Coastal and Estuarine

Hazardous Waste Site Reports

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NOS
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OR&R
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September 2004

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Contents

Acronyms and abbreviations

AST	Above-ground Storage Tank
AWQC	Ambient water quality criteria for the protection of aquatic life
bgs	below ground surface
BHC	benzene hexachloride
BNA	base, neutral, and acid-extractable organic compounds
BOD	biological oxygen demand
BSL	brine sludge lagoon
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
cfs	cubic feet per second
cm	centimeter
COC	contaminant of concern
COD	chemical oxygen demand
COE	U.S. Army Corps of Engineers
CRC	Coastal Resource Coordinator
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DNAPL	dense non-aqueous phase liquid
DNT	dinitrotoluene
DOD	U.S. Department of Defense
DOI	U.S. Department of the Interior
EPA	U.S. Environmental Protection Agency
ERL	Effects Range - Low
ERM	Effects Range - Median
ft	foot
ha	hectare
HMX	cyclotetramethylene tetranitramine
HRS	Hazard Ranking System
HUC	Hydrologic Unit Code
kg	kilogram
km	kilometer
L	liter
LNAPL	light, non-aqueous phase liquid
LOEL	lowest observed effects level
m	meter
mi	mile
m^3/second	cubic meter per second
µg/g	micrograms per gram (ppm)
µg/kg	micrograms per kilogram (ppb)
µg/L	micrograms per liter (ppb)
µR/hr	microroentgens per hour
mg	milligram
mg/kg	milligrams per kilogram (ppm)
mg/L	milligrams per liter (ppm)
mR/hr	milliroentgens per hour
NAPL	non-aqueous phase liquid
NFA	no further action
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OU	operable unit
PAH	polycyclic (or polynuclear) aromatic hydrocarbon
PA/SI	Preliminary Assessment/Site Investigation
PCB	polychlorinated biphenyl
PCE	perchloroethylene (aka tetrachloroethylene)
pCi/g	picocuries per gram
PCP	pentachlorophenol
PNRS	Preliminary Natural Resource Survey
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand or parts per trillion
PRP	Potentially Responsible Party
PVC	polyvinyl chloride

RCRA Resource Conservation and Recovery Act

RD/RA Remedial Design/Remedial Action

RDX cyclonite

RI/FS Remedial Investigation/Feasibility Study

ROD Record of Decision

SARA Superfund Amendments and Reauthorization Act of 1986

SVOC semi-volatile organic compound

TCA 1,1,1-trichloroethane

TCE trichloroethylene

TCL Target Compound List

TNT trinitrotoluene

TPH total petroleum hydrocarbons

TSS total suspended solids

USEPA U.S. Environmental Protection Agency

USFWS U.S. Fish and Wildlife Service

USGS U.S. Geological Survey

UST underground storage tank

VOC volatile organic compound

< less than

> greater than

Introduction

The National Oceanic and Atmospheric Administration (NOAA) regularly evaluates hazardous waste sites that are proposed for addition to the National Priorities List (NPL), a U.S. Environmental Protection Agency (USEPA) listing of sites that have undergone preliminary assessment and site inspection to determine which locations pose the greatest threat. The NPL is compiled under authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (United States Code, Title 42, Chapter 103). This volume identifies hazardous waste sites that could impact natural resources for which NOAA acts as a federal trustee under the National Oil and Hazardous Substances Pollution Contingency Plan (commonly referred to as the National Contingency Plan or NCP) (Code of Federal Regulations, Title 40, Part 300).

Waste site reports (WSRs) of the type included in this volume often represent NOAA's first examination of a site. Following completion of a WSR, some sites may require a more in-depth assessment called a Preliminary Natural Resource Survey (PNRS). NOAA has published 351 coastal and estuarine hazardous WSRs, 145 PNRS's, and three Air Force Reports (see Tables 1 and 2 in the appendix for a complete list).

Not all hazardous waste sites will affect NOAA trust resources; NOAA is concerned about sites located near trustee resources and their habitats in states along the Atlantic and Pacific oceans, the Gulf of Mexico, and the Great Lakes. NOAA works with the USEPA to identify and assess risks to natural resources and to develop strategies to minimize those risks. Trustee responsibilities also include evaluating cleanup alternatives and restoring habitats.

NOAA uses information from this volume to establish priorities for further site investigations. NOAA's regional Coastal Resource Coordinators (CRCs) will follow up on sites that appear to pose ongoing problems. The CRCs work with other agencies and trustees to communicate any concerns to the USEPA. The CRCs also review sampling and monitoring plans for the sites and help to plan and set objectives for site cleanups. This coordinated approach protects all natural resources, not just those for which NOAA is a steward. The USEPA can use the WSRs to help identify the types of information that may be needed to complete environmental assessments of the sites. Other federal and state trustees can use the reports to help evaluate the potential impacts to their resources.

Each WSR contains an executive summary and three distinct sections. The first section, Site Background, describes the site, previous site operations and disposal practices, and pathways by which contaminants could migrate to NOAA trust resources. The second section, NOAA Trust Resources, describes the species, habitats, and commercial and recreational fisheries near the site. The final section, Site-Related Contamination, identifies the contaminants of concern to NOAA and describes contaminant distribution at the site.

In addition to the WSRs, this volume contains a list of acronyms and abbreviations (p. vii) and a glossary of terms (p. 75) that commonly appear throughout the reports. Table 1 in the appendix lists the WSRs that NOAA has published to date, and Table 2 lists all of the sites as of July 2004 at which NOAA has been involved because of their potential to affect trust resources. Table 2 also lists the number and variety of hazardous waste reports that the Coastal Protection and Restoration Division has published since 1984, including PNRS's and Air Force Reports.

Chemical-Specific Screening Guidelines

Most WSRs contain a table that focuses on the contaminants in different media that have potential to degrade natural resources. These site-specific tables highlight only a few of the many contaminants often found at hazardous waste sites. We compare the chemical concentrations reported in the tables against published screening guidelines for surface water, groundwater, soil, and sediment. Because contaminant releases from hazardous waste sites to the environment can span many years, we are concerned about long-term effects to natural resources. This is why we compare site contaminant levels against screening guidelines for chronic effects rather than for short-term effects.

Ambient water quality criteria (AWQC; USEPA 2002) are used for comparison to contaminant levels detected in surface water and groundwater; mean U.S. soil concentrations (Shacklette and Boerngen 1984; USEPA 1983; Lindsay 1979) are used for comparison to contaminant levels in soil; and effects range-low (ERL) values (Long and Morgan 1991) and threshold effects level (TEL) values (MacDonald 1993) are used for comparison to contaminant levels in sediment.

There are no national criteria for sediment comparable to the AWQC established for water. In the absence of national criteria, we compare sediment concentrations to several published screening guidelines (Long and Morgan 1991; MacDonald et al. 1996; MacDonald et al. 2000a; MacDonald et al. 2000b). Studies that associate contaminant concentrations in sediment with biological effects provide guidance for evaluating contaminant concentrations that could harm sediment-dwelling aquatic organisms. These studies include Kemble et al. 2000; Long et al. 1998; MacDonald et al. 1996; Smith et al. 1996; Long et al. 1995; and Long and MacDonald 1992. However, screening guidelines are often based on effects from individual chemicals. Their application may be difficult when evaluating biological effects that could be attributed to combined effects from multiple chemicals, unrecognized chemicals, or physical parameters that were not measured.

NOAA's National Status and Trends Program has used chemical and toxicological evidence from a number of modeling, field, and laboratory studies to determine the ranges of chemical concentrations associated with toxic biological effects (Long and Morgan 1991; Long and MacDonald 1992):

- No Effects Range — the range of concentrations over which toxic effects are rarely observed;
- Possible Effects Range — the range of concentrations over which toxic effects are occasionally observed; and
- Probable Effects Range — the range of concentrations over which toxic effects are frequently observed.

Two slightly different methods (Long and Morgan 1991; MacDonald 1993) were used to determine these chemical ranges. Long and Morgan (1991; see also Long et al. 1995) compiled chemical data associated with adverse biological effects. The data were ranked to determine where a chemical concentration was associated with an adverse effect (the ERL)—the lower 10th percentile for the data set in which effects were observed or predicted. Sediment samples were not expected to be toxic when all chemical concentrations were below the ERL values.

MacDonald (1993) modified the approach used by Long and Morgan to include both the "effects" and "no effects" data, whereas Long and Morgan used only the "effects" data. TELs were derived by taking the geometric mean of the 15th percentile of the "effects" data and the 50th percentile of the "no effects" data.

Although different percentiles were used for these two methods, their results closely agree (Kemble et al. 2000). We do not advocate one method over the other, and we use both screening guidelines to help focus cleanup efforts in areas where natural resources may be at risk from site-related contaminants.

Chemical concentrations in soil that are elevated above background levels (for this purpose, the mean U.S. soil concentrations) can indicate a potential source of contamination. Ideally, screening guidelines for soils would be calculated from a regional data set. In the absence of such data, we compare soil concentrations to the national mean concentrations (Shacklette and Boerngen 1984), except for cadmium and silver, which we compare to average concentrations in the Earth's crust (USEPA 1983; Lindsay 1979). The soil values are based on averages calculated from soil data collected throughout the U.S. and are used as a reference only for comparison purposes.

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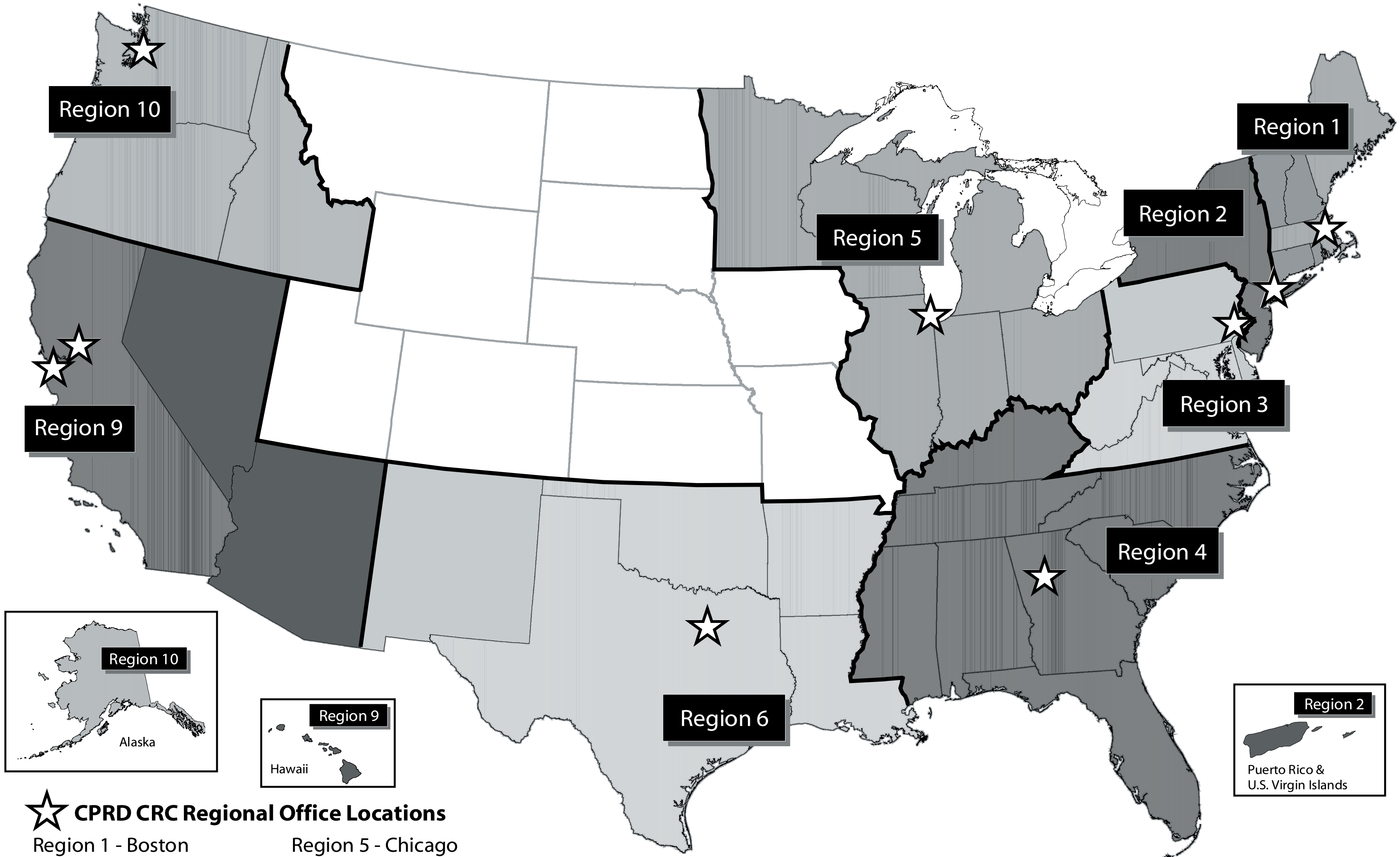
CPRD Coastal Resource Coordinators in EPA Regions



CPRD CRC Regional Office Locations

Region 1 - Boston
Region 2 - New York
Region 3 - Philadelphia
Region 4 - Atlanta
Region 5 - Chicago
Region 6 - Dallas
Region 9 - San Francisco and Sacramento
Region 10 - Seattle

Atlantic Resources

Sayreville, New Jersey

USEPA Facility ID: NJD981558430

Basin: Raritan

HUC: 02030105

Executive Summary

The Atlantic Resources site is located in the Borough of Sayreville, New Jersey on the Raritan River approximately eight km (five mi) upstream of Raritan Bay. From 1972 to 1985 reclamation, recovery, and refinement of precious metals took place at the Atlantic Resources site. Arsenic, nickel, and silver, are the primary contaminants of concern at the site. During environmental investigations at the site, contaminants were detected in all environmental samples collected. A wide variety of NOAA trust resources are present in the Raritan River near the site.

Site Background

The Atlantic Resources site is located approximately 60 m (200 ft) southeast of the Raritan River, which discharges into Raritan Bay eight km (five mi) downstream of the site (Figure 1). The site is part of the former Horseshoe Road Industrial Complex and is surrounded by several other facilities including Atlantic Development Corporation, the Horseshoe Road drum dump (HRDD), and the Sayreville pesticide dump (Figure 2). A contaminated marsh area classified as an emergent wetland is located between the site and the Raritan River. Structures remaining at the site include two abandoned buildings, several above ground storage tanks (ASTs), and several incinerators (CDM Federal 2000).

Prior to 1972, solvent reclamation and possibly hazardous waste incineration activities took place at the Atlantic Resources site. During this time period it is reported that ammonia was disposed of in three surface impoundments located at the site. From 1972 to 1985 the reclamation, recovery, and refinement of precious metals, including gold silver, and platinum were the primary activities that took place at the Atlantic Resources site. X-ray film, metal foils, microfilm, and coated papers were incinerated in eight fabricated burners. After incineration, the remaining ash was crushed in the ball-room building (exact location of this building could not be determined) and then shipped offsite for smelting. In addition to reclamation by incineration, sodium cyanide baths were used to release precious metals from circuit boards, casting sweeps, and fines. The precious metals were filtered out of the acid solution and smelted into ingots. The remaining acid was then neutralized (CDM Federal 1999).

Improper waste management techniques have been documented at the site since 1972. Unknown chemicals were reportedly disposed of directly into the Raritan River and drums of potassium cyanide, and nitric, muriatic, and hydrochloric acids were dumped into a wooded area near the site. Twice during the 1970s the discharge of a dark-colored liquid into the Raritan River was observed and reported to New Jersey Department of Environmental Protection (NJDEP). Investigation of the second observed discharge revealed that the source was a black pool of water at the rear of the facility. This pool was connected by underground pipe to a drainage ditch that was discharging

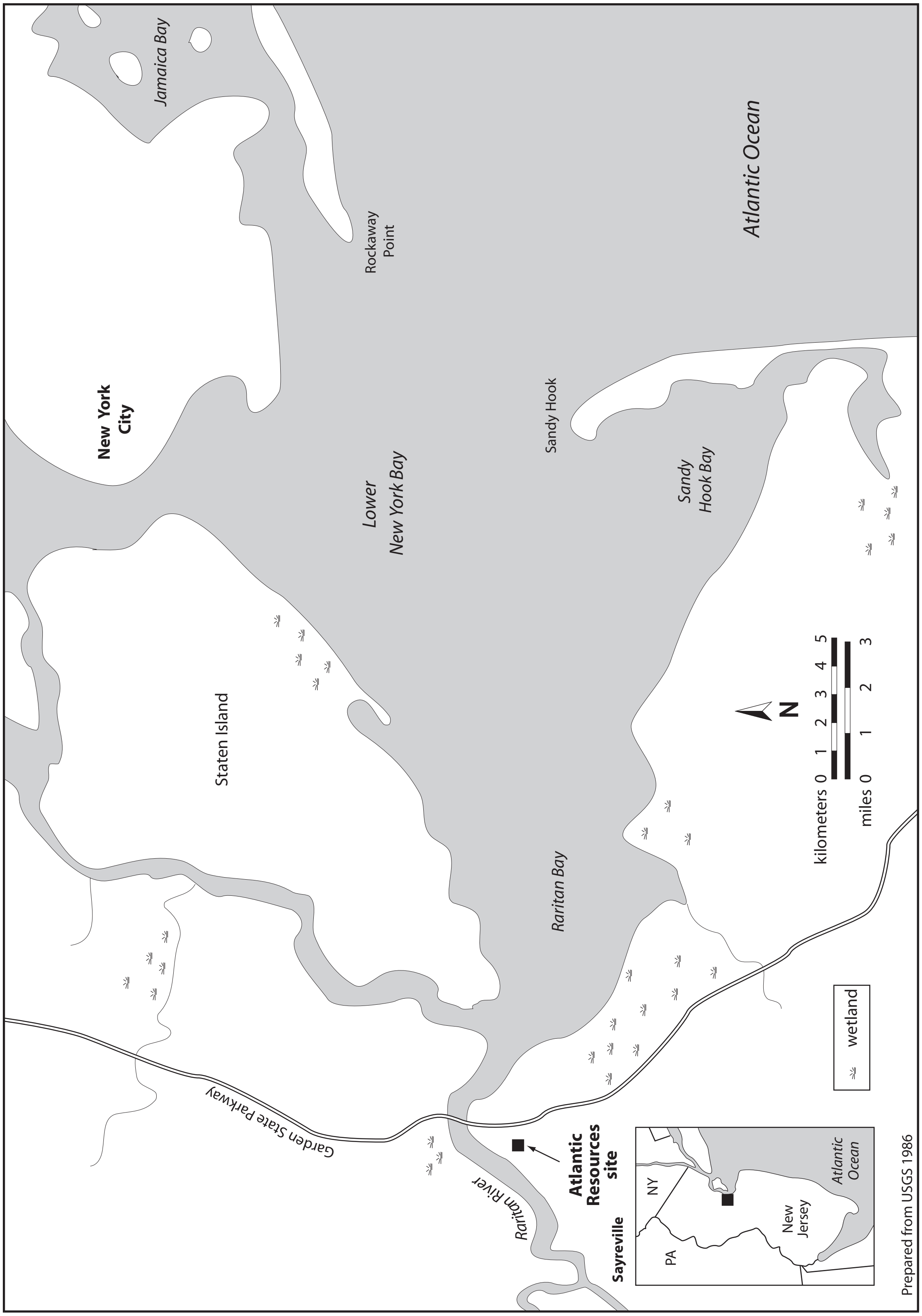


Figure 1. Location of Atlantic Resources site in Sayreville, New Jersey.

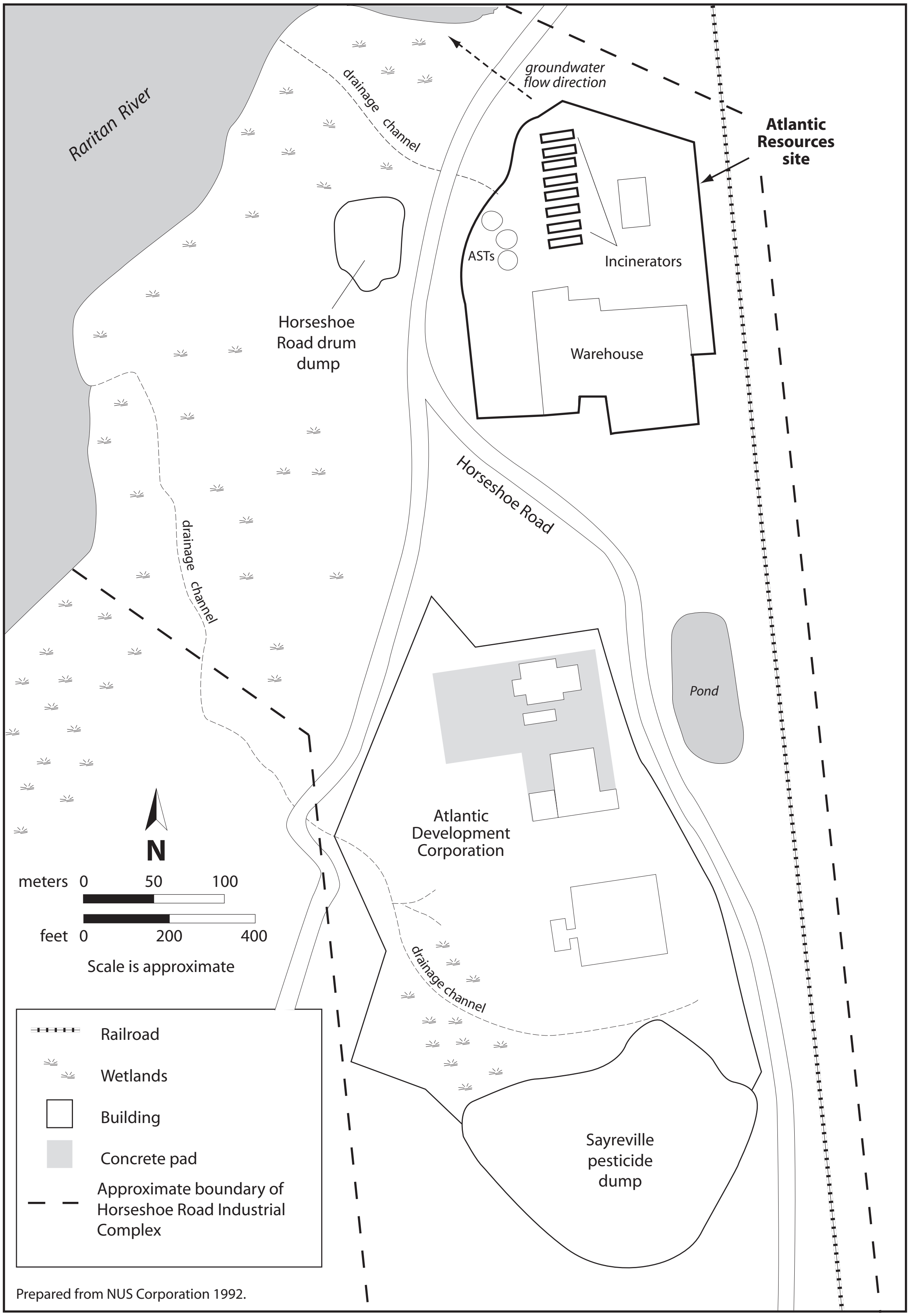


Figure 2. Detail of Atlantic Resources property.

directly to the Raritan River (CDM Federal 1999). In addition, during a 1987 removal-related excavation an intact, partially filled drum was discovered at the site. Air monitoring during this excavation indicated that elevated concentrations of volatile organic vapors were present (CDM Federal 1999).

Surface water runoff, direct discharge, and groundwater migration are the potential pathways for the transport of contaminants from the site to NOAA trust resources. Several unnamed drainage channels flow from the site through the adjacent marsh area and eventually drain into the Raritan River. Groundwater at the site is very shallow and is under both unconfined and confined conditions. Groundwater flow beneath the site is tidally influenced and is northwest toward the Raritan River (CDM Federal 1999).

The Atlantic Resources site was originally placed on the National Priorities List (NPL) in September 1995 as one of the areas of concern at the Horseshoe Road Superfund site. Due to legal actions taken by Atlantic Resources, the site was removed from the Horseshoe Road site in April 1997. In September 2001, after further sampling and analysis were completed during a USEPA Remedial Investigation (RI), the Atlantic Resources site was proposed for placement on the NPL as a separate site (USEPA 2001).

NOAA Trust Resources

Primary habitats of concern to NOAA are surface waters, substrates, and associated wetlands of the Raritan River and surface waters and associated bottom substrates of Raritan Bay. The Raritan River is included in the New York/New Jersey Harbor management area under the National Estuary Program, a federal program designed to create management plans for estuaries of national significance (Byrne 1994a; Gastrich 1990).

From the site, the Raritan River flows approximately 8 km to Raritan Bay. Near the site, the Raritan River is approximately 2.5 to 7.5 m deep and 0.75 to 1.0 km wide, with bottom substrates composed primarily of fine sand, silt, and clay. Surface waters are mesohaline and typically range from 5 to 20 parts per thousand (ppt) and average between 10 and 15 ppt, depending on rainfall, tidal phase, saltwater intrusion, and urban runoff (Byrne 1994a). Tidal amplitude in this portion of the Raritan River averages 1.6 m (Byrne 1994a; USGS 1981 (Photo-revised from 1954)).

Estuarine intertidal wetlands present in this reach of the Raritan River are largely disturbed and commonly dominated by reed grass (*Phragmites communis*). Wetland areas in this portion of the Raritan River are fringed by isolated stands of salt meadow hay (*Spartina patens*), salt marsh cord grass (*Spartina alterniflora*), saltwater sedges (*Scripus* spp.), and salt grass (*Distichlis spicata*) (Byrne 1994a).

The Raritan River serves as habitat for migratory and estuarine-dependent fish and invertebrate species of concern to NOAA (Table 1) (Barno 2002; Boriek 1991; Boriek 1992; Byrne 1994a; Byrne 1994b; Stuart 1991). The first barrier to fish migration on the Raritan River is the Calco Dam, however this dam is located approximately 19 km upstream of the Atlantic Resources site, and fish are not prevented from using the area near the site as juvenile and adult habitat, as well as a migratory corridor to reach spawning areas above the Atlantic Resources site (Crouse 2003). NOAA trust species occurring in greatest abundance near the site include bay anchovy, killifishes, silversides, and grass shrimp. Atlantic menhaden, weakfish, spot, Atlantic tomcod, bluefish, blue crab, and sand shrimp are common inhabitants found in the lower Raritan River estuary. Anadromous runs of alewife, blueback herring, and American shad commonly enter the Raritan River drainage during

Table 1. NOAA trust resources present in the vicinity of the Atlantic Resources Corporation site (Boriek 1991 and 1992; Stuart 1991; Byrne 1994; Barno 2002).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
ANADROMOUS FISH						
Alewife	*Alosa pseudoharengus*		◆	◆		
American shad	*Alosa sapidissima*		◆	◆		
Atlantic sturgeon	*Acipenser oxyrhynchus*			◆		
Blueback herring	*Alosa aestivalis*		◆	◆		
Rainbow smelt	*Osmerus mordax*			◆		
Striped bass	*Morone saxatilis*		◆			◆
CATADROMOUS FISH						
American eel	*Anguilla rostrata*		◆	◆		
MARINE/ESTUARINE FISH						
Atlantic croaker	*Micropogonias undulatus*		◆			
Atlantic herring	*Clupea harengus*		◆			
Atlantic manhaden	*Brevoortia tyrannus*		◆	◆		
Atlantic tomcod	*Microgadus tomcod*		◆	◆		
Bay anchovy	*Anchoa mitchilli*	◆	◆	◆		
Black drum	*Pogonias cromis*		◆			
Bluefish	*Pomatomus saltatrix*		◆	◆		◆
Butterfish	*Peprilus triacanthus*		◆			
Gobies	*Gobiosoma spp.*	◆	◆	◆		
Hogchoker	*Trinectes maculatus*		◆			
Killifishes	*Fundulus spp.*	◆	◆	◆		
Mullets	*Mugil spp.*		◆			
Northern pipefish	*Syngnathus fuscus*	◆	◆	◆		
Northern searobin	*Prionotus carolinus*		◆			
Oyster toadfish	*Opsanus tau*	◆	◆	◆		
Red hake	*Urophycis chuss*		◆			
Silversides	*Menidia spp.*	◆	◆	◆		
Spot	*Leiostomus xanthurus*		◆			
Summer flounder	*Paralichthys dentatus*		◆			◆
Tautog	*Tautoga onitis*		◆			
Weakfish	*Cynoscion regalis*		◆			
White perch	*Morone americana*			◆		
Windowpane flounder	*Scophthalmus aquosus*		◆			
Winter flounder	*Pleuronectes americanus*	◆	◆	◆		◆
INVERTEBRATES						
Blue crab	*Callinectes sapidus*		◆	◆	◆	◆
Brown shrimp	*Penaeus aztecus*	◆	◆	◆		
Daggerblade grass shrimp	*Palaemonetes pugio*	◆	◆	◆		
Northern quahog	*Mercenaria mercenaria*	◆	◆	◆		
Sand shrimp	*Crangon septemspinosa*	◆	◆	◆		
Softshell clam	*Mya arenaria*			◆		

the spring to access suitable freshwater spawning habitats farther upstream. Juveniles generally return to the ocean and the lower Raritan Bay by the following fall (Byrne 1994a). Bluefish seasonally migrate into the Raritan River to forage on alewife, blueback herring, American shad, Atlantic menhaden, and killifishes (Pottern et al. 1989). Weakfish and spot utilize surface waters near the site exclusively as a juvenile rearing habitat. American shad and Atlantic tomcod use the Raritan River as an adult forage area and nursery habitat. It is generally assumed that tomcod in the Raritan River are strays originating from the Hudson River stock and do not represent a distinct population. American eel are ubiquitous throughout the Raritan River drainage. Blue crabs use the river as a seasonal juvenile and adult foraging area (Barno 2002; Byrne 1994a; Byrne 1994b).

Some recreational fishing and crabbing occurs near the site, while commercial activities exclusively target the blue crab fishery in the Raritan River. Recreational fishers are considered unlikely to target any specific species of finfish, but striped bass, summer flounder, winter flounder, and bluefish are likely the most commonly captured fish species (Byrne 1994a; Byrne 1994b). Sport fishing occurs primarily during warm weather months when targeted species migrate into the Raritan River watershed (Stuart 1991). Commercial and recreational crabbing occurs regularly at Crab Island, approximately 3.0 km upstream from the site (Byrne 1994a).

A fish consumption advisory is in effect for Raritan Bay, the tidal portions of the Raritan River downstream of the Route 1 bridge in New Brunswick, and the tidal portions of all rivers and streams that feed into these water bodies. The advisory is in effect because of PCB, dioxin [sic], and chlordane contamination and affects consumption of striped bass, bluefish (exceeding 6 lbs), white perch, white catfish, and blue crab (NJDEP 2002). Sale of striped bass from these waters is prohibited in New Jersey. Limits are imposed on recreational catches of American shad, striped bass, and several warmwater species (NJDFW 2002). No federal or state protected species are known to frequent nearby habitats of concern (USFWS 2002).

Site-Related Contamination

Elevated concentrations of metals and inorganics were detected in all environmental media sampled from the Atlantic Resources site. A remedial investigation/feasibility study (RI/FS) conducted at the Horseshoe Road Industrial Complex was completed in September 2000. During this investigation, 76 soil, nine surface water, and 14 sediment samples were collected specifically to identify contamination at the Atlantic Resources site. An additional 124 sediment and 22 groundwater samples were collected with the intent of documenting the migration of contaminants from the entire Horseshoe Road Industrial Complex into the surrounding marsh area and the Raritan River. All media sampled at the site were analyzed for metals and inorganics, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), including polynuclear aromatic hydrocarbons (PAHs), pesticides, and polychlorinated biphenyls (PCBs). River sediment samples were analyzed for dioxins. Maximum concentrations of selected contaminants of concern and their respective screening guidelines are summarized in Table 2.

Soil

Metals and inorganics were detected at concentrations that exceeded mean U.S. soil concentrations in soil samples collected from the Atlantic Resources site. Arsenic, chromium, and lead were the metals most frequently detected in soil samples collected from the site. The greatest concentrations of mercury, selenium, and silver were found in soil samples just south of the incinerators. A soil sample collected from the eastern side of the property contained the maximum concentrations of cadmium, lead, nickel, and zinc. The maximum concentration of silver exceeded the mean U.S. soil concentration by three orders of magnitude. Concentrations of several other metals, including cadmium, copper, lead, mercury, nickel and zinc, exceeded their respective screening guidelines by at least one order of magnitude.

Table 2. Maximum concentrations of contaminants of concern to NOAA in environmental media at the Atlantic Resources Corporation site (CDM Federal 1999, CDM Federal 2000). Bold values indicate contaminant exceeded the screening criteria.

	Soil (mg/kg)		Water (µg/l)			Sediment (mg/kg)	
Contaminant	Soil	Mean U.S.[a] Soil	Ground-water	Surface Water	AWQC[b]	Sediment	ERL[c]
METALS/INORGANICS							
Arsenic	**33**	5.2	**71**	**570**	36	**8,200**	8.2
Cadmium	**100**	0.06	**110**	8.5	8.8	**6.6**	1.2
Chromium[d]	**260**	37	**830**	2.4	50	**5,000**	81
Copper	**590**	17	ND	**1,200**	3.1	**4,000**	34
Lead	**12,000**	16	**37**	**93**	8.1	**420**	46.7
Mercury	**33**	0.058	ND	**2.7**	0.94[e]	**390**	0.15
Nickel	**510**	13	**2,700**	**10**	8.2	**670**	20.9
Selenium	**1.9**	0.26	ND	<1.8	71	**41**	1[f]
Silver	**290**	0.05	ND	**51**	1.9[g]	**63**	1
Zinc	**31,000**	48	ND	**470**	81	**1,300**	150
PAHs							
Acenaphthene	ND	NA	ND	ND	710[h]	**1.7**	0.016
Acenaphthylene	ND	NA	ND	ND	300[g,h,i]	**0.19**	0.044
Anthracene	ND	NA	ND	ND	300[g,h,i]	**0.49**	0.0853
Benz(a)anthracene	ND	NA	ND	ND	300[g,h,i]	**1.1**	0.261
Chrysene	ND	NA	ND	ND	300[g,h,i]	**0.58**	0.384
Dibenz(a,h)anthracene	ND	NA	ND	ND	300[g,h,i]	**0.18**	0.0634
Fluoranthene	ND	NA	ND	ND	16[h]	**1.8**	0.6
Fluorene	ND	NA	ND	ND	300[g,h,i]	**0.34**	0.019
2-Methylnaphthalene	ND	NA	ND	ND	300[g,h,i]	**0.42**	0.07
Naphthalene	ND	NA	ND	ND	2350[g,h]	**1.5**	0.16
Phenanthrene	ND	NA	ND	ND	NA	**0.99**	0.24
Pyrene	ND	NA	ND	ND	300[g,h,i]	**6**	0.665
PHENOLs							
Pentachlorophenol	ND	NA	3	ND	7.9	3.2	NA
PESTICIDES/PCBs							
Chlordane	ND	NA	ND	**0.05**	0.004	**36**	0.0005
4,4'-DDE	ND	NA	ND	ND	NA	**0.24**	0.0022
4,4'-DDT	ND	NA	ND	ND	0.001	**0.42**	0.00158[j]
Dieldrin	ND	NA	ND	**0.01**	0.0019	**0.18**	0.00002
Heptachlor	ND	NA	ND	**0.02**	0.0036	0.0041	NA
Heptachlor Epoxide	ND	NA	ND	ND	0.0036	0.58	NA
Aroclor 1248[k]	ND	NA	ND	ND	0.03	**32**	0.0227
Aroclor 1254[k]	ND	NA	ND	ND	0.03	**69**	0.0227
Aroclor 1260[k]	ND	NA	ND	ND	0.03	**5.3**	0.0227
DIOXINS							
2,3,7,8-TCDD	N/A	NA	N/A	N/A	NA	**21×10^{-6}**	3.6×10^{-6} [f]
2,3,7,8-TCDF	N/A	NA	N/A	N/A	NA	75×10^{-6}	NA
Toxicity equivalent	N/A	NA	N/A	N/A	NA	110×10^{-6}	NA

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 2002). Marine chronic criteria presented.

c: Effects Range-Low (ERL) represents the 10th percentile for the dataset in which effects were observed or predicted in studies compiled by Long et al (1995).

