.4	0.20
Benzo(g,h,i)perylene	0.3	NA	0.16	0.29	1.7 U	*1.3*	0.26
Benzo(k)fluoranthene	13	NA	--	--	0.2	--	0.083
Chrysene	1.29	NA	0.32	0.70	0.54	*2.1*	0.17
Dibenz(a,h)anthracene	1.3	NA	0.38	0.87	--	*3.3*	--
Fluoranthene	2.23	NA	--	--	0.93	--	0.16
Fluorene	0.536	NA	0.011	0.031	0.09	0.097	0.021 U
Indeno(1,2,3-cd)pyrene	0.1	NA	*0.20*	*0.29*	*0.17*	*0.93*	0.090
Naphthalene	0.561	NA	0.0067 U	0.034	0.067	0.037	0.021 U
Phenanthrene	1.17	NA	0.14	0.47	0.71	*1.5*	0.088
Pyrene	1.52	1.9	0.40	0.90	0.83	*3.2*	0.17

Notes:

U = Analyte not detected above indicated detection limit.

NA = No screening-level value (SLV) available.

-- = Not analyzed.

mg/kg = Milligrams per kilogram.

Italic font indicates exceedance of toxicity SLVs.

Bold font indicates exceedance of bioaccumluative SLVs.

Toxicity SLV = Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs

Bioaccumulation SLV = Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.

USEPA Method 8270 C used for analysis of PAHs. USEPA Method 8270 C SIM used for analysis of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene,

Table 11
Stormwater Analytical Results – Polycyclic Aromatic Hydrocarbons

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID		209293-20071002-V33		209293-V33		209293-V33		209293-V33		209293-20071002-V39		209293-V39		209293-V39		209293-V39	
Lab Sample ID		5176350		52517717		5266525		5317405		5176352		5257719		5266527		5317407	
Sample Date		10/2/2007		1/14/2008		1/26/2008		3/28/2008		10/2/2007		1/14/2008		1/26/2008		3/28/2008	
PAHs (µg/L)	**SLV**																
Acenaphthene	0.2	0.0095	U	**0.42**		0.0095	U	1	U	0.010	U	0.011		**0.21**		0.0095	U
Acenaphthylene	0.2	0.0095	U	0.0096	U	0.0095	U	1	U	0.010	U	0.014		**0.097**		0.0095	U
Anthracene	0.2	0.0095	U	0.0096	U	0.0095	U	1	U	0.010	U	0.010		**0.13**		0.0095	U
Benzo(a)anthracene	0.018	0.0095	U	**0.081**		0.0095	U	1	U	0.010	U	**0.027**		**0.037**		0.0095	U
Benzo(a)pyrene	0.018	0.014		**0.13**		0.012		1	U	0.010	U	**0.062**		**0.038**		0.0095	U
Benzo(b)fluoranthene	0.018	**0.029**		**0.21**		0.012		1	U	0.010	U	**0.083**		**0.043**		0.0095	U
Benzo(g,h,i)perylene	0.2	0.027		0.038		0.012		1	U	0.010	U	0.079		0.038		0.0095	U
Benzo(k)fluoranthene	0.018	0.010		**0.039**		0.0095	U	1	U	0.010	U	**0.036**		**0.036**		0.0095	U
Chrysene	0.018	**0.030**		**0.21**		0.011		1	U	0.010	U	**0.053**		**0.078**		0.0095	U
Dibenz(a,h)anthracene	0.018	0.0095	U	0.010		0.0095	U	1	U	0.010	U	0.010		0.0095	U	0.0095	U
Fluoranthene	0.2	0.031		0.0096	U	0.010		1	U	0.010	U	0.081		0.15		0.0095	U
Fluorene	0.2	0.0095	U	**0.87**		0.0095	U	1	U	0.010	U	0.035		**0.35**		0.0095	U
Indeno(1,2,3-cd)pyrene	0.018	0.016		**0.028**		0.0095	U	1	U	0.010	U	**0.052**		**0.023**		0.0095	U
Naphthalene	0.2	0.010		0.0096	U	0.0095	U	1	U	0.010	U	0.028		0.19		0.0095	U
Phenanthrene	0.2	0.029		**3.6**		0.0095	U	**3**		0.010	U	0.092		**0.75**		0.0095	U
Pyrene	0.2	0.041		0.45		0.025		1	U	0.010	U	0.098		0.17		0.0095	U

Notes:

U = Analyte not detected above indicated detection limit.
- = No screening-level value (SLV) available or sample not analyzed.
µg/L = Micrograms per liter.
Bold font indicates exceedance of SLVs.
USEPA Method 8270 C used for analysis of PAHs. USEPA Method 8270 C SIM used for analysis of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and indeno(1,2,3-cd)pyrene.
SLV = DEQ/Portland Harbor Joint Source Control Strategy Screening Level Values.

Table 12
Catch Basin Analytical Results – Phthalate Esters

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**Area 1**	**Area 2**	**Area 3A**	**Area 3B**	**Area 4**
Lab Sample ID			**5138784**	**5138786**	**5138150**	**5138782**	**5140084**
Sample Date			**8/24/2007**	**8/24/2007**	**8/22/2007**	**8/23/07**	**8/28/07**
Phthalate Esters (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**					
Dimethylphthalate	NA	NA	0.67 U	0.67 U	3.3 U	0.67 U	0.086 U
Diethylphthalate	0.6	NA	0.67 U	0.67 U	3.3 U	0.67 U	0.086 U
Di-n-butylphthalate	0.1	NA	0.67 U	0.67 U	3.3 U	0.67 U	0.086 U
Butylbenzylphthalate	NA	NA	0.67 U	0.67 U	3.3 U	0.67 U	0.086 U
bis(2-Ethylhexyl)phthalate	0.8	0.33	0.67 U	***1.5***	***7.8***	***7.1***	***1.3***
Di-n-octylphthalate	NA	NA	0.67 U	0.67 U	3.3 U	0.67 U	0.086 U

Notes:

U = Analyte not detected above indicated detection limit.

NA = No screening-level value (SLV) available.

mg/kg = Milligrams per kilogram.

Italic font indicates exceedance of toxicity SLVs.

Bold font indicates exceedance of bioaccumluative SLVs.

Toxicity SLV = Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs

Bioaccumulation SLV = Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.

USEPA Method 8270 C used for analysis of phthalate esters.

Performed follow-up analyses for this constituent on individual catch basin archive samples

Table 13
Individual Catch Basin Follow-Up Analytical Results – Phthalate Esters

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**SWCB-25**	**SWCB-26**	**SWCB-27**	**SWCB-29**	**SWCB-30**	**SWCB-31**	**SWCB-32**	**SWCB-33**	**SWCB-34**	**SWCB-35**	**SWCB-37**
Lab Sample ID			**5157924**	**5157925**	**5157926**	**5157927**	**5157928**	**5157929**	**5157930**	**5157931**	**5157932**	**5157933**	**5157934**
Composite Sample ID			**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**
Sample Date			**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**
Phthalate Esters (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**											
bis(2-Ethylhexyl)phthalate	0.8	0.33	***1.7***	***1.6***	3.3 U	***4.4***	***4.1***	***17***	***18***	***2.7***	***5.8***	***2.6***	***36***

Sample ID			**SWCB-39**	**SWCB-40**	**SWCB-41**	**SWCB-44**	**SWCB-45**	**SWCB-48**	**SWCB-49**	**SWCB-50**
Lab Sample ID			**5157935**	**5157936**	**5157937**	**5157938**	**5157942**	**5157939**	**5157940**	**5157941**
Composite Sample ID			**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**
Sample Date			**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**
Phthalate Esters (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**								
bis(2-Ethylhexyl)phthalate	0.8	0.33	***8.5***	3.3 U	***3.9***	***13***	***17***	***4.4***	***5.9***	***9.6***

Sample ID			**SWCB-51**	**SWCB-52**	**SWCB-53**	**SWCB-54**	**SWCB-55**	**SWCB-56**	**SWCB-16**	**SWCB-20**	**SWCB-22**	**SWCB-23**
Lab Sample ID			**5157943**	**5157944**	**5157945**	**5157946**	**5157947**	**5157948**	**5157949**	**5157950**	**5157952**	**5157951**
Composite Sample ID			**3B**	**3B**	**3B**	**3B**	**3B**	**3B**	**4**	**4**	**4**	**4**
Sample Date			**8/23/07**	**8/23/07**	**8/23/07**	**8/23/07**	**8/23/07**	**8/23/07**	**8/28/07**	**8/28/07**	**8/28/07**	**8/28/07**
Phthalate Esters (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**										
bis(2-Ethylhexyl)phthalate	0.8	0.33	***13***	***9.0***	***1.6***	***7.1***	***1.8***	***7.5***	***7.4***	***1.2***	***1.5***	***1.1***

Notes:
U = Analyte not detected above indicated detection limit.
NA = No screening-level value (SLV) available.
mg/kg = Milligrams per kilogram.
Italic font indicates exceedance of toxicity SLVs.
Bold font indicates exceedance of bioaccumluative SLVs.
Toxicity SLV = Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs
Bioaccumulation SLV = Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.
USEPA Method 8270 C used for analysis of phthalate esters.

Table 14
Stormwater Analytical Results – Phthalate Esters

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID		209293-20071002-V33		209293-V33		209293-V33		209293-V33		209293-20071002-V39		209293-V39		209293-V39		209293-V39	
Lab Sample ID		5176350		5257717		5266525		5317405		5176352		5257719		5266527		5317407	
Sample Date		10/2/2007		1/14/2008		1/26/2008		3/28/2008		10/2/2007		1/14/2008		1/26/2008		3/28/2008	
Phthalate Esters (µg/L)	**SLV**																
Dimethylphthalate	3	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Diethylphthalate	3	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Di-n-butylphthalate	3	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
Butylbenzylphthalate	3	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U
bis(2-Ethylhexyl)phthalate	2.2	2		**6**		2	U	**9**		2	U	2	U	2	U	2	U
Di-n-octylphthalate	3	2	U	2	U	2	U	2	U	2	U	2	U	2	U	2	U

Notes:
U = Analyte not detected above indicated detection limit.
- = No screening-level value (SLV) available or sample not analyzed.
µg/L = Micrograms per liter.
Bold font indicates exceedance of SLVs.
USEPA Method 8270 C used for analysis of phthalate esters.
SLV = DEQ/Portland Harbor Joint Source Control Strategy Screening Level Values.

Table 15
Catch Basin Analytical Results – Semivolatile Organic Compounds

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**Area 1**		**Area 2**		**Area 3A**		**Area 3B**		**Area 4**	
Lab Sample ID			**5138784**		**5138786**		**5138150**		**5138782**		**5140084**	
Sample Date			**8/24/2007**		**8/24/07**		**8/22/2007**		**8/23/07**		**8/28/07**	
SVOC (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**										
Carbazole	1.6	NA	0.33	U	0.33	U	1.7	U	0.36		0.043	U
Dibenzofuran	NA	NA	0.33	U	0.33	U	1.7	U	0.33	U	0.043	U
Hexachlorobenzene	0.1	0.019	0.33	U	0.33	U	1.7	U	0.33	U	0.043	U
Hexachlorobutadiene	0.6	NA	0.67	U	0.67	U	3.3	U	0.67	U	0.003	U
Hexachloroethane	NA	NA	0.33	U	0.33	U	1.7	U	0.33	U	0.043	U

Notes:

U = Analyte not detected above indicated detection limit.

NA = No screening-level value (SLV) available.

mg/kg = Milligrams per kilogram.

Italic font indicates exceedance of toxicity SLVs.

Bold font indicates exceedance of bioaccumluative SLVs.

Toxicity SLV = Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs

Bioaccumulation SLV = Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.

USEPA Method 8270 C used for analysis of SVOCs.

Table 16
Catch Basin Analytical Results – Organochlorine Pesticides

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**Area 1**	**Area 2**	**Area 3A**	**Area 3B**	**Area 4**
Lab Sample ID			**5138784**	**5138786**	**5138150**	**5138782**	**5140084**
Sample Date			**8/24/2007**	**8/24/2007**	**8/22/2007**	**8/23/07**	**8/28/07**
OC Pesticides (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**					
Endrin aldehyde	NA	NA	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
Endrin ketone	NA	NA	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
Alpha chlordane	0.0176 [1]	0.00037 [1]	0.0038 U	0.0034 U	0.0085 U	0.0085 U	0.0022 U
Gamma chlordane	0.0176 [1]	0.00037 [1]	0.022 U	0.020 U	0.05 U	0.050 U	0.013 U
Alpha BHC	NA	NA	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
Beta BHC	NA	NA	0.013 U	0.012 U	0.031 U	0.031 U	0.0078 U
Gamma BHC (lindane)	0.00499	NA	0.0038 U	0.0034 U	0.0085 U	0.0085 U	0.0022 U
Delta BHC	NA	NA	0.0038 U	0.0034 U	0.0085 U	0.0085 U	0.0022 U
Heptachlor	0.01	NA	0.0038 U	0.0034 U	0.0085 U	0.0085 U	0.0022 U
Aldrin	0.04	NA	0.0042 U	0.0038 U	0.0095 U	0.0095 U	0.0024 U
Heptachlor epoxide	0.016	NA	0.0038 U	0.0034 U	0.0085 U	0.0085 U	0.0022 U
p,p-DDE	NA	NA	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
p,p-DDD	NA	NA	0.0073 U	0.0066 U	0.0017 U	0.017 U	0.0042 U
p,p-DDT	NA	NA	0.012	0.013	0.026	0.027	0.0087
HCB	NA	NA	0.0046 U	0.0042 U	0.011	0.011 U	0.0027 U
Mirex	NA	NA	--	--	--		--
Methoxychlor	NA	NA	0.038 U	0.034 U	0.085 U	0.085 U	0.022 U
Dieldrin	0.0618	0.0000081	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
Endrin	0.207	NA	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
Telodrin	NA	NA	--	--	--	--	--
Chlordane	0.0176	0.00037	--	--	--	--	--
Toxaphene	NA	NA	0.24 U	0.22 U	0.55 U	0.55 U	0.14 U
Endosulfan I	NA	NA	0.0049 U	0.0044 U	0.011	0.011 U	0.0028 U
Endosulfan II	NA	NA	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
Endosulfan sulfate	NA	NA	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
Kepone	NA	NA	--	--	--	--	--
o,p-DDE	NA	NA	0.012 U	0.011 U	0.027 U	0.027 U	0.0068 U
o,p-DDD	NA	NA	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
o,p-DDT	NA	NA	0.0073 U	0.0066 U	0.017 U	0.017 U	0.0042 U
Total DDE	0.0313 [2]	0.0003 [2]	ND	ND	ND	ND	ND
Total DDD	0.028 [3]	0.0003 [3]	ND	ND	ND	ND	ND
Total DDT	0.0629 [4]	0.0003 [4]	**0.012**	**0.013**	**0.026**	**0.027**	**0.0087**

Notes:

U = Analyte not detected above indicated detection limit.

