State of Oregon
Department of Environmental Quality **Memorandum**

Date: August 10, 2015

To: Sean Sheldrake and Eva DeMaria, USEPA

Through: Keith Johnson, DEQ Northwest Region Cleanup Manager

From: Alex Liverman, Portland Harbor Stormwater Coordinator

Subject: Source Control Decision
Christenson Oil Company
ECSI # 2426

1.0 Introduction

This memo presents the basis for the Department of Environmental Quality source control decision for the Christenson Oil Company site, located at 3821 NE St. Helens Road in Portland.

Christenson completed a Source Control Evaluation report for the groundwater and stormwater pathways at the site in accordance with the 2005 *EPA/DEQ Portland Harbor Joint Source Control Strategy,* also known as the JSCS.

DEQ concludes from review of the Source Control Evaluation report and supporting documents that Christenson has identified and controlled upland sources of contamination from current and past operations such that contaminant transport pathways at the site do not pose a significant current or future threat to the Willamette River. On-going control measures will be applied at the site as regulated by the NPDES 1200Z Industrial Stormwater General Permit.

2.0 Site Description and History

The site covers approximately 2-acres and is located within Section 19, Township 1 North, Range 1 East of the Willamette Meridian, in the City of Portland, Multnomah County, Oregon (Figure 1), in an area of northwest Portland zoned as "heavy industrial." The site is bordered to the west by Forest Park; to the south-southeast by Baxter-Flaming Industries; to the east-northeast by NW St. Helens Road and beyond by a bulk terminal owned by Shell Oil Products Company (DEQ ECSI No.169); and to the north-northwest by an approximately 3-acre property leased by Christenson Oil from HAJ Properties, LLC for administrative and warehousing functions other than manufacturing. Green Creek runs along the western border of the site, separating it from the leased area.

The surface elevation of the site is between approximately 40 to 80 feet above mean sea level, with an overall surface topographic slope towards the Willamette River, which is

located approximately 0.5-mile to the northeast. The site surface cover is a mixture of impervious asphalt, concrete, and structures on the northeast portion of the site, and pervious soil on the southwest portion.

As shown in Figure 2, the overland flow of stormwater at the site is generally from the southwest to northeast, in the general direction of the topographic slope. Approximately ¼ of the site consists of impervious roofs and pavement. Stormwater from these impervious areas is collected in catch basin CB-1, located in the paved parking area southeast of the main building. From the catch basin, stormwater is conveyed through underground piping into a 6,300-gallon capacity oil water separator and then into the City of Portland shared stormwater conveyance system located in the right-of-way of NW St. Helens Road. The City of Portland stormwater conveyance system that serves the site extends east beneath the Shell Bulk Terminal and stormwater collected in this system ultimately discharges into the Willamette River at Outfall #18, near River Mile 8.8. Stormwater pipes carrying stormwater discharge and any intercepted groundwater, represents a complete pathway to the Willamette River. Stormwater from the adjacent 3-acre lease area discharges to the river though City Outfall 19, but no industrial or outdoor operations occur there.

Shallow groundwater underlying the site is encountered at approximately 4 to 6 feet below ground surface in the eastern portion of the site and greater than 20 feet below ground surface in the western portion of the site, where the ground elevation is greater. The overall direction of shallow groundwater flow beneath the site is to the northeast. A map with the general potentiometric surface of the site is provided as Figure 3.

The site is developed with two structures, including an approximately 19,000 square-foot, single-level main building and an approximately 2,000 square-foot storage building. According to the City of Portland building permit records, the main building was constructed in 1947, and is a prefabricated metal building made of galvanized steel. The main building includes an office and warehouse space, an assembly line for packaging oil-based products, and three indoor aboveground storage tank areas (Tank Farms C, D and E) for storing and blending petroleum-based lubricants. There are currently thirty-three of these tanks indoors, with an aggregate storage capacity of approximately 122,700 gallons. Paved loading and receiving docks are located at the front of the main building and slope towards catch basin CB-1 in the receiving area. Behind the main building, additional above ground storage tanks are segregated into two areas (Tank Farms A and B), each of which are fully enclosed by secondary containment. Tank Farms A and B include thirteen tanks with a total storage capacity of approximately 183,900 gallons. These site features are presented on Figure 2.

The site has been operated by Christenson Oil and predecessor businesses since the late 1940s. Christenson Oil conducts mixing, blending, packaging, and storage of various petroleum-based lubrication products in the five tank farms, and formerly in underground storage tanks, which contained diesel, kerosene, and Stoddard Solvent. The former underground tanks were decommissioned between 1989 and 1993.

There have been several documented releases of petroleum products from the tanks on the property since 1975. The products reportedly released at the site have included: base oil (Bright Stock), diesel fuel, kerosene, Stoddard Solvent (a type of mineral spirits), hydraulic oil, and chain oil. Surface soils have generally been removed and disposed, though evidence of groundwater contamination was discovered with the installation of several ground water monitoring wells in 2006.

3.0 Site Investigation and Regulatory History

As documented on DEQ's Environmental Cleanup Site Information database, in DEQ's Christenson site-related files and in the 2014 Source Control Evaluation completed by Pacific Crest Environmental, multiple site investigations and removal actions have occurred.

Christenson conducted cleanup activities to address releases at the site, investigations to assess the nature and extent of affected soil and groundwater, and characterization of the geologic and hydrogeologic conditions at the site. A chronologic summary of the cleanup and investigation activities is provided below:

- In October 1975, approximately 1,000 gallons of Bright Stock was released from a transfer valve that was inadvertently left open inside the Main Building. The Bright Stock was collected by the floor drain and reportedly contained upon reaching the intermittent stream.
- In April 1989, Christenson Oil decommissioned and removed one 10,000-gallon capacity underground storage tank that previously contained diesel fuel from the Site.
- In October 1990, two 10,000-gallon capacity underground tanks that previously contained kerosene and Stoddard Solvent were decommissioned from their locations southwest of the Storage Building. The tanks were relocated to Tank Farm B and repurposed for above ground storage. Laboratory analysis of soil samples collected during the tank decommissioning activities detected concentrations of total petroleum hydrocarbons, or TPH, in the Stoddard Solvent, diesel fuel, and heavy oil ranges. Between 1991 and 1993, approximately 116 cubic yards of petroleum affected soil was over-excavated during the tank decommissioning and treated on-site by aeration. Upon confirmation of successful remediation, the soil was placed as fill in the western portion of the Site. DEQ provided notification to Christenson that cleanup requirements were met in a No Further Action Letter for Leaking Underground Storage Tanks, dated November 14, 2000.
- In November 1995, approximately 60 gallons of hydraulic oil were released from a dislodged transfer hose to a receiving truck in the loading bay area adjacent to the dispensing area. Following containment and cleanup, DEQ determined that the release was *de minimis*, and required no further action.

- In September 1998, approximately 715 gallons of bar (chain) oil, or line flush oil, was released as a result of overfilling an aboveground tank located in Tank Farm A. The release was reported to the Oregon Emergency Response System (OERS Number 98-2288) and contained within the secondary containment. The spill response measures consisted of using a suction pump, absorbent booms, and absorbent pads to recover residual liquids.
- In October 1999, the site was added to the DEQ Environmental Cleanup Site Information database (ECSI #2426).
- On July 14, 2000, DEQ requested that Christenson Oil conduct a Preliminary Assessment to assess whether hazardous substances have potentially been released at the facility and if the releases had the potential to impact the Willamette River in the Superfund study area.
- In October 2000, Wohlers Environmental Services, Inc. submitted a *Voluntary Preliminary Assessment* Report to DEQ describing the site background, products and materials used, and potential contaminant exposure pathways. The report concluded that historical releases and existing conditions were not likely to pose a significant impact to human health or the environment.
- In August 2001, Wohlers advanced five soil borings at locations within the Tank Farm A secondary containment area, to assess the residual concentrations of petroleum hydrocarbons related to the September 1998 bar oil release. The results of the subsurface soil assessment were documented in a *Transmittal of Soil Sampling Results* prepared by Wohlers, dated September 2001.
- In May 2006, a Christenson subcontractor conducted routine concrete floor repair activities in a portion of the Main Building, and encountered petroleum contaminated soil beneath the southern corner of the loading dock/storage area. Approximately 75 tons of petroleum impacted soil was excavated from this location and disposed off-site at a permitted landfill. Additionally, approximately 4,000 gallons of impacted water was pumped from the excavation and treated on-site by air sparging, and discharged to the City's sanitary sewer system (Batch Discharge Permit No. 2006-034). Confirmation sidewall samples detected diesel and oil range total petroleum hydrocarbons or TPH at concentrations ranging from 113 mg/kg to 21,200 mg/kg. In June 2006, tightness testing was conducted on the product dispensing line that transferred Stoddard Solvent from a tank in Tank Farm B to the receiving dock. The tightness testing results indicated a leak in the product line between the tank containing Stoddard Solvent and the dispenser located in the loading dock area. This leak was interpreted to be the source of Stoddard Solvent range TPH found in subsurface soil and groundwater, as documented in Wohlers Expanded Preliminary Assessment, dated December 2006.
- In August 2006, Wohlers conducted further subsurface investigation to assess the areal extent of contamination associated with the Stoddard Solvent release discovered in May 2006. The additional investigation consisted of: advancing nine soil borings (DP-1, DP-2, DP-3, and MW-1 through MW-6) (Figure 2);

collecting soil samples for laboratory analysis; installing six monitoring wells (MW-1 through MW-6); and, collecting groundwater samples from the wells and the borings for laboratory analysis. Laboratory analysis of soil and groundwater samples detected: TPH in the gasoline, diesel, and oil ranges; select volatile organic compounds, referred to as VOCs; select polycyclic aromatic hydrocarbons, referred to as PAHs, and metals. The results of the investigation are documented in the 2006 Expanded Preliminary Assessment.

- Quarterly groundwater monitoring and sampling events were generally conducted at the site from March 2007 through June 2013 (not all quarters were sampled in that 6 year timeframe). Stoddard Solvent light non-aqueous phase liquid or LNAPL was measured in well MW-2 since 2007 and groundwater contamination was found more generally across the eastern portion of the site. An assessment of the analytical results for groundwater samples indicates a decreasing trend in petroleum hydrocarbon concentrations over time.
- In the third quarter of 2009, LNAPL mitigation activities were initiated at the site in accordance with a DEQ approved work plan from Pacific Crest. The LNAPL mitigation activities started with the installation of a passive skimmer in MW-2. On June 29, 2010, the first of a series of dual phase vacuum extraction event was conducted to recover LNAPL and soil vapor containing concentrations of TPH from the vicinity of well MW-2. In March 2013, measured LNAPL in MW-2 was 0.04 feet. LNAPL and vapor remediation efforts are ongoing.

4.0 Source Control Evaluation

Because the site is located within the uplands draining to the Portland Harbor Superfund study area, upland source control investigations were guided by the 2005 EPA/DEQ Joint Source Control Strategy or JSCS. The objective of a source control evaluation is to determine whether existing and potential sources of contamination at the site have been identified and if additional characterization or source control measures are needed. When stormwater pipes are a potential pathway to mobilize contamination from the site to the river, these determinations generally rest upon demonstrating that site-related information provides sufficient support to make the following findings:

1. Existing and potential facility-related contaminant sources have been identified and characterized.

2. Contaminant sources were removed or are being controlled to the extent feasible.

3. Performance monitoring conducted after source control measures were implemented supports the conclusion that the measures are effective.

4. Adequate measures are in place to ensure source control and good stormwater management measures occur in the future (DEQ 2010).

4.1 Source Control Investigations and Actions in Response

As detailed in the Pacific Crest *Source Control Evaluation* report, multiple instances of investigation, sampling, control measure implementation, remediation, and performance evaluation were undertaken at the site.

4.1.1 Facilitated Groundwater Transport

To evaluate the potential for contaminated groundwater to enter underground utility conduits and be preferentially transported to the river, Christenson conducted a survey of the components of the site stormwater system and other relevant features relative to a City benchmark (BM 3319). The survey indicated that the invert elevation of the shallow flow components of the stormwater system conduits (i.e., catch basin, culverts, inflow and outflow to the oil/water separator) are located at a relatively higher elevation, and do not intersect the groundwater table. Feature elevations are included in Table 5, and site stormwater features are illustrated on Figure 3, with ground water elevations recorded in December 2012.

4.1.2 Groundwater

Concentrations of petroleum and most metals constituents at the down gradient site boundary (Figures 4, 5, 6 and 7) are low. Note that manganese concentrations in groundwater are elevated, which is commonly observed at sites that have had petroleum releases. The down gradient extent of site-related manganese has not been determined. However, the potential for facilitated transport of groundwater was evaluated down gradient and across NW St. Helens Road, as part of the Shell Terminal source control decision, and determined not to be a concern. Given the site's distance of approximately 0.5 mile to the river, the lack of facilitated transport, low concentrations of most contaminants and the anticipated attenuation of manganese, DEQ concludes that the groundwater from the site is not complete pathway to the river.

4.1.3 Stormwater

The stormwater conveyance captures approximately 6% of stormwater draining from the site, which is regulated under the 1200Z permit. The remainder of rain falling on the site infiltrates in the impervious site areas and a small portion comingles with the intermittent creek flowing along the western edge of the site. A chronologic summary of sampling and investigation activities that are related to the characterization of the stormwater pathway at the site is presented below:

- Between 1996 and April 2008, Christenson Oil conducted stormwater monitoring activities in accordance with the 1200Z permit (Table 1). Activities included collection of four grab stormwater samples per year; analysis of the samples for total suspended solids, oil & grease, pH, copper, lead, and zinc and monthly visual inspections of representative discharge locations for floating solids and sheen. The data collected established that the stormwater management practices documented in the site's Stormwater Pollution Prevention Plan and implemented

by Christenson Oil, were effective at maintaining compliance with stormwater discharge permit benchmarks.

- In 2006 and 2007, Wohlers conducted initial stormwater and storm drain solids sampling for source control purposes. Solids (Table 3) were collected from catch basin CB-1 in October 2006 and stormwater samples (Table 6) were collected from the oil-water separator in December 2006, March 2007, and April 2007. The samples were analyzed for TPH, VOCs, semivolatile organic compounds or SVOCs, polychlorinated bipehenyls or PCBs, pesticides and total metals.
- In 2008, on the basis of the historical monitoring results, Christenson Oil requested and obtained from DEQ a waiver limiting the stormwater monitoring activities conducted under the 1200Z permit to monthly visual inspection for sheen and floating solids. The monthly visual monitoring reflects no observed sheen, odor, or floating solids in catch basin CB-1 over the reporting period. Beginning in 2012, additional parameters were monitored in compliance with the renewed permit, as reflected in Table 1.
- In April 2010, Wohlers collected surface water samples from two locations in the intermittent Green Creek (Table 6), in accordance with a DEQ approved work plan as part of the source control evaluation. The purpose of the surface water sampling was to evaluate the quality of the surface water as it entered the site from up-gradient, and then as it discharged to the stormwater conveyance system in the down-gradient portion of the site. The surface water samples were analyzed for TPH, VOCs, SVOCs, PCBs and total metals and the data is presented in Table 6.
- Catch basin solids were sampled again on December 1, 2010 and solids from the oil water separator were sampled on September 20, 2012 (Table 2). Additional stormwater sampling was performed on November 16, 2011, January 29, 2012, March 5, 2012, and May 21, 2012 (Table 4).

The results of the investigations are summarized in the 2015 *Source Control Evaluation Report* by Pacific Crest and conclude that: 1) groundwater under the site is impacted from petroleum with remedial measures are ongoing, but, the groundwater pathways to the river are incomplete; and 2) the stormwater pathway to the river is complete, but stormwater sampling indicates that stormwater generally meets JSCS criteria.

4.2 Contaminants of Potential Concern.

Based on site operations and site sampling results the following contaminants are of potential concern in the stormwater system at the site:

- TPH;
- PAHs and phthalates;
- Total metals (arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver and zinc);

- PCB Aroclors;
- Total organic carbon
- TSS

These contaminants were selected based upon the following criteria: previously identified contaminants for the site; historical and current site operations; past environmental investigations; materials stored/handled at the facility; compliance history with regulatory permits; and the contaminants identified in proximity to City Outfall #18 in the Willamette River.

4.3 Lines of Evidence Evaluation

1200Z permit stormwater monitoring from 1996 to 2013 is presented in Table 1. Stormwater system solids data is summarized in Tables 2 and 3, and source control stormwater data is summarized in Table 4. Exceedances of Portland Harbor screening levels values were noted for some metals, PAHs and two instances of bis(2-ethylhexyl) phthalate. The phthalates were found only in the solids in CB-1, and not in the site stormwater, or oil-water separator solids.

Video inspection of the site's storm sewer conveyance system indicates that it is in good-working condition and shows no signs of disrepair. The inspection, in conjunction with the elevation survey of stormwater components presented in Table 5, confirms that groundwater does not infiltrate the stormwater system, so is not transported to the river.

Stormwater discharges from the site through outfall 18, which discharges to sediment area of potential concern 19. Contaminants found at elevated concentrations in AOPC 19 include: aluminum, barium, cadmium, copper, iron, manganese, mercury, silver, zinc, bis(2-ethylhexyl)phthalate, PCBs, PAHs, dioxins/furans, aldrin, delta-HCCH, dieldrin, endrin, DDx, chloroethane. As noted above, some metals, PCBs, PAHs and phthalates were also found above screening level values in site stormwater solids, stormwater, or both.

Because contaminants that were detected in one or more samples at concentrations exceeding applicable JSCS upland source control screening values, concentrations were compared to DEQ charts from *Appendix E: Tools for Evaluating Stormwater Data* found in DEQ 2010. This tool was created by compiling contaminant concentration data from many of the stormwater and stormwater solids samples collected at Portland Harbor-area heavy industrial sites. This data was used to create a series of charts that plot rank-order samples against contaminant concentrations, and are used to identify contaminant concentrations in samples that are atypically elevated. Concentrations falling within the upper/steeper portion of the curve are an indication that uncontrolled contaminant sources may be present at a site and that additional evaluation or source control measures may be needed. Concentrations that fall on the lower/flatter portion of the curve suggest that stormwater is not being unusually impacted by contaminants at a site, and while concentrations may exceed the risk-based SLVs, they are within the range found in stormwater from active industrial sites in Portland Harbor.

The Christensen Oil site data plotted on the curves is presented on Figures 8a through 8v**.** Contaminants concentrations are generally located below the knee of the curve, indicating that the 6% of site stormwater that is captured and conveyed to the river through outfall 18 is not elevated as compared to other heavy industrial sites and, therefore, does not warrant additional source control measures. The majority of the remaining 94% of site stormwater infiltrates on site. During saturated conditions, a small portion of stormwater may comingle with water draining from Forest Park via Green Creek. However, the results of sampling of the creek presented in Table 6 indicate all detected concentrations were lower than those detected in site stormwater.

4.4 Source Control Decision

Based on review of the file, DEQ concludes that the Christensen Oil site was adequately characterized and pollutants leaving the site via the stormwater pathway are minimal. The groundwater to stormwater system pathway via infiltration was found to be incomplete, as is the direct groundwater pathway to the river. The property does not appear to be a current or reasonably likely future source of contamination to the Willamette River, provided that effective best management practices are implemented and maintained. Site stormwater discharges will continue to be regulated under the NPDES 1200Z Industrial Stormwater General Permit, which includes regular monitoring and implementation of corrective actions to maintain compliance.

5.0 References

Pacific Crest Environmental. *Source Control Evaluation Report*. May 26, 2014.

Pacific Crest Environmental. *Source Control Evaluation Report Amendment*. November 6, 2014

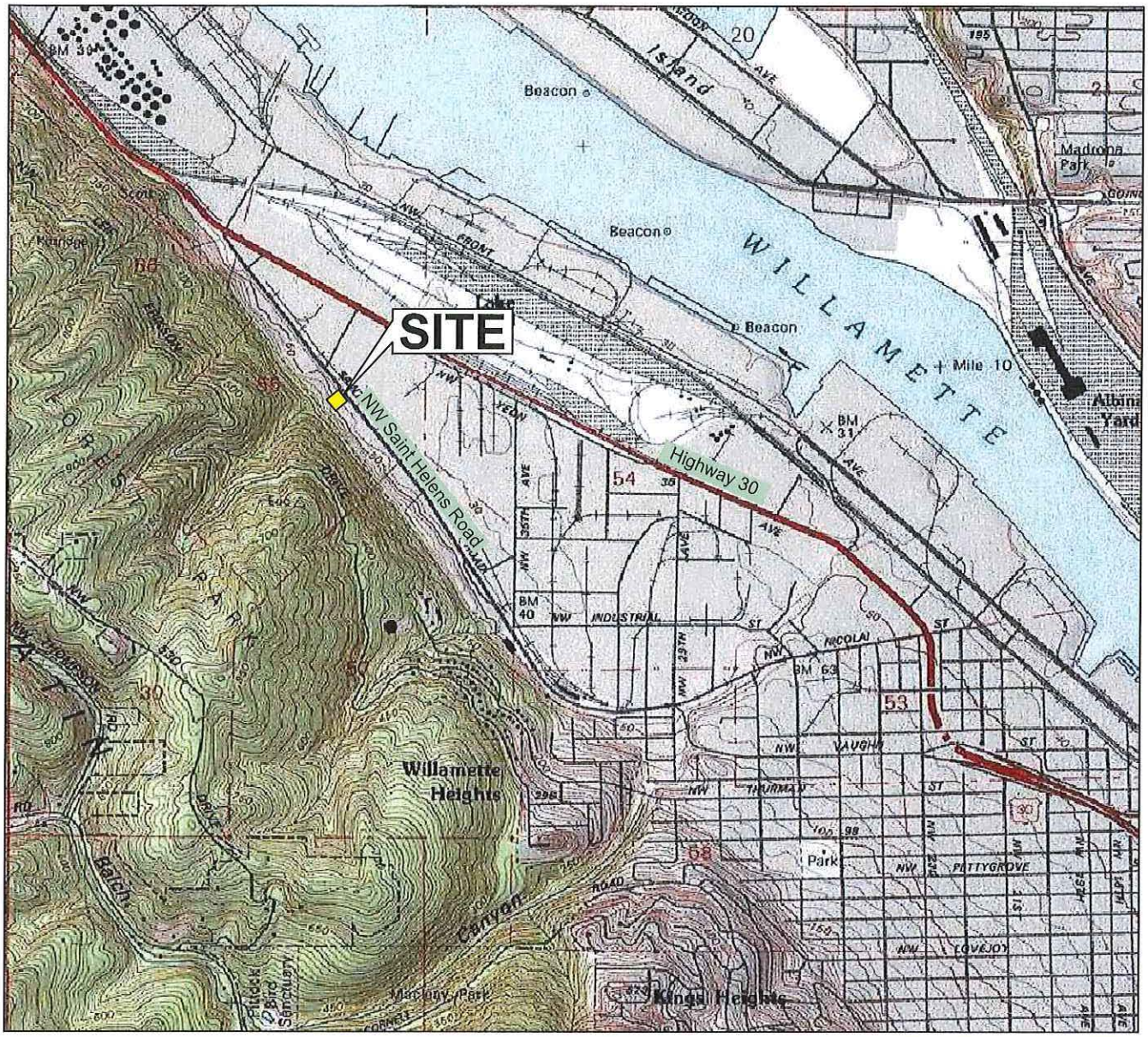
Pacific Crest Environmental. *Groundwater Monitoring and Interim LNAPL Mitigation Reports*. Quarterly 2007 to 2013.

DEQ. 2010. *Guidance for Evaluating the Stormwater Pathway at Upland Sites*. October 2010. http://www.deq.state.or.us/lq/cu/stmwtrguidance.htm

DEQ and USEPA. 2005. *Portland Harbor Joint Source Control Strategy*. December 2005. http://www.deq.state.or.us/lq/cu/stmwtrguidance.htm

Wohlers Environmental Services, Inc., *Voluntary Preliminary Assessment – Christenson Oil Facility, 3821 N.W. St. Helens Road, Portland, Oregon*. 2000.

