Harbor Oil

Portland, Oregon

USEPA Facility ID: ORD071803985

Basin: Lower Columbia-Sandy

HUC: 17080001

Executive Summary

Harbor Oil is a waste oil reprocessing facility on approximately 1.7 ha (4.2 acres) in an industrial area in Portland, Oregon. Harbor Oil is adjacent to Force Lake and approximately 400 m (1,300 ft) southwest of North Portland Harbor, which is a side channel of the Columbia River. Waste oil was released from storage tanks at the site twice during the 1970s. Metals, SVOCs, pesticides, and PCBs have been detected in soil at the site and in sediment in the wetlands adjacent to the site. The lower Columbia River is a major migratory corridor for several NOAA trust resources, including Chinook, coho, chum, and sockeye salmon and steelhead trout. The NOAA trust habitats of concern are the surface waters of North Portland Harbor and the mainstem of the Columbia River near Hayden and Tomahawk Islands.

Site Background

Harbor Oil is a waste oil reprocessing facility on approximately 1.7 ha (4.2 acres) in an industrial area of Portland, Oregon. The site is approximately 400 m (1,300 ft) southwest of North Portland Harbor, which is connected to the Columbia River (Figure 1). The Harbor Oil property is bordered by North Force Avenue to the east and the North Wetland Area to the west and south. Force Lake is approximately 23 m (75 ft) south of the site. Overflow from Force Lake drains to the west into a culvert and then into North Lake (Hendrick 2003). A ditch called North Drainage Way originates at the southwest corner of the site and is fed by a culvert connected to North Lake. The ditch flows to the west approximately 1,500 m (4,800 ft) and empties into the Western Marsh (Fig 2).

Since 1961, the Harbor Oil site has primarily been used to collect used oils and asphalts, which are then processed and refined into reusable products (USEPA 2002a). Features at the site associated with oil recycling include a boiler room, two diesel fuel storage tanks, two fuel pumps, two gasoline storage tanks, and 15 petroleum recovery tanks that hold used petroleum products in varying stages of recovery (Figure 2). Dikes surround the petroleum recovery tanks to prevent uncontrolled releases of used petroleum to surface water. Three sumps are used to collect surface water that escapes from the dikes and general runoff from the site. The water collected in the sumps is diverted to an on-site oil/water separator, treated, and then discharged into the North Wetlands Area west and south of the site. An earthen dike borders the site's south and west sides to further direct surface water runoff toward the collection sumps (Ecology and Environment 2001).

In March 1974, a major release of waste oil from on-site storage tanks spread oil across approximately 0.8 ha (2 acres) of wetlands and created a sheen over the entire surface of Force Lake. In October 1979, the Harbor Oil facility was destroyed by a fire, which originated in the tank farm area. The fire caused at least five tanks to rupture and numerous 55-gallon drums to explode, leading to