NA = No screening-level value (SLV) available.

ND = Summation of nondetect values.

-- = Not analyzed.

[1] = Total chlordane SLV.

[2] = Total DDE (o, p-DDE and p, p-DDE)

[3] = Total DDD (o, p-DDD and p, p-DDD)

[4] = Total DDT (o, p-DDT and p, p-DDT)

mg/kg = Milligrams per kilogram.

USEPA Method 8081 used for analysis of pesticides.

Italic font indicates exceedance of toxicity SLVs.

Bold font indicates exceedance of bioaccumluative SLVs.

Toxicity SLV = Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs

Bioaccumulation SLV = Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.

Table 17
Stormwater Analytical Results – Organochlorine Pesticides

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID Lab Sample ID Sample Date		209293-20071002-V33 5176350 10/2/2007		209293-V33 5257717 1/14/2008		209293-V33 5266525 1/26/2008		209293-V33 5317405 3/28/2008		209293-20071002-V39 5176352 10/2/2007		209293-V39 5257719 1/14/2008		209293-V39 5266527 1/26/2008		209293-V39 5317407 3/28/2008	
Organochlorine Pesticides (µg/L)	**SLV**																
Endrin ketone	-	0.0039	U	0.00079	U	0.00076	U	0.00082	U	0.0039	U	0.00076	U	0.00076	U	0.00078	U
Kepone	-	0.068	U	0.014	U	0.013	U	0.014	U	0.068	U	0.013	U	0.013	U	0.014	U
Alpha chlordane	-	0.0029	U	0.00059	U	0.0024		0.00061	U	0.0029	U	0.00057	U	0.0029	U	0.00058	U
Gamma chlordane	-	0.0029	U	0.00059	U	0.00057	U	0.00061	U	0.0029	U	0.00062		0.00057	U	0.00058	U
Endrin aldehyde	-	0.019	U	0.0039	U	0.0038	U	0.0041	U	0.019	U	0.0038	U	0.0038	U	0.0039	U
Alpha BHC	0.0049	0.0026	U	0.00053	U	0.00052	U	0.00055	U	0.0026	U	0.00096		0.00051	U	0.00053	U
Beta BHC	0.017	0.0039	U	0.0010		0.00076	U	0.00082	U	0.0039	U	0.00076	U	0.00076	U	0.00078	U
Gamma BHC – lindane	0.052	0.0019	U	0.00039	U	0.00038	U	0.0043		0.0019	U	0.00038	U	0.00038	U	0.00039	U
Heptachlor	0.000079	**0.0032**		0.00059	U	0.00057	U	0.00061	U	0.0029	U	0.00057	U	**0.0016**		0.00058	U
Aldrin	0.00005	0.0039	U	0.00079	U	0.00076	U	**0.0024**		0.0029	U	0.00076	U	0.00076	U	0.00078	U
Delta BHC	0.037	0.0029	U	0.00059	U	0.00068		0.0030		0.0039	U	0.00098		0.00057	U	0.00058	U
Heptachlor epoxide	0.000039	0.0029	U	0.00059	U	0.00057	U	0.00061	U	0.0029	U	0.00057	U	0.00057	U	0.00058	U
p,p-DDE	-	0.0048	U	0.00099	U	0.00095	U	0.0010	U	0.0049	U	0.00095	U	0.00095	U	0.00097	U
p,p-DDD	-	0.0039	U	0.00079	U	0.00076	U	0.00082	U	0.0039	U	0.00076	U	0.00076	U	0.00078	U
p,p-DDT	-	0.0039	U	0.0011		0.00076	U	0.00082	U	0.0039	U	0.00084		0.00076	U	0.00078	U
HCB	-	0.0029	U	0.00059	U	0.00057	U	0.0021		0.0029	U	0.00057	U	0.00097		0.00058	U
Mirex	-	0.037	U	0.0075	U	0.0072	U	0.0077	U	0.037	U	0.0072	U	0.0072	U	0.0074	U
Methoxychlor	0.03	0.029	U	0.0059	U	0.0057	U	0.0061	U	0.029	U	0.0057	U	0.0057	U	0.0058	U
Dieldrin	0.000054	0.0039	U	0.00079	U	0.00076	U	**0.0021**		0.0039	U	0.00076	U	**0.00096**		0.00078	U
Endrin	0.036	0.0039	U	0.00079	U	0.00076	U	0.00082	U	0.0039	U	0.00076	U	0.0019		0.00078	U
Telodrin	-	0.0035	U	0.00071	U	0.00069	U	0.00073	U	0.0035	U	0.00068	U	0.00068	U	0.00070	U
Chlordane	0.00081	0.068	U	0.014	U	0.013	U	0.014	U	0.068	U	0.013	U	0.013	U	0.014	U
Toxaphene	0.0002	0.97	U	0.20	U	0.19	U	0.20	U	0.97	U	0.19	U	0.19	U	0.19	U
Endosulfan I	0.051	0.0029	U	0.00059	U	0.00057	U	0.00061	U	0.0029	U	0.00057	U	0.00057	U	0.00058	U
Endosulfan II	0.051	0.0039	U	0.0018		0.00076	U	0.00082	U	0.0039	U	0.0011		0.00076	U	0.00078	U
Endosulfan sulfate	89	0.0039	U	0.00079	U	0.00076	U	0.00082	U	0.0039	U	0.00079		0.00076	U	0.00078	U
o,p-DDE	-	0.0039	U	0.00079	U	0.00076	U	0.0017		0.0039	U	0.00076	U	0.00076	U	0.00078	U
o,p-DDD	-	0.0039	U	0.00079	U	0.00076	U	0.00082	U	0.0039	U	0.00076	U	0.00076	U	0.00078	U
o,p-DDT	-	0.0039	U	0.0020		0.00076	U	0.00082	U	0.0039	U	0.00094		0.00076	U	0.00078	U
Total DDE	0.00022	ND		ND		ND		**0.0017**		ND		ND		ND		ND	
Total DDD	0.00031	ND		ND		ND		ND		ND		ND		ND		ND	
Total DDT	0.00022	ND		**0.0031**		ND		ND		ND		**0.00178**		ND		ND	

Notes:
U = Analyte not detected above indicated detection limit.
- = No screening-level value (SLV) available or sample not analyzed.
µg/L = Micrograms per liter.
Bold font indicates exceedance of SLVs.
SLV = DEQ/Portland Harbor Joint Source Control Strategy Screening Level Values.
USEPA Method SW-846 8081A used for analysis of organochlorine pesticides.

Table 18
Catch Basin Analytical Results – Total Petroleum Hydrocarbons

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID **Lab Sample ID** **Sample Date**			**Area 1** **5138784** **8/24/2007**	**Area 2** **5138786** **8/24/07**	**Area 3A** **5138150** **8/22/2007**	**Area 3B** **5138782** **8/23/07**	**Area 4** **5140084** **8/28/07**
TPH (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**					
Gasoline-range organics	NA	NA	20 U	20 U	20 U	20 U	13 U
Diesel-range organics	NA	NA	43	41	470	190	61
Heavy-oil-range organics	NA	NA	530	540	5,800	3,000	700

Notes:

mg/kg = Milligrams per kilogram.

-- = Not analyzed.

NA = No screening-level value (SLV) available.

Method NWTPH-Gx modified used for gasoline-range organics, method NWTPH-Dx modified used for diesel- and heavy-oil-range organics.

Performed follow-up analyses for this constituent on individual catch basin archive samples.

Table 19
Individual Catch Basin Follow-Up Analytical Results – Total Petroleum Hydrocarbons

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID			**SWCB-25**	**SWCB-26**	**SWCB-27**	**SWCB-29**	**SWCB-30**	**SWCB-31**	**SWCB-32**	**SWCB-33**	**SWCB-34**
Lab Sample ID			**5157924**	**5157925**	**5157926**	**5157927**	**5157928**	**5157929**	**5157930**	**5157931**	**5157932**
Composite Sample ID			**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**
Sample Date			**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**
TPH (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**									
Diesel-range organics	NA	NA	600	150 U	150 U	370	230	720	1,200	150 U	420
Heavy-oil-range organics	NA	NA	4,700	1,800	1,900	5,400	4,000	6,200	2,700	1,800	4,200

Sample ID			**SWCB-35**	**SWCB-37**	**SWCB-39**	**SWCB-40**	**SWCB-41**	**SWCB-44**	**SWCB-48**	**SWCB-49**	**SWCB-50**
Lab Sample ID			**5157933**	**5157934**	**5157935**	**5157936**	**5157937**	**5157938**	**5157939**	**5157940**	**5157941**
Composite Sample ID			**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**	**3A**
Sample Date			**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**	**8/22/2007**
TPH (mg/kg)	*Toxicity SLV*	**Bioaccumulation SLV**									
Diesel-range organics	NA	NA	200	350	330	150 U	190	150 U	150 U	560	300 U
Heavy-oil-range organics	NA	NA	3,100	2,000	5,800	1,500	2,300	2,700	1,900	7,700	2,800

Notes:
mg/kg = Milligrams per kilogram.
-- = Not analyzed.
NA = No screening-level value (SLV) available.
Method NWTPH-Gx modified used for gasoline-range organics, method NWTPH-Dx modified used for diesel- and heavy-oil-range organics.

Table 20
Stormwater Analytical Results – Total Petroleum Hydrocarbons

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Sample ID		209293-20071002-V33	209293-V33	209293-V33	209293-V33	209293-20071002-V39	209293-V39	209293-V39	209293-V39
Lab Sample ID		5176350	5257717	5266525	5317405	5176352	5257719	5266527	5357407
Sample Date		10/2/2007	1/14/2008	1/26/2008	3/28/2008	10/2/2007	1/14/2008	1/26/2008	3/28/2008
TPH (µg/L)	**SLV**								
Diesel-range organics	-	160	230	81	5,500	81 U	50 U	1,600	78 U
Heavy-range organics	-	240	11,000	96 U	1,300	100 U	76 U	560	97 U
Gasoline-range organics	-	50 U	2,000	50 U	50 U	50 U	95 U	50 U	50 U

Notes:
U = Analyte not detected above indicated detection limit.
- = No screening-level value (SLV) available or sample not analyzed.
µg/L = Micrograms per liter.
Bold font indicates exceedance of SLVs.
NWTPH-Dx w/SiGel Method used for analysis of diesel- and heavy-oil-range organics.
NWTPH-Gx used for analysis of gasoline-range organics.
SLV = DEQ/Portland Harbor Joint Source Control Strategy Screening Level Values.

Table 21
Historical Groundwater Elevations

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Monitoring Well	Date	Initial Measurements (feet)				
		Casing Elevation	Depth to Water	Depth to SPH	SPH Thickness	Water Level Elevation
A-1	12/30/05	39.31	20.11	--	0.00	19.20
	03/29/06		18.28	--	0.00	21.03
	06/30/06		19.03	--	0.00	20.28
	09/27/06		20.03	--	0.00	19.28
	12/27/06		19.22	--	0.00	20.09
A-2	12/30/05	34.00	13.40	--	0.00	20.60
	03/29/06		12.01	--	0.00	21.99
	06/30/06		11.99	--	0.00	22.01
	09/27/06		13.24	--	0.00	20.76
	12/27/06		12.29	--	0.00	21.71
W-3	12/30/05	35.74	14.10	--	0.00	21.64
	03/29/06		NA	--	0.00	NA
	06/30/06		12.69	--	0.00	23.05
	09/27/06		14.83	--	0.00	20.91
	12/27/06		13.00	--	0.00	22.74
W-4	12/30/05	35.16	14.60	--	0.00	20.56
	03/29/06		NA	--	0.00	NA
	06/30/06		13.59	--	0.00	21.57
	09/27/06		14.80	--	0.00	20.36
	12/27/06		13.93	--	0.00	21.23

Notes:
* Water level elevation = (Casing elevation - Depth to water) + S_g * (Product thickness). S_g = 0.89.
NA = Not available.
SPH = Separate-phase hydrocarbon.
Source: Hart Crowser, 2006 Annual Report, Paramount Willbridge Asphalt Refinery.

Table 22
Groundwater Screening Results

Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

	Sample ID	U-NORTH	U-SOUTH	A-8	W-1	A-10	W-12
	Sample Date	10/17/2003	10/17/2003	10/17/2003	10/17/2003	10/15/2003	10/15/2003
Metals (µg/L)	**SLV**						
Aluminum	(50-200)	-	-	-	-	-	-
Antimony	6	-	-	-	-	-	-
Arsenic	0.045	<1.0	<1.0	<1.0	<1.0	**20.7**	**1.19**
Cadmium	0.094	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chromium	100	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Copper	2.7	<0.200	<0.200	<0.200	<0.200	<0.200	**7.04**
Total cyanide (water)	5.2	-	-	-	-	-	-
Lead	0.54	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Mercury	0.77	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Nickel	16	-	-	-	-	-	-
Selenium	5[a]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver	0.12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc	36	<5.0	<5.0	5.6	6.26	5.05	8.93
PAHs (µg/L)							
Acenaphthene	0.2	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Acenaphthylene	0.2	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Anthracene	0.2	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Benzo(a)anthracene	0.018	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Benzo(a)pyrene	0.018	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Benzo(b)fluoranthene	0.018	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Benzo(g,h,i)perylene	0.2	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Benzo(k)fluoranthene	0.018	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Chrysene	0.018	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Dibenz(a,h)anthracene	0.018	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Fluoranthene	0.2	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Fluorene	0.2	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Indeno(1,2,3-cd)pyrene	0.018	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Naphthalene	0.2	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Phenanthrene	0.2	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Pyrene	0.2	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
VOCs (µg/L)							
Benzene	1.2	<1	<1	<1	<1	<1	<1
Toluene	9.8	<1	<1	<1	<1	<1	<1
Ethylbenzene	7.3	<1	<1	<1	<1	<1	<1
Xylene (total)	200	<3	<3	<3	<3	<3	<3

Notes:

< = Analyte not detected above indicated detection limit.

