Coastal and Estuarine

Hazardous Waste Site Reports

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Contents

Acronyms and abbreviations

AST	above-ground-storage tank
AWQC	Ambient water quality criteria for the protection of aquatic life
BEHP	bis(2-ethylhexyl)phthalate
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
DMG	dimethyl glycine
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
MEK	methyl ethyl ketone (a.k.a. 2-Butanone)
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

TEC Threshold Effects Concentration

TNT trinitrotoluene

TPH total petroleum hydrocarbons

TSS total suspended solids

UET Upper Effects Threshold

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 361 coastal and estuarine hazardous WSRs, 154 PNRS', 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. 77) 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 September 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.

For each site, the contaminant levels detected in surface water and groundwater are compared to the ambient water quality criteria (AWQC; USEPA 2002); contaminants detected in sediment are compared to the effects range-low (ERL) values (Long and Morgan (1991) and threshold effects concentrations (TECs; MacDonald et al. 2000a). Only when there is a soil pathway for the migration of contaminants to NOAA trust resources, do we examine contaminant levels in soil samples. Contaminants detected in soil are compared to ecological soil screening levels (USEPA 2004) and values from the Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRGs; Efroymson et al. 1997).

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.

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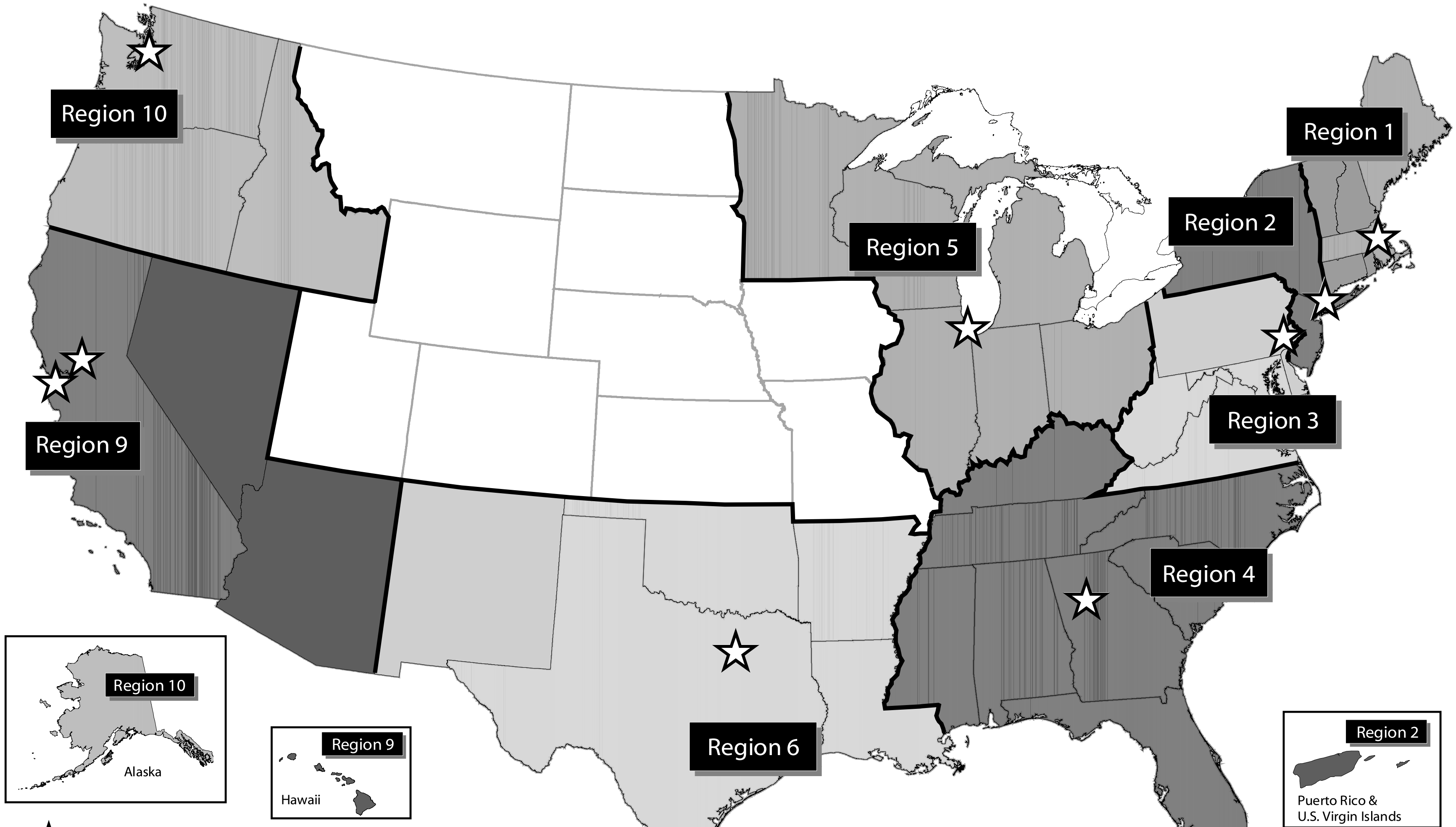
CPRD Coastal Resource Coordinators in EPA Regions



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

Callahan Mining Corp

Brooksville (Cape Rosier), Maine

EPA Facility ID: MED980524128

Basin: Maine Coastal

HUC: 01050002

Executive Summary

The Callahan Mining Corp site [sic] operated an open-pit mine for zinc and copper, the Callahan Mine, from 1968 through 1972. The site is approximately 305 m (1,000 ft) east-southeast of Harborside Village within the minor civil division of Brooksville, Maine. Harborside Village is on the Cape Rosier Peninsula at Penobscot Bay. The mine property encompasses 61 ha (151 acres). The former open-pit mine filled with water after mining operations ceased and is currently under Goose Pond. Metals are the primary contaminants of concern, particularly cadmium, copper, lead, and zinc. The marine and estuarine waters surrounding the site (Goose Cove, Goose Pond, Penobscot Bay, and the Atlantic Ocean) support a wide range of NOAA trust resources, including fish, shellfish, and other invertebrates.

Site Background

The Callahan Mining Corp [sic] operated an open-pit mine for zinc and copper, the Callahan Mine, at the site from 1968 through 1972. The site is approximately 305 m (1,000 ft) east-southeast of Harborside Village within the minor civil division of Brooksville, Maine. Harborside Village is on the Cape Rosier Peninsula at Penobscot Bay. The mine property encompasses approximately 61 ha (151 acres) of coastline along Goose Pond (Figure 1).

Historically Goose Cove was connected to Goose Pond by Goose Falls, which was a tidally influenced, reversing waterfall. The reversing waterfall was created when at low tide stages the estuarine water flowed over the rock shelf toward Penobscot Bay and then at high tide stages the water flowed from Penobscot Bay into Goose Pond. When the mine was developed, Goose Pond was drained, and dams were built to prevent fresh and salt water from entering the area. When the mine was first in operation, water containing rock flour, silt, and high concentrations of metals was pumped directly from the mine pit to Goose Cove. As the mine expanded, Dyer Cove was converted into a settling pond by enclosing the cove with a causeway (Figure 2). After Dyer Cove was converted to a settling pond it was called Dyer Pond and water from the mine was pumped into it before being discharged into Goose Cove (Weston 2001). When the mine closed, the dams blocking the flow of fresh and saltwater into the mine area were removed, Dyer Cove was reconnected with the rest of Goose Pond, and Goose Pond was flooded. Goose Pond now covers the former location of the open-pit mine (Weston 2001).

During the four years that the mine operated, 730 million kg (800,000 tons) of ore-bearing rock were removed from the Callahan Mine. After the ore-bearing rock was removed from the mine it was loaded into a series of crushers and mills to reduce it to sand and silt sized particles. A flotation process, which employed chemical reagents, was then used to separate particles containing high concentrations of copper and zinc, known as concentrate, from particles containing lower concentrations of metals, known as tailings.

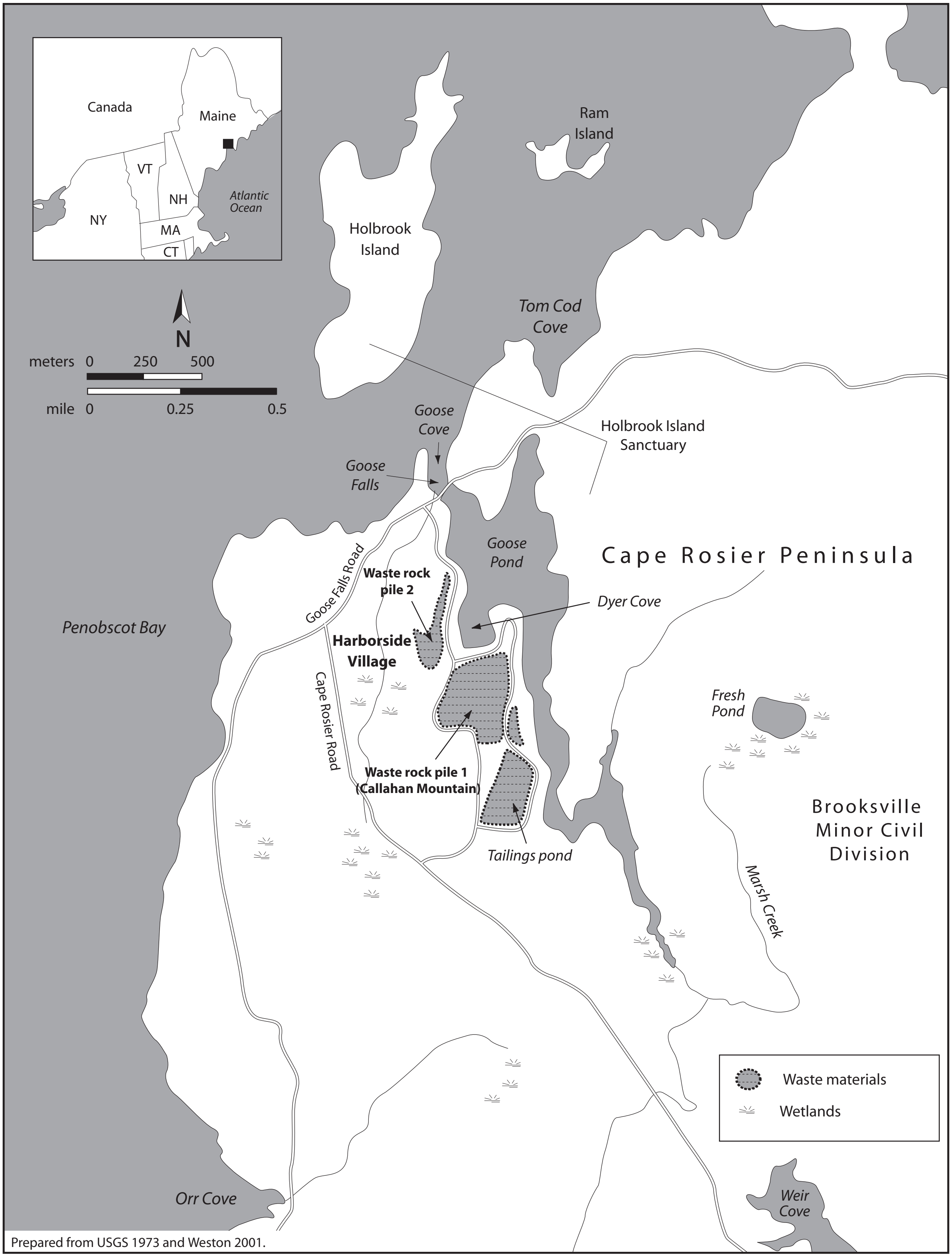


Figure 1. Location of the Callahan Mining Corp site in Brooksville (Cape Rosier), Maine.

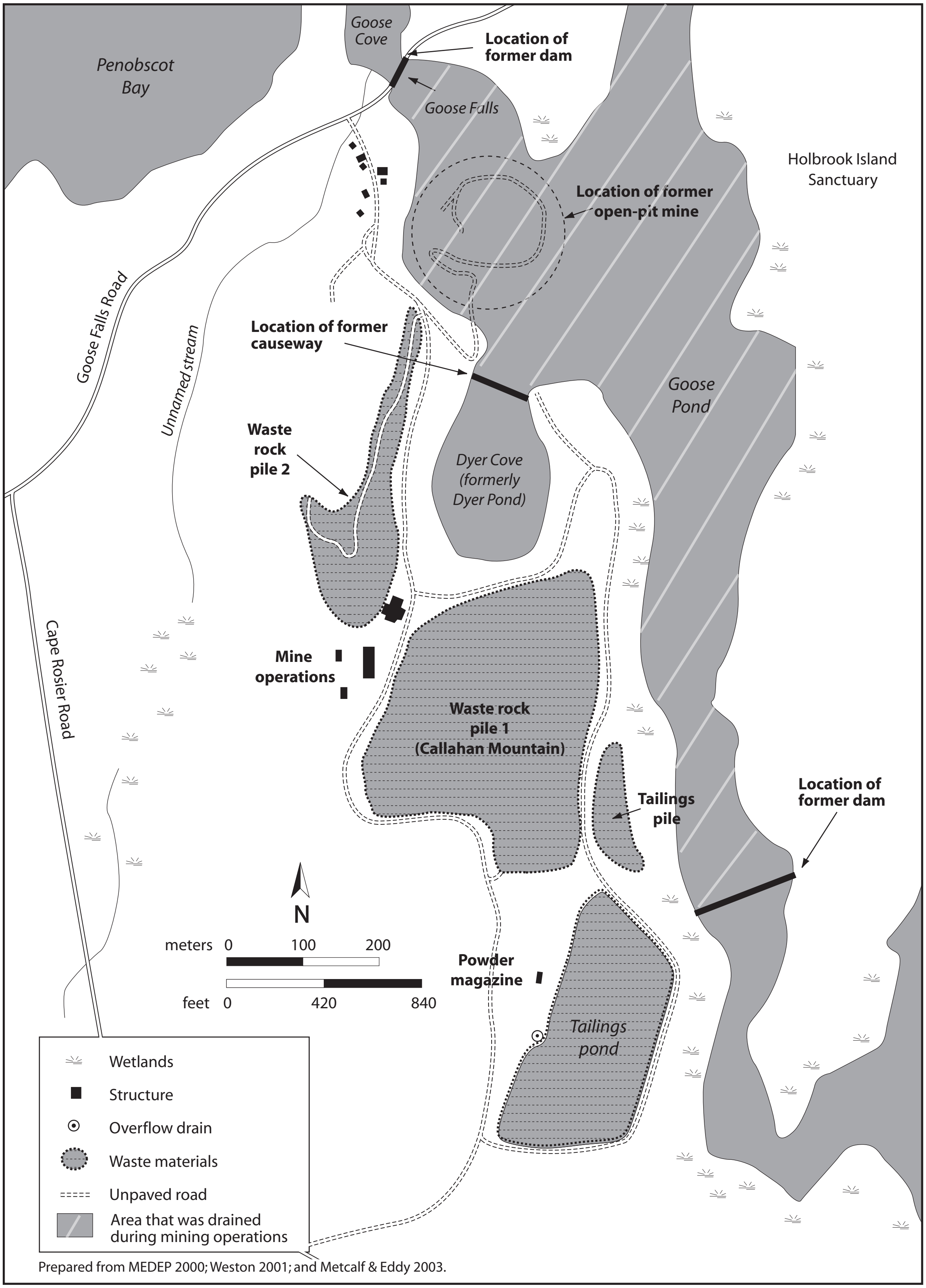


Figure 2. Detail of the Callahan Mining Corp property in Brooksville (Cape Rosier), Maine.

The tailings and residues of the chemical reagents were discharged to a 4.5-ha (11-acre) tailings pond. The tailings pond is in an area where the ground surface slopes down toward Goose Pond. A dike was constructed on three sides of the tailings pond to separate the tailings from Goose Pond. The tailings pond currently has slow leaks at several areas along the base of the dike (Weston 2001). When the mine was active, a canal was present adjacent to the tailings pond. The canal was used to divert fresh water to Weir Cove, away from the mine (Figure 1). The exact location of the canal could not be determined from the documents reviewed. No actions were taken to prevent metals and residual chemicals from leaching out of the tailings pond and into the canal or Weir Cove (Firth 1995).

Approximately 4.5 billion kg (5 million tons) of non ore-bearing waste rock were removed from the Callahan Mine. The waste rock was piled throughout the property; however, the greatest quantity of rock was piled south of Dyer Cove, in an area referred to as waste rock pile 1 or "Callahan Mountain." The second largest quantity of waste rock was piled in an area known as waste rock pile 2.

Surface water and groundwater are the primary pathways for the migration of contaminants toward NOAA trust resources. Surface runoff from the site enters Goose Pond, which is approximately 1 km (0.6 mi) in length. Goose Pond then spills over Goose Falls and into Goose Cove, which is connected to Penobscot Bay and the Atlantic Ocean. Although a quantitative analysis of groundwater depth and flow direction has not been completed at the site groundwater flow is likely towards Goose Pond (Metcalf & Eddy 2003).

Several studies of Goose Pond have been conducted to assess the environmental impact of operations at the Callahan Mining Corp site. The most recent study was conducted in October 1999. The U.S. Environmental Protection Agency is preparing to begin a remedial investigation of the site in 2004. The Callahan Mining Corp site was placed on the National Priorities List in September 2002.

NOAA Trust Resources

The NOAA trust habitats of concern are the surface waters of Goose Cove, Goose Pond, and Penobscot Bay and wetlands associated with the Holbrook Island Sanctuary. Several NOAA trust resources, including fish and invertebrates, are found in Goose Cove and Penobscot Bay (Table 1). NOAA trust resources observed in Goose Pond during a 2003 site reconnaissance include, American eel, softshell clam, blue crab, blue mussel, and moon jellies (Metcalf & Eddy 2003). A complete list of NOAA trust resources present in Goose Pond was not available, but it is assumed that species distribution is similar to that of Goose Cove and Penobscot Bay.

Goose Pond is a tidally influenced saltwater estuary (Firth 1995). The Holbrook Island Sanctuary state park, is located both on Holbrook Island to the north and along the east shore of Goose Pond, opposite the Callahan Mining Corp site. The sanctuary provides habitat for numerous species of wildlife and plant life (Weston 2001). In addition, approximately 1.2 km (0.77 mi) of wetlands are adjacent to Goose Pond, and over 100 areas designated as sensitive environments by the state of Maine, are present within a 16 to 24 km (10 to 15 mi) radius of the site (Firth 1995; Weston 2001).

Alewife, American eel, American lobster, Atlantic herring, Atlantic rock crab, softshell clam, and blue mussel are all fished commercially in Penobscot Bay and Goose Cove. There is recreational fishing of Atlantic mackerel, bluefish, pollock, and striped bass in the Penobscot Bay area. No fish consumption advisories are currently in effect for Goose Cove, Goose Pond, or Penobscot Bay.

Table 1. NOAA trust resources found in Goose Cove and Penobscot Bay (Jury et al. 1994; Joule 2002; Metcalf & Eddy 2003).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Habitat	Comm.	Rec.
ANADROMOUS/CATADROMOUS						
American eel	*Anguilla rostrata*		◆	◆	◆	
Alewife	*Alosa pseudoharengus*		◆	◆	◆	
Atlantic herring	*Clupea harengus*		◆	◆	◆	
Atlantic tomcod	*Microgadus tomcod*	◆	◆	◆		
Blueback herring	*Alosa aestivalis*		◆	◆		
Rainbow smelt	*Osmerus mordax*		◆	◆		
Striped bass	*Morone saxatilis*			◆		◆
MARINE/ESTUARINE FISH						
American plaice	*Hippoglossoides platessoides*		◆			
Atlantic mackerel	*Scomber scombrus*		◆	◆		◆
Atlantic menhaden	*Brevoortia tyrannus*			◆		
Bluefish	*Pomatomus saltatrix*		◆	◆		◆
Cunner	*Tautogolabrus adspersus*		◆	◆		
Fourspine stickleback	*Apeltes quadracus*	◆	◆	◆		
Grubby	*Myoxocephalus aenaeus*	◆	◆	◆		
Mummichog	*Fundulus heteroclitus*	◆	◆	◆		
Ninespine stickleback	*Pungitius pungitius*	◆	◆	◆		
Northern pipefish	*Syngnathus fuscus*	◆	◆	◆		
Pollock	*Pollachius virens*		◆			◆
Red hake	*Urophycis chuss*		◆	◆		
Rock gunnel	*Pholis gunnellus*	◆	◆	◆		
Silver hake	*Merluccius bilinearis*		◆	◆		
Silversides	*Menidia spp.*	◆	◆	◆		
Smooth flounder	*Pleuronectes putnami*	◆	◆	◆		
Spiny dogfish	*Squalus acanthias*		◆	◆		
White hake	*Urophycis tenuis*		◆			
White perch	*Morone americana*		◆	◆		
Windowpane	*Scophthalmus aquosus*	◆	◆	◆		
Winter flounder	*Pleuronectes americanus*	◆	◆	◆		
INVERTEBRATES						
American lobster	*Homarus americanaus*		◆	◆	◆	
Atlantic rock crab	*Cancer irroratus*	◆	◆	◆	◆	
Blue crab	*Callinectes sapidus*	◆	◆	◆		
Blue mussel	*Mytilus edulis*	◆	◆	◆	◆	
Green crab	*Carcinus maenas*	◆	◆	◆		
Moon jelly	*Aurelia aurita*	◆	◆	◆		
Sevenspine bay shrimp	*Crangon septemspinosa*	◆	◆	◆		
Softshell clam	*Mya arenaria*	◆	◆	◆	◆	

Goose Pond is classified as "closed and prohibited" to commercial and recreational shellfish harvesting and has been since 1969 (Goodwin 2002). This closure is due to high concentrations of metals and fecal bacteria counts. In 1975, the Maine Marine Environmental Monitoring Program (MMEMP) studied the bioaccumulation of metals in softshell clams in and around Goose Cove. The study found concentrations of cadmium, copper, lead, and zinc several orders of magnitude above concentrations found in reference samples collected from other mid-coastal and river locations in Maine (Weston 2001). A 1993 report by the MMEMP showed elevated concentrations of cadmium, lead, and zinc in blue mussels collected from Goose Cove (Metcalf & Eddy 2003).

Site-Related Contamination

Metals are the primary contaminants of concern at the site. Fifteen groundwater samples, five surface water samples, and eight sediment samples (three of which were background samples) were collected from the Callahan Mining Corp site and analyzed for contaminants. Samples have not been collected from the Holbrook Island Sanctuary or the wetlands that border Goose Pond to the east. The groundwater and surface water samples were analyzed for metals; the sediment samples were analyzed for metals, including selenium, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs) (Firth 1995; Fuller 1987). Table 2 summarizes the maximum concentrations of contaminants of concern to NOAA that were detected in samples collected during the site investigation. The screening guidelines are the ambient water quality criteria (AWQC) for groundwater (USEPA 2002), and the effects range-low (ERL) for sediment (Long et al. 1998), with exceptions as noted in Table 2.

Samples were also collected directly from the two waste sources identified at the site: the tailings pond and the waste rock piles. These samples included seep water from the base of the tailings pond, soil samples from the tailings pond and the waste rock piles, and sediments from the seeps at the base of the tailings pond dike. The seep sediment and tailings pond soil samples were analyzed for metals, including selenium. The seep water samples were analyzed for metals. Table 3 summarizes the maximum concentrations of contaminants of concern to NOAA that were detected in seep water, waste source soil, and seep sediment samples during the site investigation. The screening guidelines are the AWQC for groundwater; the Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRGs; Efroymson et al. 1997) for soil, and the ERL for sediment, with exceptions as noted in Table 3.

Groundwater

A quantitative analysis of groundwater depth and flow direction has not been completed at the site. It is likely that groundwater flow is towards Goose Pond (Metcalf & Eddy 2003). In groundwater, copper, lead, nickel, and zinc were detected at maximum concentrations that exceeded the AWQC by one order of magnitude. The maximum concentration of cadmium, detected in the groundwater samples, just exceeded the AWQC. The greatest concentrations of cadmium, copper, and zinc were detected in groundwater samples collected from monitoring wells southeast of Dyer Cove. The maximum nickel concentration in groundwater was detected in a sample collected south of Callahan Mountain. Lead was detected at a maximum concentration in a drinking water well southeast of the tailings pond.

Surface Water

Maximum concentrations of copper, lead, and zinc in surface water exceeded the AWQC by one order of magnitude. Cadmium was detected at a maximum concentration that exceeded the AWQC by a factor of more than two. Cadmium and copper were detected at maximum concentrations in surface water samples collected from Goose Pond north of the tailings pond. The greatest concentration of zinc was detected in a surface water sample collected from a ditch north of the tailings pond however; the exact location of the ditch could not be determined from the documents reviewed. Lead was detected at a maximum concentration in a surface water sample collected from Goose Pond, east of the tailings pond.

Table 2. Maximum concentrations of contaminants of concern detected in environmental media collected from the Callahan Mine site, Brooksville (Cape Rosier), Maine (F. M. Beck Inc. 1986; Fuller 1987; Firth 1995; Weston 2001). Bold values indicate contaminant exceeded screening guidelines.