Wohlers Environmental Services, Inc., *Expanded Preliminary Assessment Report – Christenson Oil Facility, 3821 N.W. St. Helens Road, Portland, Oregon*. 2006



Source: TOPO! 2007

N

0 2000

Approximate Scale in Feet

PACIFIC CREST ENVIRONMENTAL

WWW.PCENV.COM 425-888-4990

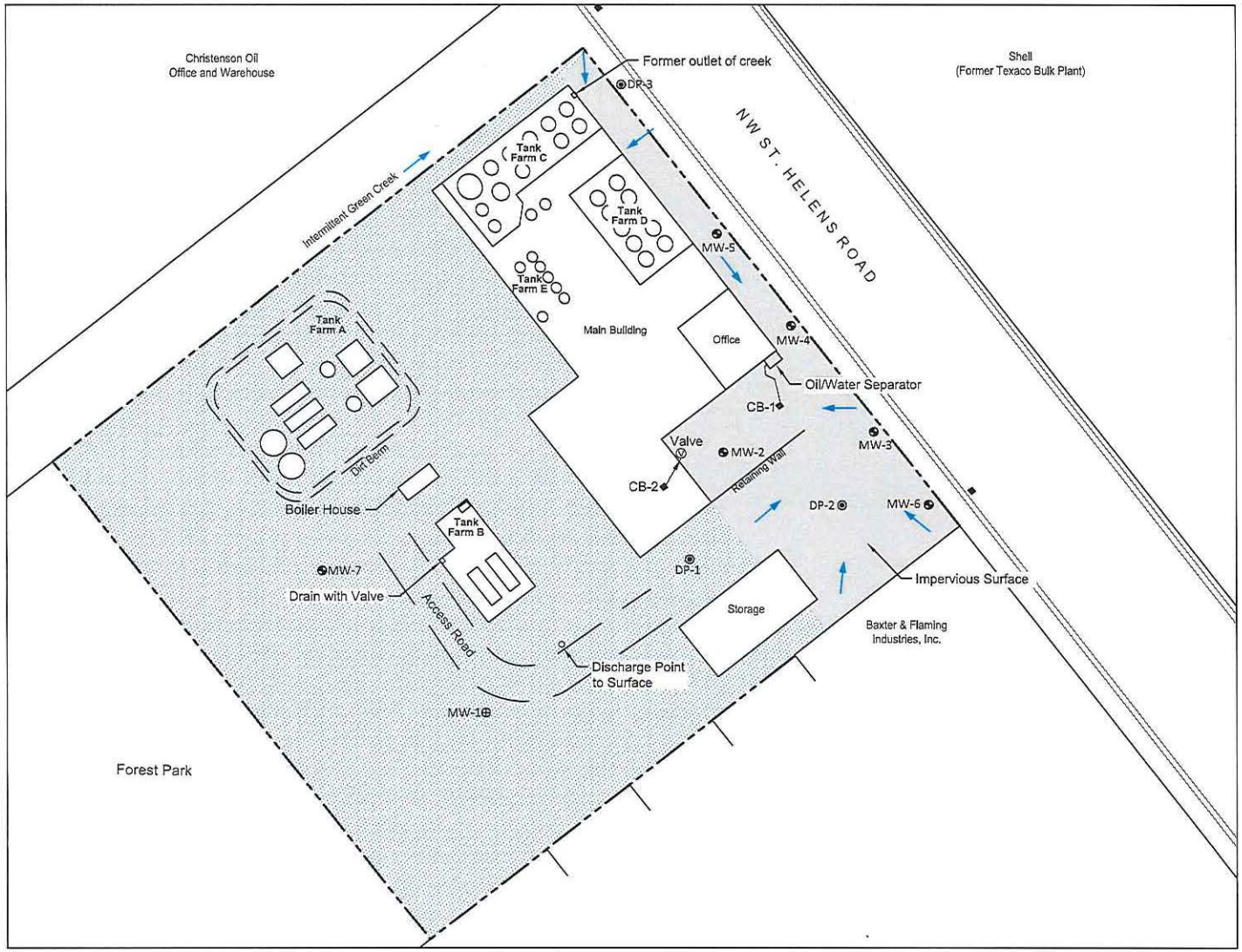
Christenson Oil Company
3821 N.W. St. Helens Rd.
Portland, Oregon

PN: 123-001

Figure 1

Site Location Map

11/26/2013 Drafting 123-001-004.dwg FIG 1



Legend

- Pervious Area
- Impervious Area
- Property Boundary
- Street Edge/Curb
- Existing Structure Boundary
- Apparent Direction of Surface Flow
- Direction of Subsurface Flow
- MW-4 Monitoring Well
- Catch Basin
- DP-1 Approximate Location of Soil Boring
- MW-1 Abandoned Well

N

0 50
Approximate Scale in Feet

Note: It is estimated that approximately 80% of stormwater infiltrates into the subsurface; 15% is captured by CB-1; 4% is captured by Green Creek; and <1% is captured by CB-2.

PACIFIC CREST ENVIRONMENTAL
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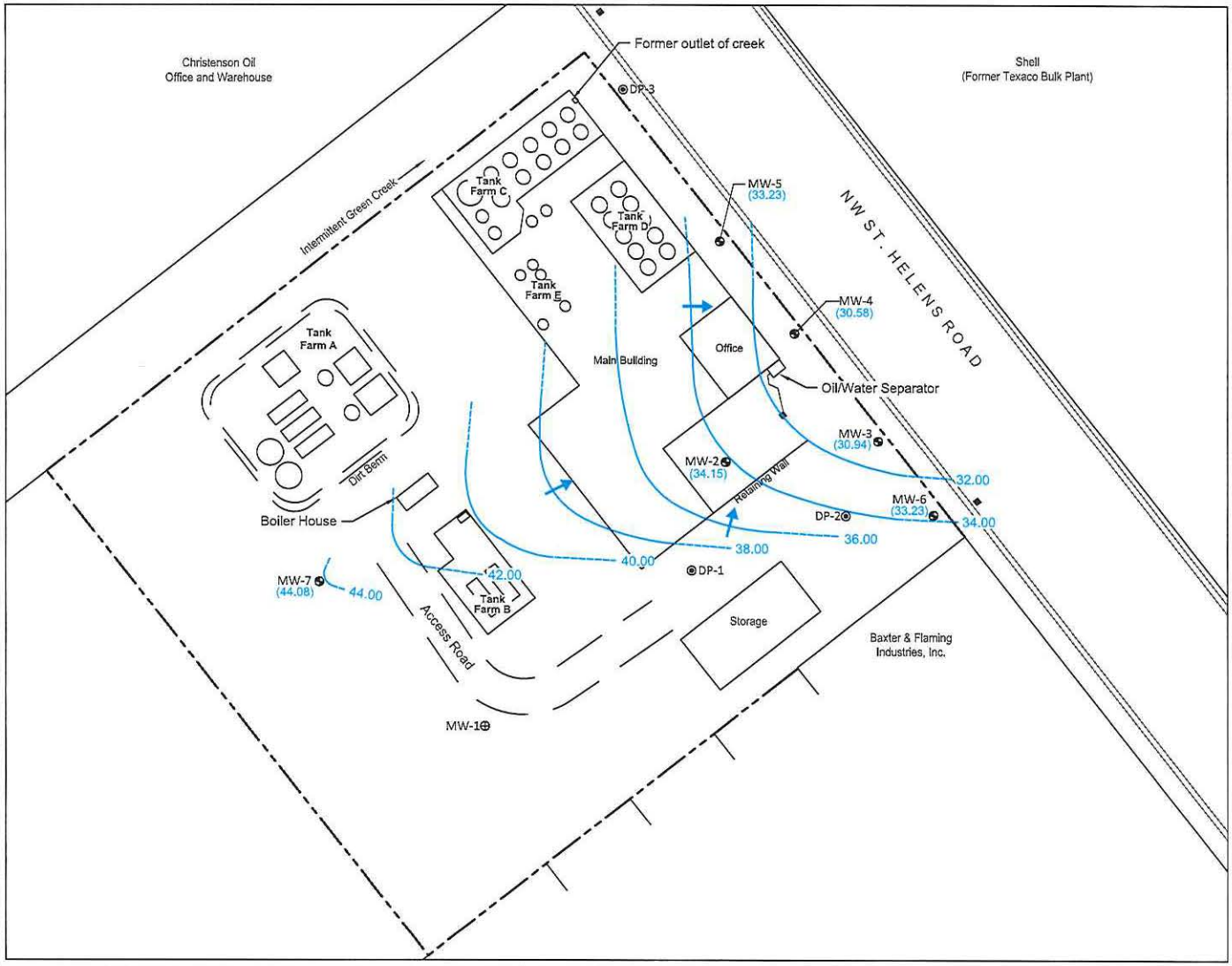
Christenson Oil Company
3821 N.W. St. Helens Road
Portland, Oregon

PN: 123-001

Figure 2

Site Drainage Map

9/29/2014 Drafting 123-001-058.dwg FIG 2 SCE Amnd



Legend

32.00	Potentiometric Contour in Feet Contour Interval = 2.0 feet
(30.58)	Groundwater Elevation (amsl)
	Apparent Direction of Groundwater Flow
	Property Boundary
	Street Edge/Curb
	Existing Structure Boundary
MW-4	Monitoring Well
	Catch Basin
DP-1	Approximate Location of Soil Boring
MW-1	Abandoned Well
amsl	above mean sea level

N

0 50
Approximate Scale in Feet

PACIFIC CREST ENVIRONMENTAL
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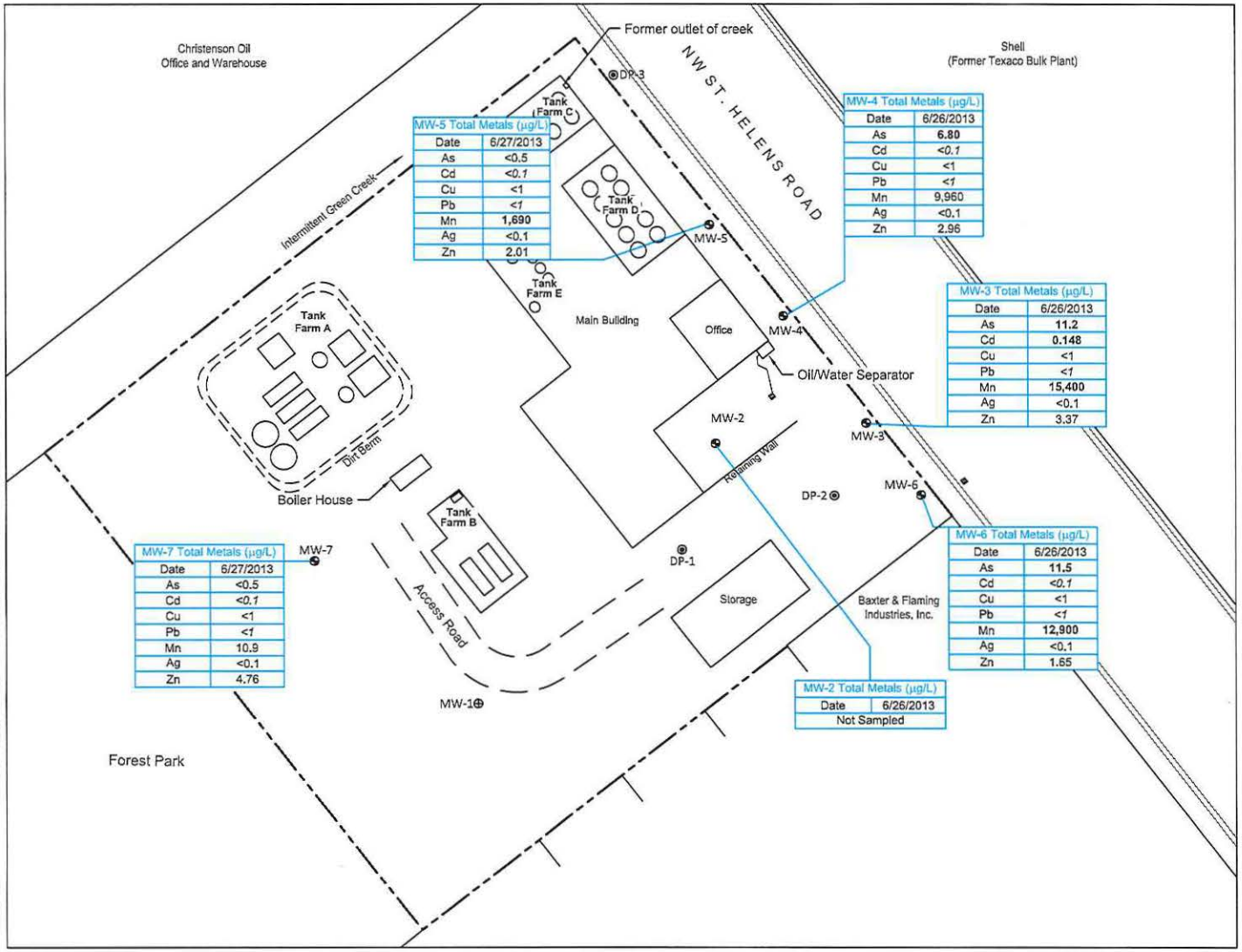
Christenson Oil Company
3821 N.W. St. Helens Road
Portland, Oregon

PN: 123-001

Figure 3

Potentiometric Surface Map
(June 26, 2013)

9/18/2013 Drafting \\PACIFIC-8E185AF\public\Project Files\123 Christenson Oil\Figures\123-001-066.dwg FIG 3 - June 2013



MW-5 Total Metals (µg/L)	
Date	6/27/2013
As	<0.5
Cd	*<0.1*
Cu	<1
Pb	*<1*
Mn	**1,690**
Ag	<0.1
Zn	2.01

MW-4 Total Metals (µg/L)	
Date	6/26/2013
As	**6.80**
Cd	*<0.1*
Cu	<1
Pb	*<1*
Mn	9,960
Ag	<0.1
Zn	2.96

MW-3 Total Metals (µg/L)	
Date	6/26/2013
As	**11.2**
Cd	**0.148**
Cu	<1
Pb	*<1*
Mn	**15,400**
Ag	<0.1
Zn	3.37

MW-7 Total Metals (µg/L)	
Date	6/27/2013
As	<0.5
Cd	*<0.1*
Cu	<1
Pb	*<1*
Mn	10.9
Ag	<0.1
Zn	4.76

MW-6 Total Metals (µg/L)	
Date	6/26/2013
As	**11.5**
Cd	*<0.1*
Cu	<1
Pb	*<1*
Mn	**12,900**
Ag	<0.1
Zn	**1.65**

MW-2 Total Metals (µg/L)	
Date	6/26/2013
Not Sampled	

Legend

- Property Boundary
- Street Edge/Curb
- Existing Structure Boundary
- MW-4 Monitoring Well
- Catch Basin
- DP-1 Approximate Location of Soil Boring
- MW-1 Abandoned Well

Joint Source Control Strategy Screening Level Values For Portland Harbor Groundwater	
Arsenic (As)	0.045 µg/l
Cadmium (Cd)	0.094 µg/l
Copper (Cu)	2.7 µg/l
Lead (Pb)	0.54 µg/l
Manganese (Mn)	50 µg/l
Silver (Ag)	0.12 µg/l
Zinc (Zn)	36 µg/l

Bold = concentration exceeding applicable screening level value

µg/L = micrograms per liter

Italics = laboratory practical quantitation limit exceeds screening level value

< = concentration was not detected at or above the laboratory detection limit

Note: Well MW-2 not sampled due to presence of free product.

N

0 50

Approximate Scale in Feet

PACIFIC CREST ENVIRONMENTAL
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Christenson Oil Company
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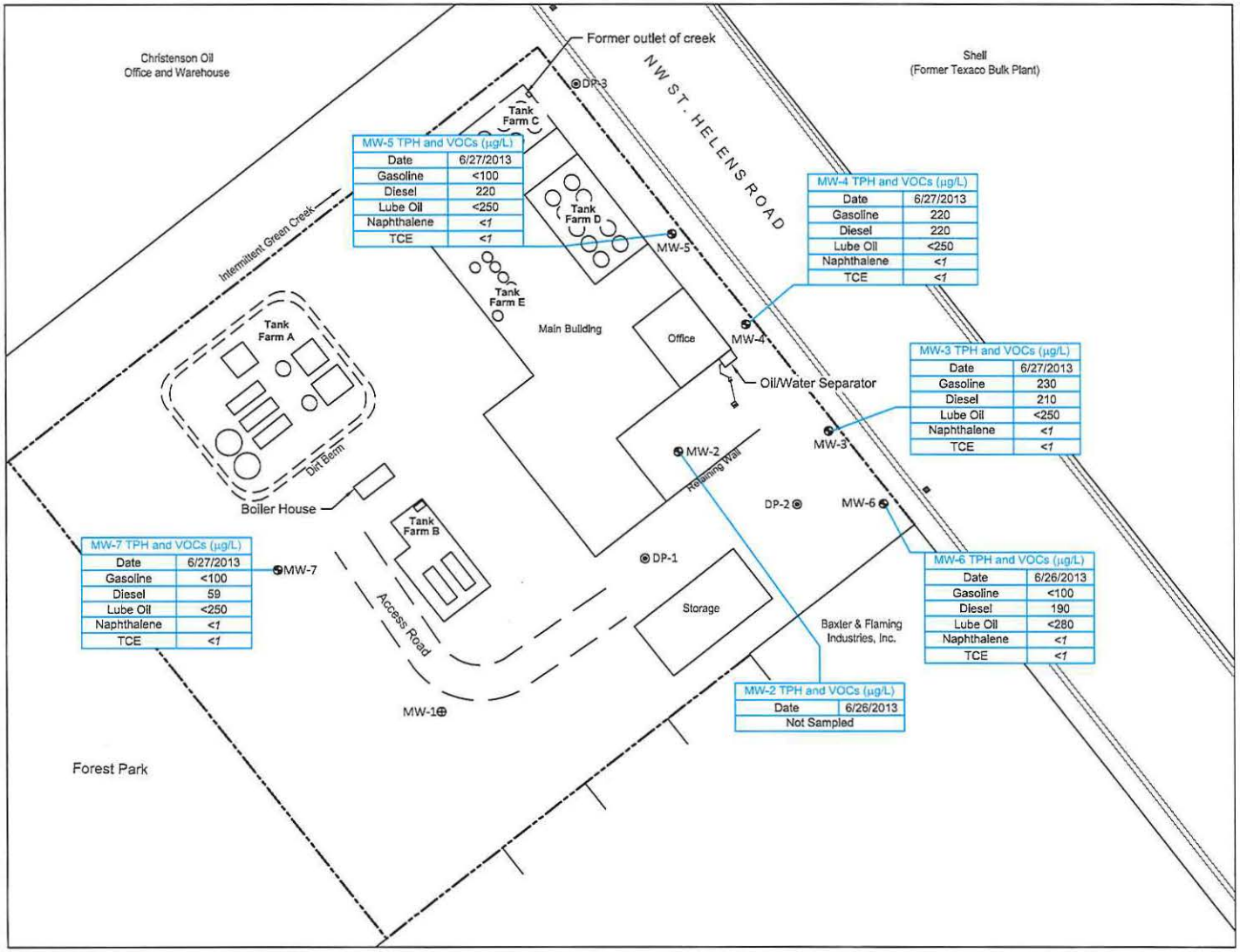
Portland, Oregon

PN: 123-001

Figure 4

Site Plan with Total Metals Concentrations in Groundwater
(June 26 & 27, 2013)

9/18/2013 Drafting \\PACIFIC-8E185AF\public\Project Files\123 Christenson Oil\Figures\123-001-067.dwg FIG 4 June 2013



MW-5 TPH and VOCs (µg/L)	
Date	6/27/2013
Gasoline	<100
Diesel	220
Lube Oil	<250
Naphthalene	<1
TCE	<1

MW-4 TPH and VOCs (µg/L)	
Date	6/27/2013
Gasoline	220
Diesel	220
Lube Oil	<250
Naphthalene	<1
TCE	<1

MW-3 TPH and VOCs (µg/L)	
Date	6/27/2013
Gasoline	230
Diesel	210
Lube Oil	<250
Naphthalene	<1
TCE	<1

MW-7 TPH and VOCs (µg/L)	
Date	6/27/2013
Gasoline	<100
Diesel	59
Lube Oil	<250
Naphthalene	<1
TCE	<1

MW-6 TPH and VOCs (µg/L)	
Date	6/26/2013
Gasoline	<100
Diesel	190
Lube Oil	<280
Naphthalene	<1
TCE	<1

MW-2 TPH and VOCs (µg/L)	
Date	6/26/2013
Not Sampled	

Legend

- Property Boundary
- Street Edge/Curb
- Existing Structure Boundary
- MW-4 Monitoring Well
- Catch Basin
- DP-1 Approximate Location of Soil Boring
- MW-1 Abandoned Well

DEQ Risk Based Concentrations (RBCtw) for Occupational Scenarios	
Gasoline	420 µg/L
Diesel	360 µg/L
Lube Oil	1,100 µg/L

Joint Source Control Strategy Screening Level Values for Portland Harbor Groundwater	
Naphthalene	0.2 µg/L
TCE	0.17 µg/L

DEQ = Oregon Department of Environmental Quality

Bold = concentration exceeding applicable screening level value

TPH = total petroleum hydrocarbons

VOCs = volatile organic compounds

TCE = trichloroethene

µg/L = micrograms per liter

Italics = laboratory practical quantitation limit exceeds screening level value

< = concentration was not detected at or above the laboratory method detection limit

- = not analyzed

Note: Well MW-2 not sampled due to presence of free product.

N

0 50

Approximate Scale in Feet

PACIFIC CREST ENVIRONMENTAL
WWW.PCENV.COM 425-888-4990

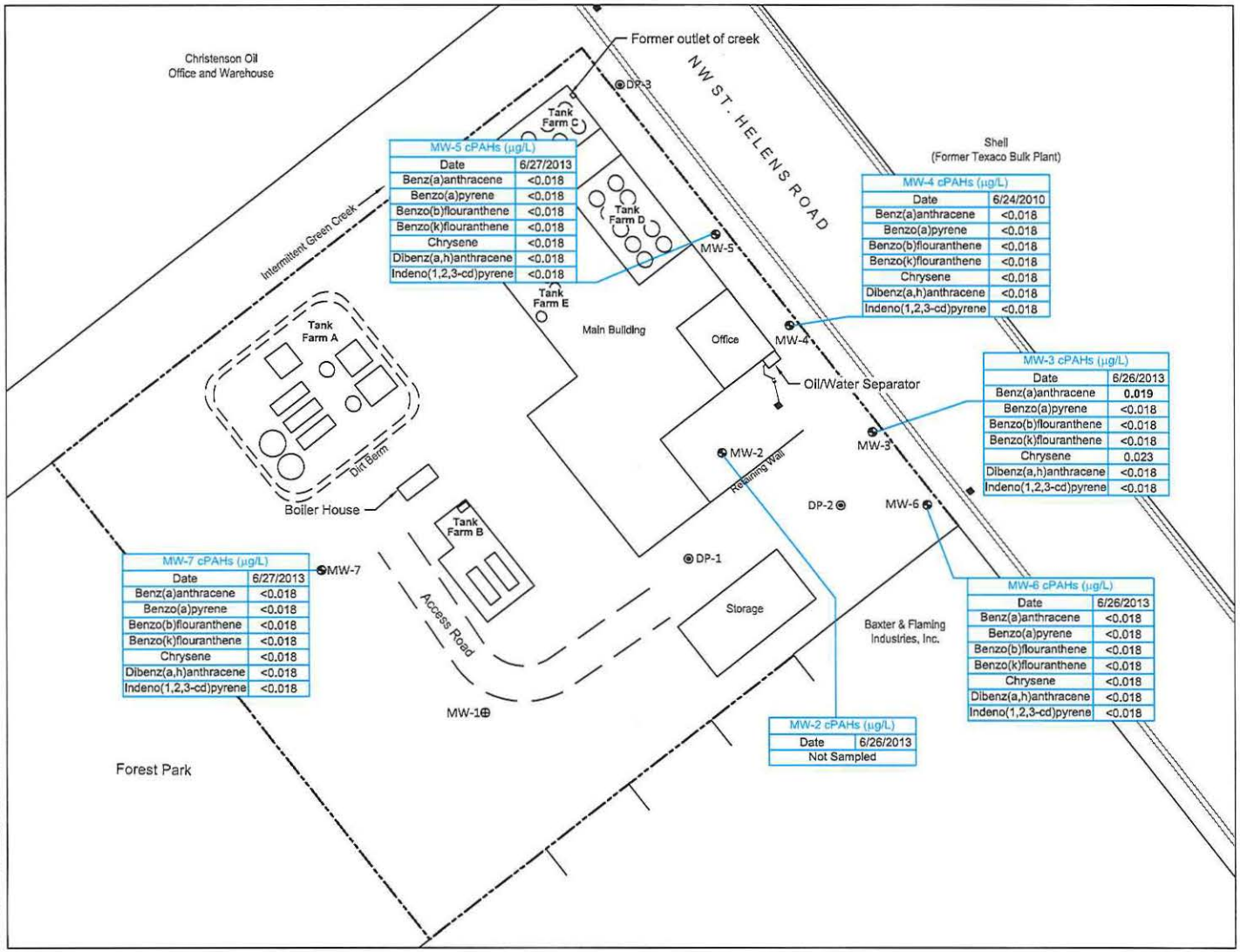
Christenson Oil Company
3821 N.W. St. Helens Road
Portland, Oregon

PN: 123-001

Figure 5

Site Plan with TPH and VOCs Concentrations in Groundwater
(June 26 & 27, 2013)

9/18/2013 Drafting \\PACIFIC-8E185AF\public\Project Files\123 Christenson Oil\Figures\123-001-070.dwg FIG 5 June 2013



MW-5 cPAHs (µg/L)	
Date	6/27/2013
Benz(a)anthracene	<0.018
Benzo(a)pyrene	<0.018
Benzo(b)flouranthene	<0.018
Benzo(k)flouranthene	<0.018
Chrysene	<0.018
Dibenz(a,h)anthracene	<0.018
Indeno(1,2,3-cd)pyrene	<0.018

MW-4 cPAHs (µg/L)	
Date	6/24/2010
Benz(a)anthracene	<0.018
Benzo(a)pyrene	<0.018
Benzo(b)flouranthene	<0.018
Benzo(k)flouranthene	<0.018
Chrysene	<0.018
Dibenz(a,h)anthracene	<0.018
Indeno(1,2,3-cd)pyrene	<0.018

MW-3 cPAHs (µg/L)	
Date	6/26/2013
Benz(a)anthracene	**0.019**
Benzo(a)pyrene	<0.018
Benzo(b)flouranthene	<0.018
Benzo(k)flouranthene	<0.018
Chrysene	0.023
Dibenz(a,h)anthracene	<0.018
Indeno(1,2,3-cd)pyrene	<0.018

MW-7 cPAHs (µg/L)	
Date	6/27/2013
Benz(a)anthracene	<0.018
Benzo(a)pyrene	<0.018
Benzo(b)flouranthene	<0.018
Benzo(k)flouranthene	<0.018
Chrysene	<0.018
Dibenz(a,h)anthracene	<0.018
Indeno(1,2,3-cd)pyrene	<0.018

MW-6 cPAHs (µg/L)	
Date	6/26/2013
Benz(a)anthracene	<0.018
Benzo(a)pyrene	<0.018
Benzo(b)flouranthene	<0.018
Benzo(k)flouranthene	<0.018
Chrysene	<0.018
Dibenz(a,h)anthracene	<0.018
Indeno(1,2,3-cd)pyrene	<0.018

MW-2 cPAHs (µg/L)	
Date	6/26/2013
Not Sampled	

Legend

- Property Boundary
- Street Edge/Curb
- Existing Structure Boundary
- MW-4 Monitoring Well
- Catch Basin
- DP-1 Approximate Location of Soil Boring
- MW-1 Abandoned Well

Joint Source Control Strategy Screening Level Values for Portland Harbor Groundwater	
Benz(a)anthracene	0.018 µg/L
Benzo(a)pyrene	
Benzo(b)flouranthene	
Benzo(k)flouranthene	
Chrysene	
Dibenz(a,h)anthracene	
Indeno(1,2,3-cd)pyrene	

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

Bold = concentration exceeding applicable screening level value

µg/L = micrograms per liter

< = concentration was not detected at or above the laboratory method detection limit

Note: Well MW-2 not sampled due to presence of free product.