- = Sample not analyzed.

µg/L = Micrograms per liter.

Bold font indicates exceedance of screening-level values (SLVs).

SLV = DEQ/Portland Harbor Joint Source Control Strategy Screening Level Values.

SLV values reflect the 7/16/07 revision table, where numbers highlighted in yellow are used for initial upland source control screening evaluation for water.

Table 23
Magnitude of SLV Exceedances

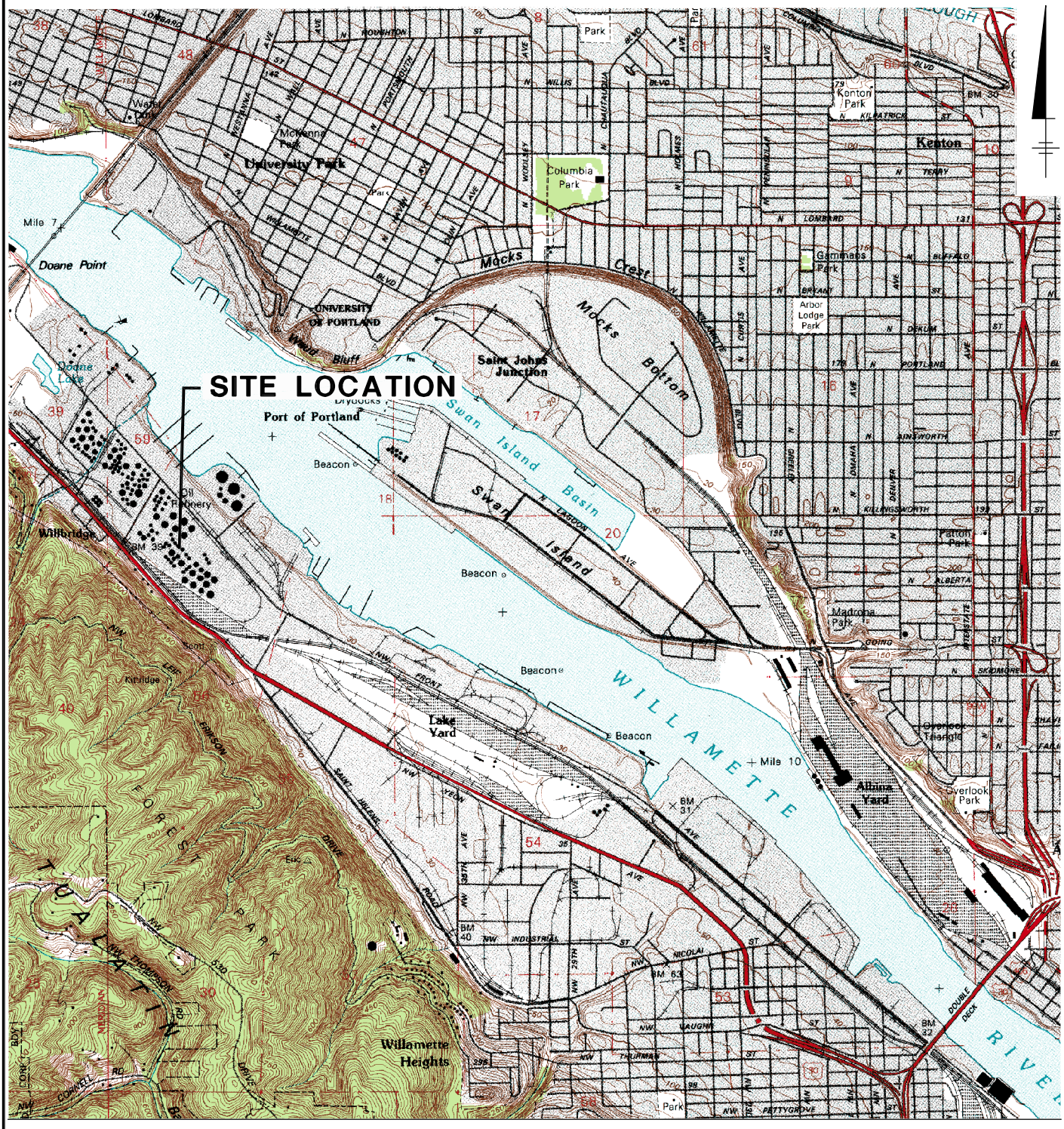
Source Control Evaluation Report
Former Chevron Asphalt Plant No. 209293
5501 NW Front Avenue
Portland, Oregon

Constituent	Percentage of Catch Basin Areas Detected Above SLV[2]	Percentage of Stormwater Sampling Events Detected Above SLV[3]	Outfall V39 Drainage Basin Magnitude of Exceedances									Outfall V33 Drainage Basin Magnitude of Exceedances												Drainage Area Outside the Stormwater Outfalls Magnitude of Exceedances	
			Catch Basin Data		Stormwater Data							Catch Basin Data						Stormwater Data							Catch Basin Data
			Area 1		10/2/2007[1]	1/14/2008		1/26/2008		3/28/2008		Area 3a		Area 3b		Area 4		10/2/2007	1/14/2008		1/26/2008		3/28/2008		Area 2	
			Toxicity	Bioaccum.	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Toxicity	Bioaccum.	Toxicity	Bioaccum.	Toxicity	Bioaccum.	Dissolved[1]	Dissolved	Total	Dissolved	Total	Dissolved	Total	Toxicity	Bioaccum.
Metals			***Magnitude of Exceedance***																						
Aluminum	0%	38%	N/A	N/A	--	--	8.9	--	--	--	--	N/A	N/A	N/A	N/A	N/A	N/A	--	--	3.4	--	5.0	--	--	N/A	N/A
Arsenic	60%	0%	--	--	--	--	--	--	--	--	--	--	--	--	2.3	--	2.3	--	--	--	--	--	--	--	--	1.7
Cadmium	40%	25%	--	--	--	--	--	--	--	--	--	--	2.3	--	--	--	2.3	1.8	--	--	--	--	1.2	1.2	--	2.2
Copper	40%	75%	--	N/A	2.7	--	2.1	--	--	1.7	1.7	--	N/A	--	N/A	1.8	N/A	3.3	--	--	--	1.3	1.8	1.6	1.7	N/A
Lead	100%	63%	--	2.5	--	--	10	--	1.3	--	1.6	--	7.2	1.1	8.6	--	6.5	--	--	--	--	5.4	--	2.0	1.1	7.9
Zinc	80%	75%	--	N/A	1.2	--	1.1	1.1	1.1	--	--	1.1	N/A	1.6	N/A	2.1	N/A	3.0	--	--	3.0	3.4	1.2	1.3	1.9	N/A
Phthalate Esters																										
bis(2-ethylhexyl)phthalate	80%	25%	--	--	--		2.7	--			4.1	9.8	23.6	8.9	21.5	1.6	3.9	--		2.7	--			4.1	1.9	4.5
OC Pesticides																										
Total DDT	100%	25%	--	40	--		8.1	--		--		--	86.7	--	90.0	--	29.0	--		14.1	--		--		--	43.3
PAHs																										
Acenaphthene	0%	25%	--	N/A	--	--		1.1		--		--	N/A	--	N/A	--	N/A	--		2.1	--		--		--	N/A
Acenaphthylene	0%	13%	--	N/A	--	--		--		--		--	N/A	--	N/A	--	N/A	--	--		--		--		--	N/A
Anthracene	0%	13%	--	N/A	--	--		--		--		--	N/A	--	N/A	--	N/A	--	--		--		--		--	N/A
Benzo(a)anthracene	20%	38%	--	N/A	--		1.5		2.1	--		--	N/A	1.3	N/A	--	N/A	--		4.5	--		--		--	N/A
Benzo(a)pyrene	20%	38%	--	N/A	--		3.4		2.1	--		--	N/A	1.2	N/A	--	N/A	--		7.2	--		--		--	N/A
Benzo(b)fluoranthene	0%	50%	--	N/A	--		4.6		2.4	--		--	N/A	--	N/A	--	N/A	1.6		11.7	--		--		--	N/A
Benzo(k)fluoranthene	0%	38%	--	N/A	--		2.0		2.0	--		--	N/A	--	N/A	--	N/A	--		2.2	--		--		--	N/A
Chrysene	20%	50%	--	N/A	--		2.9		4.3	--		--	N/A	1.6	N/A	--	N/A	1.7		11.7	--		--		--	N/A
Fluorene	0%	25%	--	N/A	--	--			1.8	--		--	N/A	--	N/A	--	N/A	--		4.4	--		--		--	N/A
Indeno(1,2,3-cd)pyrene	80%	38%	2	N/A	--		2.9		1.3	--		1.7	N/A	9.3	N/A	--	N/A	--		1.6	--		--		2.9	N/A
Phenanthrene	20%	38%	--	N/A	--	--			3.8	--		--	N/A	1.3	N/A	--	N/A	--		18.0	--			15	--	N/A

Notes:
The extents of the Outfall V33 and V39 drainage basins are provided on Figure 5.
Toxicity = Magnitude of exceedance of Oregon Department of Environmental Quality 2007 Toxicity Sediment SLVs.
Bioaccumulation = Magnitude of exceedance of Oregon Department of Environmental Quality 2007 Bioaccumulative Sediment SLVs.
N/A = No SLV for the listed constituent.
NS = Not sampled.
-- = Constituent did not exceed SLV for this sample.
[1] Total metals were not analyzed in the samples from the October 2, 2007 sampling event.
[2] Five composite samples, one for each catch basin area, were collected during the catch basin sampling.
[3] Eight stormwater samples were collected over four separate storm events. Two samples (V33 and V39) were collected from each storm event.

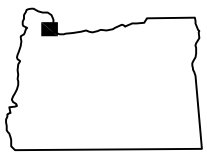
ARCADIS

Figures



0 2500' 5000'

APPROXIMATE GRAPHIC SCALE



QUADRANGLE LOCATION

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE, PORTLAND, OREGON

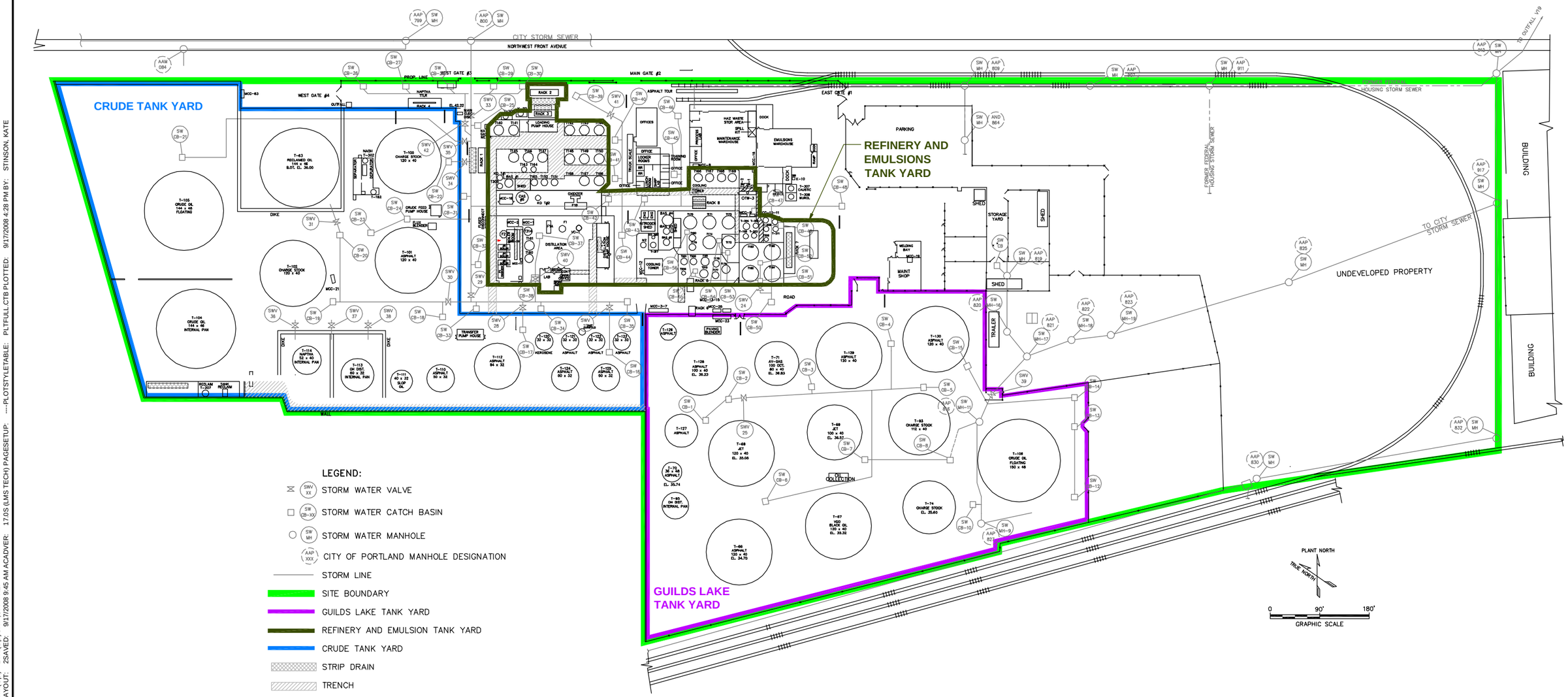
SOURCE CONTROL EVALUATION REPORT

SITE LOCATION MAP

ARCADIS

FIGURE 1

CITY:ELLIS DIV/GROUP:41 DB:LELLIS LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\CADVACT\B00\45449\002\00200\MAP\FROM-CARY\SCER45449N01.dwg LAYOUT: 1SAVED: 9/16/2008 6:46 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---PLOTSTYLETABLE: PLTFULLCTB PLOTTED: 9/17/2008 4:22 PM BY: STINSON, KATE
XREFS: IMAGES: PROJECTNAME: ---
45449X00 45449X00.tif



