Coastal Hazardous Waste Site

REVIEWS

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Coastal Hazardous Waste Site Reviews

Introduction

This report identifies uncontrolled hazardous waste sites that could pose a threat to natural resources for which the National Oceanic and Atmospheric Administration (NOAA) acts as a trustee. NOAA carries out responsibilities as a Federal trustee for natural resources under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan. As a trustee, NOAA identifies sites that could affect natural resources, determines the potential for injury to the resources, evaluates cleanup alternatives, and carries out restoration actions. NOAA works with the U.S. Environmental Protection Agency (EPA) to identify and assess risks to coastal resources from hazardous waste sites, and to develop strategies to minimize those risks.

NOAA regularly conducts evaluations of hazardous waste sites proposed for addition to the National Priorities List[1] (NPL) by EPA. The waste sites evaluated in this report are drawn from the list of all sites, including Federal facilities, proposed for inclusion on the NPL on September 25, 1997 and March 6, 1998.

The sites of concern to NOAA are located in counties bordering the Atlantic Ocean, Pacific Ocean, Great Lakes, and Gulf of Mexico, or are near inland water bodies that support anadromous fish populations. Not all sites in coastal states will affect NOAA trust resources. To select sites on the National Priorities List for initial investigation, only sites in coastal counties or sites near important anadromous or catadromous fish habitat are considered to have potential to affect trust resources.

These reports are an overall guide to the potential for injury to NOAA trust resources resulting from a site. NOAA uses this information to establish priorities for investigating sites. Sites that appear to pose ongoing problems will be followed by a NOAA Coastal Resource Coordinator (CRC) in the appropriate region. The CRC communicates concerns about ecological impact to EPA, reviews sampling and monitoring plans for the site, and helps plan and set objectives for remedial actions to clean up the site. NOAA works with other trustees to plan a coordinated approach for remedial action that protects all natural resources (not just those for which NOAA is a steward). Other Federal and state trustees can use the hazardous waste site reports to help determine the risk of injury to their trust resources. EPA uses the site reports to help identify the types of information that may be needed to complete an environmental assessment of the site.

These coastal site reports are often NOAA's first examination of a site. Sites with potential to impact NOAA resources may also have a more in-depth assessment of potential injury to environmental receptors, called a Preliminary Natural Resource Survey (PNRS). EPA may request a PNRS early in the remedial process to document the rationale for adding a site to the National Priorities List.

Eleven coastal sites were identified in 1998 using this selection method and coastal hazardous waste site reports completed for them. This reporting brings the total number of sites considered by NOAA to 761. Defense Installation Natural Resource Assessment Guidance Reports, similar to PNRSs, were completed under a cooperative agreement with the U.S. Air Force in 1994. NOAA has completed 314 coastal hazardous waste site reviews since 1984 (published in April 1984[2], June 1985[3], April 1986[4], June 1987[5], March 1989[6], June 1990[7], September 1992[8], December 1993[9], June 1995[10], September 1995[11], July 1996[12], December 1997[13], and this report). NOAA has completed 140 PNRSs and three U.S. Air Force reports since 1988. Several sites have had multiple reviews or PNRSs; these multiples are reflected in the total numbers above. Three hundred sites have been reviewed (three sites more than once), and 140 sites have had PNRSs (three more than once).

The 1999 Coastal Hazardous Waste Site Reviews contain four major sections. "Site Exposure Potential" describes activities at the site that caused the release of contaminants; local topography; and potential contaminant migration pathways. "NOAA Trust Habitats and Species" describes the habitats and species at risk of injury from releases at the site. The life stages of organisms using habitats near the site are discussed, as are commercial and recreational fisheries. "Site-Related Contamination" identifies contaminants of concern to NOAA, the transport of the contaminants in the environment, and the concentrations at which the contaminants are found. "Summary" cogently recaps this information.

Tables and Screening Values

Most of these reports contain tables of contaminants measured at the site. These tables were formulated to highlight contaminants that represent a potential problem, and to focus our concerns on only a few of the many contaminants normally present at a waste site. Data presented in tables were screened against standard comparison values, depending on the source of the sample. Screening values used are ambient water quality criteria[14], soil averages[15,16], Effects Range Low (ERL) values[17], and Threshold Effects Level (TEL) values[18].

Because releases to the environment from hazardous waste sites can span many years, we are concerned about chronic impacts. Therefore, we typically make comparisons with the lower standard value (e.g., chronic vs. acute AWQC and ERL vs. ERM). No national criteria similar to the AWQC are available for sediment. Thus, sediment concentrations were screened by comparison with the ERL reported by Long et al.[17] The ERL value is the marine or estuarine sediment concentration corresponding to the lowest 10-percentile of biological measurements reported as effects. As such, it represents the low end of the range of concentrations at which effects were observed in the studies compiled by the authors.

The TEL is intended to represent the freshwater sediment concentration below which adverse biological effects rarely occurred. The TEL is the geometric mean of the 15th percentile of the effects data and the PEL is the 50th percentile of the no-effects data reported by Smith et al[18].

Soil samples were compared to selected averages reported in *Element concentrations in soils and other surficial materials of the coterminous United States* (Shacklette and Boerngen 1984), except for cadmium and silver which are compared to concentrations reported in *Hazardous Waste Land Treatment* (EPA 1983). These values were averaged from a data set from soil throughout the entire U.S. Ideally, reference values for soil would be calculated on a regional basis, from a data set large enough to give a value representative of the area. In the absence of such data, the national average values were used as a reference for comparison purposes only.

Table 1 lists all of the sites at which NOAA has been involved that could potentially affect trust resources, as of December 1998. Tables 2 and 3 list acronyms, abbreviations, and terms commonly used in these waste site reports.

[1]National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300.

[2]Ocean Assessments Division. 1984. *Coastal Hazardous Waste Site Review April 13, 1984.* NOAA / OAD, Seattle, Washington.

[3]Pavia, R., and L. Harris, eds. 1985. *Coastal Hazardous Waste Site Review June 30, 1985.* NOAA / OAD, Seattle, Washington

[4]Pavia, R., and L. Harris, eds. 1986. *Coastal Hazardous Waste Site Review: Site Reports April 1986*. NOAA / OAD, Seattle, Washington.

[5]Pavia, R., and L. Harris, eds. 1987. *Coastal Hazardous Waste Site Review: Site Reports June 1987*. NOAA / OAD, Seattle, Washington.

[6]Pavia, R., and L. Harris, eds. 1989. *Coastal Hazardous Waste Site Review: Site Reports March 1989*. NOAA / OAD, Seattle, Washington.

[7]Hoff, R., and L. Harris, eds. 1990. *Coastal Hazardous Waste Site Review: Site Reports June 1990*. NOAA / OAD, Seattle, Washington.

[8]Beckvar, N., and L. Harris, eds. 1992. *Coastal Hazardous Waste Site Reviews September 1992*. NOAA / ORCA, Seattle, Washington.

[9]Beckvar, N., and L. Harris, eds. 1993. *Coastal Hazardous Waste Site Reviews December 1993.* NOAA / ORCA, Seattle, Washington.

[10]Beckvar, N., G. Garman, and L. Harris, eds. 1995. *Coastal Hazardous Waste Site Reviews June 1995.* NOAA / ORCA, Seattle, Washington.

[11]Garman, G., and L. Harris, eds. 1995. *Coastal Hazardous Waste Site Reviews September 1995.* NOAA / ORCA, Seattle, Washington.

[12]Garman, G., and L. Harris, eds. 1996. *Coastal Hazardous Waste Site Reviews July 1996.* NOAA / ORCA, Seattle, Washington.