Table 2 continued on next page

Table 2 *Continued.*

d: Screening guidelines represent concentrations for Cr^{+6}.
e: Derived from inorganic, but applied to total mercury.
f: Marine apparent effects threshold (AET) for bioassays. The AET value for selenium is based on bivalve bioassays, while the AET for 2,3,7,8-TCDD is based on Neanthes bioassays. The AET represents the concentration above which adverse biological impacts would be expected.
g: Chronic criterion not available; acute criterion presented.
h: Lowest Observable Effect Level (LOEL) (USEPA 1986).
i: Value for chemical class.
j: Expressed as Total DDT.
k: Effects Range-Low is for Total PCBs.
NA: Screening guidelines not available.
ND: Contaminant not detected.
N/A: Contaminant not analyzed for.

Groundwater

Several metals and pentachlorophenol, were detected in the groundwater beneath the Atlantic Resources site. Arsenic and nickel were the metals detected most frequently in the groundwater below the site. Nickel was detected at the greatest concentration, and exceeded the Ambient Water Quality Criteria (AWQC) by two orders of magnitude. Maximum concentrations of cadmium and chromium in groundwater samples exceeded the AWQC by an order of magnitude.

Surface Water

Metals and inorganics and several pesticides were detected in surface water samples at concentrations that exceeded the screening guidelines. The maximum concentration of copper in surface water samples exceeded the AWQC by two orders of magnitude. Arsenic, mercury, nickel, and silver were all detected at maximum concentrations exceeding the AWQC by one order of magnitude. Maximum concentrations of lead, mercury, copper, and silver were all detected in surface water samples collected from a drainage channel located on the Atlantic Resources property. The pesticides chlordane, dieldrin, and heptachlor were all detected in surface water samples at maximum concentrations that exceeded the AWQC by one order of magnitude. The greatest concentrations of pesticides were detected in surface water samples collected from the drainage channel west of the Atlantic Resources property.

Sediment

Metals and inorganics, SVOCs, pesticides, PCBs, and dioxins were all detected at elevated concentrations in sediment samples collected near the site. Arsenic, chromium, copper, and silver were detected in all sediment samples collected at the site. The maximum concentrations of arsenic, copper, and mercury were detected in sediments collected from the marsh area just south of the HRDD. Maximum concentrations of chromium, nickel, selenium, and silver were detected in sediments collected from the marsh area and the river west of HRDD. Arsenic, copper, and mercury were detected at concentrations at least two orders of magnitude greater than the effects range-low (ERL) screening guidelines, while concentrations of chromium, nickel, selenium, and silver exceeded the ERL screening guidelines by one order of magnitude.

Thirteen SVOCs, including PAHs, were detected in site sediment at concentrations ranging from 0.18 mg/kg (dibenz(a,h)anthracene) to 6 mg/kg (pyrene). The maximum concentrations of acenaphthene and fluorene were detected in river sediment samples collected west of HRDD. The PAHs acenaphthene and fluorene were detected at concentrations that exceeded the ERL sediment screening guidelines by at least one order of magnitude.

Concentrations of the pesticides chlordane and dieldrin exceeded the ERL sediment screening guidelines by at least three orders of magnitude. The maximum concentrations of chlordane were detected in sediment samples collected from the small drainage channel west of the Atlantic Resources Corporation site. The maximum concentrations of dieldrin were detected in sediment samples collected west of the incinerators at the site.

The maximum concentrations of PCB Aroclors 1248 and 1260 were detected in sediment collected from the marsh area south of the HRDD. PCB Aroclors 1248, 1254, and 1260 were detected at concentrations that exceeded the ERL screening guideline for total PCBs by up to three orders of magnitude.

The maximum concentrations of the dioxins 2,3,7,8-TCDD and 2,3,7,8-TCDF were detected in sediment samples collected from the river west of the HRDD. The dioxin 2,3,7,8-TCDD was detected at levels five times greater than the marine apparent effects threshold.

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Consolidated Iron and Metal

Newburgh, New York

USEPA Facility ID: NY0002455756

Basin: Hudson-Wappinger

HUC: 02020008

Executive Summary

The Consolidated Iron and Metal site is an inactive automobile/scrap metal junkyard and dealership in Newburgh, New York. The site is located adjacent to the Hudson River in a mixed industrial, commercial, and residential area. Originally a municipal landfill, the site was subsequently operated as a shipyard and was last used for scrap metal recycling and storage before becoming inactive in 1999. A series of investigations indicates that metals, SVOCs, pesticides, and PCBs are the primary contaminants of concern at the site. NOAA trust habitats of concern are the surface water and sediments of the Hudson River, which provides a migratory corridor for several anadromous fish species, as well as habitat for several marine/estuarine fish species. Surface water is the primary pathway for the migration of contaminants from the site to adjacent NOAA trust resources and habitats.

Site Background

The Consolidated Iron and Metal (Consolidated Iron) site is an inactive automobile/scrap metal junkyard and dealership in Newburgh, New York (Figure 1) that operated from approximately 1960 to 1999. The site is located adjacent to the Hudson River and encompasses approximately 2.8 ha (7 acres) in a mixed industrial, commercial, and residential area. It is bounded by Conrail railroad tracks to the west, the Hudson River to the east, and Washington Street to the north. Features on the Consolidated Iron site include a tire pile adjacent to the southern boundary, scrap metal piles throughout the property, a staging area and smelter in the southwest corner of the site, a compactor and metal shear near the western boundary, and a scale and several buildings along the northern boundary (Figure 2) (USEPA 2001).

During the early 1900s, the City of Newburgh used the property as a municipal landfill. Subsequently, it became the site of the Eureka Shipyard, which operated during World War I through the early 1940s, when the site's use shifted to an automobile/scrap metal junkyard and dealership operation. Between 1975 and 1995, a smelter operated at the site. The smelter was primarily used to melt aluminum transmissions but other metallic materials were also smelted at the site. Iron and other scrap metal was sorted on-site for recycling (Weston 2000b).

Between 1997 and 1999, the New York State Department of Environmental Conservation (NYSDEC) conducted several investigations at the Consolidated Iron site. During these investigations, oil and other liquid wastes were observed on-site soils, as indicated by staining throughout the site, and stormwater from the northeast corner of the site was observed discharging directly into the Hudson River without required testing or permits. In March 1999, NYSDEC noted an oily sheen on stormwater discharging into the Hudson River, on the Hudson River itself, and on puddles throughout the site (USEPA 2001).

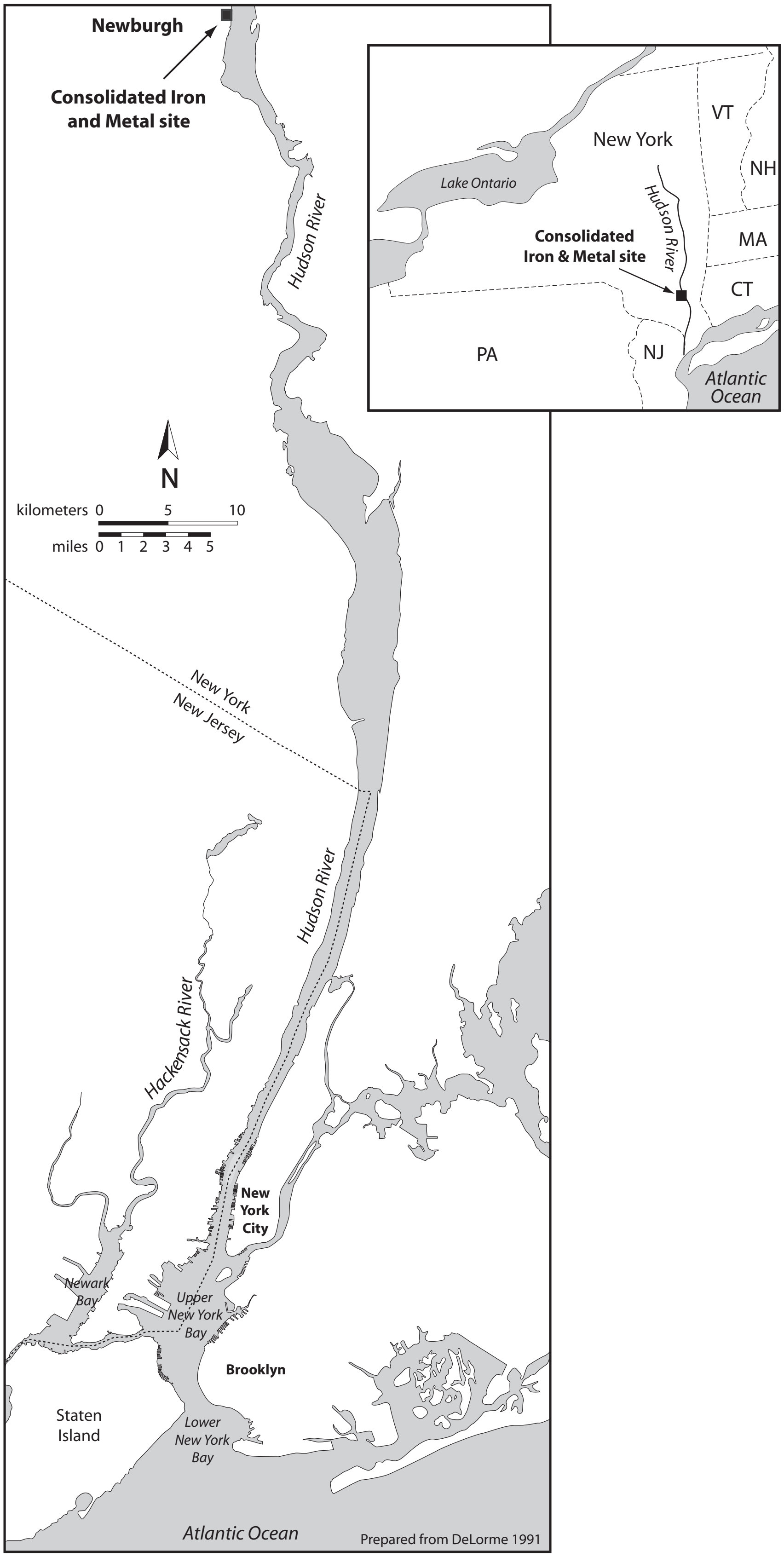

Figure 1. Location of Consolidated Iron and Metal site, Newburgh, New York.

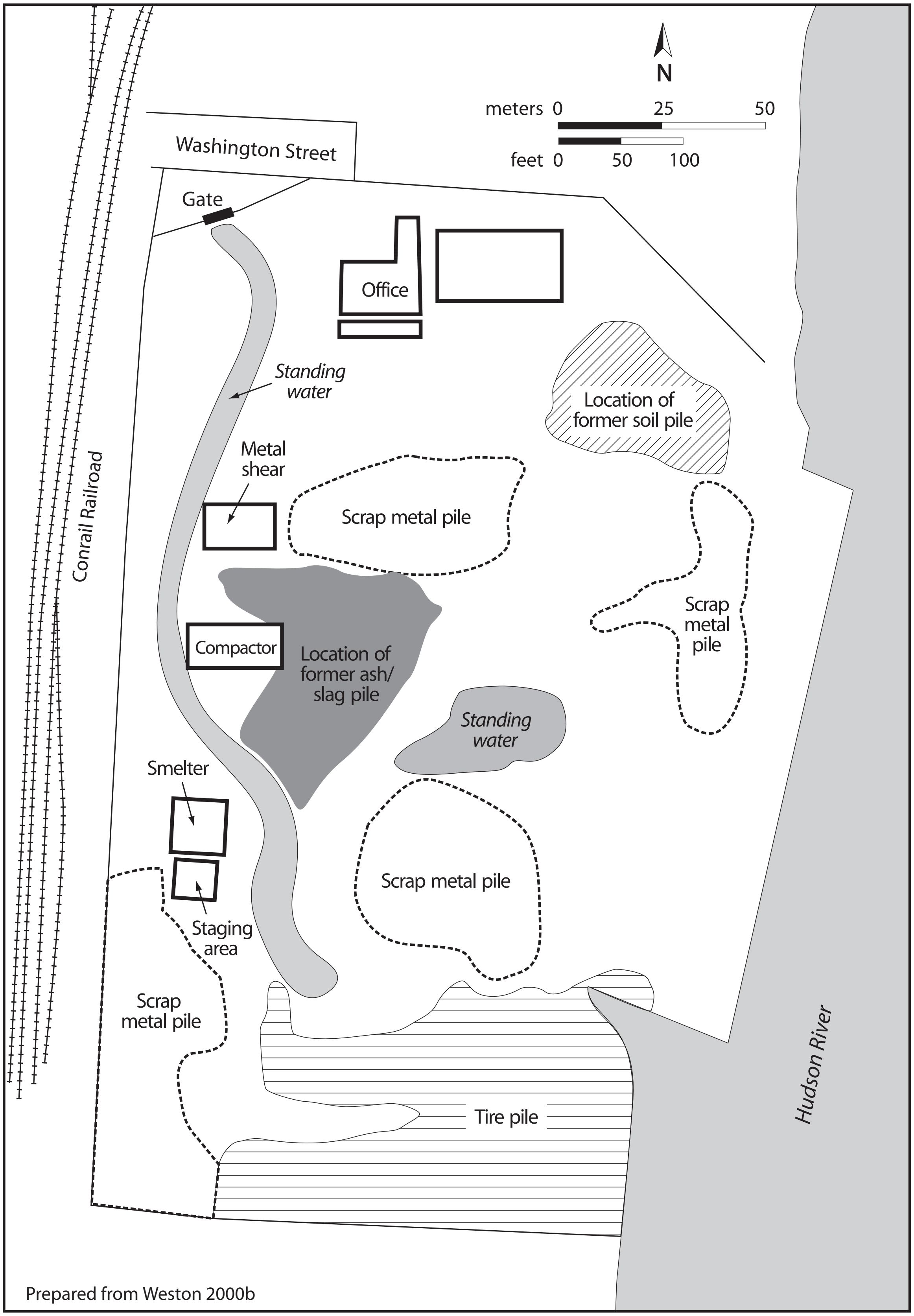

Figure 2. Detail of Consolidated Iron and Metal site.

In 1998, the U.S. Environmental Protection Agency (USEPA) collected samples from the ash/slag pile generated by the on-site smelting operation. Analysis of these samples indicated elevated concentrations of lead and polychlorinated biphenyls (PCBs) (USEPA 2001). In June 1999, Materials Recovery Service, Inc. (MRS) began processing the ash/slag pile, removing large pieces of metal, and segregating the scrap metal into ferrous, non-ferrous, and fine piles. The fine pile, which consisted of approximately 6,000 metric tons (6,600 tons) of material, was removed from the site. In July 1999, the USEPA collected samples from a soil pile generated by MRS during its recycling of the ash/slag pile. The USEPA removed the soil pile after analytical results indicated elevated concentrations of lead and PCBs in the soil (Weston 2000b).

In July 1999, an on-site hazardous characterization of 27 drums found scattered throughout the perimeter of the Consolidated Iron site was conducted by the Region II Superfund Technical Assessment and Response Team (START). Several of the drums contained liquids that exhibited the characteristics of ignitability or corrosivity, and/or contained PCBs; many of the drums were severely deteriorated, with contents leaking into the surrounding soils (Weston 2000b).

In August 1999, soil samples were collected at the former location of the ash/slag pile for analysis. Analytical results indicated the presence of elevated lead concentrations. The Region II START conducted an integrated assessment of the Consolidated Iron site in September and November 1999. The results from this investigation indicated that metals, semivolatile organic compounds (SVOCs), pesticides, and PCBs remained contaminants of concern at the site. The Consolidated Iron site was proposed to the National Priorities List (NPL) on December 1, 2000, and was placed on the NPL on June 14, 2001 (USEPA 2001).

Contaminant releases to the Hudson River (through the direct deposition of hazardous substances along the site's southeastern corner and via the flooding of soils containing hazardous substances at the site's northeast corner), have been documented during several site investigations (USEPA 2001). The release of contaminants to surface water is the primary pathway for the migration of contaminants from the site to NOAA trust resources and habitats.

NOAA Trust Resources

The NOAA trust habitats of concern are the surface water and associated bottom substrates (sediments) of the Hudson River near Newburgh, New York. The Consolidated Iron site is approximately 97 km (60 mi) up the Hudson River from the Atlantic Ocean. Several NOAA trust resources depend on habitat near and upstream of the site, and are summarized in Table 1. There are no dams along this stretch of the river to prevent the upstream migration of anadromous fish species.

The majority of the trust resources listed in Table 1 use this section of river as a migratory corridor. In addition, Atlantic sturgeon, Atlantic tomcod, bay anchovy, blue crab, shortnose sturgeon, and white perch all use the river near Newburgh, New York, for adult forage habitat. This section of the river also provides nursery habitat for alewife, American shad, Atlantic sturgeon, Atlantic tomcod, blue crab, blueback herring, striped bass, and all the marine/estuarine species listed in Table 1. Atlantic tomcod and striped bass are also known to spawn in this area of the river (Kahnle 2002).

Commercial and recreational fishing both occur in the Hudson River near Newburgh, New York. Alewife and blueback herring are fished both commercially and recreationally. American shad are fished commercially, and American eel, blue crab, striped bass, and white perch are fished recreationally (Kahnle 2002).

Table 1. NOAA trust resources present in the Hudson River near Newburgh, New York (Kahnle 2002).

Species		**Habitat Use**				**Fisheries**	
Common Name	Scientific Name	Migratory Route	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
ANADROMOUS FISH							
Alewife	*Alosa pseudoharengus*	◆		◆		◆	◆
American shad	*Alosa sapidissima*	◆		◆		◆	
Atlantic rainbow smelt	*Osmerus mordax mordax*	◆					
Atlantic sturgeon	*Acipenser oxyrhynchus*	◆		◆	◆		
Atlantic tomcod	*Microgadus tomcod*	◆	◆	◆	◆		
Blueback herring	*Alosa aestivalis*	◆		◆		◆	◆
Sea lamprey	*Petromyzon marinus*	◆					
Striped bass	*Morone saxitilis*	◆	◆	◆			◆
White perch	*Morone americana*	◆		◆	◆		◆
CATADROMOUS FISH							
American eel	*Anguilla rostrata*	◆					◆
MARINE/ESTUARINE FISH							
Atlantic menhaden	*Brevoortia tyrannus*			◆			
Bay anchovy	*Anchoa mitchilli*			◆	◆		
Bluefish	*Pomatomus saltatrix*			◆			
Shortnose sturgeon	*Acipenser brevirostrum*	◆		◆	◆		
INVERTEBRATES							
Blue crab	*Callinectes sapidus*	◆		◆	◆		◆

A fish-consumption advisory is in effect for this section of the Hudson River; the advisory recommends that women of childbearing age, infants, and children under the age of 15 should not eat any fish species from these waters. For others, the advisory recommends consuming no gizzard shad, and no more than one meal per month of American eel, Atlantic needlefish, bluefish, carp, channel catfish, goldfish, largemouth bass, smallmouth bass, rainbow smelt, striped bass, walleye, white catfish, and white perch because of elevated levels of PCBs present in the fish tissues. The advisory also recommends consuming no more than six blue crabs per week because of contamination by cadmium and PCBs. There is also an advisory to "eat none" of the hepatopancreas of blue crab and an advisory to "discard" cooking liquid associated with cooking blue crab because of cadmium and PCB contamination. (NYSDOH 2002).

Site-Related Contamination

In September and November 1999, the Region II START conducted an integrated assessment of the Consolidated Iron site. During this investigation, a total of 126 soil, 5 groundwater, and 18 sediment samples were collected at the site to determine the horizontal and vertical extent of contamination. All samples were analyzed for volatile organic compounds (VOCs), SVOCs, pesticides, PCBs, and metals. Table 2 summarizes the maximum concentrations of the primary contaminants of concern (SVOCs, pesticides, PCBs, and metals) detected in the samples collected (Weston 2000a).

Table 2. Maximum concentrations of contaminants of concern at the Consolidated Iron and Metal site (Weston 2000a). Bold values indicate contaminant exceeded the screening criteria.

	Soil (mg/kg)		Water (µg/L)		Sediment (mg/kg)	
Contaminant	Soil	Mean U.S.[a] Soil	Ground-water	AWQC[b]	Sediment	TEL[c]
METALS/INORGANICS						
Arsenic	**120**	5.2	10	150	**13**	5.9
Cadmium	**180**	0.06	**9.2**	0.25[d]	**1**	0.596
Chromium[e]	**260**	37	11	11	**71**	37.3
Copper	**15,000**	17	**160**	9d	**99**	35.7
Lead	**25,000**	16	**360**	2.5[d]	**180**	35
Mercury	**5.4**	0.058	**0.9**	0.77[f]	**1**	0.174
Nickel	**2,100**	13	26	52[d]	**37**	18
Selenium	**17**	0.26	ND	5.0[f]	3.4	NA
Silver	**18**	0.05	ND	3.2[d,g]	3.5	NA
Zinc	**15,000**	48	**1,100**	120[d]	**290**	123.1
SVOCs						
Acenaphthene	7.3	NA	0.8	520[h]	0.2	NA
Acenaphthylene	0.87	NA	0.8	NA	0.4	NA
Anthracene	13	NA	ND	NA	0.58	NA
Benz(a)anthracene	20	NA	3	NA	**2.3**	0.0317
Chrysene	20	NA	3	NA	**2.6**	0.0571
Dibenz(a,h)anthracene	4.7	NA	0.9	NA	0.16	NA
Fluoranthene	35	NA	6	NA	**4.5**	0.111
Fluorene	7.8	NA	0.5	NA	0.2	NA
2-Methylnaphthalene	18	NA	ND	NA	ND	NA
Naphthalene	17	NA	0.6	620[h]	ND	NA
Pentachlorophenol	ND	NA	ND	NA	ND	NA
Phenanthrene	42	NA	4	NA	**2.6**	0.0419
Pyrene	48	NA	5	NA	**5.3**	0.053
PESTICIDES/PCBs						
Aldrin	ND	NA	ND	3.0[g]	ND	NA
Chlordane	1.5	NA	ND	0.0043	ND	0.0045
4,4′-DDE	1.6	NA	0.091	NA	**0.016**	0.00142
4,4′-DDT	2.8	NA	**0.25**	0.001	**0.017**	0.00698[i]
Dieldrin	1.1	NA	ND	0.056	ND	0.00285
Endosulfan (alpha + beta)	3.1	NA	ND	0.056	ND	NA
Endrin	0.32	NA	ND	0.036	ND	0.00267
Gamma-BHC (Lindane)	0.18	NA	ND	0.95[g]	ND	0.00094
Heptachlor	0.0028	NA	ND	0.0038	ND	NA
Heptachlor Epoxide	0.036	NA	ND	0.0038	ND	0.0006
Total PCBs	**420**	0.371[k]	**5.7**	0.014	**1.2**	0.0341
Toxaphene	ND	NA	ND	0.0002	ND	NA

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 2002). Freshwater chronic criteria presented.

c: Threshold effects level is the geometric mean of the 15^{th} percentile of the effects data and the 50^{th} percentile of the no-effects data. The TEL is intended to represent the concentration below which adverse biological effects rarely occurred (Smith et al. 1996).

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: Criterion expressed as total recoverable metal.

g: Chronic criterion not available; acute criterion presented.

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

i: Expressed as total DDT.

k: Final Preliminary Remedial Goal for the protection of wildlife (Efroymson et al. 1997).

NA: Screening guidelines not available.

ND: Not detected.

Analyses of soil samples indicated the presence of metals, SVOCs, pesticides, and PCBs. The maximum concentrations of all the metals listed in Table 2 exceeded the average concentrations found in U.S. soil (mean U.S. soil concentrations). Concentrations of cadmium and lead exceeded the mean U.S. soil concentrations by three orders of magnitude; concentrations of copper, nickel, silver, and zinc exceeded the mean U.S. soil concentrations by two orders of magnitude. The remaining metals ranged from seven times the mean U.S. soil concentrations to one order of magnitude greater than the mean U.S. soil concentrations. The greatest concentrations of metals were detected at one of two locations: northeast of the tire pile that is adjacent to the Hudson River, or in the area where the former ash/slag pile was located. Several SVOCs were detected in the soil samples at concentrations ranging from 0.87 mg/kg (acenaphthylene) to 48 mg/kg (pyrene). A majority of the greatest concentrations of SVOCs were detected in the area northeast of the tire pile, next to the Hudson River. Several pesticides were also detected in soil samples. The maximum concentrations of pesticides ranged from 0.0028 mg/kg (heptachlor) to 3.1 mg/kg (endosulfan (alpha + beta)). The greatest concentration of PCBs, and a majority of the pesticide concentrations were detected in the area where the former ash/slag pile was located (Dorneman 1999). The maximum concentration of PCBs detected in soil exceeded the screening guideline by three orders of magnitude. Currently, there are no screening guidelines available for SVOCs and pesticides in soil.

Analyses of groundwater samples indicated the presence of metals, SVOCs, pesticides, and PCBs. The maximum concentration of lead exceeded the ambient water quality criterion (AWQC) by two orders of magnitude, and the maximum concentration of cadmium and copper exceeded the AWQC by one order of magnitude. Maximum concentrations of mercury, and zinc exceeded the AWQC by less than one order of magnitude. Arsenic, chromium, and nickel were also detected; however, concentrations of these metals did not exceed the AWQC. All of the maximum concentrations of metals were detected in a sample collected in the area where the former ash/slag pile was located. Several SVOCs were detected in the groundwater samples. No AWQC are available for several of the detected SVOCs, and none of the maximum concentrations exceeded the AWQC, when available. The maximum concentrations of SVOCs ranged from 0.5 µg/L (fluorene) to 6.0 µg/L (fluoranthene). A majority of the greatest concentrations of SVOCs were detected in a sample collected just north of the former soil pile. Two pesticides, DDE and DDT, were detected in the groundwater samples. The maximum concentration of DDT exceeded the AWQC by two orders of magnitude; no AWQC is available for DDE. PCBs were detected at a maximum concentration that exceeded the AWQC by two orders of magnitude. The maximum concentrations of pesticides and PCBs were found in a sample collected from the former ash/slag pile (Dorneman 1999).

Metals, SVOCs, pesticides, and PCBs were detected in sediment samples collected from the Hudson River, near the Consolidated Iron site. Maximum concentrations of cadmium, chromium, copper, nickel, selenium, silver, and zinc were detected in samples collected approximately 240 m (800 ft) downstream of the site. Arsenic and mercury were detected at maximum concentrations in sediment samples collected approximately 30 m (100 ft) east of the site. All the metals listed in Table 2 exceeded the screening guidelines (threshold effects level or TEL); there are no TELs currently available for selenium and silver. Several SVOCs were also detected in the sediment samples. The maximum concentration of pyrene exceeded the TEL by two orders of magnitude, and the maximum concentrations of benz(a)anthracene, chrysene, fluoranthene, and phenanthrene exceeded the TELs by one order of magnitude. Other SVOCs were also detected but no screening guidelines were available for comparison. Maximum concentrations of nine of the ten SVOCs detected in sediment were found in a sample collected approximately 240 m (800 ft) downstream of the site. DDT and DDE were the only pesticides detected in the sediment samples, and maximum concentrations of both exceeded the screening guidelines: DDE by an order of magnitude, and DDT by a factor of roughly

2.4. The maximum PCB concentration in was detected in a sediment sample collected approximately 240 m (800 ft) downstream of the site and exceeded the TEL by one order of magnitude.

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Quanta Resources

Edgewater, New Jersey

USEPA Facility ID: NJD000606442

Basin: Lower Hudson

HUC: 02030101

Executive Summary

The Quanta Resources site is a former coal tar roofing plant and waste oil reprocessing facility adjacent to the Hudson River, Edgewater, Bergen County, New Jersey. The coal tar roofing plant operated for more than forty years. The recycling and storage facility operations followed but functioned for only a few years due to closure by the New Jersey Department of Environmental Protection after polychlorinated biphenyls (PCBs) were detected in oil stored in tanks. Polynuclear aromatic hydrocarbons (PAHs) are the primary contaminants of concern detected in groundwater, soil, and sediments associated with the Quanta Resources site. Coal tar is present in upland soils, on the ground surface, in Hudson River sediments, and in groundwater beneath the site. Other contaminants of concern include arsenic, chromium, lead, and volatile organics (VOCs). The habitats of primary concern to NOAA are the surface waters and associated sediments of the Hudson River. The surface waters of the Hudson River adjacent to the site provide suitable habitat for many NOAA trust resources.

Site Background

The Quanta Resources site is a former coal tar roofing plant and oil storage and recycling facility located on approximately 3 ha (8 acres) in Edgewater, New Jersey. The site is adjacent to the Hudson River, approximately 16 km (9.9 mi) upstream of Upper New York Bay (Figure 1). From 1930 to 1974, a coal tar roofing plant operated at the Quanta Resources site. Creosote, coal tar-pitches, and refined tars were the products most likely manufactured at the site during this time (GeoSyntec Consultants 2000). In 1977, after several changes in property ownership, the Quanta Resources Corporation began using the property for the storage and recycling of oil. Sixty-one above ground storage tanks (ASTs), an unknown number of underground storage tanks (USTs), and numerous underground pipes were installed to support various activities at the site. These tanks were used to store oil, tar, asphalt, sludge, process water and other unknown liquids (USEPA 2003). In 1981, after polychlorinated biphenyls (PCBs) were detected in several storage tanks, the New Jersey Department of Environmental Protection (NJDEP) forced the shutdown of all waste oil reprocessing operations at the site. Structures that remain include a sheet metal building, office trailers, tank and building foundations, a wood bulkhead, and the remains of a wooden dock and oil/water separator (Figure 2) (GeoSyntec Consultants 2000).

From 1984 to 1988, several removal actions took place at the site, including the cleaning and decommissioning of the USTs and ASTs, the removal of underground piping, and the removal of soil contaminated with tar. In 1992, after removal activities were complete, the U.S. Environmental Protection Agency (USEPA) Removal Program collected soil, surface water, and sediment samples and determined that contaminants were still present at the site. In 1999, the owners of Quanta

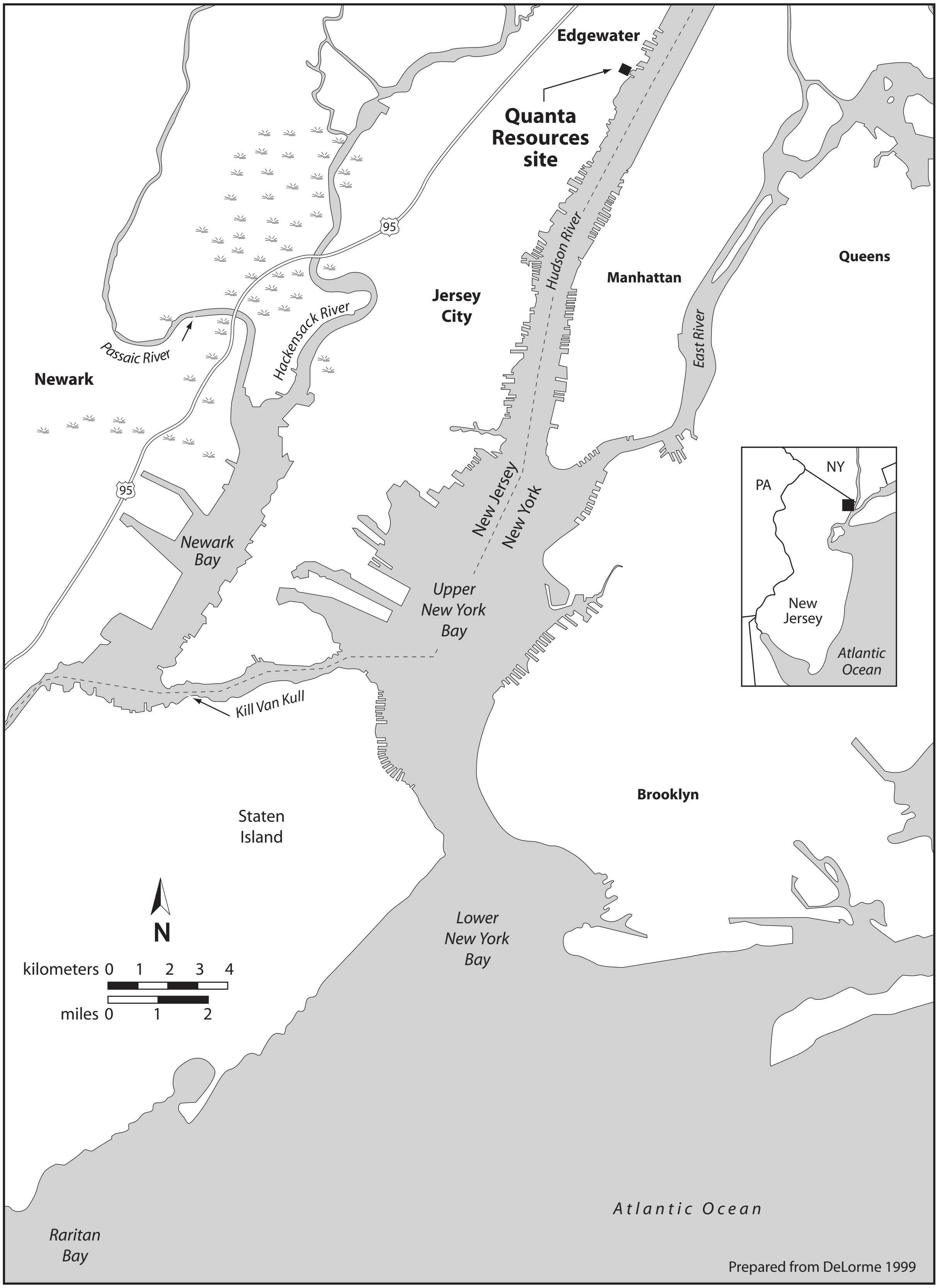

Figure 1. Location of the Quanta Resources site in Edgewater, New Jersey.

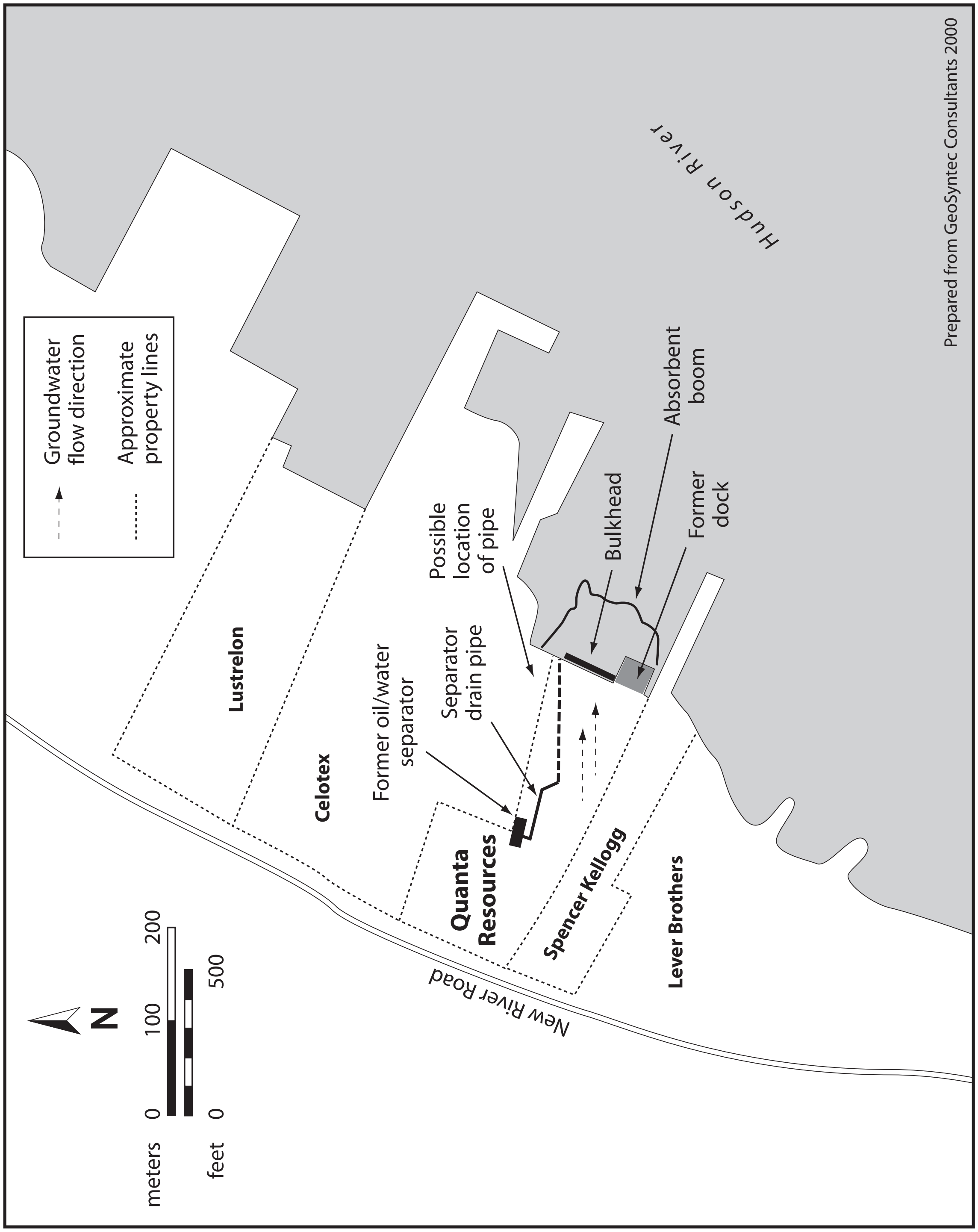

Figure 2. Detail of the Quanta Resources site.