LEGEND:

- STORM WATER VALVE
- STORM WATER CATCH BASIN
- STORM WATER MANHOLE
- CITY OF PORTLAND MANHOLE DESIGNATION
- STORM LINE
- SITE BOUNDARY
- GUILDS LAKE TANK YARD
- REFINERY AND EMULSION TANK YARD
- CRUDE TANK YARD
- STRIP DRAIN
- TRENCH

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

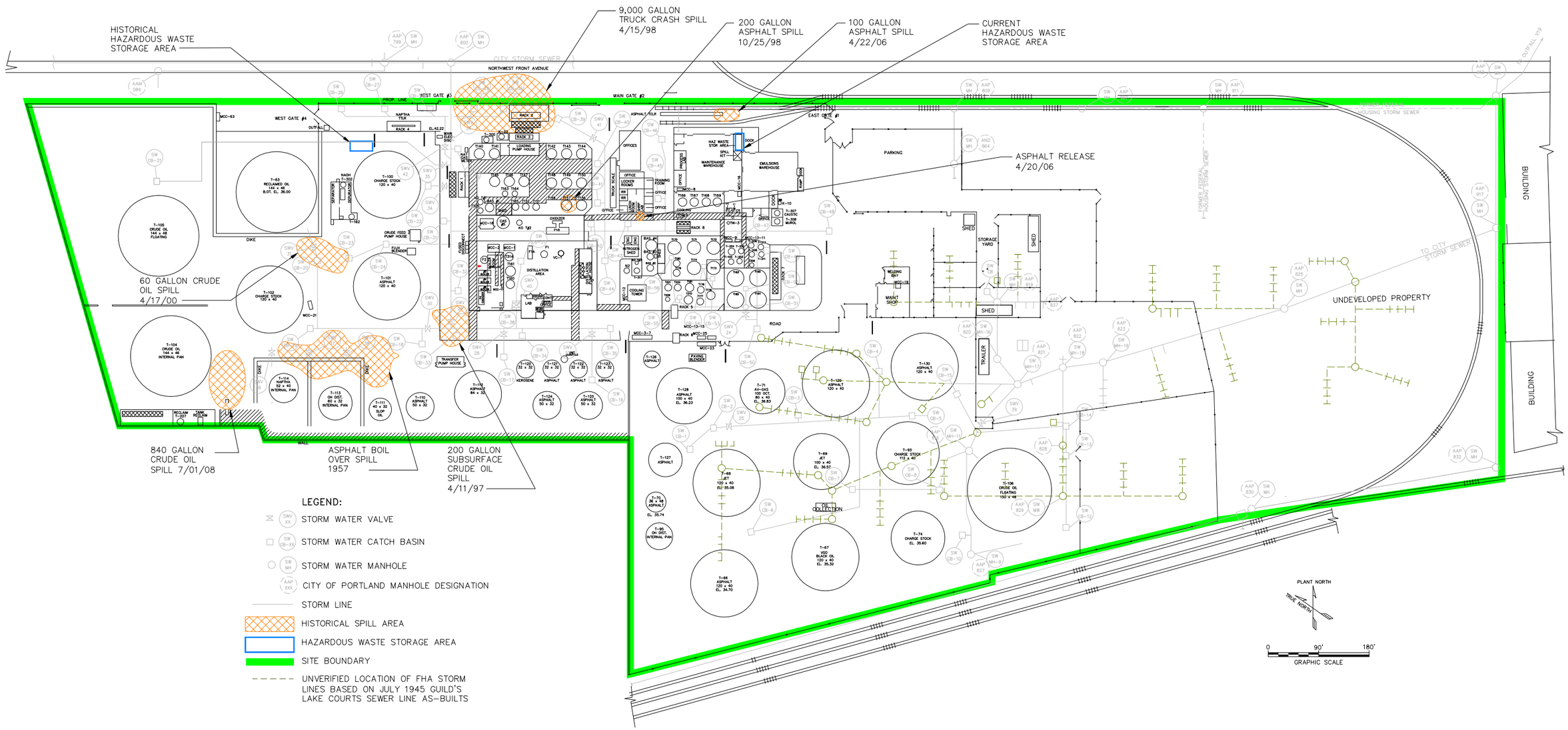
SOURCE CONTROL EVALUATION REPORT

SITE LAYOUT MAP

ARCADIS

FIGURE 2

CITY:CARY DIV/GROUP:41 DB:LELLIS LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\CADACT\B00454490002002001MAP\FROM-CARY\SCER45449B02.dwg LAYOUT: 2SAVED: 9/17/2008 9:45 AM ACADVER: 17.0S (LMS TECH) PAGESETUP:
XREFS: IMAGES: PROJECTNAME: ---
45449X01



LEGEND:

- STORM WATER VALVE
- STORM WATER CATCH BASIN
- STORM WATER MANHOLE
- CITY OF PORTLAND MANHOLE DESIGNATION
- STORM LINE
- HISTORICAL SPILL AREA
- HAZARDOUS WASTE STORAGE AREA
- SITE BOUNDARY
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS-BUILTS

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.
5. SPILL RECORDS TAKEN FROM EXPANDED PRELIMINARY ASSESSMENT, SAIC, FEBRUARY 2004, AND DEQ SITE ASSESSMENT PROGRAM RECOMMENDATION, JANUARY 2002.
6. HISTORICAL SPILLS FOR WHICH LOCATION WAS UNKNOWN DO NOT APPEAR ON THIS FIGURE.

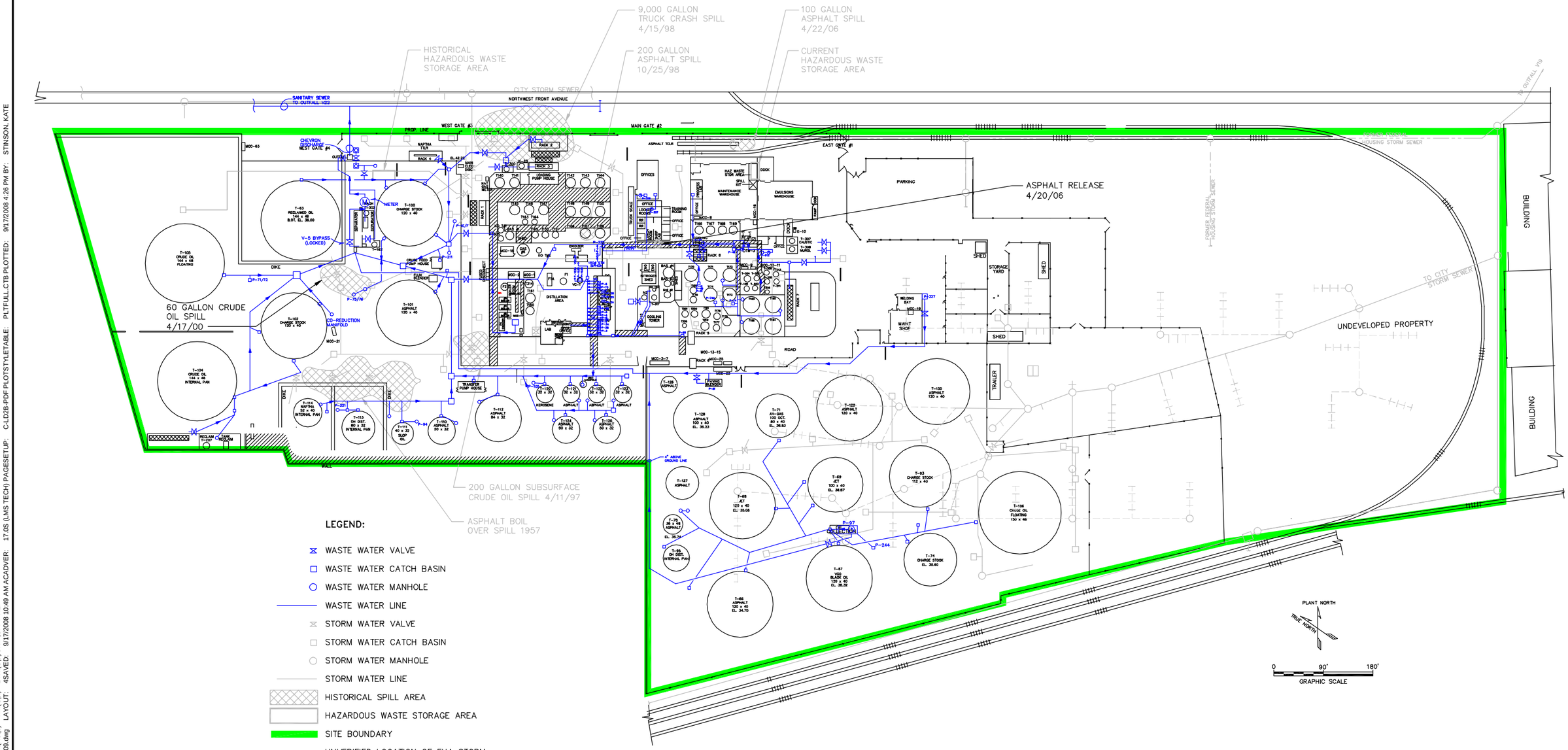
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

CURRENT AND HISTORICAL SITE FEATURES

ARCADIS

FIGURE 3



LEGEND:

- WASTE WATER VALVE
- WASTE WATER CATCH BASIN
- WASTE WATER MANHOLE
- WASTE WATER LINE
- STORM WATER VALVE
- STORM WATER CATCH BASIN
- STORM WATER MANHOLE
- STORM WATER LINE
- HISTORICAL SPILL AREA
- HAZARDOUS WASTE STORAGE AREA
- SITE BOUNDARY
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS-BUILTS

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.
5. SPILL RECORDS TAKEN FROM EXPANDED PRELIMINARY ASSESSMENT, SAIC, FEBRUARY 2004, AND DEQ SITE ASSESSMENT PROGRAM RECOMMENDATION, JANUARY 2002.
6. HISTORICAL SPILLS FOR WHICH LOCATION WAS UNKNOWN DO NOT APPEAR ON THIS FIGURE.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

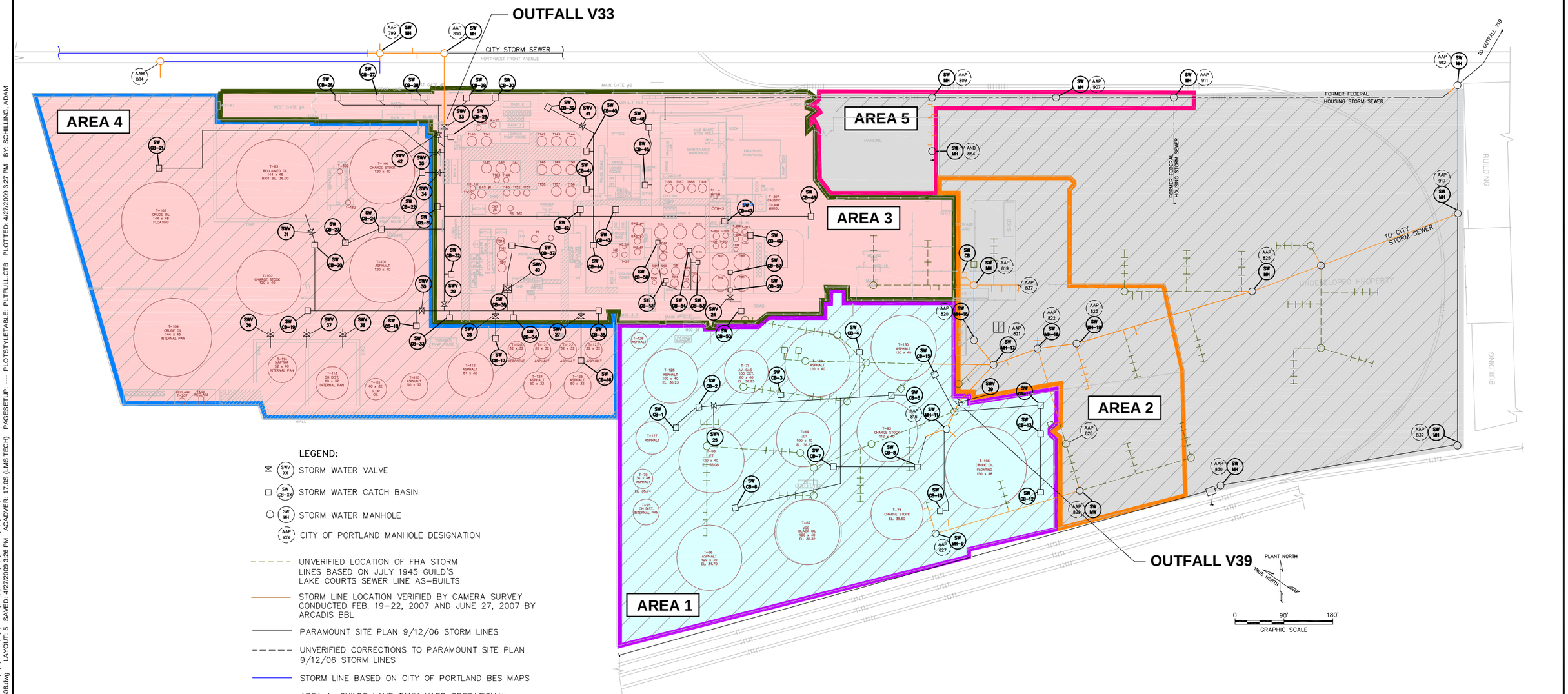
SOURCE CONTROL EVALUATION REPORT

ONSITE WASTE WATER COLLECTION SYSTEM

ARCADIS

FIGURE 4

CITY:CARY DIV/GROUP:41 DB:LELLIS LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\CAD\ACTIVE\00454\0002\00200\MAP\FROM-CARY\SCER45449B09.dwg LAYOUT: 4SAVED: 9/17/2008 10:49 AM ACADVER: 17.0S (LMS TECH) PAGESETUP:
XREFS: IMAGES: PROJECTNAME: ---
45449X01
45449XA1



LEGEND:

- STORM WATER VALVE
- STORM WATER CATCH BASIN
- STORM WATER MANHOLE
- CITY OF PORTLAND MANHOLE DESIGNATION
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS-BUILTS
- STORM LINE LOCATION VERIFIED BY CAMERA SURVEY CONDUCTED FEB. 19-22, 2007 AND JUNE 27, 2007 BY ARCADIS BBL
- PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- UNVERIFIED CORRECTIONS TO PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- STORM LINE BASED ON CITY OF PORTLAND BES MAPS
- AREA 1: GUILDS LAKE TANK YARD OPERATIONAL SUBBASIN
- AREA 2: EQUIPMENT STORAGE OPERATIONAL SUBBASIN
- AREA 3: REFINERY AND EMULSION TANK YARD OPERATIONAL SUBBASIN
- AREA 4: CRUDE TANK YARD OPERATIONAL SUBBASIN
- AREA 5: PARKING LOT AND RAIL LINE OPERATIONAL SUBBASIN
- OUTFALL V33 DRAINAGE BASIN
- OUTFALL V39 DRAINAGE BASIN
- DRAINAGE AREA OUTSIDE OF SITE STORM WATER OUTFALLS
- PERMEABLE SURFACE

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.