[13]Garman, G., and L. Harris, eds. 1997. *Coastal Hazardous Waste Site Reviews December 1997.* NOAA / ORCA, Seattle, Washington.

[14]U.S. EPA. 1993. *Water quality criteria*. Washington, DC: U.S. Environmental Protection Agency, Office of Water, Health and Ecological Criteria Division. 294 pp.

[15]U.S. EPA. 1983. *Hazardous waste land treatment*. EPA / 530 / SW-83 / 874. Cincinnati: Municipal Environmental Research Laboratory. 702 pp.

[16]Shacklette, H.T., and J.G. Boerngen. 1984. *Element concentrations in soils and other surficial materials of the conterminous United States.* USGS Professional Paper 1270. Washington, D.C.: U.S. Geological Survey.

[17]Long, E. R., D. D. MacDonald, S. L. Smith, and F. D. Calder. 1995. Incidence of adverse biological effects within ranges of chemical concentrations in marine and estuarine sediments. *Environmental Management 19*: 81-97.

[18]Smith, S.L., D.D. MacDonald, K.A. Keenleyside, C.G. Ingersoll, and L.J. Field. 1996. A preliminary evaluation of sediment quality assessment values for freshwater ecosystems. *Journal of Great Lakes Research 22*(3):624-638.

Table 1. Sites reviewed by NOAA (761) as of April 1999, including those sites for which a Coastal Hazardous Waste Site Review (314), a Preliminary Natural Resource Survey (PNRS; 140), or a U.S. Air Force report (3) has been completed. Sites in bold are reviewed in this volume .

State	Cerclis No.	Site Name	Report Date Review	Report Date PNRS
Federal Region 1				
CT	CTD983884412	29 Pomperaug Road		
CT	CTD980732333	Barkhamsted-New Hartford Landfill	1989	
CT	CTD072122062	Beacon Heights Landfill	1984	
CT	CTD001155761	Dexter Corp.		
CT	CTD108960972	Gallup's Quarry	1989	
CT	CTD001145341	Hamilton Standard		
CT	CTD980670814	Kellogg-Deering Well Field	1987	
CT	CTD980521165	Laural Park, Inc.		1988
CT	CTD001153923	Linemaster Switch Corp.		
CT	CTD980906515	New London Submarine Base	1990	
CT	CTD980669261	Nutmeg Valley Road		
CT	CTD980667992	O'Sullivans Island	1984	
CT	CTD980670806	Old Southington Landfill		
CT	CTD051316313	Precision Plating Corp.		
CT	CTD001186618	Raymark Industries, Inc.	1996	
CT	CTD004532610	Revere Textile Prints Corp.		
CT	CTD001449784	Sikorsky Aircraft Division UTC		
CT	CTD009717604	Solvents Recovery Service New England		
CT	CTD001168533	Upjohn Co-Fine Chemicals Division		
CT	CTD009774969	Yaworski Waste Lagoon	1985	1989
MA	MAD001026319	Atlas Tack Corp	1989	
MA	MAD001041987	Baird & McGuire		
MA	MAD982191363	Blackburn and Union Privileges	1993	
MA	MAD079510780	Cannon Engineering Corp. (CEC)		1988
MA	MAD003809266	Charles-George Reclamation Landfill	1987	1988
MA	MAD981063142	Coal Tar Processing Facility (Former)		
MA	MA7210025154	Fort Devens		
MA	MAD980520670	Fort Devens - Sudbury Training Annex		
MA	MAD002084093	General Electric Co.-Housatonic River	1999	
MA	MAD980732317	Groveland Wells	1987	1988
MA	MA8570024424	Hanscom Field/Hanscom Air Force Base	1995	
MA	MAD980523336	Haverhill Municipal Landfill	1985	
MA	MAD980732341	Hocomonco Pond		
MA	MAD076580950	Industri-Plex	1987	1988
MA	MAD051787323	Iron Horse Park		
MA	MA0213820939	Materials Technology Laboratory (USARMY)	1995	
MA	MA1210020631	Natick Laboratory Army Research, D& E Center	1995	
MA	MA6170023570	Naval Weapons Industrial Reserve Plant		
MA	MAD980731335	New Bedford Site	1984	
MA	MAD980670566	Norwood PCBs		
MA	MAD990685422	Nyanza Chemical Waste Dump	1987	1993
MA	MA2570024487	Otis Air National Guard/Camp Edwards		
MA	MAD980525232	Plymouth Harbor/Cannon Engineering Corp.	1984	1990

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 1 *(cont.)*				
MA	MAD980731483	PSC Resources		
MA	MAD980520621	Re-Solve, Inc.		
MA	MAD980524169	Rose Disposal Pit		
MA	MAD980525240	Salem Acres		1991
MA	MAD980503973	Shpack Landfill		
MA	MAD000192393	Silresim Chemical Corp.		
MA	MA2170022022	South Weymouth Naval Air Station	1995	
MA	MAD980731343	Sullivan's Ledge	1987	1989
MA	MAD001002252	W. R. Grace and Co. , Inc. (Acton Plant)		
MA	MAD980732168	Wells G & H		1990
ME	ME8170022018	Brunswick Naval Air Station	1987	1991
ME	MED981073711	Eastern Surplus Co.		
ME	MED000242701	Int. Minerals and Chemicals Corp.		
ME	ME9570024522	Loring Air Force Base		
ME	MED980524078	McKin Company	1984	
ME	MED980731475	O'Connor Company	1984	
ME	MED018980227	O'Connor Company Main Office		
ME	MED980732291	Pinettes Salvage Yard		
ME	ME7170022019	Portsmouth Naval Shipyard	1995	
ME	MED980504393	Saco Municipal Landfill	1989	
ME	MED980520241	Saco Tannery Waste Pits		
ME	MED042143883	Union Chemical Company, Inc.		
ME	MED980504435	Winthrop Landfill		
NH	NHD980524086	Auburn Road Landfill		1989
NH	NHD018958140	Beede Waste Oil	1997	
NH	NHD064424153	Coakley Landfill	1985	1989
NH	NHD980520191	Dover Municipal Landfill	1987	1990
NH	NHD001079649	Fletcher's Paint Works & Storage	1989	
NH	NHD069911030	Grugnale Waste Disposal Site	1985	
NH	NHD062002001	Kearsarge Metallurgical Corp.		
NH	NHD092059112	Keefe Environmental Services		
NH	NHD980503361	Mottolo Pig Farm		
NH	NHD001091453	New Hampshire Plating Co.	1992	
NH	NHD990717647	Ottati & Goss/Kingston Steel Drum		
NH	NH7570024847	Pease Air Force Base	1990	
NH	NHD980671002	Savage Municipal Water Supply	1985	1991
NH	NHD980520225	Somersworth Sanitary Landfill		
NH	NHD980671069	South Municipal Water Supply Well		
NH	NHD099363541	Sylvester	1985	
NH	NHD989090469	Tibbetts Road		
NH	NHD062004569	Tinkham Garage		
NH	NHD9810633860	Town Garage/Radio Beacon Site		
RI	RID980520183	Central Landfill		
RI	RID980731459	Davis (GSR) Landfill		
RI	RID980523070	Davis Liquid Waste	1987	
RI	RI6170022036	Davisville Naval Construction Batt. Center	1990	1994
RI	RID093212439	Landfill & Resource Recovery, Inc. (L&RR)		
RI	RI6170085470	Newport Naval Education/Training Center	1990	1994
RI	RID055176283	Peterson/Puritan, Inc.	1987	1990
RI	RID980579056	Picillo Farm	1987	1988