N

0 50
Approximate Scale in Feet

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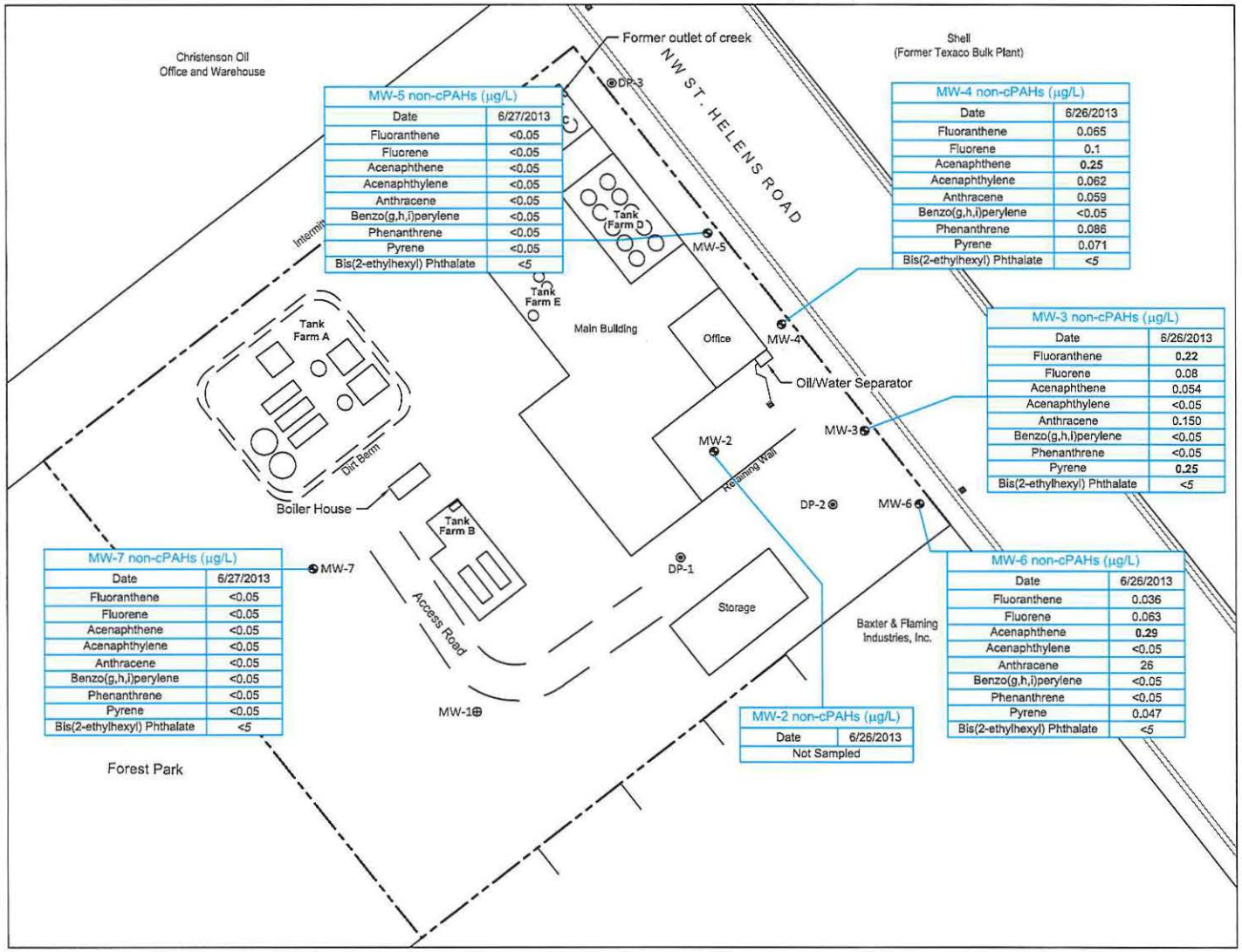
Portland, Oregon

PN: 123-001

Figure 6

Site Plan with cPAH Concentrations in Groundwater
(June 26 & 27, 2013)

9/18/2013 Drafting \\PACIFIC-8E185AF\public\Project Files\123 Christenson Oil\Figures\123-001-072.dwg FIG 6 - June 2013



MW-5 non-cPAHs (µg/L)	
Date	6/27/2013
Fluoranthene	<0.05
Fluorene	<0.05
Acenaphthene	<0.05
Acenaphthylene	<0.05
Anthracene	<0.05
Benzo(g,h,i)perylene	<0.05
Phenanthrene	<0.05
Pyrene	<0.05
Bis(2-ethylhexyl) Phthalate	<5

MW-4 non-cPAHs (µg/L)	
Date	6/26/2013
Fluoranthene	0.065
Fluorene	0.1
Acenaphthene	**0.25**
Acenaphthylene	0.062
Anthracene	0.059
Benzo(g,h,i)perylene	<0.05
Phenanthrene	0.086
Pyrene	0.071
Bis(2-ethylhexyl) Phthalate	<5

MW-3 non-cPAHs (µg/L)	
Date	6/26/2013
Fluoranthene	**0.22**
Fluorene	0.08
Acenaphthene	0.054
Acenaphthylene	<0.05
Anthracene	0.150
Benzo(g,h,i)perylene	<0.05
Phenanthrene	<0.05
Pyrene	**0.25**
Bis(2-ethylhexyl) Phthalate	<5

MW-7 non-cPAHs (µg/L)	
Date	6/27/2013
Fluoranthene	<0.05
Fluorene	<0.05
Acenaphthene	<0.05
Acenaphthylene	<0.05
Anthracene	<0.05
Benzo(g,h,i)perylene	<0.05
Phenanthrene	<0.05
Pyrene	<0.05
Bis(2-ethylhexyl) Phthalate	<5

MW-6 non-cPAHs (µg/L)	
Date	6/26/2013
Fluoranthene	0.036
Fluorene	0.063
Acenaphthene	**0.29**
Acenaphthylene	<0.05
Anthracene	26
Benzo(g,h,i)perylene	<0.05
Phenanthrene	<0.05
Pyrene	0.047
Bis(2-ethylhexyl) Phthalate	<5

MW-2 non-cPAHs (µg/L)	
Date	6/26/2013
Not Sampled	

Legend

- Property Boundary
- Street Edge/Curb
- Existing Structure Boundary
- MW-4 Monitoring Well
- Catch Basin
- DP-1 Approximate Location of Soil Boring
- MW-1 Abandoned Well

Joint Source Control Strategy Screening Levels for Portland Harbor Groundwater	
Fluoranthene	0.2 µg/L
Fluorene	
Acenaphthene	
Acenaphthylene	
Anthracene	
Benzo(g,h,i)perylene	
Phenanthrene	
Pyrene	
Bis(2-ethylhexyl) Phthalate	2.2 µg/L

non-cPAHs = non-carcinogenic polycyclic aromatic hydrocarbons

SVOC = semivolatile organic compound

Bold = concentration exceeding applicable screening level value

µg/L = micrograms per liter

Italics = laboratory practical quantitation limit exceeds screening level value

< = concentration was not detected at or above the laboratory detection limit

Note: Well MW-2 not sampled due to presence of free product.

N

0 50
Approximate Scale in Feet

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Figure 7

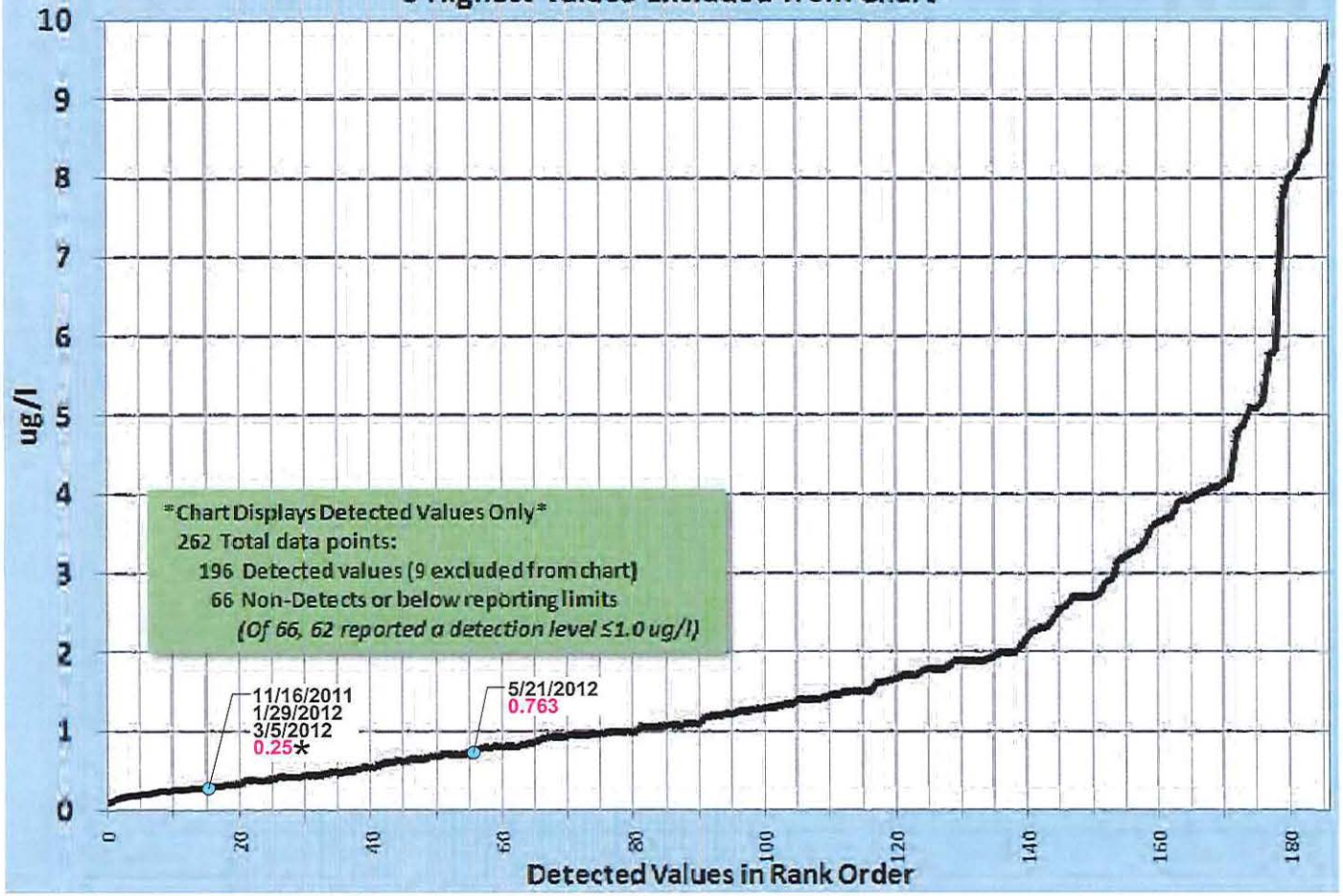
Site Plan with non-cPAH and SVOC Concentrations in Groundwater
(June 26 & 27, 2013))

9/18/2013 Drafting \\PACIFIC-8E185AF\public\Project Files\123 Christenson Oil\Figures\123-001-074.dwg FIG 7 June 2013

Figure 8a

Arsenic (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites

9 Highest Values Excluded from Chart



Legend

µg/l	micrograms per liter
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
5/21/2012	sample date
0.763	result

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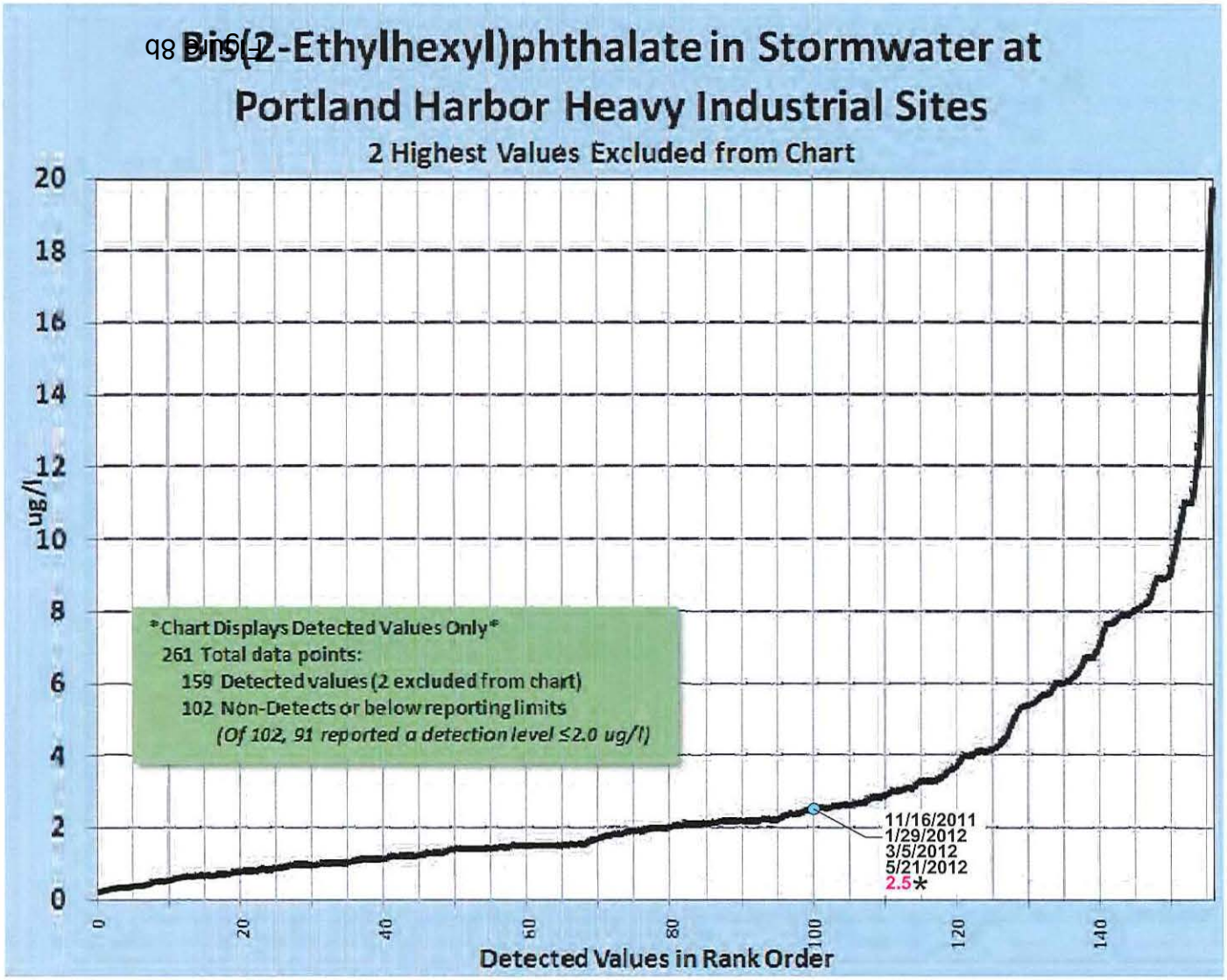
Arsenic in Stormwater

9/29/2014 Drafting 123-001-095.dwg Ar



Legend

µg/l micrograms per liter

* Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit

5/21/2012 sample date
2.5* result

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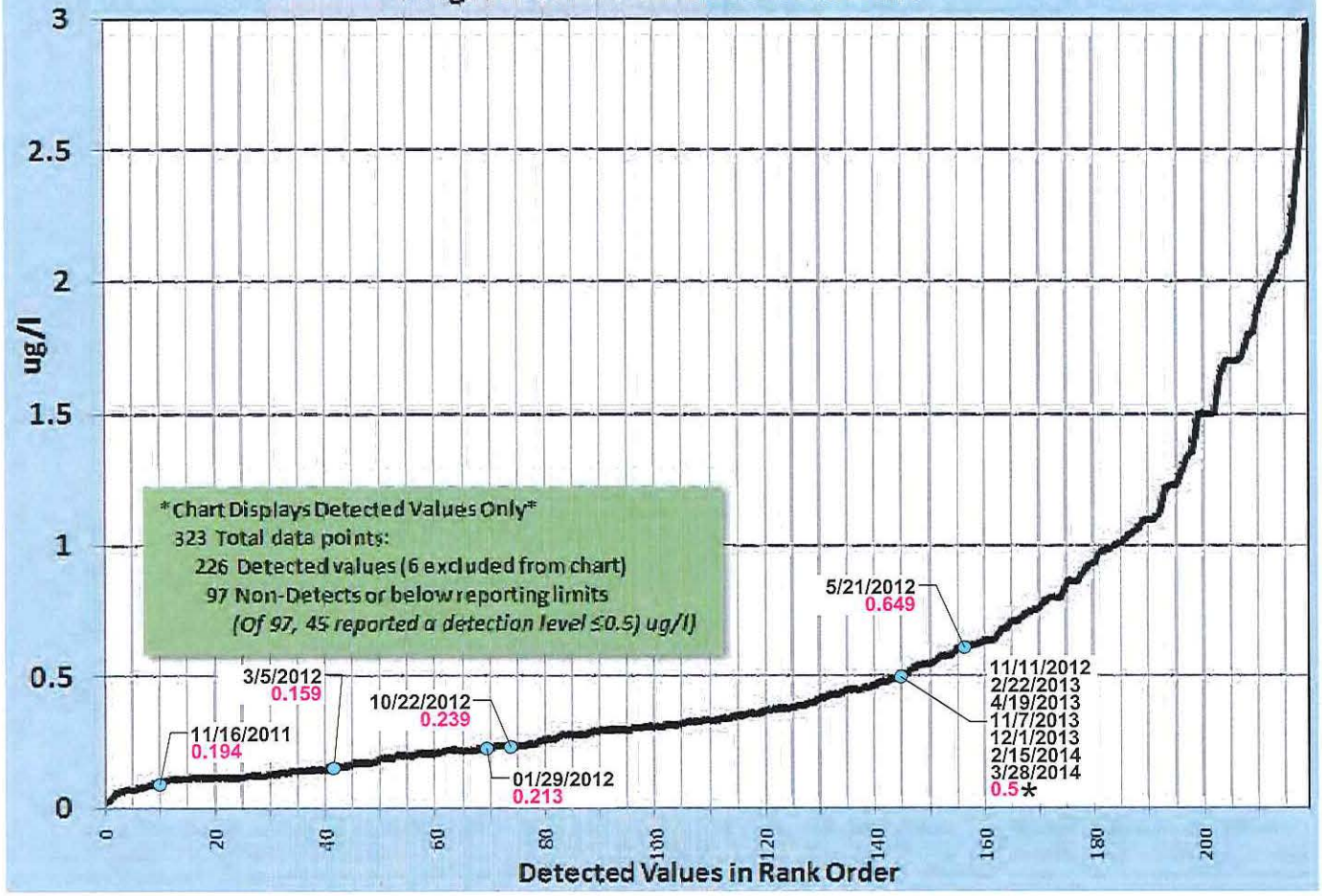
Bis(2-ethylhexyl)phthalate in Stormwater

10/23/2014 Drafting 123-001-095.dwg Bis 2-e

Figure 8c

Cadmium (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites

6 Highest Values Excluded from Chart



Legend

µg/l micrograms per liter

* Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit

10/22/2012 sample date
0.239 result

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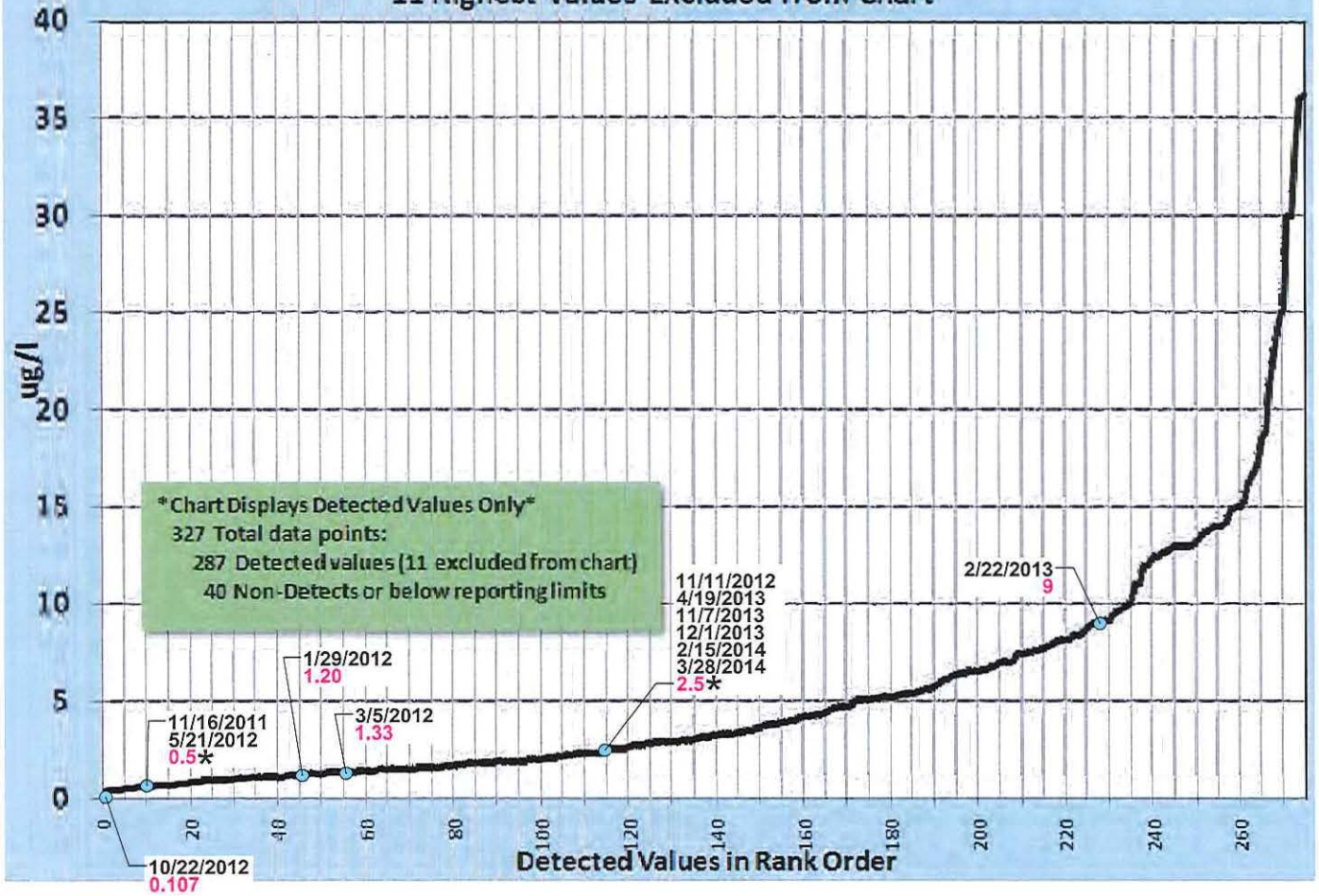
Cadmium in Stormwater

10/23/2014 Drafting 123-001-095.dwg Cd

Figure 8d

Chromium (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites

11 Highest Values Excluded from Chart



Legend

µg/l	micrograms per liter
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
2/22/2013	sample date
9	result