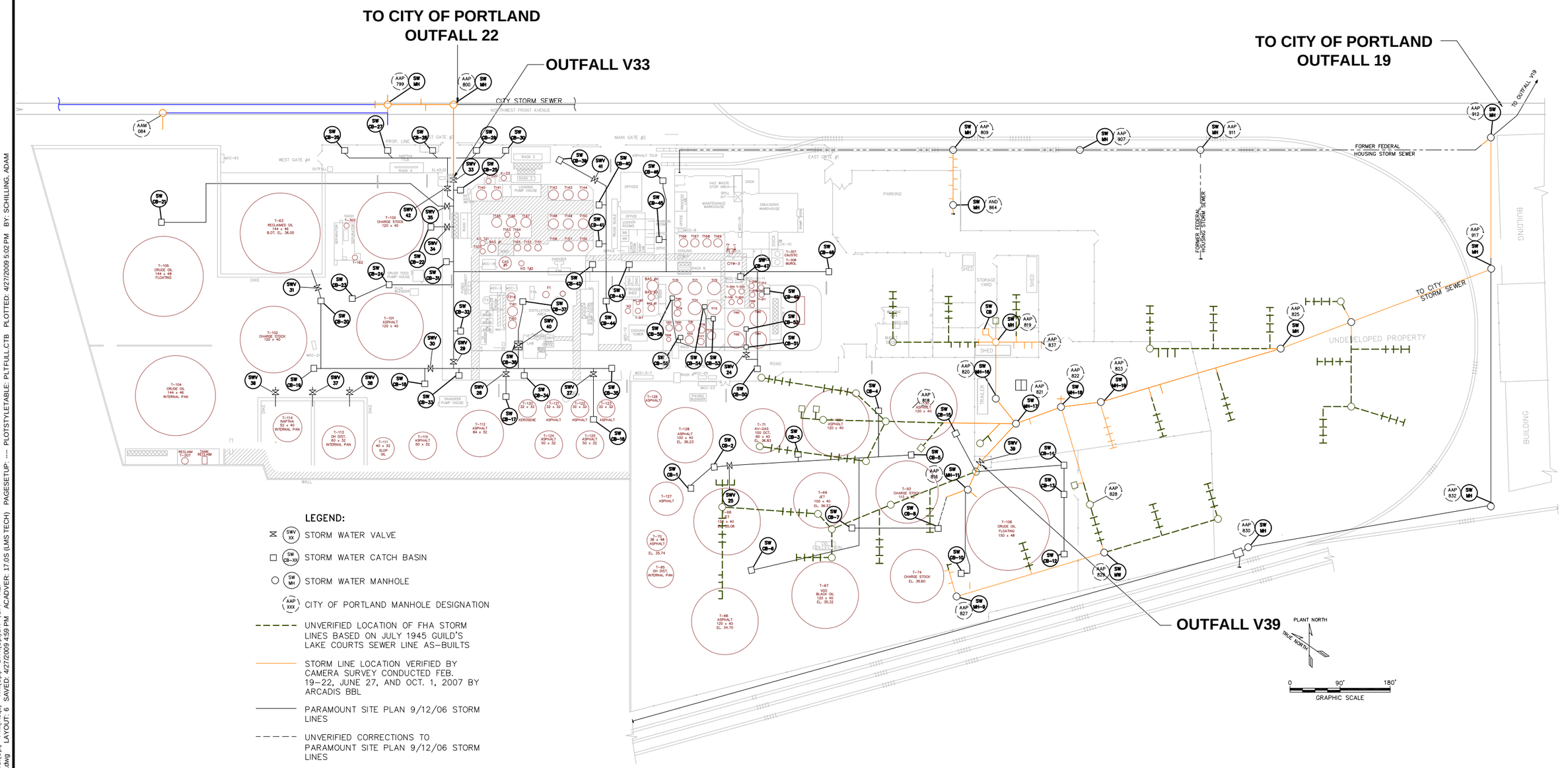
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 20929
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

STORM WATER DRAINAGE BASIN MAP

ARCADIS

FIGURE 5



LEGEND:

- STORM WATER VALVE
- STORM WATER CATCH BASIN
- STORM WATER MANHOLE
- CITY OF PORTLAND MANHOLE DESIGNATION
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS-BUILTS
- STORM LINE LOCATION VERIFIED BY CAMERA SURVEY CONDUCTED FEB. 19-22, JUNE 27, AND OCT. 1, 2007 BY ARCADIS BBL
- PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- UNVERIFIED CORRECTIONS TO PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- FHA STORM LINE LOCATIONS VERIFIED BY CAMERA SURVEY CONDUCTED BY PARAMOUNT 2005
- STORM LINE BASED ON CITY OF PORTLAND BES MAPS AND HISTORICAL AS BUILTS

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.

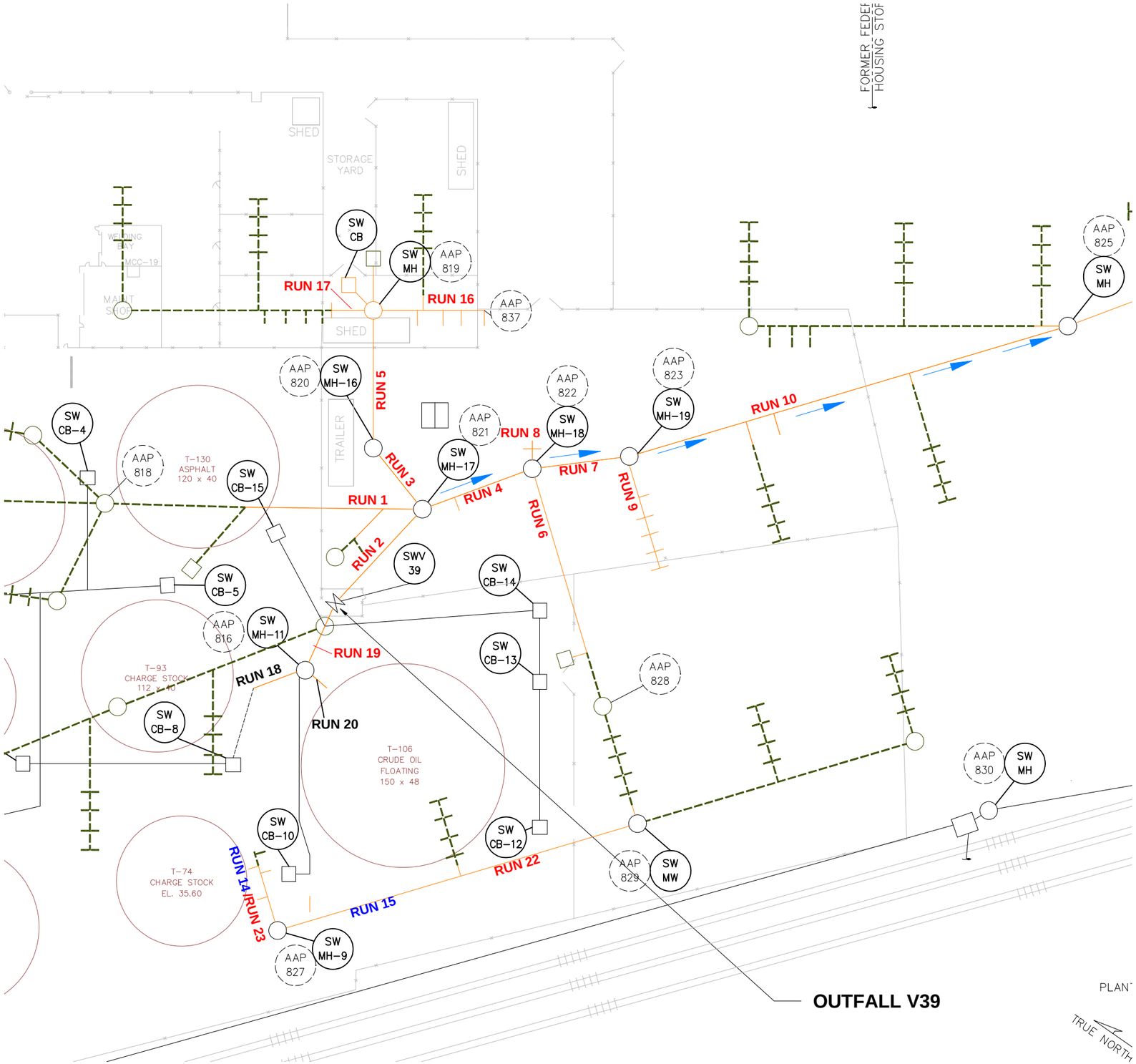
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

STORM WATER SYSTEM MAP

ARCADIS

FIGURE 6

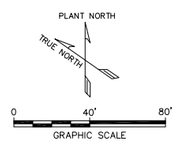


LEGEND:

- STORM WATER VALVE
- STORM WATER CATCH BASIN
- STORM WATER MANHOLE
- CITY OF PORTLAND MANHOLE DESTINATION
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS-BUILTS
- STORM LINE LOCATION VERIFIED BY CAMERA SURVEY CONDUCTED FEB. 19-22, JUNE 27, AND OCT. 1, 2007 BY ARCADIS BBL
- PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- UNVERIFIED CORRECTIONS TO PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- FHA STORM LINE LOCATIONS VERIFIED BY CAMERA SURVEY CONDUCTED BY PARAMOUNT 2005
- DYE TEST DIRECTION
- **RUN 1** SEDIMENT IN LINE AND CLEANED OUT
- **RUN 14** SEDIMENT IN LINE AND NOT CLEANED OUT
- **RUN 18** NO SEDIMENT IN LINE

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.
5. VIDEO AND FIELD SURVEY RESULTS OF SPECIFIC AREAS OF LINE BLOCKAGE, CAPS, SIGNIFICANT ACCUMULATION OF MATERIAL, AND LEAKY JOINTS ARE PROVIDED IN THE SUMMARY OF VIDEO SURVEYS TABLE AND THE STORM LINE VIDEO REPORTS.



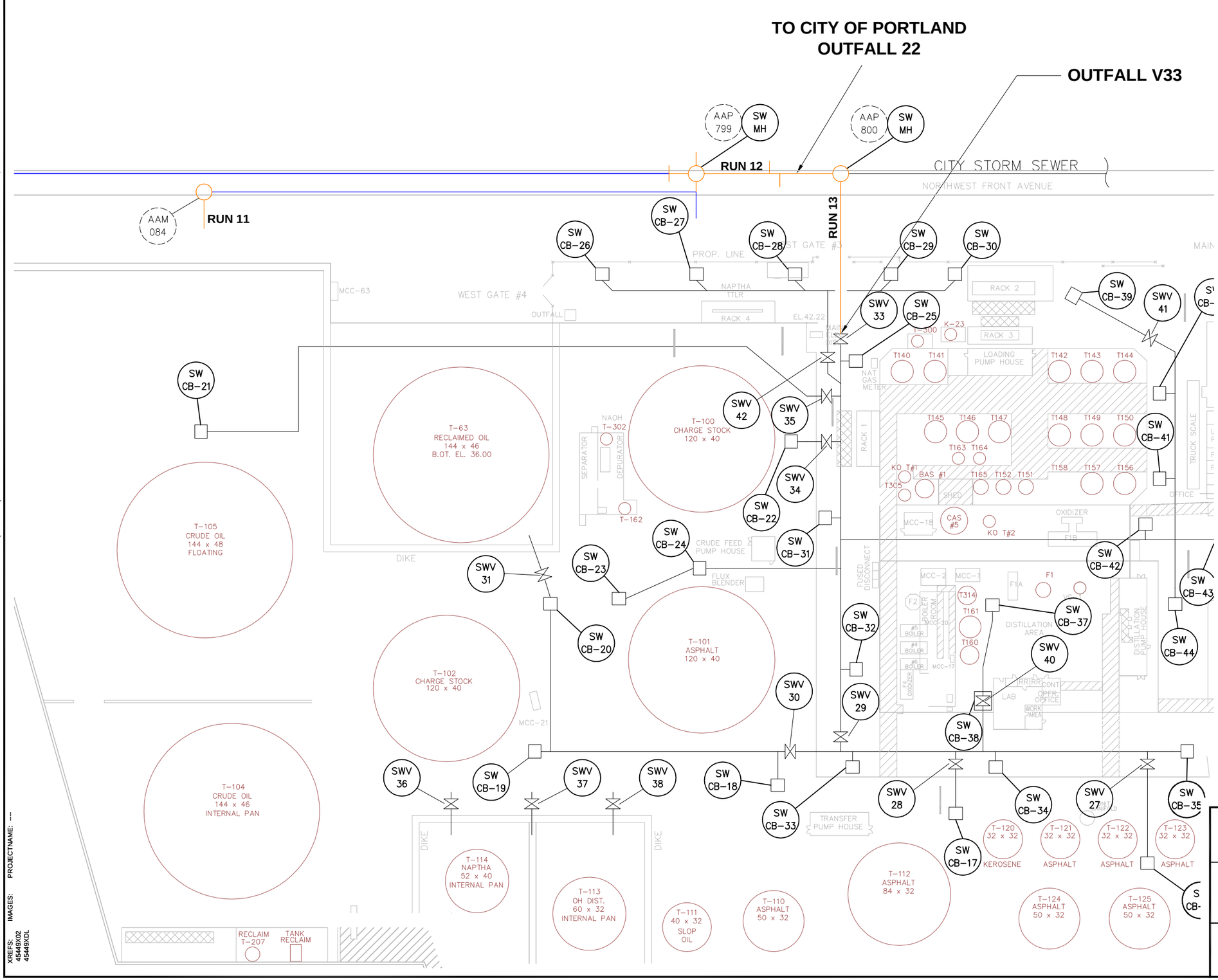
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

FEBRUARY, JUNE, AND OCTOBER 2007 VIDEO SURVEY RUNS 1-10, 14-20, 22 AND 23

ARCADIS

FIGURE 7



LEGEND:

- STORM WATER VALVE
- STORM WATER CATCH BASIN
- STORM WATER MANHOLE
- CITY OF PORTLAND MANHOLE DESTINATION
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS-BUILTS
- STORM LINE LOCATION VERIFIED BY CAMERA SURVEY CONDUCTED FEB. 19-22, JUNE 27, AND OCT. 1, 2007 BY ARCADIS BBL
- PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- UNVERIFIED CORRECTIONS TO PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- FHA STORM LINE LOCATIONS VERIFIED BY CAMERA SURVEY CONDUCTED BY PARAMOUNT 2005
- STORM LINE BASED ON CITY OF PORTLAND BES MAPS AND HISTORICAL AS BUILTS

RUN 12 NO SEDIMENT IN LINE

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.
5. VIDEO AND FIELD SURVEY RESULTS OF SPECIFIC AREAS OF LINE BLOCKAGE, CAPS, SIGNIFICANT ACCUMULATION OF MATERIAL, AND LEAKY JOINTS ARE PROVIDED IN THE SUMMARY OF VIDEO SURVEYS TABLE AND THE STORM LINE VIDEO REPORTS.