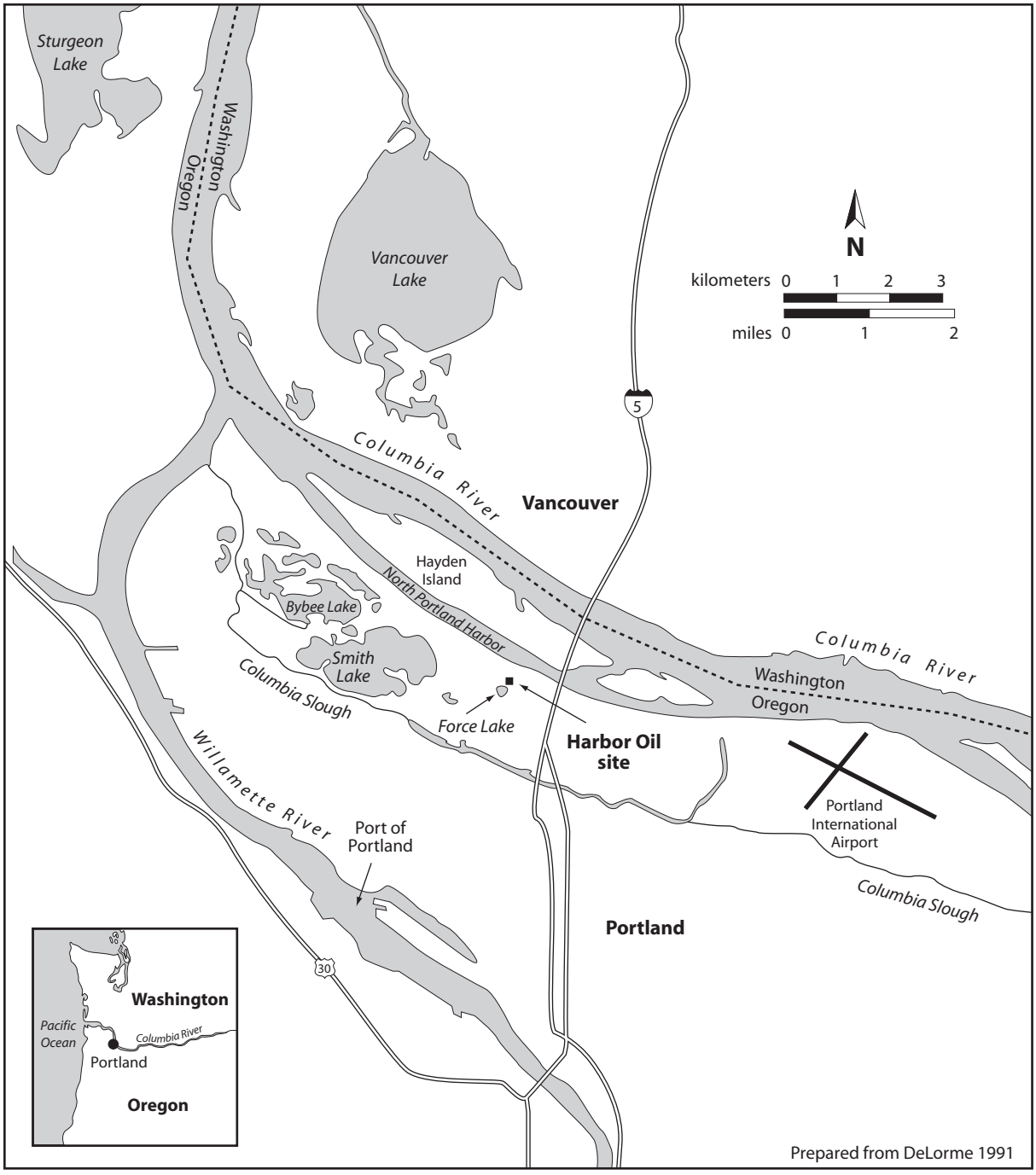

Figure 1. Location of Harbor Oil site, Portland, Oregon.