State	Cerclis	Site Name	Report Date Review	Report Date PNRS
Federal Region 1 *(cont.)*				
RI	RID980521025	Rose Hill Regional Landfill	1989	1994
RI	RID980731442	Stamina Mills, Inc.	1987	1990
RI	RID981063993	West Kingston Town Dump/URI Disposal	1992	
RI	RID009764929	Western Sand & Gravel	1987	
VT	VTD981064223	Bennington Municipal Sanitary Landfill		
VT	VTD980520092	BFI Sanitary Landfill (Rockingham)	1989	
VT	VTD003965415	Burgess Brothers Landfill		
VT	VTD980520118	Darling Hill Dump		
VT	VTD000860239	Old Springfield Landfill	1987	1988
VT	VTD981062441	Parker Sanitary Landfill		
VT	VTD980523062	Pine Street Canal		
VT	VTD000509174	Tansitor Electronics, Inc		
Federal Region 2				
NJ	NJD030253355	A.O. Polymer		
NJ	NJD000525154	Albert Steel Drum	1984	
NJ	NJD002173276	American Cyanamid Co.	1985	
NJ	NJD980654149	Asbestos Dump		
NJ	NJD011308988	Atlantic Aviation Corp.		
NJ	NJD980528731	Atlantic Development[1]	1984	
NJ	NJD063157150	Bog Creek Farm	1984	1992
NJ	NJD980505176	Brick Township Landfill	1984	
NJ	NJD053292652	Bridgeport Rental & Oil Services		1990
NJ	NJD078251675	Brook Industrial Park	1989	
NJ	NJD980504997	Burnt Fly Bog		1992
NJ	NJD048798953	Caldwell Trucking Co.		
NJ	NJD000607481	Chemical Control	1984	
NJ	NJD980484653	Chemical Insecticide Corp.	1990	1992
NJ	NJD047321443	Chemical Leaman Tank Lines, Inc.		1989
NJ	NJD980528889	Chemsol, Inc.		
NJ	NJD980528897	Chipman Chemical Co.	1985	
NJ	NJD001502517	Ciba-Geigy Corp.	1984	1989
NJ	NJD980785638	Cinnaminson Ground Water Contamination		
NJ	NJD094966611	Combe Fill South Landfill		
NJ	NJD981557879	Cornell Dubilier Electronics, Inc.	1999	
NJ	NJD000565531	Cosden Chemical Coatings Corp.	1987	
NJ	NJD002141190	CPS/Madison Industries		1990
NJ	NJD011717584	Curcio Scrap Metal, Inc.	1987	
NJ	NJD980529002	Delilah Road		
NJ	NJD046644407	Denzer & Schafer X-Ray Co.	1984	1992
NJ	NJD980761373	De Rewal Chemical Co.	1985	
NJ	NJD980528996	Diamond Alkali Co.	1984	
NJ	NJD002442408	Diamond Shamrock Corp.		
NJ	NJD980529416	D'Imperio Property		
NJ	NJD980529085	Ellis Property		
NJ	NJD980654222	Evor Phillips Leasing		1992
NJ	NJD980761365	Ewan Property		
NJ	NJ9690510020	Federal Aviation Admin. Tech. Center	1990	

[1]Formerly Sayreville Pesticide Dump

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 2 *(cont.)*				
NJ	NJ2210020275	Fort Dix (Landfill site)		
NJ	NJD986570992	Franklin Burn Site		
NJ	NJD041828906	Fried Industries		
NJ	NJD980771638	GAF Corp.		
NJ	NJD053280160	Garden State Cleaners Co.	1989	
NJ	NJD980529192	Gems Landfill		
NJ	NJD063160667	Global Sanitary Landfill	1989	1991
NJ	NJD980530109	Goose Farm		
NJ	NJ0001327733	Grand Street Mercury		
NJ	NJD980505366	Helen Kramer Landfill		1990
NJ	NJD002349058	Hercules, Inc. (Gibbstown Plant)	1984	1993
NJ	NJD053102232	Higgins Disposal	1989	
NJ	NJD981490261	Higgins Farm	1989	
NJ	NJD980532840	Hopkins Farm		
NJ	NJD980663678	Horseshoe Road	1984/1995	
NJ	NJD980532907	Ideal Cooperage Inc.	1984	
NJ	NJD980654099	Imperial Oil Co., Inc./Champion Chemicals		
NJ	NJD981178411	Industrial Latex Corp.	1989	
NJ	NJD980505283	Jackson Township Landfill	1984	
NJ	NJD097400998	JIS Landfill		
NJ	NJD002493054	Kauffman & Minteer, Inc.	1989	
NJ	NJD049860836	Kin-Buc Landfill	1984	1990
NJ	NJD980505341	King of Prussia		
NJ	NJD002445112	Koppers Co., Inc./Seaboard Plant	1984	
NJ	NJD980529838	Krysowaty Farm	1985	
NJ	NJD079303020	LCP Chemicals, Inc.	1999	
NJ	NJD980505416	Lipari Landfill		
NJ	NJD980505424	Lone Pine Landfill		1992
NJ	NJD085632164	M&T Delisa Landfill		
NJ	NJD980654180	Mannheim Avenue Dump		
NJ	NJD980529762	Maywood Chemical Co.		
NJ	NJD002517472	Metaltec/Aerosystems		
NJ	NJ0210022752	Military Ocean Terminal (Landfill)		
NJ	NJD000606756	Mobil Chemical Co.	1984	
NJ	NJD980505671	Monroe Township Landfill		
NJ	NJD980654198	Myers Property		
NJ	NJD002362705	Nascolite Corp.		
NJ	NJ7170023744	Naval Air Engineering Center		
NJ	NJ0170022172	Naval Weapons Station Earle (Site A)		
NJ	NJD061843249	NL Industries	1984	1992
NJ	NJD980529598	Pepe Field		
NJ	NJD980653901	Perth Amboy PCB's	1984	
NJ	NJD980505648	PJP Landfill	1984	1990
NJ	NJD981179047	Pohatcong Valley Ground Water Contamination		
NJ	NJD980769350	Pomona Oaks Residential Wells		
NJ	NJD070281175	Price Landfill	1984	1993
NJ	NJD981084767	Puchack Well Field	1999	
NJ	NJD980582142	Pulverizing Services		
NJ	NJD980529671	PVSC Sanitary Landfill[2]	1984	