PLANT NORTH
TRUE NORTH
0 40' 80'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 20929
5501 NW FRONT AVE., PORTLAND, OREGON

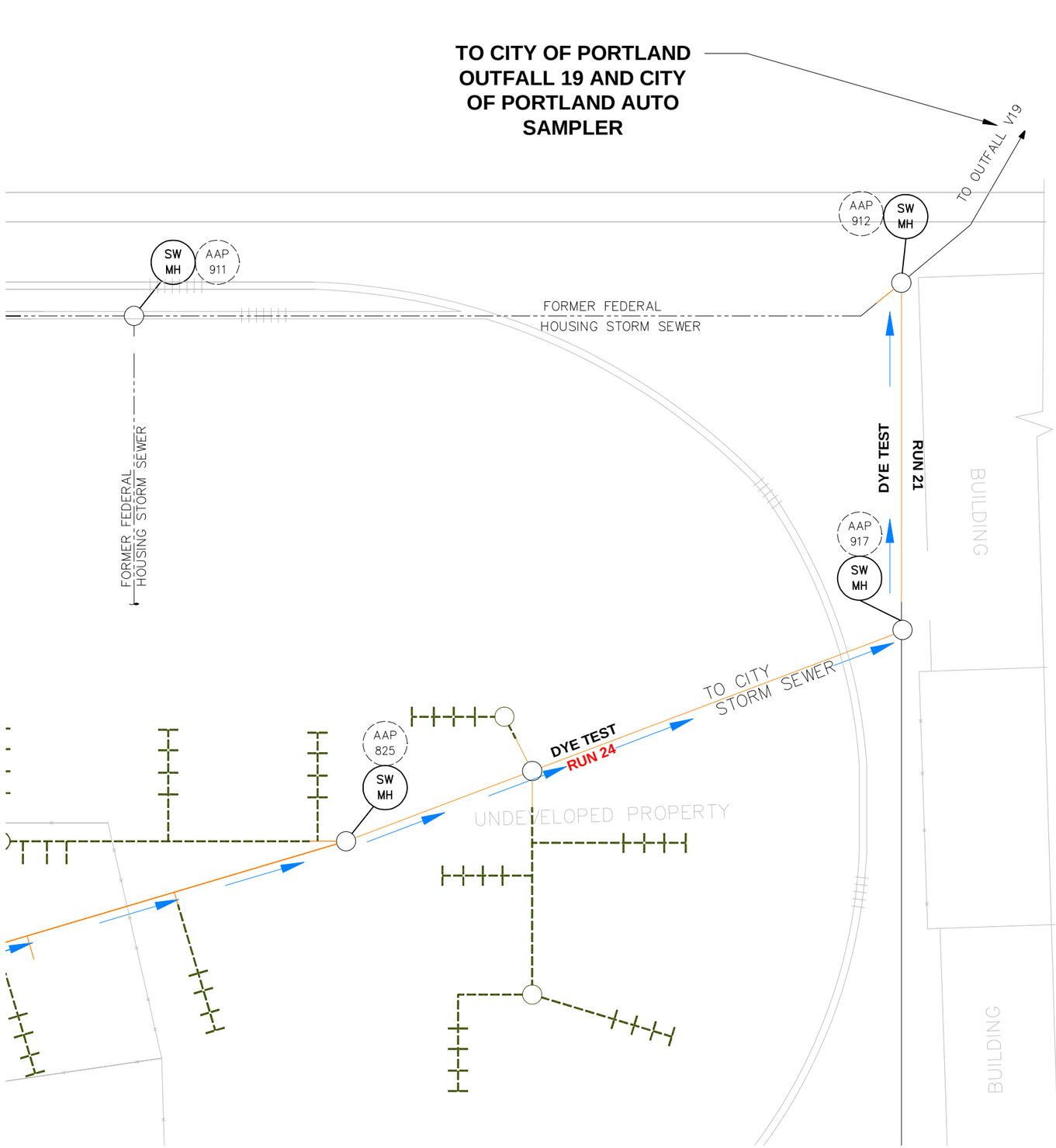
SOURCE CONTROL EVALUATION REPORT

FEBRUARY 2007 VIDEO SURVEY RUNS 11, 12 AND 13

ARCADIS

FIGURE 8

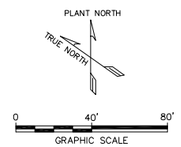
CITY:Syracuse DIVGROUP:Env-141 DB:PGL AMS LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACTIB\00454490003002000DWG\45449G01.DWG LAYOUT: 8 SAVED: 4/27/2009 2:38 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 4/27/2009 2:38 PM BY: SCHILLING, ADAM
XREFS: 45449XG2 45449XDL IMAGES: PROJECTNAME: ----



- STORM WATER VALVE (SWV XX)
- STORM WATER CATCH BASIN (SW CB-XX)
- STORM WATER MANHOLE (SW MH)
- CITY OF PORTLAND MANHOLE DESTINATION (AAP XXX)
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS-BUILTS
- STORM LINE LOCATION VERIFIED BY CAMERA SURVEY CONDUCTED FEB. 19-22, JUNE 27, AND OCT. 1, 2007 BY ARCADIS BBL
- PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- UNVERIFIED CORRECTIONS TO PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- FHA STORM LINE LOCATIONS VERIFIED BY CAMERA SURVEY CONDUCTED BY PARAMOUNT 2005
- DYE TEST DIRECTION
- **RUN 21** NO SEDIMENT IN LINE
- **RUN 24** SEDIMENT IN LINE AND CLEANED OUT

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.
5. VIDEO AND FIELD SURVEY RESULTS OF SPECIFIC AREAS OF LINE BLOCKAGE, CAPS, SIGNIFICANT ACCUMULATION OF MATERIAL, AND LEAKY JOINTS ARE PROVIDED IN THE SUMMARY OF VIDEO SURVEYS TABLE AND THE STORM LINE VIDEO REPORTS.



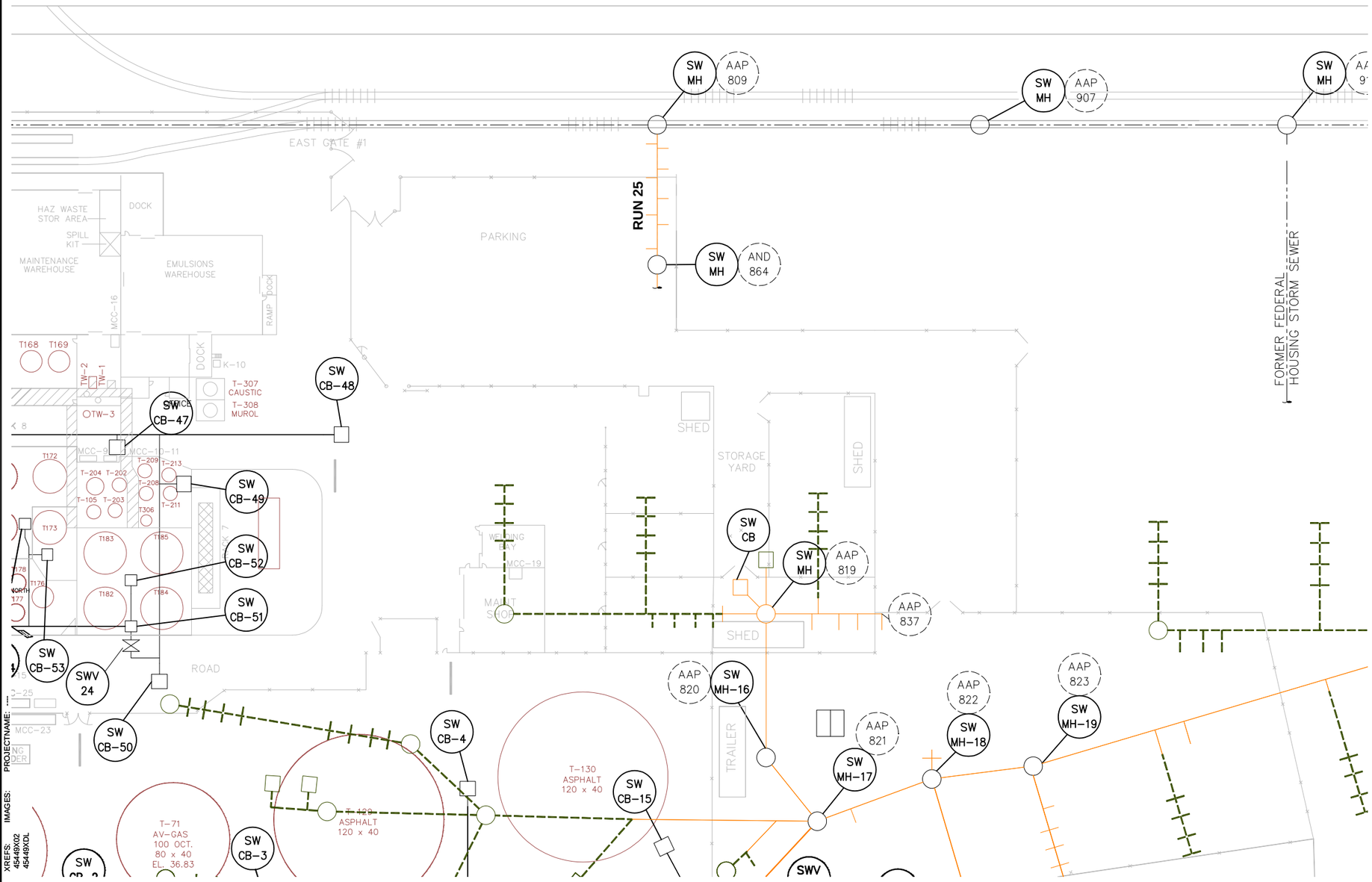
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

JUNE AND OCTOBER 2007 VIDEO SURVEY RUNS 21 AND 24 AND DYE TEST

ARCADIS

FIGURE 9



LEGEND:

- STORM WATER VALVE (SWV XX)
- STORM WATER CATCH BASIN (SW CB-XX)
- STORM WATER MANHOLE (SW MH)
- CITY OF PORTLAND MANHOLE DESTINATION (AAP XXX)
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS-BUILTS
- STORM LINE LOCATION VERIFIED BY CAMERA SURVEY CONDUCTED FEB. 19-22, JUNE 27, AND OCT. 1, 2007 BY ARCADIS BBL
- PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- UNVERIFIED CORRECTIONS TO PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- FHA STORM LINE LOCATIONS VERIFIED BY CAMERA SURVEY CONDUCTED BY PARAMOUNT 2005
- STORM LINE BASED ON CITY OF PORTLAND BES MAPS AND HISTORICAL AS BUILTS

RUN 25 NO SEDIMENT IN LINE

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.
5. VIDEO AND FIELD SURVEY RESULTS OF SPECIFIC AREAS OF LINE BLOCKAGE, CAPS, SIGNIFICANT ACCUMULATION OF MATERIAL, AND LEAKY JOINTS ARE PROVIDED IN THE SUMMARY OF VIDEO SURVEYS TABLE AND THE STORM LINE VIDEO REPORTS.