Resources sponsored a removal site investigation (RSI) to further determine the extent of the contamination (GeoSyntec Consultants 2000). USEPA conducted supplemental sampling of sediment, soil, and surface water at the site including preparation of an ecological risk assessment (ERA) in 2000 (USEPA 2000). The Quanta Resources site was proposed for placement on the National Priorities List (NPL) in January 2001 (USEPA 2002a) and the listing was finalized in October 2002 (USEPA 2003).

Groundwater and surface water are the primary pathways for the migration of contaminants from the site to NOAA trust resources. A bulkhead currently separates the upland areas of the site from the Hudson River. Pockets of oily sheen appear on the mudflats adjacent to the Hudson River. An absorbent boom has been installed to keep this material from migrating farther afield. Below the site, groundwater is encountered at depths ranging from 0.9 to 2 m (3 to 7 ft). Groundwater flows east and discharges into the surface waters of the Hudson River. The segment of the Hudson River adjacent to the site is tidally influenced, causing tidal variation in the nearshore water table by as much as 0.5 m (1.6 ft) (GeoSyntec Consultants 2000).

NOAA Trust Resources

The Quanta Resources site is bordered by an estuarine segment of the Hudson River. This section of river has strong semi-diurnal tidal currents and salinity that ranges from approximately 5 to 30 parts per thousand. The average depth of the river adjacent to the site is 12 m (39 ft) and the average width is 1,500 m (4,921 ft) (USFWS 1997). The habitats of primary concern to NOAA are the surface waters and associated sediments of the Hudson River Estuary. The Hudson River Estuary is the tidally influenced section of the Hudson River, which extends from Upper New York Bay to Troy, New York approximately 210 km (130mi) upstream of the site. The Hudson River Estuary is ranked as one of the most productive fisheries systems on the North Atlantic coast, and has been designated as Significant Coastal Fish and Wildlife Habitat under the New York Coastal Management Program (NYSDOS 1987). USFWS (1997) also designated the Hudson River Estuary as a significant habitat complex.

The surface waters of the Hudson River adjacent to the site provide suitable spawning, nursery, and adult habitat for many marine and estuarine fish species (Table 1). The most abundant marine and estuarine species observed in the Hudson River Estuary on the New Jersey shore are Atlantic tomcod, bay anchovy, hogchoker, and winter flounder. The federally endangered shortnose sturgeon and the state protected Atlantic sturgeon are also present in the Hudson River Estuary (Stone et al. 1994). Marine and estuarine species that use the Hudson River Estuary as nursery habitat include Atlantic menhaden, bluefish, fourbeard rockling, longhorn sculpin, northern pipefish, and weakfish. The Hudson River Estuary is a common spawning ground for several marine and estuarine species, including bay anchovy, hogchoker, mummichog, and winter flounder (Westchester County 2001).

Several migratory fish species use the Hudson River Estuary as adult and/or nursery habitat. Migratory fish that are considered abundant along the New Jersey shore and in the Hudson River are the anadromous alewife, American shad, striped bass, and white perch and the catadromous American eel (Westchester County 2001). The section of the Hudson River between Jersey City and Edgewater is an important over-wintering habitat for striped bass (USFWS 1997). Anadromous fish species in the Hudson River Estuary generally migrate upstream to spawn in less saline waters.

The Hudson River Estuary is both an important commercial and recreational fishery of the North Atlantic coast. Several anadromous fish species, including alewife, blueback herring, and American shad

Table 1. NOAA trust resources present in the lower Hudson River estuary near the Quanta Resources site (Beebe and Savidge 1988; USFWS 1991; Stone et al. 1994; Westchester County 2001; Hattala 2003).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
ANADROMOUS FISH						
Alewife	*Alosa pseudoharengus*		◆	◆	◆	◆
American shad	*Alosa sapidissima*		◆	◆	◆	◆
Blueback herring	*Alosa aestivalis*		◆	◆	◆	◆
Rainbow smelt	*Osmerus mordax*			◆		
Striped bass	*Morone saxatilis*			◆		◆
White perch	*Morone americana*			◆		
CATADROMOUS FISH						
American eel	*Anguilla rostrata*			◆		
MARINE/ESTUARINE FISH						
American sand lance	*Ammodytes americanus*	◆	◆	◆		
Atlantic herring	*Clupea harengus*		◆	◆		
Atlantic menhaden	*Brevoortia tyrannus*		◆	◆	◆	
Atlantic silverside	*Menidia menidia*	◆	◆	◆		
Atlantic sturgeon	*Acipenser oxyrhynchus*	◆	◆	◆		
Atlantic tomcod	*Microgadus tomcod*	◆	◆	◆		◆
Bay anchovy	*Anchoa mitchilli*	◆	◆	◆		
Bluefish	*Pomatomus saltatrix*		◆	◆	◆	◆
Fourbeard rockling	*Enchelyopus cimbrius*		◆	◆		
Hogchoker	*Trinectes maculatus*	◆	◆	◆		
Killifish	*Fundulus spp.*	◆	◆	◆		
Longhorn sculpin	*Myoxocephalus octodecemspinosus*		◆			
Mummichog	*Fundulus heteroclitus*	◆				
Northern pipefish	*Syngnathus fuscus*		◆	◆		
Shortnose sturgeon	*Acipenser brevirostrum*			◆		
Spot	*Leiostomus xanthurus*			◆		
Tautog	*Tautoga onitis*	◆	◆	◆		
Weakfish	*Cynoscion regalis*		◆	◆	◆	◆
Winter flounder	*Pleuronectes americanus*	◆	◆	◆	◆	◆
INVERTEBRATES						
Blue crab	*Callinectes sapidus*	◆	◆	◆		
Blue mussel	*Mytilus edulis*		◆	◆	◆	
Daggerblade grass shrimp	*Palaemonetes pugio*	◆	◆	◆		
Northern quahog	*Mercenaria mercenaria*	◆	◆	◆	◆	◆

are fished commercially from the Hudson River Estuary (Hattala 2003). American eel are also fished commercially but can only be sold as bait. There is also a blue crab fishery upstream of the site. Most other commercial fishing is banned due to PCB contamination (Hattala 2003). The most common marine and estuarine fish harvested commercially include Atlantic menhaden, bluefish, weakfish, and winter flounder (AOC 2002). Popular recreational fisheries in the Hudson River Estuary include alewife, American shad, Atlantic tomcod, blueback herring, and striped bass (NYSDEC 2001). Historically, Atlantic sturgeon has been an important resource to both commercial and recreational fishers. Because of declining stocks of Atlantic sturgeon in the Hudson River, this fishery was closed in 1996 and there are no plans to reopen it in the near future (NYSDEC 2002). Recreational fishing of American eel is limited to catch and release (DOI et al. 2001).

The NJDEP has issued a fish and shellfish consumption advisory for the section of the Hudson River adjacent to the Quanta Resources site. The PCB, dioxin, and chlordane advisory that was in place for many years (NJDEP 2002) was revised; chlordane has been removed from the advisory, and distinctions between two risk levels for the general population have been determined. The advisories for bluefish and American lobsters are in effect statewide. The new fish advisory for the general population, assuming a lifetime cancer risk of 1 in 10,000 risk, recommends no more than one meal per year of American eel and white perch, and no more than four meals per year of striped bass. No consumption of striped bass or American eel is advised for the general population (a lifetime cancer risk of 1 in 100,000 risk) and high-risk individuals. The bluefish advisory varies according to fish size. It is recommended that the general population consume no more than four meals per year of bluefish over 2.7 kg (6 lbs) or 60 cm (24 in) and no more than once a month if less than 2.7 kg or 60 cm. One meal a year of the smaller size class bluefish is recommended for lifetime cancer risks of 1 in 10,000 for the general population. No consumption is recommended for the smaller size class for the general population for lifetime cancer risks of 1 in 100,000 or for either size class of bluefish for high risk individual. It is also recommended that the entire population not eat white catfish. A shellfish advisory, in effect for the entire population, recommends against consumption of the hepatopancreas of American lobster and blue crab. The blue crab advisory also recommends limiting consumption to 6 crabs per week for the 1 in 10,000 risk and 3 crabs per month for the 1 in 100,000 general population and high-risk individuals. Crab cooking liquid should also be discarded. It is also prohibited to sell striped bass or American eel from these waters (NJDEP 2003).

The New York State Department of Environmental Conservation has issued fish and shellfish consumption advisories for the segment of the Hudson River adjacent to the Quanta Resources property. The fish advisory recommends that high-risk individuals should not eat any fish species collected from this area. The general public is advised to eat no more than one meal per month of American eel, Atlantic needlefish, bluefish, rainbow smelt, striped bass, white perch, and several other freshwater species. It is advised that the general public not consume gizzard shad collected from this area. The shellfish advisory recommends that the general public eat no more than six blue crabs per week, not eat the hepatopancreas, and discard the cooking liquid (NYSDEC 2003).

Site-Related Contamination

Polynuclear aromatic hydrocarbons (PAHs) are the primary contaminants of concern detected in groundwater, soil, and sediments associated with the Quanta Resources site. Secondary contaminants of concern are metals, PCBs, and volatile organic compounds (VOCs). During the RSI conducted between 1998 and 1999, 49 surface and subsurface soil and 30 groundwater samples were collected from the Quanta Resources property and adjacent properties. During several investigations conducted prior to the RSI, 356 surface and subsurface soil samples were collected from the site and adjacent properties. During the RSI and several other investigations, a total of 105 sediment samples were collected from the segment of the Hudson River adjacent to the site. The environmental samples collected from the site and adjacent properties were analyzed for a range of contaminants of concern, including volatile organic compounds (VOCs), PAHs, PCBs, and metals (GeoSyntec Consultants 2000). The maximum concentrations of select contaminants of concern are summarized and compared to screening guidelines for soil (Table 2) and water and sediment (Table 3). The soil comparison values presented in Table 2 are based on human health criteria and may not be protective of ecological resources.

<u>Soil</u>

Metals were detected at elevated concentrations in soil samples collected from the Quanta Resources site and adjacent properties. Maximum concentrations of arsenic, cadmium, copper, lead, mercury, selenium, silver, and zinc were detected in samples collected from the Celotex property (Figure 2). The maximum concentrations of chromium and nickel were detected in samples collected from the Spencer Kellogg and Lustrelon properties respectively. Arsenic, cadmium, lead, nickel, selenium, and silver were detected in soil at concentrations that exceeded the average concentration found in U.S. soil (mean U.S. soil concentration) by two orders of magnitude. Maximum concentrations of chromium, copper, and zinc exceeded mean U.S. soil concentrations by one order of magnitude. Arsenic, chromium, copper, and lead were also detected at concentrations that exceeded the New Jersey Residential Direct Contact Soil Cleanup Criteria (RDCSCC) and Non-Residential Direct Contact Soil Cleanup Criteria (NRDCSCC) (NJDEP 1999). The maximum concentration of nine of the ten metals exceeded soil preliminary remediation goals developed to protect wildlife (Efroymson 1997). No ecological benchmark is available for silver.

PAHs and PCBs were detected in soil samples at elevated concentrations. Maximum concentrations of eight of the PAHs listed in Table 2 exceeded the New Jersey RDCSCC and NRDCSCC. The greatest concentrations of the PAHs acenaphthene, dibenz(a,h)anthracene, and naphthalene were detected in soil collected near the bulkhead. The greatest concentrations of the other PAHs summarized in Table 2, except fluoranthene, were detected in soil samples collected near the location of the former dock. The maximum concentration of fluoranthene was detected in a soil sample collected from the northwest end of the Celotex property. PCBs were detected at a maximum concentration two orders of magnitude greater than the ecological and human health screening guidelines in a soil sample collected from the northern section of the site.

<u>Groundwater</u>

Groundwater samples collected at the Quanta Resources site showed elevated concentrations of PAHs, VOCs, arsenic, and lead. Arsenic was detected in a groundwater sample collected from the Lever Brothers property at a maximum concentration two orders of magnitude greater than the ambient water quality criteria (AWQC). The maximum concentration of lead was detected in a groundwater sample collected from the southeast end of the Celotex at a concentration seven times greater than the AWQC. Arsenic and lead were also detected at concentrations that exceeded the New Jersey Ground Water Quality Standards (NJGWQS) (NJDEP 1993). The PAHs naphthalene and fluoranthene were detected at maximum concentrations that exceeded the AWQC by one order of magnitude. Pyrene was detected at a maximum concentration that exceeded the AWQC by a factor of two. Maximum concentrations of acenaphthene, fluoranthene, and pyrene were detected at concentrations that also exceeded the NJGWQS. The maximum concentrations of the detected PAHs listed in Table 3 and benzene occurred in samples collected from a groundwater monitoring well in the western portion of the Quanta Resources property, near the Spencer-Kellogg property line (Figure 2). The VOCs ethyl benzene, toluene, and xylenes were detected at maximum concentrations in a sample collected near the center of the Quanta Resources property. Maximum concentrations of benzene, toluene, and ethyl benzene exceeded both the AWQC and the NJGWQS.

Table 2. Maximum concentrations of select contaminants of concern detected in soil at the Quanta Resources site (GeoSyntec Consultants 2000). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)			
Contaminant	Soil	Mean U.S. Soil[a]	New Jersey RDCSCC[b]	ORN-PRG[c]
METALS/INORGANICS				
Arsenic	**3,400**	5.2	20	9.9
Cadmium	**27**	0.06	39	4.2
Chromiumd	**680**	37	270	16.1
Copper	**1,200**	17	600	370
Lead	**11,000**	16	400	40.5
Mercury	**88**	0.058	14	0.00051
Nickel	**1,900**	13	250	121
Selenium	**100**	0.26	63	0.21
Silver	**20**	0.05	110	NA
Zinc	**1,700**	48	1,500	9
PAHs				
Acenaphthene	1,500	NA	3,400	NA
Acenaphthylene	260	NA	NA	NA
Anthracene	1,400	NA	10,000	NA
Benz(a)anthracene	**2,100**	NA	0.9	NA
Benzo(a)pyrene	**2,500**	NA	0.66	NA
Benzo(b)fluoranthene	**2,800**	NA	0.9	NA
Benzo(k)fluoranthene	**1,100**	NA	0.9	NA
Benzo(g,h,i)perylene	1,400	NA	NA	NA
Chrysene	**2,300**	NA	9	NA
Dibenz(a,h)anthracene	**390**	NA	0.66	NA
Fluoranthene	**3,800**	NA	2,300	NA
Fluorene	1,400	NA	2,300	NA
Indeno(1,2,3-cd)pyrene	**1,500**	NA	0.9	NA
Naphthalene	**5,300**	NA	230	NA
Phenanthrene	4,400	NA	NA	NA
Pyrene	**3,300**	NA	1,700	NA
VOCs				
Benzene	**51**	NA	3	NA
Ethyl benzene	310	NA	1,000	NA
Toluene	310	NA	1,000	NA
Xylene	200	NA	410	NA
PCBs				
PCBs (as Aroclors)	**74**	NA	0.49	0.371

a: Shacklette and Boerngen (1984), except for cadmium and silver, which represent average concentrations in the Earth's crust from Lindsay (1979).
b: Human health criteria for New Jersey Residential Direct Contact Soil Cleanup (RDCSC) (NJDEP 1999).
c: Oak Ridge National Laboratory (ORNL) final preliminary remediation goals (PRG) for ecological endpoints (Efroymson et al. 1997).
d: Screening guidelines represent concentrations for Cr^{+6}
NA: Screening guidelines not available.

Table 3. Maximum concentrations of select contaminants of concern detected in water and sediment at the Quanta Resources site (GeoSyntec Consultants 2000). Contaminant values in bold exceeded screening guidelines.

Contaminant	Water (µg/L)			Sediment (mg/kg)		
	Ground-water	AWQC[a]	New Jersey GWQS[b]	Sediment	ERL[c]	ERM[d]
METALS/INORGANICS						
Arsenic	**21,000**	36	0.02	**2,200**	8.2	70
Cadmium	ND	8.8	4	**4.7**	1.2	9.6
Chromiume	33	50	100	**270**	81	370
Copper	ND	3.1	1,000	**190**	34	270
Lead	**59**	8.1	5	**1,500**	46.7	218
Mercury	ND	0.94[f]	2	**2.5**	0.15	0.71
Nickel	6.8	8.2	100	**47**	20.9	51.6
Selenium	ND	71	50	ND	1.0[g]	NA
Silver	ND	1.9[h]	NA	**7**	1	3.7
Zinc	8.8	81	5,000	**350**	150	410
PAHs						
Acenaphthene	**870**	710[i]	400	**1,500**	0.016	0.5
Acenaphthylene	**520**	300[h,i,j]	NA	**150**	0.044	0.64
Anthracene	**510**	300[h,i,j]	2,000	**4,600**	0.0853	1.1
Benz(a)anthracene	**350**	300[h,i,j]	NA	**640**	0.261	1.6
Benzo(a)pyrene	200	300[h,i,j]	NA	**470**	0.43	1.6
Benzo(b)fluoranthene	200	300[h,i,j]	NA	**500**	1.8k	NA
Benzo(k)fluoranthene	ND	300[h,i,j]	NA	**230**	1.8k	NA
Benzo(g,h,i)perylene	ND	300[h,i,j]	NA	**210**	0.670[l]	NA
Chrysene	260	300[h,i,j]	NA	**580**	0.384	2.8
Dibenz(a,h)anthracene	ND	300[h,i,j]	NA	**65**	0.0634	0.26
Fluoranthene	**950**	16[i]	300	**2,200**	0.6	5.1
Fluorene	**940**	300[h,i,j]	300	**1,800**	0.019	0.54
Indeno(1,2,3-cd)pyrene	ND	300[h,i,j]	NA	**230**	0.600[l]	NA
Naphthalene	2,000	2,350[h,i]	NA	**8,000**	0.16	2.1
Phenanthrene	2,300	NA	NA	**3,700**	0.24	1.5
Pyrene	**830**	300[h,i,j]	200	**1,600**	0.665	2.6
VOCs						
Benzene	**14,000**	700[i]	0.2	5.1	NA	NA
Ethyl benzene	**1,100**	430[h,i]	700	**7.1**	4[m]	NA
Toluene	**6,100**	5,000[i]	1,000	ND	NA	NA
Xylene	5,000	NA	NA	**16**	4[n]	NA
PCBs						
Total PCBs	ND	0.03	0.02	**6.5**	0.0227	0.18

a: Ambient water quality criteria (AWQC) for the protection of aquatic organisms (USEPA 2002). Marine chronic criteria presented.

b: New Jersey Groundwater Quality Standard (GWQS) (NJDEP 1993).

c: Effects range-low (ERL) represents the 10th percentile for the dataset in which effects were observed or predicted in studies compiled by Long et al. (1998).

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

e: Effects range median (ERM) represents the median concentration at which effects were observed or predicted in studies compiled by Long et al. (1998).

f: Derived from inorganic, but applied to total mercury.

g: Marine apparent effects threshold (AET) for amphipod bioassay. The AET represents the concentration above which adverse biological impacts would be expected.

Table 3 continued on next page

Table 3 *Continued.*

h: Chronic criterion not available; acute criterion presented.

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

j: Value for chemical class.

k: Marine apparent effects threshold (AET) for infaunal community impacts based on the echinoderm larvae bioassay. The AET represents the concentration above which adverse biological impacts would be expected.

l: Marine apparent effects threshold (AET) for microtox bioassay. The AET represents the concentration above which adverse biological impacts would be expected.

m: Marine apparent effects threshold (AET) for echinoderm larvae bioassay. The AET represents the concentration above which adverse biological impacts would be expected.

n: Marine apparent effects threshold (AET) for larval bivalve bioassay. The AET represents the concentration above which adverse biological impacts would be expected.

NA: Screening guidelines not available.

ND: Not detected.

Sediment

Metals, PAHs, and PCBs were detected at elevated concentrations in sediment samples collected from Hudson River locations adjacent to the Quanta Resources site. The maximum arsenic concentration exceeded the effects range-median (ERM) by one order of magnitude. Maximum concentrations of lead and mercury were respectively six times and three times greater than the ERM. Silver was detected at a maximum concentration that just exceeded the ERM. Cadmium, chromium, copper, and nickel were detected at maximum concentrations that exceeded the effects range-low (ERL). Selenium was not detected. Maximum concentrations of cadmium, chromium, copper, mercury, nickel, silver, and zinc all occurred in sediment samples collected on the shore side of the absorbent boom. Maximum concentrations of arsenic and lead occurred in a sediment sample collected just north of the site. All PAHs listed in Table 3 were detected at maximum concentrations exceeding the ERL by at least three orders of magnitude. Twelve of the PAHs also exceeded the ERM by two to three orders of magnitude. Maximum concentrations of nine PAHs occurred in sediment samples collected on the shore side of the absorbent boom. The maximum PCB concentration in sediment was one order of magnitude greater than the ERM and occurred in a sample collected approximately 60 m (200 ft) upstream of the site.

The ERA completed in 2000, included toxicity testing of sediment and a survey of the benthic macroinvertebrate community adjacent to the site. During the toxicity tests the amphipod *Leptocheirus plumulosus* and the silverside minnow *Menidia beryllina* were exposed to sediment collected from six locations in the Hudson River adjacent to the site. The results of the toxicity tests indicate that exposure to sediments associated with the site pose a risk to organisms that use the tidal flat. All of the benthic macroinvertebrates collected during the community survey are short-lived and shallow-dwelling organisms. The majority of the macroinvertebrates collected were also opportunists and relatively pollution tolerant. These results indicate that the benthic community adjacent to the site is negatively impacted (USEPA 2000).

During the RSI, coal tar was identified in upland soil, on the ground surface, in groundwater, and in Hudson River sediment. The coal tar present in the different environmental media ranged in viscosity from a solid hard non-mobile product to a thick mobile oil-like product. In some areas of the Quanta Resources property the coal tar is estimated to extend approximately 12 feet below ground surface. The coal tar on the ground surface consists of sticky coal tar roofing pitch. Viscous oil-like coal tar was collected from the surface of several of the groundwater monitoring wells on the Quanta Resources property, including those adjacent to the bulkhead along the Hudson River. The coal tar product present in the Hudson River sediments is composed of oil-like and roofing pitch product (GeoSyntec Consultants 2000). Flowable tar product was observed throughout the 6 m (20 ft) length Hudson River cores (depth of penetration). The product extends eastward in the Hudson River from the bulkhead, at a depth of 1.5 to 2.1 m (5 to 7 ft), for about 46 to 60 m (150 to 200 ft) and then occurs at greater depth for several hundred feet more (GeoSyntec Consultants 2001).

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NWS Yorktown – Cheatham Annex

Williamsburg, Virginia

USEPA Facility ID: VA3170024605

Basin: York

HUC: 02080107

Executive Summary

NWS (Naval Weapons Station) Yorktown – Cheatham Annex is a 639-ha (1,579-acre) federal facility near Williamsburg, Virginia. When it was commissioned in 1943, the facility's primary mission was receiving, storing, and packing materials for shipment to federal facilities on the East Coast and major distribution centers in Europe. The facility is currently used to store and ship naval supplies. The primary contaminants of concern at the Cheatham Annex site are metals, SVOCs (primarily PAHs), pesticides, and PCBs. Habitats of concern to NOAA are the surface waters and associated substrates of the York River and Queen and King Creeks, adjacent to the site. These areas provide habitat for many NOAA trust resources. The primary pathways for the migration of contaminants from the site to NOAA trust resources are surface water and sediment.

Site Background

NWS (Naval Weapons Station) Yorktown – Cheatham Annex (Cheatham Annex) is in York County, Virginia, east of Williamsburg. This 639-ha (1,579-acre) federal facility lies adjacent to the York River between Queen and King Creeks, approximately 24 km (15 mi) upstream of Chesapeake Bay (Figure 1) (USEPA 2000). During World War I, before the U.S. Navy became owner of the facility, the Cheatham Annex and several adjacent properties were occupied by the Penniman Shell Loading Plant (Penniman Plant), which was operated by DuPont (CH2M Hill and Baker Environmental Inc. 2002). The Penniman Plant was approximately 1,300 ha (3,300 acres) and included what are now the Cheatham Annex, National Colonial Park, and the Virginia fuel farm (ATSDR 2000) (Figure 2). The Penniman Plant operated for approximately one year, and was then used for demilitarization activities over several years following World War I. From approximately 1922 through 1942, the Cheatham Annex property was under private ownership and was used for farming or was left idle. In June 1943, the Cheatham Annex was commissioned as, and currently remains, a satellite unit of the Naval Supply Depot in Norfolk, Virginia, to receive, store, pack, and ship materials to federal facilities on the East Coast and to major distribution centers in Europe (USEPA 2000; VDEQ 2001).

An initial site assessment of the Cheatham Annex was completed in 1984. Twelve disposal sites and potentially contaminated areas were identified in this study (Figure 2), and four areas, Sites 1, 7, 9, and 11, were recommended for further study. In 1999, the U.S. Environmental Protection Agency (USEPA) conducted a site inspection (SI) of the area formerly occupied by the Penniman Plant. The SI identified five areas within the Cheatham Annex as potential sources of contamination, and three areas of concern (AOC), AOC 1, AOC 2, and the Penniman AOC, were recommended for further study. The Penniman AOC is comprised of five sub-areas in the vicinity of Penniman Lake (Figure 2), three of which were recommended for further investigation: the Ammonia Settling Pits, the Trinitrotoluene (TNT) Graining House Sump, and the TNT Catch Box Ruins. Two Penniman AOC sub-areas, the Waste Slag Material area and the 1918 Drum Storage area were not recommended

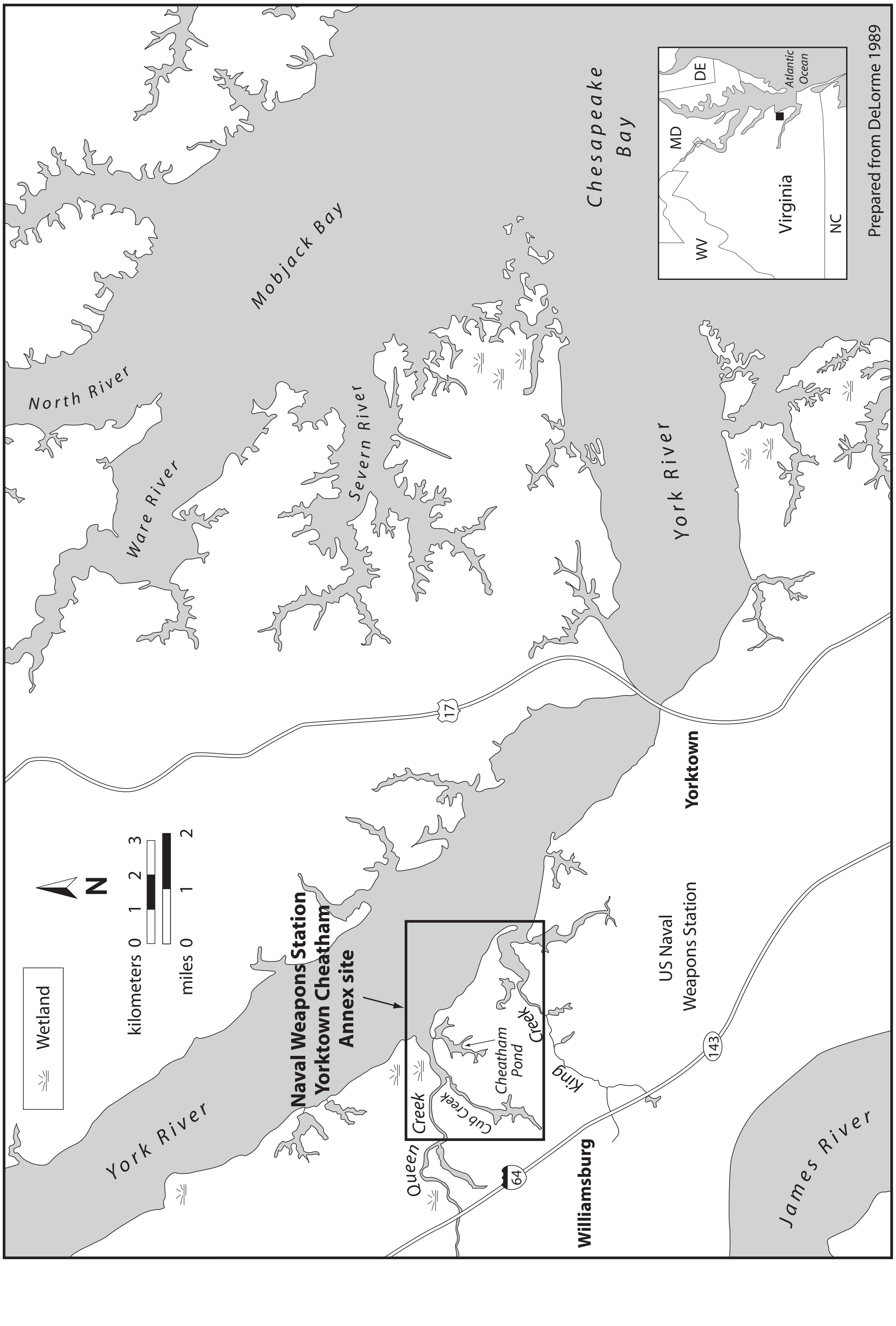

Figure 1. Location of the Naval Weapons Station Yorktown Cheatham Annex site, Williamsburg, Virginia.

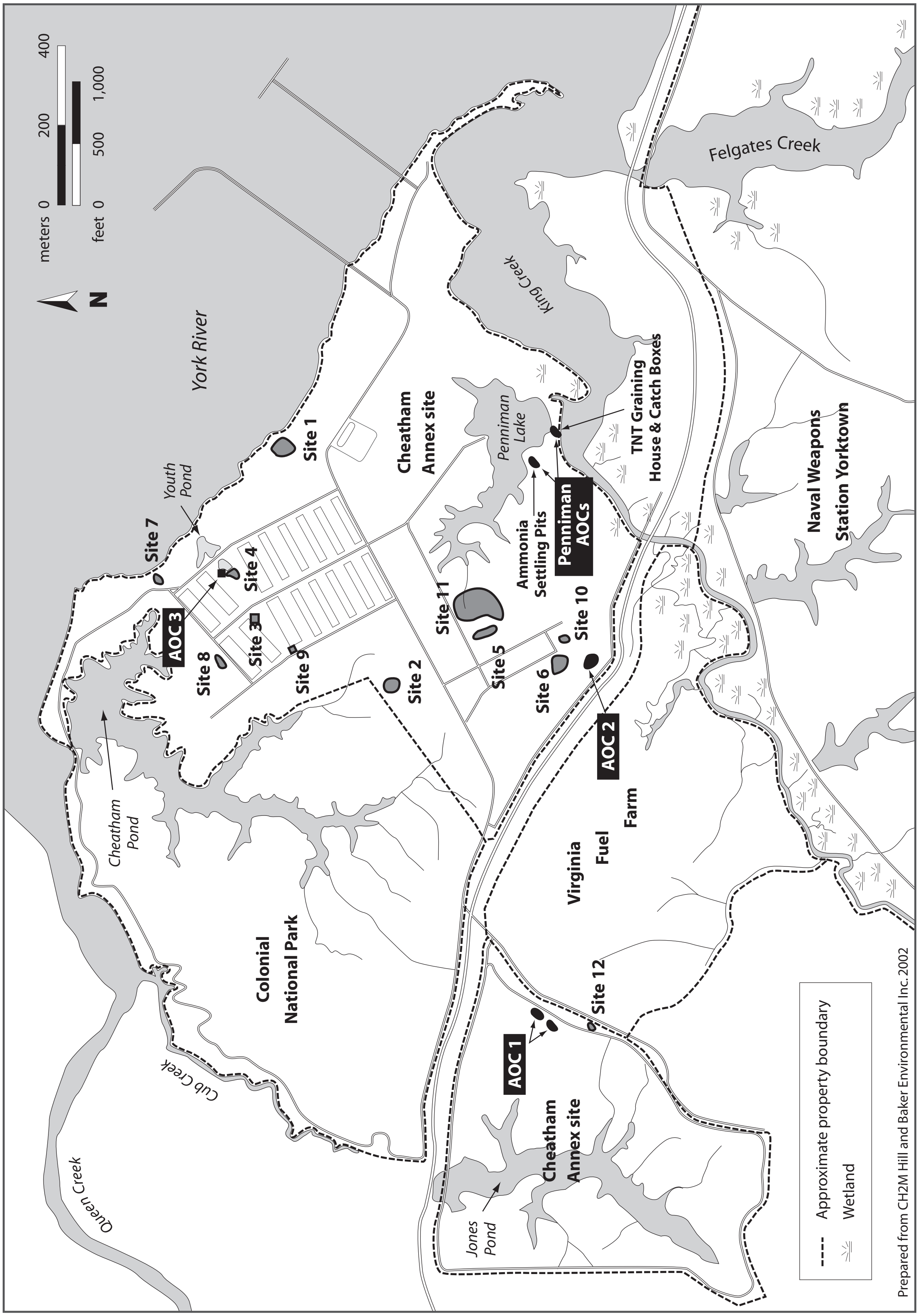

Figure 2. Detail of the Naval Weapons Station Yorktown Cheatham Annex site.

for further investigation. The locations of these sub-areas could not be determined from the documents reviewed for this report. (CH2M Hill and Baker Environmental Inc. 2002). Table 1 provides a summary and brief description of the hazardous waste sites and AOCs that were identified during the investigations conducted at the Cheatham Annex site.

Site investigations indicate that the primary contaminants of concern are semivolatile organic compounds (SVOCs), primarily polynuclear aromatic hydrocarbons (PAHs), metals, pesticides, and polychlorinated biphenyls (PCBs). The primary pathways for the migration of contaminants from the site to NOAA trust resources are surface water and sediment. The Cheatham Annex site was placed on the National Priorities List December 1, 2000 (USEPA 2000).

Table 1. Summary descriptions of the sites and AOCs within the Naval Weapons Station Yorktown-Cheatham Annex site (CH2M Hill and Baker Environmental Inc. 2002).