	Water (μg/L)			Sediment (mg/kg)	
Contaminant	Groundwater	Surface Water	AWQC[a]	Sediment	ERL[b]
METALS/INORGANICS					
Arsenic	N/A	N/A	36	**56**	8.2
Cadmium	**20**	**25**	8.8	**43**	1.2
Chromium[c]	N/A	N/A	50	45	81
Copper	**250**	**80**	3.1	**2,200**	34
Lead	**100**	**90**	8.1	**1,500**	46.7
Nickel	**150**	N/A	8.2	**40**	20.9
Selenium	N/A	N/A	71	**6.9**	1[d]
Silver	N/A	N/A	1.9[e]	**5.8**	1
Zinc	**1,600**	**4,900**	81	**22,000**	150
PAH					
Pyrene	N/A	N/A	NA	0.1	0.665

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

b: The 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).

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

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

e: Chronic criterion not available; acute criterion presented.

NA: Screening guidelines not available

N/A: Contaminant not analyzed for.

Sediment

In sediment, all of the metals, including selenium, for which the samples were analyzed were detected. The maximum concentration of zinc exceeded the ERL by two orders of magnitude, while cadmium, copper, and lead concentrations exceeded the ERL by one order of magnitude. Maximum concentrations of arsenic, nickel, selenium, and silver exceeded the ERLs by factors ranging from two to nearly seven times the guidelines. Chromium was also detected, but the maximum concentration did not exceed the ERL screening guideline. Arsenic, cadmium, chromium, lead, selenium, silver, and zinc were all detected at their greatest concentration in sediment samples collected from Goose Pond near the tailings pond. The maximum concentrations of copper, nickel, and pyrene were detected in sediment collected from Dyer Cove. No SVOCs were detected at concentrations greater than the screening guidelines.

In the seep sediment samples, the maximum concentrations of cadmium and zinc exceeded the ERL screening guidelines by two orders of magnitude. The maximum concentrations of arsenic, copper, lead, nickel, and silver exceeded the ERLs by one order of magnitude. Chromium was detected at a maximum concentration below the ERL.

Table 3. Maximum concentrations of contaminants of concern detected in waste sources collected from the Callahan Mine site, Brooksville (Cape Rosier), Maine (F. M. Beck Inc. 1986; Fuller 1987; Firth 1995; Weston 2001). Bold values indicate contaminant exceeded screening guidelines.

	Water (μg/L)		**Soil (mg/kg)**		**Sediment (mg/kg)**	
Contaminant	Seep Water	AWQC[a]	Waste Source Soil	ORNL[b] PRG	Seep Sediment	ERL[c]
METALS/INORGANICS						
Arsenic	N/A	36	**100**	9.9	**270**	8.2
Cadmium	**60**	8.8	**150**	0.38[d]	**170**	1.2
Chromium[e]	N/A	50	**26**	0.4	38	81
Copper	**50**	3.1	**110,000**	60	**1,600**	34
Lead	3	8.1	**9,100**	40.5	**760**	46.7
Mercury	N/A	0.094[f]	**4.4**	0.00051	N/A	0.15
Nickel	N/A	8.2	**30**	30	**250**	20.9
Selenium	N/A	71	**77**	0.21	**7**	1[g]
Silver	N/A	1.9[h]	**70**	2	**12**	1
Zinc	**14,000**	81	**18,000**	8.5	**58,000**	150

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

b: Oak Ridge National Laboratory (ORNL) final preliminary remediation goals (PRG) for ecological endpoints (Efroymson et al. 1997).

c: The 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: Ecological soil screening guidelines (USEPA 2004).

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

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.

h: Chronic criterion not available; acute criterion presented.

N/A: Contaminant not analyzed for.

Seep Water

In seep water, the maximum concentration of zinc exceeded the AWQC by two orders of magnitude; copper exceeded the AWQC by one order of magnitude, and cadmium exceeded the AWQC by a factor of six. Other metals were not detected in the seep water samples.

Soil

In soil samples collected from the tailings pond and waste rock piles, the maximum concentrations of copper, mercury, and zinc exceeded the ORNL-PRGs by three orders of magnitude. Maximum concentrations of copper, lead, and selenium were at least two orders of magnitude greater than the PRGs, while the maximum concentrations of arsenic, chromium, and silver exceeded the PRGs by one order of magnitude. The maximum concentration of nickel was equal to the screening guideline.

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Diamond Head Oil Refinery Div.

Kearny, New Jersey

EPA Facility ID: NJD092226000

Basin: Hackensack-Passaic

HUC: 02030103

Executive Summary

The Diamond Head Oil Refinery Div. site is located in Kearny, New Jersey. The site encompasses approximately 6 ha (15 acres), part of which is an abandoned oil refinery. The primary contaminants of concern at the site are metals, SVOCs, and PCBs. Surface water runoff and drainage from the site are the primary pathways for the migration of contaminants from the site to NOAA trust resources. Nearby wetlands, Frank's Creek, and the Passaic River are habitats of concern to NOAA. Wetlands lie within, and surround the Diamond Head Oil Refinery Div. site. Anadromous fish use the reach of the Passaic River nearest the site as a migratory route to reach spawning grounds upstream of the site. Other NOAA trust resources use the river for adult forage and juvenile nursery grounds.

Site Background

The Diamond Head Oil Refinery Div. site (Diamond Head) is approximately 6 ha (15 acres) of land in Kearny, Hudson County, New Jersey (Figure 1). The site contains wetlands, drainage ditches, a small pond/wetland, an inactive landfill that is overgrown with vegetation, and the remnants of the former Diamond Head Oil Refinery. The remnants of the oil refinery include the foundations of the former oil refinery building and two above-ground-storage tanks (AST) (Figure 2) (Weston 2000).

The oil refinery was in operation from February 1946 until early 1979. During this time used oil was collected and refined into fuel and lubrication oil. The refinery operated under several company names all owned by Mr. Robert Mahler. In January 1985, Newton Refining Corporation, the last company to operate at the refinery, sold the property to Mimi Urban Development Corporation, which later changed its name to Hudson Meadows Urban Renewal Development Corporation, which is the current property owner (Weston 2000). The site is currently inactive (USEPA 2002a).

Two ASTs, were used to store oily wastes when the refinery was in operation. Oily waste was also intermittently discharged directly to adjacent properties, including a wetland to the south of the site, which created a lake of oil. In March 1968, the New Jersey Department of Transportation acquired property south of the site, where construction of Interstate 280 (I-280) began in 1977. During construction, the New Jersey Department of Transportation removed approximately 34 thousand m^3 (9 million gal) of oil-contaminated water and 3.8 to 4.6 million m^3 (5 to 6 million yd^3) of oily sludge from the lake of oil. Also during the construction of I-280, oil-contaminated groundwater was discovered that extended from beneath the site west to Frank's Creek (Weston 2000).

From the time refinery operations ceased in 1979 until 1982, the Diamond Head site was not fenced off and waste oils and other debris were reportedly dumped at the site during that time. Newton Refining Corporation began cleanup of the site in 1982. Analysis of the material

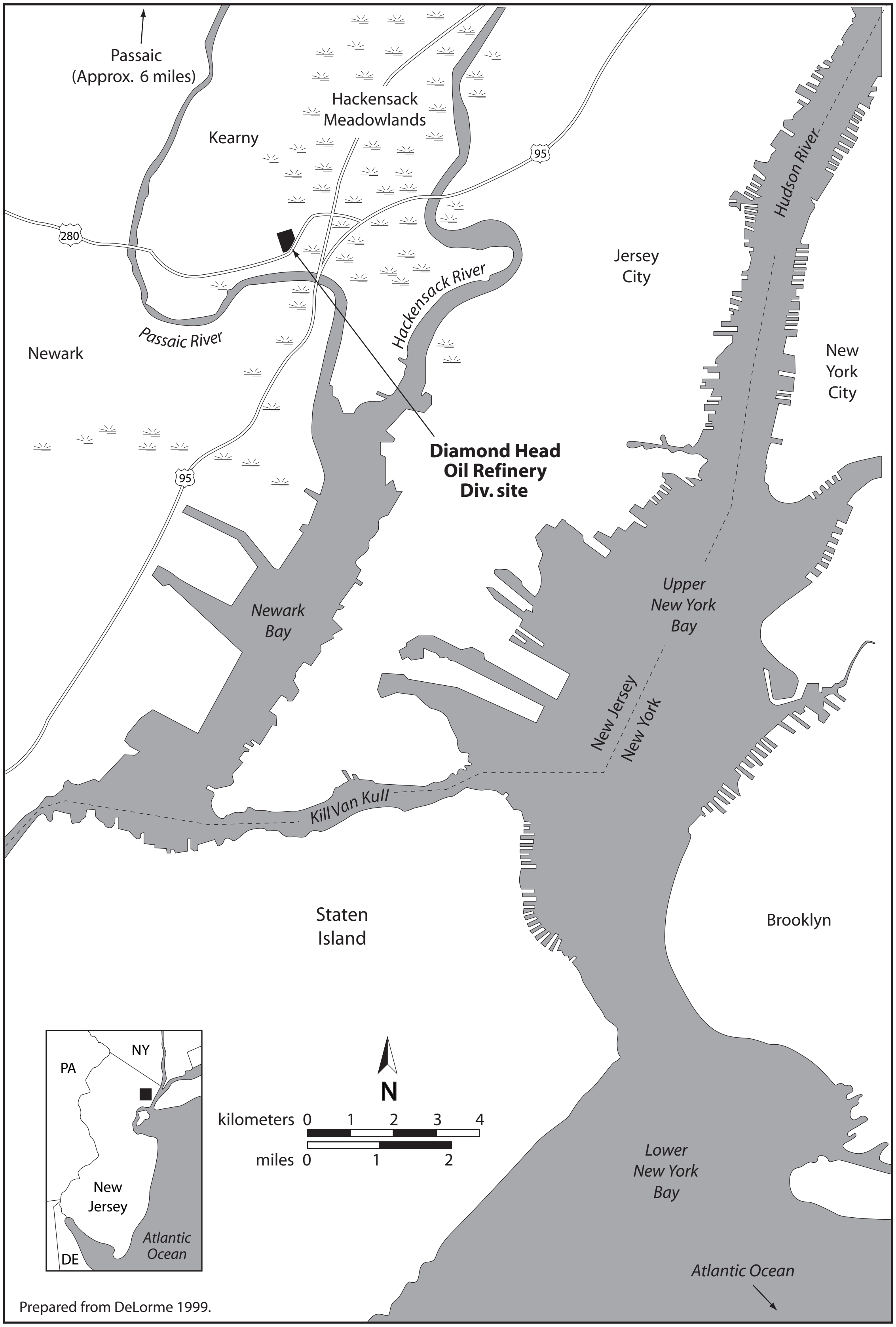

Figure 1. Location of the Diamond Head Oil Refinery Div. site, Kearny, New Jersey.

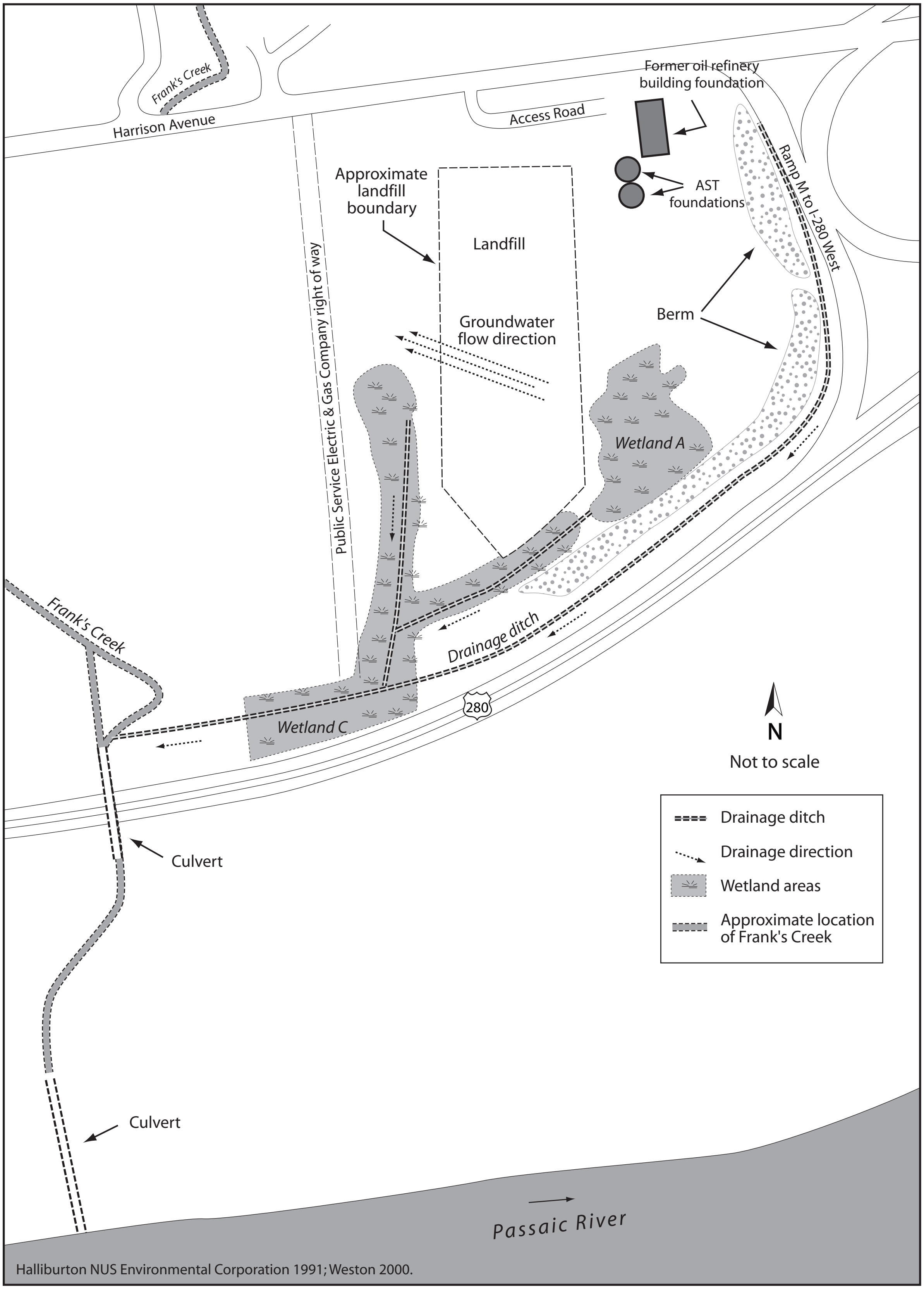

Figure 2. Detail of the Diamond Head Oil Refinery Div. property.

remaining in the ASTs indicated the presence of polychlorinated biphenyls (PCBs) at concentrations greater than 3,100 ppm. After the tank contents were analyzed for PCBs, approximately 28,000 L (7,500 gal) of contaminated material was reportedly pumped from the tanks and disposed of off site. In addition, approximately 24 metric tons (27 tons) of contaminated soil was removed from the site (Weston 2000).

During a 1991 site inspection, extensive areas of orange- and black-stained soil were observed at locations throughout the site. Groundwater, surface water, sediment, surface soil, and subsurface soil samples were collected during this site inspection. Analysis of the soil and sediment samples indicated the presence of elevated concentrations of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, pesticides, and PCBs (in soil). Analysis of groundwater samples indicated elevated concentrations of VOCs, SVOCs, and metals (Halliburton NUS Environmental Corporation 1991). The site was placed on the National Priorities List on September 5, 2000 (USEPA 2002a).

The pathway for the migration of contaminants from the Diamond Head site to the nearby wetlands, Frank's Creek, and NOAA trust resources in the Passaic River is via surface water runoff (Weston 2000). Groundwater is another potential pathway for the migration of contaminants to NOAA trust resources. Groundwater is encountered beneath the site at approximately 0.3 m (1 ft) below ground surface and generally flows to the west toward Frank's Creek. At the time of this report, it was unknown whether there is a connection between the groundwater below the site and a surface water pathway for the migration of contaminants (Scorca 2004).

NOAA Trust Resources

The habitats of concern to NOAA are the nearby wetlands, Frank's Creek, and the Passaic River. NOAA trust resources that use these habitats are summarized in Table 1 and include anadromous, catadromous, estuarine, and marine species.

Two palustrine emergent wetlands, Wetland A and Wetland C, are present at the Diamond Head site (Figure 2). Wetland A contains a ponded area that is believed to have been part of the former oil lake. Wetland A is connected to Wetland C, which extends along the southern and western ends of the site property. Wetland C connects to Frank's Creek, which drains south into the Passaic River (Weston 2000). Although it could not be confirmed at the time of this report, it appears that Wetlands A and C are connected to Frank's Creek by a drainage ditch. The approximate location of Frank's Creek is shown in Figure 2; the exact location was not available at the time this report was prepared.

The Passaic River provides spawning habitat for alewife, American shad, blueback herring, striped bass, and white perch. The spawning grounds begin 8.2 km (5.1 mi) upstream of the Diamond Head site near the mouth of the Second River and extend upstream to Dundee Dam, in Passaic, which does not have fish passage facilities. Near the site, the Passaic River is a migratory route for anadromous species, which travel to spawning areas located upstream of the Diamond Head site. The spawning areas are located north of the area shown in Figure 1. Juvenile alewife, American shad, and blueback herring frequently overwinter in the estuarine reaches of the Passaic River, possibly near the Diamond Head site, before migrating out to sea (NOAA 1992).

Several estuarine and marine fish species use the lower, estuarine reaches of the Passaic River and the waters of upper Newark Bay. Surface waters in the lower Passaic River frequently experience low levels of dissolved oxygen during summer months (USEPA 1995). Low oxygen levels may con-

Table 1. NOAA trust resources that use the Passaic River and upper Newark Bay (Anselmini 1974; Papson 1981; Byrne 2003).

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*	◆		◆			
Blueback herring	*Alosa aestivalis*	◆		◆			
Striped bass	*Morone saxatilis*	◆		◆			
White perch	*Morone americana*	◆		◆			
CATADROMOUS FISH							
American eel	*Anguilla rostrata*	◆			◆		
MARINE/ESTUARINE FISH							
Atlantic croaker	*Micropogonias undulatus*			◆	◆		
Atlantic menhaden	*Brevoortia tyrannus*			◆	◆		
Atlantic silverside	*Menidia menidia*		◆	◆	◆		
Atlantic tomcod	*Microgadus tomcod*		◆	◆	◆		
Bay anchovy	*Anchoa mitchilli*		◆	◆	◆		
Bluefish	*Pomatomus saltatrix*			◆			
Mummichog	*Fundulus heteroclitus*		◆	◆	◆		
Northern pipefish	*Syngnathus fuscus*		◆	◆	◆		
Spot	*Leiostomus xanthurus*			◆			
Summer flounder	*Paralichthys dentatus*			◆	◆		
Threespine stickleback	*Gasterosteus aculeatus*		◆	◆	◆		
Weakfish	*Cynoscion regalis*			◆	◆		
Windowpane	*Scophthalmus aquosus*			◆	◆		
Winter flounder	*Pleuronectes americanus*		◆		◆		
INVERTEBRATES							
Blue crab	*Callinectes sapidus*			◆	◆		◆

tribute to a seasonal decrease in fish use of the river's lower reaches. American eel and blue crab use the lower reaches of the Passaic River for adult forage habitat. Blue crabs also use the lower reaches of the river as nursery habitat (NOAA 1992).

The Diamond Head site is located within the Hackensack Meadowlands, which consist of numerous wetlands along coastal tidal waters. These meadowlands provide habitat for transient federal- and state-listed endangered or threatened species, especially birds (Halliburton NUS Environmental Corporation 1991).

No commercial fishing takes place in the Passaic River or in upper Newark Bay. Some recreational fishing occurs along the banks of the lower Passaic River and in upper Newark Bay. The most popular recreational fishery is blue crab (NOAA 1992). A consumption advisory for fish and crab is currently in effect for Newark Bay and the Passaic River. The New Jersey Department of Environmental Protection (NJDEP) issued this advisory, which is based on PCB, dioxin, and/or chlordane contamination. The advisory recommends against consuming any fish and shellfish harvested from the lower Passaic River and against harvesting or consuming blue crabs from the lower Passaic River. The NJDEP also advises that American eel, bluefish, white catfish, and white perch harvested from Newark Bay not be eaten more than once per week; that striped bass not be consumed at all; and that blue crab from Newark Bay not be harvested or consumed (NJDEP 2004).

Site-Related Contamination

The primary contaminants of concern at the Diamond Head site are metals, SVOCs, and PCBs. Soil, groundwater, surface water, and sediment samples collected from the site in 1985 and 1991 were analyzed for metals, selenium, cyanide, VOCs, SVOCs, pesticides, and PCBs. The maximum concentrations of contaminants of concern to NOAA are summarized in Table 2. The data in Table 2 were derived from a total of 12 soil samples, four groundwater samples, five surface water samples, and three sediment samples.

<u>Surface Water</u>
In surface water samples collected from the site, five metals and cyanide were detected at concentrations that exceeded the ambient water quality criteria (AWQC), which is the screening guideline for water. The maximum concentrations of arsenic, chromium, copper, cyanide, lead, nickel, and zinc were detected in samples collected from the drainage ditch in the southwest corner of the site. The maximum concentration of lead exceeded the AWQC by two orders of magnitude, and maximum concentrations of copper, zinc, and cyanide exceeded the AWQC by one order of magnitude. Arsenic was detected in the surface water samples but concentrations did not exceed the AWQC. Cadmium, mercury, selenium, and silver were not detected in the surface water samples.

<u>Sediment</u>
In sediment samples collected from the Diamond Head site, maximum concentrations of all detected contaminants exceeded the Effects Range-Low (ERL) screening guidelines, which is the main screening guideline for sediment. Arsenic, chromium, copper, lead, and nickel were detected at maximum concentrations in a sediment sample collected from the south end of Wetland A. The greatest concentrations of cadmium and zinc were detected in a sediment sample collected from the north end of Wetland A. The maximum concentration of zinc exceeded the ERL by two orders of magnitude. Maximum concentrations of cadmium, copper, and lead exceeded the ERL by one order of magnitude. Two SVOCs, 2-methylnaphthalene and naphthalene, were detected in a sediment sample collected from the north end of Wetland A at concentrations that exceeded the ERL by three orders of magnitude and two orders of magnitude, respectively. The pesticide, DDT and its metabolite DDE, were detected in a sediment sample collected from the south end of Wetland A. The maximum concentration of DDT exceeded the ERL by two orders of magnitude, and the maximum concentration of DDE exceeded the ERL by one order of magnitude. No PCBs were detected in the sediment samples.