[2]Formerly T. Fiore Demolition

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 2 *(cont.)*				
NJ	NJD000606442	Quanta Resources		
NJ	NJD986589190	Raritan Arsenal		
NJ	NJD980529713	Reich Farms		
NJ	NJD070415005	Renora, Inc.		
NJ	NJD980529739	Ringwood Mines/Landfill		
NJ	NJD073732257	Roebling Steel Co.	1984	1990
NJ	NJD030250484	Roosevelt Drive-In	1984	
NJ	NJD980505754	Sayreville Landfill	1984	1990
NJ	NJD070565403	Scientific Chemical Processing	1984	1989
NJ	NJD980505762	Sharkey Landfill		1990
NJ	NJD002365930	Shieldalloy Corp.		
NJ	NJD980766828	South Jersey Clothing Co.	1989	
NJ	NJD041743220	Swope Oil & Chemical Co.		
NJ	NJD064263817	Syncon Resins	1984	1992
NJ	NJD980761357	Tabernacle Drum Dump		
NJ	NJD002005106	Universal Oil Products (Chemical Division)	1984	
NJ	NJD980761399	Upper Deerfield Township Sanitary Landfill		
NJ	NJD980529879	Ventron/Velsicol	1984	
NJ	NJD002385664	Vineland Chemical Co., Inc.		1990
NJ	NJD054981337	Waldick Aerospace Devices, Inc.		1990
NJ	NJD001239185	White Chemical Corp.	1984	
NJ	NJD980529945	Williams Property	1984	1992
NJ	NJD980532824	Wilson Farm		
NJ	NJD045653854	Witco Chemical Corp. (Oakland Pit)		
NJ	NJD980505887	Woodland Route 532 Dump		
NJ	NJD980505879	Woodland Route 72 Dump		
NJ	NJD986643153	Zschiegner Refining Company	1999	
NY	NYD980780829	93rd Street School		
NY	NYD072366453	Action Anodizing, Plating, & Polishing	1989	
NY	NYD980506232	ALCOA Aggregation Site		
NY	NYD002066330	American Thermostat Co.		
NY	NYD001485226	Anchor Chemicals		
NY	NYD980535652	Applied Environmental Services	1985	1991
NY	NYD980507693	Batavia Landfill		
NY	NYD980768675	BEC (Binghampton Equipment Co.) Trucking		1990
NY	NYD980768683	Bioclinical Laboratories, Inc.		
NY	NYD980652275	Brewster Well Field		
NY	NY7890008975	Brookhaven National Laboratory (USDOE)	1990	
NY	NYD980780670	Byron Barrel & Drum		
NY	NYD981561954	C & J Disposal Leasing Co. Dump	1989	
NY	NYD010968014	Carrol & Dubies Sewage Disposal	1989	
NY	NYD981184229	Circuitron Corp.		
NY	NYD002044584	Claremont Polychemical		
NY	NYD000511576	Clothier Disposal		
NY	NYD980768691	Colesville Municipal Landfill		
NY	NYD982276933	Cornwall Landfill		
NY	NYD980528475	Cortese Landfill		
NY	NYD980508048	Croton Point Sanitary Landfill		
NY	NYD980780746	Endicott Village Well Field		
NY	NYD981560923	Forest Glen Mobile Home Subdivision		
NY	NYD091972554	General Motors (Central Foundry Division)		1989

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 2 *(cont.)*				
NY	NYD002050110	Genzale Plating Co.		
NY	NYD980768717	Goldisc Recordings, Inc.		
NY	NY4571924451	Griffiss Air Force Base		
NY	NYD980785661	Haviland Complex		
NY	NYD980780779	Hertel Landfill		
NY	NYD980506810	Hooker (102nd Street)		
NY	NYD002920312	Hooker Chemical/Ruco Polymer Corp.		
NY	NYD980763841	Hudson River PCBs		1989
NY	NYD000813428	Jones Chemicals, Inc.		
NY	NYD980534556	Jones Sanitation	1987	
NY	NYD980780795	Katonah Municipal Well		
NY	NYD002041531	Lawrence Aviation Industries, Inc.		
NY	NYD986882660	Li Tungsten Corp.	1992	1993
NY	NYD053169694	Liberty Heat Treating Co., Inc.		
NY	NYD000337295	Liberty Industrial Finishing	1985	1993
NY	NYD000606947	Love Canal		
NY	NYD013468939	Ludlow Sand & Gravel		
NY	NYD980535124	Malta Rocket Fuel Area		
NY	NYD010959757	Marathon Battery Corp.	1984	1989
NY	NYD000512459	Mattiace Petrochemical Co., Inc.	1989	1990
NY	NYD980763742	MEK Spill - Hicksville		
NY	NYD002014595	Nepera Chemical Co., Inc.		
NY	NYD000514257	Niagara County Refuse		
NY	NYD980664361	Niagara Mohawk Power Co. (Saratoga Springs)		
NY	NYD980762520	North Sea Municipal Landfill	1985	1989
NY	NYD991292004	Pasley Solvents & Chemicals, Inc.		
NY	NY6141790018	Pennsylvania/Fountain Ave. Landfill[3]		
NY	NYD980530265	Peter Cooper	1999	
NY	NYD000511659	Pollution Abatement Services		
NY	NYD980654206	Port Washington Landfill	1984	1989
NY	NYD980768774	Preferred Plating Corp.		
NY	NYD002245967	Reynolds Metals Co.		1996
NY	NYD980507735	Richardson Hill Road Landfill/Pond		
NY	NYD981486954	Rowe Industries Ground Water Contamination	1987	1991
NY	NYD980507677	Sidney Landfill	1989	
NY	NYD980535215	Sinclair Refinery		
NY	NYD980421176	Solvent Savers		
NY	NYD980780878	Suffern Village Wellfield		
NY	NYD000511360	Syosset Landfill		
NY	NYD980509285	Tri-Cities Barrel Co., Inc.		
NY	NYD002059517	Tronic Plating Co., Inc.		
NY	NYD980509376	Volney Municipal Landfill		
NY	NYD980535496	Wallkill Landfill		
NY	NYD980506679	Warwick Landfill		
NY	NYD980652259	Wide Beach Development		
NY	NYD000511733	York Oil Co.		
PR	PRD090416132	Clear Ambient Services Co.	1984	
PR	PRD980640965	Frontera Creek	1984	1991

[3]Formerly Pennsylvania Avenue Landfill

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 2 *(cont.)*				
PR	PRD090282757	GE Wiring Devices		
PR	PRD980512362	Juncos Landfill		
PR	PR4170027383	Naval Security Group Activity	1989	1991
PR	PRD980301154	Upjohn Facility		
PR	PRD987366101	V&M/Albaladejo Farms	1997	
PR	PRD980763775	Vega Alta Public Supply Wells		
VI	VID980651095	Island Chemical Corp./V.I. Chemical Corp.	1996	
VI	VID982272569	Tutu Wellfield	1993	
Federal Region 3				
DC	DC9170024310	Washington Naval Yard	1999	
DE	DED980494496	Army Creek Landfill	1984	
DE	DED980704860	Coker's Sanitation Service Landfills	1986	1990
DE	DED980551667	Delaware City PVC Plant	1984	
DE	DED000605972	Delaware Sand & Gravel	1984	
DE	DE8570024010	Dover Air Force Base	1987	1989
DE	DED980693550	Dover Gas and Light Company	1987	
DE	DED980555122	E.I. Du Pont, Newport Landfill	1987	1991/1992
DE	DED980830954	Halby Chemical	1986	1990
DE	DED980705727	Kent County Landfill	1989	
DE	DED980552244	Koppers Co. Facilities Site	1990	
DE	DED043958388	NCR Corp., Millsboro	1986	
DE	DED058980442	New Castle Spill Site	1984	1989
DE	DED980705255	New Castle Steel Plant	1984	
DE	DED980704894	Old Brine Sludge Landfill	1984	
DE	DED980494603	Pigeon Point Landfill	1987	
DE	DED981035520	Sealand Ltd.	1989	
DE	DED041212473	Standard Chlorine Co.	1986	
DE	DED980494637	Sussex Co. Landfill #5	1989	
DE	DED000606079	Tybouts Corner Landfill	1984	
DE	DED980705545	Tyler Refrigeration Pit		
DE	DED980704951	Wildcat Landfill	1984	
MD	MDD069396711	Allied Chemical Corp. Baltimore Works		
MD	MDD980705057	Anne Arundel County Landfill	1989	
MD	MDD980504195	Bush Valley Landfill	1989	1993
MD	MDD003061447	Central Chemical Corporation	1999	
MD	MDD980555478	Chemical Metals Industries		
MD	MDD030324073	Dundalk Marine Terminal		
MD	MDD000731356	Hawkins Pt./Md. Port Admin.		
MD	MDD030321178	Joy Reclamation Co.	1984	
MD	MDD980923783	Kane & Lombard Street Drums		
MD	MDD064882889	Mid-Atlantic Wood Preservers		
MD	MD7170024684	Naval Surface Warfare Center, Indian Head		1997
MD	MDD985397256	Naval Training Center Bainbridge		
MD	MDD982364341	Ordnance Products, Inc.	1995	
MD	MDD980705164	Sand Gravel & Stone Site	1984	1990
MD	MDD980704852	Southern Maryland Wood Treating	1987	
MD	MDD000218008	Spectron Inc.		1997
MD	MD0120508940	U.S. Agricultural Center Beltsville (2 tenants)	1995	