Source Area	Period of Operation	Location	Description of Contamination
Site 1			
Landfill near Incinerator	1942-1981	Located along the York River.	Wastes burned and disposed of at this site included empty paint cans and paint thinner cans, cartons of ether and other unspecified drugs, railroad ties, tar paper, sawdust, rags, concrete, and lumber.
Site 2			
Contaminated Food Disposal Area	1970	Located in a grassy area in the woods approximately 530 m (1750 ft) east of the southern end of Cheatham Pond.	Frozen food was buried in a disposal pit after it was contaminated with ammonia from a leak in one of the cold storage rooms.
Site 3			
Submarine Dye Disposal Area	unknown	Located approximately 910 m (2975 ft) east of the middle section of Cheatham Pond.	Dye was stored in 55-gallon drums on pallets between the warehouses. The drums corroded, the dye was released into the ground and into the storm sewer system connected to the York River; the dye turned the river green.
Site 4			
Medical Supplies Disposal Area	1968 or 1969	Located approximately 640 m (2100 ft) northwest of Site 1.	Out-of-date medical supplies, possibly including syringes and empty IV bottles, and one-inch metal banding, were dumped down a bank and covered with soil.
Site 5			
Photographic Chemicals Disposal Area	1967 or 1968	Located west of Penniman Lake.	Outdated photographic chemicals were reportedly disposed of in a pit.
Site 6			
Spoiled Food Disposal Area	1970	Located approximately 370 m (1225 ft) south of Site 5.	Spoiled food from cold storage was buried in a pit approximately 3.7-4.6 m (12-15 ft) deep.
Site 7			
Old DuPont Disposal Area	unknown	Located along the York River, approximately 850 m (2800 ft) upstream of Site 1.	This site received non-hazardous and/or inert waste and ammunition waste from the former Penniman Plant.

Table 1 continued on next page

Table 1 *Continued.*

Source Area	Period of Operation	Location	Description of Contamination
Site 8			
Landfill near Building CAD 14	1940s-1980s	Located approximately 640 m (2100 ft) east of the middle section of Cheatham Pond.	Non-hazardous materials such as spoiled meat, spoiled candy, and clothing were reportedly disposed of in trenches 610 m (2,000 ft) deep and 3 m (10 ft) wide.
Site 9			
Transformer Storage Area	1973-1980	Located approximately 347 m (1140 ft) south of Site 8.	Electrical transformers, some containing PCBs, were reportedly stored at this site.
Site 10			
Decontamination Agent Disposal Area near First Street	prior to 1982	Located approximately 240 m (800 ft) east of Site 6.	Containers of decontamination agent DS-2, were reportedly buried at this site. It is not known whether the DS-2 was neutralized prior to disposal.
Site 11			
Bone Yard	1940-1978	Located approximately 210 m (700 ft) west of Penniman Lake.	Oil, asphalt, and gasoline were reportedly contained in 15 barrels and two 500-gal above-ground tanks. Scrap metal, old containers (fuel oil, mixing tanks, etc.), fence posts, abandoned cars, discarded clamshell buckets, and other surplus metal objects used in heavy construction were found at this site. Approximately ten 5-gallon containers labeled "paraplastic" (concrete sealant), several 500-gallon tanks containing asphalt or oil used to make asphalt, and tar cylinders were also found at this site.
Site 12			
Disposal Site near Water Tower	unknown	Located approximately 610 m (2000 ft) east of Jones Pond.	This site was used for disposal of scrap metal, primarily old automobile parts and iron pipes.
AOC 1			
Scrap Metal Dump	unknown	Located in the former Penniman Plant area, approximately 270 m (875 ft) north of Site 12, near unnamed tributaries to Jones Pond.	This site was used as a debris disposal area. Both wood and metal debris were disposed of into two ravines along unnamed tributaries to Jones Pond.
AOC 2			
Dextrose Dump	unknown	Located in the former Penniman Plant area, approximately 160 m (525 ft) south of Site 6.	Glass bottles - many labeled "dextrose," partially buried empty drums, and mounds of soil (possibly indicating buried material), were found at this site. Buried drums containing a thin layer of tar or residue were also found at this site.
AOC 3			
CAD 11/12 Pond Bank	unknown	Located in the former Penniman Plant area, along the north bank of an unnamed pond, north of Site 4.	Metal banding and empty drums were disposed of at this site.
Penniman AOC			
sub-area Ammonia Settling Ponds	unknown	Located in the former Penniman Plant area within the former shell loading area.	This area contains earthen ammonia settling-pits where wastewater from an ammonia finishing building was discharged.

Table 1 continued on next page

Table 1 *Continued.*

Source Area	Period of Operation	Location	Description of Contamination
Penniman AOC			
sub-area Trinitrotoluene (TNT) Graining House Sump	unknown	Located in the former Penniman Plant area.	This area is an open-top, concrete-lined pit believed to be the sump pit for the TNT graining house.
Penniman AOC			
sub-area Trinitrotoluene (TNT) Catch Box Ruins	unknown	Located in the former Penniman Plant area.	This area was used to separate TNT particles from wastewater and consists of an earthen, brick-lined depression located next to the TNT graining house.
Penniman AOC			
sub-area Waste Slag Material	unknown	Located throughout the former Penniman Plant area, predominantly along the railroad tracks.	The area is comprised of metallic ore waste material (slag).
Penniman AOC			
sub-area 1918 Drum Storage	unknown	Located in the former Penniman Plant area.	This area was used to store 55-gallon drums.

NOAA Trust Resources

The NOAA trust habitats of concern are the surface waters and associated bottom substrates of the York River and its tributaries Queen and King Creeks (USEPA 2000). All water bodies within the Cheatham Annex drain into the York River, which empties into Chesapeake Bay approximately 24 km (15 mi) downstream from the site. Adjacent to the Cheatham Annex site, the lower York River is a tidal estuarine river, approximately 4 km (2.5 mi) in width and up to 10 m (33 ft) in depth. Queen and King Creeks are shallow tidal creeks with extensive tidal flats and emergent estuarine wetlands along the facility's border (USGS 1984).

Numerous estuarine and marine species use the York River estuary as a juvenile nursery and adult residence (Table 2). Atlantic croaker, bluefish, butterfish, weakfish, red drum, spot, and spotted seatrout, are coastal spawners; eggs and larval stages free-drift offshore and juvenile stages migrate into the estuary. Because many of these species have long life spans, juveniles tend to spend several years in the estuary before heading out to deeper water. Several species, as adults, can also be found seasonally within the estuary (Stone et al. 1994; Watkins 2002).

Anadromous species such as alewife, gizzard shad, striped bass, and white perch migrate up the lower York River, past the Cheatham Annex site, to spawning areas upstream. Adults of these species are considered common to abundant in the York River estuary. American eel, which spawn in marine waters, migrate past the site to reside in freshwater areas in the York River and its tributaries (Stone et al. 1994; Watkins 2002).

Table 2. NOAA trust resources present in the York River Estuary including Queen and King Creeks (Stone et al. 1994, Watkins 2002).

Species		**Habitat Use**				**Fisheries**	
Common Name	Scientific Name	Migratory Route	Spawning Area	Nursery/ Juvenile Area	Adult Habitat	Comm.	Rec.
ANADROMOUS FISH							
Alewife	*Alosa pseudoharengus*	◆		◆	◆	◆	
Gizzard shad	*Dorosoma cepedianum*	◆		◆	◆	◆	
Striped bass	*Morone saxatilis*	◆		◆	◆	◆	◆
White perch	*Morone americana*	◆	◆	◆	◆	◆	◆
CATADROMOUS FISH							
American eel	*Anguilla rostrata*			◆		◆	
MARINE/ESTUARINE FISH							
Atlantic croaker	*Micropogonias undulatus*			◆	◆	◆	◆
Atlantic herring	*Clupea harengus*				◆	◆	◆
Atlantic mackerel	*Scomber scombrus*				◆	◆	◆
Atlantic menhaden	*Brevoortia tyrannus*			◆		◆	
Atlantic spadefish	*Chaetodipterus faber*			◆	◆	◆	◆
Bluefish	*Pomatomus saltatrix*			◆	◆	◆	◆
Butterfish	*Peprilus triacanthus*			◆	◆	◆	
Channel catfish	*Ictalurus punctatus*			◆	◆	◆	◆
Cobia	*Rachycentron canadum*				◆	◆	◆
Mullet	*Mugil sp.*				◆	◆	◆
Northern kingfish	*Menticirrhus saxatilis*			◆	◆	◆	◆
Northern puffer	*Sphoeroides maculatus*				◆	◆	◆
Pigfish	*Orthopristis chrysoptera*				◆	◆	◆
Red drum	*Sciaenops ocellatus*			◆	◆	◆	◆
Spanish mackerel	*Scomberomorus maculatus*				◆	◆	◆
Spot	*Leiostomus xanthurus*			◆	◆	◆	◆
Spotted seatrout	*Cynoscion nebulosus*			◆	◆	◆	◆
Summer flounder	*Paralichthys dentatus*			◆	◆	◆	◆
Tautog	*Tautoga onitis*			◆		◆	◆
Weakfish	*Cynoscion regalis*		◆	◆	◆	◆	◆
INVERTEBRATES							
Blue crab	*Callinectes sapidus*		◆	◆	◆	◆	◆
Eastern oyster	*Crassostrea virginica*		◆	◆	◆	◆	◆
Northern quahog	*Mercenaria mercenaria*		◆	◆	◆	◆	◆

Blue crab, eastern oyster, and northern quahog are present in the estuary. Juvenile and adult blue crab are abundant; mating and larval stages are also observed in the estuary, although females usually migrate to coastal waters to brood and release eggs (Stone et al. 1994; Watkins 2002).

The York River supports commercial fishing of every trust species listed in Table 2 and there is recreational fishing for these species as well.

There are currently no fish consumption advisories in effect for the York River or the main stem of Chesapeake Bay (VDH 2002).

Site-Related Contamination

Sub-areas within the Cheatham Annex site identified for further study were Sites 1, 7, 9, and 11, and AOC 1, AOC 2, and the Penniman AOC. This section focused on these sub-areas, which are potentially of greatest concern. Unfortunately, data for Site 11, AOC 1, and the Penniman AOC was not available for review at the time of this report. Table 3 provides a summary of the maximum concentrations of the primary contaminants of concern detected in various media sampled at Sites 1 and 7, and AOC 2. At Site 9, sample collection and chemical analysis were limited to PCBs in soil; results were not included in Table 3 but are instead presented below.

Site 1

The primary contaminants of concern at Site 1 are metals, SVOCs (primarily PAHs), pesticides, and PCBs. The Site 1 data, summarized in Table 3, represent 21 soil, six groundwater, four surface water, and five sediment samples collected during a series of site investigations conducted from 1986 through 1999. These samples were analyzed for metals, SVOCs, pesticides, and PCBs (CH2M Hill and Baker Environmental Inc. 2000).

Metals were the only contaminants detected in surface water and groundwater samples collected from Site 1. Arsenic, cadmium, chromium, mercury, and zinc were detected in the groundwater; however, only zinc was detected at a maximum concentration that exceeded the ambient water quality criteria (AWQC). The surface water samples from Site 1 contained detectable concentrations of arsenic, cadmium, chromium, copper, lead, mercury, and zinc. However, only copper and mercury were detected at concentrations that exceeded the AWQC.

In 1998, sediment samples were collected from the wetland adjacent to Site 1. No sediment samples were collected from the York River. Metals, SVOCs, pesticides, and PCBs were detected in the sediment samples. Concentrations of arsenic, cadmium, copper, lead, mercury, nickel, silver, and zinc exceeded the effects range-low (ERL) screening guidelines. Chromium and selenium were also detected, but at maximum concentrations below their ERLs. Four PAHs, benz(a)anthracene, chrysene, flouranthene, and pyrene were detected at maximum concentrations that exceeded the ERLs by an order of magnitude. Of the five pesticides detected at Site 1, dieldrin exceeded the ERL by two orders of magnitude, and DDE and DDT exceeded the ERLs by one order of magnitude. There are no ERLs available for comparison with the concentrations of the two pesticides gamma-BHC and heptachlor epoxide. PCB concentrations detected in sediment samples exceeded the ERL by one order of magnitude.

Soil sample analyses indicated that contaminants of concern were present at elevated concentrations. Concentrations of cadmium, copper silver, and zinc exceeded the mean concentration found in U.S. soil (mean U.S. soil concentration) by at least two orders of magnitude. Concentrations of mercury and nickel exceeded the mean U.S. soil concentration by one order of magnitude; arsenic and chromium concentrations were seven times the mean U.S. concentration. Concentrations of

Table 3. Maximum concentrations of primary contaminants of concern detected at Site 1, Site 7, and AOC 2 at the Cheatham Annex site (CH2M Hill and Baker Environmental Inc 2000; 2001a; 2001b). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)			Water (µg/L)			Sediment (mg/kg)		
	Site Soil		BTAG[a] Screening	Ground-water	Surface Water			Sediment	
Contaminant	Site 1	AOC 2	Level	Site 1	Site 1	AWQC[b]	Site 1	Site 7	ERL[c]
METALS/INORGANICS									
Arsenic	**40**	**37**	5.2[d]	35	14	36	**12**	5.9	8.2
Cadmium	**31**	**12**	0.06[d]	2.8	0.21	8.8	**3.3**	<0.09	1.2
Chromiume	**70**	**95**	37[d]	7.7	1.7	50	30	22	81
Copper	**4300**	**320**	17[d]	ND	**11**	3.1	**90**	7.4	34
Lead	**2700**	**220**	0.01	ND	6.9	8.1	**89**	21	46.7
Mercury	**1.6**	**0.06**	0.058[d]	0.05	0.17	0.94[f]	**1.4**	0.11	0.15
Nickel	**500**	**24**	13[d]	ND	ND	8.2	**25**	4.8	20.9
Selenium	**7.9**	<1.1	1.8	ND	ND	71	0.54	<0.81	1.0[g]
Silver	**14**	**23**	0.05[d]	ND	ND	1.9[h]	**2.4**	**8**	1
Zinc	**8700**	**130**	48[d]	**130**	64	81	**340**	33	150
PAHs									
Acenaphthene	**41**	**<0.4**	0.1	ND	ND	710[i]	ND	**<0.47**	0.016
Acenaphthylene	0.069	**<0.4**	0.1	ND	ND	300[h,i,j]	**0.13**	**<0.47**	0.044
Anthracene	**77**	**<0.4**	0.1	ND	ND	300[h,i,j]	**0.39**	**<0.47**	0.0853
Benz(a)anthracene	**120**	**<0.4**	0.1	ND	ND	300[h,i,j]	**3.3**	**<0.47**	0.261
Chrysene	**120**	**<0.4**	0.1	ND	ND	300[h,i,j]	**5.6**	**<0.47**	0.384
Dibenz(a,h)anthracene	**17**	**<0.4**	0.1	ND	ND	300[h,i,j]	**0.57**	**<0.47**	0.0634
Fluoranthene	**240**	**<0.4**	0.1	ND	ND	16[i]	**7.6**	<0.47	0.6
Fluorene	**48**	**<0.4**	0.1	ND	ND	300[h,i,j]	ND	**<0.47**	0.019
2-Methylnaphthalene	9.6	<0.4	NA	ND	ND	300[h,i,j]	ND	**<0.47**	0.07
Naphthalene	**17**	**<0.4**	0.1	ND	ND	2350[h,i]	ND	**<0.47**	0.16
Phenanthrene	**260**	**<0.4**	0.1	ND	ND	NA	ND	**<0.47**	0.24
Pyrene	**200**	**<0.4**	0.1	ND	ND	300[h,i,j]	**8.8**	<0.47	0.665
Other SVOCs									
Pentachlorophenol	ND	**<1.0**	0.1	ND	ND	7.9	ND	<1200	NA
PESTICIDES/PCBs									
Aldrin	0.029	ND	0.1	ND	ND	1.3[h]	ND	<0.0024	0.0095[k]
Chlordane	ND	ND	0.1	ND	ND	0.004	ND	<0.0048	0.0005
4,4-DDE	**1.5**	0.0054	0.1	ND	ND	14[h,i]	**0.047**	**<0.0047**	0.0022
4,4-DDT	**2.2**	0.0041	0.1	ND	ND	0.001	**0.024**	**<0.0047**	0.00158[l]
Dieldrin	ND	0.0096	0.1	ND	ND	0.0019	**0.0049**	**<0.0047**	0.00002
Endosulfan (alpha + beta)	0.0022	<0.0067	NA	ND	ND	0.0087	ND	<0.0071	NA
Endrin	ND	<0.004	0.1	ND	ND	0.0023	ND	<0.0047	NA
Lindane (Gamma-BHC)	ND	<0.002	0.1	ND	ND	0.16[h]	**0.011**	**<0.0024**	0.00032[m]
Heptachlor	ND	<0.002	NA	ND	ND	0.0036	ND	**<0.0024**	0.0003[n]
Heptachlor Epoxide	**0.16**	<0.002	0.1	ND	ND	0.0036	0.039	<0.0024	NA
Total PCBs	5.4	0.35	NA	ND	ND	0.03	**0.81**	**0.54**	0.0227
Toxaphene	ND	<0.2	NA	ND	ND	0.0002	ND	<0.240	NA

Table 3 continued on next page

Table 3 *Continued.*

a:	Region III Biological Technical Assistance Group (BTAG) screening levels for fauna (USEPA 1995).
b:	Ambient water quality criteria (AWQC) for the protection of aquatic organisms (USEPA 2002). Marine chronic criteria presented.
c:	Effects Range-Low represents the 10th percentile for the dataset in which effects were observed or predicted in studies compiled by Long et al. (1998).
d:	Shacklette and Boerngen (1984), except for cadmium and silver, which represent average concentrations in the Earth's crust from Lindsay (1979).
e:	Screening guidelines represent concentrations for $Cr.^{+6}$
f:	Derived from inorganic mercury data, but is applied to total mercury.
g:	Marine apparent effects threshold (AET) for amphipod bioassay. The AET represents the concentration above which adverse biological impacts would be expected.
h:	Chronic criterion not available; acute criterion presented.
i:	Lowest Observable Effect Level (LOEL) (USEPA 1986).
j:	Value for chemical class.
k:	Marine apparent effects threshold (AET) for amphipod and echinoderm larvae bioassays. The AET represents the concentration above which adverse biological impacts would be expected.
l:	Expressed as Total DDT.
m:	Threshold effects level (TEL).
n:	Marine apparent effects threshold (AET) for bivalve bioassay. The AET represents the concentration above which adverse biological impacts would be expected.
NA:	Screening guidelines not available.
ND:	Not detected

lead exceeded the BTAG screening level by five orders of magnitude. The maximum selenium concentration was detected at a concentration four times the BTAG screening level. Several PAHs were detected in the soil samples (range 0.069 - 260 mg/kg). Ten of the 12 PAHs listed in Table 2 were detected at concentrations that exceeded the BTAG screening levels by at least two orders of magnitude. Pesticides were detected in soil samples from (range 0.0022 - 2.2 mg/kg). Maximum concentrations of DDE and DDT exceeded the BTAG screening levels by one order of magnitude. PCBs were also detected in soil samples at 5.4 mg/kg.

Site 7

A single sediment sample was collected from Site 7 in 1999 and analyzed for metals, SVOCs, pesticides, and PCBs; only metals and PCBs were detected (CH2M Hill and Baker Environmental Inc. 2001b). Maximum concentrations of arsenic, chromium, copper, lead, mercury, nickel, and zinc did not exceed the ERL screening guidelines. The maximum concentration of silver exceeded the ERL by a factor of eight. Cadmium and selenium were not detected. PCBs detected in the sediment sample exceeded the ERL by one order of magnitude.

Site 9

The primary contaminants of concern at Site 9 are PCBs. Thirteen soil samples were collected in 1986 and were analyzed only for PCBs (CH2M Hill and Baker Environmental Inc. 2001a). Although PCBs were detected, there is no mean U.S. soil concentration available for comparison with the PCB concentrations that were detected in the soil samples.

AOC 2

The primary contaminants of concern at AOC 2 are metals, pesticides, and PCBs. In 1999, six test pits were excavated and one soil sample was taken from each pit. These soil samples were analyzed for metals, SVOCs, pesticides, and PCBs (CH2M Hill and Baker Environmental Inc. 2001b).

Analysis of the soil samples showed that concentrations of cadmium and silver exceeded the mean U.S. soil concentrations by two orders of magnitude; concentrations of copper exceeded the guidelines by one order of magnitude. The maximum concentration of lead exceeded the BTAG screening level by four orders of magnitude. The mean U.S. soil concentrations were exceeded by a factor of seven for arsenic, a factor of two for chromium and zinc, and just exceeded for nickel. PCBs and three pesticides, DDE, DDT, and dieldrin, were detected in soil samples collected from AOC2. However, there are no mean U.S. soil concentrations available for comparison to the concentrations of pesticides and PCBs reported in the soil samples. Selenium and PAHs were not detected in soil samples collected at AOC 2.

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Macalloy Corporation

North Charleston, South Carolina

USEPA Facility ID: SCD003360476

Basin: Cooper

HUC: 03050201

Executive Summary

The Macalloy Corporation site, where ferrochromium alloy was produced from 1942 to 1998, is located just west of Shipyard Creek, a tributary of the Cooper River, in North Charleston, South Carolina. Byproducts of the alloy production process were disposed of in an unlined surface impoundment located on the site property. Surface water runoff containing chromium concentrations that exceeded NPDES permit limits was discharged from the site into Shipyard Creek via four outfalls. The migration of metal contaminants from the site into the creek has been documented during several field investigations. The NOAA trust habitats of concern are the estuarine waters of the lower Cooper River, including Shipyard Creek and upper Charleston Harbor. NOAA trust resources, including estuarine and anadromous fish, are present in the sediment and surface waters surrounding the Macalloy Corporation site.

Site Background

The Macalloy Corporation site encompasses 51 hectares (125 acres) in North Charleston, South Carolina. The facility is bordered on the east by Shipyard Creek, a tributary of the Cooper River (Figure 1). The Cooper River connects to Charleston Harbor approximately 3.8 km (2.4 mi) downstream of the Macalloy site.

Ferrochromium alloy was produced at the Macalloy Corporation site from 1942 to 1998. The process involved smelting iron and chromium ore in electric arc furnaces. Byproducts of the ferrochromium alloy production process included slag; fine particulate matter, ash, and dust (PMAD); gas conditioning tower (GCT) sludge; GCT wastewater; electrostatic precipitator (ESP) dust; and baghouse dust (USEPA 2002b). Untreated ESP dust, GCT sludge, and slag were used to fill a lake (Figure 2) and various other low areas around the Macalloy site (Tetra Tech EM Inc. 1999). Until 1997, ESP dust was also disposed of in an unlined surface impoundment (Figure 2) constructed out of approximately 36 million kg (40,000 tons) of GCT sludge. The Macalloy Corporation operated four surface water outfalls that discharged into Shipyard Creek under a National Pollutant Discharge Elimination System (NPDES) permit. NPDES permit limits for chromium and hexavalent chromium were exceeded several times during the facility's operation (USEPA 2002b).

On the basis of a stormwater inspection conducted in 1997, the U.S. Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC) concluded that stormwater discharge had occurred at site locations other than permitted outfalls. A hazard ranking system package was prepared for the Macalloy Corporation site in July 1998. The USEPA placed the Macalloy Corporation site on the National Priorities List in February 2000 (USEPA 2002b).

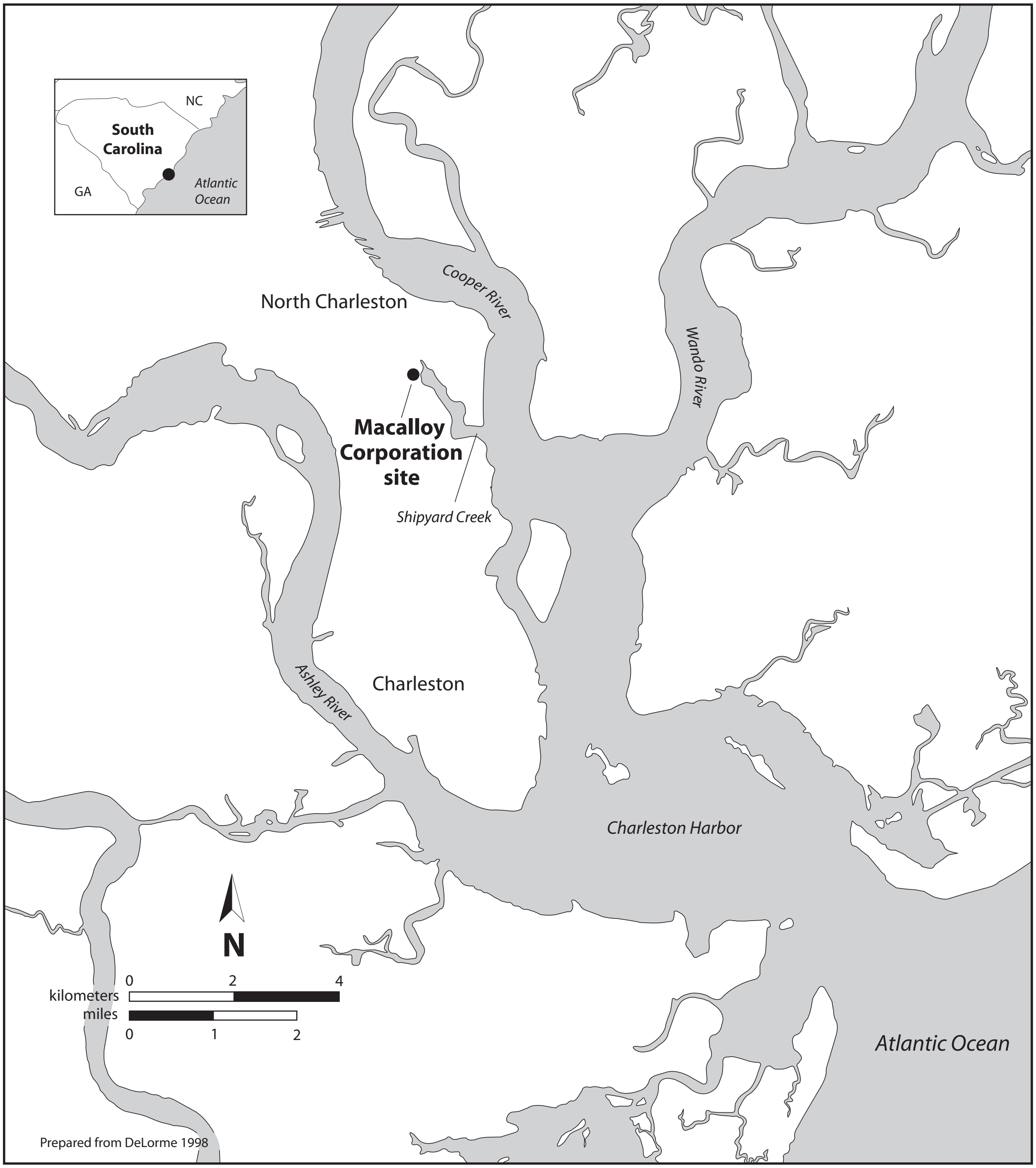

Figure 1. Location of the Macalloy Corporation site in North Charleston, South Carolina.

The primary pathways for migration of contaminants to NOAA trust resources are groundwater discharge and surface water runoff into Shipyard Creek. An approximately 9.3-hectare (23-acre) chromium-contaminated groundwater plume is located below the unlined surface impoundment. The groundwater below the site property flows northeast to Shipyard Creek and is encountered at 4.3 to 6.7 m (14 to 22 ft) below ground surface (USEPA 1999).

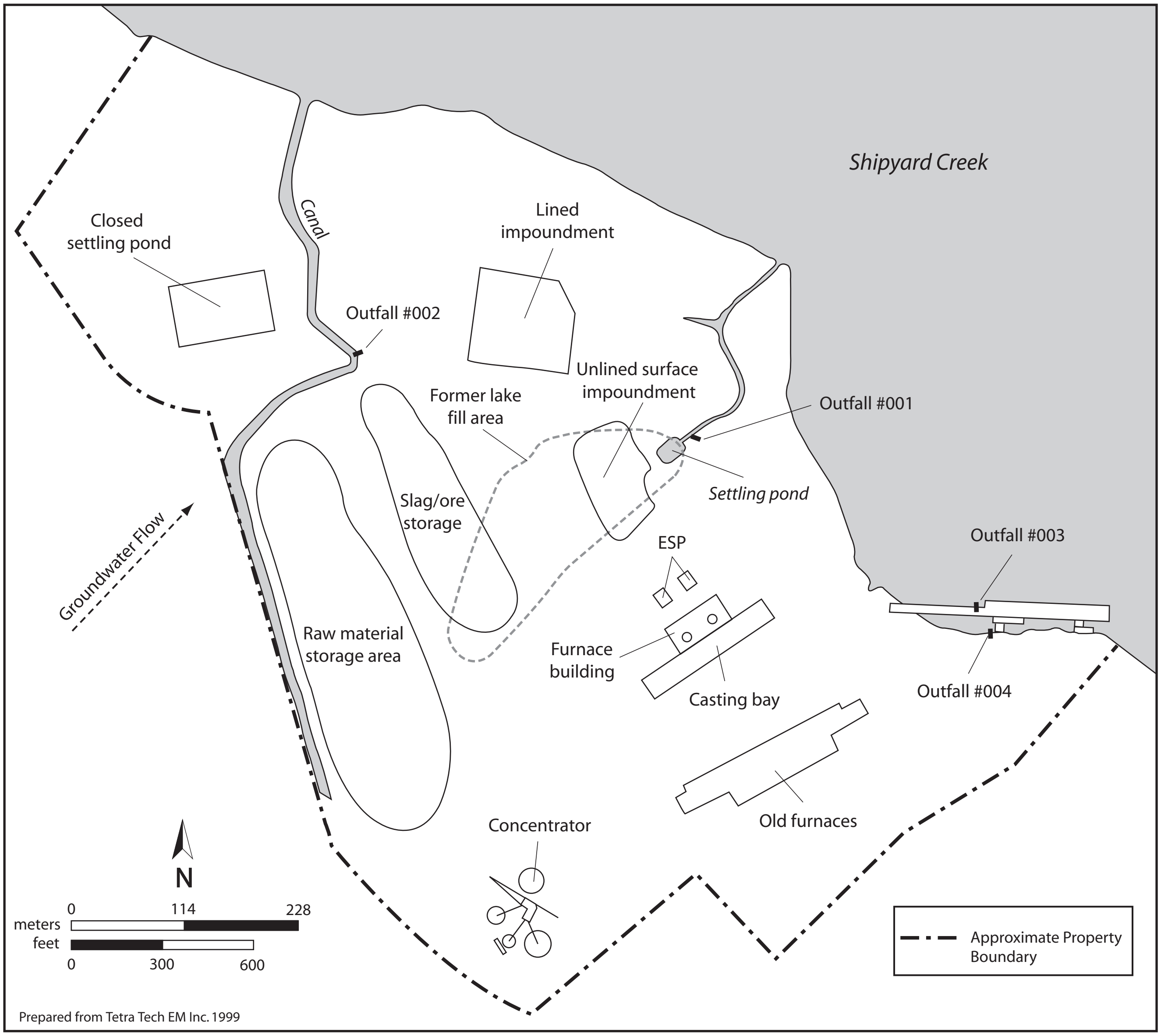

Figure 2. Detail of the Macalloy Corporation property.

NOAA Trust Resources

The NOAA trust habitats of concern are the estuarine waters of the lower Cooper River, including Shipyard Creek and upper Charleston Harbor. Adjacent to the site, the Cooper River is estuarine river-mouth habitat about 1 km (0.6 mi) in width and up to 9 m (30 ft) in depth, with salinities ranging from 14 to 25 parts per thousand (ppt). Shipyard Creek, a tributary of the lower Cooper River, is about 2 km (1.2 mi) in length, 200 m (660 ft) in width, and up to 5.5 m (18 ft) in depth. The upland areas adjacent to Shipyard Creek are highly developed. Little freshwater input enters Shipyard Creek (Marine Resources Research Institute 2000; USGS 2000). Sediments in the lower Cooper River are heterogeneous, ranging from sandy to very muddy and silty (Marine Resources Research Institute 2000). Lower Charleston Harbor, an estuary of the Atlantic Ocean, has depths ranging up to

12 m (40 ft) and salinities ranging from 15 ppt to full seawater (which generally has salinities of approximately 30 to 40 ppt) (Nelson et al. 1991; USGS 2000).

Numerous estuarine and marine species use the lower Cooper River and Charleston Harbor estuaries as a juvenile nursery and adult residence (Table 1). Resident estuarine fish species include bay anchovy, killifishes, sheepshead minnow, and silversides. All life stages of these species are spent within the estuary, and several of these species are considered abundant. Species such as bluefish, mullets, pinfish, and the sciaenids (Atlantic croaker, black drum, spot, spotted seatrout, weakfish) are coastal spawners; eggs and larval stages drift offshore and juvenile stages migrate into the estuary. Because many of these species are long-lived, juveniles may spend several years in the estuary. Adults of several of the species can also be found within the estuary seasonally. Species such as cobia and Spanish mackerel are pelagic and migratory; juveniles are primarily found in estuaries, which also receive some seasonal use by adults (Nelson et al. 1991; Wenner 2002).

Several anadromous species, including American shad, blueback herring, striped bass, and white perch, spawn in freshwater portions of the Cooper River upstream of the site. The Cooper River is an actively managed anadromous fish stream. Dam and lock systems such as the Pinopolis Dam on the Lake Moultrie impoundment, located approximately 48 km (30 mi) upstream of the site, allow passage of migrating fish during spawning seasons (Cooke and Cappelear 1992). All of the anadromous species are spring spawners (Nelson et al. 1991). The catadromous American eel is also present in Shipyard Creek in the vicinity of the site (Wenner 2002). Adult residents in the Cooper River and Charleston Harbor are considered common to abundant.

Many invertebrate species are present in the estuary, including blue crab, daggerblade grass shrimp, eastern oyster, northern quahog, and penaeid shrimp. Juvenile and adult blue crab are abundant; mating and larval stages are also observed in the estuary although females usually migrate to coastal waters to brood and release eggs. Daggerblade grass shrimp, eastern oyster, northern quahog, and penaeid shrimp spend all their life stages in the estuary (Nelson et al. 1991; Wenner 2002).

Commercial and recreational fishing and shellfish collection occur in the lower Cooper River and Charleston Harbor. Sixteen estuarine and three anadromous fish species are fished commercially in the vicinity of the Macalloy site (Table 1). In addition, there is recreational fishing of 18 estuarine and three anadromous fish species in the lower Cooper River and Charleston Harbor (Table 1). Several of these species, including American eel, Atlantic menhaden, killifish, and striped mullet, are collected solely for use as bait (Wenner 2002). There is also an active, year-round recreational harvest of penaeid shrimp (SCDNR 2003).

No fish consumption advisories are currently in effect for Shipyard Creek. In 1998, the SCDHEC issued an emergency order closing Shipyard Creek to the harvest of all shellfish because of high levels of chromium in edible tissue. However, this advisory was lifted in November 2001 (SCDHEC 2001).

Site-Related Contamination

The primary contaminants of concern at the site are metals. A site investigation (SI), a preliminary ecological risk evaluation (PERE), and a Phase II remedial investigation (RI) have documented the migration of these contaminants from the site into Shipyard Creek. Fifteen surface water samples collected from Shipyard Creek during the SI were analyzed for metals. One hundred sediment samples collected during the SI, 15 collected during the PERE, and eight collected during the RI were analyzed for metals, semivolatile organic compounds (including polynuclear aromatic hydrocarbons [PAHs]), pesticides, and polychlorinated biphenyls (PCBs). Maximum concentrations of selected contaminants of concern are summarized in Table 2.