<u>Groundwater</u>
Several metals, cyanide, and SVOCs were detected in groundwater samples collected from the Diamond Head site. The maximum concentrations of arsenic, chromium, nickel, and zinc were found in a groundwater sample collected from the area of the former refinery. The maximum concentrations of cadmium, copper, lead, mercury, and cyanide were found in a sample collected near the

Table 2. Maximum concentrations of contaminants of concern detected in soil, groundwater, surface water, and sediment samples collected from the Diamond Head site (ETC 1985; Halliburton NUS Environmental Corporation 1991; Weston 2000). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)		Water (µg/L)			Sediment (mg/kg)	
Contaminant	Soil	ORNL PRG[a]	Ground-water	Surface Water	AWQC[b]	Sediment	ERL[c]
METALS/INORGANICS							
Arsenic	**59**	9.9	**46**	27	36	**15**	8.2
Cadmium	**22**	0.38[d]	7.6	<3.0	8.8	**31**	1.2
Chromium[e]	**1900**	0.4	**4700**	**94**	50	**92**	81
Copper	**1600**	60	**170**	**290**	3.1	**340**	34
Cyanide, free	N/A	NA	**30**	**12**	1	N/A	NA
Lead	**76000**	40.5	**320**	**970**	8.1	**910**	46.7
Mercury	**7.5**	0.00051	**2.2**	<0.6	0.94[f]	R	0.15
Nickel	**270**	30	**120**	**60**	8.2	**53**	20.9
Selenium	**3.5**	0.21	ND	<5.0	71	ND	1.0[g]
Silver	**93**	2	ND	<10	1.9[h]	ND	1
Zinc	**5600**	8.5	**650**	**1200**	81	**18000**	150
SVOCs							
Acenaphthene	**120**	20	10	<1.9	710[i]	ND	0.016
Acenaphthylene	690	NA	ND	<3.5	300[h,i,j]	ND	0.044
Anthracene	380	NA	ND	<1.9	300[h,i,j]	ND	0.0853
Benz(a)anthracene	**440**	0.1[k]	ND	<7.8	300[h,i,j]	ND	0.261
Chrysene	220	NA	ND	<2.5	300[h,i,j]	ND	0.384
Dibenz(a,h)anthracene	**0.16**	0.1[k]	ND	<2.5	300[h,i,j]	ND	0.0634
Fluoranthene	601	NA	3	<2.2	16[i]	ND	0.6
Fluorene	370	NA	3	<1.9	NA	ND	0.019
2-Methylnaphthalene	370	NA	22	N/A	300[h,i,j]	**310**	0.07
Naphthalene	**1400**	0.1[k]	39	<1.6	2350[h,i]	**130**	0.16
Pentachlorophenol	0.49	3	ND	<7.2	7.9	ND	NA
Phenanthrene	**1500**	0.1[k]	5	<5.4	NA	ND	0.24
Pyrene	**1100**	0.1[k]	3	<1.9	300[h,i,j]	ND	0.665
PESTICIDES/PCBs							
DDE	0.14	NA	ND	<5.6	NA	**0.1**	0.0022
DDT	1.3	NA	ND	<4.7	0.001[l]	**0.26**	0.00158[l]
Endrin	2.0	NA	ND	<10	0.0023	ND	NA
Total PCBs	**770**	0.371	ND	<36	0.03	ND	0.0227

a: Oak Ridge National Laboratory (ORNL) final preliminary remediation goals (PRG) for ecological endpoints (Efroymson et al. 1997).
b: Ambient water quality criteria (AWQC) for the protection of aquatic organisms (USEPA 2002b). 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 (1998).
d: Ecological soil screening guidelines (USEPA 2004).
e: Screening guidelines represent concentrations for $Cr.^{+6}$
f: Derived from inorganic, but applied to total mercury.
g: Marine apparent effects threshold (AET) criterion 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: Canadian Council of Ministers of the Environment (CCME) environmental quality guidelines for agricultural land uses.
l: Expressed as Total DDT.
N/A: Contaminant not analyzed for.
NA: Screening guidelines not available.
ND: Not detected.
R: Analysis of this contaminant did not pass EPA QA/QC standards.

center of the landfill. Concentrations of chromium, copper, lead, mercury, nickel, and cyanide exceeded the AWQC by at least one order of magnitude. Cadmium was detected in the groundwater samples but concentrations did not exceed the AWQC. Selenium and silver were not detected in the groundwater samples. Several SVOCs were detected in groundwater samples but concentrations did not exceed the AWQC. No AWQC have been established for fluorene and phenanthrene. Maximum concentrations of five of the seven SVOCs detected were found in samples collected from the landfill area. No pesticides or PCBs were detected in the groundwater samples.

Soil

Analyses of soil samples indicated several contaminants were present at elevated concentrations. The maximum concentrations of all metals detected were found in the area of the former refinery, in the northeastern section of the site. All metals detected in soil samples exceeded the soil screening guidelines (Table 2). Concentrations of chromium, lead, and mercury exceeded screening guidelines by more than three orders of magnitude, and concentrations of zinc exceeded the screening guideline by at least two orders of magnitude. Concentrations of cadmium, copper, selenium, and silver exceeded screening guidelines by at least one order of magnitude.

Several SVOCs were detected in the soil samples at concentrations which ranged from 0.16 mg/kg of dibenz(a,h)anthracene to 1,500 mg/kg of phenanthrene. Concentrations of benz(a)anthracene, naphthalene, phenanthrene, and pyrene exceeded the screening guidelines by at least one order of magnitude. Acenaphthene was detected at a maximum concentration that was six times greater than the screening guideline. There are no screening guidelines available for comparison with the other SVOCs detected in the soil samples. All but two of the SVOCs detected were found in samples collected from the AST foundation area. Endrin, DDE, and DDT were the pesticides detected in the soil samples but there are no screening guidelines available for comparison. The maximum concentrations of pesticides were found in samples collected from near the former oil refinery building foundation. PCBs were detected in a sample collected just west of the former refinery building foundation at a concentration that exceeded the screening guideline by three orders of magnitude.

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MacKenzie Chemical Works

Central Islip, New York

EPA Facility ID: NYD980753420

Basin: Southern Long Island

HUC: 02030202

Executive Summary

The MacKenzie Chemical Works site was a chemical manufacturing facility that operated in a residential and light commercial area of Central Islip, New York, from 1948 to 1987. Various chemicals, including fuel additives and metal acetylacetonates, were manufactured at the site. Spills, releases, and a fire have occurred at the site, including a methyl ethyl ketone spill in 1977, a nitrous oxide release in 1978, and a methyl ethyl ketone spill followed by a fire in 1979. Several buildings, waste lagoons, sanitary cesspools, and aboveground storage tanks remain at the site. The primary contaminants of concern at the MacKenzie site are VOCs, which have been detected in soil and groundwater. The primary pathway of contaminant migration from the site to NOAA trust resources is groundwater. The NOAA trust habitats of concern are Connetquot Brook, Champlin Creek, and West Brook. American eel and steelhead are NOAA trust resources in the vicinity of the site.

Site Background

The MacKenzie Chemical Works (MacKenzie) site is a former chemical manufacturing facility in Central Islip, Suffolk County, New York (Figure 1). The site, which encompasses approximately 0.57 ha (1.4 acres) is in an area where the predominant land uses are residential and light commercial. The facility was operated between 1948 and 1987. Buildings on the site include a manufacturing building, a storage warehouse, a dimethyl glycine (DMG) building, and a warehouse and laboratory where chemical products, including fuel additives and metal acetylacetonates, were manufactured (Figure 2). Chemicals were stored in aboveground storage tanks (Weston 2001). Three documented contaminant releases have occurred on the site: a release of 2-butanone, commonly known as methyl ethyl ketone (MEK), in June 1977; a nitrous oxide release in April 1978 that resulted in a local neighborhood evacuation; and a second MEK release in April 1979 that resulted in a fire.

During operations at the site, sanitary and laboratory wastes were discharged at a permitted outfall located between the storage warehouse and the laboratory. The exact location of the outfall is not identified in the documents reviewed for this report. Two covered lagoons were also used for the disposal of other wastes (USEPA 2001).

Investigations at the site have documented improper waste management practices. Inspections conducted by the Suffolk County Department of Health Services and the New York State Department of Environmental Conservation (NYSDEC) identified leaking drums, spills, and overflowing acid tanks. During a preliminary assessment in 1983, 55 drums containing flammable alcohols, acids, caustic solutions, and contaminated concrete and soil were documented at the MacKenzie site (Weston 2001).

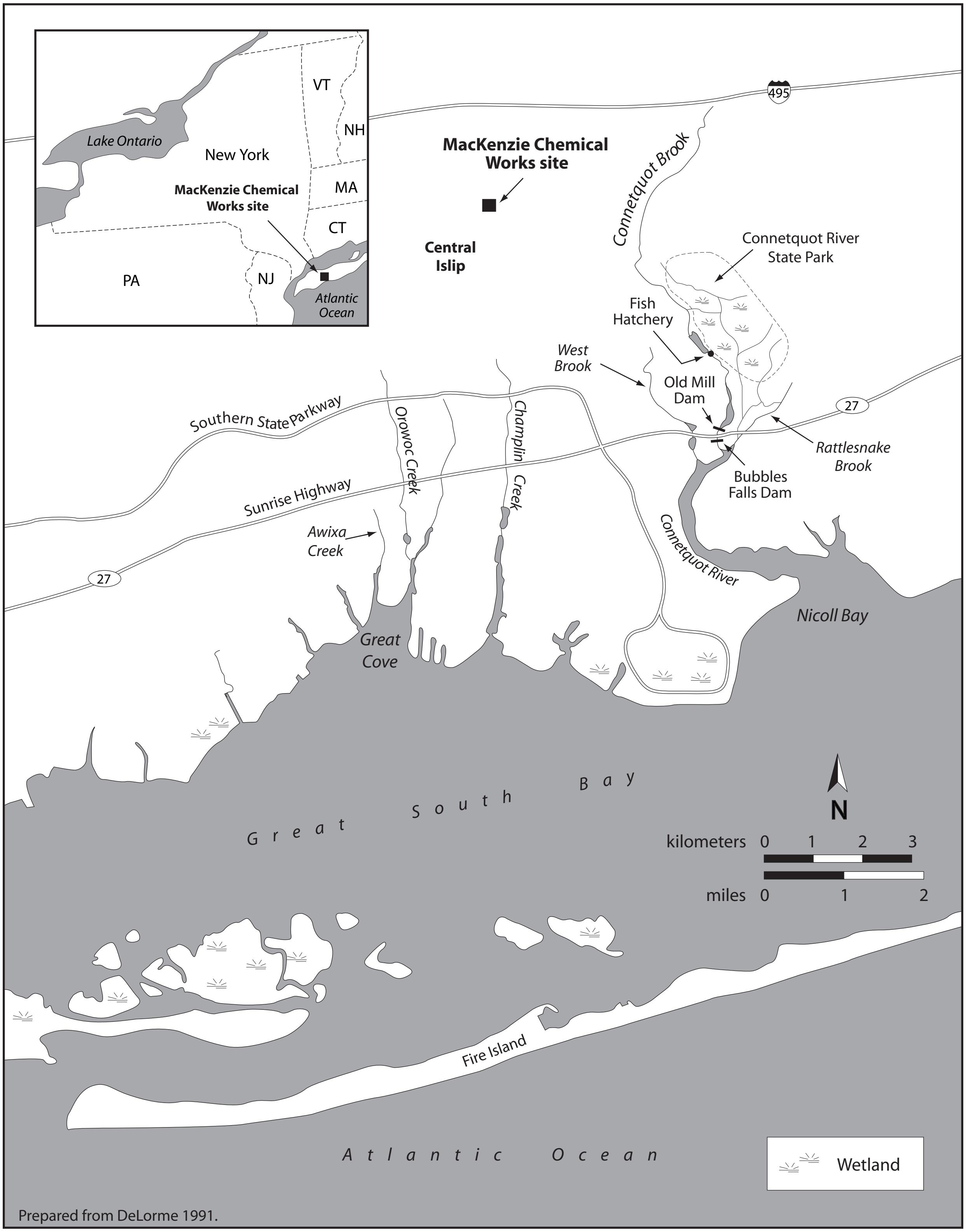

Figure 1. Location of MacKenzie Chemical Works site, Central Islip, New York.

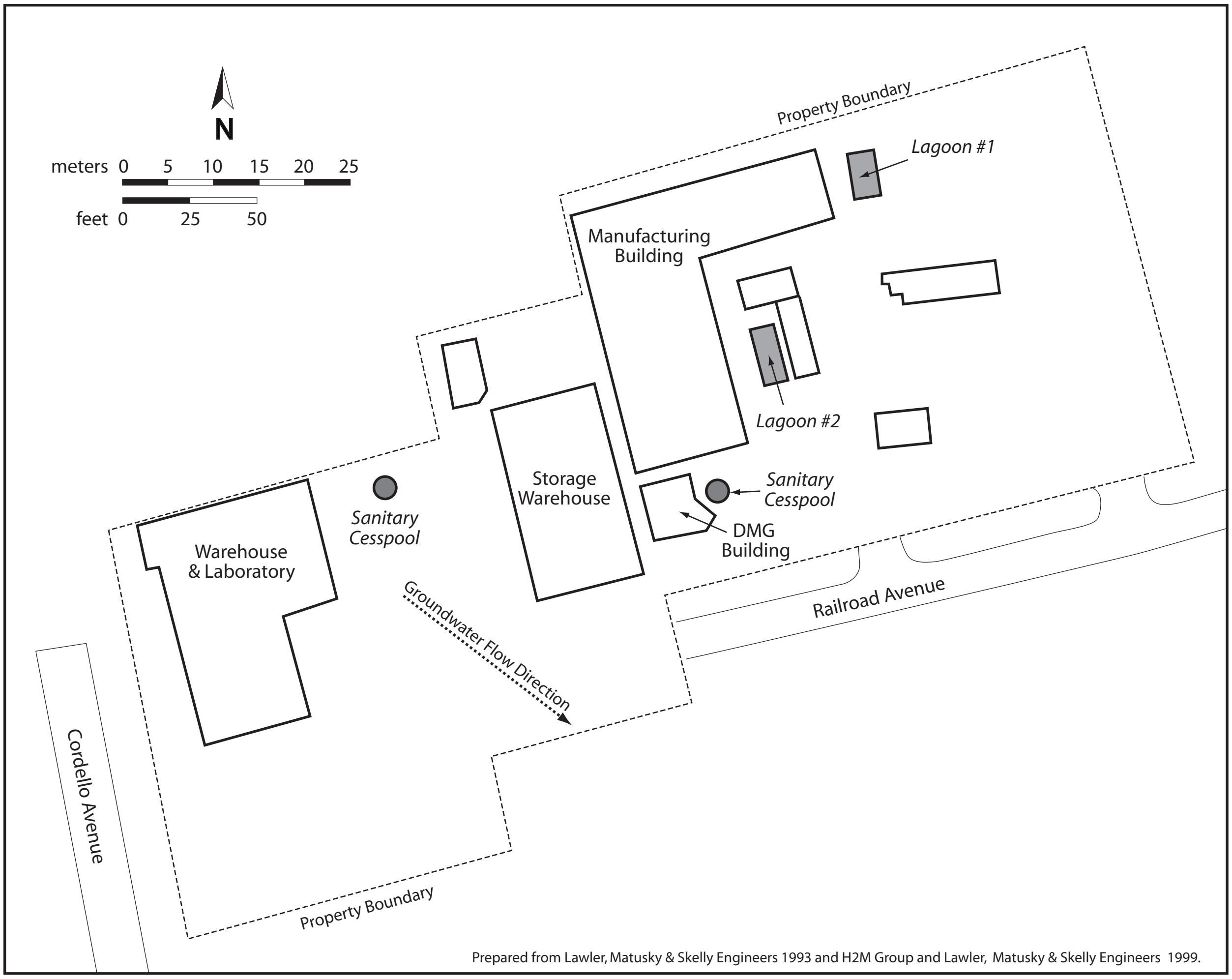

Figure 2. Detail of MacKenzie Chemical Works property.

Volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals have been detected at the site (Weston 2001). In March 1985, several VOCs were detected in nearby residential wells at concentrations that exceeded the NYSDEC groundwater standard. In 1986, VOCs were detected in on-site monitoring wells installed by MacKenzie Chemical at the request of the NYSDEC. In December 1993, a site inspection established that groundwater contamination was attributable to the MacKenzie Chemical Works (Weston 2001). In 2000, a remedial investigation/feasibility study and a removal site evaluation were conducted. The MacKenzie site was proposed for placement on the National Priorities List on September 13, 2001 (USEPA 2001; Weston 2001). A record of decision (ROD) was issued by the USEPA for the MacKenzie site in March 2003. The ROD outlines the methods that were selected for removing contaminants from the site and monitoring the site to assure the removal was successful (USEPA 2003).

Groundwater is the primary pathway for the migration of contaminants from the site to NOAA trust resources (Weston 2001). Three primary water-bearing aquifers underlie the site (H2M Group 1999). The upper aquifer, which consists of sand and gravel with very little interstitial clay and silt, is the most permeable aquifer on Long Island (H2M Group and Lawler, Matusky & Skelly Engineers

1999; Lawler, Matusky & Skelly Engineers 1993). Local groundwater flow at the MacKenzie site is south to southeast toward Great South Bay (H2M Group and Lawler, Matusky & Skelly Engineers 1999; Weston 2001). It is possible that contaminants are discharged from the groundwater into Connetquot Brook, Champlin Creek, and West Brook, which are 3.2 km (2 mi) east and 3.2 km (2 mi) south and 4.8 km (3 mi) southeast of the site respectively.

NOAA Trust Resources

The NOAA trust habitats of concern are Connetquot Brook, Champlin Creek, and West Brook. Connetquot Brook is in a relatively large, low-lying, well-drained area approximately 3.2 km (2 mi) east of the MacKenzie site. The brook flows south to join the Connetquot River, which empties into Great South Bay approximately 9.7 km (6 mi) downstream of the site. West Brook is a tributary of the Connetquot River approximately 4.8 km (3 mi) southeast of the site. Champlin Creek, which is located 3.2 km (2 mi) south of the site, flows into Great South Bay approximately 8 km (5 mi) downstream of the site. There are no surface water bodies on the MacKenzie site and no evidence of ephemeral streams or stream-cut channels (H2M Group and Lawler, Matusky & Skelly Engineers 1999).

Connetquot River State Park is approximately 4.8 km (3 mi) southeast of the site on the Connetquot River. The park is a wildlife preserve intended for the protection and propagation of birds, fish, and other wildlife. The park is more than 1,200 ha (3,000 acres) in area and includes freshwater wetlands and a fish hatchery (USFWS 1997).

Steelhead and American eel are NOAA trust resources of concern in the vicinity of the site (Table 1). Steelhead and American eel are able to migrate upstream of all dams on Connetquot Brook, the Connetquot River, and Champlin Creek. American eel have been documented upstream of the dam on West Brook. Steelhead spawn in the upper reaches of Connetquot Brook and Champlin Creek. American eel and steelhead use the section of Connetquot Brook and Champlin Creek nearest the site as adults. Alewife, blueback herring, and white perch enter the tidal section of the Connetquot River, which extends approximately 3.2 km (2 mi) upstream of Great South Bay, but are unable to traverse the small dams in the lower reaches of the river (Kozlowski 2002).

Several dams are present along the Connetquot River (Figure 1). Bubbles Falls Dam, on the Connetquot River at Sunrise Highway, is a small dam that is easily passable by fish. Old Mill Dam, a short distance upstream of Bubbles Falls Dam, is passable by fish via a spillway immediately upstream of Sunrise Highway. Several more small dams are upstream of Sunrise Highway, including one at the fish hatchery. These dams are no more than 1.8 m (6 ft) in height, and some migratory fish are able to traverse upstream of them. The same is true for Champlin Creek—all dams on the creek are at most 1.8 m (6 ft) in height and remain passable by certain migratory fish (Kozlowski 2002). A 2.1 m (7 ft) dam on West Brook blocks passage of anadromous fish. The dam does not stop American eel from migrating into the upper reaches of West Brook (Henson 2004).

Recreational fishing for steelhead, as well as brook and brown trout, occurs in Connetquot Brook. No commercial fishing takes place in Connetquot Brook or Champlin Creek (Kozlowski 2002). No fish consumption advisories are in effect for surface waters near the site (NYSDOH 2004).

Table 1. NOAA trust resources in the Connetquot River, Connetquot Brook, and Champlin Creek (Hensen 2004; Kozlowski 2002).

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
ANADROMOUS FISH						
Alewife[a]	*Alosa pseudoharengus*			◆		
Blueback herring[a]	*Alosa aestivalis*			◆		
Steelhead	*Oncorhynchus mykiss*	◆		◆		◆
White perch[a]	*Morone americana*			◆		
CATADROMOUS FISH						
American eel	*Aguilla rostrata*			◆		

a: Found only in the tidal portion of Connetquot River.

Site-Related Contamination

The primary contaminants of concern at the MacKenzie site are VOCs. VOCs have been detected in groundwater samples collected from monitoring wells at the site and down-gradient from the site, and in soil samples collected throughout the site. The groundwater and soil samples were analyzed for metals (including selenium), VOCs, SVOCs, pesticides, and PCBs (H2M Group and Lawler, Matusky & Skelly Engineers 1999). Based on a review of the ROD there does not appear to be any plans to collect samples from the habitats of concern (USEPA 2003). The maximum concentrations of contaminants of concern to NOAA are summarized in Table 2. The screening guidelines for groundwater samples are the Ambient Water Quality Criteria (AWQC; USEPA 2002) and the Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRGs; Efroymson et al. 1997) for soil samples, with exceptions as noted in Table 2.

Groundwater

VOCs, metals, SVOCs, and the pesticide gamma-BHC (lindane) were detected in groundwater. VOCs were detected in groundwater samples collected as far as 610 m (2,000 ft) down-gradient from the MacKenzie site. Maximum concentrations of trichloroethene (TCE) and 1,2,3-trichloropropane were detected in a monitoring well sample taken approximately 30 m (100 ft) southeast of the site. However, the maximum TCE concentration did not exceed the AWQC and there is currently no AWQC available for comparison to the maximum concentration of 1,2,3-trichloropropane. The maximum concentration of tetrachloroethene (PCE), detected in a sample collected approximately 180 m (600 ft) southeast of the site, exceeded the AWQC by a factor of approximately six.

The maximum concentrations of arsenic, chromium, copper, mercury, and nickel were detected in groundwater samples collected southeast of the site. Cadmium and zinc were detected at maximum concentrations in a sample collected from the southeast corner of the site. The maximum lead concentration was detected in a sample from south of the storage warehouse. Concentrations of cadmium, chromium, copper, lead, and zinc all exceeded the AWQC by at least one order of magnitude. The maximum concentrations of nickel and mercury exceeded the AWQC by factors of approximately five and 2.5, respectively. Because the detection limits for silver were above than the screening guidelines, it is unknown whether silver concentrations exceeded the AWQC (Table 2). Arsenic concentrations did not exceed the AWQC and selenium and was not detected.

Table 2. Maximum concentrations of contaminants of concern to NOAA detected in samples collected from the MacKenzie Chemical Works Inc., site (H2M Group and Lawler, Matusky & Skelly Engineers 1999; Lawler, Matusky & Skelly Engineers 1993). Bold values indicate contaminant exceeded the screening guidelines.

	Soil (mg/kg)		Water (µg/L)	
Contaminant	Soil	ORNL-PRG[a]	Groundwater	AWQC[b]
METALS/INORGANICS				
Arsenic	**12**	9.9	35	150
Cadmium	**1.0**	0.38[c]	**19**	0.25[d]
Chromium[e]	**22**	0.4	**1,500**	11
Copper	24	60	**190**	9[d]
Lead	**500**	40.5	**74**	2.5[d]
Mercury	**1.0**	0.00051	0.29	0.77[f]
Nickel	15	30	**250**	52[d]
Selenium	**0.55**	0.21	<2.1	5.0[f]
Silver	**6.8**	2	<8.6[g]	3.2[d,h]
Zinc	**220**	8.5	**2,400**	120[d]
SVOCs				
Acenaphthene	1.2	20	<15	520[i]
Acenaphthylene	0.19	NA	<15	NA
Anthracene	9.2	NA	<15	NA
Benz(a)anthracene	**20**	0.1[j]	<15	NA
Bis(2-ethylhexyl)phthalate	0.85	NA	40	NA
Chrysene	16	NA	<15	NA
Dibenz(a,h)anthracene	**2.5**	0.1[j]	<15	NA
Fluoranthene	36	NA	<15	NA
Fluorene	1.9	NA	4.0	NA
2-Methylnaphthalene	0.079	NA	20	NA
Naphthalene	0.045	0.1[j]	6.0	620[i]
Phenanthrene	**14**	0.1[j]	<15	NA
Pyrene	**27**	0.1[j]	<15	NA
PESTICIDES/PCBs				
Aldrin	0.0075	NA	<0.071	3.0[h]
4,4′-DDE	0.066	NA	<0.14	NA
4,4′-DDT	0.69	0.7[j]	<0.14[g]	0.001
Dieldrin	0.013	NA	<0.14[g]	0.056
Endosulfan (alpha + beta)	0.017	NA	<0.21[g]	0.056
Endrin	0.017	NA	<0.14[g]	0.036
Gamma-BHC (Lindane)	<0.0018	0.01[j]	0.029	0.95[h]
Heptachlor	0.0043	NA	<0.071[g]	0.0038
Total PCBs	0.22	0.371	<2.8[g]	0.014
VOCs				
2-Butanone (Methyl ethyl ketone or MEK)	0.0040	NA	<10	NA
Tetrachloroethene (PCE)	**2.3**	0.1[j]	**5,600**	840[i]
Trichloroethene (TCE)	0.030	0.1[j]	9.0	21,900[i]
1,2,3-Trichloropropane	680	NA	34,000	NA
Toluene	**0.24**	0.1[j]	2.0	17,500[h,i]

Table 2 continued on next page

Table 2 *Continued.*

a: Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRG) for ecological endpoints (Efroymson et al. 1997).

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

c: Ecological soil screening level (USEPA 2004).

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: It is unknown whether these contaminants were present at concentrations that exceeded the screening guidelines because the detection limits were above the screening guidelines.

h: Chronic criterion not available; acute criterion presented.

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

j: Canadian Council of Ministers of the Environment (CCME) environmental quality guidelines for agricultural land uses.

NA: Screening guidelines not available.

Four SVOCs were detected in groundwater samples collected down-gradient from the MacKenzie site. No AWQC are available for comparison to the maximum concentrations of SVOCs except for naphthalene, which did not exceed the AWQC. Gamma-BHC (lindane) was detected in a groundwater sample collected from the southwest corner of the site however the maximum concentration was below the AWQC.

Pesticides and PCBs were detected in groundwater samples collected from monitoring wells in the southwest and southeast portion of the site. Because the detection limits for DDT, dieldrin, endosulphan, endrin, heptachlor, and PCBs were all above the screening guidelines, it is unknown whether these contaminants exceeded the AWQC (Table 2).