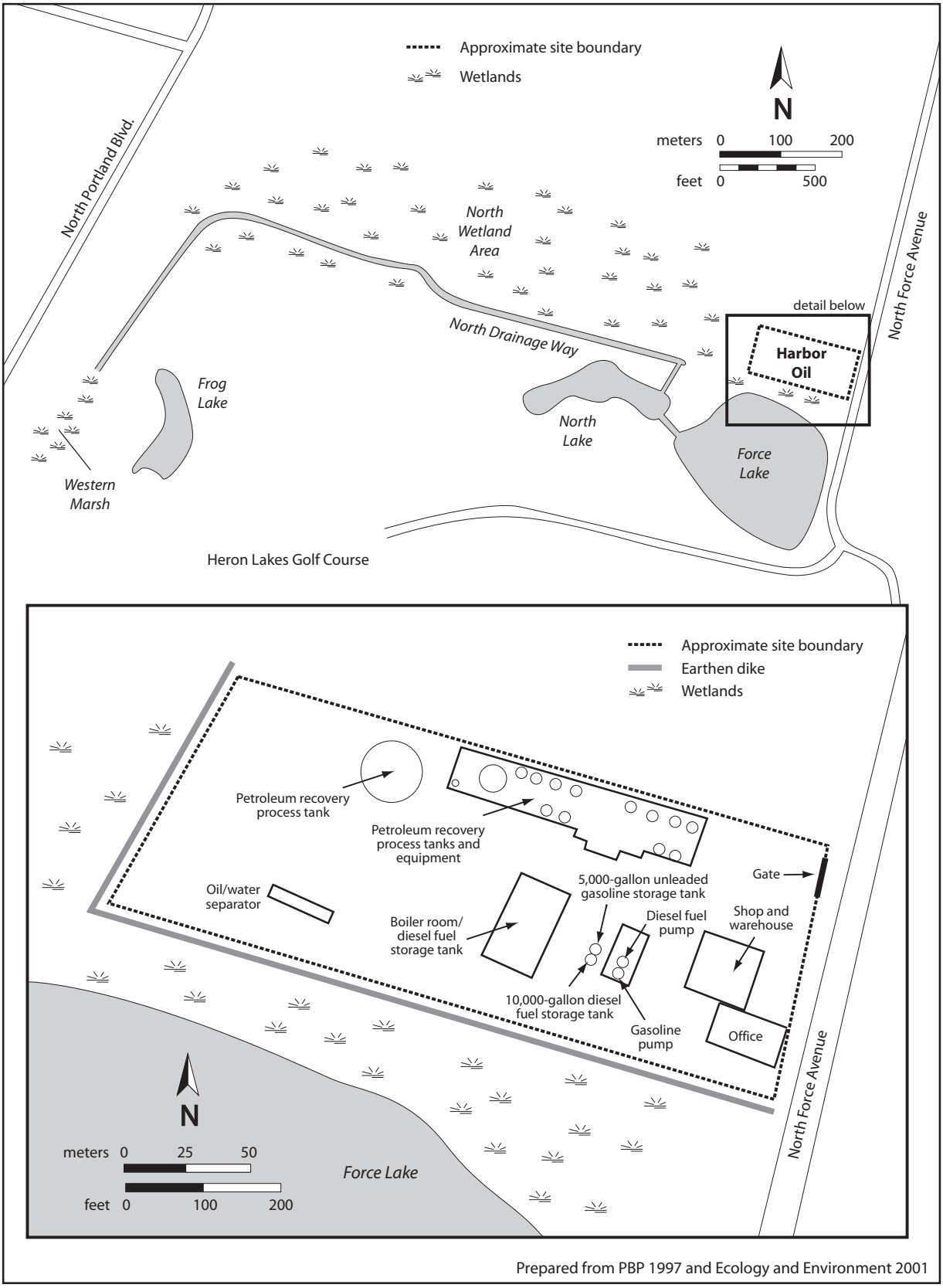

Figure 2. Detail of the Harbor Oil site.

a release of large volumes of used oil and lesser amounts of paints and solvents. The oil recycling facility was rebuilt in 1980 (Ecology and Environment 2001).

Since 1984, tank-truck cleaning has also occurred at the site. Tank-truck cleaning involves removing asphalt from the trucks using trichloroethylene (TCE). A closed-loop system is used to collect and distill the TCE/asphalt mixture; residual sludge is stored in 55-gallon drums until it is transported for treatment and disposal off site (Ecology and Environment 2001).

In 1980, the U.S. Environmental Protection Agency (USEPA) conducted a hazardous waste site inspection at the Harbor Oil site and concluded that the operations taking place at that time did not appear to be generating significant quantities of hazardous waste. However, the USEPA determined that the dike system around the tanks was inadequate and recommended continued investigation into the site's discharges to the nearby wetlands. During site visits throughout the late 1980s by the Oregon Department of Environmental Quality, releases from the oil/water separator to the nearby wetlands were observed (Ecology and Environment 2001).