0 40' 80'
GRAPHIC SCALE

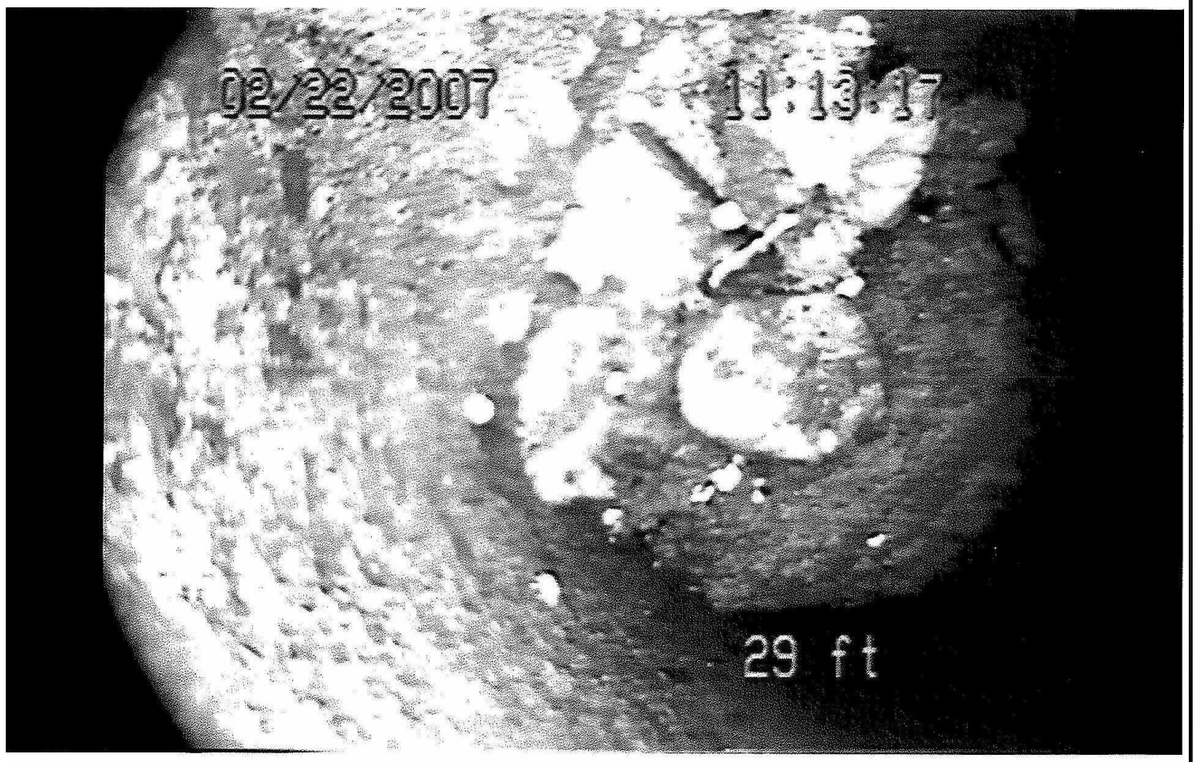
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

OCTOBER VIDEO SURVEY RUN 25

ARCADIS

FIGURE 10



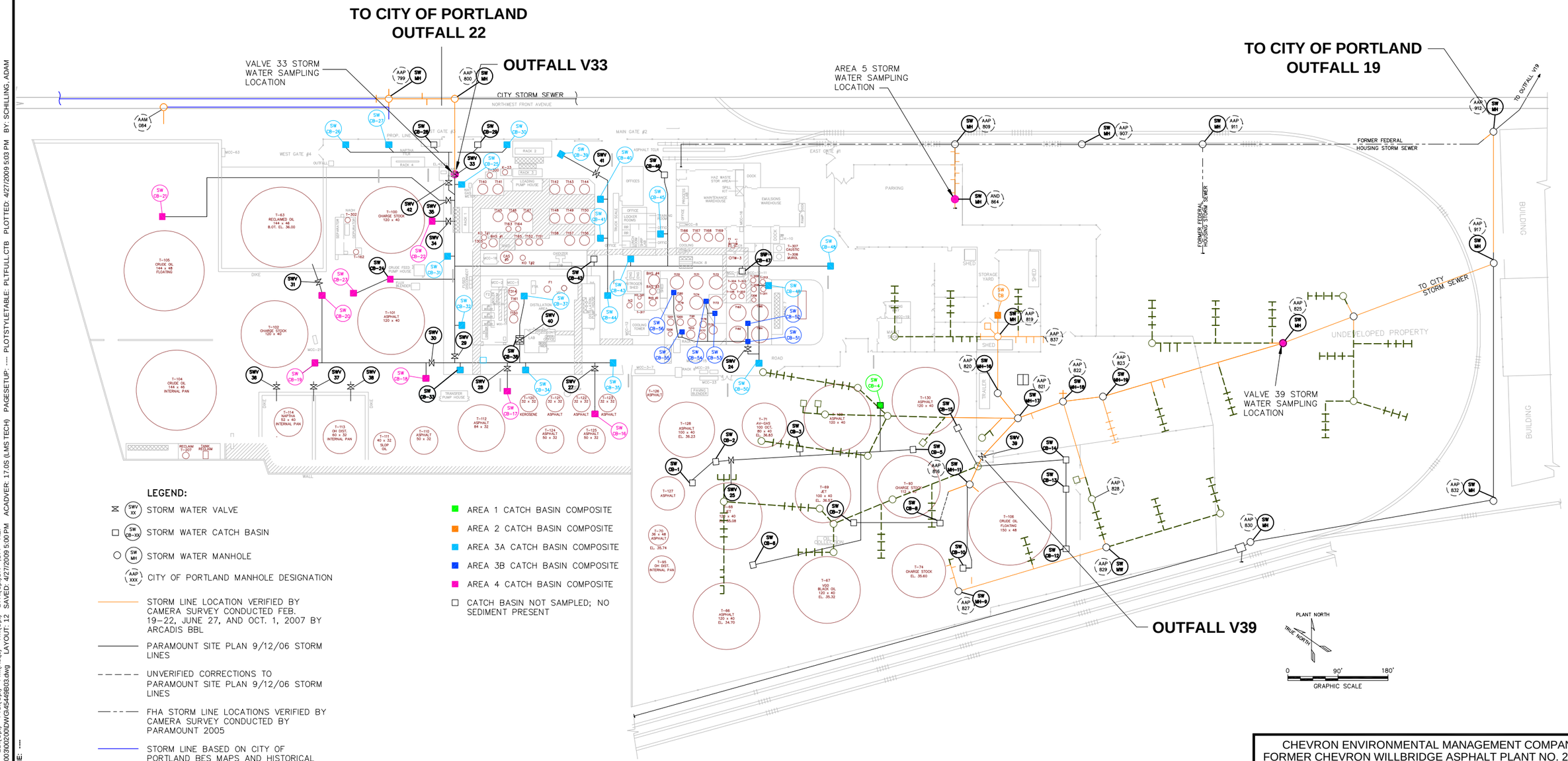
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

ABANDONED LINE SOUTH OF MH-AAM084

ARCADIS

FIGURE
11



LEGEND:

- STORM WATER VALVE
- STORM WATER CATCH BASIN
- STORM WATER MANHOLE
- CITY OF PORTLAND MANHOLE DESIGNATION
- STORM LINE LOCATION VERIFIED BY CAMERA SURVEY CONDUCTED FEB. 19–22, JUNE 27, AND OCT. 1, 2007 BY ARCADIS BBL
- PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- UNVERIFIED CORRECTIONS TO PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- FHA STORM LINE LOCATIONS VERIFIED BY CAMERA SURVEY CONDUCTED BY PARAMOUNT 2005
- STORM LINE BASED ON CITY OF PORTLAND BES MAPS AND HISTORICAL AS BUILTS
- STORM WATER SAMPLING LOCATION
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS–BUILTS

- AREA 1 CATCH BASIN COMPOSITE
- AREA 2 CATCH BASIN COMPOSITE
- AREA 3A CATCH BASIN COMPOSITE
- AREA 3B CATCH BASIN COMPOSITE
- AREA 4 CATCH BASIN COMPOSITE
- CATCH BASIN NOT SAMPLED; NO SEDIMENT PRESENT

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

STORM WATER AND CATCH BASIN SAMPLING LOCATIONS

ARCADIS

FIGURE 12

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

SAMPLE LOCATION V33

ARCADIS

FIGURE
13

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

SAMPLE LOCATION AAP825/V39

ARCADIS

FIGURE
14

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

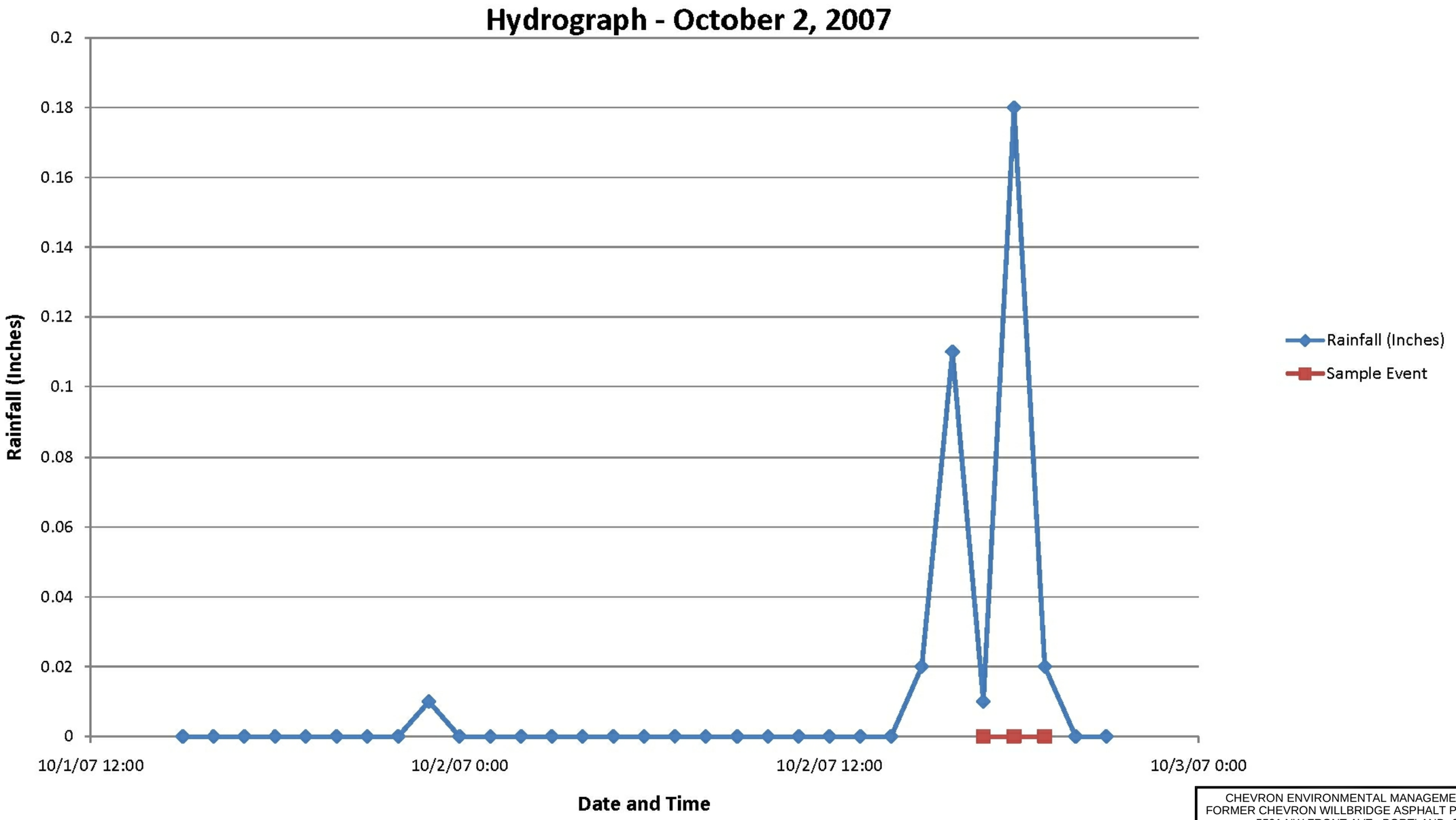
SOURCE CONTROL EVALUATION REPORT

SAMPLE LOCATION AND864/AREA 5

ARCADIS

FIGURE
15

CITY:CARY Syracuse DIV/GROUP:41 DB:LE AMS LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*:OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0045449\0003\002\00DWG\45449B04.dwg LAYOUT: 15 SAVED: 4/27/2009 2:41 PM ACADVER: 17.0S (LMS TECH) PAGESETUP: ----
XREFS: IMAGES: PROJECTNAME: ----
45449XDL 45449X07.jpg