Soil

VOCs, metals, SVOCs, pesticides, and PCBs were detected in soil samples collected at the MacKenzie site. The maximum concentration of 1,2,3-trichloropropane was detected in a sample collected southeast of the warehouse and laboratory; the maximum concentration of PCE was detected in a sample collected north of the manufacturing building (Figure 2). The maximum concentrations of SVOCs were detected in samples collected southeast of the manufacturing building. The maximum concentrations of four SVOCs exceeded the screening guidelines for soil by at least one order of magnitude (Table 2). Two VOCs, PCE and toluene, were detected at concentrations that exceeded the screening guidelines for soil by at least one order of magnitude (Table 2).

Several metals were detected in soil samples at elevated concentrations. Table 2 shows the maximum concentrations of metals in soil samples that met quality control criteria and noted those samples that were rejected because of failure to meet quality control criteria (Lawler, Matusky & Skelly Engineers 1993). Concentrations of arsenic, lead, nickel, selenium, and silver were detected in soil samples collected north of the manufacturing building. Chromium, copper, and zinc concentrations were detected in a sample collected southeast of Lagoon #1 (Figure 2). Cadmium and mercury concentrations were detected in samples collected south of the warehouse and laboratory. Mercury concentrations exceeded the screening guidelines for soil by three orders of magnitude; concentrations of chromium, lead, and zinc by one order of magnitude. Maximum concentrations of selenium and silver exceeded the ORNL-PRG screening guidelines by factors of approximately two and three, respectively; cadmium by a factor of two. Arsenic concentrations just exceeded the ORNL-PRG; copper and nickel concentrations did not exceed the screening guidelines.

Pesticides and PCBs were also detected in soil samples collected at the site. The maximum concentrations of DDE and DDT were detected in samples collected north of the manufacturing building (Figure 2). The remaining maximum concentrations of the pesticides listed in Table 2 were detected in samples from east of the warehouse and laboratory. PCBs were detected in soil collected east of the DMG building however, concentrations were below the ORNL-PRG.

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Pesticide Warehouse III

Manatí, Puerto Rico

EPA Facility ID: PRD987367299

Basin: Cibuco-Guajataca

HUC: 21010002

Executive Summary

The Pesticide Warehouse III site is in a mixed rural and residential area of Manatí, Puerto Rico. From 1954 to 1996, the Puerto Rico Land Authority manufactured and stored insecticides, herbicides, and fertilizers at the site. During operations, tanker trucks were parked near the loading docks while pesticides and water were mixed in their tanks. All excess pesticides and spills were allowed to go directly to the surrounding soil. Environmental investigations at the property show that soil and groundwater are contaminated with pesticides, PAHs, and metals. Groundwater is the primary pathway of contaminant migration from the site to NOAA trust resources in the Laguna Tortuguero. The freshwater habitat of the Laguna Tortuguero provides nursery and adult habitat for a variety of NOAA trust resources and is the habitat of primary concern to NOAA.

Site Background

The Pesticide Warehouse III (Pesticide Warehouse) site is in a mixed rural and residential area of Manatí, Puerto Rico. The Pesticide Warehouse property is approximately 0.8 hectare (2 acres) in area and is bordered to the west and north by pineapple fields, to the south by Road No. 670, and to the east by a church and retirement home. Laguna Tortuguero, a natural freshwater lagoon with an outlet channel connected to the Atlantic Ocean, is approximately 4 km (2.5 mi) northeast of the Pesticide Warehouse site. The Río Grande de Manatí is approximately 3 km (2 mi) west of the facility (Figure 1).

From 1954 to 1996, the Puerto Rico Land Authority, a division of the Puerto Rico Department of Agriculture, manufactured and stored insecticides, herbicides, and fertilizers at the site. The Puerto Rico Land Authority also used part of the site for processing and canning pineapple (Weston 1997). The site is currently privately owned and operated by Axel Gonzales Fruit Packers. A main warehouse, a smaller warehouse, and a small well shed are still present at the site (USEPA 2003). Sources of contamination that have been identified at the site are contaminated surface soil, a drainage ditch, and a leach-pit (Weston 2002). During operations, tanker trucks were parked near the loading docks while pesticides and water were mixed in their tanks. All excess pesticides and spills were allowed to go directly to the surrounding soil. There were no concrete pads, berms, or other secondary containments at the mixing and tanker truck loading area to collect spills (Weston 1997). Empty pesticide drums and bags were stored outside behind the main warehouse. The layout of the Pesticide Warehouse site is shown in Figure 2.

In 1989, the Puerto Rico Environmental Quality Board conducted an on-site preliminary assessment (PA) on behalf of the U.S. Environmental Protection Agency (USEPA). During the PA, drums and bags containing organochlorine pesticides and Toxaphene E8 were observed in the main warehouse, where there was a strong pesticide odor that made breathing difficult (Weston 2002).

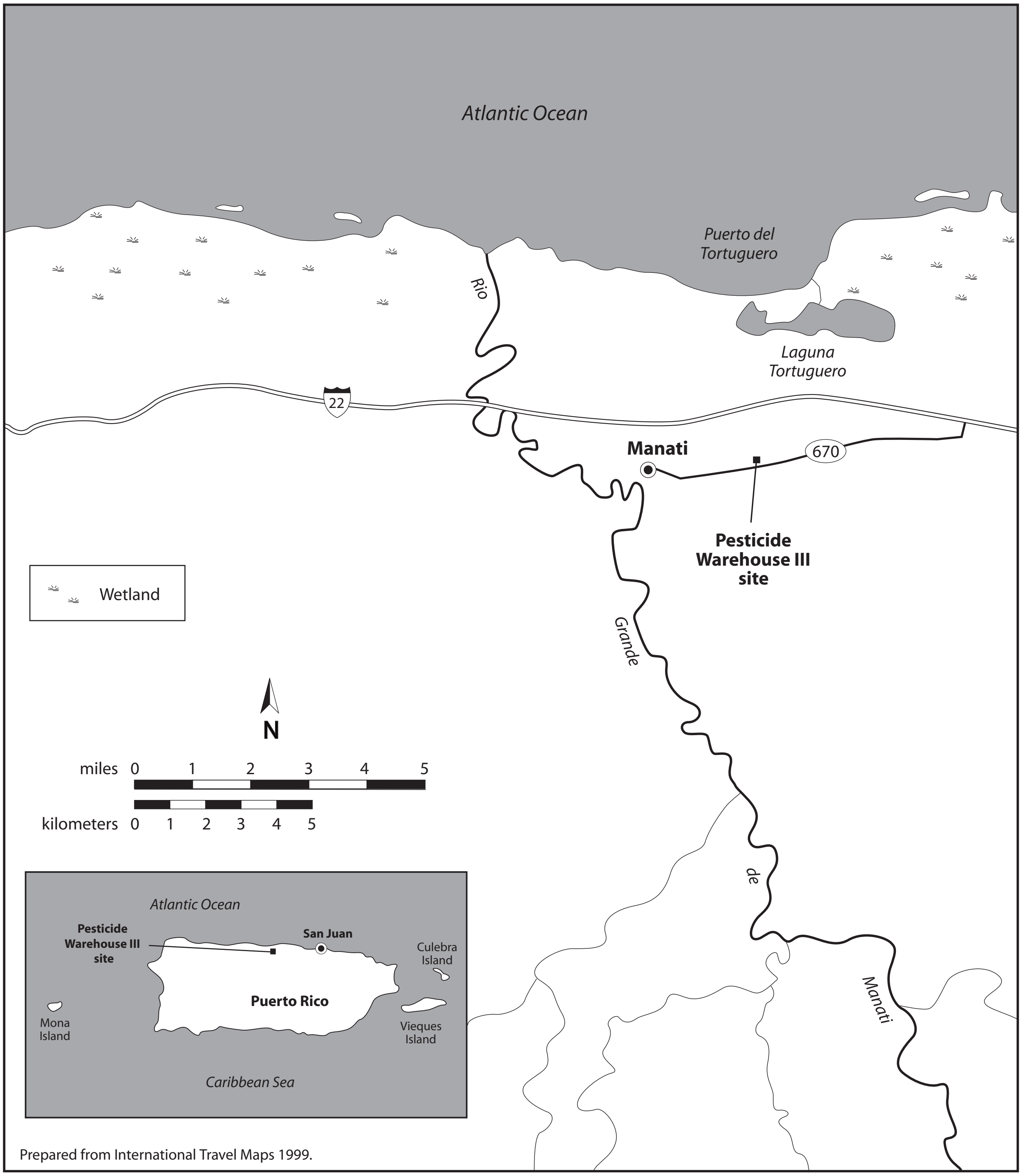

Figure 1. Location of the Pesticide Warehouse III site, Manatí, Puerto Rico.

During a site inspection (SI) conducted by the USEPA in 1996, stained soils were documented throughout the site and spilled materials were observed throughout the warehouse (USEPA 2003). At the time the SI was conducted, pesticides were still being mixed at the loading platform and evidence of spilled pesticides was observed. Also during the SI, stressed vegetation was observed along the surface water runoff pathway from the loading platform to a drainage ditch (Weston 1997; 2002).

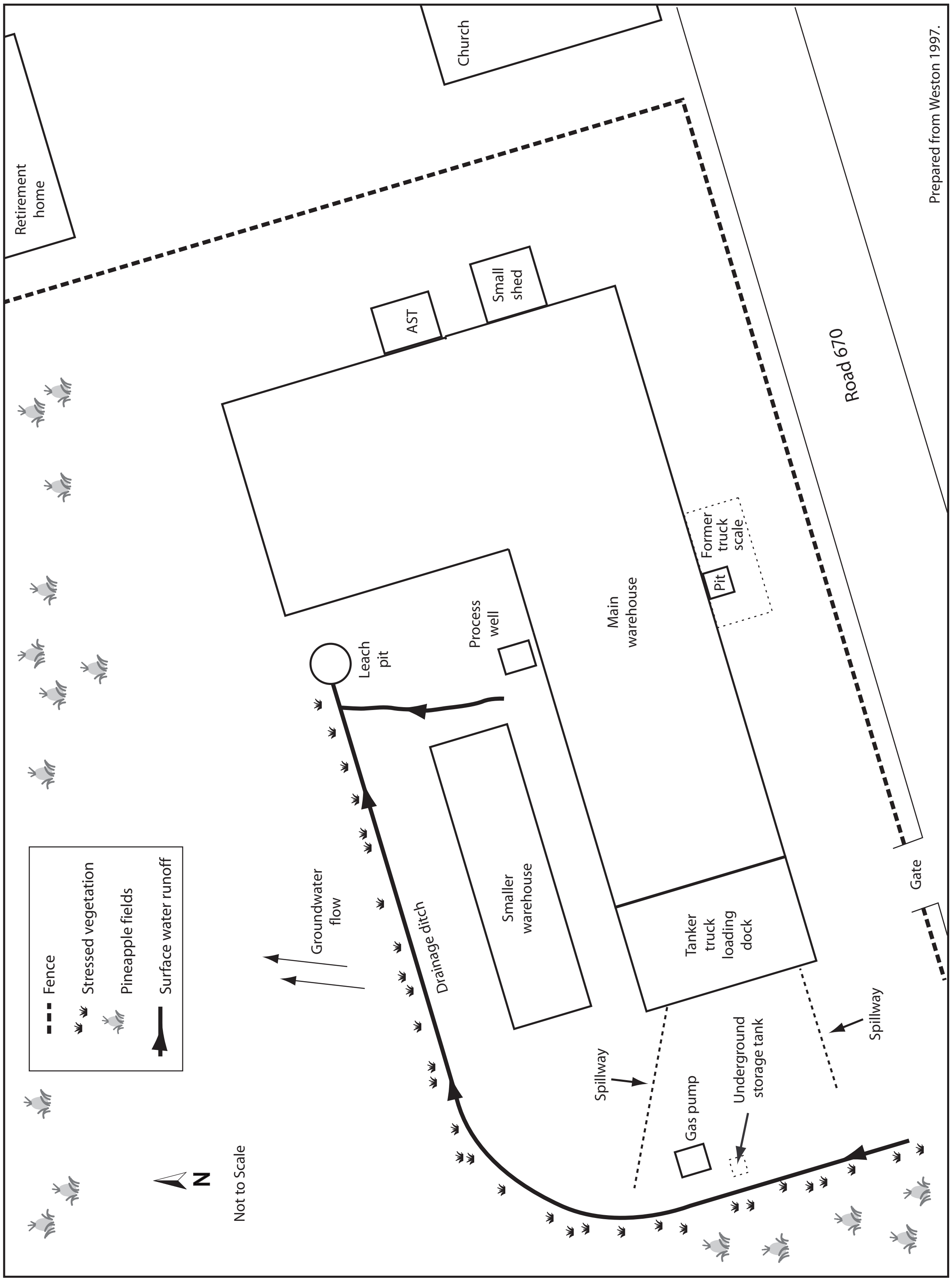

Figure 2. Detail of the Pesticide Warehouse III property, Manatí, Puerto Rico.

In 2001, the USEPA conducted an on-site reconnaissance. Observations made during the reconnaissance indicated that conditions had not changed at the facility since the 1996 SI (Weston 2002). The Pesticide Warehouse site was proposed to the National Priorities List (NPL) on September 5, 2002, and placed on the NPL on April 30, 2003 (USEPA 2003).

Groundwater is the primary pathway for the migration of contaminants from the site to NOAA trust resources. Surface water runoff flows to the west to a drainage ditch that runs along the western and northern boundaries of the site and empties into an unlined leach-pit, which appears to be a natural sinkhole, on the north side of the warehouses (USEPA 2003). The upper groundwater aquifer beneath the site is a karst aquifer, and numerous karst features, including sinkholes and limestone hills, characterize the area under and surrounding the Pesticide Warehouse site. The aquifer is an important source of groundwater and the principal source of water supply in the Manatí area (Weston 2002). Sinkholes are the primary mode of aquifer recharge in this area. The depth to groundwater beneath the site is approximately 79 m (260 ft) below ground surface; the groundwater generally flows north. The primary point of natural groundwater discharge from the upper groundwater aquifer is into the Laguna Tortuguero (AWRA 1998).

NOAA Trust Resources

The habitat of primary concern to NOAA in the vicinity of the site is the Laguna Tortuguero. Laguna Tortuguero is a freshwater lagoon connected to the Atlantic Ocean by an outlet channel and contains approximately 19 species of fish, several of which are NOAA trust resources. The endangered hawksbill turtle nests regularly at the beach north of Laguna Tortuguero. The Río Grande de Manatí is a habitat that is also of concern to NOAA because it could not be confirmed whether or not contaminants were migrating from the site to the river (Modica 2004). The Río Grande de Manatí is one of the largest rivers in Puerto Rico and it also has the fewest number of dams. This river provides habitat to a variety of NOAA trust resources.

Freshwater lagoons such as Laguna Tortuguero are a rare type of wildlife habitat in Puerto Rico, and Laguna Tortuguero has been classified as a natural reserve by the Department of Natural Resources (Lilyestrom 2004). Laguna Tortuguero provides adult and juvenile rearing habitat for several NOAA trust species (Table 1). Amphidromous fish species, including the jurel ojon (horse-eye jack), snook, and dog snapper, have been observed in the outlet channel to the Atlantic Ocean (Lilyestrom 2004). Other species present in the lake include the white mullet, fat sleeper, and yellowfin mojarra. The beach north of the lagoon is prime nesting habitat for three federally protected species of sea turtle: green, hawksbill, and loggerhead (Lilyestrom 2004).

The native freshwater fish and invertebrate species found in Puerto Rico are compulsory migrators that must spend a portion of their life cycle in estuarine or marine waters (Yoshioka 2002). Puerto Rican native freshwater fish and invertebrates are best described as amphidromous and iteroparous. The term amphidromous refers to predominately freshwater species that require estuarine or marine waters for completion of larval phases; iteroparous means they do not die after spawning. Following fertilization in fresh water, eggs and larvae are carried downstream to estuaries, and fish and shrimp larvae spend several months maturing in marine or estuarine waters. Shrimp larvae enter marine and estuarine waters as non-feeders; when salinities reach 12 parts per thousand and above, the larvae molt and begin feeding before re-entering freshwater systems as juveniles. These fish and shrimp spend the majority of their life cycles in the middle to upper reaches of natural freshwater rivers and lagoons (Yoshioka 2002).

Table 1. NOAA trust resources in the Rio Grande de Manati and Laguna Tortuguero, Puerto Rico (Lilyestrom 2004; Yoshioka 2002).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
CATADROMOUS FISH						
American eel	*Anguilla rostrata*		◆	◆		◆
AMPHIDROMOUS FISH						
Atlanitc tarpon	*Megalops atlanticus*	◆	◆	◆		
Bigmouth sleeper	*Gobiomorus dormitor*	◆	◆	◆		◆
Dog snapper	*Lutjanus jocu*		◆	◆		◆
Fat sleeper	*Dormitator maculatus*	◆	◆	◆		◆
Horse-eye jack	*Caranx latus*		◆	◆		◆
Western mosquitofish	*Gambusia affinis*	◆	◆	◆		
Mountain mullet	*Agonostomus monticola*	◆	◆	◆		◆
River goby	*Awaous tajasica*	◆	◆	◆		◆
Sirajo goby[b]	*Sicydium plumieri*	◆	◆	◆		◆
Snook[a]	*Centropomus undecimalis*		◆	◆		◆
Spinycheek sleeper	*Eleotris pisonis*	◆	◆	◆		◆
Tilapia[a]	*Tilapia mossambica*	◆	◆	◆		◆
White mullet	*Mugil curema*		◆	◆		◆
Yellowfin mojarra	*Gerres cinereus*		◆	◆		◆
AMPHIDROMOUS INVERTEBRATES						
Cascade river prawn	*Macrobrachium heterochirus*	◆	◆	◆		◆
Unamed river prawn[c]	*Macrobrachium crenulatum*	◆	◆	◆		
Unamed river prawn[c]	*Macrobrachium faustinum*	◆	◆	◆		
Bigclaw river shrimp	*Macrobrachium carcinus*	◆	◆	◆		
Cinnamon river shrimp	*Macrobrachium acanthurus*	◆	◆	◆		
Unnamed river shrimp[b,c]	*Atya innocous*	◆	◆	◆		◆
Unnamed river shrimp[b,c]	*Atya lanipes*	◆	◆	◆		◆
Unnamed river shrimp[b,c]	*Atya scabra*	◆	◆	◆		◆
Unnamed river shrimp[b,c]	*Jonga serrei*	◆	◆	◆		
Unnamed river shrimp[b,c]	*Micratya poeyi*	◆	◆	◆		
Unnamed river shrimp[b,c]	*Potimirrim americana*	◆	◆	◆		
Unnamed river shrimp[b,c]	*Potimirrim mexican*	◆	◆	◆		
Unnamed river shrimp[b,c]	*Xiphocaris elongata*	◆	◆	◆		
SEA TURTLES						
Green turtle	*Chelonia mydas*	◆	◆			
Hawksbill turtle	*Eretmochelys imbricata*	◆	◆			
Loggerhead turtle	*Caretta caretta*	◆	◆			

a: Common names are from Lilyestrom 2004.

b: Scientific names are from Yoshioka 2002.

c: No common names were available.

Two large dams are present on the Río Grande de Manatí; however, both dams are upstream of the site. The lower portion of the river contains several small impediments, none greater than 3 m (10 ft) in height, which allows most migratory species to pass upstream. Table 1 lists the NOAA trust resources commonly found in the Río Grande de Manatí. Mountain mullet, sirajo and river goby, three species of sleepers, and several shrimp species are the primary NOAA trust resources that use the Río Grande de Manatí (Yoshioka 2002). American eel is also found in the river. The amphidromous and catadromous species listed in Table 1 are found throughout the Río Grande de Manatí system, from the mouth to the headwaters. Many of the NOAA trust resources use the river system for adult and juvenile habitat, and as a spawning area.

No commercial fishing occurs in Laguna Tortuguero or Río Grande de Manatí. Recreational fishing for most of the fish listed in Table 1 occurs in Laguna Tortuguero (Lilyestrom 2004), and recreational and subsistence fishing occurs throughout the Río Grande de Manatí. Sirajo goby, considered a delicacy, are fished in their larval stage as they migrate upstream. The larger Macrobrachium prawns, Atya shrimp, eel, mountain mullet, and bigmouth sleeper are also fished recreationally (Yoshioka 2002). Many of the larger shrimp species are important for native celebrations. No fish-consumption advisories were in effect for the Río Grande de Manatí or Laguna Tortuguero at the time of this report (Lilyestrom 2004).

Site-Related Contamination

Several surface-soil samples and groundwater samples were collected from the Pesticide Warehouse III site during multiple sampling events between 1989 and 1997. All samples were analyzed for metals (including selenium), polycyclic aromatic hydrocarbons (PAHs), phenols, pesticides, and polychlorinated biphenyls (PCBs). Soil samples were collected from throughout the site, including the spillways and the leach-pit. Groundwater samples were collected from the Pesticide Warehouse process well, public supply wells, and monitoring wells.

The primary contaminants of concern to NOAA are zinc and pesticides. Table 2 summarizes maximum contaminant concentrations detected during the site investigations and compares them to appropriate screening guidelines. Only maximum concentrations that exceeded relevant screening guidelines are discussed below. The screening guidelines for soil are from the Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRGs; Efroymson et al. 1997) and screening guidelines for water are from the ambient water quality criteria (AWQC; USEPA 2002), with exceptions as noted on Table 2.

Groundwater

During a 1992 groundwater quality survey conducted by the U.S. Geological Survey, groundwater samples were collected from public supply wells and monitoring wells within the Manatí area, including the Pesticide Warehouse process well, approximately 9 m (30 ft) north of the main warehouse (Figure 2). The process well was also sampled during the 1996 SI. The process well provided water for operations conducted at the facility. Chromium, toxaphene, and dieldrin were detected in samples from the process well. Although the maximum concentration of chromium was less than the ambient water quality criteria (AWQC), toxaphene concentrations exceeded the AWQC by four orders of magnitude, and dieldrin concentrations were six times the AWQC (Table 2).

Soil

During the 1996 SI, fifteen surface soil samples were collected at the Pesticide Warehouse site from the area surrounding the loading dock, the spillways, the drainage ditch west and north of the main warehouse, and the area adjacent to the above-ground-storage tank (AST) east of the

Table 2. Maximum concentrations of contaminants of concern to NOAA detected at the Pesticide Warehouse III site (Weston 1997; 2002). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)		Water (µg/L)	
Contaminant	Soil	ORNL-PRG[a]	Groundwater	AWQC[b]
METALS/INORGANICS				
Arsenic	**42**	9.9	ND	150
Cadmium	**6.8**	0.38[c]	ND	0.25[d]
Chromium[e]	**90**	0.4	6.1	11
Copper	**99**	60	ND	9[d]
Lead	**180**	40.5	ND	2.5[d]
Mercury	**0.34**	0.00051	ND	0.77[f]
Nickel	21	30	ND	52[d]
Selenium	**1.3**	0.21	ND	5.0[g]
Silver	1	2	ND	3.2[d,h]
Zinc	**3,700**	8.5	ND	120[d]
PAHs				
Benz(a)anthracene	0.067	0.1[i]	N/A	NA
Chrysene	0.096	NA	N/A	NA
Fluoranthene	0.21	NA	N/A	NA
2-Methylnaphthalene	0.096	NA	N/A	NA
Naphthalene	0.096	0.1[i]	N/A	620[j]
Phenanthrene	**0.14**	0.1[i]	N/A	NA
Pyrene	**0.25**	0.1[i]	N/A	NA
PHENOLS				
Pentachlorophenol (PCP)	0.091	3	N/A	15[k]
PESTICIDES				
Aldrin	1.7	NA	ND	3[h]
Chlordane	3.4	NA	ND	0.0043
4,4'-DDE	0.33	NA	ND	1050[h,j]
Diazinon	0.98	NA	ND	NA
Dieldrin	**3.6**	0.00028[c]	**0.35**	0.056
Diuron	35	NA	ND	NA
Endosulfan (alpha and beta)	0.1	NA	ND	0.056
Endrin	0.19	NA	ND	0.036
Heptachlor	1	NA	ND	0.0038
Heptachlor Epoxide	0.17	NA	ND	0.0038
Malathion	0.075	NA	ND	NA
Toxaphene	200	NA	**6**	0.0002

a: Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRG) for ecological endpoints (Efroymson et al. 1997).
b: Ambient water quality criteria for the protection of aquatic organisms (USEPA 2002). Freshwater chronic criteria presented.
c: Ecological soil screening guidelines (USEPA 2004).
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: Derived from inorganic, but applied to total mercury.
g: Criterion expressed as total recoverable metal.
h: Chronic criterion not available; acute criterion presented.
i: Canadian Council of Ministers of the Environment (CCME) soil screening guidelines for protection of agricultural land uses.
j: Lowest observable effects level (LOEL) (USEPA 1986).
k: Chronic value is pH dependent; concentration shown above corresponds to pH of 7.8.
NA: Screening guidelines not available.
N/A: Contmaminant was not analyzed for.
ND: Not detected.

main warehouse (Figure 2). Dieldrin, a pesticide, was detected in on-site soils and the leach-pit at concentrations substantially greater than concentrations detected in background soil samples collected during the same event. Several other pesticides were also detected in the soil samples, including diuron (Table 2). The maximum concentration of dieldrin exceeded the soil screening guidelines by four orders of magnitude (Table 2). Currently, there is no screening guideline available for comparison to the maximum concentration of diuron found in the soil samples (Table 2).