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 3 *(cont.)*				
MD	MD2210020036	USA Aberdeen - Edgewood	1986	
		Bush River Watershed		1994
		Gun Powder River Watershed		1994
MD	MD3210021355	USA Aberdeen - Michaelsville	1986	
		Romney Creek Watershed		1994
MD	MD9210020567	USA Fort George Meade	1997	
MD	MD0570024000	USAF Andrews Air Force Base		1994[4]
MD	MD7170024536	USN Patuxent Naval Air Station	1996	
MD	MDD980504344	Woodlawn Co. Landfill	1987	
PA	PAD004351003	A.I.W. Frank		
PA	PAD000436436	Ambler Asbestos Piles		
PA	PAD009224981	American Electronic Lab., Inc.		
PA	PAD980693048	AMP, Inc.		
PA	PAD987341716	Austin Avenue Radiation Site	1993	
PA	PAD003053709	Avco Lycoming - Williamsport Division		
PA	PAD061105128	Bally Ground Water Contamination		
PA	PAD047726161	Boarhead Farms	1989	
PA	PAD980508402	Bridesburg Dump	1984	
PA	PAD980691760	Brodhead Creek		
PA	PAD980831812	Brown's Battery Breaking		1991
PA	PAD980508451	Butler Mine Tunnel	1987	
PA	PAD980419097	Crater Resources/Keystone Coke/Alan Wood	1993	
PA	PAD981035009	Croydon TCE Spill	1986	
PA	PAD981038052	Delta Quarries/Stotler Landfill		
PA	PAD002384865	Douglassville Disposal	1987	
PA	PAD003058047	Drake Chemical		
PA	PAD981740004	Dublin Water Supply		
PA	PAD987323458	East Tenth Street Site		
PA	PAD980830533	Eastern Diversified Metals		
PA	PAD980539712	Elizabethtown Landfill	1989	
PA	PAD980552913	Enterprise Avenue	1984	
PA	PAD980714505	FMC Marcus Hook	1996	
PA	AD077087989	Foote Mineral Co.	1993	
PA	PAD987332541	Hamburg Playground Site		
PA	PAD002338010	Havertown PCP Site		
PA	PAD002390748	Hellertown Manufacturing Co.	1987	
PA	PAD009862939	Henderson Road Site		1989
PA	PAD980508493	Industrial Drive Site		
PA	PAD980508493	Jack's Creek/Sitkin Smelting	1989	
PA	PAD981036049	Keyser Ave. Borehole	1989	
PA	PAD980508931	Lord Shope Landfill		
PA	PAD014353445	Malvern TCE Site		
PA	PAD046557096	Metal Bank of America	1984	1990
PA	PAD982366957	Metropolitan Mirror & Glass Co., Inc.		
PA	PAD980538763	Middletown Air Field		
PA	PAD980539068	Modern Sanitation Landfill		
PA	PAD980508766	Moyers Landfill		
PA	PAD980691372	MW Manufacturing		
PA	PAD107214116	National Vulcanized Fiber		

[4] U.S. Air Force report.

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 3 *(cont.)*				
PA	PAD096834494	North Penn-Area 1		
PA	PAD002342475	North Penn-Area 2		
PA	PAD980692693	North Penn-Area 5		
PA	PAD980926976	North Penn-Area 6		
PA	PAD002498632	North Penn-Area 7		
PA	PAD057152365	North Penn-Area 12		
PA	PAD079160842	Novak Sanitary Landfill		
PA	PAD980229298	Occidental Chem./Firestone	1989	
PA	PAD002395887	Palmerton Zinc Pile		
PA	PAD980692594	Paoli Rail Yard	1987	1991
PA	PAD981939200	Publicker/Cuyahoga Wrecking Plant	1990	
PA	PAD039017694	Raymark	1996	
PA	PAD002353969	Recticon/Allied Steel	1989	
PA	PAD051395499	Revere Chemical Co.	1986	
PA	PAD091637975	Rohm and Haas Landfill	1986	
PA	PAD980693204	Salford Quarry	1997	
PA	PAD980830889	Shriver's Corner Site		
PA	PAD014269971	Stanley Kessler		
PA	PA6143515447	Tinicum National Environmental Center	1986	
PA	PAD980692024	Tysons Dump #1	1985	
PA	PAD980539126	UGI Corp. Gas Manufacturing Plant	1995	
PA	PA6170024545	USN Naval Warfare Center		
PA	PA4170022418	USN Philadelphia Naval Shipyard		
PA	PA3170022104	USN Ships Parts Control Center	1996	
PA	PAD980539407	Wade (ABM)	1984	
PA	PAD980537773	William Dick Lagoons		
VA	VAD980551683	Abex Corp.	1989	
VA	VAD042916361	Arrowhead Associates/Scovill	1989	
VA	VAD990710410	Atlantic Wood Industries, Inc.	1987	1990
VA	VAD049957913	C & R Battery Co., Inc.	1987	
VA	VAD980712913	Chisman Creek	1984	
VA	VAD007972482	Clarke L.A. & Son		
VA	VAD980539878	H & H Inc.-Burn Pit		
VA	VAD988197133	Hampton Roads Welders Site		
VA	VA1170024722	Marine Corps Combat and Development Command	1995	
VA	VA2800005033	NASA-Langley Research Center[5]	1995	1997
VA	VA7170024684	Naval Surface Warfare Center - Dahlgren	1993	
VA	VA8170024170	Naval Weapons Station - Yorktown	1993	1997
VA	VAD071040752	Rentokil Inc., Virginia Wood Preserving Division		
VA	VAD020312013	Richmond, Fredericksburg & Potomac Railroad		1994
VA	VAD003117389	Saunders Supply Co.	1987	
VA	VAD980917983	Suffolk City Landfill		
VA	VA3971520751	U.S. Defense General Supply Center		
VA	VA6210020321	USA Fort Eustis	1996	
VA	VA7210020981	USA Woodbridge Research Facility		
VA	VA4570024477	USAF Langley Air Force Base[5]		1997
VA	VA5170022482	USN Naval Amphibious Base/Little Creek		

[5] USAF Langley Air Force Base and Langley Research Center have been combined into one CERCLA site: Langley Air Force Base/NASA Langley Research Center.