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

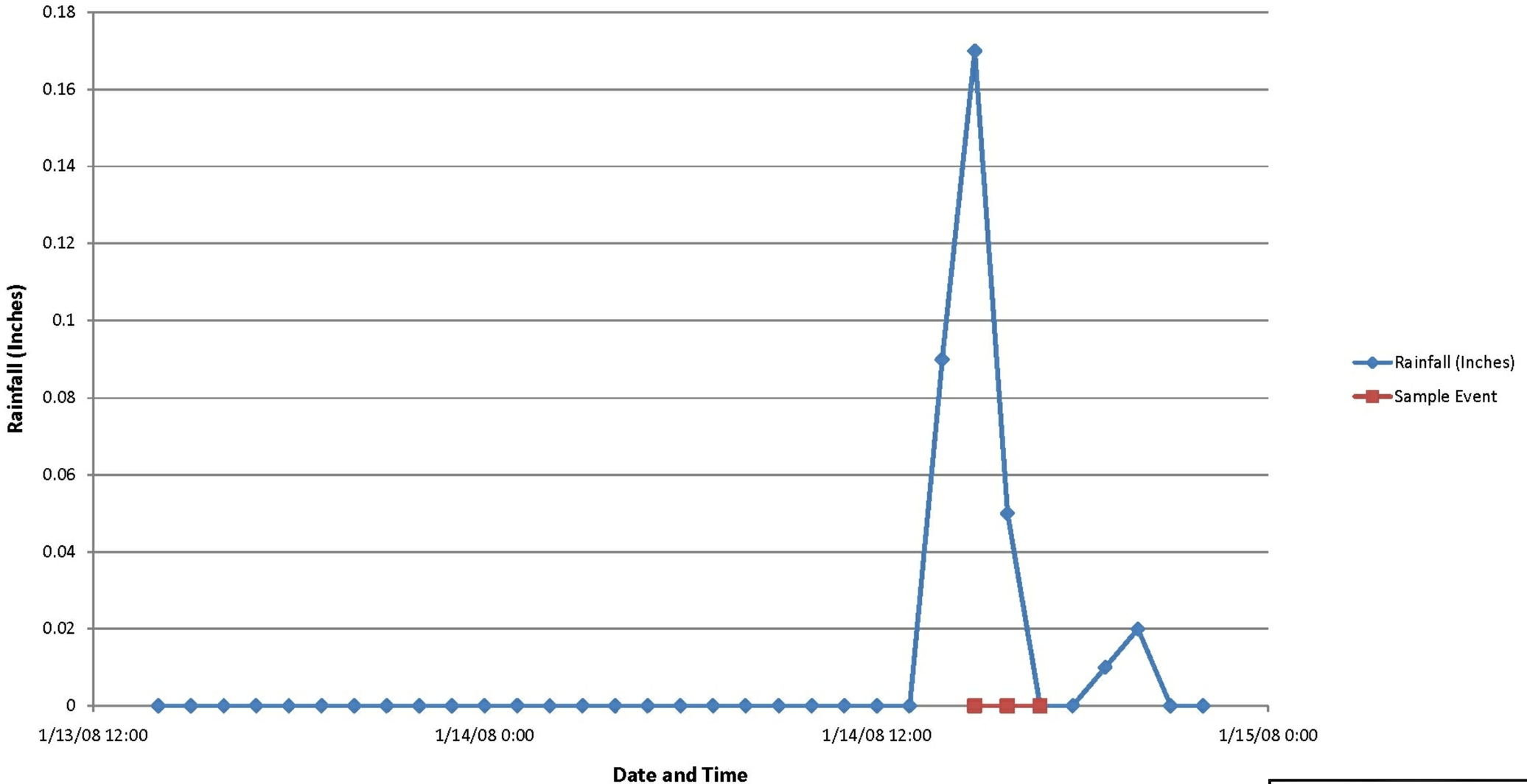
SOURCE CONTROL EVALUATION REPORT

HYDROGRAPH - OCTOBER 2, 2007

ARCADIS

FIGURE
16

Hydrograph - January 14, 2008



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

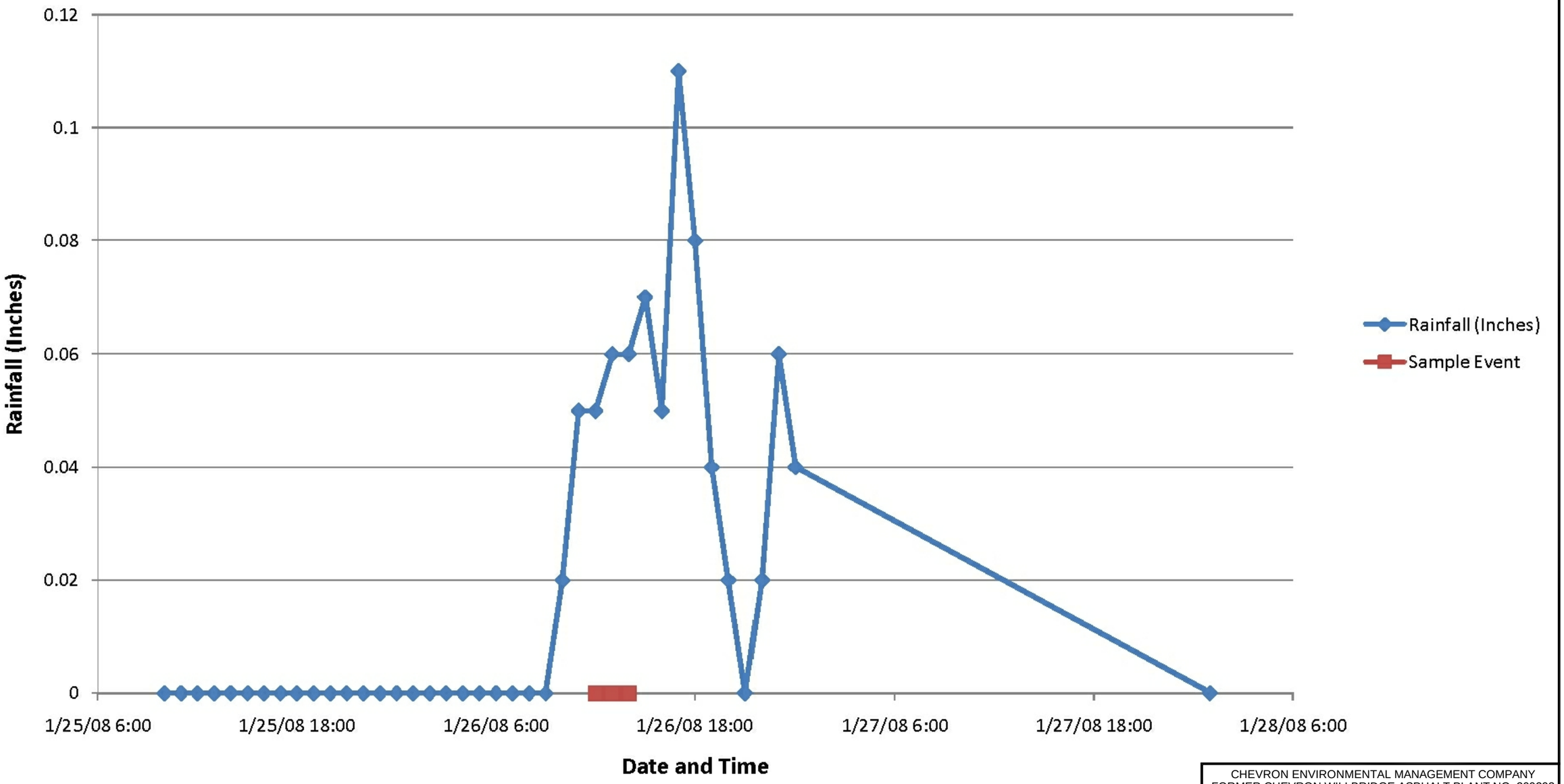
SOURCE CONTROL EVALUATION REPORT

HYDROGRAPH - JANUARY 14, 2008

ARCADIS

FIGURE
17

Hydrograph - January 26, 2008



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

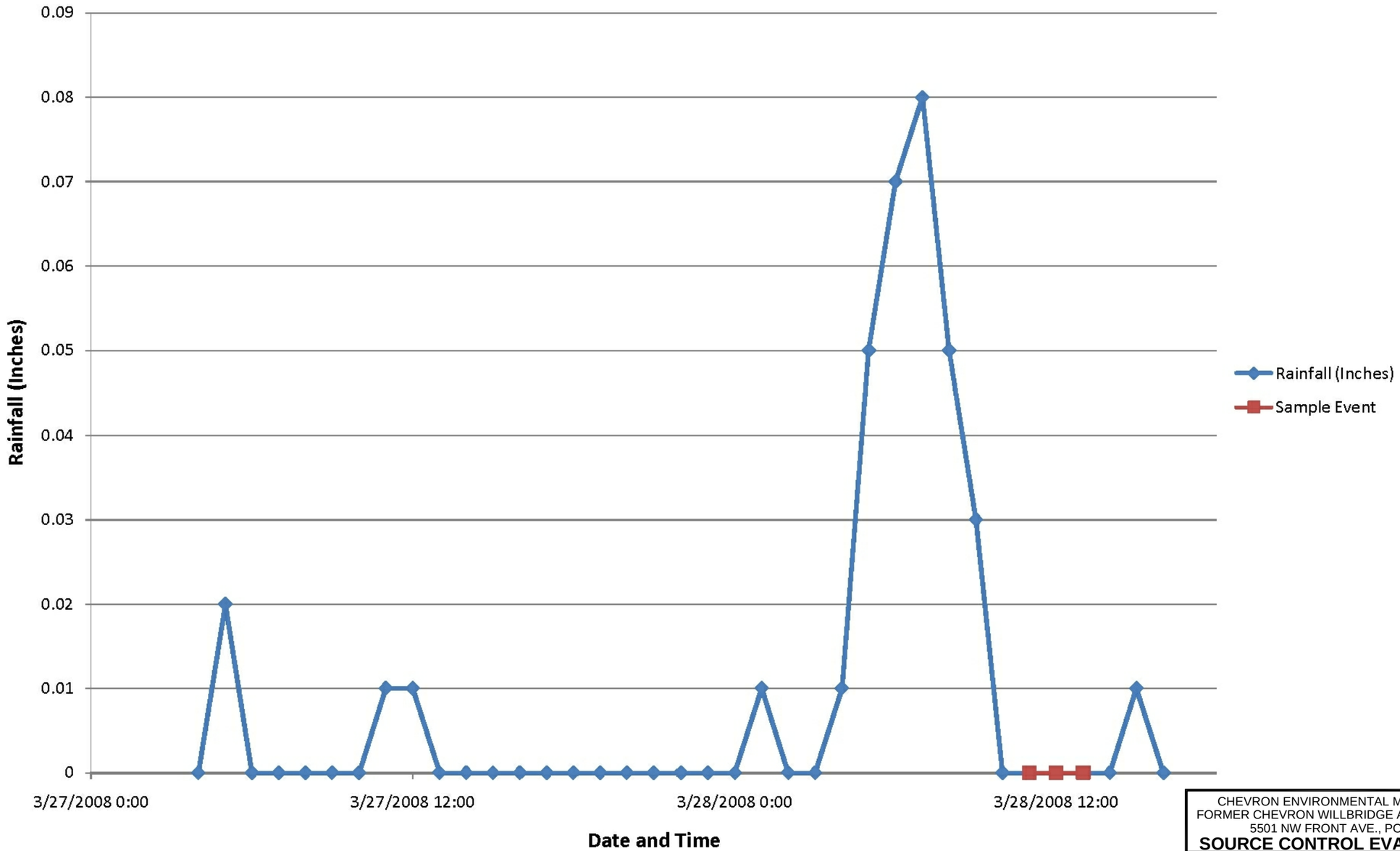
SOURCE CONTROL EVALUATION REPORT

HYDROGRAPH - JANUARY 26, 2008

ARCADIS

FIGURE
18

Hydrograph - March 28, 2008



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

HYDROGRAPH - MARCH 28, 2008

ARCADIS

FIGURE
19

TO CITY OF PORTLAND
OUTFALL 22

OUTFALL V33

TO CITY OF PORTLAND
OUTFALL 19

CITY STORM SEWER

NORTHWEST FRONT AVENUE

FORMER FEDERAL HOUSING STORM SEWER

TO OUTFALL V19

U-NORTH

U-SOUTH

TO CITY STORM SEWER

UNDEVELOPED PROPERTY

OUTFALL V39

A-1 A-2 A-3 A-4 A-5 A-6 A-7 A-8 A-9 A-10

W-1 W-2 W-3 W-3A W-4 W-4A W-5 W-6 W-9 W-10 W-11 W-12 W-14 W-15 W-16 W-17 W-18 W-28

EX-1

PLANT NORTH

TRUE NORTH

0 90' 180'

GRAPHIC SCALE

LEGEND:

- STORM WATER VALVE
- STORM WATER CATCH BASIN
- STORM WATER MANHOLE
- CITY OF PORTLAND MANHOLE DESIGNATION
- MONITORING WELL (APPROXIMATE LOCATION)
- UNVERIFIED LOCATION OF FHA STORM LINES BASED ON JULY 1945 GUILD'S LAKE COURTS SEWER LINE AS-BUILTS
- STORM LINE LOCATION VERIFIED BY CAMERA SURVEY CONDUCTED FEB. 19-22, JUNE 27, AND OCT. 1, 2007 BY ARCADIS BBL
- PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- UNVERIFIED CORRECTIONS TO PARAMOUNT SITE PLAN 9/12/06 STORM LINES
- FHA STORM LINE LOCATIONS VERIFIED BY CAMERA SURVEY CONDUCTED BY PARAMOUNT 2005
- STORM LINE BASED ON CITY OF PORTLAND BES MAPS AND HISTORICAL AS BUILTS

NOTES:

1. FHA: FEDERAL HOUSING AUTHORITY
2. BES: BUREAU OF ENVIRONMENTAL SERVICES
3. BASEMAP FROM PARAMOUNT PETROLEUM "PLAN AND DETAILS SITE PLAN – STORM SEWER" SHEET 8 REV. 3 DATED 9/12/06.
4. LOCATION OF MANHOLES AND STORM LINES ARE APPROXIMATE.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER CHEVRON WILLBRIDGE ASPHALT PLANT NO. 209293
5501 NW FRONT AVE., PORTLAND, OREGON

SOURCE CONTROL EVALUATION REPORT

MONITORING WELLS

ARCADIS

FIGURE 20

Attachment 1

NOTE (TO RE-ACTIVATE)
CITY MUST CUT & PLUG 15" SEWER LINE, AND INSTALL NEW LINE, AS SHOWN, FROM POINT OF CUT TO M.H. AT GR. 26.95, SAID LOCATION BEING ON A 24" LINE.
3/21/51

SEWER LINES — AS-BUILT.

GUILD'S LAKE COURTS.

DIVISION 35091 OF OREG. 35288.

HOUSING AUTHORITY OF PORTLAND, OR.

July - 1945.

Scale of Feet. 0 100 200 300 400 500 600 700

Compiled by - John H. Lewis - Reg. Engr. No. 4. 11/1/19

T.1N. R.1E. W.M. Sec. 18. Sec. 19.
1320 Ft. to Section Corner

N.W. FRONT AVE.
N.W. BUNA ST.
N.W. GONA ST.
N.W. 54TH AVE.
N.W. 53RD AVE.
N.W. 52ND AVE.
N.W. 51ST AVE.
N.W. 21ST AVE.
N.W. KITTRIDGE AVE.
N.W. 44TH COURT.
N.W. 41ST COURT.
N.W. YEON AVE.
N.W. ST. HELENS ROAD.
NORTHERN PACIFIC R.R.
MAIN LINE R.R.
N.P.R.R.
COLUMBIA RIVER Sewer Outfall

WEST SECTOR - OREG. 35091.
34.213 Acres.

EAST SECTOR - OREG. 35091.
20.48 Acres.

EAST SECTOR. SEE INSERT BELOW.

Sewer 36" W. of Property Line
74.0 ft to end of 42" concrete pipe in River. Later: 257 ft Wood Stave Pipe Extension, built.
24" Concrete Pipe.
Dry Well.
Grade 24.90
Amended 8/21/45

N.W. EXPRESS AVE.

LEGEND.

- Main Sewer Lines.
- Lateral Sewer Lines.
- Manholes.
- Lamp Holes.
- Clean Outs.
- Street Inlets.
- 18" Diameter in inches.

L-19