PAHs were detected in soil samples collected approximately 18 m (60 ft) west and 9 m (30 ft) east of the main warehouse and approximately 6 m (20 ft) north of the Pesticide Warehouse process well (Figure 2). Concentrations of PAHs ranged between 0.067 mg/kg and 0.25 mg/kg. The maximum concentration of the PAH pyrene, exceeded the screening guideline by a factor of two, while the PAH phenanthrene, was just above the screening guideline (Table 2). Currently, there are no screening guidelines available for comparison to the maximum concentrations of three of the seven PAHs found in the soil samples (Table 2).

Metals, including selenium, were detected in soil samples collected throughout the site at concentrations above the screening guidelines. The maximum concentration of cadmium was found in a sample collected from a spillway approximately 15 m (50 ft) northwest of the main warehouse (Figure 2), and exceeded soil screening guidelines by one order of magnitude (Table 2). Zinc was detected at concentrations substantially above background levels both in on-site soils and in soils collected at the retirement home adjacent to the Pesticide Warehouse site. Zinc was detected in soil samples taken approximately 18 m (60 ft) west of the main warehouse (Figure 2); maximum concentrations exceeded the screening guidelines by two orders of magnitude (Table 2). The maximum concentration of lead, detected in a sample taken approximately 3 m (10 ft) south of the main warehouse (Figure 2), also exceeded the screening guidelines by a factor of four (Table 2). The maximum concentration of arsenic, detected in a sample taken approximately 6 m (20 ft) north of the process well (Figure 2), was four times the screening guidelines (Table 2). Copper, mercury, and selenium were detected in soil samples taken approximately 6 m (20 ft) north of the process well, at the leach-pit approximately 16 m (55 ft) north of the process well, and 9 m (30 ft) east of the process well, respectively (Figure 2). The maximum concentration of mercury exceeded the screening guidelines by two orders of magnitude; concentrations of selenium were six times the screening guidelines, and concentrations of copper just exceeded the screening guidelines (Table 2). The maximum concentration of chromium, detected in a soil sample taken from the leach-pit (Figure 2), exceeded the screening guidelines by two orders of magnitude (Table 2).

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Davis Timber Company

Hattiesburg, Mississippi

EPA Facility ID: MSD046497012

Basin: Upper Leaf

HUC: 03170004

Executive Summary

The Davis Timber Company site is in Hattiesburg, Lamar County, Mississippi. From 1972 to 1987, Davis Timber used the site for timber processing and wood preserving, including production of treated pine poles, pilings, and timber. A preserving solution containing PCP was used to treat timber. This preserving solution was occasionally spilled on the ground in the timber-treating area. Wastewater from the treatment process was stored in an on-site holding pond. Intentional and accidental releases of contaminants from the holding and cooling ponds into West and East Mineral Creeks have been documented. The primary contaminants of concern to NOAA at the site are PCP, dioxins, furans, and metals. Mineral Creek is the habitat of immediate concern to NOAA, which provides freshwater nursery and adult habitat for numerous NOAA trust resources. Surface water runoff and groundwater are the primary pathways for the migration of contaminants from the site to NOAA trust resources.

Site Background

The Davis Timber Company (Davis Timber) site is in Hattiesburg, Lamar County, Mississippi, approximately 9 km (6 mi) northwest of Hattiesburg (Figure 1). The site is approximately 12 ha (30 acres) in area and is bordered to the north by a power line, to the west by West Mineral Creek, to the south by a former railroad track that has been converted to a walking trail, and to the east by Jackson Road (USEPA 1999). The headwaters of West and East Mineral Creeks are adjacent to the site.

From 1972 to 1987, Davis Timber used the site for timber processing and wood preserving, including production of treated pine poles, pilings, and timber. As a result of state regulatory actions by the Mississippi Department of Environmental Quality (MDEQ), treatment operations were stopped in 1987. A skag mill, pole peeler, bark remover, capped holding pond, treating cylinder, cooling pond, oil separator, two above-ground-storage tanks (ASTs) for oil, two ASTs for a pentachlorophenol (PCP) preserving solution, an office, and a storage yard are still present at the site (Figure 2) (USEPA 2002a).

Operations at the site included bark removal, wood treatment, and storage of finished wood product. When unprocessed logs arrived at the site, the bark was removed using a bark remover and pole peeler. After the bark was removed, the logs were cut in half and pressure processed in a treating cylinder to force preservatives into the wood. During this process, the timber was first treated with steam to remove sap fluids and residual oils. The timber was then treated with a preservation solution containing 5 percent PCP and oil (USEPA 2002a). After treatment, excess preservation solution was removed from the treating cylinder by a vacuum, and the timber was again treated with steam. When the pressure process was complete, treated timber was moved to the open yard for drying and storage. A skag mill was also operated at the facility to salvage timber unsuitable for poles or pilings.

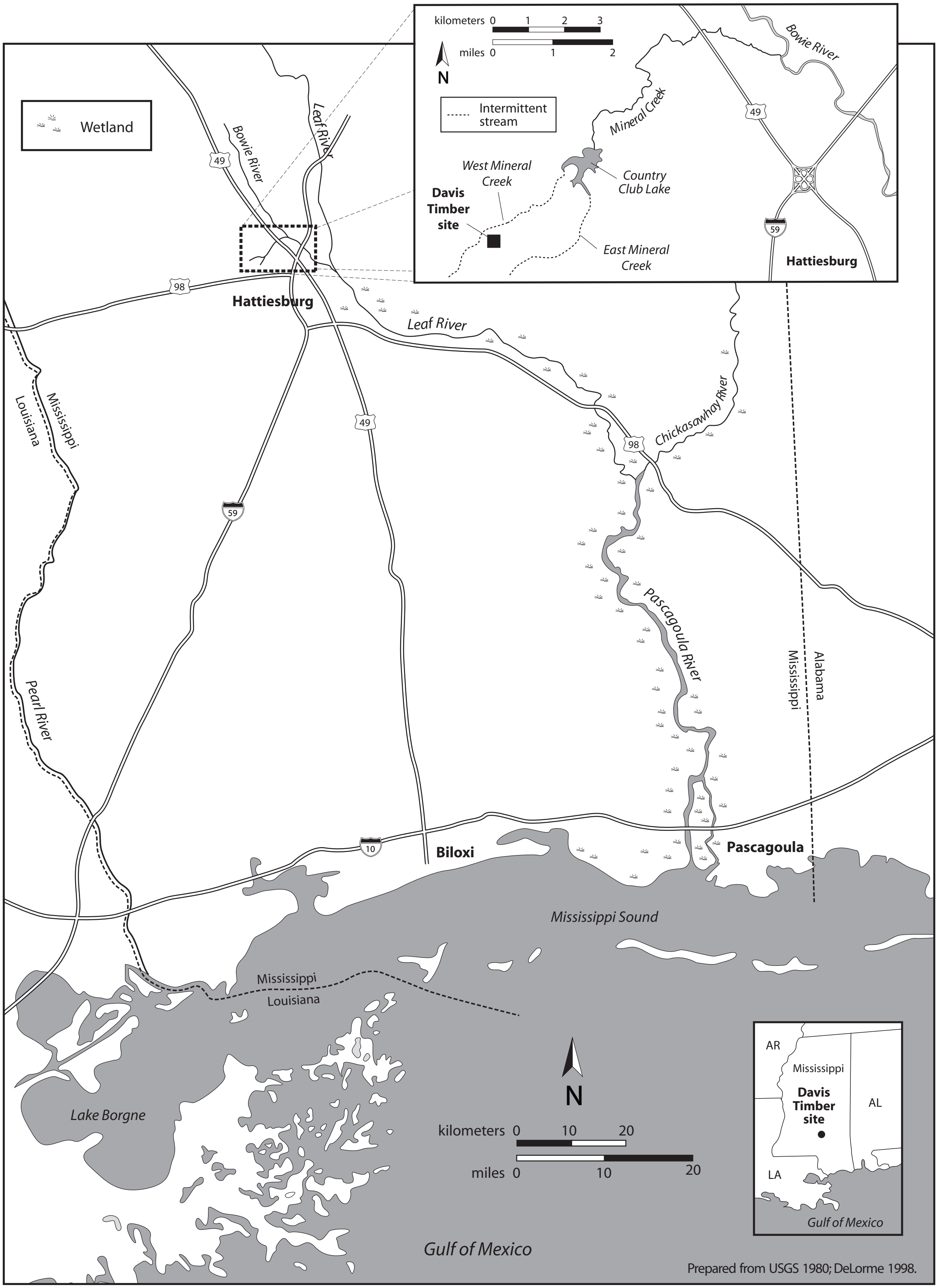

Figure 1. Location of the Davis Timber Company site, Hattiesburg, Mississippi.

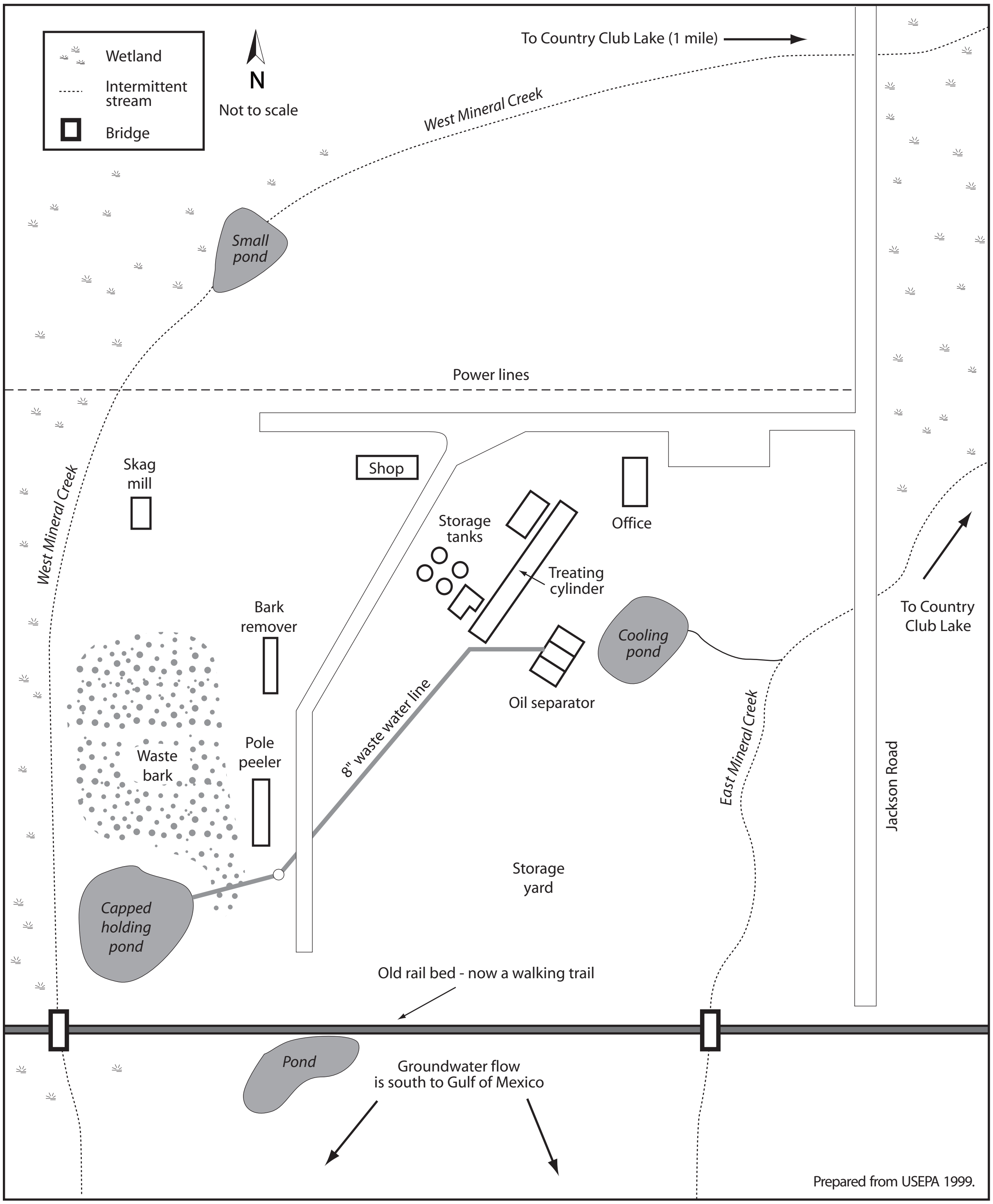

Figure 2. Detail of the Davis Timber Company property, Hattiesburg, Mississippi.

Wastewater was stored in a holding pond and a cooling pond. The holding pond was periodically drained into West Mineral Creek and has overflowed during heavy rain. Wastewater in the cooling pond overflowed into East Mineral Creek during heavy rain as well (ATSDR 2003). It is not known how often the holding pond was intentionally drained into West Mineral Creek or how often both ponds overflowed into West and East Mineral Creeks. In addition, the preservation solution was occasionally spilled on the ground in the vicinity of the ASTs and the treating cylinder. In 1980, the holding pond was closed, backfilled, and capped with approximately 15 to 20 cm (6 to 8 in) of clay (MDEQ 2000; USEPA 2002a).

Between 1974 and 1987, the Mississippi Department of Environmental Quality reported numerous violations and intentional and accidental releases of contaminants from the storage and cooling ponds into West and East Mineral Creeks (ATSDR 2003). Several orders related to improper operations were issued to Davis Timber during this time frame and Davis Timber was found in violation of discharging wastewater without a permit. As a result, the Department of Environmental Quality ordered Davis Timber to cease all wastewater discharge from the facility until the company obtained a valid permit. To obtain a wastewater discharge permit, Davis Timber was required to hire an engineering firm to provide guidance in the design of a wastewater treatment system. Davis Timber complied and in April of 1977, the department issued a five-year permit. In 1979, the Department of Environmental Quality ordered Davis Timber to modify the facilities wastewater treatment process, and in May of 1982 they reissued the five-year wastewater discharge permit. During the same period, the department reported six fish kills in Country Club Lake and a nearby privately owned lake. The fish kills were attributed to releases of PCP into West and East Mineral Creeks (ATSDR 2003). In 1989, the Department of Environmental Quality petitioned the Agency for Toxic Substances and Disease Registry (ATSDR) to conduct a public health assessment at Country Club Lake Estates. The ATSDR classified Country Club Lake as a public health hazard because of elevated levels of PCP, dioxins, and furans.

The Mississippi Department of Environmental Quality conducted a phase II site investigation in 1991 and an expanded site investigation in 1995. Elevated levels of PCP, dioxins, and furans were detected in soil and sediment samples taken on and off-site. In 1997 and 2000, the department detected elevated levels of dioxins and furans in freshwater fish tissue samples collected from Country Club Lake. The U.S. Environmental Protection Agency (USEPA) conducted a remedial investigation from 2000 to 2001 (USEPA 2002a). During a 2001 site visit by the ATSDR and Department of Environmental Quality, a black, shiny substance was observed on the surface water of West Mineral Creek near the small pond and a black, oily substance was observed in the ditch surrounding the capped holding pond (ATSDR 2003). The Davis Timber Company site was proposed to the National Priorities List (NPL) on May 11, 2000, and placed on the NPL on July 27, 2000.

Surface water runoff and groundwater are the primary pathways for the migration of contaminants from the site to NOAA trust resources. Groundwater beneath the site is encountered approximately 4.5 m (15 ft) below ground surface and flows south toward the Gulf of Mexico (ATSDR 2003). Surface water runoff from the property flows west and east into West and East Mineral Creeks. West and East Mineral Creeks flow into Mineral Creek.

NOAA Trust Resources

The habitats of primary concern to NOAA are the surface water and sediments of Mineral Creek. The Bowie River is also of concern to NOAA but due to its distance from the site, it is of secondary concern. Mineral Creek is a small stream bordered by pine forests and farmlands. Two tributaries of Mineral Creek, West and East Mineral Creeks, flow through the site. West and East Mineral

Creeks are intermittent streams that join Country Club Lake, 1.6 km (1 mi) downstream of the site. Mineral Creek was damned near its headwaters in the early 1970s to create Country Club Lake for recreational use (Figure 1). Country Club Lake flows into Mineral Creek, which intersects the Bowie River 5 km (3 mi) downstream. A privately owned lake is between Country Club Lake and the Bowie River. The Bowie River flows southeasterly for 7 km (4.5 mi) and intersects the Leaf River. The Leaf River flows southwest approximately 40 km (25 mi) to its confluence with the Pascagoula River, which continues to flow approximately 64 km (40 mi) before discharging into the Mississippi Sound north of the Gulf of Mexico.

No dams or other impediments block fish from entering Mineral Creek near its confluence with the Bowie River (Slack 2004). NOAA trust resources that use the Bowie River and Mineral Creek for spawning, nursery or adult habitat are anadromous species such as Alabama shad, Gulf sturgeon, skipjack herring, and striped bass and the catadromous American eel (Table 1; Slack 2004). NOAA trust resources are not present in East and West Mineral Creeks or Country Club Lake because they are unable to migrate upstream of the dam that forms Country Club Lake (Folmar 2004). During high water events there is a possibility that NOAA trust resources would be able to migrate past the dam that forms the privately owned lake (Folmar 2004).

Table 1. NOAA trust resources present in Mineral Creek and the Bowie River in the vicinity of the Davis Timber site (Slack 2004).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
ANADROMOUS FISH						
Alabama shad	*Alosa alabamae*	◆	◆	◆		◆
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	◆	◆	◆		
Skipjack herring	*Alosa chrysochloris*	◆	◆	◆		◆
Striped bass	*Morone saxatilis*	◆	◆	◆		◆
CATADROMOUS FISH						
American eel	*Anguilla rostrata*			◆		

In 2002, the U.S. Fish and Wildlife Service proposed the Bowie River as critical habitat for Gulf sturgeon (a subspecies of Atlantic sturgeon) (USFWS 2002). The Bowie River provides crucial cool-water habitat during the warm summer months for aestivating fish (aestivation is the dormant or sluggish state that some animals enter to cope with periods of hot and dry conditions). The Bowie River is the only documented spawning area for Gulf sturgeon in Mississippi (Slack 2004).

Gulf sturgeon and Alabama shad spawn in freshwater reaches of coastal rivers and streams from January to April. Both species spend the majority of their lives in coastal rivers seeking cool water, especially during hot summer months. Gulf sturgeon enter freshwater reaches of coastal rivers and streams from February to April and return to saltwater habitats October through November. Gulf sturgeon require 9 to 12 years to reach sexual maturity (USFWS 2003a). Breeding habitat for Gulf sturgeon consists of riverine spawning sites with substrates suitable for egg deposition and development, such as limestone outcrops and cut limestone banks, bedrock, large gravel or cobble beds, marl, soapstone, or hard clay. Alabama shad enter fresh water to spawn from January to April when water temperatures reach 19°C to 22°C. Spawning occurs over sand, gravel, and rock substrates in a moderate current (NMFS 2004).

Striped bass migrate extensively throughout river systems, spending most of their life cycle in fresh water. Striped bass enter coastal rivers and streams to spawn in mid-February when saltwater temperatures begin to rise. Striped bass deposit eggs and sperm directly into the water column. Under normal conditions, eggs hatch after 36 to 42 hours. This is a critical time for striped bass, requiring strong water currents and adequate river distances to ensure eggs and newly hatched young will not settle to the river bottom. (USFWS 2003b).

There is no commercial fishery on the Bowie River or Mineral Creek. Alabama shad, skipjack herring, and striped bass are fished recreationally on the Bowie River (Slack 2004). Creel surveys have not been conducted on Mineral Creek so it is unknown to what extent the creek is fished recreationally (Gibson 2004).

There are no fish consumption advisories currently in effect for Mineral Creek or the Bowie River (MDEQ 2003). A fish-consumption advisory is in effect for the entire length of the Pascagoula River because of mercury contamination. The Mississippi State Health Department recommends that people limit their consumption of bass and large catfish from these areas. Children under seven and women of child-bearing age are advised to eat no more than one meal of these fish every two months. Other adults are advised to eat no more than one meal of these fish every two weeks (MDEQ 2003).

Site-Related Contamination

Soil, groundwater, surface water, and sediment samples were collected from the site and adjacent properties during multiple sampling events between 1995 and 2001. The samples were analyzed for metals, polycyclic aromatic hydrocarbons (PAHs), phenols, pesticides, dioxins, and furans. Soil samples were collected throughout the site. Groundwater samples were collected from on-site monitoring wells. Surface water samples were collected from a pond just south of the site, the wetlands adjacent to the site, Country Club Lake, and the privately owned lake downstream of the site. Sediment samples were collected from wetland areas on-site and adjacent to the site, as well as from Country Club Lake, the privately owned lake, and West and East Mineral Creeks.

The primary contaminants of concern to NOAA are PCP, dioxins, furans, and metals. Table 2 summarizes maximum contaminant concentrations detected during the site investigations and compares them to appropriate screening guidelines. Only maximum concentrations that exceeded the screening guidelines are discussed below. The screening guidelines for soil are the ecological screening values for soil recommended by USEPA Region 4 (USEPA 2001), and the ambient water quality criteria (AWQC) for water (USEPA 2002b). For sediment, the screening guidelines are the threshold effects concentrations (TECs; MacDonald et al. 2000). Any exceptions to the screening guidelines are noted in Table 2.

Groundwater

Metals were detected in the groundwater samples taken from on-site monitoring wells. The only metal that exceeded the AWQC was lead (Table 2), which was detected in groundwater samples taken from the monitoring well in the southwest corner of the site.

Surface water

Metals were detected in surface water samples taken from the wetlands southwest of the site and from the pond south of the site. However, the only metal that exceeded the AWQC screening guidelines was copper. Copper was detected in surface water samples taken from wetlands adjacent to the southwest corner of the site (Figure 2) at concentrations that exceeded the AWQC by a factor of two (Table 2).

Table 2. Maximum concentrations of contaminants of concern to NOAA detected in samples collected at the Davis Timber site (USEPA 2002a). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)		Water (µg/L)			Sediment (mg/kg)	
Contaminant	Soil	USEPA Region 4[a]	Ground-water	Surface Water	AWQC[b]	Sediment	TEC[c]
METALS/INORGANICS							
Arsenic	6.7	10	2.2	ND	150	4	9.79
Chromium[d]	**21**	0.4	6.7	ND	11	9.6	43.4
Copper	12	40	3.1	**20**	9[e]	18	31.6
Lead	21	50	**4**	ND	2.5[e]	18	35.8
Nickel	19	30	8.1	ND	52[e]	5.2	22.7
Selenium	**2**	0.81	ND	ND	5.0[f]	0.91	NA
Zinc	46	50	ND	43	120[e]	41	121
PAHs							
Benz(a)anthracene	0.15	NA	ND	ND	NA	0.046	0.108
Benzo(a)pyrene	**0.13**	0.1	ND	ND	NA	0.072	0.15
Benzo(b)fluoranthene	0.34	NA	ND	ND	NA	**0.17**	NA
Benzo(k)flouranthene	0.16	NA	ND	ND	NA	0.13	13.4[g]
Chrysene	0.41	NA	ND	ND	NA	0.17	0.166
Indeno(1,2,3cd)pyrene	0.096	NA	ND	ND	NA	0.049	0.330[g]
Pyrene	ND	0.1	ND	ND	NA	**0.28**	0.195
PHENOLS							
Pentachlorophenol (PCP)	**68**	0.002	ND	ND	15[h]	8.2	NA
PESTICIDES							
4,4'-DDD	ND	0.0025	ND	ND	0.006[i,j]	0.0021	0.00488
4,4'-DDE	ND	0.0025	ND	ND	1.05[i,j]	**0.0058**	0.00316
4,4'-DDT	ND	0.0025	ND	ND	0.001[k]	**0.0091**	0.00416
Dieldrin	ND	0.00028[l]	ND	ND	0.056	0.0011	0.0019
Endrin	ND	0.001	ND	ND	0.036	0.0015	0.00222
Gamma-BHC (Lindane)	ND	0.00005	ND	ND	0.95[i]	0.00063	0.00237
Heptachlor Epoxide	ND	NA	ND	ND	0.0038	0.0011	0.00247
DIOXINS/FURANS							
TEQ (Toxic Equivalent Value)[m]	6.6×10^{-4}	NA	ND	**1.3×10^{-5}**	1.0×10^{-8}[j]	**0.0059**	8.8×10^{-6}[g]

a: USEPA Region 4 recommended ecological screening values (USEPA 2001).

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

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

f: Criterion expressed as total recoverable metal.

g: Freshwater upper effects threshold (UET) for bioassays. The UET represents the concentration above which adverse biological impacts would be expected.

h: Chronic criterion is pH dependent; concentration shown above corresponds to pH of 7.8.

i: Chronic criterion not available; acute criterion presented.

j: Lowest observable effects level (LOEL) (USEPA 1986).

k: Expressed as total DDT.

l: Ecological soil screening guidelines (USEPA 2004).

m: 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 in this group of compounds. In order 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.