Table 1. Fish and invertebrate species present in the lower Cooper River and Charleston Harbor (Nelson et al. 1991; Wenner 2002).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Forage	Comm.	Rec.
MARINE/ESTUARINE FISH						
Atlantic croaker	*Micropogonias undulatus*		◆	◆	◆	◆
Atlantic menhaden	*Brevoortia tyrannus*		◆		◆	◆[a]
Bay anchovy	*Anchoa mitchilli*	◆	◆	◆		
Black drum	*Pogonias cromis*		◆	◆		◆
Bluefish	*Pomatomus saltatrix*		◆	◆	◆	◆
Cobia	*Rachycentron canadum*		◆	◆	◆	◆
Gray snapper	*Lutjanus griseus*		◆		◆	◆
Gulf flounder	*Paralichthys albigutta*		◆	◆		◆
Killifish	*Fundulus spp.*	◆	◆	◆	◆[a]	◆[a]
Pinfish	*Lagodon rhomboides*		◆	◆		
Red drum	*Sciaenops ocellatus*	◆	◆	◆	◆	◆
Sheepshead	*Archosargus probatocephalus*		◆	◆	◆[b]	◆
Sheepshead minnow	*Cyprinodon variegatus*	◆	◆	◆		
Silversides	*Menidia spp.*	◆	◆	◆		
Southern flounder	*Paralichthys lethostigma*		◆	◆	◆	◆
Southern kingfish	*Menticirrhus americanus*		◆	◆	◆	◆
Spanish mackerel	*Scomberomorus maculatus*		◆	◆	◆	◆
Spot	*Leiostomus xanthurus*		◆	◆	◆	◆
Spotted seatrout	*Cynoscion nebulosus*		◆	◆	◆	◆
Striped mullet	*Mugil cephalus*		◆	◆	◆	◆[a]
Summer flounder	*Paralichthys dentatus*		◆	◆	◆	◆
Weakfish	*Cynoscion regalis*		◆	◆	◆	◆
ANADROMOUS/CATADROMOUS FISH						
American eel	*Anguilla rostrata*		◆	◆	◆	◆[a]
American shad	*Alosa sapidissima*		◆	◆	◆	◆
Blueback herring	*Alosa aestivalis*		◆	◆	◆	
Striped bass	*Morone saxatilis*		◆	◆		◆
White perch	*Morone americana*		◆	◆		
INVERTEBRATES						
Blue crab	*Callinectes sapidus*	◆	◆	◆	◆	◆
Daggerblade grass shrimp	*Palaemonetes pugio*	◆	◆	◆		
Eastern oyster	*Crassostrea virginica*	◆	◆	◆	◆	◆
Northern quahog	*Mercenaria mercenaria*	◆	◆	◆	◆	◆
Penaeid shrimps	*Penaeidae spp.*	◆	◆	◆	◆	◆

a: Species fished as bait

b: Species represents minor fishery

Table 2. Maximum concentrations of selected contaminants of concern to NOAA detected in samples collected at the Macalloy Corporation site (Tetra Tech EM Inc. 1999, EnRisk 2000, BDY 2001). Contaminant values in bold exceeded screening guidelines.

	Surface Water (µg/L)		Sediment (mg/kg)	
Contaminant	Surface Water	AWQC[a]	Sediment	ERL[b]
METALS/INORGANICS				
Arsenic	13	36	**25**	8.2
Cadmium	ND	8.8	**2.3**	1.2
Chromium[c]	**2,600**	50	**3,900**	81
Copper	**50**	3.1	**98**	34
Lead	**130**	8.1	**620**	46.7
Mercury	0.73	0.94[d]	**0.61**	0.15
Nickel	**56**	8.2	**610**	20.9
Selenium	28	71	**8**	1.0[e]
Zinc	**730**	81	**4,800**	150
PAHs				
Acenaphthene	N/A	710[f]	**0.11**	0.016
Anthracene	N/A	300[f,g,h]	**0.37**	0.0853
Benz(a)anthracene	N/A	300[f,g,h]	**6.8**	0.261
Chrysene	N/A	300[f,g,h]	**9.4**	0.384
Dibenz(a,h)anthracene	N/A	300[f,g,h]	**0.096**	0.0634
Fluoranthene	N/A	16[f]	**4.9**	0.6
Fluorene	N/A	NA	**0.072**	0.019
2-Methylnaphthalene	N/A	300[f,g,h]	**0.16**	0.07
Naphthalene	N/A	2350[f,g]	**0.3**	0.16
Phenanthrene	N/A	NA	**0.6**	0.24
Pyrene	N/A	300[f,g,h]	**9.6**	0.665
PESTICIDES/PCBs				
Chlordane	N/A	0.004	**0.024**	0.0005
4,4′-DDE	N/A	NA	**0.087**	0.0022
4,4′-DDT	N/A	0.001	**0.19**	0.00158[i]
Total PCBs	N/A	0.03	**12**	0.0227

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

b: Effects range-low represents the 10th percentile for the dataset in which effects were observed or predicted in studies compiled by Long et al. (1998).

c: Screening guidelines represent concentrations for Cr^{+6}

d: Derived from inorganic, but applied to total mercury.

e: Marine apparent effects threshold (AET) for bivalve bioassays. The AET represents the concentration above which adverse biological impacts would be expected.

f: Lowest Observable Effect Level (LOEL) (USEPA 1986).

g: Chronic criterion not available; acute criterion presented.

h: Value for chemical class.

i: Expressed as Total DDT.

N/A: Not analyzed.

NA: Screening guidelines not available.

ND: Not detected.

<u>Surface Water</u>

Several metals were detected in surface water samples collected from Shipyard Creek. Maximum concentrations of detected metals ranged from 0.73 µg/L (mercury) to 2,600 µg/L (chromium). Maximum concentrations of chromium, copper, and lead in surface water samples exceeded the ambient water quality criteria (AWQC) screening guidelines by one order of magnitude. Mercury, nickel, and zinc were detected at maximum concentrations at least seven times the AWQC. Arsenic and selenium were also detected, but at maximum concentrations below the AWQC. Cadmium was not detected in the surface water samples. Both chromium and zinc were detected at concentrations exceeding the AWQC in six of the 15 surface water samples collected.

<u>Sediment</u>

Metals, PAHs, and pesticides were detected in several sediment samples collected from Shipyard Creek. The most frequently detected metals were chromium, copper, lead, and nickel. Maximum concentrations of chromium, lead, nickel, and zinc all exceeded the effects range-low (ERL) screening guidelines by one order of magnitude, while maximum concentrations of arsenic, cadmium, copper, mercury, and selenium exceeded the ERLs by factors ranging between approximately two and eight. Maximum concentrations of PAHs in sediment samples ranged from 0.072 mg/kg (fluorene) to 9.6 mg/kg (pyrene). The PAHs most frequently detected included chrysene, flouranthene, and phenanthrene. Benz(a)anhthracene, chrysene, and pyrene were detected in a Shipyard Creek sediment sample collected near the shore opposite the site at maximum concentrations that exceeded the ERLs by one order of magnitude. Maximum concentrations of the other PAHs summarized in Table 2 exceeded ERLs by factors ranging between approximately two and eight. The pesticides chlordane, DDE, and DDT were detected in a sediment sample collected near where existing outfall #001 discharges into Shipyard Creek at maximum concentrations that exceeded the ERLs by one order of magnitude (chlordane, DDE) or two orders of magnitude (DDT). Total PCBs were detected at a maximum concentration that exceeded the ERL by two orders of magnitude.

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Reasor Chemical Company

Castle Hayne, North Carolina

USEPA Facility ID: NCD986187094

Basin: Northeast Cape Fear

HUC: 03030007

Executive Summary

The Reasor Chemical Company site is an inactive outdoor stump rendering facility located in Castle Hayne, North Carolina just north of Prince George Creek. Stump rendering activities at the site included the extraction and distillation of pine tar from stumps using unknown solvents. PAHs, inorganic compounds, pesticides and dioxins have been documented at the site at concentrations exceeding screening guidelines. Several NOAA trust species utilize Prince George Creek as spawning or nursery habitat.

Site Background

The Reasor Chemical Company (Reasor Chemical) site is located in Castle Hayne, North Carolina on 10 hectares (25 acres) of land approximately 122 m (400 ft) north of Prince George Creek. Prince George Creek is a small creek that flows into the Northeast Cape Fear River approximately 8.9 km (5.5 mi) downstream of the site (Figure 1). The Northeast Cape Fear River joins the Cape Fear River approximately 22 km (14 mi) downstream of its confluence with Prince George Creek. The Cape Fear River then flows roughly 38 km (24 mi) into the Atlantic Ocean.

Outdoor stump rendering operations took place at the Reasor Chemical site from 1959 to 1972. In 1972 there was a fire and an explosion that destroyed all remaining site buildings and some material related to the stump rendering operations. Evidence of Reasor Chemical activities remaining after the fire include cement pads where buildings once were, five surface impoundments (ponds), a scrap copper refinery, two railroad sidings, a surface drum disposal area, a sluice area, and several drainage ditches (Figure 2). The rest of the site property is currently vacant and overgrown with brush and secondary growth forest (Weston 1999).

Stump rendering at the Reasor Chemical site involved the use of unknown solvents to extract pine tar from chipped stumps. After the extraction process was complete, raw pine tar was distilled and temporarily stored in the south tank cradle. Distilled product was then transferred to the north tank cradle before distribution via railway. The remaining wood chips were disposed of in the sluice area (Weston 1999) (Figure 2). Although little information was available regarding hazardous substances used at the Reasor Chemical site, typical hazardous wastes associated with stump rendering operations include spent solvents, SVOCs, dioxins, and metals (USEPA 2001a). Five surface impoundments (ponds) located on the site property were used for waste and cooling water storage. These impoundments had spillways connected to drainage ditches that flow toward Prince George Creek. Transformers containing PCBs were observed on the Reasor Chemical property (Weston 1999).

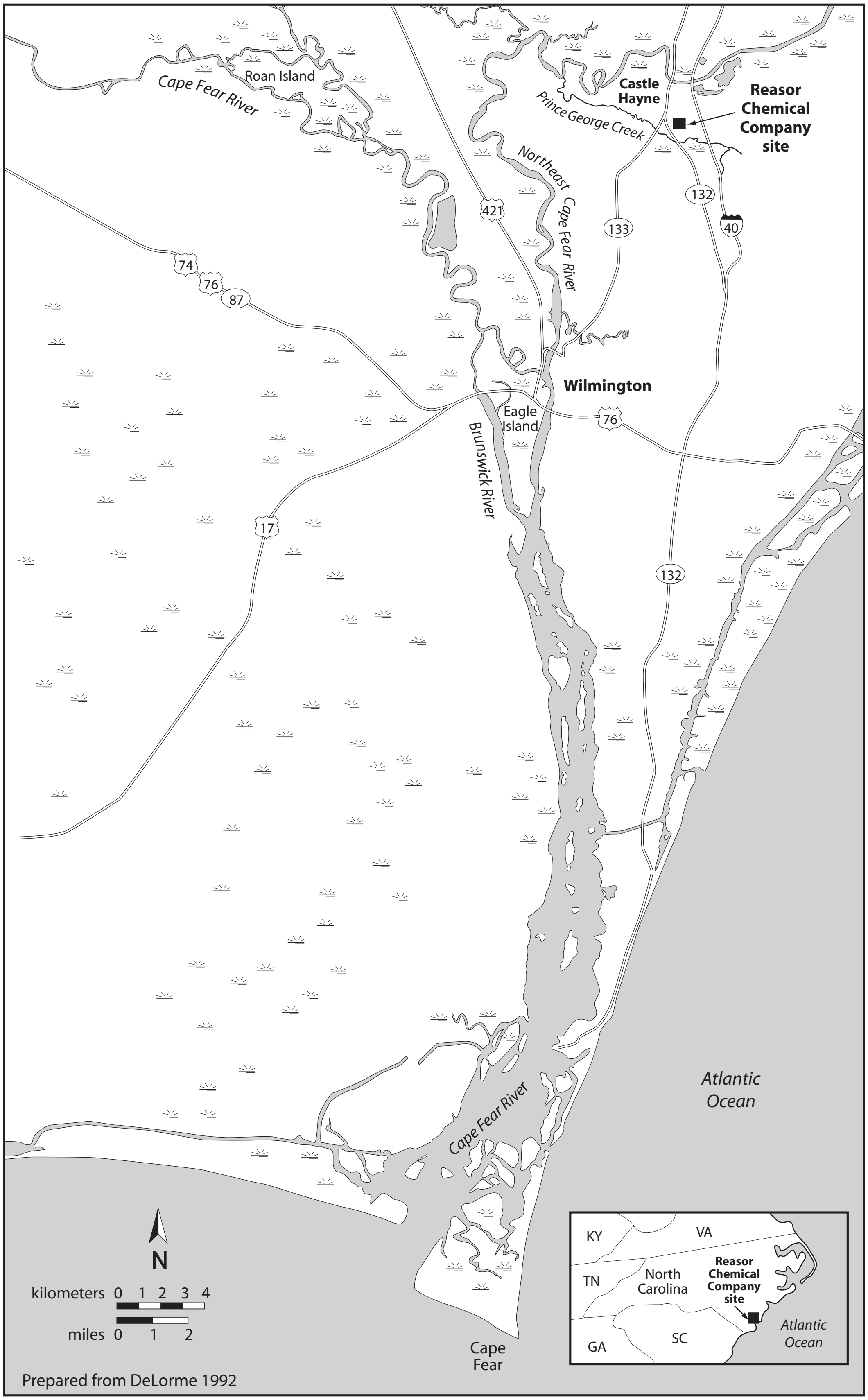

Figure 1. Location of Reasor Chemical Company site, Castle Hayne, North Carolina.

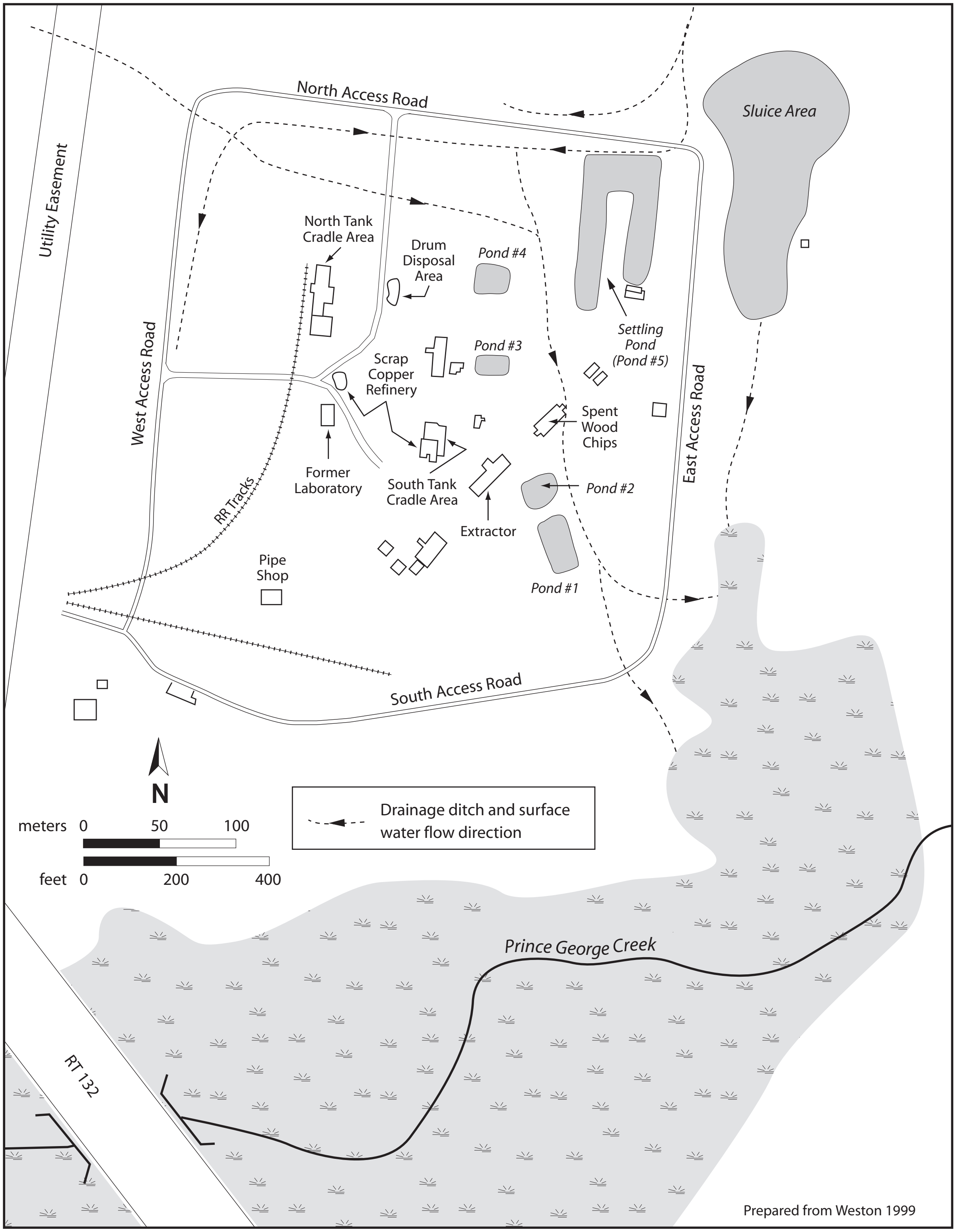

Figure 2. Detail of Reasor Chemical Company property.

From 1997 to 1999 the United States Environmental Protection Agency (USEPA) conducted a remedial investigation/feasibility study (RI/FS) of the Reasor Chemical site. A screening-level ecological risk assessment was also completed in 1999 using data collected during the RI/FS. The Reasor Chemical site was proposed to the USEPA National Priorities Listing in September 2001 because toluene and dioxins were detected in wetlands adjacent to the site (USEPA 2001b).

Surface water runoff, groundwater, and sediment are the primary pathways for transport of contaminants from the site to NOAA trust resources. Surface runoff from the site drains via drainage ditches in a southeasterly direction toward Prince George Creek and the surrounding wetlands. In addition to surface runoff, the drainage ditches receive overflow from the surface impoundments (ponds) on the site property. Sediment present in the drainage ditches is transported towards NOAA resources with the surface water flow. Information on sediment composition at the site was not available for incorporation in this report. Groundwater flow beneath the site is southeast toward Prince George Creek. Groundwater in this area is encountered approximately 2 m (6.5 ft) below ground surface (Weston 1999).

NOAA Trust Resources

The Reasor Chemical site is located in the Cape Fear River basin approximately 200 m (700 ft) north of Prince George Creek. The NOAA trust habitat of concern is Prince George Creek, a small tributary of the Northeast Cape Fear River. Near the site, Prince George Creek is a westward-flowing freshwater creek. However, the creek experiences flow reversal and saltwater intrusion due to tidal influence, approximately 1.5 km (1 mi) downstream of the Reasor Chemical site (Weston 1999).

There are no dams present on the Cape Fear or Northeast Cape Fear Rivers to impede the migration of anadromous fish into Prince George Creek. Several anadromous fish are present in the segment of Prince George Creek near the Reasor Chemical site, including blueback herring, American shad, and striped bass (Table 1). Blueback herring spawn in Prince George Creek, while American shad and striped bass use the creek as nursery grounds. Atlantic and shortnose sturgeon are present in the Cape Fear and Northeast Cape Fear Rivers but do not ascend into smaller tributaries such as Prince George Creek. Shortnose sturgeon is listed as endangered by the state of North Carolina and the US Fish and Wildlife Service. The catadromous American eel is also present near the site (Rohde 2002).

A fish consumption advisory is in effect for eastern North Carolina which includes the location of the Reasor Chemical site. This advisory is due to elevated mercury concentrations in several fresh and saltwater fish species and restricts consumption of these fish. Shark, swordfish, tilefish, and king mackerel are several NOAA trust resources that are included in the advisory (North Carolina Department of Health and Human Services: Epidemiology 2002).

Commercial and recreational fishing of American shad and striped bass takes place in the Northeast Cape Fear River near the confluence of Prince George Creek. Information on fishing activities further upstream, in Prince George Creek, was not available at the time of this report (Rohde 2002).

Table 1. NOAA trust fish species present in the vicinity of the Reasor Chemical Company site (Rohde 2001).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
ANADROMOUS FISH						
American shad	*Alosa sapidissima*		◆		◆	◆
Atlantic sturgeon	*Acipenser oxyrhynchus*		◆			
Blueback herring	*Alosa aestivalis*	◆	◆			
Shortnose sturgeon	*Acipenser brevirostrum*		◆			
Striped bass	*Morone saxatilis*		◆		◆	◆
CATADROMOUS FISH						
American eel	*Anguilla rostrata*			◆		

Site-Related Contamination

Primary contaminants of concern detected at the site include metals and PAHs. However, pesticides and dioxins were also detected at lower concentrations throughout the site. Contamination was documented in soil, groundwater, surface water and sediment at the site during a remedial investigation/feasibility study (RI/FS) completed in 1999. During the RI/FS 131 soil samples, 29 groundwater samples, 15 surface water samples and 28 sediment samples were collected. All media sampled at the site were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, inorganics, and dioxins. Samples of environmental media were also analyzed for PCBs however, the results were not available for review at the time of this report. Maximum concentrations of contaminants were compared to screening guidelines (Table 2).

Surface Water

Metals, PAHs, and dioxins were detected in surface water samples collected from the Reasor Chemical site. Concentrations of copper, lead, silver, and zinc were detected in surface water collected from the drainage ditch in the southeast corner of the site property. Copper and silver were detected at concentrations that exceeded the ambient water quality criteria (AWQC) by at least one order of magnitude. The PAHs fluorene and phenanthrene were detected in Pond #3. Dioxins were detected in surface water samples at concentrations below the freshwater AWQC.

Groundwater

Metals, PAHs, and dioxins were detected in groundwater samples from several different monitoring wells located on the Reasor Chemical site property. Cadmium, copper, and lead were detected in a well just south of Pond #4, at concentrations at least one order of magnitude greater than the freshwater AWQC. Maximum concentrations of chromium and cadmium were detected in a monitoring well located at the southern end of the site property. The PAHs acenaphthene, fluoranthene, phenanthrene, and pyrene were detected in a groundwater well located in the southwest corner of the site property. The PAH napthalene was detected at the greatest concentration but the concentration was below the freshwater AWQC. Dioxins were detected in 10 of the 19 samples analyzed. The maximum toxic equivalent value (TEQ) for dioxins was seven times the freshwater AWQC.

Table 2. Maximum concentrations of contaminants of concern detected in environmental media at the Reasor Chemical Company site compared to screening guidelines (Weston 1999). 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	Surface Water	AWQC[b]	Pond Sediment	Prince George Creek Sediment	TEC[c]
Metals/Inorganics								
Arsenic	**10**	5.2	96	ND	150	3.1	ND	9.79
Cadmium	**6.1**	0.06	**6**	ND	0.25[d]	0.94	ND	0.99
Chromium[e]	**55**	37	**290**	ND	11	21.1	28	43.4
Copper	**5,900**	17	**240**	**110**	9[d]	**660**	ND	31.6
Lead	**410**	16	**330**	**13**	2.5[d]	**59**	28	35.8
Mercury	**2.4**	0.058	**2**	ND	0.77[f]	**0.23**	ND	0.18
Nickel	**90**	13	**530**	ND	52[d]	**55**	ND	22.7
Silver	**6.9**	0.05	NA	**44**	3.2[d,g]	1.5	2.6	NA
Zinc	**2,300**	48	**870**	95	120[d]	120	94	121
PAHs/Phenols								
Acenaphthene	0.26	NA	1	ND	520[h]	0.082	ND	NA
Acenaphthylene	1.8	NA	ND	ND	NA	ND	ND	NA
Anthracene	2	NA	ND	ND	NA	ND	ND	0.0572
Benz(a)anthracene	4.4	NA	ND	ND	NA	ND	ND	0.108
Benzo(b)flouranthene	5.3	NA	ND	ND	NA	ND	ND	NA
Benzo(a)pyrene	3.9	NA	ND	ND	NA	ND	ND	0.15
Chrysene	4.7	NA	ND	ND	NA	**14**	ND	0.166
Dibenz(a,h)anthracene	0.36	NA	ND	ND	NA	ND	ND	0.033
Fluoranthene	6.6	NA	1	ND	NA	**8.4**	ND	0.423
Fluorene	1.7	NA	ND	2	NA	**0.078**	ND	0.0774
2-Methylnaphthalene	1.2	NA	8	ND	NA	12	ND	NA
Naphthalene	1.2	NA	13	ND	620[h]	**5.1**	ND	0.176
Phenanthrene	7.1	NA	1	3	NA	**11**	ND	0.204
Pyrene	8.5	NA	1	ND	NA	**20**	ND	0.195
Pesticides								
DDT	0.095	NA	ND	ND	0.001	ND	**0.025**	0.00528[i]
Endosulfan (alpha + beta)	0.0028	NA	ND	ND	0.056	ND	ND	NA
Endrin	0.038	NA	ND	ND	0.036	ND	**0.056**	0.00222
Dioxins/Furans								
TEQ (Toxic Equiv. Value)[j]	0.00007	NA	**0.00007**	0.00000044	0.00001[h,k]	**0.0053**	0.0000029	0.000008[k,l]

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 2002); Freshwater chronic criteria presented.

c: Threshold Effects Concentration (TEC). Concentration below which harmful effects are unlikely to be observed (MacDonald 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: Chronic criterion not available; acute criterion presented.

g: Criterion derived from inorganic, but applied to total mercury.

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

i: Expressed as total DDT.

j: Maximum toxic equivalant value (TEQ) is provided. Each dioxin/furan is assigned a toxic equivalency factor (TEF) relative to 2,3,7,8 tetrachlorodibenzodioxin, which is the most toxic compound in this group. To determine the toxicity of a mixture of dioxin/furan compounds, the measured concentration of the individual dioxin/furans is multiplied by its assigned TEF. The results are summed to produce a TEQ.

k: Value is for 2,3,7,8-TCDD.

l: TEC not available; Upper Effects Threshold (UET) presented.

NA: Screening guidelines not available..

ND: Not detected.

<u>Sediment</u>

Sediment samples collected from ponds located onsite, Prince George Creek, and surrounding wetlands contained elevated concentrations of metals, PAHs, pesticides, and dioxins. The maximum concentrations of copper, lead, mercury, nickel, zinc, and arsenic were detected in samples collected from Pond #4. The maximum copper concentration in sediment exceeded the Threshold Effects Concentration (TEC) by one order of magnitude. The maximum concentrations of chromium and silver were detected in sediment samples collected from Prince George Creek. Maximum concentrations of cadmium, lead, mercury, and nickel were all slightly greater than their respective TECs. No PAHs were detected in samples collected from Prince George Creek. However, several PAHs including chrysene, fluoranthene, phenanthrene, and pyrene were detected in the drum disposal area and sample concentrations exceeded the TECs by at least one order of magnitude. The maximum dioxin TEQ was two orders of magnitude greater than the TEC screening guideline in a sediment sample collected from Pond #2.

<u>Soil</u>

Elevated concentrations of metals and PAHs were detected in soils samples collected from the Reasor Chemical site. The maximum concentrations of eight metals were detected in soil at the southwest corner of the site property near the pipe shop. Concentrations of copper, lead, and mercury all exceeded mean U.S. soil concentrations by at least one order of magnitude. Fourteen PAHs were detected at various locations throughout the site. Maximum concentrations ranged from 0.26 mg/kg (acenapthene) to 8.5 mg/kg (pyrene). Of the soil samples that were analyzed for PAHs, phenanthrene, flouranthene, and pyrene were detected in the greatest percentages. Pesticides and dioxins were detected in soil samples from the Reasor Chemical site at minimal concentrations.

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Del Amo

Los Angeles, California

USEPA Facility ID: CAD029544731

Basin: Santa Monica Bay

HUC: 18070104

Executive Summary

The Del Amo site is a former facility for the manufacture of synthetic rubber; the facility consisted of a butadiene plant, a styrene plant, and a copolymer/synthetic rubber plant. The site encompasses approximately 113 ha (280 acres) in Los Angeles, California, near the city of Torrance. The primary contaminants of concern at the Del Amo site are inorganic compounds (metals), SVOCs, VOCs, pesticides, and PCBs in soil and groundwater. The primary pathway for the migration of contaminants to NOAA trust resources is surface water runoff, which drains from the site into a storm drain that empties into the Torrance Lateral. The Torrance Lateral then drains into the Dominguez Channel, which drains into Los Angeles Harbor and ultimately into San Pedro Bay. San Pedro Bay provides spawning, nursery, and adult habitat for several NOAA trust resources. The primary NOAA habitats of concern are the surface waters and sediments of Los Angeles Harbor and San Pedro Bay.

Site Background

The Del Amo site is within the city limits of Los Angeles, near the city of Torrance, in Los Angeles County, California (Figure 1). The facility, which encompasses approximately 113 ha (280 acres), was built in 1943 to produce synthetic rubber during World War II (USEPA 2002b) and consisted of a butadiene plant, a styrene plant, and a copolymer/synthetic rubber plant. The federal government was the original owner of the Del Amo facility. In 1955, the government sold the facility to Shell Oil Company, which continued to produce synthetic rubber there until 1971. The Del Amo facility was closed in 1972, and a large business park currently occupies the property (USEPA 2002a).

The waste produced in each plant during the production processes was directed into separator units, where sludge was settled out of the waste. The sludge was then removed and disposed of either off site or in a waste pit area in the southern portion of the site (Figure 2). The waste pit area, which occupied approximately 1.5 ha (3.7 acres), consisted of six disposal pits and two evaporation ponds, all unlined (USEPA 2002a). By 1951 the six disposal pits were covered with fill material; in 1967, the two evaporation ponds were also covered with fill material (Ecology and Environment 2000). Between 1987 and 1995, a change in groundwater level of approximately 1 m (3 ft) caused the soil beneath the waste pit area to shift below the water table. The consequence of this change is that any contaminants present in the soil could be directly released into the groundwater (USEPA 2002b).

In 1992, Dames and Moore collected soil samples from the six disposal pits and the two evaporation ponds. In the disposal pits, black to gray-black tar and clay-like sludge wastes were observed. Analytical results indicated that the waste contained elevated concentrations of polynuclear aromatic hydrocarbons (PAHs), predominantly naphthalene, and volatile organic compounds (VOCs),

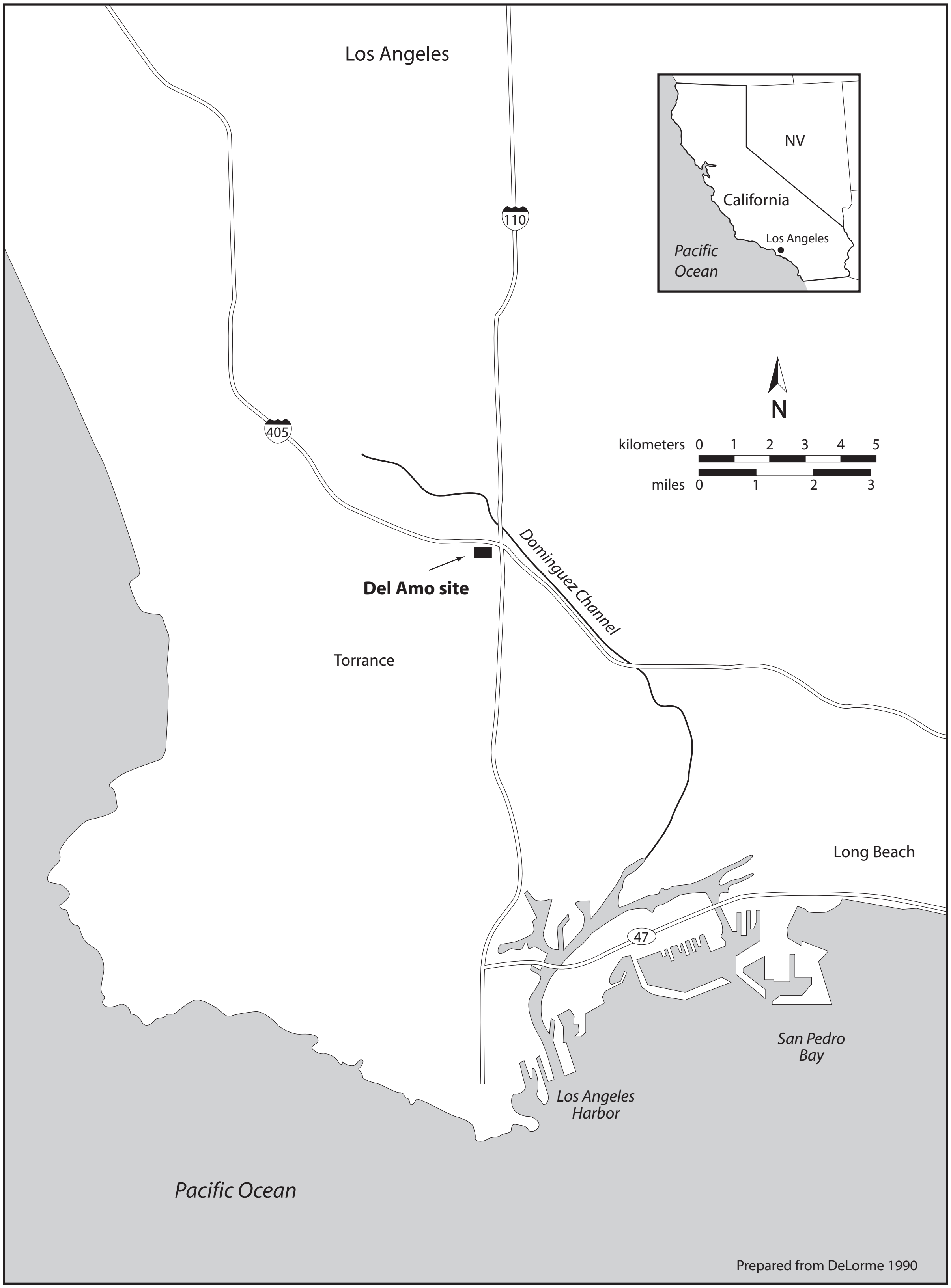

Figure 1. Location of the Del Amo site, Los Angeles, California.

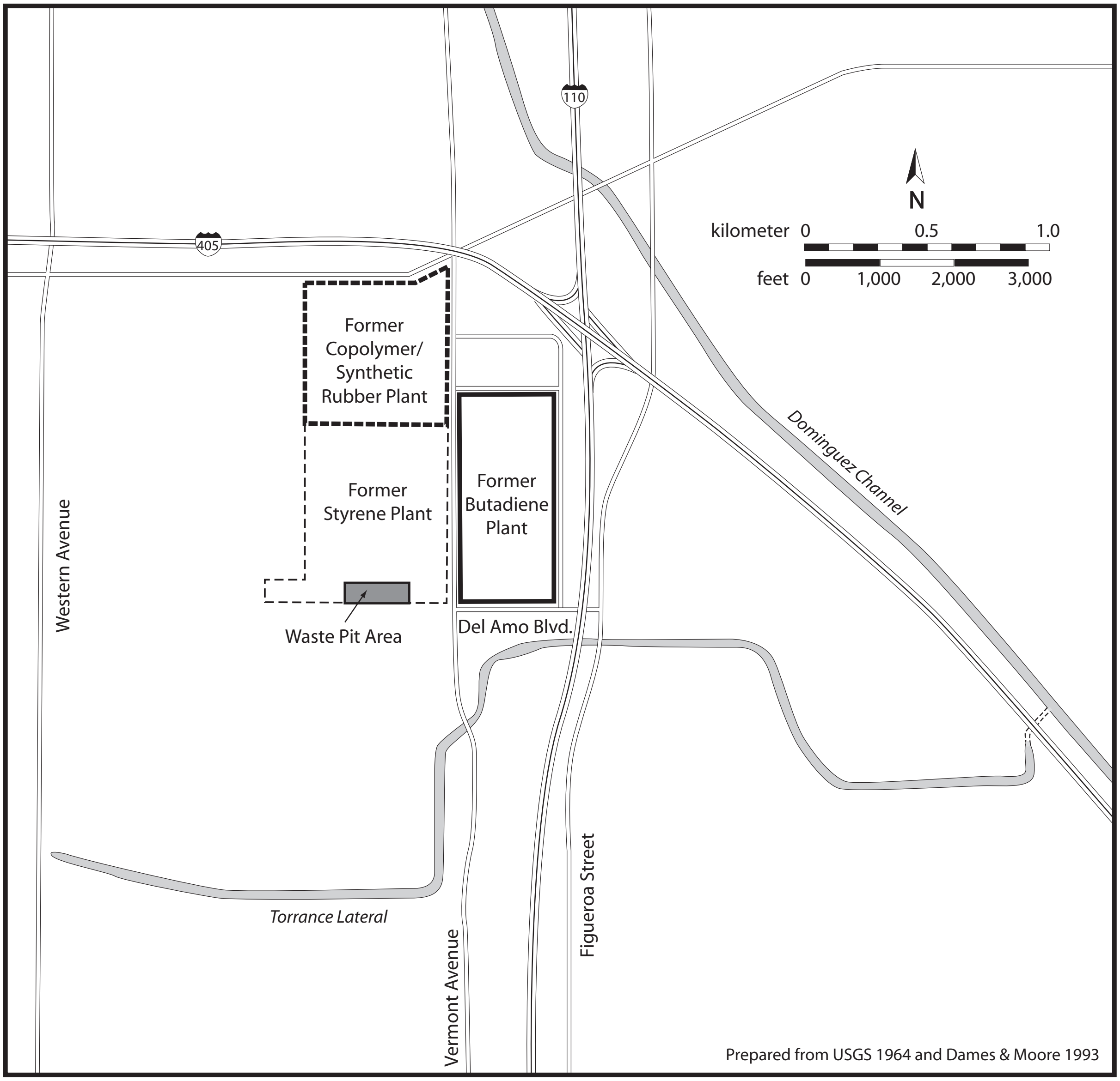

Figure 2. Detail of the Del Amo site.

predominantly benzene and ethylbenzene. At the evaporation ponds, the wastes resembled clay-like sludge. Analytical results were similar to those for the disposal pits (Ecology and Environment 2000).