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 3 (cont.)				
VA	VA1170024813	USN Naval Shipyard Norfolk	1999	
VA	VA6170061463	USN Norfolk Naval Base	1997	
VA	VA9170022488	USN Radio Transmitting Facility		
Federal Region 4				
WV	WV0170023691	Allegany Ballistics Laboratory		
WV	WVD004336749	Follansbee Site		
AL	ALD058221326	Alabama Wood Treating Corp., Inc.		
AL	ALD001221902	Ciba-Geigy Corp. (McIntosh Plant)	1990	
AL	ALD000604249	Gulf Oil Co.		
AL	ALD041906173	Interstate Lead Co. (Ilco)		
AL	ALD008188708	Olin Corp. (McIntosh Plant)	1990	
AL	ALD980844385	Redwing Carriers, Inc. (Saraland)	1989	
AL	ALD095688875	Stauffer Chemical Co. (Cold Creek Plant)		1990
AL	ALD008161176	Stauffer Chemical Co. (Lemoyne Plant)		
AL	ALD007454085	T.H. Agriculture & Nutrition (Montgomery)		
AL	AL0570024182	USAF Maxwell Air Force Base		
AL	AL2170024630	US Naval Outlying Barin Field		
FL	FLD980221857	Agrico Chemical Co.	1989	
FL	FLD004145140	Airco Plating Co.		
FL	FLD008161994	American Creosote Works (Pensacola Plant)	1984	1989
FL	FLD020536538	Anaconda Aluminum Co./Milgo Electronics		
FL	FLD981014368	Anodyne, Inc.		
FL	FLD004574190	B&B Chemical Co., Inc.		
FL	FLD088783865	Bay Drum		
FL	FLD980494660	Beulah Landfill		
FL	FLD052172954	BMI-Textron		
FL	FLD981930506	Broward County-21st Manor Dump	1992	
FL	FLD980709356	Cabot/Koppers		
FL	FLD080174402	Chemform, Inc.	1990	
FL	FLD004064242	Chevron Chemical Co. (Ortho Division)		
FL	FLD991279894	Coleman-Evans Wood Preserving Co.		
FL	FLD980602288	Davie Landfill		
FL	FLD000833368	Dubose Oil Products Co.		
FL	FL984184127	Florida Petroleum Processors		
FL	FLD050432251	Florida Steel Corp.		
FL	FLD000602334	Harris Corp. (Palm Bay Plant)	1986	1990
FL	FLD053502696	Helena Chemical Co. (Tampa Plant)	1993	
FL	FLD980709802	Hipps Road Landfill		
FL	FLD004119681	Hollingsworth Solderless Terminal		
FL	FLD980727820	Kassouf-Kimerling Battery Disposal		
FL	FLD981019235	Madison County Sanitary Landfill		
FL	FLD088787585	MRI Corporation	1997	
FL	FLD084535442	Munisport Landfill	1984	
FL	FLD004091807	Peak Oil Co./Bay Drum Co.		
FL	FLD984259374	Peele-Dixie Wellfield Site		
FL	FL9170024567	Pensacola Naval Air Station	1990	
FL	FLD032544587	Pepper Steel & Alloys, Inc.		
FL	FLD980556351	Pickettville Road Landfill	1984	1990
FL	FLD004054284	Piper Aircraft/Vero Beach Water & Sewer		
FL	FLD984169763	Pleasant Grove Landfill		

State	Cerclis	Site Name	Report Date Review	Report Date PNRS
Federal Region 4 *(cont.)*				
FL	FLD000824888	Reeves SE Corp. Southeastern Wire Division		
FL	FLD000824896	Reeves SE Galvanizing Corp.		
FL	FLD980602882	Sapp Battery Salvage		1989
FL	FLD062794003	Schuylkill Metals Corp.		
FL	FLD043861392	Sherwood Medical Industries		
FL	FLD980728877	Sixty-Second Street Dump	1984	1989
FL	FLD004126520	Standard Auto Bumper Corp.	1989	
FL	FLD004092532	Stauffer Chemical Co. (Tampa Plant)	1993	
FL	FLD010596013	Stauffer Chemical Co. (Tarpon Springs)	1993	
FL	FLD000648055	Sydney Mine Sludge Ponds		1989
FL	FLD980494959	Taylor Road Landfill		
FL	FL2800016121	USAF Cape Canaveral Air Force Base		
FL	FL7570024037	USAF Homestead Air Force Base		
FL	FL1570024124	USAF Tyndall Air Force Base	1997	
FL	FL6170022952	USAF NAS Key West (Boca Chica)		
FL	FL2570024404	USAF Patrick Air Force Base		
FL	FL1690331300	USCG Station Key West		
FL	FL5170022474	USN Air Station Cecil Field	1990	
FL	FL6170024412	USN NAS Jacksonville	1990	
FL	FL6800014585	US NASA Kennedy Space Center		
FL	FL9170024260	USN Naval Air Station Mayport		
FL	FL2170023244	USN Naval Air Station Whiting Field Site 5	1996	
FL	FL8170023792	USN Naval Coastal Systems Center		
FL	FLD980602767	Whitehouse Oil Pits		
FL	FLD041184383	Wilson Concepts of Florida, Inc.		
FL	FLD981021470	Wingate Road Municipal Incinerator Dump		
FL	FLD004146346	Woodbury Chemical Co. (Princeton Plant)	1989	
FL	FLD049985302	Zellwood Ground Water Contamination		
GA	GAD095840674	Cedartown Industries, Inc.		
GA	GAD980495402	Cedartown Municipal Landfill		
GA	GAD990741092	Diamond Shamrock Corp. Landfill		
GA	GAD981024466	Brunswick Wood Preserving	1997	
GA	GAD008212409	Escambia Wood – Camilla	1999	
GA	GAD990855074	Firestone Tire & Rubber Co. (Albany Plant)		
GA	GAD004065520	Hercules, Inc.		
GA	GAD980556906	Hercules 009 Landfill		
GA	GAD000827444	International Paper Co.		
GA	GAD099303182	LCP Chemicals Georgia, Inc.		1995
GA	GAD980838619	Mathis Brothers Landfill		
GA	GAD001700699	Monsanto Corp. (Augusta Plant)		
GA	GAD980495451	New Sterling Landfill		
GA	GAD982112658	Terry Creek Dredge Spoil /Hercules Outfall	1997	
GA	GAD042101261	T.H. Agriculture & Nutrition (Albany)		
GA	GA1570024330	USAF Robins Air Force Base (Landfill/Sludge lagoon)		
GA	GAD003269578	Woolfolk Chemical Works, Inc.		
MS	MSD008154486	Chemfax, Inc.	1995	
MS	MSD098596489	Gautier Oil Co., Inc.	1989	
MS	MS2170022626	US Naval Const. Battalion Center		
NC	NCD024644494	ABC One Hour Cleaners	1989	
NC	NCD980840409	Charles Macon Lagoon & Drum Storage		
NC	NC1170027261	Cherry Point Marine Corps Air Station		

State	Cerclis	Site Name	Report Date Review	Report Date PNRS
Federal Region 4 *(cont.)*				
NC	NCD980840342	Dockery Property		
NC	NCD981475932	FCX , Inc. (Washington Plant)	1989	
NC	NCD981927502	Geigy Chemical Corp. (Aberdeen Plant)		
NC	NCD079044426	General Electric Co./Shepherd Farm		
NC	NCD003200383	Koppers Co., Inc. (Morrisville Plant)		
NC	NCD991278953	National Starch & Chemical Corp.		
NC	NCD981021157	New Hanover County Airport Burn Pit	1989	
NC	NCD986186518	Old ATC Refinery		
NC	NCD981023260	Potter's Septic Tank Service Pits	1989	
NC	NC6170022580	USMC Camp Lejeune	1989	
SC	SCD987581337	Calhoun Park/Ansonborough Homes/Scegco		1993
SC	SCD980558316	Carolawn, Inc.		
SC	SCD980846034	Charleston Landfill		
SC	SCD980711279	Geiger (C&M Oil)	1984	
SC	SCD058753971	Helena Chemical Co. Landfill	1989	
SC	SCD055915086	International Paper Co.		
SC	SCD094995503	Kalama Specialty Chemicals		
SC	SCD980310239	Koppers Co., Inc. (Charleston Plant)	1993	
SC	SCD991279324	Leonard Chemical Co., Inc.		
SC	SCD980558043	Lexington County Landfill Area		
SC	SC0170022560	Naval Shipyard - Charleston		
SC	SC8170022620	Naval Weapons Station - Charleston		
SC	SCD037398120	Palmetto Recycling, Inc.		
SC	SCD002601656	Para-Chem Southern, Inc.		
SC	SC6170022762	Parris Island Marine Corps Recruit Depot		1995
SC	SC1890008989	US DOE Savannah River Site	1990	
SC	SCD987572674	US DOI Charleston Harbor Site		1993
SC	SCD037405362	Wamchem, Inc.	1984	
Federal Region 5				
IL	ILD000802827	Outboard Marine Corporation		
IN		Grand Calumet/Indiana Harbor		
MI	MID006007306	Allied Paper/Portage Creek/Kalamazoo River		
MI	MID980678627	Cannelton Industries		
MI	MID980679799	Deer Lake		
MI		Ford River Raisin		
MI	MID006014906	Hooker Montague Plant		
MI	MID981192628	Manistique River/Harbor Area of Concern		
MI	MID072569510	Muskegon Chemical Co.		
MI		Packaging Corporation of America		
MI		Shiawassee River		
MI		Thunder Bay		
MI	MID980901946	Torch Lake		
MI		White Pine		
MN	MND039045430	St. Louis River - USX Duluth		
OH		Ashtabula River		
OH	OHD980614572	Fields Brook		
WI		Boerke		
WI	WID006136659	Fort Howard Paper Co. Sludge Site		
WI	WID006141402	Fort Howard Steel Incorporated		
WI		Green Bay/Fox River		