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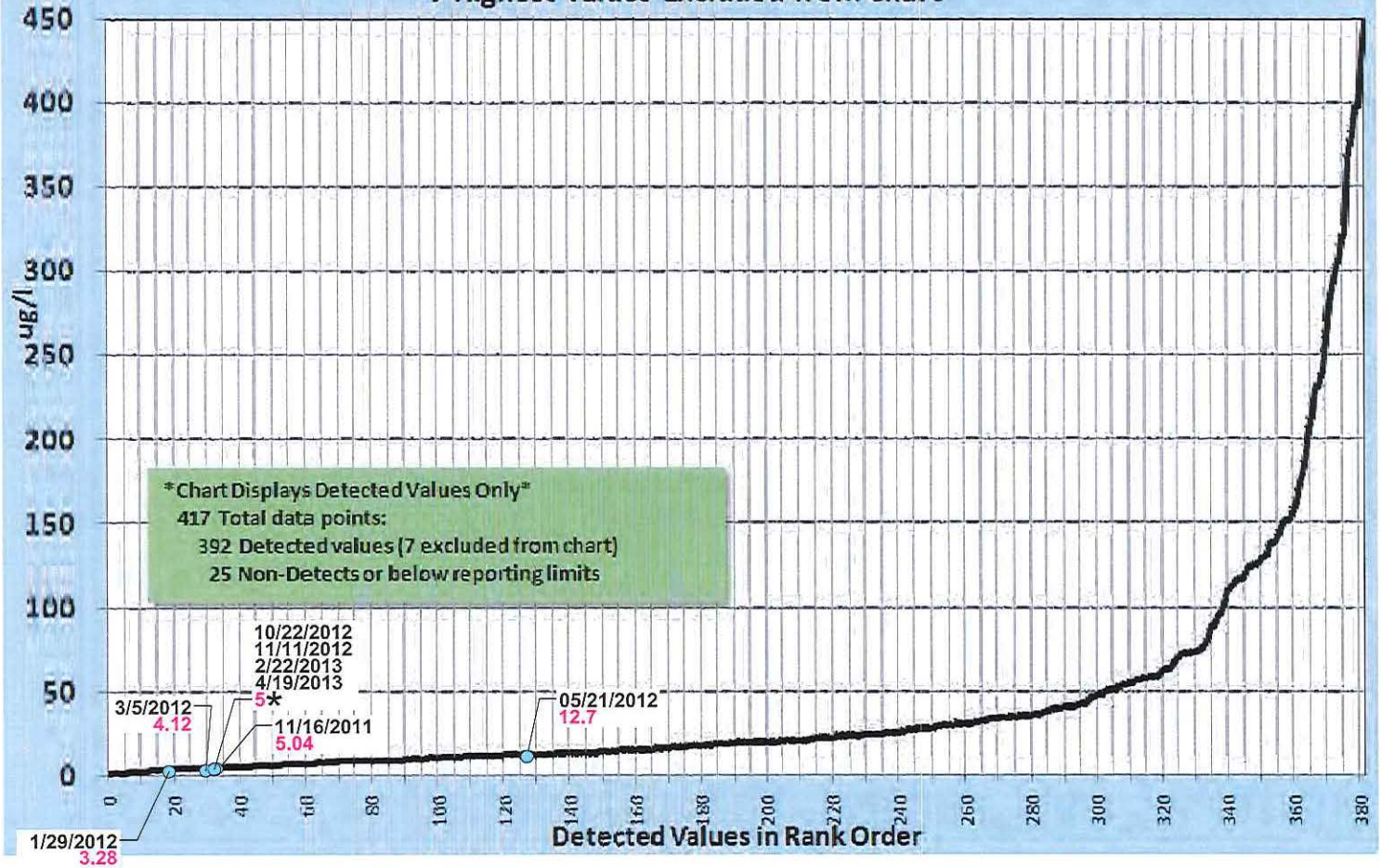
Chromium in Stormwater

10/23/2014 Drafting 123-001-095.dwg Cr

Figure 8e

Copper (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites

7 Highest Values Excluded from Chart



Legend

µg/l	micrograms per liter
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
05/21/2012	sample date
12.7	result

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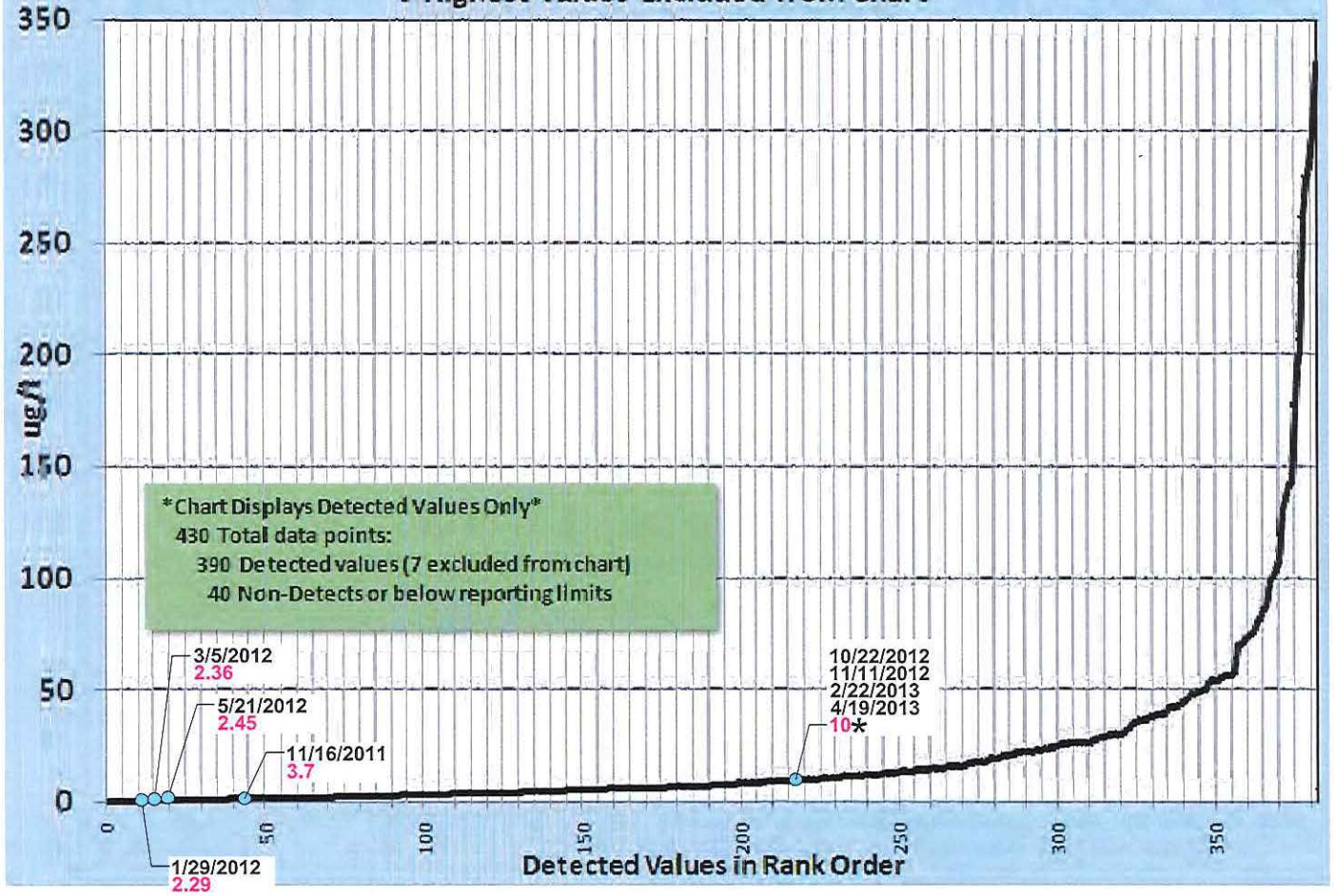
Copper in Stormwater

10/23/2014 Drafting 123-001-095.dwg Cu

Figure 8f

Lead (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites

7 Highest Values Excluded from Chart



Legend

µg/l	micrograms per liter
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
5/21/2012	sample date
2.45	result

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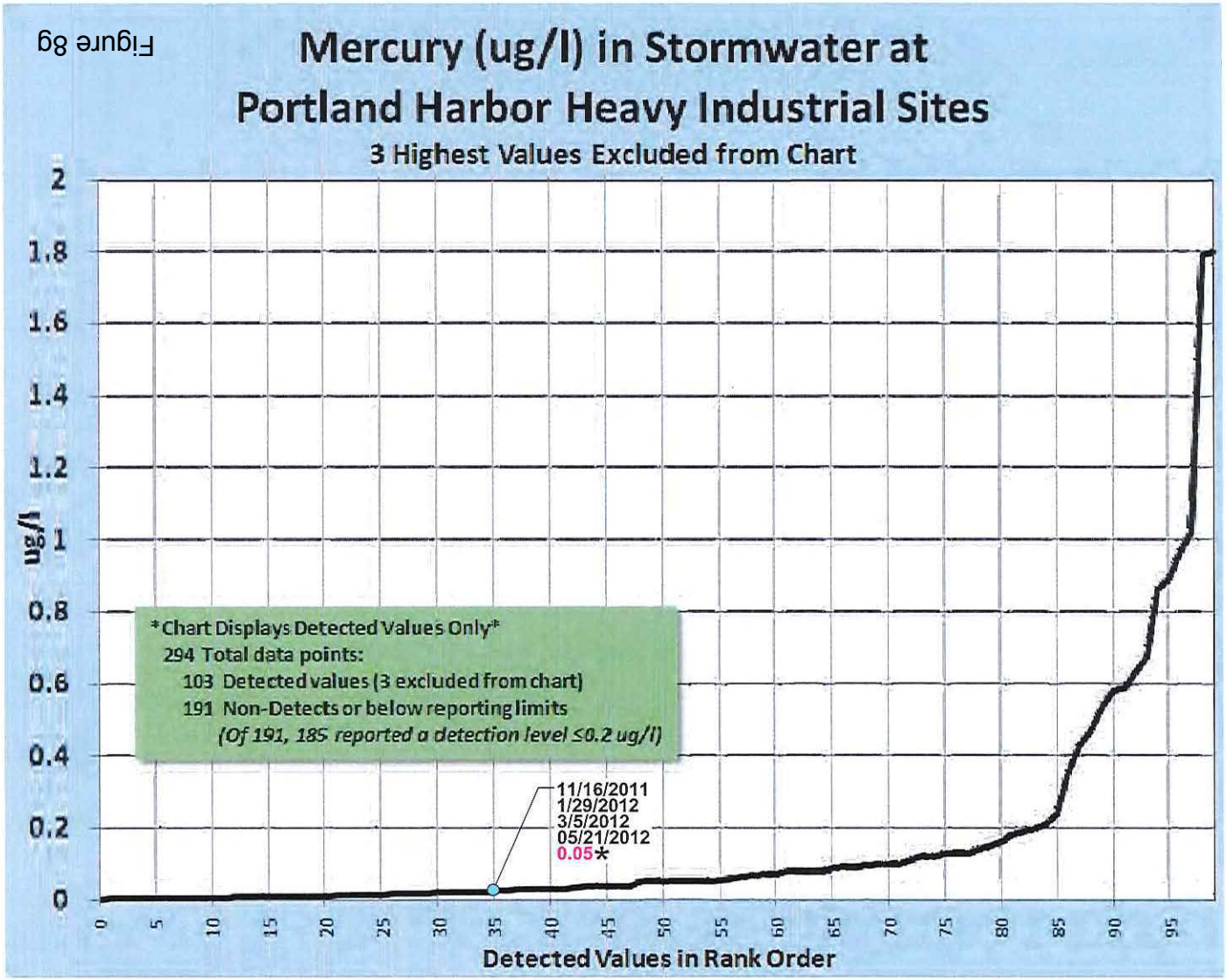
Lead in Stormwater

10/23/2014 Drafting 123-001-095.dwg Pb

Figure 8g



Legend

µg/l micrograms per liter

* Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit

11/16/2011 sample date
0.05* result

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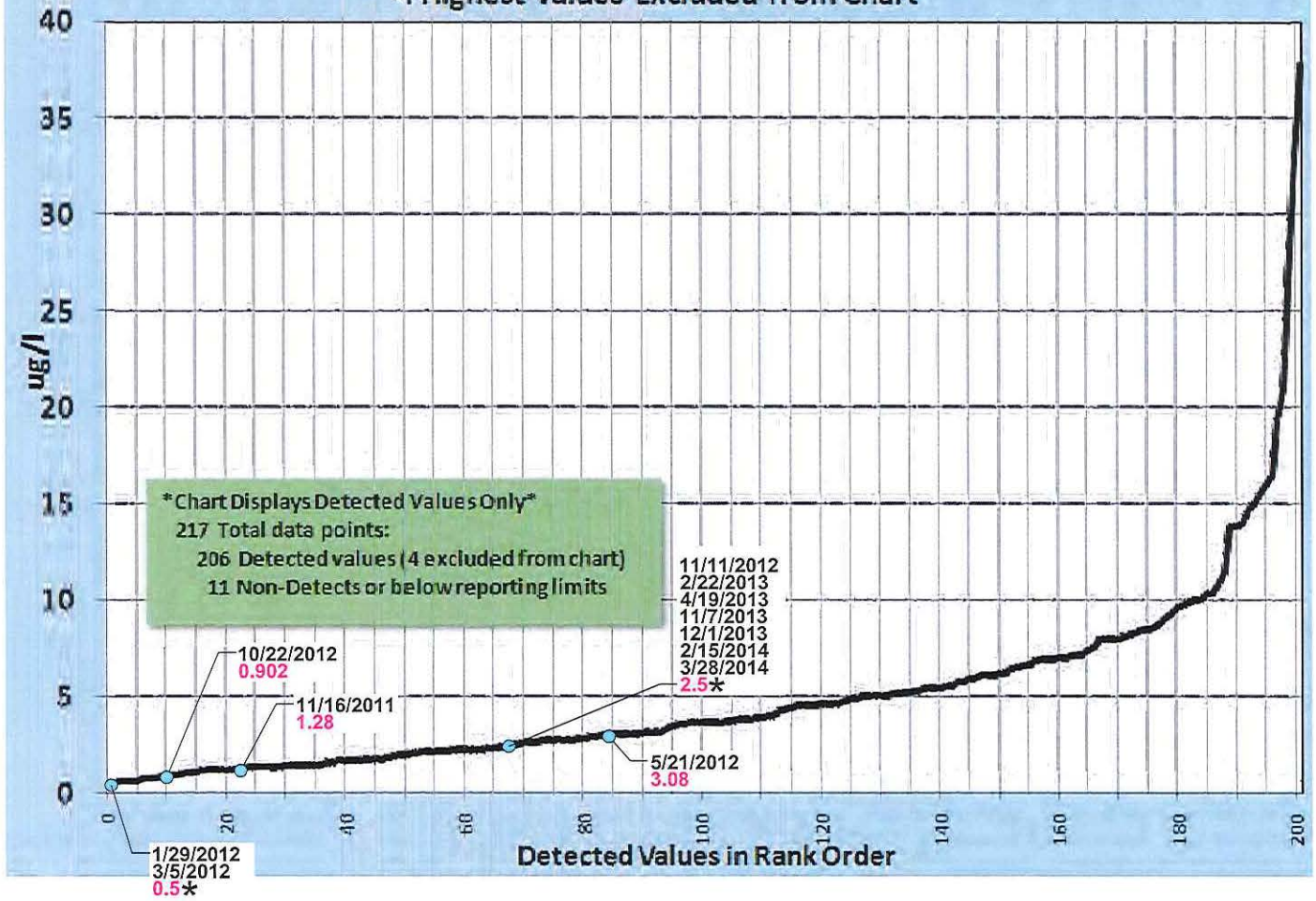
Mercury in Stormwater

10/23/2014 Drafting 123-001-095.dwg Hg

Figure 8h

Nickel (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites

4 Highest Values Excluded from Chart



Legend

µg/l micrograms per liter

* Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit

5/21/2012 sample date
3.08 result

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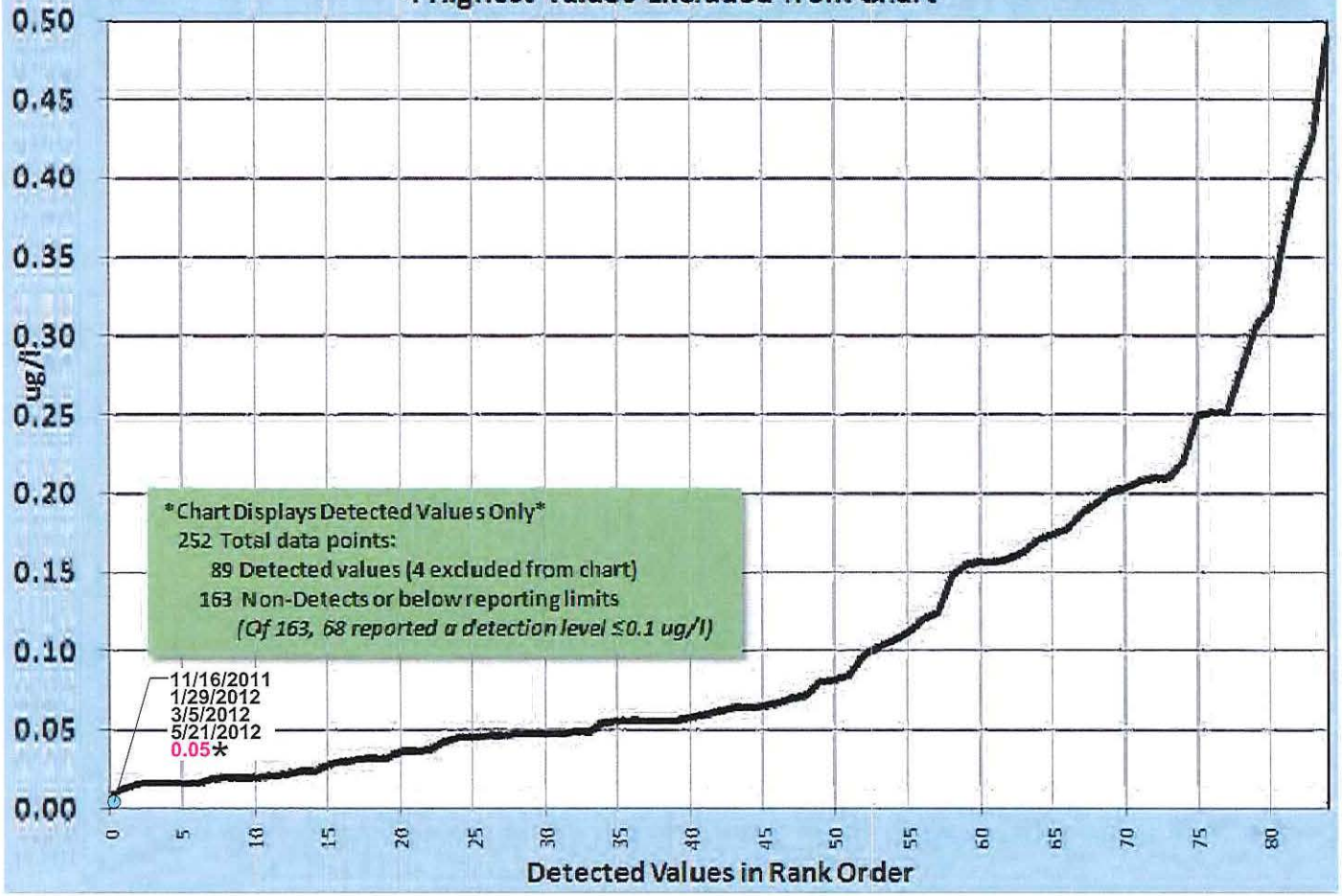
Nickel in Stormwater

10/23/2014 Drafting 123-001-095.dwg Ni

Figure 8i

Silver (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites

4 Highest Values Excluded from Chart



Legend

µg/l micrograms per liter

* Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit

11/16/2011 sample date
0.05* result

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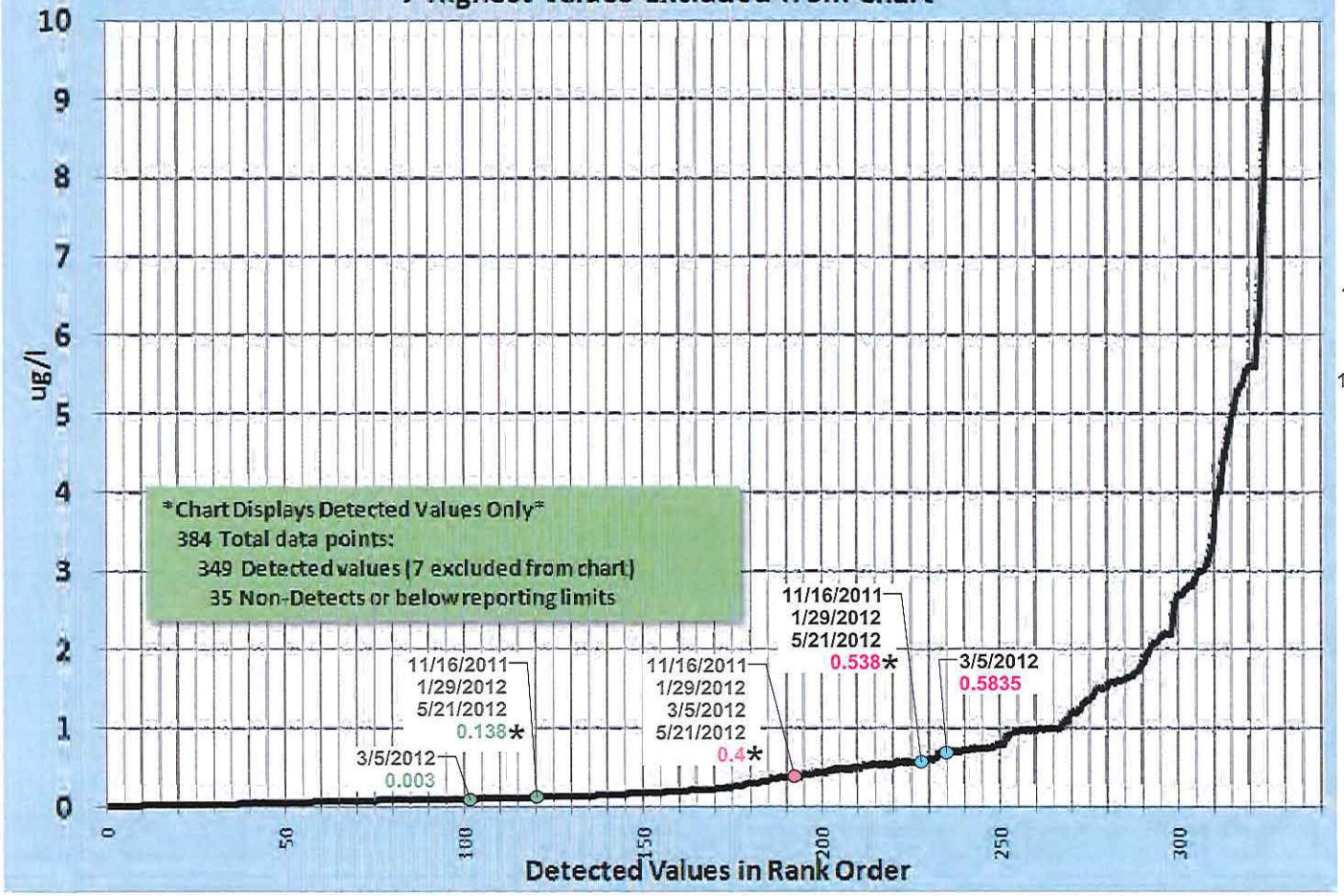
Silver in Stormwater

10/23/2014 Drafting 123-001-095.dwg Ag

Figure 8j

Total PAHs (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites

7 Highest Values Excluded from Chart



Legend

µg/l	micrograms per liter
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
11/16/2011 0.538*	Total PAHs sample date result
11/16/2011 0.138*	Total HPAHs sample date result
3/5/2012 0.003	Total LPAHs sample date result
PAHs	polycyclic aromatic hydrocarbons
HPAHs	heavy polycyclic aromatic hydrocarbons
LPAHs	light polycyclic aromatic hydrocarbons