NA: Screening guidelines not available.

ND: Not detected.

Dioxins and furans were detected in surface water samples taken from the wetlands at concentrations that exceeded the AWQC by three orders of magnitude.

Sediment

Metals, PAHs, PCP, pesticides, dioxins, and furans were detected in sediment samples. Maximum concentrations of metals were below the TECs. The PAHs chrysene and pyrene were detected in sediment samples taken from East Mineral Creek downstream of Jackson Road (Figure 2) at concentrations that slightly exceeded the TECs (Table 2).

The maximum concentrations of pesticides 4,4′-DDE and 4,4′-DDT, were also detected in sediment samples taken from East Mineral Creek downstream of Jackson Road. The maximum concentration of 4,4′-DDE slightly exceeded the TEC, and the maximum concentration of 4,4′-DDT exceeded the TEC by a factor of two.

Dioxins and furans were also detected in sediment samples taken from East Mineral Creek downstream of Jackson Road at maximum concentrations that exceeded the TEC by two orders of magnitude. There is no TEC available for comparison to the maximum concentration of PCP detected in sediment.

Soil

Metals, PAHs, PCP, dioxins, and furans were detected in soil samples taken from the site. Selenium was detected in a soil sample taken in the area of the treating cylinder (Figure 2) at a maximum concentration two times the USEPA Region 4 screening guidelines (Table 2). Chromium was detected in a soil sample from the southwest corner of the capped holding pond (Figure 2) at a maximum concentration that exceeded the screening guidelines by one order of magnitude (Table 2).

Maximum concentrations of PAHs were detected in soil samples taken from the area of the ASTs and treating cylinder (Figure 2). PAHs were also detected in soil samples taken from the south edge of the waste bark pile, the east side of the holding pond, and northeast of the cooling pond (Figure 2). Benzo(a)pyrene was detected in a soil sample taken in the area of the treating cylinder at a maximum concentration that just exceeded the screening guidelines (Table 2). There are no USEPA screening guidelines available for comparison to five of the PAHs that were detected in soil samples (Table 2). Maximum concentrations of PCP, dioxins, and furans were detected in soil samples taken northeast of the cooling pond. The maximum concentration of PCP exceeded the screening guidelines by four orders of magnitude. There are no USEPA screening guidelines available for comparison to dioxin and furan concentrations detected in soil.

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United Metals, Inc.

Marianna, Florida

EPA Facility ID: FLD098924038

Basin: Chipola

HUC: 03130012

Executive Summary

The United Metals, Inc. site is in Marianna, Florida, a rural area of Jackson County. The property is approximately 72 hectares (180 acres) in area, of which approximately 9 hectares (23 acres) were used for processing and recycling lead-acid and nickel-cadmium batteries. During peak operations, the facility processed and recycled approximately 12,000 batteries per week. Until 1981, treated and untreated wastewater flowed into a settling basin, then into concrete basins, and then through a ditch to an unlined holding pond. Environmental investigations at the property found metals contamination in groundwater, soil, and sediment. The Chipola River, which is the NOAA trust habitat of primary concern, provides spawning, nursery, and adult habitat for many NOAA trust resources. Surface water runoff is the primary pathway for the migration of contaminants from the site to NOAA trust resources; groundwater and sediment transport are secondary pathways.

Site Background

The United Metals, Inc. site (United Metals) is in Marianna, Florida, a rural area of Jackson County. The property is approximately 72 hectares (180 acres) in area, of which approximately 9 hectares (23 acres) were used for processing and recycling batteries. The property is bordered to the north by a large agricultural wheat field and to the east, south, and west by wooded areas that in turn are bordered by forested wetlands. The United Metals site is approximately 2 km (1.25 mi) east of the Chipola River and 1 km (0.6 mi) south of Rocky Creek (Figure 1).

From 1979 to 1991, United Metals was operated as a battery reclamation facility where used lead-acid and nickel-cadmium batteries were recycled (CDM Federal 2002). Five buildings and two holding ponds remain at the site. The buildings include the battery recycling plant and materials storage area, the plastic storage and processing plant, the truck maintenance shop, the health center, and the office (Figure 2).

During peak operations, the facility processed and recycled approximately 12,000 batteries per week. Batteries were unloaded onto a conveyor belt in the northwest part of the battery recycling plant. The plastic battery casings, which were separated from the lead plates, were crushed and pelletized in the plastic storage and processing plant, then shipped to an off-site extruding facility. The lead components and lead oxide from the batteries were sent to an off-site lead smelter.

Prior to 1981, treated and untreated wastewater flowed into a settling basin, then into concrete basins, and then through a ditch to an unlined holding pond (USEPA 2003). In 1982, the wastewater system was modified so that wastewater could be neutralized in storage tanks and recycled back into plant operations, which eliminated wastewater discharges to the holding ponds. Around

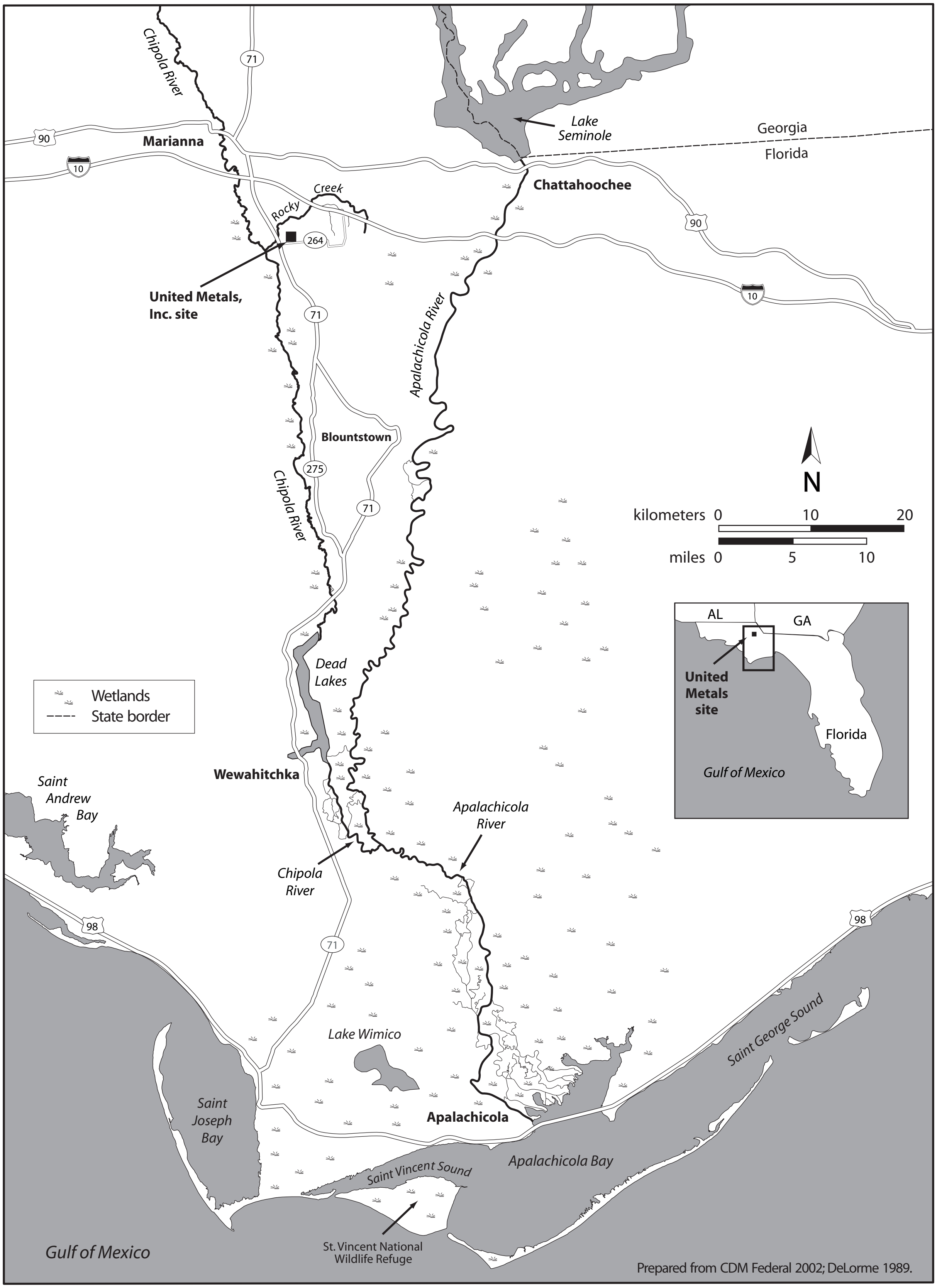

Figure 1. Location of United Metals, Inc. site, Marianna, Florida.

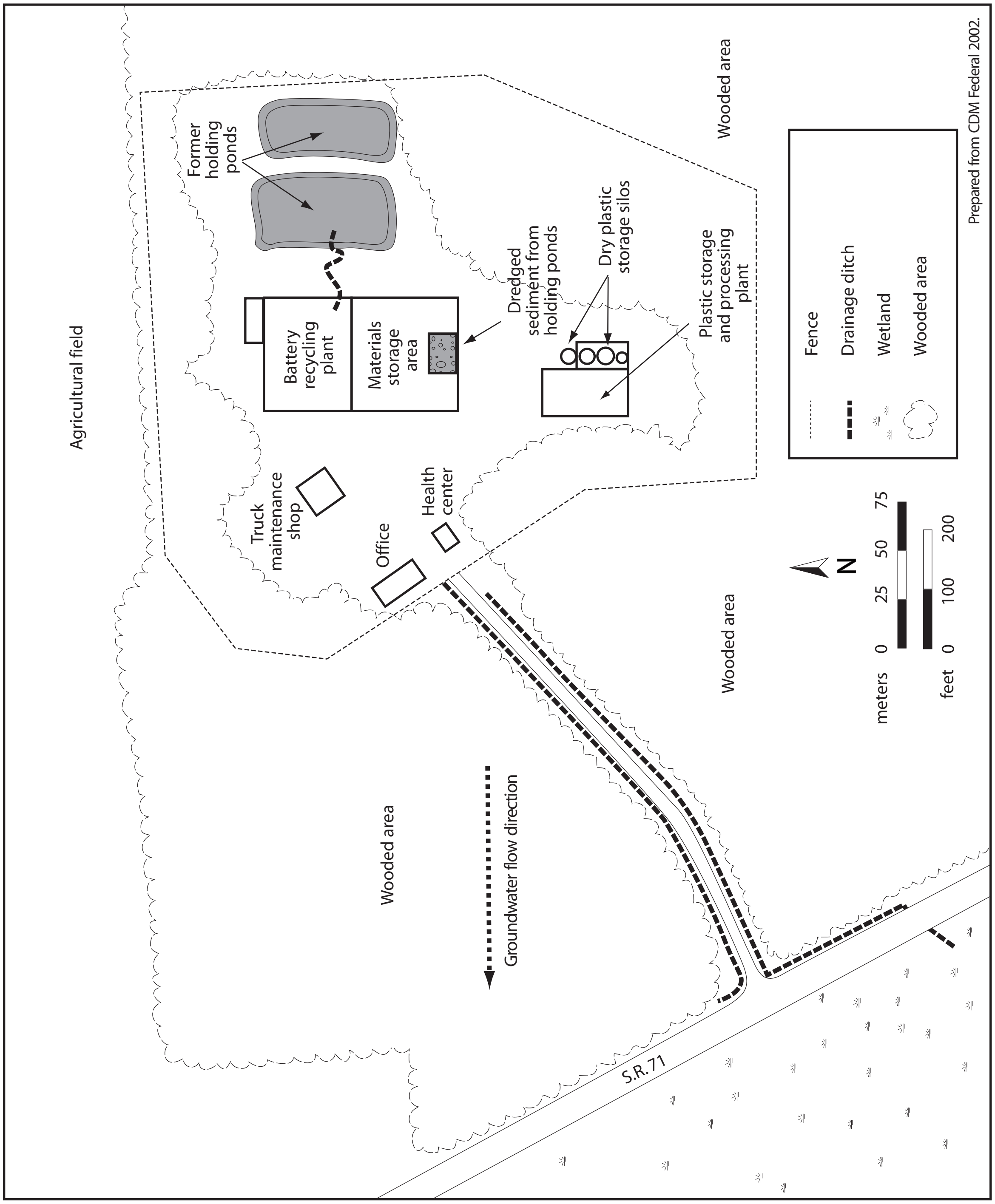

Figure 2. Detail of the United Metals, Inc. property, Marianna, Florida.

the same time, the holding ponds were abandoned, dredged, and backfilled. Dredged sediments from the holding ponds and drainage ditches are currently stockpiled in the materials storage area (USEPA 2003).

From 1981 to 1993, the Florida Department of Environmental Protection conducted numerous site investigations that found metals contamination in groundwater, soil, and sediment. In 1986, the U.S. Environmental Protection Agency (USEPA) conducted a Resource Conservation and Recovery Act (RCRA) program inspection and reported numerous RCRA violations. In 1991, the Florida Department of Environmental Protection ordered all site operations to cease because of numerous RCRA violations. In 1996, the USEPA conducted an emergency removal operation to remove six 210-liter (55-gallon) drums of hazardous materials, and several hundred gallons of sulfuric acid sludge from a tank in the battery recycling plant (CDM Federal 2002). The United Metals site was proposed for placement on the National Priorities List (NPL) on September 5, 2002, and was placed on the NPL on April 30, 2003.

Surface water runoff is the primary pathway for the migration of contaminants from the site to NOAA trust resources; groundwater and sediment transport are secondary pathways. Surface water runoff from the site generally flows to the west and south. Surface water that flows to the west drains into a ditch that borders the access road to the site. This ditch connects with the ditch that borders State Route 71, which then flows south into a culvert. The culvert drains to a forested wetland approximately 152 m (500 ft) south-southwest of the United Metals site (Figure 2). This wetland is hydraulically connected to an unnamed stream that flows to the Chipola River. Surface runoff that drains to the south enters an intermittent stream that discharges into a series of interconnected wetlands. The interconnected wetlands are hydraulically connected to another intermittent stream that then discharges into a sinkhole-pond approximately 0.2 km (0.1 mi) west of State Route 71. The exact location of the intermittent streams and the sinkhole pond could not be determined from the documents reviewed for this report.

There are two aquifer systems in the vicinity of the site: a surficial aquifer system and the Floridian aquifer system. The surficial aquifer system consists of sand and clay and generally flows to the west. The Floridian aquifer system is approximately 18 m (60 ft) below the site; groundwater in the aquifer generally flows west, where it ultimately discharges into the Chipola River (CDM Federal 2002). Numerous sinkholes, a karst feature, are present at the site.

NOAA Trust Resources

The habitats of primary concern to NOAA are the surface water and sediments of the Chipola River and associated wetlands. The Chipola River is the largest tributary of the Apalachicola River and drains one-half of the Apalachicola watershed (American Rivers 2004). Near the United Metals site, the Chipola River ranges from 8 to 20 m (26 to 66 ft) in width and from 0.3 to more than 1 m (0.9 to 3 ft) in depth. The Chipola River is a spring-fed clearwater stream characterized by long runs, pools, rocks, and rapids. It has been designated a Florida state Wild and Scenic River and an Outstanding Florida Water (American Rivers 2004). Both designations attempt to protect water bodies from further pollution and degradation. The Chipola River joins the Apalachicola River approximately 72 km (45 mi) downstream of the site. From its confluence with the Chipola River, the Apalachicola River flows 40 km (25 mi) to Apalachicola Bay, which enters the Gulf of Mexico. The Apalachicola River provides habitat for the only known naturally reproducing population of Gulf Coast striped bass in the Gulf of Mexico (Parauka 2004).

NOAA trust resources in the Chipola River near the site include anadromous Alabama shad, Gulf Coast sturgeon (a local subspecies of Atlantic sturgeon), skipjack herring, and Gulf Coast striped bass and catadromous American eel (Hill 2003; Parauka 2004). These species use the Chipola River for spawning, nursery, and adult habitat (Table 1).

From 1962 to 1988, the Dead Lakes Dam blocked fish migration to the upper reaches of the Chipola River. In 1988, the dam was removed, which allowed fish passage for the first time in 20 years. Since the removal, striped bass have resumed summer migrations to the upper reaches of the Chipola River (Hill 2003). The Chipola River provides crucial cool-water habitat during the warm summer months for aestivating fish. Aestivation is the dormant or sluggish state that some animals enter to cope with periods of hot and dry conditions.

Table 1. NOAA trust resources in the Chipola River in the vicinity of the United Metals, Inc. site (Hill 2003 and Parauka 2004).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
CATADROMOUS FISH						
American eel	*Anguilla rostrata*			◆		◆
ANADROMOUS FISH						
Alabama shad	*Alosa alabamae*	◆	◆	◆		◆
Gulf Coast sturgeon[a]	*Acipenser oxyrhynchus desotoi*	◆	◆	◆		◆
Skipjack herring	*Alosa chrysochloris*	◆	◆	◆		◆
Gulf Coast striped bass	*Morone saxatilis*	◆	◆	◆		◆

a: Scientific name from Parauka 2004.

Gulf Coast striped bass are stocked periodically, by the Gulf States Marine Fisheries Commission, in the Chipola River and a number of other systems along the coast of the Gulf of Mexico (Parauka 2004). Gulf Coast striped bass migrate extensively throughout river systems, spending most of their life cycle in fresh water but in the winter months they migrate to coastal estuarine waters to forage. Gulf Coast striped bass enter coastal rivers and streams to spawn in mid-February, when saltwater temperatures start to rise. Gulf Coast striped bass deposit semi-buoyant eggs and sperm into the water column. The eggs normally hatch 36 to 42 hours after they are deposited. This is a critical time for striped bass, which require strong water currents and adequate river lengths to ensure their eggs and newly hatched young do not drop to the river bottom where they would be covered by silt. (USFWS 2003a).

Gulf Coast sturgeon, and Alabama shad spawn in freshwater reaches of rivers and streams from January to April. These species spend the majority of their life cycles in coastal rivers seeking cool water, especially during hot summer months. Gulf Coast sturgeon enter coastal rivers and streams from February to April and return to saltwater habitats in October through November. They do not reach sexual maturity until nine to 12 years of age (USFWS 2003b). Alabama shad enter freshwater to spawn from January to April, when water temperatures reach 19 to 22 degrees C. Spawning occurs over sand, gravel, and rock substrates in a moderate current (NMFS 2004).

No commercial fishing occurs in the vicinity of the site. Alabama shad, American eel, skipjack herring, and striped bass are fished recreationally on the Chipola River (Hill 2003). A state-wide fish consumption advisory is in effect for all fresh waters of Florida because of mercury contamination. The 2003 advisory recommends that adults consume no more than one meal per week of large-mouth bass, bowfin, gar, and other species and that women of child-bearing age and children limit their consumption of fish from the Chipola River system to one meal per month (FDOH 2003).

Site-Related Contamination

Sediment, groundwater, and soil samples have been collected for analysis from the United Metals site and adjacent properties during the course of several site investigations. The samples were analyzed for metals; semivolatile organic compounds, including polycyclic aromatic hydrocarbons (PAHs) and bis(2-ethylhexyl)phthalate (BEHP); pesticides; and polychlorinated biphenyls (PCBs). PCBs were not detected in any of the samples. Based on the results of these analyses, the primary contaminants of concern to NOAA are metals. Table 2 summarizes maximum contaminant concentrations detected during the site investigations and compares them to appropriate screening guidelines. Only maximum concentrations that exceeded relevant screening guidelines are discussed below. The screening guidelines are the threshold effects concentrations (TECs) for sediment (MacDonald et al. 2000) and the ambient water quality criteria (AWQC) for groundwater (USEPA 2002). For soil, the screening guidelines are the ecological screening values recommended by USEPA Region 4 (USEPA 2001). Any exceptions to the screening guidelines are noted in Table 2.

Sediment samples were taken from wetland areas adjacent to the site and on-site and off-site drainage ditches. Groundwater samples were taken from monitoring wells, on-site production wells, and private potable-water wells on properties adjacent to the site. Soil samples were taken throughout the site.

Sediment

Metals were detected in sediment samples taken both on and off site. Lead concentrations in sediment samples ranged from 24 to 16,000 mg/kg. The maximum concentration of lead was detected in a sample taken from the drainage ditch along the entrance driveway approximately 120 m (400 ft) southwest of the entrance gate. Lead was also detected at elevated concentrations in sediment samples taken from a wetland west of State Route 71. The maximum lead concentration exceeded the threshold effects concentration (TEC) by two orders of magnitude. Maximum concentrations of chromium, copper, mercury, nickel, and zinc detected in sediment did not exceed the TECs.

Groundwater

Metals and pesticides were detected in groundwater samples. Maximum concentrations of cadmium, chromium, copper, lead, and nickel were detected in samples taken from a monitoring well approximately 60 m (200 ft) north of the battery recycling plant. The maximum concentration of zinc was detected in a sample taken from a monitoring well approximately 30 m (100 ft) west of the battery recycling plant. The maximum concentration of cadmium exceeded the AWQC by three orders of magnitude. The maximum concentration of lead exceeded the AWQC by two orders of magnitude. The maximum concentrations of copper and chromium exceeded the AWQC by one order of magnitude. Nickel and zinc were detected at maximum concentrations that exceeded the AWQC by factors of approximately six and three, respectively. Arsenic and mercury were also detected, but at maximum concentrations that did not exceed the AWQC.

The pesticides, dieldrin and heptachlor were detected in groundwater samples taken from monitoring wells approximately 22 m (72 ft) southwest of the battery recycling plant and approximately 30 m (100 ft) west of the battery recycling plant, respectively, at maximum concentrations that exceeded the AWQC by one order of magnitude. Heptachlor epoxide was detected in a sample taken from a production well approximately 30 m (100 ft) southeast of the plastic storage and processing plant at a maximum concentration that exceeded the AWQC by a factor of four. Aldrin was also detected, but at a maximum concentration that did not exceed the AWQC.

Table 2. Maximum concentrations of contaminants of concern to NOAA detected in samples collected at the United Metals, Inc. site (CDM Federal 2002). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)		Water (µg/L)		Sediment (mg/kg)	
Contaminant	Soil	USEPA Region 4[a]	Ground-water	AWQC[b]	Sediment	TEC[c]
METALS/INORGANICS						
Arsenic	**670**	10	40	150	ND	9.79
Cadmium	ND	0.38[d]	**500**	0.25[e]	ND	0.99
Chromium[f]	**24**	0.4	**110**	11	25	43.4
Copper	40	40	**390**	9[e]	18	31.6
Lead	**260,000**	50	**520**	2.5[e]	**16,000**	35.8
Mercury	0.038	0.1	0.26	0.77[g]	0.14	0.18
Nickel	10	30	**320**	52[e]	14	22.7
Zinc	**97**	50	**400**	120[e]	41	121
PAHs						
Benz(a)pyrene	0.63	0.1	ND	NA	ND	0.15
Benzo(b)fluoranthene	0.92	NA	ND	NA	ND	NA
Bis(2-ethylhexyl)phthalate	45	NA	ND	NA	ND	NA
PESTICIDES/PCBs						
Aldrin	ND	0.0025	0.93	3.0[h]	ND	0.040[i]
Dieldrin	ND	0.00028[d]	**0.79**	0.056	ND	0.0019
Heptachlor	ND	NA	**0.067**	0.0038	ND	0.040[i]
Heptachlor Epoxide	ND	NA	**0.016**	0.0038	ND	0.00247
Total PCBs	ND	0.02	ND	0.014	ND	0.0598

a: USEPA Region 4 recommended ecological screening values (USEPA 2001).

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 et al. 2000).

d: Ecological soil screening guidelines (USEPA 2004).

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

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

g: Criterion expressed as total recoverable metal.

h: Chronic criterion not available; acute criterion presented.

i: Freshwater upper effects threshold (UET) for bioassays. The UET represents the concentration above which adverse biological impacts would be expected.

NA: Screening guidelines not available.

ND: Not detected.

Soil

Metals, PAHs, and BEHP were detected in soil samples taken on-site and adjacent to the United Metals site. Lead and arsenic were detected in samples taken adjacent to the southwest corner of the battery recycling plant at maximum concentrations that exceeded the USEPA Region 4 values by three orders of magnitude and one order of magnitude, respectively (Table 2). Zinc was detected in samples taken approximately 60 m (200 ft) east of the battery recycling plant at maximum concentrations that exceeded the Region 4 values by a factor of two. Chromium was detected in samples taken from the drainage ditch along the entrance driveway and State Route 71. Maximum concentrations of chromium exceeded the Region 4 values by one order of magnitude. Maximum concentrations of BEHP and two PAHs, benz(a)pyrene and benzo(b)fluoranthene, were detected in soil samples taken adjacent to the southwest corner of the battery plant. There are no USEPA soil screening guidelines available for comparison to the maximum concentrations of BEHP and one of the PAHs in soil.