State	Cerclis	Site Name	Report Date Review	Report Date PNRS
Federal Region 5 (cont.)				
WI	WID006073225	Kohler Co. Landfill		
WI	WID039052626	Moss-American Kerr-McGee Oil Co.		
WI	WID980996367	Sheboygan Harbor & River		
Federal Region 6				
AR	ARD980496723	South 8th Street Landfill		
LA	LAD000239814	American Creosote Works, Inc. (Winnfield)		
LA	LAD980745632	Bayou Bonfouca		
LA	LAD981916570	Bayou D'Inde		
LA	LAD980745541	Bayou Sorrell Site	1984	
LA	LAD985195346	Bayou Verdine		
LA	LAD980501423	Calcasieu Parish Landfill		
LA	LAD985202464	Devil's Swamp Lake		
LA	LAD985169317	GSU (North Ryan St.)/Utilities Yard		
LA	LAD981522998	Madisonville Creosote Works, Inc.	1997	
LA	LAD057482713	Petro-Processors of Louisiana, Inc.		
LA	LAD062644232	Ponchatoula Battery Co.		
LA	LAD008086506	PPG Industries, Inc.		
LA	LAD008149015	Southern Shipbuilding, Inc.		
TX	TXD008123168	ALCOA (Point Comfort)/Lavaca Bay	1995	
TX	TXD980864649	Bailey Waste Disposal	1985	1989
TX	TXD980625453	Brio Refining , Inc.	1989	1989
TX	TXD990707010	Crystal Chemical Co.	1989	1989
TX	TXD089793046	Dixie Oil Processors, Inc.	1989	1989
TX	TXD980514814	French Ltd.	1989	1989
TX	TXD980748453	Geneva Industries/Fuhrmann Energy		
TX	TXD980745582	Harris (Farley Street)		
TX	TXD980514996	Highlands Acid Pit	1989	
TX	TXD980625636	Keown Supply Co.		
TX	TXD980629851	Motco, Inc.	1984	
TX	TXD980873343	North Cavalcade Street		
TX	TXD980873350	Petro-Chemical Systems (Turtle Bayou)		
TX	TXD062132147	Sheridan Disposal Services		
TX	TXD980513956	Sikes Disposal Pits	1989	
TX	TXD980873327	Sol Lynn/Industrial Transformers		
TX	TXD980810386	South Cavalcade Street		
TX	TX0001407444	Sprague Road Groundwater		
TX	TXD099801102	State Marine	1999	
TX	TXD062113329	Tex-Tin Corp.	1989	
TX	TXD055143705	Triangle Chemical Company		
Federal Region 9				
AS	ASD980637656	Taputimu Farm	1984	
CA	CAD980358832	Aerojet General Corp.		
CA	CA2170023236	Alameda Naval Air Station	1989	
CA	CA2170023533	Camp Pendleton Marine Corps Base	1990	1992
CA	CAD009114919	Chevron USA Richmond Refinery		
CA	CAD063015887	Coast Wood Preserving	1984	
CA	CA7170024528	Concord Naval Weapons Station	1989/1993	1990
CA	CAD055753370	Cooper Drum Co.	1993	
CA	CAD980498455	Crazy Horse Sanitary Landfill		

State	Cerclis	Site Name	Report Date Review	Report Date PNRS
Federal Region 9 *(cont.)*				
CA	CAD009212838	CTS Printex, Inc.	1989	
CA	CAD029544731	Del Amo Facility	1992	
CA	CAD000626176	Del Norte Pesticide Storage	1984	
CA	CA6170023208	El Toro Marine Corps Air Station	1989	
CA	CAD981159585	Farallon Islands		1990
CA	CA7210020676	Fort Ord	1990	1992
CA	CAD980636914	Fresno Municipal Sanitary Landfill		
CA	CAD980498562	GBF & Pittsburg Dumps	1989/1993	
CA	CA3570024288	Hamilton Air Force Base		
CA	CAD980884209	Hewlett-Packard (620-640 Page Mill Road)	1989	
CA	CAD058783952	Hexcel Corp.		
CA	CAD041472341	Intersil Inc./Siemens Components	1989	
CA	CAD980498612	Iron Mountain Mine	1989	1989
CA	CAD000625731	J.H. Baxter & Co.		
CA	CAD009103318	Jasco Chemical Corp.	1989	
CA	CA9800013030	Jet Propulsion Laboratory (NASA)		
CA	CAD008274938	Kaiser Steel Corp. (Fontana Plant)		
CA	CAD981429715	Kearney - KPF		
CA	CA3170024381	Lemoore Naval Air Station		
CA	CAT000646208	Liquid Gold Oil Corp.	1984	
CA	CA2170023194	Long Beach Naval Station		
CA	CAD065021594	Louisiana-Pacific Corp.		
CA	CA7170024775	Mare Island Naval Shipyard		
CA	CAD009106527	McCormick & Baxter Creosoting Co.	1993	
CA	CAD982463812	M-E-W Study Area		
CA	CAD000074120	MGM Brakes	1984	
CA	CAD981997752	Modesto Ground Water Contamination		
CA	CA2170090078	Moffett Naval Air Station	1986	
CA	CAD008242711	Montrose Chemical Corp.	1985	
CA	CA1170090483	Naval Shipyard Long Beach		
CA	CA0170090021	Naval Supply Center Pt. Molate Site		
CA	CAD981434517	Newmark Ground Water Contamination		
CA	CA7170090016	North Island Naval Air Station		
CA	CA4170090027	Oakland Naval Supply Center		
CA	CAD980636781	Pacific Coast Pipe Lines	1989	
CA	CA9170027271	Pacific Missile Test Center		
CA	CA1170090236	Point Loma Naval Complex		
CA	CA6170023323	Port Hueneme Naval Construct. Battalion Center		
CA	CAD982462343	Redwood Shore Landfill		
CA	CAT000611350	Rhone-Poulenc, Inc./Zoecon Corp.	1985	
CA	CA7210020759	Riverbank Army Ammunition Plant	1989	
CA	CAD009452657	Romic Chemical Corp		
CA	CA0210020780	Sacramento Army Depot		
CA	CA0170024491	Seal Beach Naval Weapons Station		
CA	CAD009164021	Shell Oil Co. Martinez		
CA	CAD980637482	Simpson-Shasta Ranch		
CA	CAD981171523	Sola Optical USA, Inc.	1989	
CA	CAD059494310	Solvent Service, Inc.		
CA	CAD980894885	South Bay Asbestos Area	1985	
CA	CAD009138488	Spectra-Physics, Inc.		
CA	CAD980893275	Sulphur Bank Mercury Mine		