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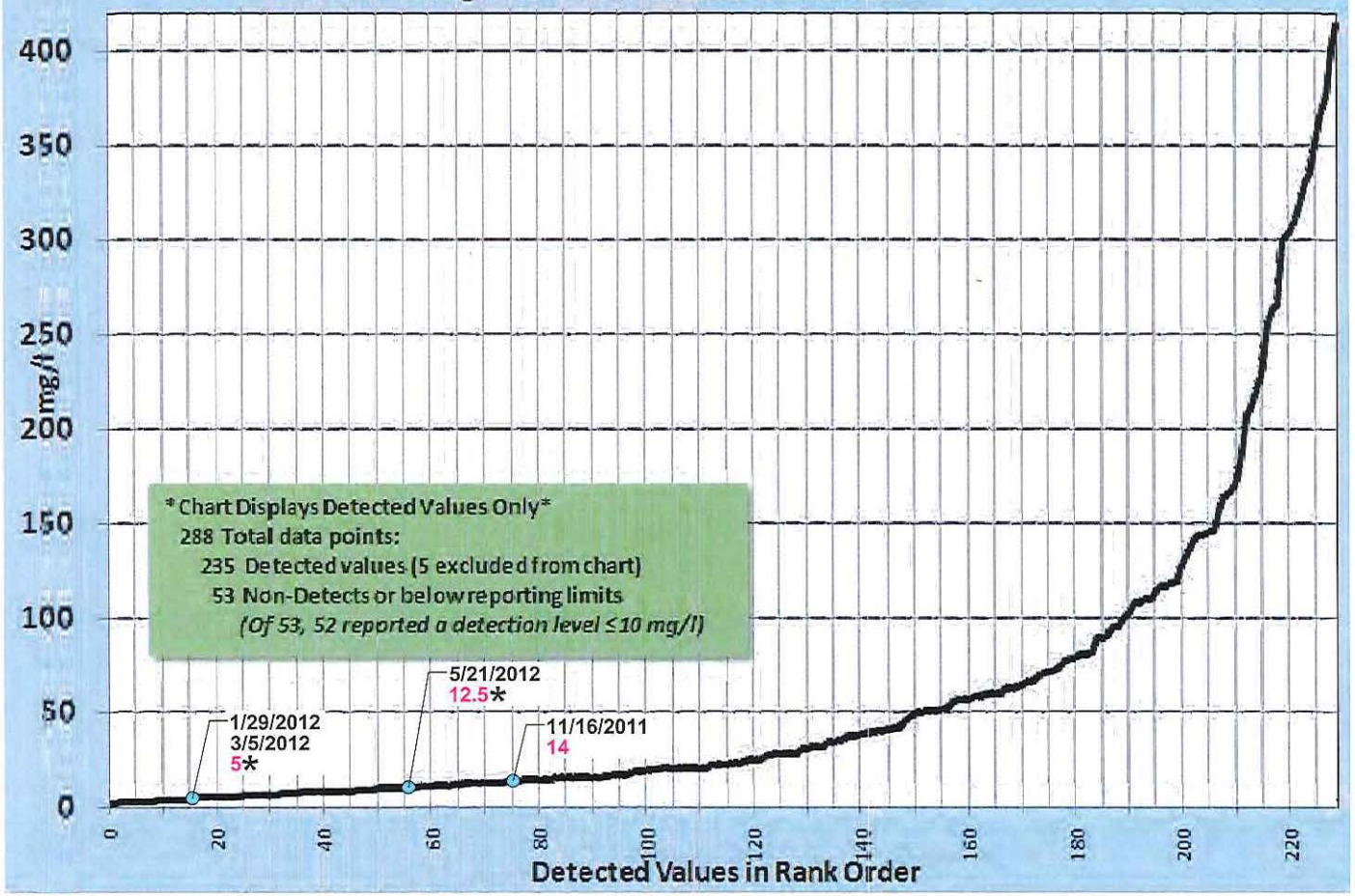
Total PAHs in Stormwater

10/23/2014 Drafting 123-001-095.dwg Total PAHs

Figure 8k

TSS (mg/l) in Stormwater at Portland Harbor Heavy Industrial Sites

5 Highest Values Excluded from Chart



Legend

mg/l	milligrams per liter
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
11/16/2011	sample date
14	result
TSS	total suspended solids

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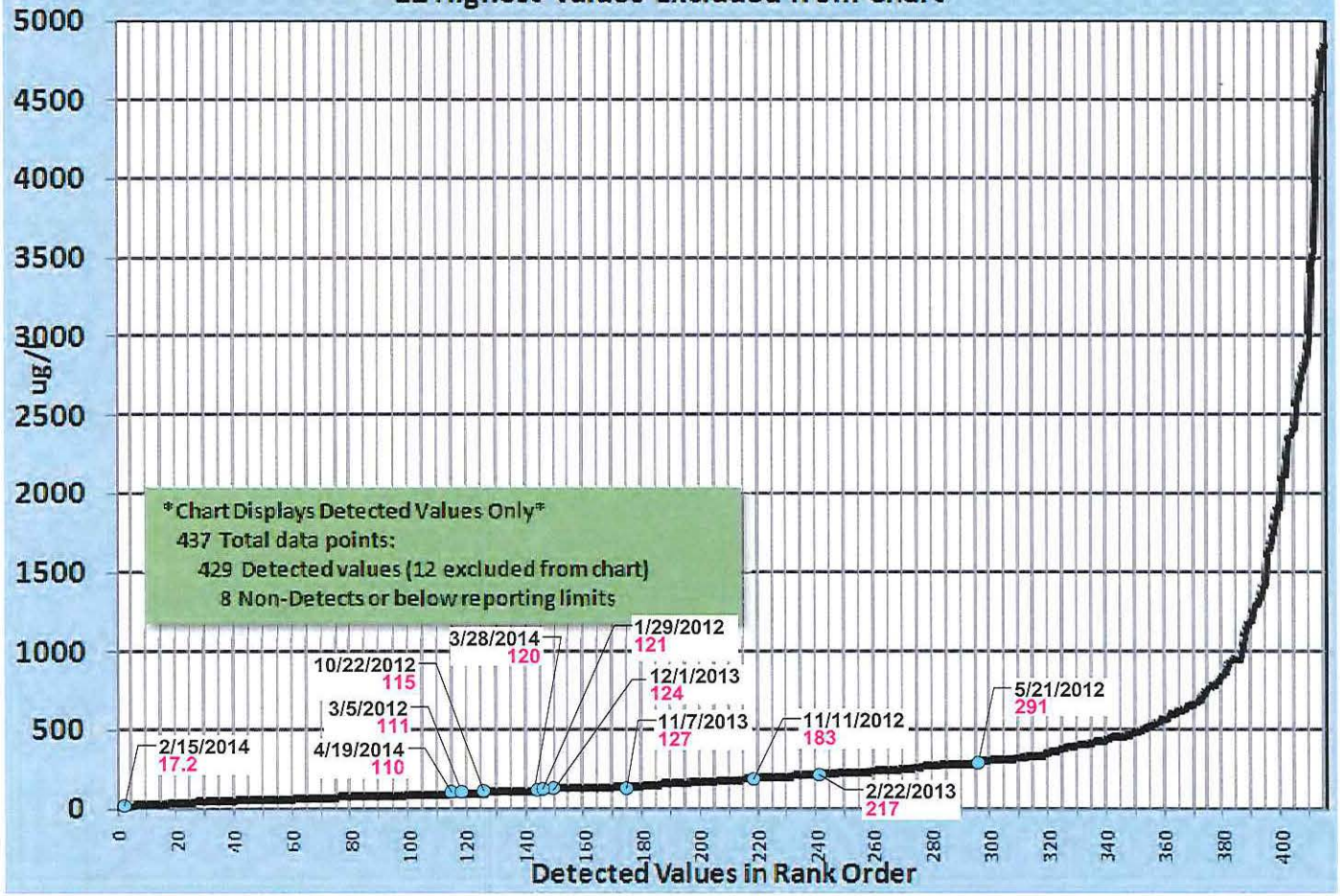
Total TSSs in Stormwater

10/23/2014 Drafting 123-001-095.dwg Total TSS

Figure 8l

Zinc (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites

12 Highest Values Excluded from Chart



Legend

µg/l micrograms per liter

5/21/2012 sample date
291 result

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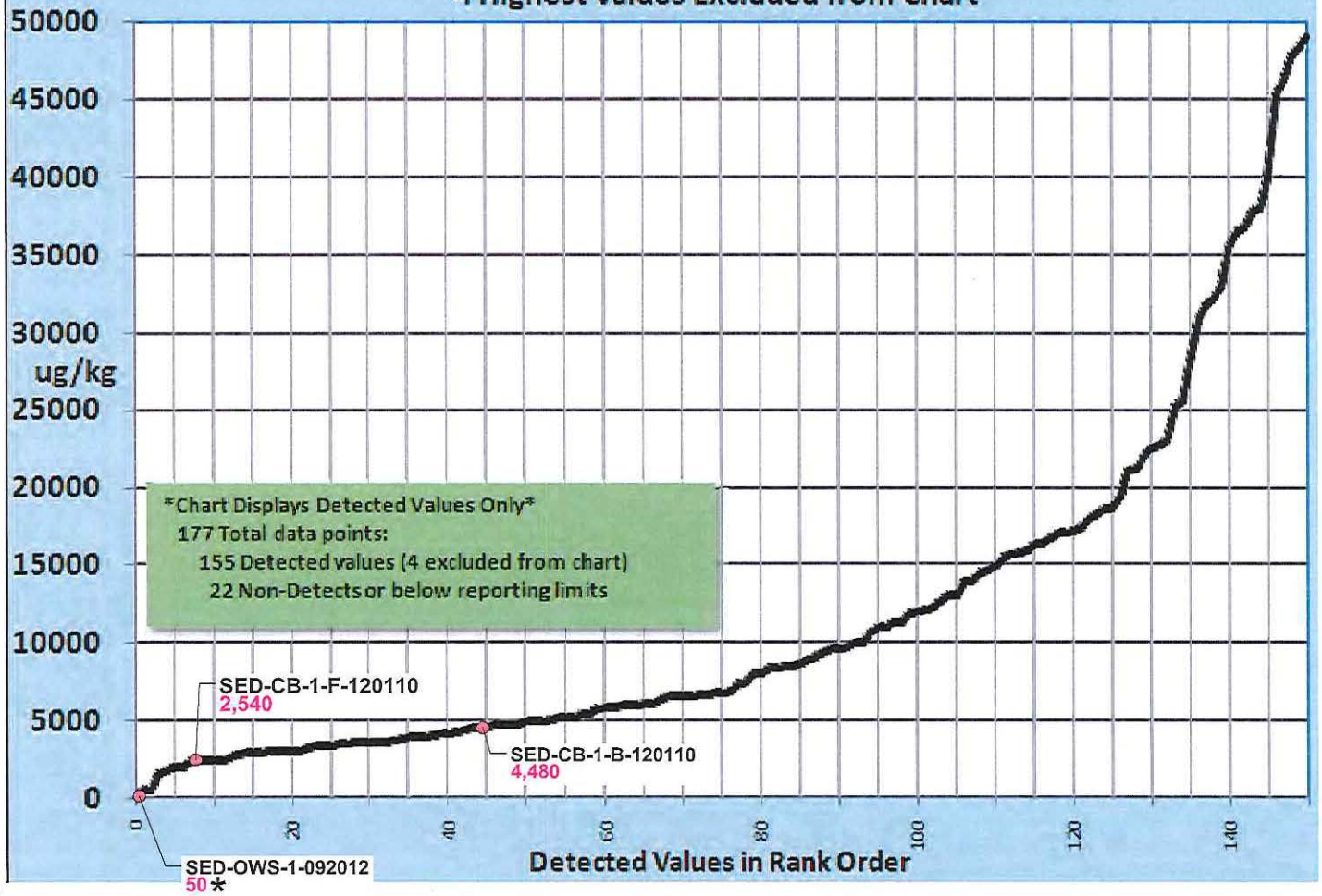
Zinc in Stormwater

10/23/2014 Drafting 123-001-095.dwg Zn

Figure 8m

Arsenic (ug/kg) in Stormwater Sediments at Portland Harbor Heavy Industrial Sites

4 Highest Values Excluded from Chart



Legend

µg/kg	micrograms per kilogram
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
SED-CB-1-B-120110	sample ID
4,480	result

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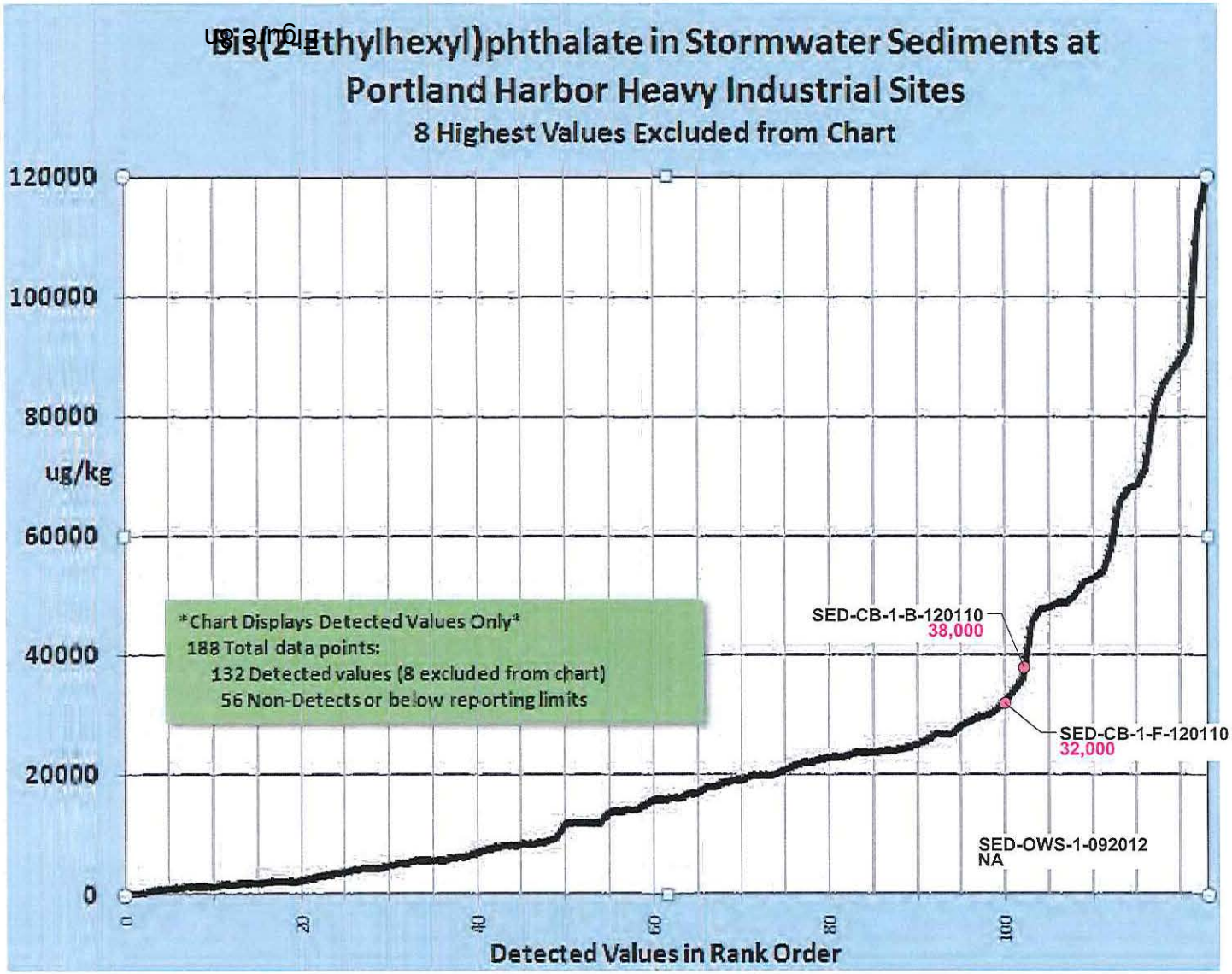
Arsenic in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Ar



Legend

µg/kg	micrograms per kilogram
NA	not analyzed
SED-CB-1-B-120110	sample ID
38,000	result

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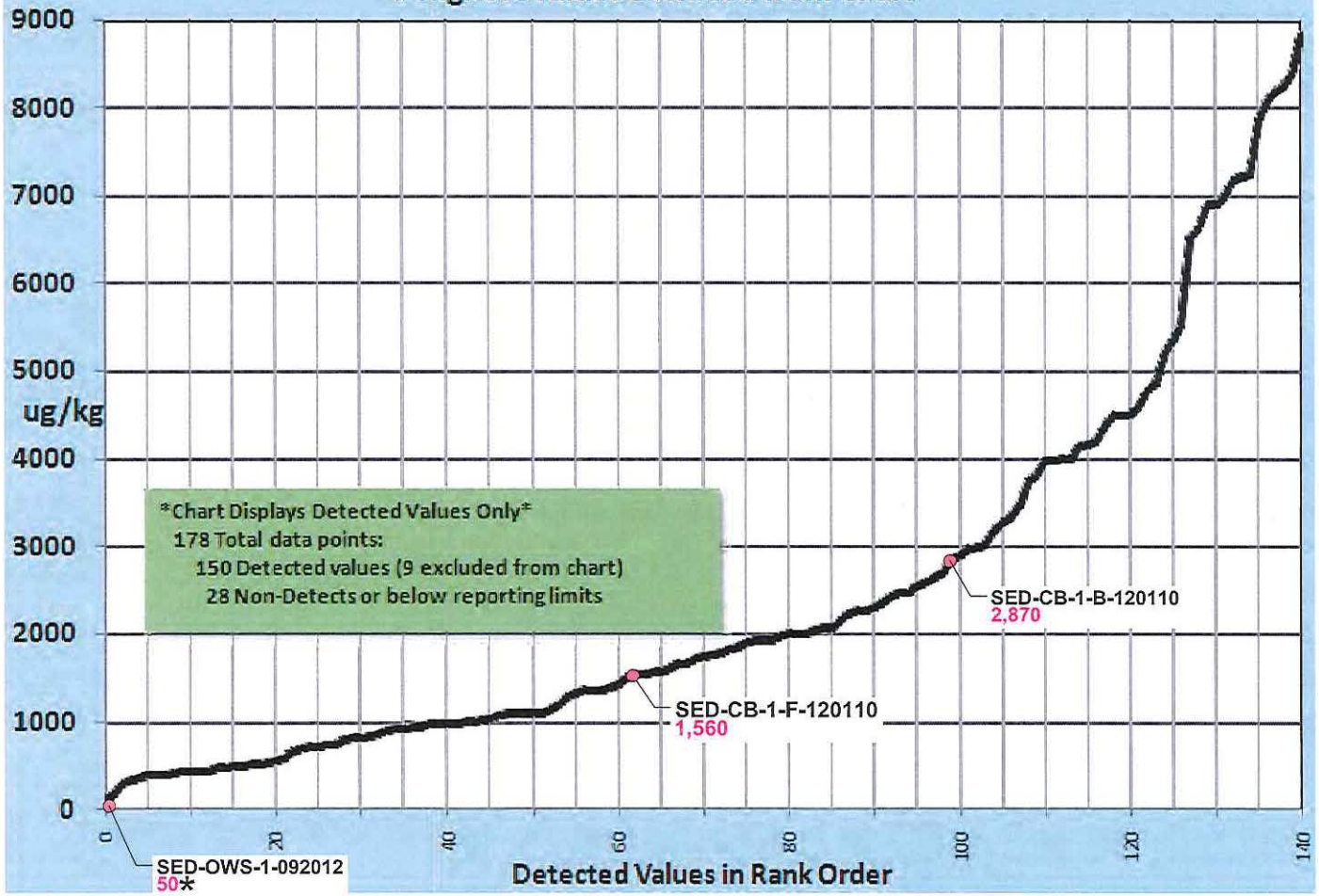
Bis(2-ethylhexyl)phthalate in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Bis 2-e

Figure 8a

Cadmium (ug/kg) in Stormwater Sediments at Portland Harbor Heavy Industrial Sites

9 Highest Values Excluded from Chart



Legend

µg/kg	micrograms per kilogram
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
SED-CB-1-B-120110	sample ID
2,870	result

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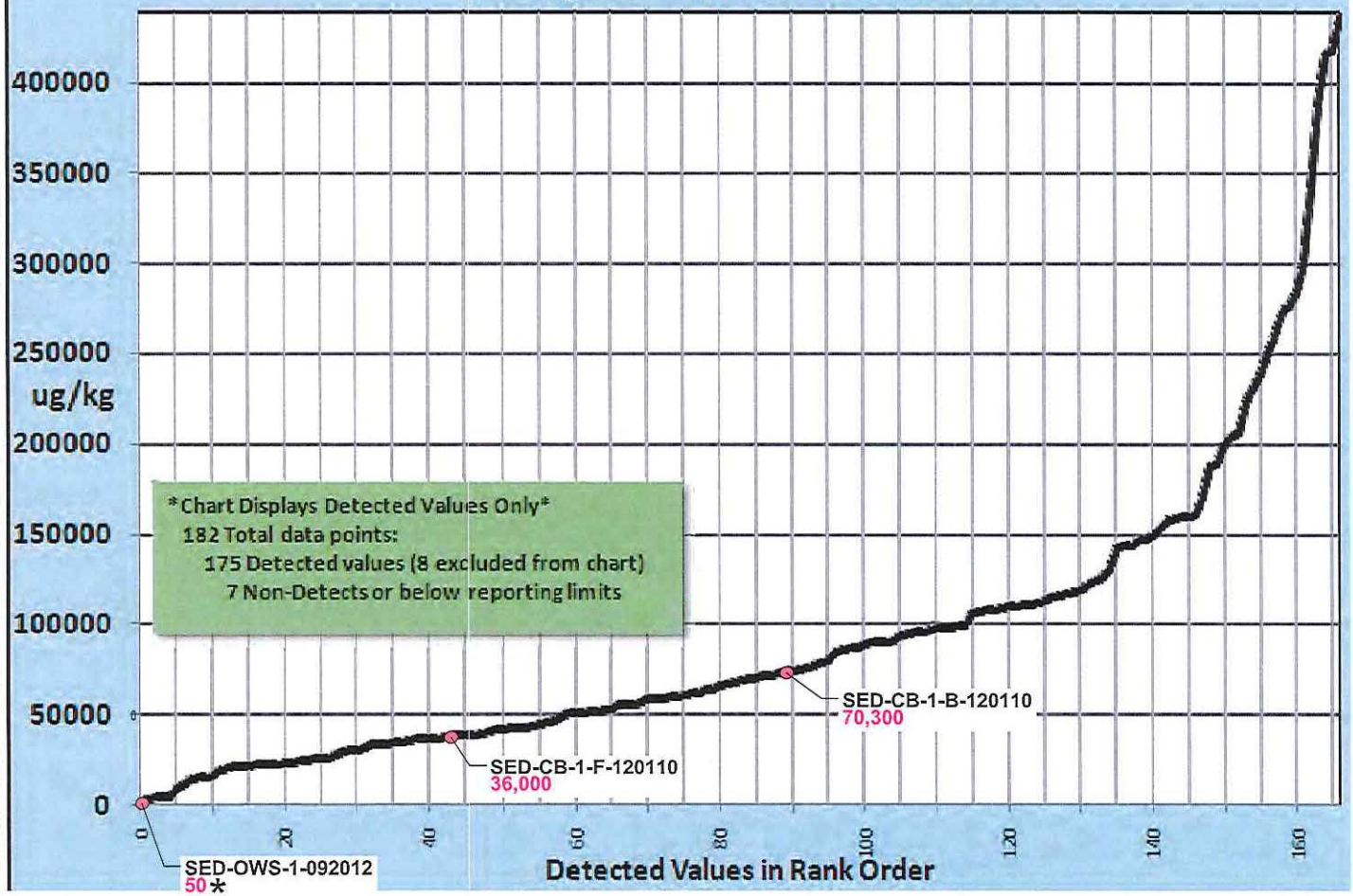
Cadmium in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Cd

Figure 8p

Chromium (ug/kg) in Stormwater Sediments at Portland Harbor Heavy Industrial Sites

8 Highest Values Excluded from Chart



Legend

µg/kg	micrograms per kilogram
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
SED-CB-1-B-120110	sample ID
70,300	result

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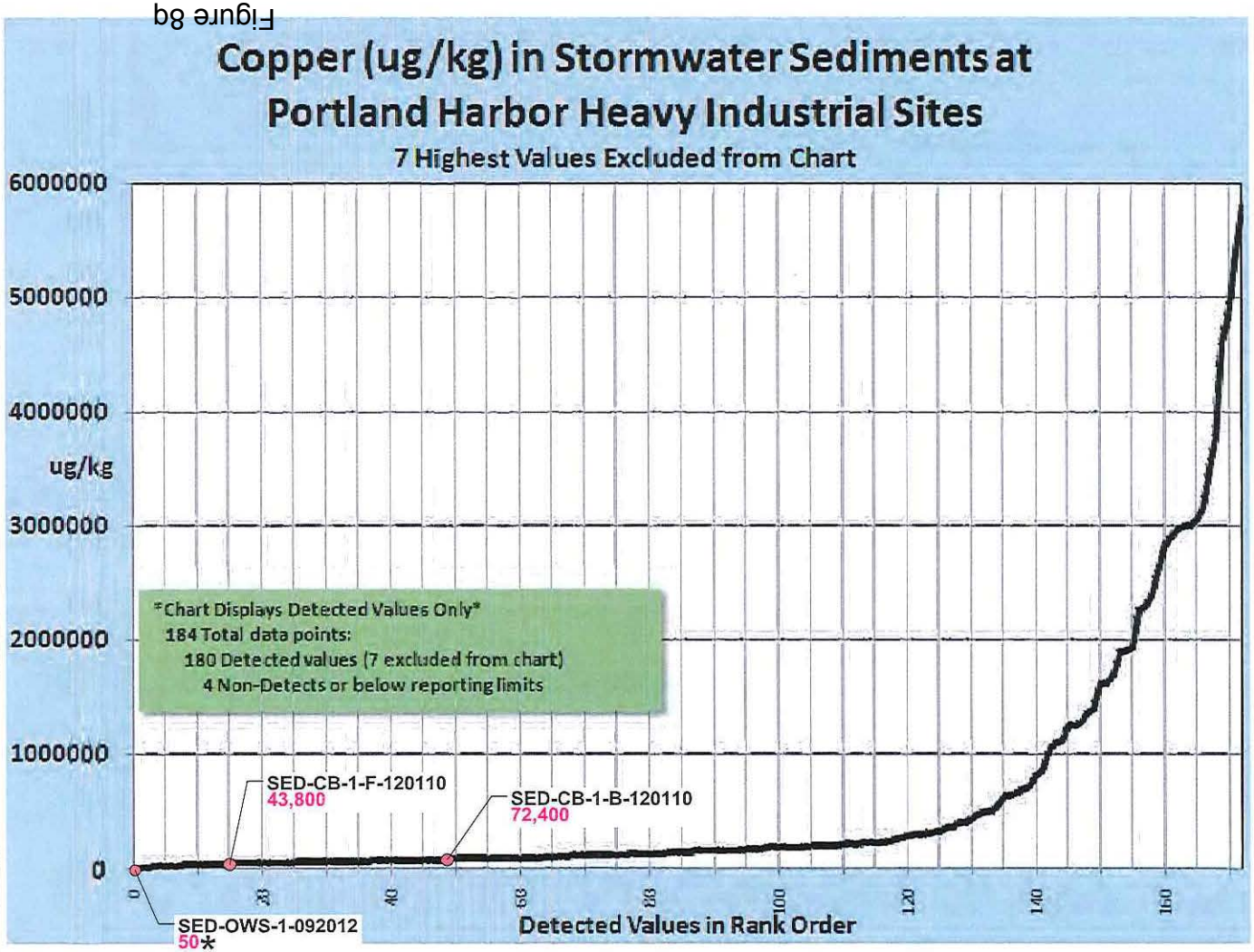
Chromium in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Cr