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Brine Service Company

Corpus Christi, Texas

EPA Facility ID: TX0000605264

Basin: South Corpus Christi Bay

HUC: 12110202

Executive Summary

The Brine Service Company site is west of Corpus Christi, Texas. The site contains two pit areas originally used as sand and caliche quarries and later for waste disposal. The primary contaminants of concern at the site are metals and SVOCs. A drainage ditch directs surface water runoff from the site to the north, where it empties into the wetlands adjacent to Tule Lake. Several NOAA trust resources use the surface waters of Tule Lake and Tule Lake Channel, which are NOAA habitats of concern.

Site Background

The Brine Service Company (BSC) site is approximately 10 km (6.5 mi) west of downtown Corpus Christi, northeast of the intersection of Interstate Highway 37 (IH-37) and Goldston Road (Figure 1). The total area of the site is unavailable or unknown. The BSC site consists of two former waste disposal pit areas, referred to as the North Pit and the South Pit, which were originally used as quarries for sand and caliche (gravel, sand, and desert debris cemented by calcium carbonate). The South Pit area, which is the larger of the two, is currently occupied by a communications tower, a heavy equipment repair shop, and a video store. The North Pit is currently the site of a fabrication shop and warehouse (Figure 2) (TNRCC 2000).

Excavation of the South Pit area, which was reportedly owned and operated by the Brine Service Company, Inc. from 1946 through the 1960s, documented oil field wastes, drilling fluids, and/or refinery wastes (TNRCC 2001). The North Pit, owned by a Mr. Goldston since the early 1970s, has been the location of several different operations conducted by several different companies, including a trucking depot/construction yard and a tire warehouse (EMCON 1998; TNRCC 2000).

The site was identified in November 1997, when a representative of Koch Pipeline Company (Koch) reported an apparent waste disposal site to the Texas Natural Resource Conservation Commission (TNRCC). Koch had been advancing an excavation trench along the eastern side of the BSC site to install interconnecting pipelines between Koch's East and West Refineries. A TNRCC inspector observed that the floor and walls of the excavated trench were visibly stained with phase-separate hydrocarbons, which were also evident in the groundwater seeping into the excavation. In addition, the inspector noted a strong organic-compound odor in the area of the excavation (TNRCC 2000).

A meeting was held in early November 1997 between TNRCC Region 14 representatives and Koch officials to discuss disposal options for the excavated soils. During that meeting, Mr. Goldston, a current owner of part of the BSC site, reported that the site had formerly been owned and operated by BSC, Inc. He indicated that between 1946 and the 1960s, refineries had used a pit (likely

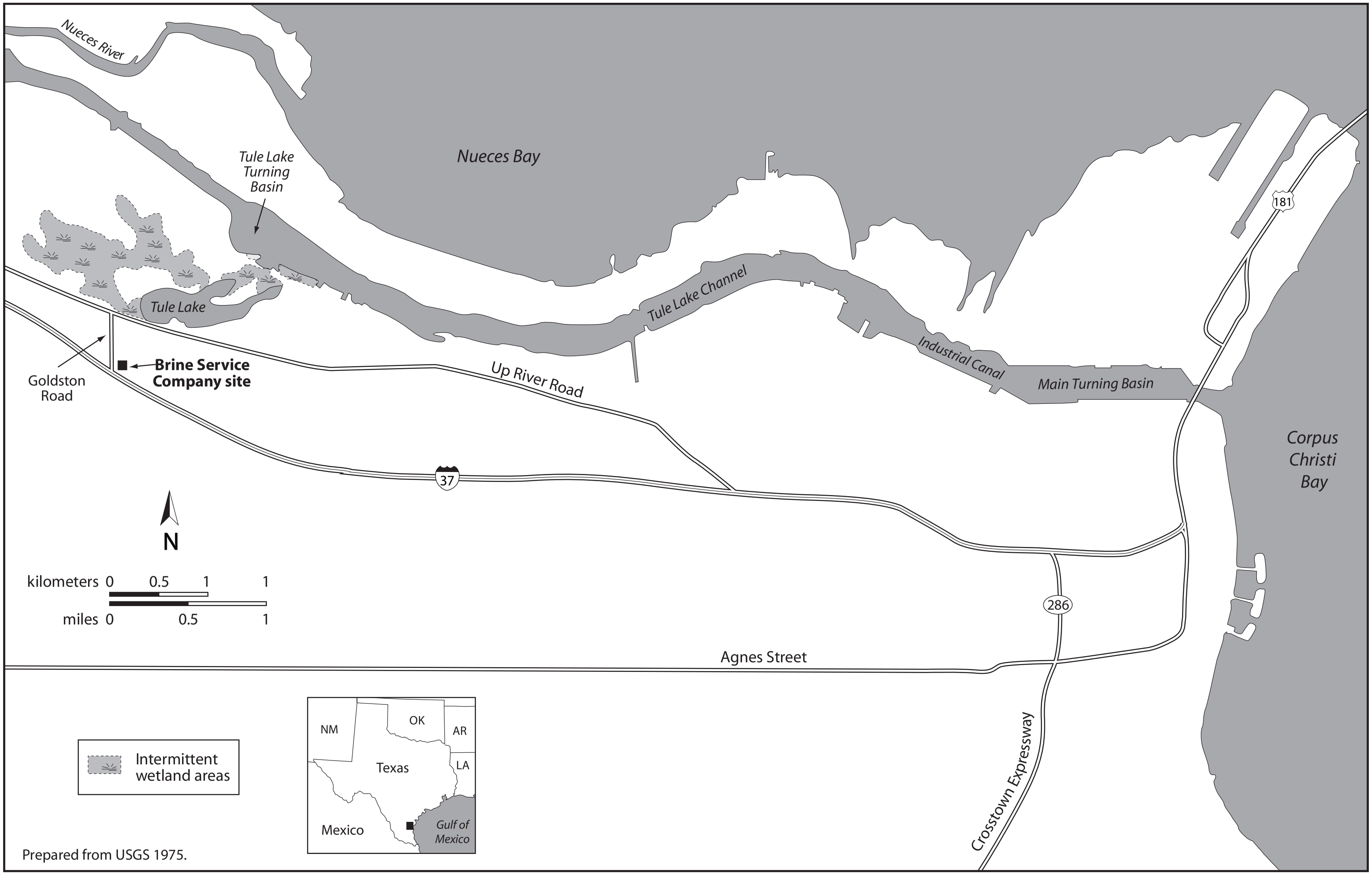

Figure 1. Location of Brine Service Company site, Corpus Christi, Texas.

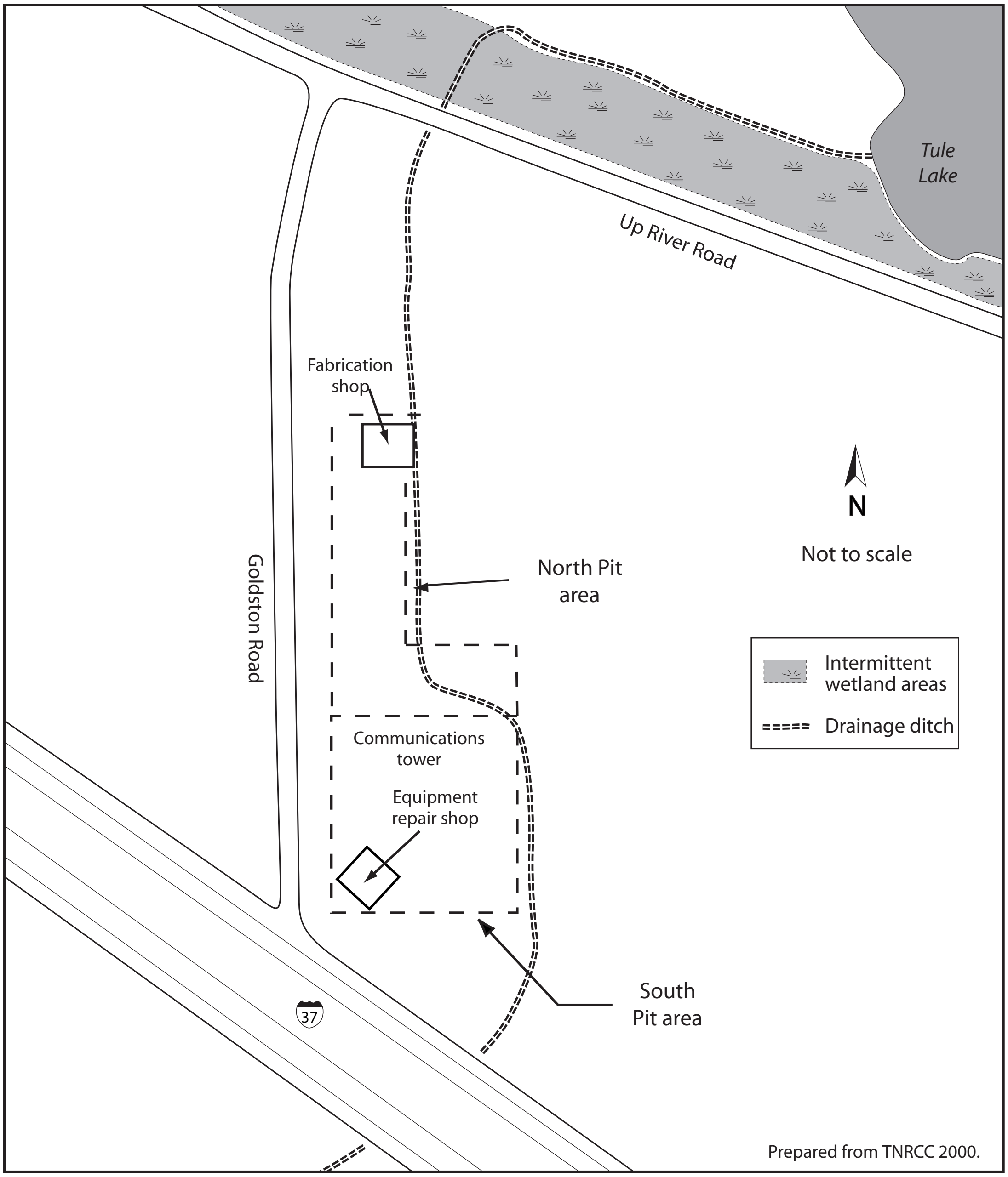

Figure 2. Detail of Brine Service Company site.

the South Pit) for waste disposal. In a 1999 interview, the president of BSC, Inc., revealed that during the mid-1950s, the site was used to store drilling fluid. Aerial photographs show that the pit excavations began prior to 1956 and that the excavations contained liquid until they were filled. The North Pit was filled sometime between 1962 and 1965, and the South Pit was completely filled by late 1973 (TNRCC 2000).

Laboratory analysis of samples of the soils excavated by Koch indicated elevated levels of total petroleum hydrocarbons and total metals, as well as volatile and semivolatile organic compounds (VOCs and SVOCs). In February 2000, the TNRCC's Superfund Site Discovery and Assessment Program conducted sampling at the BSC site as part of a screening site inspection. A hazard ranking system package was completed for the BSC site on September 1, 2001, and on September 13, 2001, the site was proposed to the National Priorities List (TNRCC 2000).

The main pathway for the migration of contaminants to NOAA trust resources at Tule Lake is via surface water runoff from the South Pit, which flows into a drainage ditch that empties into a wetland area. The wetlands area is contiguous to the lake's estuarine intertidal emergent areas that are regularly and irregularly flooded (TNRCC 2000).

NOAA Trust Resources

The NOAA habitats of concern are the surface waters of Tule Lake and Tule Lake Channel. The NOAA trust resources that use these habitats are summarized in Table 1.

Table 1. NOAA trust resources present in Tule Lake (Lee 2001; Lee 2002).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm. Fishery	Rec. Fishery[a]
MARINE/ESTUARINE FISH						
Atlantic croaker	*Micropogonias undulatus*		◆			◆
Black drum	*Pogonias cromis*		◆			
Gulf killifish	*Fundulus grandis*	◆	◆	◆		◆
Gulf menhaden	*Brevoortia patronus*	◆	◆	◆		◆
Hardhead catfish	*Arius felis*	◆	◆	◆		◆
Pinfish	*Lagodon rhomboides*	◆	◆	◆		◆
Red drum	*Sciaenops ocellatus*		◆	◆		
Sheepshead minnow	*Cyprinodon variegatus*	◆	◆	◆		◆
Spot	*Leiostomus xanthurus*	◆	◆	◆		◆
Striped mullet	*Mugil cephalus*		◆	◆		◆
INVERTEBRATES						
Blue crab	*Callinectes sapidus*		◆	◆		◆

a: These represent possible recreationally fished species within Tule Lake.

The BSC site is located in the Nueces-Rio Grande Coastal Basin. Surface water runoff from the site flows into a man-made drainage ditch along the east side of the property, travels north in the ditch as it passes below Up River Road, and continues north to the probable point of entry on the west shore of Tule Lake, a distance of approximately 0.8 km (0.5 mi). The discharge point is located in the wetlands (TNRCC 2000).

Tule Lake empties into Tule Lake Channel, which continues to Corpus Christi Bay. The lake serves as a sanctuary for several aquatic bird species, including gulls and pelicans. Corpus Christi Bay is listed under the National Estuary Program as one of the most important estuarine systems along the Gulf Coast (TNRCC 2000).

The upper northeast end of Tule Lake, near the mouth, ranges from approximately 0.61 to 0.76 m (2 to 2.5 ft) in depth. Tidal influence at this end of the lake extends from the ship channel approximately 0.20 km (0.13 mi) into the lake. The remainder of the lake is shallow, with an average depth of 30 to 46 cm (12 to 18 in). The lake bottom is soft, silty mud with minimal vegetation. Salinity in the lake ranges from 5 to 35 parts per thousand, depending on the rainfall and season (Lee 2001).

NOAA trust resources commonly found in shallower parts of the lake are striped mullet, sheepshead minnow, and gulf killifish. NOAA trust resources found in deeper parts of the lake include both black and red drum, gulf menhaden, and Atlantic croaker (Lee 2001). Many of these species use the lake for nursery and adult habitat (Table 1). Because Tule Lake is privately owned, it is not popular for recreational fishing. However, the lake is accessible and a small amount of recreational fishing does take place. Species that are occasionally recreationally fished include gulf killifish, gulf menhaden, hardhead catfish, and blue crab (Lee 2002). There is no commercial fishing in Tule Lake or the Tule Lake Channel. No fish consumption advisories are in effect for Tule Lake or the Tule Lake Channel. However, a consumption advisory in effect for the Gulf of Mexico recommends limited consumption of king mackerel between 94 cm (37 in) and 110 cm (43 in) in length and recommends against consumption of king mackerel greater than 110 cm (43 in) in length (TDH 2002).

Site-Related Contamination

The primary contaminants of concern at the BSC site are inorganic compounds (metals) and SVOCs (including polynuclear aromatic hydrocarbons [PAHs]). Soil, groundwater, and sediment samples have been collected from the site; sediment samples have also been collected from Tule Lake and the adjacent wetlands. Seventeen soil and 41 sediment samples were analyzed for metals, VOCs, SVOCs, pesticides, and polychlorinated biphenyls (PCBs). Approximately three groundwater samples were analyzed for only metals and SVOCs. The maximum concentrations of metals, SVOCs, pesticides, and PCBs detected in these media are summarized in Table 2. Surface water samples have not been collected from the BSC site to date (TNRCC 2000).

Sediment

In sediment samples, several metals were detected at maximum concentrations that exceeded the Effects Range-Low (ERL) guidelines. The maximum concentration of selenium exceeded the ERL by at least one order of magnitude. Concentrations of mercury and zinc were at least five times the ERLs. The majority of the maximum metals concentrations were detected in a sampled collected north of the site from the drainage ditch that flows to Tule Lake. Several SVOCs also were detected; however, only the maximum concentrations of anthracene and dibenz(a,h)anthracene exceeded the ERLs. Several maximum concentrations of SVOCs were detected in a sample collected from the drainage ditch at the point where the ditch enters the wetlands. Three pesticides also were detected in the sediment samples: aldrin, chlordane, and DDE. The maximum concentration of chlordane was detected in a sample collected to the east of the North Pit area. A sample collected from where the drainage ditch flows into Tule Lake, contained the maximum concentration of DDE. Concentrations of chlordane and DDE exceeded the ERLs by at least a factor of three; there is no ERL for aldrin.

Groundwater

In groundwater samples, metals were the most frequently detected contaminants. The maximum concentrations of arsenic, cadmium, chromium, and mercury were detected in a sample collected near the center of the North Pit area. All of the six metals detected had maximum concentrations in excess of the ambient water quality criteria (AWQC). Maximum concentrations of arsenic, lead, and silver exceeded the AWQC by an order of magnitude. Concentrations of chromium and mercury exceeded the AWQC by six and eight times respectively. No SVOCs were detected in the groundwater samples, and analysis for pesticides and PCBs was not performed.

Table 2. Maximum concentrations of contaminants of concern to NOAA at the Brine Service Company site (UE 1999; TNRCC 2000). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)		Water (μg/L)		Sediment (mg/kg)	
Contaminant	Soil	ORNL-PRG[a]	Ground-water	AWQCb	Sediment	ERL[c]
METALS/INORGANICS						
Arsenic	**12**	9.9	**740**	36	7.9	8.2
Cadmium	**37**	0.38[d]	**13**	8.8	**5.4**	1.2
Chromium[e]	**640**	0.4	**340**	50	29	81
Copper	**93**	60	N/A	3.1	**48**	34
Lead	**430**	40.5	**270**	8.1	**110**	46.7
Mercury	**11**	0.00051	**0.8**	0.094[f]	**0.76**	0.15
Nickel	11	30	N/A	8.2	19	20.9
Selenium	<5.0	0.21	<25	71	**19**	1.0[g]
Silver	<5.0	2	**140**	1.9[h]	<2.0	1
Zinc	**60**	8.5	N/A	81	**850**	150
PAHs						
Acenaphthene	**39**	20	<5.0	710[i]	<0.63	0.016
Anthracene	4.4	NA	<5.0	300[h,i,j]	**0.22**	0.0853
Benz(a)anthracene	3.3	NA	<5.0	300[h,i,j]	0.2	0.261
Chrysene	3.1	NA	<5.0	300[h,i,j]	0.34	0.384
Dibenz(a,h)anthracene	<33	NA	<5.0	300[h,i,j]	**0.15**	0.0634
Fluoranthene	5.0	NA	<5.0	16[i]	0.34	0.6
Fluorene	67	NA	<5.0	NA	<0.63	0.019
2-Methylnaphthalene	360	NA	<5.0	300[h,i,j]	0.058	0.07
Naphthalene	120	NA	<5.0	2350[h,i]	<0.63	0.16
Phenanthrene	330	NA	<5.0	NA	0.22	0.24
Pyrene	8.9	NA	<5.0	300[h,i,j]	0.41	0.665
PESTICIDES/PCBs						
Aldrin	<0.0029	NA	N/A	1.3[h]	0.0063	NA
Chlordane	<0.0029	NA	N/A	0.004	**0.0016**	0.0005
4,4-DDE	0.0058	NA	N/A	NA	**0.01**	0.0022
Dieldrin	**0.015**	0.00028[d]	N/A	0.0019	<0.0044	0.00002
Total PCBs	**17**	0.371	N/A	0.03	<0.044	0.0227

a: Oak Ridge National Laboratory (ORNL) final preliminary remediation goals (PRG) for ecological endpoints (Efroymson et al. 1997).
b: Ambient water quality criteria 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. Ecological soil screening guidelines (USEPA 2004).
e: Screening guidelines represent concentrations for Cr^{+6}.
f: Derived from inorganics, but applied to total mercury.
g: Marine (AET) for amphipod bioassay. The Apparent Effects Threshold (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.
NA: Screening guidelines not available.
N/A: Contaminant not analyzed for.

Soil

Soil sample analysis indicated the presence of several contaminants of concern. Seven metals were detected at maximum concentrations in excess of the screening guidelines. Arsenic, cadmium, chromium, copper, lead, mercury, and nickel were detected at maximum concentrations in soil from the South Pit area. Maximum concentrations of cadmium and lead exceeded the screening guidelines by one order of magnitude. Mercury and chromium were detected at concentrations that exceeded the screening guidelines by four and three orders of magnitude respectively. Seven SVOCs were detected at maximum concentrations in samples from the South Pit area and three were detected in samples from the North Pit area. The pesticides, dieldrin and DDE were detected in the soil samples. Dieldrin was detected in a sample collected from the North Pit area at a concentration that exceeded the screening guideline by one order of magnitude. PCBs were detected in a sample from the South Pit area at a maximum concentration that exceeded the screening guideline by one order of magnitude.

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Mallard Bay Landing Bulk Plant

Grand Cheniere, Louisiana

EPA Facility ID: LA0000187518

Basin: Mermentau

HUC: 08080202

Executive Summary

The Mallard Bay Landing Bulk Plant (MBLBP) site is an abandoned crude oil refinery and bulk storage facility. The site is on the north bank of the Intracoastal Waterway and near Grand Lake in Cameron Parish, Louisiana. Environmental investigations at the site show that soil, groundwater, and sediments are contaminated with metals, and metals at the site are the contaminants of primary concern to NOAA. The trust habitats of primary concern to NOAA are Grand Lake and the wetlands surrounding the MBLBP site. NOAA trust resources within the area include estuarine species, both fish and invertebrates, as well as several low-salinity-tolerant marine species and the catadromous American eel. Surface water runoff is the primary pathway for the migration of contaminants from the site to NOAA trust resources.

Site Background

The Mallard Bay Landing Bulk Plant (MBLBP) site is an abandoned crude oil refinery and bulk storage facility. The site is on the north bank of the Intracoastal Waterway (ICW) and near Grand Lake in Cameron Parish, Louisiana (Figure 1). The site is composed of two tracts of land, the East and West Facilities, totaling approximately 2 ha (5 acres). The area surrounding the site is mainly undeveloped and is used for hunting and cattle ranching. The East Facility is bordered by the ICW to the north and west and by wooded wetlands to the south and east. The West Facility is bordered by a ditch and wooded wetlands to the north and west. Talen's Marine and Fuel (an active refueling facility and dock) borders the southern edge of the West Facility (Figure 2) (USEPA 1990).

The function of the plant changed many times during its operation. The MBLBP was built in the early 1980s and originally operated as a crude oil refinery. The plant was permitted to receive 5,000 barrels of mixed crude oil per day. The mixed crude oil was refined to produce naphtha (petroleum), diesel fuel oil, and No. 6 fuel oil (reduced crude). In 1981, after receiving a permit to discharge wastewater into an unnamed tributary of the ICW, the plant became a hazardous waste treatment, storage, and disposal facility (Ecology and Environment 1999a). The unnamed tributary's proximity to the site could not be determined.

During the early and mid 1980s, the MBLBP was cited with many violations. A 1987 inspection report by the Louisiana Department of Environmental Quality (LDEQ)-Hazardous Waste Division (HWD) alleged that the plant was accepting hazardous waste fuels, which the plant was not permitted to process. The same inspection report stated that MBLBP received and attempted to process styrene, resulting in serious problems within the refinery and eventually leading to its closure. A 1993 inspection by the LDEQ-Inactive and Abandoned Sites Division (IASD) documented the presence of material and sludge in several tanks, areas of stained soil, and three impoundments filled with unknown liquids (USEPA 1990; Ecology and Environment 1999b).