In May 2001, the Region 10 Superfund Technical Assessment and Response Team completed a preliminary assessment/site inspection (PA/SI) of the Harbor Oil site (Ecology and Environment 2001). Chemistry data from the PA/SI are discussed below. The Harbor Oil site was proposed to the National Priorities List on September 5, 2002 (USEPA 2002a).

Surface water provides the primary pathway for the migration of contaminants from the Harbor Oil site to NOAA trust resources. The site is within the 100-year alluvial floodplain of the Columbia River (FEMA 1986). During floods, contaminants in the soil, sediment, and surface water could be transported into North Portland Harbor and the lower Columbia River (Ecology and Environment 2001). Surface runoff from the Harbor Oil site is collected and discharged into the North Wetland Area (Hendrick 2003). During storm events water is pumped from the North Wetland Area through pipes and open channels, over a levee, and into the Columbia Slough. Neither the wetlands nor the ditch have any other direct hydrologic connection to North Portland Harbor or the Columbia Slough (Frazier 2003; Hendrick 2003).

NOAA Trust Resources

The NOAA trust habitats of concern are the surface waters of North Portland Harbor and the mainstem of the Columbia River near Hayden and Tomahawk Islands, which are used by a number of NOAA trust resources (Table 1). The Columbia River is a major migratory corridor for several salmonid species migrating inland from the Pacific Ocean. Chinook (spring, summer, and fall runs), coho, chum, and sockeye salmon and steelhead trout (summer and winter runs) all migrate through this section of the Columbia River, as do American shad, Pacific lamprey, and smelt. For several years, smelt runs have been inconsistent and often reduced in number. During years with reduced runs, smelt spawn in the lower mainstem of the Columbia River, including the section near the Harbor Oil site. White sturgeon are also found in this section of the Columbia River, which they use as both a migratory corridor and for juvenile habitat. NOAA trust species present in the lower Columbia River also temporarily enter the mouth of the Columbia Slough to rest and avoid being flushed out of the river during floods. Salmon do not migrate further into the slough because water temperatures are too high (Caldwell 2003; Frazier 2003).

Table 1. NOAA trust resources present in North Portland Harbor and the Columbia River near the Harbor Oil site (Caldwell 2003; Frazier 2003).

Species		**Habitat Use**			**Fisheries**[a]	
Common Name	Scientific Name	Migratory Corridor	Spawning Habitat	Juvenile Habitat	Comm.	Rec.
ANADROMOUS FISH						
American shad	*Alosa sapidissima*	◆			◆	◆
Chinook salmon[b]	*Oncorhynchus tshawytscha*	◆			◆	◆
Chum salmon	*Oncorhynchus keta*	◆			◆	◆
Coho salmon	*Oncorhynchus kisutch*	◆			◆	◆
Pacific lamprey	*Lampetra tridentata*	◆				
Eulachon (Columbia River smelt)[c]	*Thaleichthys pacificus*	◆	◆			
Sockeye salmon	*Oncorhynchus nerka*	◆			◆	◆
Steelhead[d]	*Oncorhynchus mykiss*	◆			◆	◆
White sturgeon	*Acipenser transmontanus*	◆		◆	◆	◆

a: Fisheries status for salmonid species depends on the size of the runs.

b: This includes fall, spring, and summer runs.

c: Smelt runs have been inconsistent and low. During years when smelt runs have very low numbers, smelt may spawn in the Columbia River mainstem.

d: This includes summer and winter runs.

All the salmonid species listed in Table 1 are fished from the lower Columbia River both commercially and recreationally. Catch limits for each species depend on the size of the run. In addition, there is commercial and recreational fishing of American shad and white sturgeon in the lower Columbia River. No commercial or recreational fishing is permitted inside North Portland Harbor (Frazier 2003).