Figure 8q



Legend

µg/kg	micrograms per kilogram
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
SED-CB-1-B-120110	sample ID
72,400	result

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Copper in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Cu

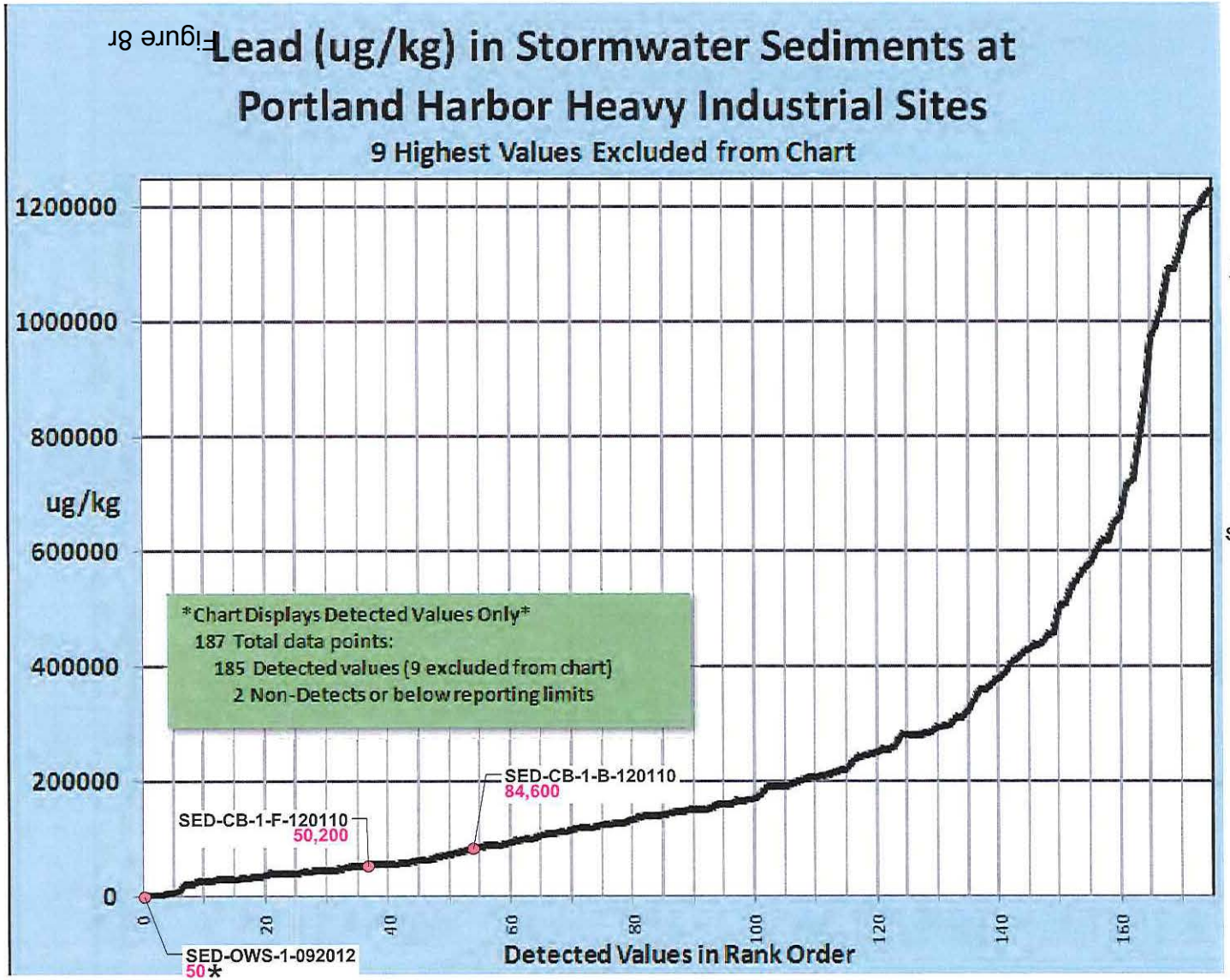

Figure 8r

Legend

µg/kg	micrograms per kilogram
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
SED-CB-1-B-120110	sample ID
84,600	result

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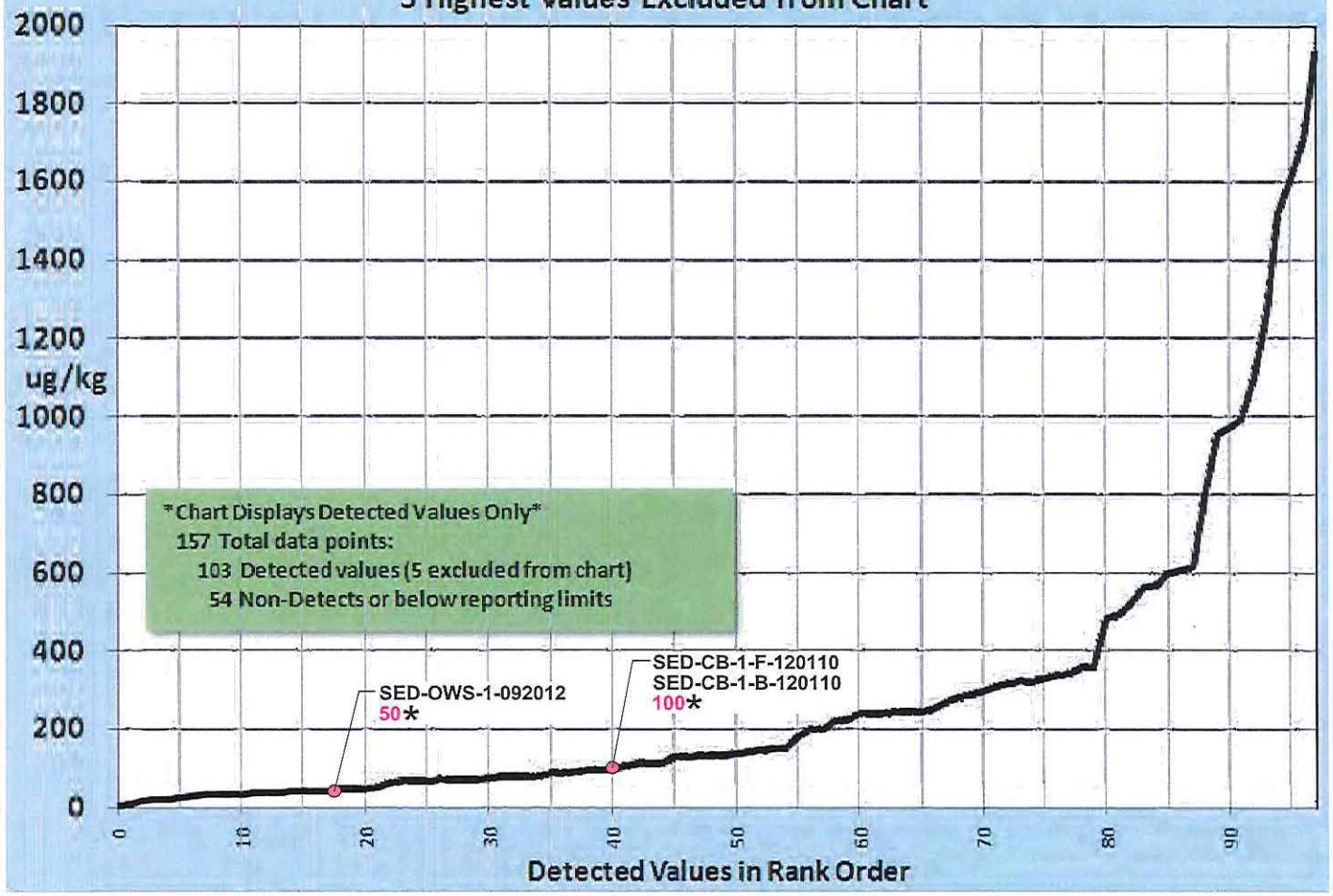
Lead in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Pb

Figure 8s

Mercury (ug/kg) in Stormwater Sediments at Portland Harbor Heavy Industrial Sites

5 Highest Values Excluded from Chart



Legend

µg/kg	micrograms per kilogram
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
SED-CB-1-B-120110	sample ID
50*	result

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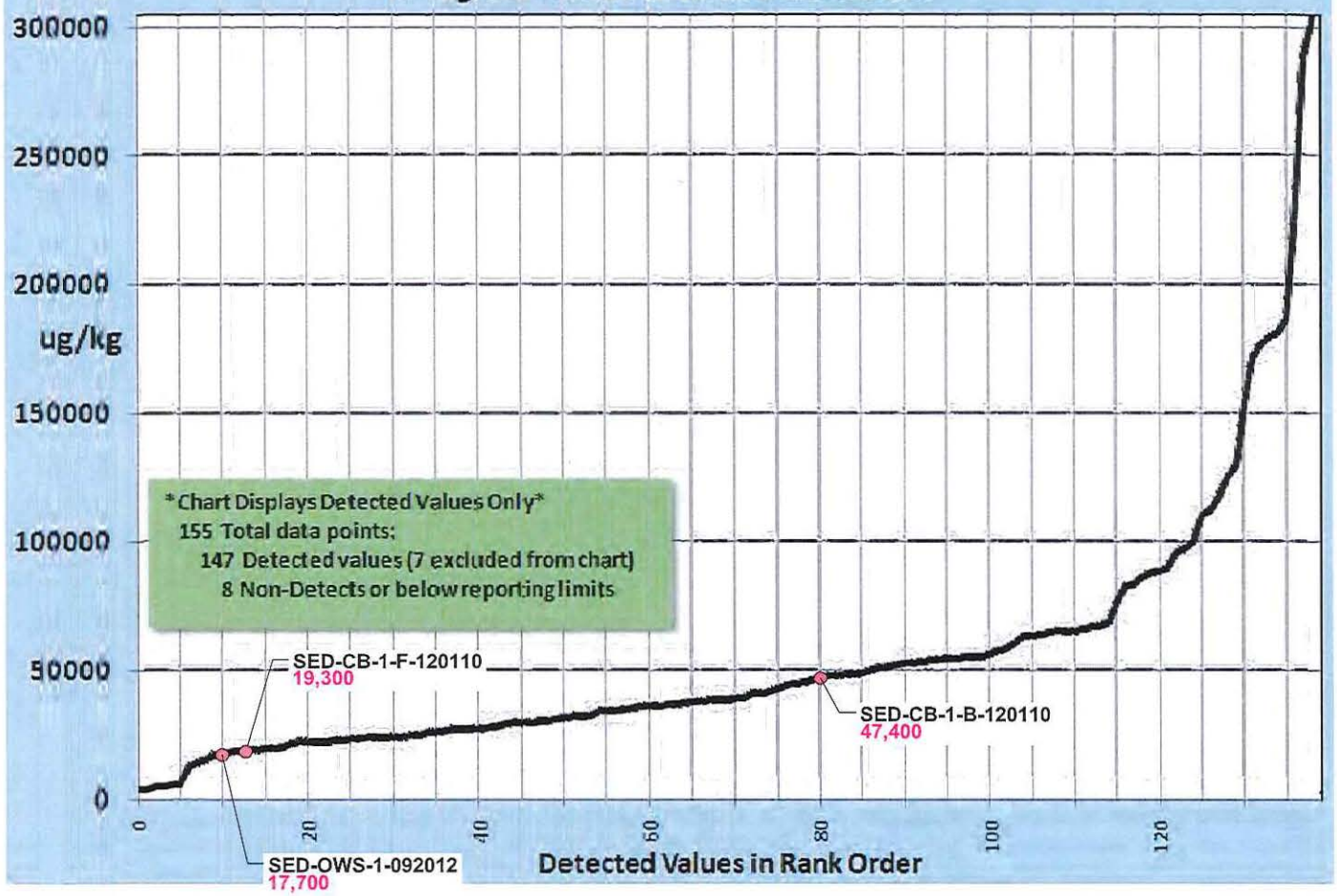
Mercury in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Hg

Figure 8t

Nickel (ug/kg) in Stormwater Sediments at Portland Harbor Heavy Industrial Sites

7 Highest Values Excluded from Chart



Legend

µg/kg	micrograms per kilogram
SED-CB-1-B-120110	sample ID
47,400	result

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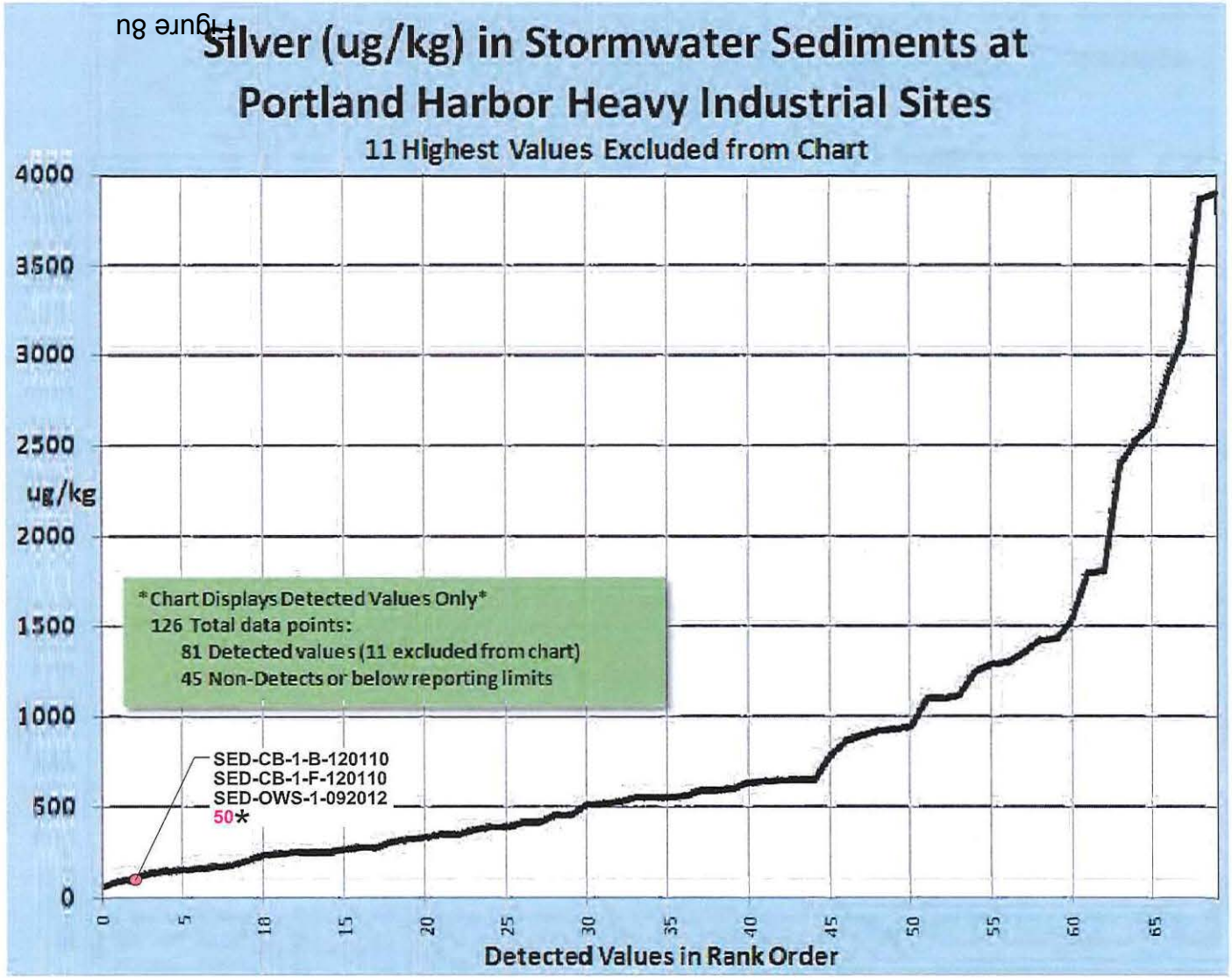
Christenson Oil Company
3821 N.W. St. Helens Rd.
Portland, Oregon

PN: 123-001

Nickel in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Ni

Figure 8u



Legend

µg/kg	micrograms per kilogram
*	Concentration was not detected above the laboratory detection limit; data is estimated at half of the achieved detection limit
SED-CB-1-B-120110	sample ID
50*	result

PACIFIC CREST ENVIRONMENTAL
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Christenson Oil Company
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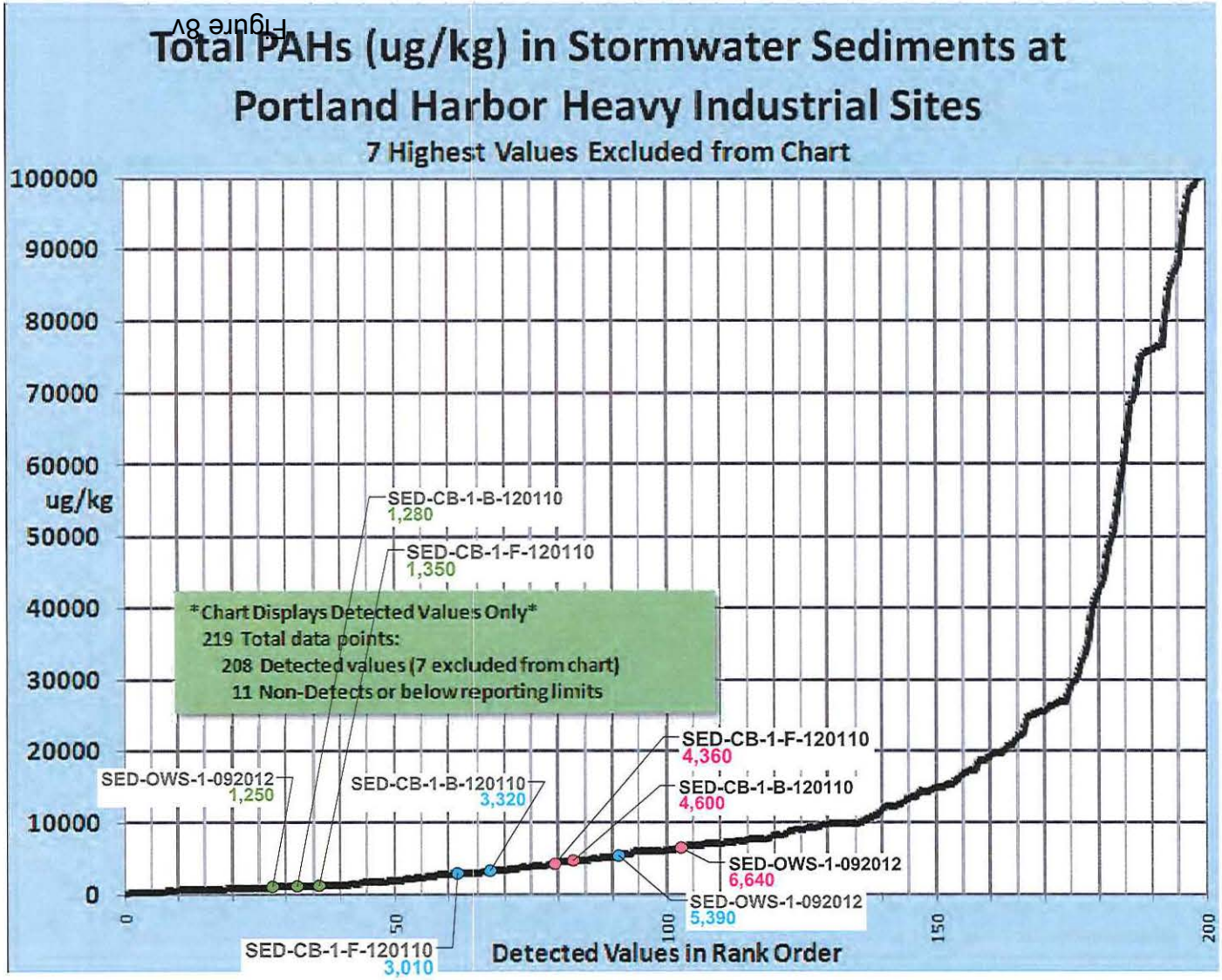
Portland, Oregon

PN: 123-001

Silver in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Ag



Legend

µg/kg	micrograms per kilogram
SED-CB-1-B-120110 4,360	Total PAHs sample ID result
SED-CB-1-B-120110 3,320	HPAHs sample ID result
SED-CB-1-B-120110 1,280	LPAHs sample ID result
PAHs	polycyclic aromatic hydrocarbons
HPAHs	heavy polycyclic aromatic hydrocarbons
LPAHs	light polycyclic aromatic hydrocarbons

Figure 8V

PACIFIC CREST ENVIRONMENTAL
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Christenson Oil Company
3821 N.W. St. Helens Rd.
Portland, Oregon

PN: 123-001

Total PAHs in Stormwater Sediments

10/23/2014 Drafting 123-001-094.dwg Total-PAHs

Table 1
NPDES Stormwater Analytical Results Summary
Christenson Oil
3821 NW St. Helens Rd, Portland, Oregon
Pacific Crest PN 123-001

Date	Sample Location[1]	COCs (µg/L)																									pH	Total Suspended Solids (mg/L)	Oil and Grease (mg/L)
		Copper	Lead	Zinc	Cadmium	Nickel	Chromium	Iron	Aldrin	DDT	DDT Metabolite (DDE)	Dieldrin	Total PCBs	Pentachlorophenol	Acenaphthene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene 3,4	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Pyrene			
11/27/1996	Valve #1	**2**	<1	**18.5**	<1	**5.4**	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.82	<10	<0.500
10/30/1997	PLT 1 Dock Drain	**28**	**35.7**	**368**	**1.7**	**5.3**	**8.3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.39	**108**	**1.03**
9/18/1998	Plant 1	<20	<50	**150**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.09	**230**	<3
11/20/1998	N/A	<30	<100	**144**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.40	**152**	**7.3**
1/19/1999	Storm Drain Front Trucking Lot	<18	<45	**90**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.28	**120**	<3
3/1/1999	CB near Entrance & Loading Dock	**56**	<100	**290**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.70	**246**	**14.7**
5/17/1999	Plant #1 Truck Parking	<20	<50	**70**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.15	**19**	<3
10/27/1999	CB near Entrance & Loading Dock	<30	<100	**340**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.60	**98.8**	**23**
6/27/2000	Stormwater/Truck Parking	**52**	**90**	**900**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.72	**760**	**7**
11/29/2000	CB near Entrance & Loading Dock	<50	<200	**170**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.00	**55**	<5
11/29/2000	Parking Lot Drain Pl#1	<50	**16**	**150**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.52	**97**	<3
2/16/2001	Front Truck Parking Drain	<30	**11**	**200**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.78	**33**	<3
11/19/2001	CB-1	**28.9**	**419**	**392**	-	-	-	-	-	-	-	-	-	-	<0.0500	**0.07**	**0.18**	**0.62**	**0.59**	**0.16**	**0.2**	**0.12**	**0.34**	**0.13**	**0.59**	**0.95**	6.38	**402**	-
11/20/2001	CB near Entrance & Loading Dock	**162**	<200	**670**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.50	**110**	**10**
2/21/2002	Truck Dock/ Plant #1	<30	**150**	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.32	**21**	<3
5/13/2002	CB	**35.6**	<20	**312**	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	6.59	**20**	-
12/23/2006	N/A	**1.42**	**1.44**	**158**	<0.10	**0.93**	<1.0	-	-	-	-	-	-	<0.029	<0.0031	<0.0039	<0.0039	0.0047	<0.0046	<0.0051	**0.0074**	<0.0036	**0.011**	<0.0036	**0.0049**	**0.017**	6.30	**14**	<5
3/7/2007	N/A	**6.31**	**5.58**	**177**	**0.315**	**1.65**	**1.76**	-	-	-	-	-	-	**0.064**	<0.0031	<0.0039	**0.013**	**0.013**	**0.023**	**0.01**	**0.029**	**0.0058**	**0.032**	<0.0036	**0.017**	**0.059**	-	-	-
4/7/2007	N/A	**7.01**	**3.46**	**125**	**0.332**	**1.31**	<0.129	-	-	-	-	-	-	**0.071**	**0.0059**	**0.011**	**0.0068**	**0.0072**	**0.01**	<0.0051	**0.015**	<0.0036	**0.027**	**0.0059**	**0.0087**	**0.032**	5.86	**22**	<5
6/9/2007	N/A	**9.62**	**4.73**	**98.6**	**0.278**	**1.36**	**1.09**	-	-	-	-	-	-	**0.14**	<0.0044	<0.0036	0.0068	0.0046	0.0091	<0.0025	**0.0093**	<0.0025	**0.021**	<0.0044	**0.0059**	**0.018**	6.11	**34**	<5
10/18/2007	Oil/Water Separator	<10	<20	**116**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.11	**34**	<5
11/19/2007	Oil/Water Separator	<10	<20	**130**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.25	**13**	<5
12/2/2007	Oil/Water Separator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.78	-	-
1/2/2008	Oil/Water Separator	<10	<20	**173**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.99	**7**	<5
3/28/2008	Oil/Water Separator	<10	<20	**132**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.34	**23**	<5
11/5/2008	Oil/Water Separator	MW	MW	MW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.20	MW	MW
11/20/2008	Oil/Water Separator	MW	MW	MW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.60	MW	MW
NPDES Benchmark[2]		**100**	**400**	**600**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**5.5-9.0**	**130**	**10**
10/22/2012	Oil/Water Separator	<10	<20	**115**	**0.239**	**0.902**	**0.107**	**632**	<0.009	<0.009	<0.009	<0.009	<0.008	<1.92	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	6.50	<5.00	<3.30
11/11/2012	Oil/Water Separator	<10	<20	**183**	<1	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.33	**12**	<4.95
2/22/2013	Oil/Water Separator	<10	<20	**217**	<1	<5	**9**	**3,220**	<0.00496	<0.0125	<0.00496	<0.00496	<0.00992	<2.00	<0.051	<0.051	**0.061**	**0.081**	**0.14**	<0.051	**0.071**	<0.051	**0.16**	<0.051	**0.1**	**0.19**	6.40	**76**	**7.58**
4/19/2013	Oil/Water Separator	<10	<20	**110**	<1	<5	<5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.10	**6**	<5.10
NPDES Benchmark[3]		**20**	**40**	**120**	**N/A**	**N/A**	**N/A**	**1,000**	**3**	**1.1**	**0.01**	**2.5**	**2**	**20**	**95**	**2,900**	**1**	**1**	**1**	**1**	**1**	**1**	**14**	**390**	**1**	**1**	**5.5-9.0**	**100**	**10**