A tank farm in the western portion of the former styrene manufacturing plant consisted of 17 large, cylindrical, aboveground storage tanks and several smaller tanks. These various tanks stored crude and refined products associated with the styrene manufacturing process, including benzene, ethylbenzene, toluene, styrene, and fuel oil. Historical documents and aerial photographs indicate that spills occurred at the tank farm during the transfer of tank contents to and from railroad cars and trucks and during filling. In 1990, a monitoring well was installed approximately 30 m (100 ft) southeast of a storage tank that had historically contained crude benzene; non-aqueous phase liquid (NAPL) was detected floating on the groundwater in the well. In 1992 and 1993, groundwater and soil samples were collected to further delineate and identify the chemical constituents of the NAPL.

It was determined that the lateral extent of the NAPL ranged from 1,300 to 1,600 sq m (14,300 to 17,500 sq ft) and that the NAPL was predominantly composed of benzene, with lesser quantities of toluene, ethylbenzene, and styrene (Ecology and Environment 2000).

In 1992, the potentially responsible parties began an investigation to characterize the nature and extent of the contamination. This investigation is scheduled to be completed in 2003 and will be followed by a feasibility study to determine cleanup options (USEPA 2002a). The Del Amo site was proposed to the National Priorities List (NPL) on December 1, 2000, and placed on the NPL on September 5, 2002 (USEPA 2002b).

Surface water is the potential pathway for the migration of contaminants from the site to NOAA trust resources. Surface water runoff from the Del Amo site enters a storm drain inlet at the intersection of Vermont Avenue and Del Amo Boulevard, approximately 183 m (600 ft) southeast of the waste pit area. This storm drain system discharges to the Torrance Lateral, which is a concrete-lined open channel approximately 490 m (1,600 ft) south of the storm drain inlet. The Torrance Lateral discharges into the Dominguez Channel, a concrete-lined drainage and flood control channel, approximately 2.4 km (1.5 mi) downstream of the storm drain system discharge point. The Dominguez Channel discharges into Los Angeles Harbor, which empties into San Pedro Bay and, ultimately, the Pacific Ocean (Ecology and Environment 2000).

NOAA Trust Resources

The primary NOAA habitats of concern are the surface waters and sediments of Los Angeles Harbor and San Pedro Bay, and, to a lesser degree, tidal waters and substrates (sediments) in Dominguez Channel. Dominguez Channel is tidally influenced from the point where it connects with Los Angeles Harbor to north of the site near Vermont Avenue. In the vicinity of the site, the channel is approximately 5 m (16 ft) wide and 25 m (80 ft) deep (California Energy Commission 1986).

San Pedro Bay and Los Angeles Harbor are considered important spawning, nursery, and adult habitats for NOAA trust resources (Appy 2003). Over 130 fish and invertebrate species have been identified in San Pedro Bay and Los Angeles Harbor, although species diversity and abundance are greater in San Pedro Bay. The NOAA trust resources most abundant in San Pedro Bay and Los Angeles Harbor are listed in Table 1; of these, northern anchovy and white croaker are the most common in San Pedro Bay. Several fish species found in both Los Angeles Harbor and San Pedro Bay were also found in the Dominguez Channel during fish seining conducted in the 1970s (California Energy Commission 1986). However, no more recent information regarding fish habitat uses of Dominguez Channel was available at the time of this report.

Commercial fishing does not occur in the industrialized Dominguez Channel, and recreational fishing is minimal because of limited public access (Cross 1991). San Pedro Bay supports significant year-round recreational fishing and some commercial fishing. Species regularly caught by anglers include barred sand bass, black rockfish, California halibut, diamond turbot, kelp bass, queenfish, shiner perch, white croaker, and white seaperch. Invertebrate species caught regularly by sport fisherman near Los Angeles Harbor are spiny lobster and Pacific rock crab. A commercial bait fishery exists in San Pedro Bay for jack mackerel, northern anchovy, queenfish, and topsmelt. No significant recreational or commercial fishing occurs in Los Angeles Harbor because of the commercial shipping traffic (Crooke 1991).

Table 1. NOAA trust resources found in San Pedro Bay and Los Angeles Harbor (Crooke1991; Cross 1991; MEC Analytical Systems 2002; Appy 2003).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
MARINE AND ESTUARINE FISH						
Arrow goby[a]	*Clevelandia ios*	◆	◆	◆		
Barred sand bass	*Paralabrax nebulifer*	◆	◆	◆		◆
Bat ray	*Myliobatis californica*		◆	◆		
Black rockfish	*Sebastes melanops*	◆	◆	◆		◆
California grunion	*Leuresthes tenuis*		◆	◆		
California halibut	*Paralichthys californicus*	◆	◆	◆		◆
Deepbody anchovy[a]	*Anchoa compressa*		◆	◆		
Diamond turbot	*Hypsopsetta guttulata*	◆	◆	◆		◆
English sole	*Pleuronectes vetulus*			◆		
Jack mackerel	*Trachurus symmetricus*		◆	◆	◆	
Jacksmelt	*Atherinopsis californiensis*	◆	◆	◆		
Kelp bass	*Paralabrax clathratus*	◆	◆	◆		◆
Leopard shark	*Triakis semifasciata*	◆	◆	◆		
Lingcod	*Ophiodon elongatus*		◆	◆		
Northern anchovy[a]	*Engraulis mordax*	◆	◆	◆	◆	
Pacific barracuda	*Sphyraena argentea*			◆		
Pacific herring	*Clupea pallasi*		◆	◆		
Pacific staghorn sculpin	*Leptocottus armatus*		◆	◆		
Queenfish[a]	*Seriphus politus*				◆	◆
Shiner perch[a]	*Cymatogaster aggregata*	◆	◆	◆		◆
Slough anchovy	*Anchoa delicatissima*		◆	◆		
Topsmelt[a]	*Atherinops affinis*	◆	◆	◆	◆	
White croaker	*Genyonemus lineatus*	◆	◆	◆		◆
White seabass	*Atractoscion nobilis*	◆	◆	◆		◆
White seaperch[a]	*Phanerodon furcatus*	◆	◆	◆		◆
INVERTEBRATES						
Blue mussel[a]	*Mytilus edulis*	◆	◆	◆		
California spiny lobster	*Panulirus interruptus*	◆	◆	◆	◆	◆
California tagelus	*Tagelus californianus*	◆	◆	◆		
Octopus	*Octopodidae sp.*	◆	◆	◆		◆
Pacific gaper	*Tresus nuttallii*	◆	◆	◆		◆
Pacific geoduck	*Panopea abrupta*		◆	◆		
Pacific littleneck	*Protothaca staminea*	◆	◆	◆		
Pacific rock crab	*Cancer antennarius*	◆	◆	◆	◆	◆

a: Species also present in the Dominguez Channel (Truesdale Laboratories 1972).

A ban is in effect for commercial and recreational harvesting of white croaker from the Los Angeles Harbor area. A fish consumption advisory is in effect for black croaker, queenfish, perch because of PCB and DDT contamination. The fish consumption advisory recommends that only one meal of these fish collected from the Los Angeles Harbor area be eaten every two weeks (CEPA 2001).

Site-Related Contamination

Soil and groundwater samples collected from several locations throughout the site were analyzed for metals, semivolatile organic compounds (SVOCs), chlorinated pesticides, and VOCs. Soil samples were also analyzed for polychlorinated biphenyls (PCBs) (Dames and Moore 1993). Table 2 summarizes the maximum concentrations of the primary contaminants of concern and compares them to relevant screening guidelines.

Groundwater

Metals, SVOCs, chlorinated pesticides, and VOCs were detected in groundwater samples from the Del Amo site. Maximum concentrations of four metals exceeded the ambient water quality criteria (AWQC) (Table 2). The maximum concentration of nickel exceeded the AWQC by one order of magnitude, while the maximum concentrations of arsenic, cadmium, and lead exceeded the AWQC by factors of approximately two to four. Chromium and zinc were detected at maximum concentrations below the AWQC. Copper, mercury, and silver were not detected. The SVOCs detected in groundwater samples were 2-methylnaphthalene, naphthalene, phenanthrene, and phenol. The maximum concentrations of naphthalene and phenol did not exceed the AWQC; no AWQC are available for 2-methylnaphthalene and phenanthrene. The maximum concentrations of the two chlorinated pesticides detected in groundwater samples exceeded the AWQC by two orders of magnitude (DDT) and one order of magnitude (gamma-BHC). The VOCs benzene, ethylbenzene, styrene, and toluene were detected in the groundwater samples; maximum concentrations ranged from 2,800 µg/L of styrene to 850,000 µg/L of benzene. The maximum concentration of benzene exceeded the AWQC by two orders of magnitude, the maximum concentration of toluene exceeded the AWQC by a factor of approximately six, and the maximum concentration of ethylbenzene did not exceed the AWQC; no AWQC is available for comparison to the maximum concentration of styrene.

Soil

Metals, SVOCs, chlorinated pesticides, PCBs, and VOCs were all detected in subsurface and surface soil samples from the Del Amo site. Maximum concentrations of all the metals listed in Table 2 exceeded mean U.S. soil concentrations. The maximum concentration of cadmium exceeded the mean U.S. soil concentration for that metal by two orders of magnitude, while maximum concentrations of copper, lead, mercury, silver, and zinc exceeded their respective concentrations by one order of magnitude. Maximum concentrations of arsenic, chromium, and nickel ranged from five to nine times their mean U.S. soil concentrations. Several SVOCs (primarily PAHs) were detected in the soil samples. Maximum concentrations ranged from 0.19 mg/kg of dibenz(a,h)anthracene to 270 mg/kg of naphthalene. Three chlorinated pesticides were detected in the soil samples: DDE, DDT, and dieldrin. The maximum concentrations ranged from 0.01 mg/kg of dieldrin to 9.1 mg/kg of DDT. PCBs were detected at a maximum concentration in a sample collected northwest of the Former Copolymer/Synthetic Rubber Plant. The VOCs benzene, ethylbenzene, styrene, and toluene were detected in the soil samples; maximum concentrations ranged from 460 mg/kg of toluene to 15,000 mg/kg of styrene. Mean U.S. soil concentrations are not available for comparison to the maximum concentrations of SVOCs, pesticides, PCBs, and VOCs.

Table 2. Maximum concentrations of primary contaminants of concern detected in soil and groundwater at the Del Amo site (Dames and Moore 1993). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)		Water (µg/L)	
Contaminant	Soil	Mean U.S. Soil[a]	Groundwater	AWQC[b]
METALS/INORGANICS				
Arsenic	**49**	5.2	**560**	150
Cadmium	**19**	0.06	**3.4**	0.25[c]
Chromium[d]	**290**	37	6.7	11
Copper	**240**	17	<20	9[c]
Lead	**240**	16	**8.7**	2.5[c]
Mercury	**1.3**	0.058	ND	0.77[e]
Nickel	**59**	13	**550**	52[c]
Silver	**2.5**	0.05	ND	3.2[c,f]
Zinc	**650**	48	100	120[c]
PAHs				
Acenaphthene	44	NA	ND	520[g]
Acenaphthylene	160	NA	ND	NA
Anthracene	51	NA	ND	NA
Benz(a)anthracene	1.1	NA	ND	NA
Chrysene	15	NA	ND	NA
Dibenz(a,h)anthracene	0.19	NA	ND	NA
Fluoranthene	28	NA	ND	NA
Fluorene	91	NA	ND	NA
2-Methylnaphthalene	140	NA	110	NA
Naphthalene	270	NA	590	620[g]
Phenanthrene	210	NA	53	NA
Phenol	8.6	NA	300	2,560[g]
Pyrene	85	NA	ND	NA
PESTICIDES/PCBs				
DDE	2.2	NA	ND	NA
DDT	9.1	NA	**0.13**	0.001[h]
Dieldrin	0.01	NA	ND	0.056
Gamma-BHC (Lindane)	ND	NA	**5**	0.95[f]
Total PCBs	6.8	NA	N/A	0.014
VOCs				
Benzene	6,100	NA	**850,000**	5,300[f,g]
Ethylbenzene	2,600	NA	26,000	32,000[f,g]
Styrene	15,000	NA	2,800	NA
Toluene	460	NA	**100,000**	17,500[f,g]

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 2002c). Freshwater chronic criteria presented.

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

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

e: Criterion expressed as total recoverable metal.

f: Chronic criterion not available; acute criterion presented.

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

h: Expressed as total DDT.

NA: Screening guidelines not available

ND: Not detected.

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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

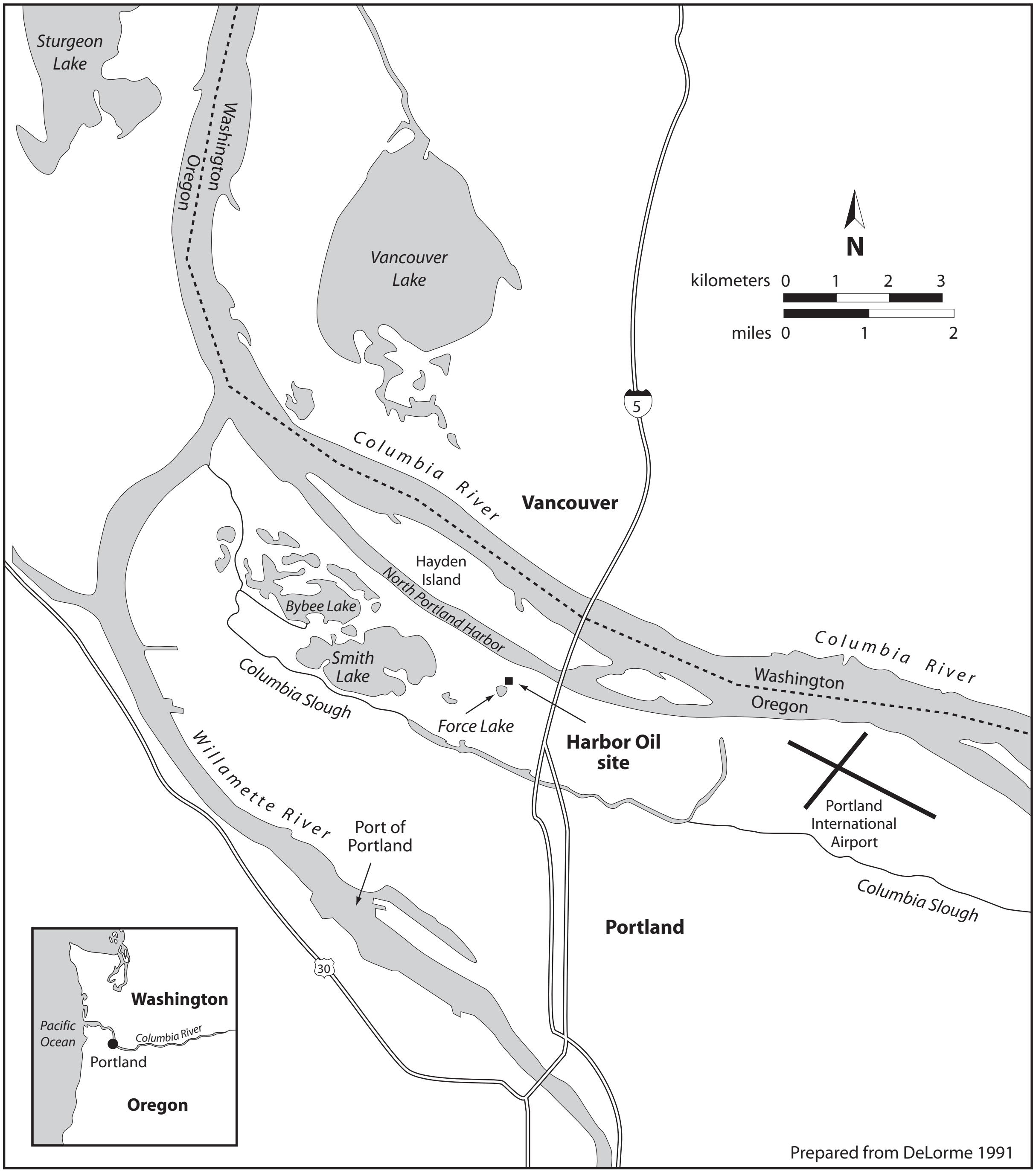

Figure 1. Location of Harbor Oil site, Portland, Oregon.

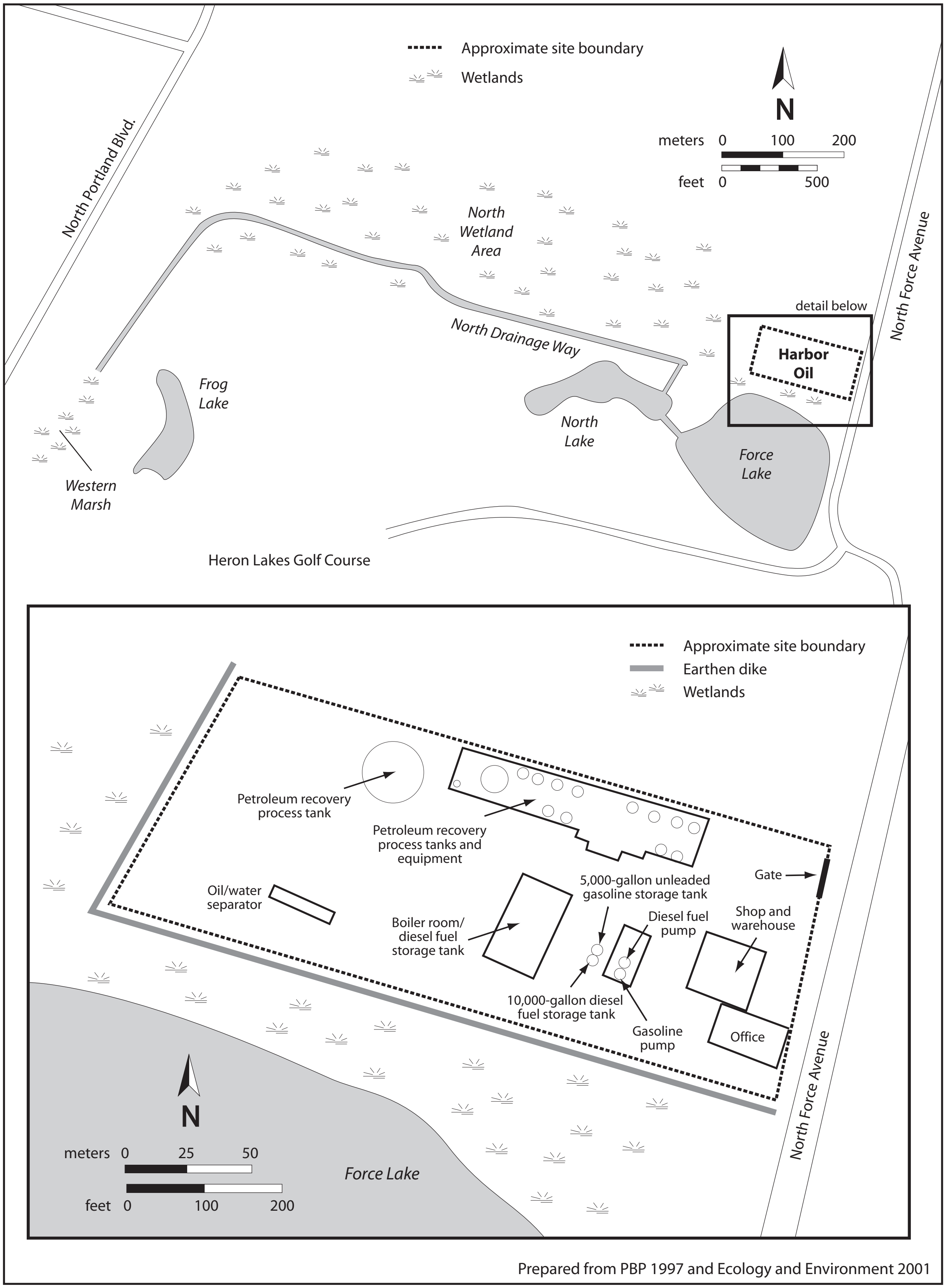

Figure 2. Detail of the Harbor Oil site.

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]	Groundwater	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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Glossary of terms

Adit Horizontal entrance to a mine.

Adult habitat The environment where an aquatic resource lives after reaching physical and sexual maturity.

Ambient water quality criteria (AWQC) The U.S. Environmental Protection Agency's (USEPA) compilation of nationally recommended water quality criteria, based on data and scientific judgments on pollutant concentrations and how they affect the environment or human health.[1]

Anadromous Migrating from marine waters to breed in freshwater. Examples of anadromous fish include salmon, river herring (alewife), and striped bass.

Aquifer An underground geological formation, or group of formations, containing water. Are sources of groundwater for wells and springs.

Aroclor A trade name for a group of polychlorinated biphenyls (PCBs).

Artesian aquifer An aquifer in which groundwater is confined under pressure by impermeable rock layers.

Baghouse dust particles collected from the air by an air pollution system

Bioavailable The fraction of the total chemical in the surrounding environment that is available for uptake by organisms. The environment may include water, sediment, suspended particles, and food items.

Biotransformation Chemical alteration of a substance within the body.

Body burden The amount of a chemical stored in the body at a given time, especially a potential toxin in the body as the result of exposure.

Borehole A hole made with drilling equipment.

Brood To hatch eggs.

Capacitor An electric circuit element used to store charge temporarily.

Catadromous Living in fresh water but migrating to marine waters to breed. An example is the American eel.

Chemical affinity An attraction or force between particles that causes them to combine.

Coal tar A material obtained from the destructive distillation of coal in the production of coal gas. The crude tar contains a large number of organic compounds (e.g., benzene, naphthalene, methylbenzene, etc.), and is used as roofing, waterfproofing, and insulating compounds. It is also used as a raw material for dyes, drugs, and paints.

Confined aquifer An aquifer that is bounded above and below by impermeable rock layers.

Confluence The point where two or more streams meet or flow together.

Contaminants of concern Chemicals at a hazardous waste site that are likely to have an adverse effect on NOAA trust resources.

Contaminant partitioning In general, it is the tendency of a contaminant to be in the air, water, soil, or sediment based on the relative chemical affinities of that contaminant.

Decant To pour off without disturbing the sediment.

Demersal Dwelling at or near, sinking to, or deposited near the bottom of a body of water.

Depurate Elimination of a chemical from an organism by desorption, diffusion, excretion, egestion, biotransformation, or another route.

Desorption To remove an absorbed substance from.

Diadromous Fishes that migrate between fresh and salt water (e.g., salmon and American eel).

Effects range–low (ERL) NOAA sediment quality guidelines derived from the examination of a large number of individual contamination studies, all in salt water. The ERLs are indicative of contaminant concentrations below which adverse effects rarely occur.[2]

Egestion To discharge or excrete from the body.

Emergency Removal Action Steps taken to remove contaminated materials that pose imminent threats to local residents (e.g., removal of leaking drums or the excavation of explosive waste).[3]

Emergent wetland, emergent area A wetland in which vegetation is present for most of the growing season in most years and is dominated by plants that grow year round.[4]

Emergent wetland, subclass: non-persistent No obvious signs of emergent vegetation at certain seasons.

Emergent wetland, subclass: persistent Erect, rooted, herbaceous aquatic plants. Species that normally remain standing until the beginning of the next growing season.

Endangered species Animals, birds, fish, plants, or other living organisms threatened with extinction by anthropogenic (human-caused) or other natural changes in their environment.[3]

Endangered Species Act A 1973 act of Congress mandating that endangered and threatened species of fish, wildlife, and plants be protected and restored.

Environmental medium/media External conditions affecting the life, development, and survival of an organism, including air, water, and soil, which are the subject of regulatory concern and activities.

Estuary, estuarine Region of interaction between rivers and nearshore marine waters, where tidal action and river flow mix fresh and salt water. Such areas include bays, mouths of rivers, salt marshes, and lagoons. These brackish water ecosystems shelter and feed marine life, birds, and wildlife. See wetlands.

Fish passage Features of a dam that enable fish to move around, through, or over without harm. Generally an upstream fish ladder or a downstream bypass system.

Flue A tunnel or conduit that connects a furnace to a chimney stack.

Forage To search for food.

Groundwater The supply of fresh water found beneath the earth's surface, which supplies wells and springs.[3]

Groundwater monitoring well See monitoring well.

Groundwater plume A visible or measurable discharge of a contaminant from a given point of origin into groundwater.[3]

Habitat The place where a plant or animal species naturally lives and grows or characteristics of the soil, water, and biologic community (other plants and animals) that make this possible.

Habitat of concern The habitat that will be or is being affected by contaminants of concern from a hazardous waste site.

Hazard ranking system/hazard ranking system package The principal screening tool used by the USEPA to evaluate risks to public health and the environment associated with abandoned or uncontrolled hazardous waste sites.[3]

Heavy metals Metallic elements with high atomic weights (e.g., mercury, chromium, cadmium, arsenic, and lead).

Hectare 2.471 acres or 10,000 square meters (m^2).

Heterogeneous consisting of dissimilar parts or elements.

Hydrologic Unit Code (HUC) The United States is divided into hydrologic units for water resource planning and data management. Hydrologic units represent natural and human-imposed areas. Each HUC is a unique eight-digit number. The first two digits indicate the major geographic area or region, the second two digits indicate the sub-region, the third two digits indicate the accounting units, and the fourth two digits indicate the cataloging units. Cataloging units are also called "watersheds."

Ingot A mass of metal that is cast in a standard shape for convenient storage or transportation.

Inorganic compounds Chemical substances of mineral origin, not of basically carbon structure.

Intertidal That area of the shore between the high and low water marks; the intertidal zone of oceans and estuaries is regularly covered and exposed by the tides.

Invertebrate An animal without a spinal column or backbone.

Isomers Different substances that have the same formula.

Juvenile habitat The environment in which an organism lives from one year of age until sexual maturity.

Leachate Water that collects contaminants as it trickles through wastes, pesticides or fertilizers. Leaching may occur in farming areas, feedlots, and landfills, and may result in hazardous substances entering surface water, ground water, or soil.[3]

Lowhead dam Dams that range from a six-inch drop off to a 25- foot drop off.

Mainstem The principal channel of a drainage system into which other smaller streams or rivers flow.

Marine Of or relating to the sea.

Marsh A type of wetland that does not accumulate appreciable peat deposits (partially decomposed plants and other organic materials that can build up in poorly drained wetland habitats) and is dominated by plants with little or no woody tissue. See wetland.

Materiel The equipment, apparatus, and supplies of a military force.

Mean U.S. soil screening guidelines Average concentrations of inorganic compounds found in natural soils of the United States.

Metals Chemical elements with particular properties that include being good conductors of electricity and heat; in these reports, generally synonymous with inorganic compounds.

Migratory corridor, migratory route A body of water that adult fish travel through but do not remain in for any significant time.

Monitoring well (1) A well used to obtain water quality samples or measure groundwater levels. (2) A well drilled to collect groundwater samples for the purpose of physical, chemical, or biological analysis to determine the amounts, types, and distribution of contaminants beneath a site.

National Priorities List A list of hazardous waste sites, compiled by the USEPA, where hazardous wastes have been found and the initial evaluation shows a significant risk to human health or the environment. NPL sites are often called "Superfund sites" because Superfund money can be used by the USEPA to investigate and clean up these sites.

Neutralization Decreasing the acidity or alkalinity of a substance by adding alkaline or acidic materials, respectively.

NOAA trust resources Natural resources in coastal and marine areas, including the anadromous and catadromous fish that migrate between freshwater and coastal and marine areas.

Nursery habitat The habitat where larvae or juveniles settle, seek shelter, feed, and mature.

Oligohaline A low salinity region of an estuary, typically 0.5 to 5.0 parts per thousand salinity.

Order of magnitude A change in the value of a quantity or unit by a factor of 10.

Ordnance Military materiel, such as weapons, ammunition, artillery, combat vehicles, and equipment.

Organic compounds/chemicals/substances/materials Naturally occurring (animal- or plant-produced) or synthetic substances containing mainly carbon, hydrogen, nitrogen, and oxygen.[3]

Outfall The point where wastewater or drainage discharges from a sewer pipe, ditch, or other conveyance to a receiving body of water.[8]

Palustrine wetland A wetland beyond the influence of tidal brackish waters and typically dominated by persistent vegetation that remain standing into the next growing season; most inland wetlands fall into this classification; located in upland areas.

Pathway (for migration of contaminants) The physical course a chemical or pollutant takes from its source to the exposed organism.[5]

Pelagic Living or occurring in the open sea.

Pentachlorophenol A manufactured chemical that is not found naturally in the environment. It was used as a biocide and wood preservative, and was one of the most heavily used pesticides in the United States. Now, only certified applicators can purchase and use this chemical. It is still used in industry as a wood preservative for power line poles, railroad ties, cross arms, and fence posts.

Pesticides Substances or mixtures thereof intended for preventing, destroying, repelling, or mitigating any pest.[3]

Polychlorinated biphenyls (PCBs) A group of synthetic organic compounds that can cause a number of different harmful effects. There are no known natural sources of PCBs in the environment. PCBs are either oily liquids or solids and are colorless to light yellow.[5]

Polynuclear aromatic hydrocarbons (PAHs) A group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat. Also referred to as polycyclic aromatic hydrocarbons (PAHs).[5]

Rearing habitat See nursery habitat.

Remediation Cleanup or other methods used to remove or contain a toxic spill or hazardous materials from a Superfund site.[3]

Rinsate The solution remaining after something is rinsed.

Rock flour Very finely powdered rock, produced when rocks are ground together.

Runoff That part of precipitation, snowmelt, or irrigation water that runs off the land into streams or other surface-water. It can carry pollutants from the air and land into receiving waters.

Salinity A measurement of the amount (usually in parts per thousand) of salt in water.

Salmonid Fish of the family Salmonidae, which includes salmon and steelhead.

Sediment The organic material that is transported and deposited by wind and water.

Semivolatile organic compounds (SVOCs) Organic compounds that volatilize slowly at standard temperature (20°C and 1 atm pressure).

Slag The glassy waste product created during the smelting of metal ores.

Spawning habitat The habitat where fish reproduce.

Steam (or boiler) blowdown To control solids in the boiler water

Stormwater Precipitation that accumulates in natural and/or constructed storage and stormwater systems during and immediately following a storm event

Storm sewer A system of pipes (separate from sanitary sewers) that carries water runoff from buildings and land surfaces.[8]

Substrate The composition of a streambed, including either mineral or organic materials.[6]

Sump A low-lying place such as a pit, that receives drainage.

Superfund Money collected from a special tax on chemicals and raw petroleum that is appropriated by Congress. These funds are used to investigate, evaluate, and clean up the worst hazardous waste sites in the U.S. These sites are listed on the NPL.

Supratidal The area of the shore above the normal high-tide line.

Surface water All water naturally open to the atmosphere (rivers, lakes, reservoirs, ponds, streams, impoundments, seas, estuaries, etc.).

Surface water runoff Precipitation, snow melt, or irrigation water in excess of what can infiltrate the soil surface and be stored in small surface depressions.[3]

Tailings Residue of raw material or waste separated out during the processing of crops or mineral ores.[3]

Threatened species Plants and animals whose numbers are very low or decreasing rapidly. Threatened species are not endangered species yet, but are likely to become endangered in the future.[7]

Threshold effect level (TEL) The concentration of a contaminant below which negative biological effects are expected to occur only rarely.

Trace elements In these reports, generally synonymous with inorganic compounds.

Trust resources See NOAA trust resources.

Trustee (for natural resources) The party responsible for maintaining the original characteristics of our land, water, and the plants and animals that live there. NOAA is a federal trustee for natural resources that spend any portion of their life cycle in a marine or estuarine environment; and their habitats.

Unconfined aquifer An aquifer that is not confined under pressure and is bounded by permeable layers.

Uptake The transfer of a chemical into or onto an aquatic organism.

Volatile organic compounds (VOCs) Organic compounds that evaporate readily.[4]

Wastewater The spent or used water from a home, community, farm, or industry, which contains dissolved or suspended matter.

Water Quality Criteria Levels of water quality expected to render a body of water suitable for its designated use. Criteria are based on specific levels of pollutants that would make the water harmful if used for drinking, swimming, farming, fish production, or industrial processes.

Water table The level of groundwater.

Watershed The region draining into a river, river system, or other body of water.

Wetland An area that is saturated by surface or groundwater with vegetation adapted for life under those soil conditions including marshes, estuaries, swamps, bogs, and fens.

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[1] http://www.epa.gov/waterscience/criteria/

[2] http://response.restoration.noaa.gov/cpr/sediment/SPQ.pdf

[3] USFWS. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31.

[4] http://www.epa.gov/OCEPAterms/

[5] http://www.atsdr.cdc.gov/toxprofiles/

[6] http://www.streamnet.org/pub-ed/ff/Glossary/

[7] http://www.epa.gov/espp/coloring/especies.htm

Appendix

Appendix

Table 1. List of the 351 hazardous Waste Site Reports published by NOAA to date. Sites in bold italics are included in this volume.