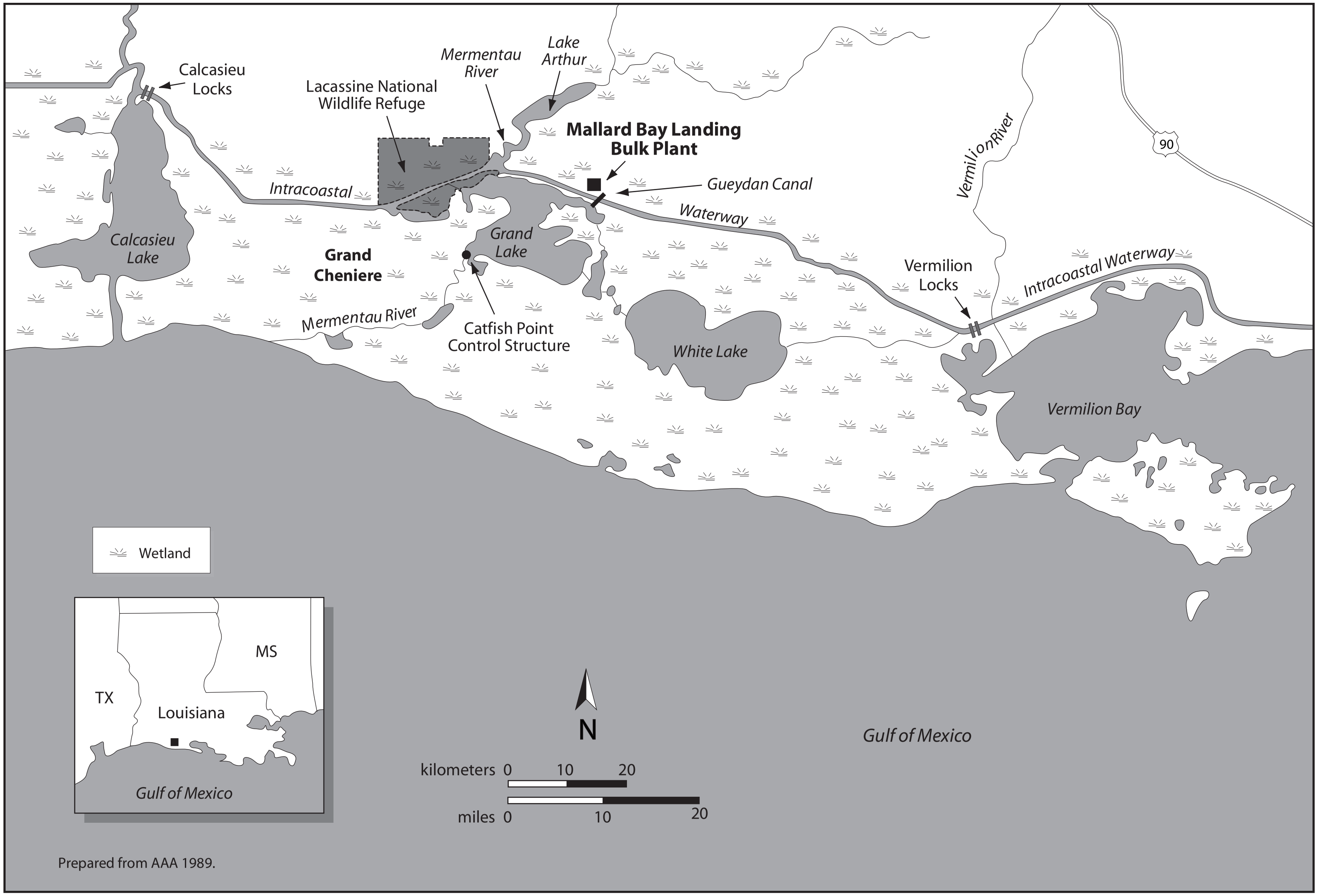

Figure 1. Location of the Mallard Bay Landing Bulk Plant site, Grand Chenier, Cameron Parish, Louisiana.

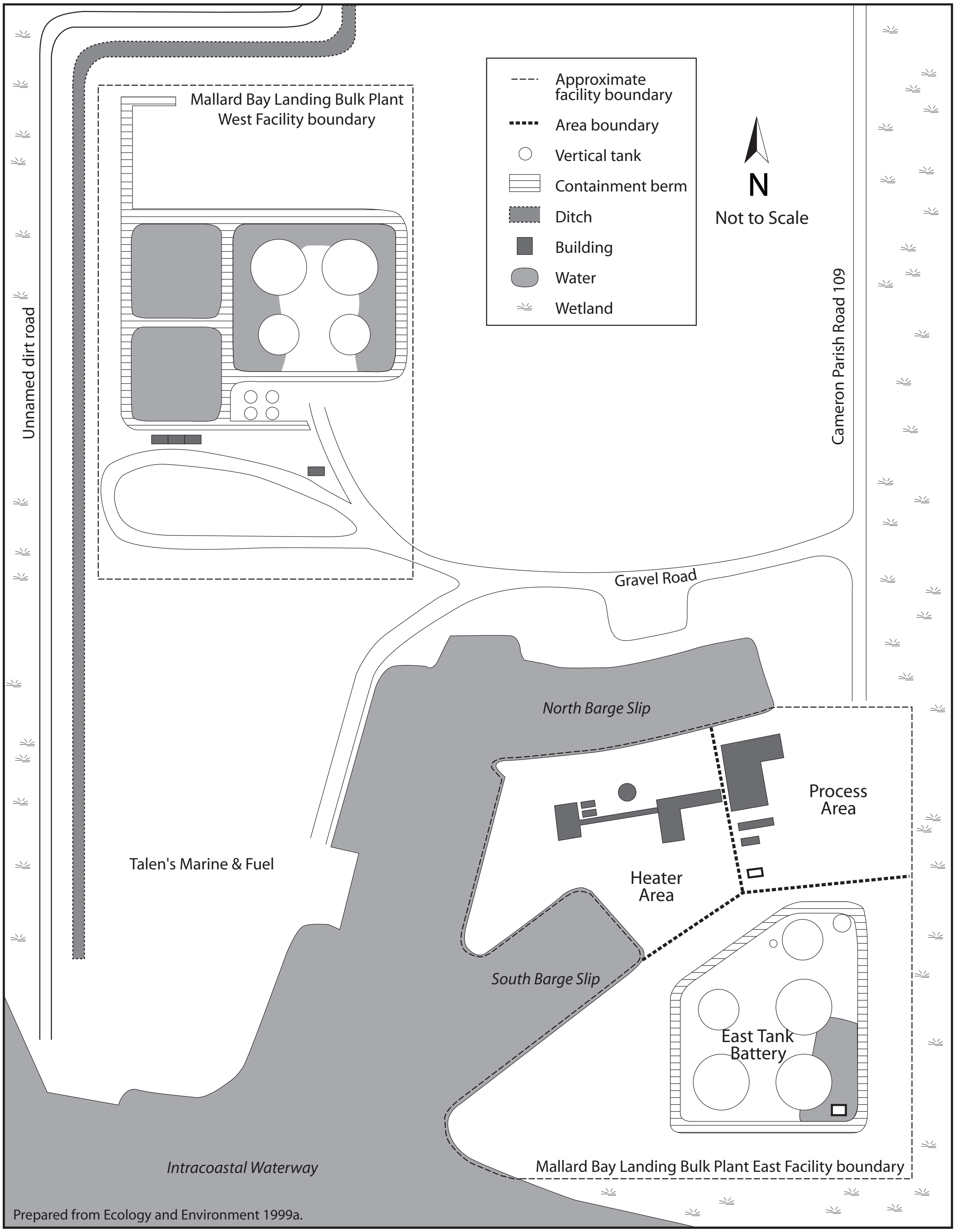

Figure 2. Detail of the Mallard Bay Landing Bulk Plant property.

In 1993, the LDEQ-IASD referred the MBLBP site to the U.S. Environmental Protection Agency (USEPA) because the site was believed to be a potentially hazardous waste site. In 1997, a Superfund Technical Assessment and Response Team (START) initiated removal assessments, which included sampling of all tanks and drums. Removal began in 1998; from January 1999 to March 1999, 3.3 million L (870,000 gal) of oil/waste material from on-site tanks was transported off the site for disposal (USEPA 1990).

The MBLBP site was placed on the National Priorities List on July 27, 2000. In 2001, field activities for a remedial investigation/feasibility study (RI/FS) were conducted, and the RI/FS report was completed in 2002. A Record of Decision for the site was issued in 2003 (USEPA 2004b). From June through October 2003, a remedial action was completed at the site by the USEPA. During the remedial action sludge, contaminated soil, and structures were removed from the site (USEPA 2004b).

Surface water runoff is the primary pathway for the migration of contaminants from the site to NOAA trust resources. Surface water runoff at the MBLBP site drains in many directions. In the vicinity of the heater/process area and the northwest section of the east tank battery (Figure 2), surface water drains into the north and south barge slips and from there into the ICW. Surface water runoff from the east tank battery also drains south and east toward the surrounding low-lying wetlands (USEPA 1990). The distance from the east tank battery to these wetlands is approximately 3 m (10 ft). Surface water from the West Facility drains west approximately 76 m (250 ft) to an unnamed drainage ditch (Ecology and Environment 1999b). Just south of the site, the ICW connects to Grand Lake via Gueydan Canal and an unnamed canal.

NOAA Trust Resources

The trust habitats of primary concern to NOAA are Grand Lake and the wetlands surrounding the MBLBP site. Grand Lake was historically part of an interior, low-salinity estuary. Construction of the Catfish Point Control Structure in 1951 helped block the flow of salt water into Grand Lake, turning the lake into a mostly freshwater ecosystem (LCWCRTF 2002). Salinity within Grand Lake can range from 0.3 to 3.5 parts per thousand in one year (USACE 2004). The only source of salt water to this ecosystem occurs when the locks are opened to allow vessel passage. The lake experiences periods of both low and high salinity, depending on the amount of rainfall and how often the locks are opened within a given time frame (Reed 2002).

The ICW, which flows between the site and Grand Lake, consists primarily of fresh water near the site. A series of locks restricts the amount of salt water entering the system. These locks include the Calcasieu Locks to the west of the site along the ICW, the Catfish Point Control Structure on Grand Lake to the south of the site, and several locks to the east of the site that block saltwater intrusion from Vermilion Bay (Figure 2) (USEPA 1990).

Estuarine and catadromous fish and invertebrate species are present in Grand Lake (Table 1). Adult American eel have been identified in Grand Lake and the Mallard Bay area. Blue crab, striped mullet, and white shrimp are estuarine species that use the lake as spawning, nursery, and adult habitat. Several marine species, including Atlantic croaker, gulf menhaden, and southern flounder, are found in Grand Lake during periods of higher salinity and use the lake for spawning and adult habitat. There is no recreational fishing of NOAA trust resources in the vicinity of the site. White shrimp are fished commercially in Grand Lake during periods of high salinity, when the shrimp become more abundant (Reed 2002). There are no fish consumption advisories or fishery closures specific to Grand Lake (LDEQ 2004).

Table 1. NOAA trust resources present in Grand Lake and Mallard Bay in the vicinity of the Mallard Bay Landing Bulk Plant site (Reed 2002).

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
CATADROMOUS						
American eel	*Anguilla rostrata*			◆		
MARINE/ESTUARINE FISH						
Alligator gar[a]	*Lepisosteus spatula*	◆				
Atlantic croaker[a]	*Micropogonias undulatus*	◆		◆		
Black crappie[a]	*Pomoxis nigromaculatus*	◆		◆		
Gizzard shad	*Dorosoma cepedianum*	◆		◆		
Gulf menhaden[a]	*Brevoortia patronus*	◆		◆		
Southern flounder[a]	*Paralichthys lethostigma*	◆		◆		
Spot[a]	*Leiostomus xanthurus*	◆		◆		
Striped mullet	*Mugil cephalus*	◆	◆	◆		
Warmouth[a]	*Lepomis gulosus*	◆		◆		
White crappie[a]	*Pomoxis annularis*	◆		◆		
INVERTEBRATES						
Blue crab	*Callinectes sapidus*	◆	◆	◆		
White shrimp	*Litopenaeus setiferus*	◆	◆	◆	◆[b]	

a: Species is present during periods of high salinity within Grand Lake and Mallard Bay.

b: Commercial fishery during periods of high salinity within Grand Lake and Mallard Bay.

Site-Related Contamination

Twenty soil samples, 13 groundwater samples, and 17 sediment samples were collected from the MBLBP site. All samples were analyzed for metals, volatile organic compounds, and semivolatile organic compounds, including polycyclic aromatic hydrocarbons (PAHs) (Ecology and Environment 1999a). Based on the results of these analyses, the primary contaminants of concern to NOAA are metals. Table 2 summarizes the maximum contaminant concentrations detected in the soil, groundwater, and sediment samples and compares them to appropriate screening guidelines. Only maximum concentrations that exceeded relevant screening guidelines are discussed below. The screening guidelines are the Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRGs) for soil, the ambient water quality criteria (AWQC) for groundwater, and the threshold effects concentrations (TECs) for sediment.

Soil

Soil samples contained maximum concentrations of metals in excess of the ORNL-PRGs. The maximum concentration of arsenic slightly exceeded the ORNL-PRG. The maximum concentration of selenium exceeded the ORNL-PRG by a factor of approximately 7.5. The maximum concentrations of cadmium, chromium, and zinc exceeded the ORNL-PRGs by more than one order of magnitude. The maximum concentration of mercury exceeded the ORNL-PRG by three orders of magnitude. PAHs were also detected in soil samples, but no ORNL-PRGs are available for comparison to the maximum concentrations of PAHs.

Table 2. Maximum concentrations of contaminants of concern to NOAA detected in samples collected at the Mallard Bay Landing Bulk Plant site (Canning and Carson 1999; Ecology and Environment 1999a). Contaminant values in bold exceeded screening guidelines.

	Soil (mg/kg)		Water (µg/L)		Sediment (mg/kg)	
Contaminant	Soil	ORNL-PRG[a]	Ground-water	AWQC[b]	Sediment	TEC[c]
METALS/INORGANICS						
Arsenic	**10.1**	9.9	**2000**	150	4.5	9.79
Cadmium	**8.4**	0.38[d]	**45**	0.25[e]	ND	0.99
Chromium[f]	**28**	0.4	**210**	11	11	43.4
Copper	28	60	**280**	9[e]	9.2	31.6
Lead	40	40.5	**520**	2.5[e]	13.3	35.8
Mercury	**1.5**	0.00051	ND	0.77[g]	**0.38**	0.18
Nickel	10	30	**520**	52[e]	8.6	22.7
Selenium	**1.6**	0.21	**1900**	5.0[h]	0.8	NA
Zinc	**720**	8.5	**620**	120[e]	**640**	121
PAHs						
Anthracene	2.4	NA	ND	NA	N/A	0.0572
Fluoranthene	2.7	NA	ND	NA	N/A	0.423
Fluorene	4.6	NA	ND	NA	N/A	0.0774
Naphthalene	48	NA	ND	620[i]	N/A	0.176
Phenanthrene	13	NA	ND	NA	N/A	0.204
Pyrene	5.2	NA	ND	NA	**3.1**	0.195

a: Oak Ridge National Laboratory (ORNL) final preliminary remediation goals (PRG) for ecological endpoints (Efroymson et al. 1997).

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 et al. 2000).

d: Ecological soil screening guidelines (USEPA 2004a).

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

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

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

h: Criterion expressed as total recoverable metal.

i: Lowest observable effects level (LOEL) (USEPA 1986).

NA: Screening guidelines not available.

N/A: Not analyzed for.

ND: Not detected.

Groundwater

Excepting mercury, maximum concentrations of all metals for which the groundwater samples were analyzed exceeded the AWQC. The maximum concentration of zinc exceeded the AWQC by a factor of five. Maximum concentrations of arsenic, chromium, copper, and nickel exceeded AWQCs by more than one order of magnitude, while the maximum concentrations of cadmium, lead, and selenium exceeded the AWQCs by more than two orders of magnitude. The maximum concentrations of metals were detected in a groundwater sample from the Talen's Marine and Fuel property. Organic compounds were not detected in the groundwater samples.

Sediment

The maximum concentration of mercury in sediment samples exceeded the TEC by a factor of two, while the maximum concentration of zinc exceeded the TEC by more than a factor of five. Other metals were detected in sediment samples, but at maximum concentrations that did not exceed the TECs. The maximum concentration of mercury was detected in a sample collected from the wetlands east of the East Facility. The maximum concentration of zinc occurred in a sample collected from the ICW south of the site. Pyrene, a PAH, was detected at a maximum concentration that exceeded the TEC by more than one order of magnitude.

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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.

Aestivation The dormant or sluggish state that some animals enter to cope with periods of hot and dry conditions.

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]

Amphidromous Refers to predominately freshwater species that require estuarine or marine waters for completion of larval phases.

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, waterproofing, 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.

Iteroparous Animals that do not die after spawning.

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

Karst A type of topography that results from dissolution and collapse of carbonate rocks such as limestone and dolomite and characterized by closed depressions or sinkholes, caves, and underground drainage.[5]

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.

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.[6]

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.[4]

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.[7]

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).[7]

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.[3]

Substrate The composition of a streambed, including either mineral or organic materials.[8]

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.[9]

Threshold Effects Concentration (TEC) Concentration below which harmful effects are unlikely to be observed.

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/ (accessed September 17, 2004).

2 http://response.restoration.noaa.gov/cpr/sediment/SPQ.pdf (accessed September 17, 2004).

3 http://www.epa.gov/OCEPAterms/ (accessed September 17, 2004).

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

5 http://water.usgs.gov/pubs/circ/circ1166/nawqa91.e.html (accessed September 17, 2004).

6 http://www.forester.net/sw_glossary.html (accessed September 17, 2004).

7 http://www.atsdr.cdc.gov/toxprofiles/ (accessed September 17, 2004).

8 http://www.streamnet.org/pub-ed/ff/Glossary/ (accessed September 17, 2004).

9 http://www.epa.gov/espp/coloring/especies.htm (accessed September 17, 2004).

Appendix

Appendix

Table 1. List of the 361 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
Naval Weapons Industrial Reserve Plant	1995	MA6170023570
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
Callahan Mining Corp	***2004***	***MED980524128***
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. (Toms River Chemical Company)	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
Diamond Head Oil Refinery Div.	***2004***	***NJD092226000***
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 (Horseshoe Road Dump)	1984	NJD980663678
Horseshoe Road (Horseshoe Road Industrial Complex)	1995	NJD980663678
Horseshoe Road (Atlantic Development Facility)	1984	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

Region 2 *cont.*

New Jersey *cont.*	**Date**	**EPA Facility ID**
LCP Chemicals, Inc.	1999	NJD079303020
Martin Aaron, Inc.	2003	NJD014623854
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 (T. Fiore Demolition, Inc. Site)	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
Mackenzie Chemical Works	***2004***	***NYD980753420***
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
Pesticide Warehouse III	***2004***	***PRD987367299***
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

Region 3 *cont.*

Delaware *cont.*	**Date**	**EPA Facility ID**
Delaware Sand & Gravel	1984	DED000605972
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
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
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
United Metals, Inc.	***2004***	***FLD098924038***
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
Davis Timber Company	***2004***	***MSD046497012***
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

Region 6

Louisiana		
Bayou Sorrel Site	1984	LAD980745541
Delatte Metals	2002	LAD052510344
Madisonville Creosote Works	1997	LAD981522998
Mallard Bay Landing Bulk Plant	***2004***	***LA0000187518***

Texas		
ALCOA (Point Comfort)/Lavaca Bay	1995	TXD008123168
Bailey Waste Disposal	1985	TXD980864649
Brine Service Company	***2004***	***TX0000605264***
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

California		
Alameda Naval Air Station	1989	CA2170023236
Camp Pendleton Marine Corps Base	1990	CA2170023533
Coast Wood Preserving	1984	CAD063015887
Concord Naval Weapons Station (Naval Weapons Station)	1989	CA7170024528
Concord Naval Weapons Station (Naval Weapons Station Concord)	1993	CA7170024528
Cooper Drum Co.	1993	CAD055753370
CTS Printex, Inc.	1989	CAD009212838
Del Amo Facility (Del Amo)	1992	CAD029544731
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	1989	CAD980498562
GBF, Inc. Dump (GBF/Pittsburg Landfill)	1993	CAD980498562
Hewlett-Packard (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 (Alviso Dumping Areas)	1985	CAD980894885
Travis Air Force Base	1990	CA5570024575

Region 9 *cont.*

Guam	Date	EPA Facility ID
Andersen Air Force Base	1993	GU6571999519

Hawaii		
Del Monte Corp. (Oahu Plantation)	1995	HID980637631
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 (Lower Willamette River)	2003	ORSFN1002155
Rhone Poulenc, Inc. (Stauffer Chemical)	1984	ORD990659492
Teledyne Wah Chang	1985	ORD050955848
Union Pacific Railroad	1990	ORD009049412

Region 10 *cont.*

Washington	Date	EPA Facility ID
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
Centralia Municipal Landfill	1989	WAD980836662
Commencement Bay, Near Shore/Tide Flats & South Tacoma Channel	1984	WAD980726368 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	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 (946) 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	1995			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
Callahan Mining Corp	***2004***			***MED980524128***
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			NH7570024847
Savage Municipal Water Supply	1985	1991		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
Old Springfield Landfill	1987	1988		VTD000860239

Region 1 *cont.*

Vermont *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
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. (Toms River Chemical Company)	1984	1989, 1992		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.	***2004***			***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 (Atlantic Development Facility)	1984			NJD980663678
Horseshoe Road (Horseshoe Road Dump)	1984			NJD980663678
Horseshoe Road (Horseshoe Road Industrial Complex)	1995			NJD980663678
Iceland Coin Laundry and Dry Cleaning				NJ0001360882
Ideal Cooperage Inc.	1984			NJD980532907
Imperial Oil Co., Inc./Champion Chemical				NJD980654099

Region 2 *cont.*

New Jersey *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Industrial Latex Corp.	1989			NJD981178411
ISP Environmental Services, Inc.				NJD002185973
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

Region 2 *cont.*

New Jersey *cont.*	**WSR**	**PNRS**	**USAF**	**EPA FACILITY ID**
Pohatcong Valley Groundwater Contamination				NJD981179047
Pomona Oaks Residential Wells				NJD980769350
Price Landfill	1984	1993		NJD070281175
Puchack Well Field	1999			NJD981084767
Pulverizing Services				NJD980582142
PVSC Sanitary Landfill (T. Fiore Demolition, Inc. Site)	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

Region 2 *cont.*

New Jersey *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
White Chemical Corp	1984			NJD001239185
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
Mackenzie Chemical Works	***2004***			***NYD980753420***
Malta Rocket Fuel Area				NYD980535124
Marathon Battery Corp.	1984	1989		NYD010959757
Mattiace Petrochemical Co., Inc.	1989	1990		NYD000512459
Mercury Refining Inc.				NYD048148175

Region 2 *cont.*

New York *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Nepera Chemical Co., Inc.				NYD002014595
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
Pesticide Warehouse III	***2004***			***PRD987367299***
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	1991, 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		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		date unk.*		PAD002395887
Paoli Rail Yard	1987			PAD980692594
Publicker/Cuyahoga Wrecking Plant	1990			PAD981939200
Raymark				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	date unk.*		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	date unk.*		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
United Metals, Inc.	***2004***			***FLD098924038***
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	***2004***			***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
Para-Chem Southern, Inc				SCD002601656

Region 4 *cont.*

South Carolina *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
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	NA
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

Minnesota	
St Louis River/Interlake	MND039045430

Ohio	
Ashtabula River	NA
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	***2004***			***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
1994 Conoco EDC Spill				NA
ALCOA (Point Comfort)/Lavaca Bay	1995			TXD008123168
Bailey Waste Disposal	1985	1989		TXD980864649
Brine Service Company	***2004***			***TX0000605264***
Brio Refining, Inc.	1989	1989		TXD980625453
Brio/DOP				NA
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 (Naval Weapons Station Concord)	1993			CA7170024528
Concord Naval Weapons Station (Naval Weapons Station)	1989			CA7170024528
Cooper Drum Co.	1993			CAD055753370
Crazy Horse Sanitary Landfill				CAD980498455
CTS Printex, Inc.	1989			CAD009212838
Del Amo Facility	2004			CAD029544731
Del Amo Facility (Del Amo)	1992			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	1989			CAD980498562
GBF, Inc. Dump (GBF/Pittsburg Landfill)	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

Region 9 *cont.*

California *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Intersil Inc./Siemens Components	1989			CAD041472341
Iron Mountain Mine	1989	1989		CAD980498612
J.H. Baxter & Co				CAD000625731
Jasco Chemical Corp.	1989			CAD009103318
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

Region 9 *cont.*

California *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Point Loma Naval Complex				CA1170090236
Port Hueneme Naval Constr Battalion Ctr				CA6170023323
Presidio of San Francisco				CA7210020791
Ralph Gray Trucking Co				CAD981995947
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 (Alviso Dumping Areas)	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

Region 9 *cont.*

Hawaii	WSR	PNRS	USAF	EPA FACILITY ID
ABC Chem Corp				HID033233305
Barbers Point Naval Air Station				HI1170024326
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				NA
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		date unk.*		AKSFN1002080
Elmendorf Air Force Base	1990	1990	1994	AK8570028649

Region 10 *cont.*

Alaska *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Fort Richardson (US Army)	1995			AK6214522157
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		date unk.*		OR0001389972
Portland Harbor (Lower Willamette River)	2003	1999		ORSFN1002155
Reynolds Metals Company		1996		ORD009412677
Rhone Poulenc, Inc. (Stauffer Chemical)	1984			ORD990659492
Taylor Lumber and Treating		1991		ORD009042532

Region 10 *cont.*

Oregon *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Teledyne Wah Chang	1985	1988		ORD050955848
Union Pacific Railroad	1990	1990		ORD009049412

Washington				
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		1988		WAD980726368
Commencement Bay, Near Shore/ Tide Flats & South Tacoma Channel	1984			WAD980726368 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	1992		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

Region 10 *cont.*

Washington *cont.*	WSR	PNRS	USAF	EPA FACILITY ID
Puget Sound Naval Shipyard	1995	1992		WA2170023418
Quendall Terminals	1985			WAD980639215
Rayonier Incorporated Port Angeles Mill (ITT Rayonier)		2000		WAD000490169
Seattle Municipal Landfill (Kent Highlands)	1989	1988		WAD980639462
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		1989, 1995		WA4170090001
Wyckoff Co./Eagle Harbor (ferry dock & wood treatment facility)	1986	1988		WAD009248295

* date unk. =date unknown

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