A fish consumption advisory is in effect for the North Portland Harbor area and the Columbia River because of the presence of polychlorinated biphenyls (PCBs) and other organic contaminants. The advisory recommends that pregnant women, women of child-bearing age, and children limit their consumption of fish caught in these waters (ODHS 2003).

Site-Related Contamination

Between July 31 and August 2, 2000, the Region 10 Superfund Technical Assessment and Response Team collected samples from the Harbor Oil site. Twenty-five soil samples (15 surface and 10 subsurface), six sediment samples, and seven groundwater samples were collected and analyzed for metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, and/or PCBs depending on sample location and the contaminants expected at that location. Table 2 summarizes the maximum concentrations of the primary contaminants of concern detected in the media sampled at the Harbor Oil site (Ecology and Environment 2001).

Table 2. Maximum concentrations of the primary contaminants of concern detected in soil, groundwater, and sediment samples collected at the Harbor Oil site (Ecology and Environment 2001). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)		Water (µg/L)		Sediment (mg/kg)	
Contaminant	Soil	Mean U.S. Soil[a]	Ground-water	AWQC[b]	Sediment	TEC[c]
METALS						
Arsenic	**7.2**	5.2	25	150	**26**	9.79
Cadmium	**3.8**	0.06	**1.3**	0.25[d]	**2.0**	0.99
Chromiume	**38**	37	8.1	11	**96**	43.4
Copper	**290**	17	**25**	9[d]	**120**[f]	31.6
Lead	**340**	16	**20**	2.5[d]	**260**	35.8
Mercury	**6.7**	0.058	0.14	0.77[g]	**0.40**	0.18
Nickel	**32**	13	25	52[d]	**43**	22.7
Selenium	**0.43**	0.26	4.7	5.0[g]	1.1	NA
Silver	**3.2**	0.05	N/A	3.2[dh]	1.5	NA
Zinc	**290**	48	**1200**	120[d]	**750**	121
SEMIVOLATILE ORGANIC COMPOUNDS						
Acenaphthene	1.0	NA	3.2	520[i]	ND	NA
Acenaphthylene	0.60	NA	ND	NA	0.84	NA
Anthracene	1.0	NA	ND	NA	**0.90**	0.0572
Benz(a)anthracene	0.89	NA	ND	NA	ND	0.108
Chrysene	1.4	NA	ND	NA	**1.1**	0.166
Dibenz(a,h)anthracene	0.24	NA	ND	NA	ND	0.033
Fluoranthene	1.9	NA	0.64	NA	**2.7**	0.423
2-Methylnaphthalene	23	NA	0.1	NA	2.9	NA
Naphthalene	5.9	NA	ND	620[i]	**4.2**	0.176
Phenanthrene	6.8	NA	ND	NA	**4.4**	0.204
Pyrene	2.5	NA	0.53	NA	**4.6**	0.195
PESTICIDES/PCBs						
DDE	0.52[j,k]	NA	ND	NA	**0.23**[j]	0.00316
DDT	8.4[l]	NA	ND	0.001[m]	**0.068**[l]	0.00416
Total PCBs	12	NA	ND	0.014	**2.3**	0.0598

a: Shacklette and Boerngen (1984), except for cadmium and silver, which represent average concentrations in the Earth's crust from Lindsay (1979).

b: Ambient water quality criteria for the protection of aquatic organisms (USEPA 2002b). Freshwater chronic criteria presented.

c: Threshold Effects Concentration (TEC). Concentration below which harmful effects are unlikely to be observed (MacDonald et al. 2000).

d: Criterion expressed as a function of total hardness; concentrations shown correspond to hardness of 100 mg/L $CaCO_3$.

e: Screening guidelines represent concentrations for $Cr.^{+6}$

f: Concentration adjusted by the lab due to unknown bias.

g: Criterion expressed as total recoverable metal.

h: Chronic criterion not available; acute criterion presented.

i: Lowest Observable Effects Level (LOEL) (USEPA 1986).

j: Expressed as p,p'-DDE.

k: Concentration adjusted by the lab due to a high bias.

l: Expressed as p,p'-DDT.

m: Expressed as total DDT.