Region 1

Connecticut	Date	EPA Facility ID
Barkhamsted-New Hartford Landfill	1989	CTD980732333
Beacon Heights Landfill	1984	CTD072122062
Broad Brook Mill	2003	CT0002055887
Gallup's Quarry	1989	CTD108960972
Kellogg-Deering Well Field	1987	CTD980670814
New London Submarine Base	1990	CTD980906515
O'Sullivans Island	1984	CTD980667992
Raymark Industries, Inc.	1996	CTD001186618
Yaworski Waste Lagoon	1985	CTD009774969

Massachusetts		
Atlas Tack Corp.	1989	MAD001026319
Blackburn and Union Privileges	1993	MAD982191363
Charles-George Reclamation Landfill	1987	MAD003809266
GE - Housatonic River	1999	MAD002084093
Groveland Wells	1987	MAD980732317
Hanscom Field/Hanscom Air Force Base	1995	MA8570024424
Haverhill Municipal Landfill	1985	MAD980523336
Industri-Plex	1987	MAD076580950
Materials Technology Laboratory (USArmy)	1995	MA0213820939
Natick Laboratory Army Research, D&E Center	1995	MA1210020631
New Bedford Site (Acushnet Estuary)	1984	MAD980731335
Nyanza Chemical Waste Dump	1987	MAD990685422
Plymouth Harbor/Cannon Engineering Corp.	1984	MAD980525232
South Weymouth Naval Air Station	1995	MA2170022022
Sullivan's Ledge	1987	MAD980731343

Region 1 *cont.*

Maine	Date	EPA Facility ID
Brunswick Naval Air Station	1987	ME8170022018
Eastland Woolen Mill	2002	MED980915474
McKin Company	1984	MED980524078
O'Connor Company	1984	MED980731475
Portsmouth Naval Shipyard	1995	ME7170022019
Saco Municipal Landfill	1989	MED980504393

New Hampshire		
Beede Waste Oil	1997	NHD018958140
Coakley Landfill	1985	NHD064424153
Dover Municipal Landfill	1987	NHD980520191
Fletcher's Paint Works & Storage	1989	NHD001079649
Grugnale Waste Disposal Site	1985	NHD069911030
New Hampshire Plating Co.	1992	NHD001091453
Pease Air Force Base	1990	NH7570024847
Savage Municipal Water Supply	1985	NHD980671002
Sylvester	1985	NHD099363541

Rhode Island		
Davis Liquid Waste	1987	RID980523070
Davisville Naval Construction Battalion Center	1990	RI6170022036
Newport Naval Education & Training Center	1990	RI6170085470
Peterson/Puritan, Inc.	1987	RID055176283
Picillo Farm	1987	RID980579056
Rose Hill Regional Landfill	1989	RID980521025
Stamina Mills, Inc.	1987	RID980731442
West Kingston Town Dump/URI Disposal	1992	RID981063993
Western Sand & Gravel	1987	RID009764929

Vermont		
BFI Sanitary Landfill (Rockingham)	1989	VTD980520092
Elizabeth Mine	2003	VTD988366621
Ely Copper Mine	2003	VTD988366571
Old Springfield Landfill	1987	VTD000860239

Region 2

New Jersey	Date	EPA Facility ID
Albert Steel Drum	1984	NJD000525154
American Cyanamid Co.	1985	NJD002173276
Atlantic Resources	***2004***	***NJD981558430***
Bog Creek Farm	1984	NJD063157150
Brick Township Landfill	1984	NJD980505176
Brook Industrial Park	1989	NJD078251675
Chemical Control	1984	NJD000607481
Chemical Insecticide Corp.	1990	NJD980484653
Chipman Chemical Co.	1985	NJD980528897
Ciba-Geigy Corp.	1984	NJD001502517
Cornell Dubilier Electronics, Inc.	1999	NJD981557879
Cosden Chemical Coatings Corp.	1987	NJD000565531
Curcio Scrap Metal, Inc.	1987	NJD011717584
De Rewal Chemical Co.	1985	NJD980761373
Denzer & Schafer X-Ray Co.	1984	NJD046644407
Diamond Alkali Co.	1984	NJD980528996
Emmell's Septic Landfill	2002	NJD980772727
Federal Aviation Admin. Tech. Center	1990	NJ9690510020
Garden State Cleaners Co.	1989	NJD053280160
Global Sanitary Landfill	1989	NJD063160667
Hercules, Inc. (Gibbstown Plant)	1984	NJD002349058
Higgins Disposal	1989	NJD053102232
Higgins Farm	1989	NJD981490261
Horseshoe Road	1995	NJD980663678
Ideal Cooperage Inc.	1984	NJD980532907
Industrial Latex Corp.	1989	NJD981178411
Jackson Township Landfill	1984	NJD980505283
Kauffman & Minteer, Inc.	1989	NJD002493054
Kin-Buc Landfill	1984	NJD049860836
Koppers Co Inc/Seaboard Plant	1984	NJD002445112
Krysowaty Farm	1985	NJD980529838
LCP Chemicals, Inc.	1999	NJD079303020
Martin Aaron, Inc.	2003	NJD014623854

Region 2 *cont.*

New Jersey *cont.*	Date	EPA Facility ID
Middlesex Sampling Plant (DOE)	2002	NJ0890090012
Mobil Chemical Co.	1984	NJD000606756
NL Industries	1984	NJD061843249
Perth Amboy PCB's	1984	NJD980653901
PJP Landfill	1984	NJD980505648
Price Landfill	1984	NJD070281175
Puchack Well Field	1999	NJD981084767
PVSC Sanitary Landfill	1984	NJD980529671
Quanta Resources	***2004***	***NJD000606442***
Roebling Steel Co.	1984	NJD073732257
Roosevelt Drive-In	1984	NJD030250484
Route 561 Dump	2002	NJ0000453514
Sayreville Landfill	1984	NJD980505754
Scientific Chemical Processing	1984	NJD070565403
South Jersey Clothing Co.	1989	NJD980766828
Syncon Resins	1984	NJD064263817
United States Avenue Burn	2002	NJ0001120799
Universal Oil Products (Chemical Division)	1984	NJD002005106
Ventron/Velsicol	1984	NJD980529879
White Chemical Corp	1984	NJD001239185
Williams Property	1984	NJD980529945
Zschiegner Refining Company	1999	NJD986643153

New York		
Action Anodizing, Plating, & Polishing Corp.	1989	NYD072366453
Applied Environmental Services	1985	NYD980535652
Brookhaven National Laboratory (USDOE)	1990	NY7890008975
C & J Disposal Leasing Co. Dump	1989	NYD981561954
Carroll & Dubies Sewage Disposal	1989	NYD010968014
Computer Circuits	2002	NYD125499673
Consolidated Iron and Metal	***2004***	***NY0002455756***
Ellenville Scrap Iron and Metal	2003	NYSFN0204190
Jones Sanitation	1987	NYD980534556

Region 2 *cont.*

New York *cont*.	**Date**	**EPA Facility ID**
Li Tungsten Corp.	1992	NYD986882660
Liberty Industrial Finishing	1985	NYD000337295
Marathon Battery Corp.	1984	NYD010959757
Mattiace Petrochemical Co., Inc.	1989	NYD000512459
North Sea Municipal Landfill	1985	NYD980762520
Old Roosevelt Field Contaminated Groundwater Area	2003	NYSFN0204234
Peter Cooper	1999	NYD980530265
Port Washington Landfill	1984	NYD980654206
Rowe Industries Groundwater Contamination	1987	NYD981486954
Sidney Landfill	1989	NYD980507677
Smithtown Groundwater Contamination	2003	NY0002318889
Stanton Cleaners Area Groundwater Contamination	2002	NYD047650197

Puerto Rico		
Clear Ambient Services Co.	1984	PRD090416132
Frontera Creek	1984	PRD980640965
Naval Security Group Activity	1989	PR4170027383
V&M/Albaladejo Farms	1997	PRD987366101
Vega Baja Solid Waste Disposal	2002	PRD980512669

Virgin Islands		
Island Chemical Corp./V.I. Chemical Corp.	1996	VID980651095
Tutu Wellfield	1993	VID982272569

Region 3

Washington, D.C.		
Washington Navy Yard	1999	DC9170024310

Delaware		
Army Creek Landfill	1984	DED980494496
Coker's Sanitation Service Landfills	1986	DED980704860
Delaware City PVC Plant	1984	DE0001912757
Delaware Sand & Gravel	1984	DED000605972

Region 3 *cont.*

Delaware *cont.*	**Date**	**EPA Facility ID**
Dover Air Force Base	1987	DE8570024010
Dover Gas Light Co.	1987	DED980693550
E.I. Du Pont Newport Landfill	1987	DED980555122
Halby Chemical	1986	DED980830954
Kent County Landfill	1989	DED980705727
Koppers Co. Facilities Site	1990	DED980552244
NCR Corp., Millsboro	1986	DED043958388
New Castle Spill Site	1984	DED058980442
New Castle Steel	1984	DED980705255
Old Brine Sludge Landfill	1984	DED980704894
Pigeon Point Landfill	1987	DED980494603
Sealand Limited	1989	DED981035520
Standard Chlorine Co.	1986	DED041212473
Sussex Co. Landfill #5	1989	DED980494637
Tybouts Corner Landfill	1984	DED000606079
Wildcat Landfill	1984	DED980704951

Maryland		
68th Street Dump/Industrial Enterprises	2002	MDD980918387
Andrews Air Force Base	2003	MD0570024000
Anne Arundel County Landfill	1989	MDD980705057
Brandywine DRMO	2003	MD9570024803
Bush Valley Landfill	1989	MDD980504195
Central Chemical Corporation	1999	MDD003061447
Indian Head Naval Surface Warfare Center	1984	MD7170024684
Joy Reclamation Co	1984	MDD030321178
Ordnance Products, Inc.	1995	MDD982364341
Sand, Gravel & Stone Site	1984	MDD980705164
Southern Maryland Wood Treating	1987	MDD980704852
U.S. Agricultural Center Beltsville (2 Tenants)	1995	MD0120508940
USA Aberdeen - Edgewood	1986	MD2210020036
USA Aberdeen - Michaelsville	1986	MD3210021355
USA Fort George Meade	1997	MD9210020567

Region 3 *cont.*

Maryland *cont.*	Date	EPA Facility ID
USN Patuxent Naval Air Station	1996	MD7170024536
Woodlawn Co. Landfill	1987	MDD980504344

Pennsylvania		
Austin Avenue Radiation Site	1993	PAD987341716
Boarhead Farms	1989	PAD047726161
Bridesburg Dump	1984	PAD980508402
Butler Mine Tunnel	1987	PAD980508451
Crater Resources, Inc./Keystone Coke Co./Alan Wood	1993	PAD980419097
Croydon TCE Spill	1986	PAD981035009
Douglassville Disposal	1987	PAD002384865
Elizabethtown Landfill	1989	PAD980539712
Enterprise Avenue	1984	PAD980552913
FMC Marcus Hook	1996	PAD987323458
Foote Mineral Co.	1993	PAD077087989
Hellertown Manufacturing Co.	1987	PAD002390748
Jack's Creek/Sitkin Smelting & Refining, Inc.	1989	PAD980829493
Keyser Ave. Borehole	1989	PAD981036049
Lower Darby Creek Area	2003	PASFN0305521
Metal Bank of America	1984	PAD046557096
Occidental Chemical Corp./Firestone Tire and Rubber Co.	1989	PAD980229298
Paoli Rail Yard	1987	PAD980692594
Publicker/Cuyahoga Wrecking Plant	1990	PAD981939200
Raymark	1996	PAD039017694
Recticon/Allied Steel	1989	PAD002353969
Revere Chemical Co.	1986	PAD051395499
Rohm and Haas Landfill	1986	PAD091637975
Salford Quarry	1997	PAD980693204
Tinicum National Environmental Center	1986	PA6143515447
Tysons Dump #1	1985	PAD980692024
UGI Corp. Gas Manufacturing Plant	1995	PAD980539126
USN Ships Parts Control Center	1996	PA3170022104
Wade (ABM)	1984	PAD980539407

Region 3 *cont.*

Virgina	Date	EPA Facility ID
Abex Corp.	1989	VAD980551683
Arrowhead Associates Inc./Scovill Corp.	1989	VAD042916361
Atlantic Wood Industries, Inc.	1987	VAD990710410
C & R Battery Co., Inc.	1987	VAD049957913
Chisman Creek	1984	VAD980712913
Former Nansemond Ordnance Depot	2002	VAD123933426
Kim-Stan Landfill	2002	VAD077923449
Langley Air Force Base/NASA Langley Research Center	1995	VA2800005033
Marine Corps Combat and Development Command	1995	VA1170024722
Naval Amphibious Base Little Creek	2002	VA5170022482
Naval Surface Warfare Center - Dahlgren	1993	VA7170024684
Naval Weapons Station - Yorktown	1993	VA8170024170
NWS Yorktown - Cheatham Annex	***2004***	***VA3170024605***
Saunders Supply Co.	1987	VAD003117389
USA Fort Eustis	1996	VA6210020321
USN Naval Shipyard Norfolk	1999	VA1170024813
USN Norfolk Naval Base	1997	VA6170061463

Region 4

Alabama		
American Brass Inc.	2002	ALD981868466
Ciba-Geigy Corp. (McIntosh Plant)	1990	ALD001221902
Olin Corp. (McIntosh Plant)	1990	ALD008188708
Redwing Carriers, Inc. (Saraland)	1989	ALD980844385

Florida		
Agrico Chemical Co.	1989	FLD980221857
American Creosote Works (Pensacola Plant)	1984	FLD008161994
Broward County-21st Manor Dump	1992	FLD981930506
Chemform, Inc.	1990	FLD080174402
Harris Corp. (Palm Bay Plant)	1986	FLD000602334
Helena Chemical Co. (Tampa Plant)	1993	FLD053502696

Region 4 *cont.*

Florida *cont.*	**Date**	**EPA Facility ID**
MRI Corporation	1997	FLD088787585
Munisport Landfill	1984	FLD084535442
Pensacola Naval Air Station	1990	FL9170024567
Pickettville Road Landfill	1984	FLD980556351
Sixty-Second Street Dump	1984	FLD980728877
Solitron Microwave	2002	FLD045459526
Standard Auto Bumper Corp.	1989	FLD004126520
Stauffer Chemical Co. (Tampa Plant)	1993	FLD004092532
Stauffer Chemical Co. (Tarpon Springs)	1993	FLD010596013
USAF Tyndall Air Force Base	1997	FL1570024124
USN Air Station Cecil Field	1990	FL5170022474
USN NAS Jacksonville	1990	FL6170024412
USN Naval Air Station Whiting Field Site 5	1996	FL2170023244
Woodbury Chemical Co. (Princeton Plant)	1989	FLD004146346

Georgia		
Brunswick Wood Preserving	1997	GAD981024466
Camilla Wood Preserving Company	1999	GAD008212409
Terry Creek Dredge Spoil Areas/Hercules Outfall	1997	GAD982112658

Mississippi		
Chemfax, Inc.	1995	MSD008154486
Gautier Oil Co., Inc.	1989	MSD098596489

North Carolina		
ABC One Hour Cleaners	1989	NCD024644494
Camp Lejeune Military Res. (USNAVY)	1989	NC6170022580
FCX, Inc. (Washington Plant)	1989	NCD981475932
New Hanover County Airport Burn Pit	1989	NCD981021157
Potter's Septic Tank Service Pits	1989	NCD981023260
Reasor Chemical Company	***2004***	***NCD986187094***

Region 4 *cont.*

South Carolina	Date	EPA Facility ID
Geiger (C&M Oil)	1984	SCD980711279
Helena Chemical Co. Landfill	1989	SCD058753971
Koppers Co., Inc. (Charleston Plant)	1993	SCD980310239
Macalloy Corporation	***2004***	***SCD003360476***
Savannah River Site (USDOE)	1990	SC1890008989
Wamchem, Inc.	1984	SCD037405362

Wisconsin		
Fox River NRDA/PCB Releases	2003	WI0001954841

Louisiana		
Bayou Sorrel Site	1984	LAD980745541
Delatte Metals	2002	LAD052510344
Madisonville Creosote Works	1997	LAD981522998

Texas		
ALCOA (Point Comfort)/Lavaca Bay	1995	TXD008123168
Bailey Waste Disposal	1985	TXD980864649
Brio Refining, Inc.	1989	TXD980625453
Crystal Chemical Co.	1989	TXD990707010
Dixie Oil Processors, Inc.	1989	TXD089793046
French, Ltd.	1989	TXD980514814
Highlands Acid Pit	1989	TXD980514996
Malone Service Company, Inc.	2003	TXD980864789
Motco, Inc.	1984	TXD980629851
Patrick Bayou	2003	TX0000605329
Sikes Disposal Pits	1989	TXD980513956
State Marine	1999	TXD099801102
Tex-Tin Corp.	1989	TXD062113329

Region 9

American Samoa	Date	EPA Facility ID
Taputimu Farm	1984	ASD980637656

Region 9 *cont.*

California	Date	EPA Facility ID
Alameda Naval Air Station	1989	CA2170023236
Camp Pendleton Marine Corps Base	1990	CA2170023533
Coast Wood Preserving	1984	CAD063015887
Concord Naval Weapons Station	1993	CA7170024528
Cooper Drum Co.	1993	CAD055753370
CTS Printex, Inc.	1989	CAD009212838
Del Amo Facility	***2004***	***CAD029544731***
Del Norte Pesticide Storage	1984	CAD000626176
El Toro Marine Corps Air Station	1989	CA6170023208
Fort Ord	1990	CA7210020676
GBF, Inc. Dump	1993	CAD980498562
Hewlett-Packa rd (620-640 Page Mill Road)	1989	CAD980884209
Hunters Point Naval Shipyard	1989	CA1170090087
Intersil Inc./Siemens Components	1989	CAD041472341
Iron Mountain Mine	1989	CAD980498612
Jasco Chemical Corp.	1989	CAD009103318
Liquid Gold Oil Corp.	1984	CAT000646208
McCormick & Baxter Creosoting Co.	1993	CAD009106527
MGM Brakes	1984	CAD000074120
Moffett Naval Air Station	1986	CA2170090078
Montrose Chemical Corp.	1985	CAD008242711
Pacific Coast Pipe Lines	1989	CAD980636781
Rhone-Poulenc, Inc./Zoecon Corp.	1985	CAT000611350
Riverbank Army Ammunition Plant	1989	CA7210020759
Sola Optical USA, Inc.	1989	CAD981171523
South Bay Asbestos Area	1985	CAD980894885
Travis Air Force Base	1990	CA5570024575

Guam		
Andersen Air Force Base	1993	GU6571999519

Hawaii		
Del Monte Corp. (Oahu Plantation)	1995	HID980637631

Region 9 *cont.*

Hawaii *cont.*	**Date**	**EPA Facility ID**
Pearl City Landfill	1984	HID980585178
Pearl Harbor Naval Station	1992	HI2170024341

Region 10

Alaska		
Adak Naval Air Station	1993	AK4170024323
Elmendorf Air Force Base	1990	AK8570028649
Fort Richardson (US Army)	1995	AK6214522157
Klag Bay Site	2002	AK0002364768
Standard Steel & Metal Salvage Yard (USDOT)	1990	AKD980978787

Idaho		
Blackbird Mine	1995	IDD980725832
Stibnite/Yellow Pine Mining Area	2003	IDD980665459

Oregon		
Allied Plating, Inc.	1987	ORD009051442
Gould, Inc.	1984	ORD095003687
Harbor Oil Inc.	***2004***	***ORD071803985***
Martin-Marietta Aluminum Co.	1987	ORD052221025
McCormick & Baxter Superfund Site	1995	ORD009020603
Northwest Pipe & Casing Co.	1993	ORD980988307
Portland Harbor	2003	ORSFN1002155
Reynolds Metals Company	1996	ORD009412677
Rhone Poulenc, Inc.	1984	ORD990659492
Teledyne Wah Chang	1985	ORD050955848
Union Pacific Railroad	1990	ORD009049412

Washington		
ALCOA (Vancouver Smelter)	1989	WAD009045279
American Crossarm & Conduit Co.	1989	WAD057311094
Bangor Naval Submarine Base	1990	WA5170027291
Bonneville Power Administration Ross Complex (USDOE)	1990	WA1891406349

Region 10 *cont.*

Washington *cont.*	**Date**	**EPA Facility ID**
Centralia Municipal Landfill	1989	WAD980836662
Commencement Bay, Near Shore/Tide Flats	1984	WAD980726368
Commencement Bay, South Tacoma Channel	1984	WAD980726301
Hamilton Island Landfill (USA/COE)	1992	WA5210890096
Hanford 100-Area (USDOE)	1989	WA3890090076
Harbor Island (Lead)	1984	WAD980722839
Jackson Park Housing Complex (USNavy)	1995	WA3170090044
Lower Duwamish Waterway	2003	WA0002329803
Naval Air Station, Whidbey Island (Ault Field)	1986	WA5170090059
Naval Air Station, Whidbey Island (Seaplane Base)	1986	WA6170090058
Northwest Transformer (South Harkness Street)	1989	WAD027315621
Oeser Company	1997	WAD008957243
Old Navy Dump/Manchester Lab (USEPA/NOAA)	1996	WA8680030931
Pacific Sound Resources	1995	WAD009248287
Puget Sound Naval Shipyard Complex	1995	WA2170023418
Quendall Terminals	1985	WAD980639215
Seattle Municipal Landfill (Kent Highlands)	1989	WAD980639462
Tulalip Landfill	1992	WAD980639256
Western Processing Co., Inc.	1984	WAD009487513
Wyckoff Co./Eagle Harbor (ferry dock & wood treatment facility)	1986	WAD009248295

Table 2. List of sites (939) and published reports, including Hazardous Waste Site Reports (WSR), Preliminary Natural Resource Surveys (PNRS'), U.S. Air Force reports (USAF), and hazardous waste sites that have been evaluated at the time of publication. Sites in bold italic are included in this volume.

Region 1

Connecticut	WSR	PNRS	USAF	EPA FACILITY ID
29 Pomperaug Road				CTD983884412
Army Engine Plant/Stratford				CT3213822924
Barkhamsted-New Hartford Landfill	1989			CTD980732333
Beacon Heights Landfill	1984			CTD072122062
Black Rock Shipyard				CT0001407865
Broad Brook Mill	2003			CT0002055887
Dexter Corp.				CTD001155761
Gallup's Quarry	1989			CTD108960972
Hamilton Standard				CTD001145341
Kellogg-Deering Well Field	1987			CTD980670814
Laurel Park, Inc.		1988		CTD980521165
Linemaster Switch Corp.				CTD001153923
New London Submarine Base	1990			CTD980906515
Nutmeg Valley Road				CTD980669261
Old Southington Landfill				CTD980670806
O'Sullivans Island	1984			CTD980667992
Pharmacia & Upjohn Company				CTD001168533
Precision Plating Corp.				CTD051316313
Raymark Industries, Inc.	1996			CTD001186618
Remington Arms Company Incorporated				CTD001453216
Revere Textile Prints Corp.				CTD004532610
Sikorsky Aircraft Division UTC				CTD001449784
Solvents Recovery Service of New England				CTD009717604
Yaworski Waste Lagoon	1985	1989		CTD009774969

Massachusetts				
Atlas Tack Corp.	1989			MAD001026319
Baird & McGuire				MAD001041987
Blackburn and Union Privileges	1993			MAD982191363

Region 1 *cont.*

Massachusetts *cont.*	**WSR**	**PNRS**	**USAF**	**EPA FACILITY ID**
Boston Gas Co. LNG Plt				MAD087137329
Cannon Engineering Corp. (CEC)		1988		MAD079510780
Charles-George Reclamation Landfill	1987	1988		MAD003809266
Eastern Gas & Fuel				MAD981063142
Fort Devens				MA7210025154
Fort Devens-Sudbury Training Annex				MAD980520670
GE - Housatonic River	1999			MAD002084093
Groveland Wells	1987	1988		MAD980732317
Hanscom Field/Hanscom Air Force Base	1995			MA8570024424
Haverhill Municipal Landfill	1985			MAD980523336
Hocomonco Pond				MAD980732341
Holyoke Gas Works (Former)				MAD985298108
Industri-Plex	1987	1988		MAD076580950
Iron Horse Park				MAD051787323
Materials Technology Laboratory (USArmy)	1995			MA0213820939
Natick Laboratory Army Research, D&E Center	1995			MA1210020631
Naval Weapons Industrial Reserve Plant				MA6170023570
New Bedford Harbor				MA2690390024
New Bedford Site (Acushnet Estuary)	1984			MAD980731335
Norwood PCB's				MAD980670566
Nuclear Metals				MAD062166335
Nyanza Chemical Waste Dump	1987	1993		MAD990685422
Otis Air National Guard Base/Camp Edwards				MA2570024487
Plymouth Harbor/Cannon Engineering Corp.	1984	1990		MAD980525232
PSC Resources				MAD980731483
Re-Solve, Inc.				MAD980520621
Rose Disposal Pit				MAD980524169
Salem Acres		1991		MAD980525240
Shpack Landfill				MAD980503973
Silresim Chemical Corp				MAD000192393
South Weymouth Naval Air Station	1995			MA2170022022
Sullivan's Ledge	1987	1989		MAD980731343
Sutton Brook Disposal Area				MAD980520696

Region 1 *cont.*

Massachusetts *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
W. R. Grace and Co., Inc. (Acton Plant)				MAD001002252
Wells G&H		1990		MAD980732168
Zeneca Specialties				MAD051505477

Maine				
Brunswick Naval Air Station	1987	1991		ME8170022018
Eastern Surplus Co.				MED981073711
Eastland Woolen Mill	2002			MED980915474
Holtrachem				MED000242701
Loring Air Force Base				ME9570024522
Maine Yankee Atomic Power Company				MED071749329
McKin Company	1984			MED980524078
O'Connor Company	1984			MED980731475
O'Connor Company Main Office				MED018980227
Pinette's Salvage Yard				MED980732291
Portsmouth Naval Shipyard	1995			ME7170022019
Saco Municipal Landfill	1989			MED980504393
Saco Tannery Waste Pits				MED980520241
Union Chemical Co., Inc				MED042143883
Winthrop Landfill				MED980504435

New Hampshire				
Auburn Road Landfill		1989		NHD980524086
Beede Waste Oil	1997			NHD018958140
Coakley Landfill	1985	1989		NHD064424153
Dover Municipal Landfill	1987	1990		NHD980520191
Fletcher's Paint Works & Storage	1989			NHD001079649
Gilson Road Tar Pit				NHD980503304
Grugnale Waste Disposal Site	1985			NHD069911030
Kearsarge Metallurgical Corp				NHD062002001
Keefe Environmental Services				NHD092059112
Mohawk Tannery				NHD981889629
Mottolo Pig Farm				NHD980503361

Region 1 *cont.*

New Hampshire *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
New Hampshire Plating Co.	1992			NHD001091453
Ottati & Goss/Kingston Steel Drum				NHD990717647
Pease Air Force Base	1990	1991		NH7570024847
Savage Municipal Water Supply	1985			NHD980671002
Somersworth Sanitary Landfill				NHD980520225
South Municipal Water Supply Well				NHD980671069
Sylvester	1985			NHD099363541
Tibbetts Road				NHD989090469
Tinkham Garage				NHD062004569
Town Garage/Radio Beacon				NHD981063860

Rhode Island				
Central Landfill				RID980520183
Centredale Manor Restoration Project				RID981203755
Davis (GSR) Landfill				RID980731459
Davis Liquid Waste	1987			RID980523070
Davisville Naval Construction Battalion Center	1990	1994		RI6170022036
Landfill & Resource Recovery, Inc. (L&RR)				RID093212439
Newport Naval Education & Training Center	1990	1994		RI6170085470
Peterson/Puritan, Inc.	1987	1990		RID055176283
Picillo Farm	1987	1988		RID980579056
Rose Hill Regional Landfill	1989	1994		RID980521025
Stamina Mills, Inc.	1987	1990		RID980731442
West Kingston Town Dump/URI Disposal	1992			RID981063993
Western Sand & Gravel	1987			RID009764929

Vermont				
Bennington Municipal Sanitary Landfill				VTD981064223
BFI Sanitary Landfill (Rockingham)	1989			VTD980520092
Burgess Brothers Landfill				VTD003965415
Darling Hill Dump				VTD980520118
Elizabeth Mine	2003			VTD988366621
Ely Copper Mine	2003			VTD988366571

Region 1 *cont.*

Vermont *cont.*	**WSR**	**PNRS**	**USAF**	**EPA FACILITY ID**
Old Springfield Landfill	1987	1988		VTD000860239
Parker Sanitary Landfill				VTD981062441
Pine Street Canal				VTD980523062
Tansitor Electronics, Inc				VTD000509174

Region 2

New Jersey				
A.O. Polymer				NJD030253355
Albert Steel Drum	1984			NJD000525154
Allied Corp				NJD980530604
American Cyanamid Co.	1985			NJD002173276
Asbestos Dump				NJD980654149
Atlantic Aviation Corp.				NJD011308988
Atlantic Resources	***2004***			***NJD981558430***
Bog Creek Farm	1984	1992		NJD063157150
Brick Township Landfill	1984			NJD980505176
Bridgeport Rental & Oil Services		1990		NJD053292652
Brook Industrial Park	1989			NJD078251675
Burnt Fly Bog		1992		NJD980504997
Chemical Control	1984			NJD000607481
Chemical Insecticide Corp.	1990	1992		NJD980484653
Chemical Leaman Tank Lines, Inc		1989		NJD047321443
Chemsol, Inc				NJD980528889
Chipman Chemical Co.	1985			NJD980528897
Ciba-Geigy Corp.	1984	1989		NJD001502517
Cinnaminson Ground Water Contamination				NJD980785638
Combe Landfill South				NJD094966611
Cornell Dubilier Electronics, Inc.	1999			NJD981557879
Cosden Chemical Coatings Corp.	1987			NJD000565531
CPS/Madison Industries		1990		NJD002141190
Curcio Scrap Metal, Inc.	1987			NJD011717584
De Rewal Chemical Co.	1985			NJD980761373

Region 2 *cont.*

New Jersey *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Delilah Road				NJD980529002
Denzer & Schafer X-Ray Co.	1984	1992		NJD046644407
Diamond Alkali Co.	1984			NJD980528996
Diamond Head Oil Refinery Div.				NJD092226000
Diamond Shamrock Corp				NJD002442408
D'Imperio Property				NJD980529416
E.I. Du Pont de Nemours				NJD002385730
Ellis Property				NJD980529085
Emmell's Septic Landfill	2002			NJD980772727
Evor Phillips Leasing		1992		NJD980654222
Ewan Property				NJD980761365
Federal Aviation Admin. Tech. Center	1990			NJ9690510020
Federal Creosote				NJ0001900281
Fort Dix (Landfill Site)				NJ2210020275
Franklin Burn Site				NJD986570992
Fried Industries				NJD041828906
GAF Corp				NJD980771638
GAF Corp - Gloucester City				NJD043292606
Garden State Cleaners Co.	1989			NJD053280160
Global Sanitary Landfill	1989	1991		NJD063160667
Goose Farm				NJD980530109
Grand Street Mercury				NJ0001327733
Helen Kramer Landfill		1990		NJD980505366
Hercules, Inc. (Gibbstown Plant)	1984	1993		NJD002349058
Higgins Disposal	1989			NJD053102232
Higgins Farm	1989			NJD981490261
Hopkins Farm				NJD980532840
Horseshoe Road	1995			NJD980663678
Iceland Coin Laundry and Dry Cleaning				NJ0001360882
Ideal Cooperage Inc.	1984			NJD980532907
Imperial Oil Co., Inc./Champion Chemical				NJD980654099
Industrial Latex Corp.	1989			NJD981178411
ISP Environmental Services, Inc.				NJD002185973

Region 2 *cont.*

New Jersey *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Jackson Township Landfill	1984			NJD980505283
JIS Landfill				NJD097400998
Kauffman & Minteer, Inc.	1989			NJD002493054
Kin-Buc Landfill	1984	1990		NJD049860836
King of Prussia				NJD980505341
Koppers Co Inc/Seaboard Plant	1984			NJD002445112
Krysowaty Farm	1985			NJD980529838
LCP Chemicals, Inc.	1999			NJD079303020
Lightman Drum Company				NJD014743678
Lipari Landfill				NJD980505416
Lone Pine Landfill		1992		NJD980505424
Lustrelon Inc.				NJD008388951
M&T Delisa Landfill				NJD085632164
Mannheim Avenue Dump				NJD980654180
Martin Aaron, Inc.	2003			NJD014623854
Matteo Brothers				NJD011770013
Maywood Chemical Co				NJD980529762
McGuire Air Force Base				NJ0570024018
Metaltec/Aerosystems				NJD002517472
Middlesex Sampling Plant (DOE)	2002			NJ0890090012
Military Ocean Terminal (Landfill)				NJ0210022752
Mobil Chemical Co.	1984			NJD000606756
Monroe Township Landfill				NJD980505671
Myers Property				NJD980654198
Nascolite Corp.				NJD002362705
Naval Air Engineering Center				NJ7170023744
Naval Weapons Station Earle (Site A)				NJ0170022172
NL Industries	1984	1992		NJD061843249
Pepe Field				NJD980529598
Perth Amboy PCB's	1984			NJD980653901
PJP Landfill	1984	1990		NJD980505648
Pohatcong Valley Groundwater Contamination				NJD981179047
Pomona Oaks Residential Wells				NJD980769350

Region 2 *cont.*

New Jersey *cont.*	**WSR**	**PNRS**	**USAF**	**EPA FACILITY ID**
Price Landfill	1984	1993		NJD070281175
Puchack Well Field	1999			NJD981084767
Pulverizing Services				NJD980582142
PVSC Sanitary Landfill	1984			NJD980529671
Quanta Resources	***2004***			***NJD000606442***
Raritan Arsenal				NJD986589190
Reich Farms				NJD980529713
Renora, Inc.				NJD070415005
Rhone-Poulenc Chemical Co				NJD099293326
Ringwood Mines/Landfill				NJD980529739
Roebling Steel Co.	1984	1990		NJD073732257
Roosevelt Drive-In	1984			NJD030250484
Route 561 Dump	2002			NJ0000453514
Safety-Kleen (Rollins Environmental)				NJD053288239
Sayreville Landfill	1984	1990		NJD980505754
Scientific Chemical Processing	1984	1989		NJD070565403
Sharkey Landfill		1990		NJD980505762
Shield Alloy Corp				NJD002365930
South Jersey Clothing Co.	1989			NJD980766828
Swope Oil & Chemical Co.				NJD041743220
Syncon Resins	1984	1992		NJD064263817
Tabernacle Drum Dump				NJD980761357
Troy Chemical				NJD002144517
United States Avenue Burn	2002			NJ0001120799
Universal Oil Products (Chemical Division)	1984			NJD002005106
Upper Deerfield Township Sanitary Landfill				NJD980761399
Ventron/Velsicol	1984			NJD980529879
Vineland Chemical Co., Inc		1990		NJD002385664
W.R. Grace/Wayne Interim Storage (USDOE)				NJ1891837980
Waldick Aerospace Devices, Inc.		1990		NJD054981337
Welsbach & General Gas Mantle (Camden Radiation)				NJD986620995
White Chemical Corp	1984			NJD001239185

Region 2 *cont.*

New Jersey *cont.*	**WSR**	**PNRS**	**USAF**	**EPA FACILITY ID**
White Chemical Corp.				NJD980755623
Williams Property	1984	1992		NJD980529945
Wilson Farm				NJD980532824
Witco Chemical Corp. (Oakland Plant)				NJD045653854
Woodland Route 532 Dump				NJD980505887
Woodland Route 72 Dump				NJD980505879
Zschiegner Refining Company	1999			NJD986643153

New York				
93rd Street School				NYD980780829
Action Anodizing, Plating, & Polishing Corp.	1989			NYD072366453
ALCOA Aggregation Site				NYD980506232
American Thermostat Co. Superfund Site				NYD002066330
Anchor Chemicals				NYD001485226
Applied Environmental Services	1985	1991		NYD980535652
BEC Trucking		1990		NYD980768675
Bioclinical Laboratories, Inc.				NYD980768683
Brewster Well Field				NYD980652275
Brookhaven National Laboratory (USDOE)	1990			NY7890008975
Byron Barrel & Drum				NYD980780670
C & J Disposal Leasing Co. Dump	1989			NYD981561954
Carroll & Dubies Sewage Disposal	1989			NYD010968014
Circuitron Corp.				NYD981184229
Claremont Polychemical				NYD002044584
Clothier Disposal				NYD000511576
Colesville Municipal Landfill				NYD980768691
Computer Circuits	2002			NYD125499673
Consolidated Iron and Metal	***2004***			***NY0002455756***
Cornwall Lf.				NYD982276933
Croton Point Sanitary Landfill				NYD980508048
Dupont/Necco Park				NYD980532162
Ellenville Scrap Iron and Metal	2003			NYSFN0204190
Endicott Village Well Field				NYD980780746

Region 2 *cont.*

New York *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
FMC Corp.				NYD000511857
Forest Glen Mobile Home Subdivision				NYD981560923
Fort Totten				NY2213720897
Fulton Terminals				NYD980593099
G.E. Moreau				NYD980528335
General Motors (Central Foundry Division)		1989		NYD091972554
Genzale Plating Co.				NYD002050110
Goldisc Recordings, Inc.				NYD980768717
Griffiss Air Force Base (Former)-AFBCA/OL-X				NY4571924451
Harbor at Hastings Associates				NY0001817097
Haviland Complex				NYD980785661
Hertel Landfill				NYD980780779
Hooker (102nd Street)				NYD980506810
Hooker Chemical/Ruco Polymer Corp.				NYD002920312
Hooker Hyde Park				NYD000831644
Hooker S Area				NYD980651087
Hudson Coal Tar				NYD987039104
Hudson River PCB's		1989		NYD980763841
Jackson Steel				NYD001344456
Johnstown City Landfill				NYD980506927
Jones Chemicals, Inc.				NYD000813428
Jones Sanitation	1987			NYD980534556
Lawrence Aviation Industries Inc				NYD002041531
Li Tungsten Corp.	1992	1993		NYD986882660
Liberty Heat Treating Co. Inc.				NYD053169694
Liberty Industrial Finishing	1985	1993		NYD000337295
Love Canal				NYD000606947
Ludlow Sand & Gravel				NYD013468939
Malta Rocket Fuel Area				NYD980535124
Marathon Battery Corp.	1984	1989		NYD010959757
Mattiace Petrochemical Co., Inc.	1989	1990		NYD000512459
Mercury Refining Inc.				NYD048148175
Nepera Chemical Co., Inc.				NYD002014595