Notes:
SLV = Screening Level Value
N/A = Not Available
NE= not established
- = Not Analyzed
µg/L = micrograms per liter
mg/l = milligrams per liter
MDL = Method Detection Limit
< = concentration was not detected at or above the laboratory MDL
Bold = concentration detected above the laboratory MDL
= concentration exceeds NPDES benchmark
[1] Stormwater sample collected by Wohlers Environmental Services, Inc.
[2] NPDES Benchmarks effective July 1, 2007
[3] NPDES Benchmarks effective July 1, 2012

Table 2
SCE Sediment Analytical Results Summary
Christenson Oil
3821 NW St. Helens Rd, Portland, Oregon
Pacific Crest PN 123-001

Analyte	SLV[1]	CB-1 Filter Sample[2] (12/1/10)	CB-1 Bottom Sample[2] (12/1/10)	Oil Water Separator Sample[2] (9/20/12)
Total Petroleum Hydrocarbons[3] (mg/kg)				
Diesel	NE	**1,700**	**3,000**	**1,700**
Oil	NE	**12,000**	**16,000**	**9,000**
Gasoline	110[4]	<2	**35**	**6.8**
Semivolatile Organic Compounds[5] (mg/kg)				
1,2-Dichlorobenzene	1.7	<1.5	<1.5	NA
1,3-Dichlorobenzene	0.3	*<1.5*	*<1.5*	NA
1,4-Dichlorobenzene	0.3	*<1.5*	*<1.5*	NA
1,2,4-Trichlorobenzene	9.2	<1.5	<1.5	NA
Hexachlorobenzene	0.019	*<1.5*	*<1.5*	NA
2-Chloronaphthalene	NE	<1.5	<1.5	NA
Hexachloroethane	16[4]	<1.5	<1.5	NA
Hexachlorobutadiene	0.6	*<1.5*	*<1.5*	NA
Hexachlorocyclopentadiene	0.4	*<4.5*	*<4.5*	NA
Bis-(2-chloroethoxy)methane	NE	<1.5	<1.5	NA
Bis-(2-chloroethyl)ether	NE	<1.5	<1.5	NA
4-chlorophenyl-phenyl ether	NE	<1.5	<1.5	NA
4-bromophenyl-phenyl ether	NE	<1.5	<1.5	NA
3,3'-Dichlorobenzidine	0.2[4]	NA	NA	NA
4-Chloroaniline	NE	<150	<150	NA
Nitrobenzene	NE	<1.5	<1.5	NA
Aniline	NE	NA	NA	NA
2-Nitroanaline	NE	<1.5	<1.5	NA
3-Nitroanaline	NE	<45	<45	NA
4-Nitroanaline	NE	<45	<45	NA
N-Nitrosodimethylamine	NE	NA	NA	NA
N-Nitroso-di-n-propylamine	NE	<1.5	<1.5	NA
n-Nitrosodiphenylamine	NE	<1.5	<1.5	NA
2,4-Dinitrotoluene	NE	<1.5	<1.5	NA
2,6-Dinitrotoluene	NE	<1.5	<1.5	NA
Carbazole	1.6	<1.5	<1.5	NA
Benzoic Acid	NE	<1.5	<1.5	NA
Benzyl alcohol	NE	<1.5	<1.5	NA
Dibenzofuran	NE	<1.5	<1.5	NA
Isophorone	NE	<15	<15	NA
Phenol	0.5	*<15*	*<15*	NA
2-Methylphenol (o-Cresol)	NE	<15	<15	NA
3-Methylphenol+4-Methylphenol	NE	<30	<30	NA
2,4-Dimethylphenol	NE	<15	<15	NA
2-Chlorophenol	NE	<15	<15	NA

Table 2
SCE Sediment Analytical Results Summary
Christenson Oil
3821 NW St. Helens Rd, Portland, Oregon
Pacific Crest PN 123-001

Analyte	SLV[1]	CB-1 Filter Sample[2] (12/1/10)	CB-1 Bottom Sample[2] (12/1/10)	Oil Water Separator Sample[2] (9/20/12)
2,4-Dichlorophenol	NE	<15	<15	NA
2,4,5-Trichlorophenol	NE	<15	<15	NA
2,4,6-Trichlorophenol	13[4]	<15	<15	NA
Pentachlorophenol	0.25	*<15*	*<15*	NA
4-Chloro-3methylphenol	NE	<15	<15	NA
2-Nitrophenol	NE	<15	<15	NA
4-Nitrophenol	NE	<15	<15	NA
2,4-Dinitrophenol	NE	<45	<45	NA
Methyl-4,6-Dinitrophenol 2-	NE	<45	<45	NA
Dimethyl phthalate	NE	<1.5	<1.5	NA
Diethyl phthalate	0.6	*<1.5*	*<1.5*	NA
Di-n-butyl phthalate	0.06	*<1.5*	*<1.5*	NA
Benz butyl phthalate	NE	<1.5	**3.3**	NA
Di-n-octyl phthalate	NE	<1.5	**2**	NA
Bis(2-ethylhexyl) phthalate	0.33	**32**	**38**	NA
Polycyclic Aromatic Hydrocarbons[6] (mg/kg)				
2-Methylnaphthalene	0.2	<1.5	<1.5	NA
Naphthalene	0.561	<0.1	<0.1	<0.2
Acenaphthylene	0.2	<0.1	<0.1	<0.2
Acenaphthene	0.3	<0.1	<0.1	<0.2
Fluorene	0.536	<0.1	<0.1	<0.2
Phenanthrene	1.17	**0.35**	**0.28**	**0.75**
Anthracene	0.845	<0.1	<0.1	<0.2
Fluoranthene	2.23	**0.39**	**0.52**	**1.1**
Pyrene	1.52	**0.93**	**0.51**	**1.1**
Benzo(a)anthracene	1.05	**0.19**	**0.26**	**0.37**
Chrysene	1.29	**0.49**	**0.45**	**0.59**
Benzo(b)fluoranthene	NE	**0.31**	**0.47**	**0.63**
Benzo(k)fluoranthene	13	<0.1	**0.13**	**0.22**
Benzo(a)pyrene	1.45	**0.17**	**0.28**	**0.43**
Indeno(1,2,3-cd)pyrene	0.1	**0.18**	**0.28**	**0.42**
Dibenz(a,h)anthracene	1.3	<0.1	<0.1	<0.2
Benzo(g,h,i)perylene	0.3	**0.25**	**0.37**	**0.43**
Polychlorinated Biphenyls[7](mg/kg)				
Aroclor #1016	0.53	<0.1	<0.1	<0.1
Aroclor #1221	NE	<0.1	<0.1	<0.1
Aroclor #1232	NE	<0.1	<0.1	<0.1
Aroclor #1242	NE	<0.1	<0.1	<0.1
Aroclor #1248	1.5	<0.1	<0.1	<0.1
Aroclor #1254	0.3	<0.1	<0.1	<0.1
Aroclor #1260	0.2	<0.1	<0.1	<0.1

Table 2
SCE Sediment Analytical Results Summary
Christenson Oil
3821 NW St. Helens Rd, Portland, Oregon
Pacific Crest PN 123-001

Analyte	SLV[1]	CB-1 Filter Sample[2] (12/1/10)	CB-1 Bottom Sample[2] (12/1/10)	Oil Water Separator Sample[2] (9/20/12)
Total Metals[8] (mg/kg)				
Arsenic	7	**2.54**	**4.48**	<0.1
Barium	NE	**67.2**	**99.5**	<0.1
Cadmium	1	**1.56**	**2.87**	<0.1
Chromium	111	**36**	**70.3**	<0.1
Copper	149	**43.8**	**72.4**	<0.1
Lead	17	**50.2**	**84.6**	<0.1
Manganese	1,100	**179**	**243**	<0.1
Mercury[9]	0.07	*<0.2*	*<0.2*	*<0.1*
Nickel	48.6	**19.3**	**47.4**	**17.7**
Selenium	2	<1	<1	<1
Silver	5	<1	<1	<1
Zinc	459	**376**	**584**	**752**
Miscellaneous (%)				
Total Organic Carbon[10]	NE	5.8%	7.4%	13.8%
Total Solids[11]	NE	41.7%	42.6%	39.3%

NOTES:
CB-1 = Catch Basin 1
SLV = Screening Level Value
NE= not established
NA = not analyzed
mg/kg = milligrams per kilogram
MDL = Method Detection Limit
< = concentration was not detected at or above the laboratory MDL
Bold = concentration detected above the laboratory MDL
ITALICS = laboratory method detection limit is greater than the corresponding SLV
= concentration exceeds SLV

[1]Value from Oregon Department of Environmental Quality: Portland Harbor Joint Source Control Strategy for Initial Upland Source Control Screening Evaluations for Soil and Stormwater Sediment, December, 2005, unless otherwise noted.
[2]Sediment sample collected by Wohlers Environmental Services, Inc.
[3]TPH analysis by Northwest Method NWTPH-Dx for diesel- and oil-range organics and Northwest Method NWTPH-Gx for gasoline range organics.
[4]Oregon Department of Environmental Quality: Risk-Based Concentrations for Soil (Leaching to Groundwater) in an Occupational Setting, September 2009.
[5]Semivolatile organic compound analysis by EPA Method 8270D.
[6]Semivolatile organic compound analysis by EPA Method 8270D SIM.
[7]Polychlorinated biphenyl analysis by EPA Method 8082A.
[8]Total metals analysis by EPA Method 200.8 unless otherwise noted.
[9]Total mercury analysis by EPA Method 1631E.
[10]Total organic carbon analysis by SW-846 Method 9060.
[11]Total solids analysis by Method SM 2540G.

Table 3
Pre-SCE Sediment Analytical Data Summary: 2006
Christenson Oil
3821 NW St. Helens Rd, Portland Oregon
Pacific Crest PN 123-001

Analyte	Applicable Target Concentration[1]	CB-1 Sample (10/24/2006)[3]
Total Petroleum Hydrocarbons[4] (µg/kg)		
Diesel	NA	<25,000
Oil	NA	**10,300,000**
Gasoline	110,000[2]	<20,000
Volatile Organic Compounds[5] (µg/kg)		
1,1,1,-2 Tetrachloroethane	NA	<100
1,1,1-Trichloroethane (TCA)	NA	<100
1,1,2,3-Tetrachloroethane	NA	NA
1,1,2-Trichloroethane	25[2]	<100
1,1-Dichloroethane	200[2]	<100
1,2,3-Trichloropropane	NA	<200
1,2-Diclororethane (EDC)	NA	<100
Cis-1,2-Dichloroethylene	NA	<200
1,2-Dichloropropane	NA	<100
1,2-Dibromoethane (EDB)	NA	<100
2-Butane (MEK)	NA	<500
2-Hexanone	NA	<500
4-Methyl-2-Pentanone (MIBK)	NA	<500
Acetone	NA	<1,100
Acrylonitrile	1.7[2]	NA
Bromochloromethane	NA	<100
Bromodichloromethane	13[2]	<100
Bromoform	1,600[2]	<100
Bromomethane	410[2]	<200
Carbon Tetrachloride	73[2]	<100
Chlorobenzene	27,000[2]	<100
Chlorodibromomethane	110[2]	<100
Chloroethane	1,400,000[2]	<300
Chloroform	17[2]	<100
Chloromethane	9,400[2]	<100
Cis-1,3-dichloropropene	NA	<100
Dibromomethane	NA	<100
Dichlorodifluoromethane	NA	<200
Isopropylbenzene	NA	<100
Methylene chloride	NA	<700
Styrene	NA	<100
Trichlorofluoromethane	300,000[2]	<200
Benzene	53[2]	<30
Ethylbenzene	900[2]	<100
m,p-Xylene	NA	NA
o-Xylene	NA	NA
Xylenes (total)	100,000[2]	<100

Table 3
Pre-SCE Sediment Analytical Data Summary: 2006
Christenson Oil
3821 NW St. Helens Rd, Portland Oregon
Pacific Crest PN 123-001

Analyte	Applicable Target Concentration[1]	CB-1 Sample (10/24/2006)[3]
Methyl-tert-butyl ether	520[2]	<200
Tetrachloroethene (PCE)	500	<100
Toluene	NA	**1,200**
p-Isopropyltoluene	NA	100
Trans-1,2-Dichloroethene	10,000[2]	<100
Trans-1,3-Dichloropropene	NA	<100
Trichloroethene (TCE)	2,100	<100
Vinyl Chloride	10[2]	<200
Semivolatile Organic Compounds[6] (µg/kg)		
Halogenated Compounds		
1,2-Dichlorobenzene	1,700	<167
1,3-Dichlorobenzene	300	<167
1,4-Dichlorobenzene	300	<167
1,2,4-Trichlorobenzene	9,200	<167
Hexachlorobenzene	19	<167
2-Chloronaphthalene	NA	<167
Hexachloroethane	16,000[2]	<167
Hexachlorobutadiene	600	<167
Hexachlorocyclopentadiene	400	<167
Bis-(2-chloroethoxy)methane	NA	<167
Bis-(2-chloroethyl)ether	NA	<167
4-chlorophenyl-phenyl ether	NA	<167
4-bromophenyl-phenyl ether	NA	<167
3,3'-Dichlorobenzidine	200[2]	<835
4-Chloroaniline	NA	<167
Organonitrogen Compounds		
Nitrobenzene	NA	<167
Aniline	NA	NA
2-Nitroanaline	NA	<167
3-Nitroanaline	NA	<167
4-Nitroanaline	NA	<167
N-Nitrosodimethylamine	NA	<167
N-Nitroso-di-n-propylamine	NA	<167
n-Nitrosodiphenylamine	NA	<167
2,4-Dinitrotoluene	NA	<167
2,6-Dinitrotoluene	NA	<167
Carbazole	1,600	**560**
Oxygen-Containing Compounds		
Benzoic Acid	NA	<3,340
Benzyl alcohol	NA	<167
Dibenzofuran	NA	**183**
Isophorone	NA	<167

Table 3
Pre-SCE Sediment Analytical Data Summary: 2006
Christenson Oil
3821 NW St. Helens Rd, Portland Oregon
Pacific Crest PN 123-001

Analyte	Applicable Target Concentration[1]	CB-1 Sample (10/24/2006)[3]
Phenols and Substituted Phenols		
Phenol	50	**330**
2-Methylphenol (o-Cresol)	NA	<167
4-Methylphenol (p-cresol)	NA	**4,540**
2,4-Dimethylphenol	NA	<167
2-Chlorophenol	NA	<167
2,4-Dichlorophenol	NA	<167
2,4,5-Trichlorophenol	NA	<167
2,4,6-Trichlorophenol	13,000[2]	<167
Pentachlorophenol	250	<250
4-Chloro-3methylphenol	NA	<167
2-Nitrophenol	NA	<835
4-Nitrophenol	NA	<835
2,4-Dinitrophenol	NA	<1670
Methyl-4,6-Dinitrophenol 2-	NA	<835
Phthalate Esters		
Dimethylphthalate	NA	<167
Diethylphthalate	600	<167
Di-n-butylphthalate	60	<167
Butylbenzylphthalate	NA	NA
Di-n-octylphthalate	NA	**1,870**
bis(2-ethylhexyl)phthalate	330	**11,900**
Polycyclic Aromatic Hydrocarbons		
Napthalene	561	<167
2-Methylnaphthalene	200	<167
Acenaphthylene	200	<167
Acenaphthene	300	**398**
Fluorene	536	**313**
Phenanthrene	1,170	**3,750**
Anthracene	845	**792**
Fluoranthene	2,230	**4,560**
Pyrene	1,520	**3,870**
Benzo(a)anthracene	1,050	**1,690**
Chrysene	1,290	**1,820**
Benzo(b)fluoranthene	NA	**3,250**
Benzo(k)fluoranthene	13,000	**1,360**
Benzo(a)pyrene	1,450	**2,250**
Indeno(1,2,3-cd)-pyrene	100	**543**
Dibenz(a,h)anthracene	1,300	**353**
Benzo(g,h,i)perylene	300	**603**

Table 3
Pre-SCE Sediment Analytical Data Summary: 2006
Christenson Oil
3821 NW St. Helens Rd, Portland Oregon
Pacific Crest PN 123-001

Analyte	Applicable Target Concentration[1]	CB-1 Sample (10/24/2006)[3]
Polychlorinated Biphenyls[7] (µg/kg)		
Arochlor #1016	530	<10
Arochlor #1221	NA	<10
Arochlor #1232	NA	<10
Arochlor #1242	NA	<10
Arochlor #1248	1,500	<10
Arochlor #1254	300	<10
Arochlor #1260	200	**20**
Organochlorine Pesticides[8] (µg/kg)		
Aldrin	40	<67
α-BHC	NA	<67
β-BHC	NA	<67
δ-BHC	NA	<67
γ-BHC (Lindane)	4.99	<67
Chlorodane	0.37	<330
p,p'-DDD	0.33	<67
p,p'-DDE	0.33	<67
p,p'-DDT	0.33	<67
Dieldrin	0.0081	<67
Endosulfan I(Thiodan)	NA	<67
Endosulfan II	NA	<67
Endosulfan Sulfate	NA	<67
Endrin	207	<67
Endrin aldehyde	NA	<67
Endrin ketone	NA	<67
Heptachlor	10	<67
Heptachlor epoxide	16	<67
Methoxychlor	NA	<130
Toxaphene	NA	<670

Table 3
Pre-SCE Sediment Analytical Data Summary: 2006
Christenson Oil
3821 NW St. Helens Rd, Portland Oregon
Pacific Crest PN 123-001

Analyte	Applicable Target Concentration[1]	CB-1 Sample (10/24/2006)[3]
Total Metals[9] (µg/kg)		
Antimony	64,000	<1,000
Arsenic	7,000	<1,000
Barium	NA	NA
Cadmium	1,000	<1,000
Chromium	111,000	**7,000**
Copper	149,000	**73,000**
Lead	17,000	**44,000**
Manganese	1,100,000	**125,000**
Mercury	70	<500
Nickel	48,600	**6,000**
Selenium	2,000	<1,000
Silver	5,000	<1,000
Zinc	459,000	**444,000**
Total Organic Carbon[10] (µg/kg)		
Total Organic Carbon	NA	**32,400,000**

NOTES:
CB-1 = Catch Basin 1
NA= Not Available
µg/kg = micrograms per kilogram
< denotes concentration was not detected at or above the laboratory Method Reporting Limit.
Bold = denotes concentration detected above the laboratory Method Reporting Limit.
= concentration exceeds applicable target concentration

[1]Value from Oregon Department of Environmental Quality: Portland Harbor Joint Source Control Strategy for Initial Upland Source Control Screening Evaluations for Soil and Stormwater Sediment, December, 2005, unless otherwise noted (see note 2).

[2] Oregon Department of Environmental Quality: Risk-Based Concentrations for Soil (Leaching to Groundwater) in an Occupational Setting, September 2009.

[3] Catch Basin Sediment Sample collected by Wohlers Environmental Services, Inc.

[4] TPH analysis by Method NWTPH-Dx for diesel- and oil-range organics, and Method NWTPH-Gx for gasoline range organics.

[5] Volatile Organic Compound analysis by EPA Method 8260.

[6] Semi-volatile organic compound analysis by EPA Method SW8270D.

[7] Polychlorinated biphenyl analysis by EPA Method 8082.

[8] Organochlorine pesticides analysis by EPA Method 8081A (GC-ECD).

[9] Total metals analysis by EPA Method 200.8 ICP/MS.

[10] Total organic carbon analysis by Method SW9060.