NA: Screening guidelines not available

ND: Not detected.

N/A: Not analyzed for.

Sediment

Metals, SVOCs, pesticides, and PCBs were detected in sediment samples collected from the wetlands south and west of the Harbor Oil site. The maximum concentrations of all the metals listed in Table 2 exceeded the threshold effects concentration (TEC) by a factor of two or more, except selenium and silver, for which no TECs are currently available. The majority of the maximum metals concentrations occurred in a sample collected along the earthen dike that separates the site from the wetlands to the west. Maximum concentrations of anthracene, naphthalene, phenanthrene, and pyrene exceeded the TECs by one order of magnitude. Maximum concentrations of chrysene and fluoranthene were detected at concentrations six times the TEC. Two other SVOCs for which TECs are not available were detected in the sediment samples. The maximum concentrations of SVOCs were detected in the same sample as were the maximum metals concentrations. PCBs were detected at a maximum concentration that exceeded the TEC by one order of magnitude, also in the sample collected along the earthen dike. The pesticides DDE and DDT were detected at maximum concentrations that exceeded the TECs by one order of magnitude. These maximum concentrations occurred in samples collected near the southwestern corner of the site.

Groundwater

Metals and SVOCs were detected in groundwater at the Harbor Oil site. The maximum concentration of zinc exceeded the ambient water quality criteria (AWQC) by one order of magnitude. The maximum concentrations of copper and lead exceeded the AWQC by factors of approximately three and eight, respectively. Arsenic, cadmium, chromium, mercury, nickel, and selenium were detected at maximum concentrations that did not exceed the AWQC. The majority of the maximum metals concentrations occurred in a sample collected approximately 15 m (50 ft) west of the largest petroleum process recovery tank shown on Figure 2. Four SVOCs were detected in the groundwater samples. The maximum SVOC concentrations ranged from 0.1 µg/L (2-methylnaphthalene) to 3.2 µg/L (acenaphthene). Three of the four maximum concentrations of SVOCs were detected in a sample collected south of the office. AWQC are not available for most SVOCs.

Soil

Metals, SVOCs, pesticides, and PCBs were detected in soil samples from the Harbor Oil site. All the metals listed in Table 2 were detected at maximum concentrations in excess of the mean U.S. soil guidelines. The maximum concentration of mercury exceeded the mean U.S. soil guideline by two orders of magnitude, while the maximum concentrations of cadmium, copper, lead, and silver exceeded the guidelines by one order of magnitude. The maximum concentrations of arsenic, nickel, selenium, and zinc exceeded the mean U.S. soil guidelines by less than an order of magnitude (at factors ranging from less than twice to six times the guidelines). The maximum concentrations of metals occurred in a sample collected approximately 15 m (50 ft) north of the oil/water separator shown on Figure 2, except the maximum concentration of selenium, which was detected in a sample collected near the southwestern corner of the boiler room/diesel fuel tank. Several SVOCs were detected in the soil samples at maximum concentrations ranging from 0.24 mg/kg (dibenz(a,h)anthracene) to 23 mg/kg (2-methylnaphthalene). Maximum concentrations of the pesticides DDE (0.52 mg/kg) and DDT (8.4 mg/kg) were detected in a sample collected near the southwestern corner of the boiler room/diesel fuel tank. PCBs were detected at a maximum concentration of 12 mg/kg in a sample collected between the shop and warehouse building and the petroleum recovery process tanks and equipment. Mean U.S. soil guidelines are not available for comparison with the maximum concentrations of SVOCs, pesticides, and PCBs.

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