Region 2 *cont.*

New York *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Newstead Site				NYD986883387
Niagara County Refuse				NYD000514257
Niagara Mohawk Power Co. (Saratoga Springs)				NYD980664361
North Sea Municipal Landfill	1985	1989		NYD980762520
Old Roosevelt Field Contaminated Groundwater Area	2003			NYSFN0204234
Pasley Solvents & Chemicals, Inc.				NYD991292004
Pennsylvania Ave. Municipal Landfill				NY6141790018
Peter Cooper	1999			NYD980530265
Pfohl Brothers Landfill				NYD986875979
Pollution Abatement Services				NYD000511659
Port Washington Landfill	1984	1989		NYD980654206
Preferred Plating Corp				NYD980768774
Reynolds Metals Co		1996		NYD002245967
Richardson Hill Road Landfill/Pond				NYD980507735
Rowe Industries Groundwater Contamination	1987	1991		NYD981486954
Sidney Landfill	1989			NYD980507677
Sinclair Refinery				NYD980535215
Smithtown Groundwater Contamination	2003			NY0002318889
Solvent Savers				NYD980421176
Stanton Cleaners Area Groundwater Contamination	2002			NYD047650197
Suffern Village Well Field				NYD980780878
Syosset Landfill				NYD000511360
Tri-Cities Barrel Co., Inc.				NYD980509285
Tronic Plating Co., Inc.				NYD002059517
Volney Municipal Landfill				NYD980509376
Wallkill Landfill				NYD980535496
Warwick Landfill				NYD980506679
Wide Beach Development				NYD980652259
York Oil Co.				NYD000511733

Region 2 *cont.*

Puerto Rico	WSR	PNRS	USAF	EPA FACILITY ID
Clear Ambient Services Co.	1984			PRD090416132
Frontera Creek	1984	1991		PRD980640965
GE Wiring Devices				PRD090282757
Juncos Landfill				PRD980512362
Naval Security Group Activity	1989	1991		PR4170027383
Upjohn Facility				PRD980301154
V&M/Albaladejo Farms	1997			PRD987366101
Vega Alta Public Supply Wells				PRD980763775
Vega Baja Solid Waste Disposal	2002			PRD980512669

Virgin Islands				
Island Chemical Corp./V.I. Chemical Corp.	1996			VID980651095
Tutu Wellfield	1993			VID982272569

Region 3

Washington, D.C.				
Poplar Point Nursery				DCN000305662
Washington Gas Light Co				DCD077797793
Washington Navy Yard	1999			DC9170024310

Delaware				
12th Street Landfill				DESFN0305510
Army Creek Landfill	1984			DED980494496
Chem-Solv, Inc				DED980714141
Coker's Sanitation Service Landfills	1986	1990		DED980704860
Delaware City PVC Plant	1984			DE0001912757
Delaware Sand & Gravel	1984			DED000605972
Dover Air Force Base	1987	1989		DE8570024010
Dover Gas Light Co.	1987			DED980693550
E.I. Du Pont Newport Landfill	1987	1992		DED980555122
Halby Chemical	1986	1990		DED980830954
Harvey & Knott Drum, Inc				DED980713093

Region 3 *cont.*

Delaware *cont.*	**WSR**	**PNRS**	**USAF**	**EPA FACILITY ID**
Kent County Landfill	1989			DED980705727
Koppers Co. Facilities Site	1990			DED980552244
NCR Corp., Millsboro	1986			DED043958388
New Castle Spill Site	1984	1989		DED058980442
New Castle Steel	1984			DED980705255
NVF (Yorklyn)				DE0002014975
Old Brine Sludge Landfill	1984			DED980704894
Pigeon Point Landfill	1987			DED980494603
Sealand Limited	1989			DED981035520
Standard Chlorine Co.	1986			DED041212473
Sussex Co. Landfill #5	1989			DED980494637
Tybouts Corner Landfill	1984			DED000606079
Tyler Refrigeration Pit				DED980705545
Wildcat Landfill	1984			DED980704951

Maryland				
68th Street Dump/Industrial Enterprises	2002			MDD980918387
Allied Chemical				MDD069396711
Andrews Air Force Base	2003		1994	MD0570024000
Anne Arundel County Landfill	1989			MDD980705057
Bethlehem Steel Sparrows Point Plant				MDD053945432
Brandywine DRMO	2003			MD9570024803
Bush Valley Landfill	1989	1993		MDD980504195
Central Chemical Corporation	1999			MDD003061447
Chemical Metals Industries, Inc.				MDD980555478
Hawkins Pt / MD. Port Admin.				MDD000731356
Indian Head Naval Surface Warfare Center	1984	1997		MD7170024684
Joy Reclamation Co	1984			MDD030321178
Kane & Lombard Street Drums				MDD980923783
Maryland Port Admin.				MDD030324073
Mid-Atlantic Wood Preservers, Inc				MDD064882889
Naval Surface Warfare Center - White Oak				MD0170023444
Naval Training Center Bainbridge				MDD985397256

Region 3 *cont.*

Maryland *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Ordnance Products, Inc.	1995			MDD982364341
Sand, Gravel & Stone Site	1984	1990		MDD980705164
Southern Maryland Wood Treating	1987			MDD980704852
Spectron, Inc		1997		MDD000218008
U.S. Agricultural Center Beltsville (2 Tenants)	1995			MD0120508940
USA Aberdeen - Edgewood	1986			MD2210020036
USA Aberdeen - Edgewood: Bush River Watershed		1994		MD2210020036a
USA Aberdeen - Edgewood: Gun Powder River Watershed		1994		MD2210020036b
USA Aberdeen - Michaelsville	1986			MD3210021355
USA Aberdeen - Michaelsville: Romney Creek Watershed		1994		MD3210021355a
USA Fort George Meade	1997			MD9210020567
USN Patuxent Naval Air Station	1996			MD7170024536
Woodlawn Co. Landfill	1987			MDD980504344

Pennsylvania				
A.I.W. Frank/Mid-County Mustang				PAD004351003
Allied Signal Aerospace Co. Guidance and Control Systems				PAD003047974
Ambler Asbestos Piles				PAD000436436
American Electronic Lab, Inc				PAD009224981
AMP Inc, Global Envir Services				PAD980693048
Austin Avenue Radiation Site	1993			PAD987341716
Bally Engineered Structure Incorporated				PAD061105128
Bell Landfill				PAD980705107
Berkley Products				PAD980538649
Berks Landfill Corp				PAD000651810
Berks Sand Pit				PAD980691794
Boarhead Farms	1989			PAD047726161
Bridesburg Dump	1984			PAD980508402
Brodhead Creek				PAD980691760
Brown's Battery Breaking		1991		PAD980831812
Butler Mine Tunnel	1987			PAD980508451

Region 3 *cont.*

Pennsylvania *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Butz Landfill				PAD981034705
Crater Resources, Inc./Keystone Coke Co./ Alan Wood	1993			PAD980419097
Croydon TCE Spill	1986			PAD981035009
Delta Quarries & Disposal Inc./Stotler Landfill				PAD981038052
Douglassville Disposal	1987			PAD002384865
Drake Chemical				PAD003058047
Dublin TCE Site				PAD981740004
Eastern Diversified Metals				PAD980830533
Elizabethtown Landfill	1989			PAD980539712
Enterprise Avenue	1984			PAD980552913
FMC Marcus Hook	1996			PAD987323458
Foote Mineral Co.	1993			PAD077087989
GMT Microelectronics				PAD093730174
Hamburg Lead Site				PASFN0305567
Havertown PCP Site				PAD002338010
Hebelka Auto Salvage Yard				PAD980829329
Hellertown Manufacturing Co.	1987			PAD002390748
Henderson Road		1989		PAD009862939
Industrial Lane				PAD980508493
Jack's Creek/Sitkin Smelting & Refining, Inc.	1989			PAD980829493
Keyser Ave. Borehole	1989			PAD981036049
Kimberton				PAD980691703
Lackawanna Refuse				PAD980508667
Lansdowne Radiation Site				PAD980830921
Letterkenny Army Depot (PDO Area)				PA2210090054
Letterkenny Army Depot (SE Area)				PA6213820503
Lord-Shope Landfill				PAD980508931
Lower Darby Creek Area	2003			PASFN0305521
Malvern TCE				PAD014353445
Marjol Operation				PAD003041910
Metal Bank of America	1984	1990		PAD046557096
Metropolitan Mirror and Glass				PAD982366957

Region 3 *cont.*

Pennsylvania *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Middletown Air Field				PAD980538763
Mill Creek Dump				PAD980231690
Modern Sanitation Landfill				PAD980539068
Moyers Landfill				PAD980508766
MW Manufacturing				PAD980691372
National Vulcanized Fiber				PAD107214116
Naval Air Development Center (8 Areas)				PA6170024545
North Penn - Area 1				PAD096834494
North Penn - Area 12				PAD057152365
North Penn - Area 2				PAD002342475
North Penn - Area 5				PAD980692693
North Penn - Area 6				PAD980926976
North Penn - Area 7				PAD002498632
Novak Sanitary Landfill				PAD079160842
Occidental Chemical Corp./Firestone Tire and Rubber Co.	1989			PAD980229298
Old Wilmington Road GW Contamination				PAD981938939
Palmerton Zinc Pile				PAD002395887
Paoli Rail Yard	1987	1991		PAD980692594
Publicker/Cuyahoga Wrecking Plant	1990			PAD981939200
Raymark	1996			PAD039017694
Recticon/Allied Steel	1989			PAD002353969
Reeser's Landfill				PAD980829261
Revere Chemical Co.	1986			PAD051395499
Rohm and Haas Landfill	1986			PAD091637975
Sable Diamonds/US Metal & Coins				PAD982364234
Saegertown Industrial Area				PAD980692487
Salford Quarry	1997			PAD980693204
Shriver's Corner				PAD980830889
Stanley Kessler				PAD014269971
Strasburg Landfill				PAD000441337
Textron Lycoming				PAD003053709
Tinicum National Environmental Center	1986			PA6143515447

Region 3 *cont.*

Pennsylvania *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Tonolli Corp				PAD073613663
Tysons Dump #1	1985			PAD980692024
UGI Corp. Gas Manufacturing Plant	1995			PAD980539126
USN Philadelphia Naval Shipyard				PA4170022418
USN Ships Parts Control Center	1996			PA3170022104
Wade (ABM)	1984			PAD980539407
Walsh Landfill				PAD980829527
Whitmoyer Laboratories				PAD003005014
Willow Grove Naval Air and Air Reserve Station				PAD987277837

Virginia				
Abex Corp.	1989			VAD980551683
Arrowhead Associates Inc./Scovill Corp.	1989			VAD042916361
Atlantic Wood Industries, Inc.	1987	1990		VAD990710410
C & R Battery Co., Inc.	1987			VAD049957913
Chisman Creek	1984			VAD980712913
Clarke L.A. & Son				VAD007972482
Former Nansemond Ordnance Depot	2002			VAD123933426
H & H Inc., Burn Pit				VAD980539878
Hampton Roads Welders Site				VAD988197133
Kim-Stan Landfill	2002			VAD077923449
Langley Air Force Base/NASA Langley Research Center	1995	1997		VA2800005033
Marine Corps Combat and Development Command	1995			VA1170024722
NASA Wallops Island				VA8800010763
Naval Amphibious Base Little Creek	2002			VA5170022482
Naval Surface Warfare Center - Dahlgren	1993			VA7170024684
Naval Weapons Station - Yorktown	1993	1997		VA8170024170
NWS Yorktown - Cheatham Annex	***2004***			***VA3170024605***
Rentokil, Inc. (Virginia Wood Preserving Division)				VAD071040752
Richmond, Fredericksburg & Potomac Railroad		1994		VAD020312013
Saunders Supply Co.	1987			VAD003117389
St Juliens Creek Annex (U.S. Navy)				VA5170000181

Region 3 *cont.*

Virginia *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Suffolk City Landfill				VAD980917983
U.S. Defense General Supply Center				VA3971520751
USA Fort Eustis	1996			VA6210020321
USA Woodbridge Research Facility				VA7210020981
USN Naval Shipyard Norfolk	1999			VA1170024813
USN Norfolk Naval Base	1997			VA6170061463
USN Radio Transmitting Facility				VA9170022488

Region 4

Alabama				
Alabama Wood Treating Corp Inc				ALD058221326
American Brass Inc.	2002			ALD981868466
Ciba-Geigy Corp. (McIntosh Plant)	1990			ALD001221902
Gulf Oil Co				ALD000604249
Interstate Lead Co. (ILCO)				ALD041906173
Olin Corp. (McIntosh Plant)	1990			ALD008188708
Redwing Carriers, Inc. (Saraland)	1989			ALD980844385
Stauffer Chemical Co. (Cold Creek Plant)		1990		ALD095688875
Stauffer Chemical Co. (Lemoyne Plant)				ALD008161176
T.H. Agriculture & Nutrition (Montgomery)				ALD007454085
US Naval Outlying Barin Field				AL2170024630
USAF Maxwell Air Force Base				AL0570024182

Florida				
Agrico Chemical Co.	1989			FLD980221857
Airco Plating Co				FLD004145140
Alaric Area GW Plume				FLD012978862
American Creosote Works (Pensacola Plant)	1984	1989		FLD008161994
Anaconda Aluminum Co./Milgo Electronics				FLD020536538
Anodyne, Inc				FLD981014368
B&B Chemical Co., Inc				FLD004574190
Bay Drum				FLD088783865

Region 4 *cont.*

Florida *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Beulah Landfill				FLD980494660
BMI-Textron				FLD052172954
Broward County-21st Manor Dump	1992			FLD981930506
Cabot/Koppers				FLD980709356
Cascade Park Gasification Plant				FLD981931959
Chemform, Inc.	1990			FLD080174402
Chevron Chemical Co. (Ortho Division)				FLD004064242
Coleman-Evans Wood Preserving Co				FLD991279894
Cypress Garden Skis				FLD029505161
Davie Landfill				FLD980602288
Dubose Oil Products Co				FLD000833368
Florida Petroleum Processors				FLD984184127
Florida Steel Corp				FLD050432251
Gardinier Inc/ Ft Meade Mine				FLD000827428
Harris Corp. (Palm Bay Plant)	1986	1990		FLD000602334
Helena Chemical Co. (Tampa Plant)	1993			FLD053502696
Hipps Road Landfill				FLD980709802
Hollingsworth Solderless Terminal				FLD004119681
Kassauf-Kimerling Battery Disposal		1989		FLD980727820
Madison County Sanitary Landfill				FLD981019235
MRI Corporation	1997			FLD088787585
Munisport Landfill	1984			FLD084535442
Normandy Park Apartments				FLD984229773
Peak Oil Co./Bay Drum Co				FLD004091807
Peele-Dixie Wellfield Site				FLD984259374
Pensacola Naval Air Station	1990			FL9170024567
Pepper Steel & Alloys, Inc				FLD032544587
Pickettville Road Landfill	1984	1990		FLD980556351
Piper Aircraft/Vero Beach Water & Sewer				FLD004054284
Pleasant Grove Landfill				FLD984169763
Reeves SE Corp Southeastern Wire Div				FLD000824888
Reeves Southeastern Galvanizing Corp.				FLD000824896
Sapp Battery Salvage		1989		FLD980602882

Region 4 *cont.*

Florida *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Schuylkill Metals Corp				FLD062794003
Sherwood Medical Industries				FLD043861392
Sixty-Second Street Dump	1984	1989		FLD980728877
Solitron Devices, Inc				FLD032845778
Solitron Microwave	2002			FLD045459526
Southern Solvents, Inc				FL0001209840
St. Augustine Gas Company				FLD101835528
Standard Auto Bumper Corp.	1989			FLD004126520
Stauffer Chemical Co. (Tampa Plant)	1993			FLD004092532
Stauffer Chemical Co. (Tarpon Springs)	1993			FLD010596013
Sydney Mine Sludge Ponds		1989		FLD000648055
Taylor Road Landfill				FLD980494959
Trans Circuits, Inc.				FLD091471904
US NASA Kennedy Space Center				FL6800014585
USAF Cape Canaveral AFB				FL2800016121
USAF Eglin AFB Armament Division				FL8570024366
USAF Homestead AFB				FL7570024037
USAF MacDill AFB				FL2971590003
USAF NAS Key West (Boca Chica)				FL6170022952
USAF Patrick AFB				FL2570024404
USAF Tyndall Air Force Base	1997			FL1570024124
USCG Station Key West				FL1690331300
USN Air Station Cecil Field	1990			FL5170022474
USN NAS Jacksonville	1990			FL6170024412
USN Naval Air Station Mayport				FL9170024260
USN Naval Air Station Whiting Field Site 5	1996			FL2170023244
USN Naval Coastal Systems Ctr.				FL8170023792
Whitehouse Oil Pits				FLD980602767
Wilson Concepts of Florida, Inc				FLD041184383
Wingate Road Municipal Incinerator Dump				FLD981021470
Woodbury Chemical Co. (Princeton Plant)	1989			FLD004146346
Zellwood Ground Water Contamination				FLD049985302

Region 4 *cont.*

Georgia	WSR	PNRS	USAF	EPA FACILITY ID
Brunswick Wood Preserving	1997			GAD981024466
Camilla Wood Preserving Company	1999			GAD008212409
Cedartown Industries, Inc				GAD095840674
Cedartown Municipal Landfill				GAD980495402
Diamond Shamrock Corp. Landfill				GAD990741092
Firestone Tire & Rubber Co (Albany Plant)				GAD990855074
Hercules 009 Landfill				GAD980556906
Hercules Inc				GAD004065520
International Paper Co				GAD000827444
LCP Chemicals Georgia		1995		GAD099303182
Marine Corps Logistics Base				GA7170023694
Mathis Brothers Landfill				GAD980838619
Monsanto Corp. (Augusta Plant)				GAD001700699
New Sterling Landfill				GAD980495451
Robins Air Force Base				GA1570024330
T.H. Agriculture & Nutrition (Albany)				GAD042101261
Terry Creek Dredge Spoil Areas/Hercules Outfall	1997			GAD982112658
Woolfolk Chemical Works, Inc				GAD003269578

Mississippi				
Chemfax, Inc.	1995			MSD008154486
Davis Timber Company				MSD046497012
Gautier Oil Co., Inc.	1989			MSD098596489
Naval Construction Battalion Center				MS2170022626
Southeast Mississippi Industrial Council				MSD980403240
Tennessee Gas Pipeline/CS 530				MSD991277542
USAF Keesler AFB				MS2570024164

North Carolina				
ABC One Hour Cleaners	1989			NCD024644494
Camp Lejeune Military Res. (USNAVY)	1989			NC6170022580
Charles Macon Lagoon & Drum Storage				NCD980840409
Cherry Point Marine Corps Air Station				NC1170027261

Region 4 *cont.*

North Carolina *cont.*	**WSR**	**PNRS**	**USAF**	**EPA FACILITY ID**
Dockery Property				NCD980840342
FCX, Inc. (Washington Plant)	1989			NCD981475932
Geigy Chemical Corp. (Aberdeen Plant)				NCD981927502
General Electric Co/Shepherd Farm				NCD079044426
Georgia-Pacific Corporation Hardwood Sawmill				NCD000813592
Koppers Co. Inc. (Morrisville Plant)				NCD003200383
National Starch & Chemical Corp.				NCD991278953
New Hanover County Airport Burn Pit	1989			NCD981021157
Old ATC Refinery				NCD986186518
Potter's Septic Tank Service Pits	1989			NCD981023260
Reasor Chemical Company	***2004***			***NCD986187094***
Triangle Pacific Corp IXL Division				NCD087336335
Weyerhaeuser Company Plymouth Wood Treating Plant				NCD991278540

South Carolina				
Allied Terminals Incorporated				SC0000861054
Beaufort County Landfill				SCD980844260
Calhoun Park Area		1993		SCD987581337
Carolawn, Inc				SCD980558316
Charleston Landfill				SCD980846034
Columbia Nitrogen				SC0001040393
Geiger (C&M Oil)	1984			SCD980711279
Helena Chemical Co. Landfill	1989			SCD058753971
International Paper Co.				SCD055915086
Kalama Specialty Chemicals				SCD094995503
Koppers Co., Inc. (Charleston Plant)	1993			SCD980310239
Leonard Chemical Co., Inc				SCD991279324
Lexington County Landfill Area				SCD980558043
Macalloy Corporation	***2004***			***SCD003360476***
Naval Shipyard - Charleston				SC0170022560
Naval Weapons Station - Charleston				SC8170022620
Palmetto Recycling, Inc				SCD037398120

Region 4 *cont.*

South Carolina *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Para-Chem Southern, Inc				SCD002601656
Parris Island Marine Corps Recruit Depot		1995		SC6170022762
Savannah River Site (USDOE)	1990			SC1890008989
USDOI Charleston Harbor Site		1993		SCD987572674
Wamchem, Inc.	1984			SCD037405362

Region 5

Illinois	
Fort Sheridan	IL8214020838
Great Lakes Naval Training Center	ID not available
Outboard Marine Corp	ILD000802827
Yeoman Creek Landfill	ILD980500102

Indiana	
Grand Calumet/IHC Area of Concern	IND980500573

Michigan	
Allied Paper/Portage Creek/Kalamazoo River	MID006007306
Cannelton Industries	MID980678627
Deer Lake	MID980679799
Ford Motor Co	MID005057005
Hooker Montague Plant	MID006014906
Manistique River/Harbor, Area of Concern	MID981192628
Muskegon Chem Co.	MID072569510
Packaging Corp. of America	MID980794747
Shiawassee River	MID980794473
Thunder Bay	MID985640630
Torch Lake	MID980901946
St Louis River/Interlake	MND039045430

Ohio	
Ashtabula River	ID not available
Fields Brook	OHD980614572

Region 5 *cont.*

Wisconsin	WSR	PNRS	USAF	EPA FACILITY ID
Ashland/NSP Lakefront Site				WISFN0507952
Boerke Site				WID981189632
Fort Howard Paper Co. Lagoons				WID006136659
Fort Howard Steel Incorporated				WID006141402
Fox River NRDA/PCB Releases	2003			WI0001954841
Kohler Co. Landfill				WID006073225
Moss-American (Kerr-McGee Oil Co.)				WID039052626
Sheboygan Harbor & River				WID980996367

Region 6

Louisiana				
American Creosote Works, Inc. (Winnfield Plant)				LAD000239814
Bayou Bonfouca				LAD980745632
Bayou d'Inde				LAD981916570
Bayou Sorrel Site	1984			LAD980745541
Bayou Trepagnier (Shell Oil Co/Norco Mfg Complex)				LAD008186579
Bayou Verdine, Occidental Chemical				LAD985195346
Calcasieu Estuary				LA0002368173
Calcasieu Parish Landfill				LAD980501423
Delatte Metals	2002			LAD052510344
Devil's Swamp Lake				LAD985202464
Gulf State Utilities-North Ryan Street				LAD985169317
Madisonville Creosote Works	1997			LAD981522998
Mallard Bay Landing Bulk Plant				LA0000187518
New Orleans Naval Air Station				LA6170022788
Petro-Processors of Louisiana, Inc.				LAD057482713
Ponchatoula Battery Company				LAD062644232
PPG Industries Inc.				LAD008086506
Southern Shipbuilding Corp.				LAD008149015

Region 6 *cont.*

Texas	WSR	PNRS	USAF	EPA FACILITY ID
ALCOA (Point Comfort)/Lavaca Bay	1995			TXD008123168
Bailey Waste Disposal	1985	1989		TXD980864649
Brio Refining, Inc.	1989	1989		TXD980625453
Chevron Products Co				TXD008090409
Corpus Christi Naval Air Station				TX7170022787
Crystal Chemical Co.	1989	1989		TXD990707010
Dixie Oil Processors, Inc.	1989	1989		TXD089793046
French, Ltd.	1989	1989		TXD980514814
Geneva Industries/Fuhrmann Energy				TXD980748453
Harris (Farley Street)				TXD980745582
Highlands Acid Pit	1989			TXD980514996
International Creosoting				TXD980625636
Malone Service Company, Inc.	2003			TXD980864789
Motco, Inc.	1984			TXD980629851
North Cavalcade Street				TXD980873343
Palmer Barge Line				TXD068104561
Patrick Bayou	2003			TX0000605329
Petro-Chemical Systems (Turtle Bayou)				TXD980873350
Sheridan Disposal Services				TXD062132147
Sikes Disposal Pits	1989			TXD980513956
South Cavalcade Street				TXD980810386
Sprague Road Groundwater				TX0001407444
Star Lake Canal Site - Port Neches				TX0001414341
State Marine	1999			TXD099801102
Tex-Tin Corp.	1989			TXD062113329
Triangle Chemical Co				TXD055143705

Region 9

American Samoa				
Taputimu Farm	1984			ASD980637656

Region 9 *cont.*

California	WSR	PNRS	USAF	EPA FACILITY ID
AERA/SWEPI (Former Hercules Gas Plant)				NA
Aerojet General Corp				CAD980358832
Alameda Naval Air Station	1989			CA2170023236
Bolsa Chica Lowlands				NA
Brown & Bryant, Inc. (Arvin Plant)				CAD052384021
Camp Pendleton Marine Corps Base	1990	1992		CA2170023533
Caretaker Site Office Treasure Island				CA7170023330
Casmalia Resources				CAD020748125
Chevron USA Richmond Ref				CAD009114919
Coast Wood Preserving	1984			CAD063015887
Concord Naval Weapons Station	1993	1990		CA7170024528
Cooper Drum Co.	1993			CAD055753370
Crazy Horse Sanitary Landfill				CAD980498455
CTS Printex, Inc.	1989			CAD009212838
Del Amo Facility	***2004***			***CAD029544731***
Del Norte Pesticide Storage	1984			CAD000626176
El Toro Marine Corps Air Station	1989			CA6170023208
Fairchild Semiconductor Corp (Mt View)				CAD095989778
Farallon Islands		1990		CAD981159585
Fleet Industrial Supply Center Oakland				CA4170090027
Fort Ord	1990	1992		CA7210020676
Fresno Municipal Sanitary Landfill				CAD980636914
GBF, Inc. Dump	1993			CAD980498562
Gray Eagle Mine				CAD000629923
Halaco Engineering Co				CAD009688052
Hamilton Army Airfield				CA3570024288
Hewlett-Packard (620-640 Page Mill Road)	1989			CAD980884209
Hexcel Corporation				CAD058783952
Hunters Point Naval Shipyard	1989	1989		CA1170090087
Intersil Inc./Siemens Components	1989			CAD041472341
Iron Mountain Mine	1989	1989		CAD980498612
J.H. Baxter & Co				CAD000625731
Jasco Chemical Corp.	1989			CAD009103318

Region 9 *cont.*

California *cont.*	**WSR**	**PNRS**	**USAF**	**EPA FACILITY ID**
Jet Propulsion Laboratory (NASA)				CA9800013030
Kaiser Steel Corp. (Fontana Plant)				CAD008274938
Kearney-KPF				CAD981429715
Liquid Gold Oil Corp.	1984			CAT000646208
Long Beach Naval Station				CA2170023194
Louisiana-Pacific Corp				CAD065021594
Mare Island Naval Shipyard				CA7170024775
McClellan Air Force Base (Western Parcels)				NA
McCormick & Baxter Creosoting Co.	1993			CAD009106527
McNamara & Peepe Sawmill				CA0001097088
M-E-W Study Area				CAD982463812
MGM Brakes	1984			CAD000074120
Modesto Ground Water Contamination				CAD981997752
Moffett Naval Air Station	1986			CA2170090078
Montrose Chemical Corp.	1985			CAD008242711
NASSCO/SW Marine Shipyard				NA
Naval Air Station Lemore				CA3170024381
Naval Shipyard Long Beach				CA1170090483
Naval Station San Diego				NA
Naval Supply Center Pt Molate Site				CA0170090021
Naval Training Center (Boat Channel)				NA
Newmark Ground Water Contamination				CAD981434517
North Island Naval Air Station				CA7170090016
Oakland Army Base				CA4210020661
Oakland Naval Supply Ctr/Alameda Fac				CA1170090012
Pacific Coast Pipe Lines	1989			CAD980636781
Pacific Missile Test Center				CA9170027271
Palos Verdes Shelf				NA
Playa Vista Development Project				CAD982418139
Point Loma Naval Complex				CA1170090236
Port Hueneme Naval Constr Battalion Ctr				CA6170023323
Presidio of San Francisco				CA7210020791
Ralph Gray Trucking Co				CAD981995947

Region 9 *cont.*

California *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Redwood Shore Landfill				CAD982462343
Rhone-Poulenc, Inc./Zoecon Corp.	1985			CAT000611350
Riverbank Army Ammunition Plant	1989			CA7210020759
Romic Chem Corp				CAD009452657
Sacramento Army Depot				CA0210020780
San Diego Naval Training Center				CA7170090057
Seal Beach Naval Weapons Sta.				CA0170024491
Shell Oil Co Martinez				CAD009164021
Simpson-Shasta Ranch				CAD980637482
Sola Optical USA, Inc.	1989			CAD981171523
Solar Turbines, Inc.				CAD008314908
Solvent Service, Inc.				CAD059494310
South Bay Asbestos Area	1985			CAD980894885
Spectra-Physics, Inc				CAD009138488
Sulphur Bank Mercury Mine				CAD980893275
Synertek, Inc. (Building 1)				CAD990832735
Tosco Corp Avon Ref				CAD000072751
Travis Air Force Base	1990			CA5570024575
TRW Microwave, Inc (Building 825)				CAD009159088
United Heckathorn Co.				CAD981436363
Vandenberg AFB			1994	CA9570025149

Federated States of Micronesia				
PCB Wastes				FMD980637987

Guam				
Andersen Air Force Base	1993			GU6571999519
Apra Harbor Naval Complex				GU7170090008
Naval Air Station Agana				GU0170027320
Naval Sta Guam				GU7170027323

Hawaii				
ABC Chem Corp				HID033233305
Barbers Point Naval Air Station				HI1170024326

Region 9 *cont.*

Hawaii *cont.*	**WSR**	**PNRS**	**USAF**	**EPA FACILITY ID**
Bellows Air Force Station				HI3570028719
Chemwood Treatment Co, Inc.				HID981424138
Del Monte Corp. (Oahu Plantation)	1995			HID980637631
Hawaiian Western Steel Limited				HID981581788
Hickam Air Force Base				HI8570028722
Honolulu Skeet Club				HI0000768382
Kahoolawe Island				HI6170090074
Kailua-Kona Landfill				HID980497184
Kapaa Landfill				HID980497176
Kewalo Incin Ash Dump				HID980497226
Kure Atoll, U.S. Coast Guard				HID984470039
Marine Corps Base Hawaii				HI6170022762
Naval Submarine Base				HI3170024340
Pearl City Landfill	1984			HID980585178
Pearl Harbor Naval Complex				HI4170090076
Pearl Harbor Naval Station	1992	1993		HI2170024341
Tern Island				ID not available
USCG Base Honolulu				HID984469890
Waiakea Pond/Hawaiian Cane Prdts Plant		1990		HID982400475

U.S. Minor Outlying Islands				
Johnston Atoll				UM4210090003
Midway Island Naval Air Station				UM6170027332
Wake Island Air Field				HI0570090001

Region 10

Alaska				
Adak Naval Air Station	1993			AK4170024323
Alaska Pulp Corp		1995		AKD009252487
Dutch Harbor Sediment Site				AKSFN1002080
Elmendorf Air Force Base	1990	1990	1994	AK8570028649
Fort Richardson (US Army)	1995			AK6214522157

Region 10 *cont.*

Alaska *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Fort Wainwright				AK6210022426
Kennicott Copper Mining Co				AKD983073123
Ketchikan Pulp Co		1998		AKD009252230
Klag Bay Site	2002			AK0002364768
Metlakatla Indian Community (Brownfield Site)				NA
Standard Steel & Metal Salvage Yard (USDOT)	1990	1990		AKD980978787
USAF Eareckson AFS				AK9570028705
USAF King Salmon Airport		1999		AK3570028669
USDOC NOAA National Marine Fisheries Service				AK0131490021
USNAVY Barrow Naval Arctic Research Lab				AK2170027245

Idaho				
Blackbird Mine	1995	1994		IDD980725832
Grouse Creek Mine				IDD000643254
St Maries Creosote				IDSFN1002095
Stibnite/Yellow Pine Mining Area	2003			IDD980665459

Oregon				
Allied Plating, Inc.	1987	1988		ORD009051442
East Multnomah County Ground Water Contamination				ORD987185030
Gould, Inc.	1984	1988		ORD095003687
Harbor Oil Inc.	***2004***			***ORD071803985***
Hoys Marine, LLC				ORD987190840
Joseph Forest Products				ORD068782820
Martin-Marietta Aluminum Co.	1987	1988		ORD052221025
McCormick & Baxter Superfund Site	1995	1995		ORD009020603
Northwest Pipe & Casing Co.	1993			ORD980988307
Port of Coos Bay - Charleston Boat Yard				OR0001389972
Portland Harbor	2003	1999		ORSFN1002155
Reynolds Metals Company	1996			ORD009412677
Rhone Poulenc, Inc.	1984			ORD990659492
Taylor Lumber and Treating		1991		ORD009042532
Teledyne Wah Chang	1985	1988		ORD050955848
Union Pacific Railroad	1990	1990		ORD009049412

Region 10 *cont.*

Washington	WSR	PNRS	USAF	EPA FACILITY ID
ALCOA (Vancouver Smelter)	1989	1989		WAD009045279
American Crossarm & Conduit Co.	1989	1988		WAD057311094
Asarco Incorporated				WAD010187896
Bangor Naval Submarine Base	1990	1991		WA5170027291
Bangor Ordnance Disposal (USNavy)		1991		WA7170027265
Boeing Company Plant 2				WAD009256819
Bonneville Power Administration Ross Complex (USDOE)	1990	1990		WA1891406349
Boomsnub/Airco				WAD009624453
Centralia Municipal Landfill	1989	1989		WAD980836662
Commencement Bay, Near Shore/Tide Flats	1984	1988		WAD980726368
Commencement Bay, South Tacoma Channel	1984			WAD980726301
Hamilton /Labree Roads GW Contamination				WASFN1002174
Hamilton Island Landfill (USA/COE)	1992	1991		WA5210890096
Hanford 100-Area (USDOE)	1989	1988		WA3890090076
Hansville Landfill				WAD000711804
Harbor Island (Lead)	1984	1989		WAD980722839
Jackson Park Housing Complex (USNavy)	1995			WA3170090044
Lower Duwamish Waterway	2003			WA0002329803
Naval Air Station, Whidbey Island (Ault Field)	1986	1989		WA5170090059
Naval Air Station, Whidbey Island (Seaplane Base)	1986	1989		WA6170090058
Naval Undersea Warfare Engineering Station (4 Waste Areas)		1989		WA1170023419
Northwest Transformer (South Harkness Street)	1989	1988		WAD027315621
Oeser Company	1997			WAD008957243
Old Navy Dump/Manchester Lab (USEPA/NOAA)	1996	1995		WA8680030931
Olympic View Sanitary Landfill				WAD042804971
Pacific Sound Resources	1995	1992		WAD009248287
Pacific Wood Treating				WAD009422411
Palermo Well Field Groundwater Contamination				WA0000026534
Puget Sound Naval Shipyard Complex	1995	1992		WA2170023418
Quendall Terminals	1985			WAD980639215
Rayonier Incorporated Port Angeles Mill		2000		WAD000490169
Seattle Municipal Landfill (Kent Highlands)	1989	1988		WAD980639462

Region 10 *cont.*

Washington *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
South Tacoma Field				WAD980724173
Strandley/Manning Site		1992		WAD980976328
Tulalip Landfill	1992	1991		WAD980639256
United Marine Shipyards				WAD009264284
US Navy Puget Sound FISC Dept.				WA2170023426
Vancouver Water Station #1 Contamination				WAD988519708
Washington Natural Gas - Seattle Plant		1996		WAD980639280
Western Processing Co., Inc.	1984			WAD009487513
Weyerhaeuser Co Landfill				WAD009041450
WPNSTA Seal Beach Det. Port Hadlock		1995		WA4170090001
Wyckoff Co./Eagle Harbor (ferry dock & wood treatment facility)	1986	1988		WAD009248295

Donald L. Evans
Secretary, U.S. Department of Commerce

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