Table 4
SCE Stormwater Analytical Results Summary
Christenson Oil
3821 NW St. Helens Rd, Portland, Oregon
Pacific Crest PN 123-001

Analyte	SLV[1]	SW-OWS-EF-111611[2] (11/16/11)	SW-OWS-EF-012912[2] (01/29/12)	SW-OWS-EF-030512[2] (03/05/12)	SW-OWS-EF-052112[2] (05/21/12)
Total Petroleum Hydrocarbons[3] (µg/l)					
Diesel	NE[4]	**190[###]**	**53[###]**	<50	**100[###]**
Oil	NE[4]	<50	<250	<250	**490**
Gasoline	110,000[5]	<100	<100	<100	<100
Semivolatile Organic Compounds[6] (µg/l)					
1,2-Dichlorobenzene	49	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	14	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	2.8	<0.5	<0.5	<0.5	<0.5
1,2,4-Trichlorobenzene	8.2	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	0.00029	*<0.2*	*<0.2**	*<0.2**	*<1**
2-Chloronaphthalene	490	<0.5	<0.5	<0.5	<0.5
Hexachloroethane	3.3	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	0.86	<0.5	<0.5	<0.5	<0.5
Hexachlorocyclopentadiene	5.2	<1.5	<1.5[#]	<1.5	<1.5
Bis-(2-chloroethoxy)methane	NE	<0.5	<0.5	<0.5	<0.5
Bis-(2-chloroethyl)ether	0.06	*<5**	*<5*	*<5*	*<5*
4-chlorophenyl-phenyl ether	0.06	*<0.2*	*<0.2**	*<0.2**	*<0.2**
4-bromophenyl-phenyl ether	NE	<0.5	<0.5	<0.5	<0.5
3,3'-Dichlorobenzidine	0.028	*<5*	*<2*[#]*	*<2**	*<2**
4-Chloroaniline	150	<1.5	<1.5	<1.5	<1.5
Nitrobenzene	3.4	<0.5	<0.5	<0.5	<0.5
2-Nitroanaline	110	<0.5	<0.5	<0.5	<1.5
3-Nitroanaline	3.2	<1.5	<1.5	<1.5	<1.5
4-Nitroanaline	3.2	*<5*	*<5*	*<5*	*<5*
N-Nitrosodimethylamine	0.00042	*<0.2*[#]*	*<5*[##]*	*<5*[#]*	*<0.5*
N-Nitroso-di-n-propylamine	0.0096	*<5*	*<5*	*<5*	*<5*
N-Nitrosodipenylamine	6	<0.5*[#]	<0.5	<0.5	<5[##]
2,4-Dinitrotoluene	3.4	<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	37	<0.1	<0.1*	<0.1*	<0.1*
Carbazole	3.4	<0.5	<0.5	<0.5	<0.5
Benzoic Acid	42	<15*	<15*	<15*	<15*
Benzyl alcohol	8.6	<5	<5	<5	<5
Dibenzofuran	3.7	<0.5	<0.5	<0.5	<0.5
Isophorone	71	<0.5	<0.5	<0.5	<0.5
Phenol	2,560	<5	<5	<5	<5
2-Methylphenol (o-cresol)	13	<1*	<1*	<1*	<1*
4-Methylphenol (p-cresol)	180	<1	<1*	<1*	<1*
2,4-Dimethylphenol	730	<5	<5[#]	<5	<5
2-Chlorophenol	30	<1*	<1*	<1*	<1*
2,4-Dichlorophenol	110	<1*	<1*	<1*	<1*
2,4,5-Trichlorophenol	3,600	<1	<1*	<1*	<1*
2,4,6-Trichlorophenol	2.4	<1	<1*	<1*	<1*
Pentachlorophenol	0.56	*<1*	*<1**	*<1**	*<1**
4-Chloro-3methylphenol	NE	<1*	<1*	<1*	<1*
2-Nitrophenol	150	<1*	<1*	<1*	<1*
4-Nitrophenol	150	<1	<1*	<1*	<5
2,4-Dinitrophenol	73	<1	<1*	<1*	<15
Methyl-4,6-Dinitrophenol 2-	150	<1	<1*	<1*	<1*
Dimethyl phthalate	3	<0.5	<0.5	<0.5	**0.76**
Diethyl phthalate	3	<0.5	<0.5	**0.53****	<0.5
Di-n-butyl phthalate	3	<0.5	<0.5	<0.5	<0.5
Benz butyl phthalate	3	<0.5	<0.5	<0.5	<0.5
Di-n-octyl phthalate	3	<0.5	<0.5	<0.5	<0.5
Bis(2-ethylhexyl) phthalate	2.2	*<5*	*<5*	*<5*	*<5*
Polycyclic Aromatic Hydrocarbons[7] (µg/l)					
Naphthalene	0.2	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	0.2	*<0.5*	*<0.5*	*<0.5*	*<0.5*
Acenaphthylene	0.2	<0.05	<0.05	<0.05	<0.05
Acenaphthene	0.2	<0.05	<0.05	<0.05	<0.05
Fluorene	0.2	<0.05***[#]	<0.05	<0.05	<0.05
Phenanthrene	0.2	<0.05	<0.05	<0.05	<0.05

Table 4
SCE Stormwater Analytical Results Summary
Christenson Oil
3821 NW St. Helens Rd, Portland, Oregon
Pacific Crest PN 123-001

Analyte	SLV[1]	SW-OWS-EF-111611[2] (11/16/11)	SW-OWS-EF-012912[2] (01/29/12)	SW-OWS-EF-030512[2] (03/05/12)	SW-OWS-EF-052112[2] (05/21/12)
Anthracene	0.2	<0.05	[3]<0.05	<0.05	<0.05
Fluoranthene	0.2	<0.05	<0.05	**0.055**	<0.05
Pyrene	0.2	<0.05	<0.05	**0.084**	<0.05
Benzo(a)anthracene	0.018	<0.018	<0.018	**0.021**	<0.018
Chrysene	0.018	<0.018	<0.018	**0.030**[#]	<0.018
Benzo(b)fluoranthene	0.018	<0.018	<0.018	**0.033**	<0.018
Benzo(k)fluoranthene	0.018	<0.018	<0.018	<0.018	<0.018
Benzo(a)pyrene	0.018	<0.018	<0.018	**0.025**	<0.018
Indeno(1,2,3-cd)pyrene	0.018	<0.018	<0.018	**0.033**	<0.018
Dibenz(a,h)anthracene	0.018	<0.018	<0.018	<0.018	<0.018
Benzo(g,h,i)perylene	0.2	<0.05	<0.05	<0.05	<0.05
Polychlorinated Biphenyls[8] (µg/l)					
Aroclor #1016	0.96	<0.05	<0.05	<0.25	<0.025
Aroclor #1221	0.034	*<0.05*	*<0.05*	*<0.25*	<0.025
Aroclor #1232	0.034	*<0.05*	*<0.05*	*<0.25*	<0.025
Aroclor #1242	0.034	*<0.05*	*<0.05*	*<0.25*	<0.025
Aroclor #1248	0.034	*<0.05*	*<0.05*	*<0.25*	<0.025
Aroclor #1254	0.033	*<0.05*	*<0.05*	*<0.25*	<0.025
Aroclor #1260	0.034	*<0.05*	*<0.05*	*<0.25*	<0.025
Total Metals[9] (µg/l)					
Arsenic	0.045	*<0.5**	*<0.5**	*<0.5**	**0.763***
Barium	NE	**14.3**	**15.2**	**27**	**52.9**
Cadmium	0.094	**0.194***	**0.213***	**0.159***	**0.649***
Chromium	100	<1	**1.20**	**1.33**	<1
Copper	2.7	**5.04**	**3.28**	**4.12**	**12.7**
Lead	0.54	**3.70**	**2.29**	**2.36**	**2.45**
Manganese	50	**20.1**	**18.9**	**22.8**	**230**
Mercury[9]	0.77	<0.1	<0.1	<0.1	<0.1
Nickel	0.0028	**1.28**	<1	<1	**3.08**
Selenium	5	<1	<1	<1	<1
Silver	0.12	<0.1*	<0.1*	-	<0.1*
Zinc	36	**116**	**121**	**111**	**291**
Miscellaneous (mg/l)					
Total Organic Carbon[11]	NE	**3.5**	**1.27**	**5.1**	**27**
Total Suspended Solids[12]	NE	**14**	<10	<10	<25

NOTES:

SLV = Screening Level Value

NE= not established

NA = not analyzed

µg/l = micrograms per liter

mg/l = milligrams per liter

MDL = Method Detection Limit

< = concentration was not detected at or above the laboratory MDL

Bold = concentration detected above the laboratory MDL

ITALICS = laboratory method detection limit is greater than the corresponding SLV

= concentration exceeds SLV

[1] Value from Oregon Department of Environmental Quality: Portland Harbor Joint Source Control Strategy for Initial Upland Source Control Screening Evaluations for Water, December, 2005, unless otherwise noted.

[2] Stormwater sample collected by Wohlers Environmental Services, Inc.

[3] TPH analysis by Northwest Method NWTPH-Dx for diesel- and oil-range organics and Northwest Method NWTPH-Gx for gasoline range organics.

[4] Oregon Department of Environmental Quality: Risk Based Concentrations for Soil (Leaching to Groundwater) in an Occupational Setting, September 2009.

[5] The constituent Risk Based Concentration for this pathway is greater than 100,000 mg/kg or 100,000 mg/L. DEQ believes it is highly unlikely that such concentrations will ever be encountered.

[6] Semivolatile organic compound analysis by EPA Method 8270D.

[7] Semivolatile organic compound analysis by EPA Method 8270D SIM.

[8] Polychlorinated biphenyl analysis by EPA Method 8082A.

[9] Total metals analysis by EPA Method 200.8 unless otherwise noted.

[10] Total mercury analysis by EPA Method 1631E.

[11] Total organic carbon analysis by EPA Method SM 5310B.

[12] Total suspended solids analysis by EPA Method 2540D.

* The result is below normal reporting limits. The value reported is an estimate.

** The compound is a common laboratory and field contaminant.

*** The calibration results from this range fell outside of acceptance criteria. The value reported is an estimate.

[#] The analyte result in the laboratory control sample is out of control limits. The reported concentration should be considered an estimate.

[##] The reported concentration was generated from a library search.

[###] The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Table 5
Catch Basin Sample Location Summary
Christenson Oil
3821 NW St. Helens Rd, Portland, Oregon
Pacific Crest PN 123-001

Stormwater System Component IDs	Elevations (feet amsl[1])			Drainage Subbasin	Date of last Cleanout	Activities and Potential Sources Draining to the Catch Basin	Proposed for Sampling?	If not sampled, rationale for sample location exclusion?
	Grate	Top of Pipe/Culvert	IE of Structure					
CB-1 (Receiving/Loading Area)	35.82	NM	33.32 [2]	Primary Subbasin	3/8/2010	Product transfer, minor leaks/spills, industrial debris	Yes (filter and bottom)	NA
CB-2 (Adjacent to East Property Corner in City ROW)	36.41	34.56	33.56	NA	NA	Stormwater runoff from NW St. Helens Road	No	Not considered to be directly in Site stormwater pathway
CB-3 (Adjacent to North Property Corner in City ROW)	38.40	36.80	35.80	NA	NA	Stormwater runoff from NW St. Helens Road	No	Not considered to be directly in Site stormwater pathway
Drain Grate (Covered Loading Dock)	40.18	NM	NM	Primary Subbasin	NA	NA	NA	NA
27" Culvert (Adjacent to North Property Corner)	NA	36.61	34.09	NA	NA	NA	NA	NA
24" Culvert (Adjacent to North Property Corner)	NA	37.09	34.39	NA	NA	NA	NA	NA
12" Pipe (Adjacent to North Property Corner Outlet for Intermittent Stream)	NA	36.61	35.53	NA	NA	NA	NA	NA
Grate (Adjacent to West Property Corner)	79.36 - high end 78.18 - low end	77.93	74.81	NA	NA	NA	NA	NA
36" Culvert (Adjacent to Northwest Corner of Building)	NA	43.46	40.38	NA	NA	NA	NA	NA
Oil/Water Separator 5" Inlet (Adjacent to East Corner of Building)	NA	34.50	NM	Primary Subbasin	NA	NA	NA	NA

NOTES:
amsl = above mean sea level
City ROW = City of Portland Right-of-Way
NM = not measured
IE = invert elevation
NA = not applicable
AST = aboveground storage tank
[1]Unless otherwise indicated, elevations are based on City of Portland benchmark BM 3319, and surveyed by Heritage Surveying of Portland, Oregon, on February 3, 2009.
[2]Base of 12-inch pipe in catch basin CB-1 measured by Wohlers Environmental Services, Inc.

Table 6
Pre-SCE Stormwater Analytical Data Summary: 2006 - 2010
Christenson Oil
3821 NW St. Helens Rd, Portland, Oregon
Pacific Crest PN 123-001

Analyte	Applicable Target Concentration[1]	OWS Sample (12/23/2006)[3]	OWS Sample (3/7/2007)[3]	OWS Sample (4/7/2007)[3]	SW-1 Creek Sample (4/2/2010)[3]	SW-2 Creek Sample (4/2/2010)[3]
Total Petroleum Hydrocarbons[4] (µg/l)						
Diesel	360[2]	<250	<250	<250	<50	<50
Oil	1,100[2]	<500	<500	<500	<250	<250
Gasoline	420[2]	<40	<40	<250	<100	<100
Volatile Organic Compounds[5] (µg/l)						
1,1,1,-2 Tetrachloroethane	2.5	<2	<2	<2	<1	<1
1,1,1-Trichloroethane (TCA)	11	<2	<2	<2	<1	<1
1,1,2,3-Tetrachloroethane	0.33	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	1.2	<2	<2	<2	<1	<1
1,1-Dichloroethane	47	<2	<2	<2	<1	<1
1,2,3-Trichloropropane	0.0095	<3	<3	<3	<1	<1
1,2-Diclororethane (EDC)	0.73	<2	<2	<2	<1	<1
Cis-1,2-Dichloroethylene	61	<3	<3	<3	<1	<1
1,2-Dichloropropane	0.97	<2	<2	<2	<1	<1
1,2-Dibromoethane (EDB)	0.033	<2	<2	<2	<1	<1
2-Butane (MEK)	7,100	<8	<8	<8	<10	<10
2-Hexanone	99	<8	<8	<8	<10	<10
4-Methyl-2-Pentanone (MIBK)	170	<8	<8	<8	<10	<10
Acetone	1,500	<15	<15	<15	<10	**11**
Acrylonitrile	0.12	NA	NA	NA	NA	NA
Bromochloromethane	NA	<2	<2	<2	NA	NA
Bromodichloromethane	1.1	<2	<2	<2	<1	<1
Bromoform	8.5	<2	<2	<2	<1	<1
Bromomethane	8.7	<3	<3	<3	<1	<1
Carbon Disulfide	0.92	NA	NA	NA	NA	NA
Carbon Tetrachloride	0.51	<2	<2	<2	<1	<1
Chlorobenzene	50	<2	<2	<2	<1	<1
Chlorodibromomethane	0.79	NA	NA	NA	NA	NA
Chloroethane	23	<6	<6	<6	<1	<1
Chloroform	0.17	<2	<2	<2	<1	<1
Chloromethane	2.1	<2	<2	<2	<10	<10
Cis-1,2-Dichloroethylene	590	<3	<3	<3	<1	<1
Cis-1,3-dichloropropene	0.055	<2	<2	<2	<1	<1
Dibromomethane	61	<2	<2	<2	<1	<1
Dichlorodifluoromethane	390	<4	<4	<4	<1	<1
Isopropylbenzene	660	<2	<2	<2	<1	<1
Methylene chloride	8.9	<2	**6****	**7****	<5	<5
Styrene	100	<2	<2	<2	<1	<1
Trichlorofluoromethane	1,300	<3	<3	<3	<1	<1
Benzene	1.2	<0.3	<0.3	<0.3	<0.35	<0.35
Ethylbenzene	7.3	<1	<1	<1	<1	<1
m,p-Xylene	1.8	NA	NA	NA	<2	<2
o-Xylene	13	NA	NA	NA	<1	<1
Xylenes (total)	200	<1	<1	**2**	NA	NA
Methyltert-butyl ether	37	<4	<4	<4	<1	<1
Tetrachloroethene (PCE)	0.12	<2	<2	<2	<0.5	<0.5
Toluene	9.8	<1	<1	<1	<1	<1
Trans-1,2-Dichloroethene	110	<2	<2	<2	<1	<1
Trans-1,3-Dichloropropene	0.055	<2	<2	<2	<0.5	<0.5
Trichloroethene (TCE)	0.17	<2	<2	<2	<0.5	<0.5
Vinyl Chloride	0.015	<4	<4	<4	<0.2	<0.2

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3821 NW St. Helens Rd, Portland, Oregon
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Semivolatile Organic Compounds[6] (µg/l)						
Halogenated Compounds						
1,2-Dichlorobenzene	49	<0.2	<0.2	<0.2	<0.5	<0.5
1,3-Dichlorobenzene	14	<0.2	<0.2	<0.2	<0.5	<0.5
1,4-Dichlorobenzene	2.8	<0.2	<0.2	<0.2	<0.5	<0.5
1,2,4-Trichlorobenzene	8.2	<0.2	<0.2	<0.2	<0.5	<0.5
Hexachlorobenzene	0.00029	<0.2	<0.2	<0.2	<0.2*	<0.2*
2-Chloronaphthalene	490	<0.2	<0.2	<0.2	<0.5	<0.5
Hexachloroethane	3.3	<0.2	<0.2	<0.2	<0.5	<0.5
Hexachlorobutadiene	0.86	<0.2	<0.2	<0.2	<0.5	<0.5
Hexachlorocyclopentadiene	5.2	<0.96	<0.96	<0.2	<1.5	<1.5
Bis-(2-chloroethoxy)methane	NA	<0.2	<0.2	<0.2	<0.5	<0.5
Bis-(2-chloroethyl)ether	0.06	<0.2	<0.2	<0.2	<0.5	<0.5
4-chlorophenyl-phenyl ether	0.06	<0.2	<0.2	<0.2	<0.2*	<0.2*
4-bromophenyl-phenyl ether	NA	<0.2	<0.2	<0.2	<0.5	<0.5
3,3'-Dichlorobenzidine	0.028	<2	<2	<2	<2	<2
4-Chloroaniline	150	<0.2	<0.2	<0.2	<1.5	<1.5
Organonitrogen Compounds						
Nitrobenzene	3.4	<0.2	<0.2	<0.2	<0.5	<0.5
Aniline	12	<0.96	<0.96	<0.96	NA	NA
2-Nitroanaline	110.0	<0.2	<0.2	<0.2	<0.5	<0.5
3-Nitroanaline	3.2	<0.96	<0.96	<0.96	<1.5	<1.5
4-Nitroanaline	3.2	<0.96	<0.96	<0.96	<5	<5
N-Nitrosodimethylamine	0.00042	<2	<2	<2	<0.2*	<0.2*
N-Nitroso-di-n-propylamine	0.0096	<0.2	<0.2	<0.2	<0.2	<0.2
n-Nitrosodiphenylamine	6	<0.2	<0.2	<0.2	<0.5	<0.5
2,4-Dinitrotoluene	3.4	<0.2	<0.2	<0.2	<0.5	<0.5
Carbazole	3.4	<0.2	**0.015***	<0.2	<0.5	<0.5
Oxygen-Containing Compounds						
Benzoic Acid	42	**2.6***	<4.8	<4.8	<15*	<15*
Benzyl alcohol	8.6	<4.8	<4.8	<4.8	<0.5	<0.5
Dibenzofuran	3.7	<0.2	<0.2	<0.2	<0.5	<0.5
Isophorone	71	<0.2	<0.2	<0.2	<0.5	<0.5
Phenols and Substituted Phenols						
Phenol	2,560	<0.48	<0.48	<0.48	<5	<5
2-Methylphenol (o-Cresol)	13	<0.48	<0.48	**0.11***	<1	<1
4-Methylphenol (p-cresol)	180	<0.48	<0.48	**0.16***	NA	NA
2,4-Dimethylphenol	730	<2	<2	<2	<1	<1
2-Chlorophenol	30	<0.48	<0.48	<0.48	<1	<1
2,4-Dichlorophenol	110	<0.48	<0.48	<0.48	<1*	<1*
2,4,5-Trichlorophenol	3,600	<0.48	<0.48	<0.48	<1*	<1*
2,4,6-Trichlorophenol	2.4	<0.48	<0.48	<0.48	<1*	<1*
2,3,4,6-Tetrachlorophenol	1,100	<1	<1	<1	<50	<50
Pentachlorophenol	0.56	<0.96	**0.064***	**0.071***	<1*	<1*
4-Chloro-3methylphenol	NA	<0.48	<0.48	<0.48	<1*	<1*
2-Nitrophenol	150	<0.48	<0.48	<0.48	<1	<1
4-Nitrophenol	150	<2	<2	<2	<1	<1
2,4-Dinitrophenol	73	<3.9	<3.9	<3.9	<1	<1
Methyl-4,6-Dinitrophenol 2-	150	<2	<2	<2	<1*	<1*

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Phthalate Esters						
Dimethylphthalate	3	<0.2	**0.35**	**0.2***	<0.5	<0.5
Diethylphthalate	3	**0.06***	**0.18***	**0.23**	<0.5	<0.5
Di-n-butylphthalate	3	**0.084***	**0.26**	**0.37**	<0.5	<0.5
Butylbenzylphthalate	3	<0.2	**0.41**	**0.47**	<0.5	<0.5
Di-n-octylphthalate	3	<0.2	<0.2	<0.2	<0.5	<0.5
bis(2-Ethylhexyl)phthalate	2.2	**1.4***	**2.2**	**2.2**	<5	<5
Polycyclic Aromatic Hydrocarbons						
Napthalene	0.2	**0.027**	**0.0086***	**0.021**	<0.05	<0.05
2-Methylnaphthalene	0.2	<0.02	**0.0085***	**0.012***	NA	NA
Acenaphthylene	0.2	**0.0028***	**0.02**	**0.0047***	<0.05	<0.05
Acenaphthene	0.2	<0.02	<0.02	**0.0059***	<0.05	<0.05
Fluorene	0.2	<0.02	<0.02	**0.0084***	<0.05	<0.05
Phenanthrene	0.2	**0.0077***	**0.021**	**0.046**	<0.05	<0.05
Anthracene	0.2	<0.02	<0.02	**0.011***	<0.05	<0.05
Fluoranthene	0.2	**0.011***	**0.032**	**0.027**	<0.05	<0.05
Pyrene	0.2	**0.017***	**0.059**	**0.032**	<0.05	<0.05
Benzo(a)anthracene	0.018	<0.02	**0.013***	**0.0068***	<0.018	<0.018
Chrysene	0.018	**0.0074***	**0.029**	**0.015***	<0.018	<0.018
Benzo(b)fluoranthene	0.018	<0.02	**0.023**	**0.01***	<0.018	<0.018
Benzo(k)fluoranthene	0.018	<0.02	**0.01***	<0.02	<0.018	<0.018
Benzo(a)pyrene	0.018	**0.0047***	**0.013***	**0.0072***	<0.018	<0.018
Indeno(1,2,3-cd)-pyrene	0.018	**0.0049***	**0.017***	**0.0087***	<0.018	<0.018
Dibenz(a,h)anthracene	0.018	<0.02	**0.0058***	<0.02	<0.018	<0.018
Benzo(g,h,i)perylene	0.2	**0.0067***	**0.025**	**0.012***	<0.05	<0.05
Polychlorinated Biphenyls[7] (µg/l)						
Aroclor 1016	0.96	<0.00946	<0.101	**1.4**	<0.01	<0.01
Aroclor 1221	0.034	<0.00946	<0.101	<0.0221	<0.01	<0.01
Aroclor 1232	0.034	<0.00946	<0.101	<0.0221	<0.01	<0.01
Aroclor 1242	0.034	<0.00946	<0.101	<0.0221	<0.01	<0.01
Aroclor 1248	0.034	<0.00946	<0.101	<0.0221	<0.01	<0.01
Aroclor 1254	0.033	<0.00946	<0.101	<0.0221	<0.01	<0.01
Aroclor 1260	0.034	<0.00946	<0.101	<0.0221	<0.01	<0.01
Total PCBs	0.000064	-	-	-	-	-
PCB Congeners	NA	-	-	-	-	-
Organochlorine Pesticides (µg/l)						
Aldrin	0.00005	-	-	-	-	-
α-BHC	0.0049	-	-	-	-	-
β-BHC	0.017	-	-	-	-	-
δ-BHC	0.037	-	-	-	-	-
γ-BHC (Lindane)	0.052	-	-	-	-	-
Chlorodane	0.00081	-	-	-	-	-
p,p'-DDD	0.00031	-	-	-	-	-
p,p'-DDE	0.00022	-	-	-	-	-
p,p'-DDT	0.00022	-	-	-	-	-
Dieldrin	0.000054	-	-	-	-	-
Endosulfan I(Thiodan)	0.051	-	-	-	-	-
Endosulfan II	0.051	-	-	-	-	-
Endosulfan Sulfate	89	-	-	-	-	-
Endrin	0.036	-	-	-	-	-
Endrin aldehyde	NA	-	-	-	-	-
Endrin ketone	NA	-	-	-	-	-
Heptachlor	0.000079	-	-	-	-	-
Heptachlor epoxide	0.000039	-	-	-	-	-
Methoxychlor	0.03	-	-	-	-	-
Toxaphene	0.0002	-	-	-	-	-

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Total Metals[8] (µg/l)						
Antimony	6	<0.5	<0.5	<0.099	-	-
Arsenic	0.045	<1	<1	<0.028	**0.673**	**0.548**
Barium	29,000[2]	-	-	-	**41.7**	**34.5**
Cadmium	0.094	<0.1	**0.315**	**0.332**	**0.195**	<0.1
Chromium	100	<1	**1.76**	<0.129	**4.44**	**3.07**
Copper	2.7	**1.42**	**6.31**	**7.01**	**3.46**	**2.58**
Lead	0.54	**1.44**	**5.58**	**3.46**	**1.87**	**1.72**
Manganese	50	**342**	**257**	**42.4**	**61.6**	**57.5**
Mercury	0.77	<0.05	<0.05	<0.004	<0.1	<0.1
Nickel	16	**0.93**	**1.65**	**1.31**	**3.07**	**1.9**
Selenium	5	<1	<1	<0.0250	<1	<1
Silver	0.12	<0.1	<0.1	<0.016	<0.1	<0.1
Zinc	36	**158**	**177**	**125**	**9.72**	**12.3**
Miscellaneous						
pH[9]	5.5 - 9.0[13]	**6.3**	-	**5.86**	-	-
Polar/non-Polar Oil and Grease[10] (µg/l)	10,000[13]	<5,000	-	<5,000	-	-
Total Suspended Solids[11] (µg/l)	130,000[13]	**14,000**	-	**22,000**	**77,000**	**77,000**
Total Organic Carbon[12] (µg/l)	-	-	-	-	**2,700**	**2,780**

NOTES:
NA= Not Available
OWS = Oil/Water Separator
SW = Surface Water
µg/l = micrograms per liter
- = compound not analyzed
< =concentration was not detected at or above the indicated laboratory Method Reporting Limit.
* = a value flagged by the laboratory as an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit
** = a value flagged by the laboratory as a concentration likely due to the analytical instrument
Bold = the concentration was detected at or above the laboratory Method Reporting Limit.
= denotes concentration exceeds applicable target concentration

[1] Value from Oregon Department of Environmental Quality: Portland Harbor Joint Source Control Strategy for Initial Upland Source Control Screening Evaluations for Soil and Stormwater Sediment, December, 2005, unless otherwise noted (see Note #2)
[2] Oregon Department of Environmental Quality: Risk-Based Concentrations for Soil (Leaching to Groundwater) in an Occupational Setting, September 2009.
[3] Stormwater samples collected by Wohlers Environmental Services, Inc. on the Christenson Oil property.
[4] TPH analysis by Method NWTPH-Dx for diesel- and oil-range organics, and Method NWTPH-Gx for gasoline range organics.
[5] Volatile organic compound analysis by EPA Method 8260B/C.
[6] Semi-volatile organic compound analysis by EPA Method SW8270C/D.
[7] Polychlorinated biphenyl analysis by EPA Method E8082.
[8] Total metals analysis by EPA Method SW6020/200.8.
[9] pH analysis by Method E150.1.
[10] Oil and grease analysis by Method E1664.
[11] Total suspended solids analysis by Method E160.2/2540D.
[12] Total organic carbon analysis by EPA Method 415.1.
[13] Source: National Pollutant Discharge Elimination System Storm Water Discharge Permit 1200-Z benchmark values.