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 9 (cont.)				
CA	CAD990832735	Synertek, Inc. (Building 1)		
CA	CAD000072751	Tosco Corp. Avon Refinery		
CA	CA5570024575	Travis Air Force Base	1990	
CA	CA1170090087	Treasure I. Naval Station - Hunters Pt. Annex	1989	1989
CA	CAD009159088	TRW Microwave, Inc. (Building 825)		
CA	CAD981436363	United Heckathorn Co.		
CA	CA9570025149	Vandenberg Air Force Base		1994[6]
GU	GU6571999519	Andersen Air Force Base	1993	
GU	GU7170027323	Naval Air Station Guam		
HI	HID033233305	ABC Chemical Corp.		
HI	HI3570028719	Bellows Air Force Station		
HI	HID981424138	Chemwood Treatment Co., Inc.		
HI	HID980637631	Del Monte Corporation (Oahu Plantation)	1995	
HI	HID981581788	Hawaiian Western Steel Limited		
HI	HI8570028722	Hickam Air Force Base		
HI	HI0000768382	Honolulu Skeet Club		
HI	HI4210090003	Johnston Atoll		
HI	HI6170090074	Kahoolawe Island		
HI	HID980497184	Kailua-Kona Landfill		
HI	HID980497176	Kapaa Landfill		
HI	HID980497226	Kewalo Incinerator Ash Dump		
HI	HI6170022762	MCAS Kanehoe Landfill		
HI	HI3170024340	Naval Submarine Base		
HI	HID980585178	Pearl City Landfill	1984	
HI	HI2170024341	Pearl Harbor Naval Complex	1992	1993
HI	HI2170024341	Pearl Harbor Naval Station		
HI	HID982400475	Waiakea Pond/Hawaiian Cane Products Plant		1990
MQ	MQ6170027332	Midway Island Naval Air Station		
TT	TTD981622285	PCB Wastes (15 Saipan)		
WQ	WQ0570090001	Wake Island Air field		
Federal Region 10				
AK	AK4170024323	Adak Naval Air Station	1993	
AK	AKD009252487	Alaska Pulp Corp.		1995
AK	AK6214522157	Fort Richardson (US ARMY)	1995	
AK	AK6210022426	Fort Wainwright		
AK	AKD980978787	Standard Steel & Metals Salvage Yard (USDOT)	1990	1990
AK	AK9570028705	USAF Eareckson Air Force Station		
AK	AK8570028649	USAF Elmendorf Air Force Base	1990	1990/1994[7]
AK	AK0131490021	USDOC NOAA National Marine Fisheries Service		
ID	IDD980725832	Blackbird Mine	1995	1994
ID	IDD980665459	Stibnite/Yellow Pine Mining Area		
OR	ORD009051442	Allied Plating, Inc.	1987	1988
OR	ORD987185030	East Multnomah County Groundwater		
OR	ORD095003687	Gould, Inc.	1984	1988
OR	ORD068782820	Joseph Forest Products		
OR	ORD052221025	Martin-Marietta Aluminum Co.	1987	1988

[6] USAF Report.

[7] USAF Report.

State	Cerclis	Site Name	Report Date Review	PNRS
Federal Region 10 *(cont.)*				
OR	ORD009020603	McCormick & Baxter Creosote Co. (Portland)	1995	1995
OR	ORD980988307	Northwest Pipe & Casing Co.	1993	
OR	ORD009412677	Reynolds Metals Co.	1996	
OR	ORD009025347	Rhone Poulence Inc. Basic Chemicals Division	1984	
OR	ORD009042532	Taylor Lumber and Treating, Inc.		1991
OR	ORD050955848	Teledyne Wah Chang	1985	1988
OR	ORD009049412	Union Pacific Railroad Tie Treatment	1990	1990
WA	WAD009045279	ALCOA (Vancouver Smelter)	1989	1989
WA	WAD057311094	American Crossarm & Conduit Co.	1989	1988
WA	WA5170027291	Bangor Naval Submarine Base	1990	1991
WA	WA7170027265	Bangor Ordnance Disposal		1991
WA	WA1891406349	Bonneville Power Admin. Ross (USDOE)	1990	1990
WA	WAD009624453	Boomsnub/Airco		
WA	WAD980836662	Centralia Municipal Landfill	1989	1989
WA	WAD980726368	Commencement Bay , Near Shore/Tide Flats	1984[8]	1988
WA	WAD980726301	Commencement Bay , South Tacoma Channel	1984[8]	
WA	WA5210890096	Hamilton Island Landfill (USA/COE)	1992	1991
WA	WA3890090076	Hanford 100-Area (USDOE)	1989	1988
WA	WAD980722839	Harbor Island (Lead)	1984	1989
WA	WA3170090044	Jackson Park Housing Complex (USNAVY)	1995	
WA	WA5170090059	Naval Air Station Whidbey Island (Ault)	1986	1989
WA	WA6170090058	Naval Air Station Whidbey Island (Seaplane)	1986	1989
WA	WA1170023419	Naval Undersea Warfare Station (4 Areas)		1989
WA	WAD027315621	Northwest Transformer (South Harkness St.)	1989	1988
WA	WAD008957243	Oeser Company	1997	
WA	WA8680030931	Old Navy Dump/Manchester Lab (USEPA/NOAA)	1996	1995
WA	WAD009248287	Pacific Sound Resources	1995	1992
WA	WAD009422411	Pacific Wood Treating		
WA	WA0000026534	Palermo Groundwater Contamination		
WA	WA4170090001	Port Hadlock Detachment (USNAVY)		1989/1995
WA	WA2170023418	Puget Sound Naval Shipyard Complex	1995	
WA	WAD980639215	Quendall Terminals	1985	
WA	WAD980639462	Seattle Municipal Landfill (Kent Highlands)	1989	1988
WA	WAD980976328	Strandley/Manning Site		1992
WA	WAD980639256	Tulalip Landfill	1992	1991
WA	WA2170023426	USN Fuel Depot Naval Support Center Puget Sound		
WA	WAD988519708	Vancouver Water Station #1 Contamination		
WA	WAD980639280	Washington Natural Gas - Seattle Plant		1996
WA	WAD009487513	Western Processing Co., Inc.	1984	
WA	WAD009041450	Weyerhaeuser Co.		
WA	WAD009248295	Wyckoff Co./Eagle Harbor	1986	1988

[8] Evaluated in a single Coastal Hazardous Waste Site Review.

Table 2. Acronyms and abbreviations used in Coastal Hazardous Waste Site Reviews

AST	above-ground storage tank
AWQC	Ambient water quality criteria for the protection of aquatic life
bgs	below ground surface
BHC	benzene hexachloride
BNA	base, neutral, and acid-extractable organic compounds
BOD	biological oxygen demand
BSL	brine sludge lagoon
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
cfs	cubic feet per second
cm	centimeter
COC	contaminant of concern
COD	chemical oxygen demand
COE	U.S. Army Corps of Engineers
CRC	Coastal Resource Coordinator
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DNAPL	dense non-aqueous phase liquid
DNT	dinitrotoluene
DOD	U.S. Department of Defense
DOI	U.S. Department of the Interior
EPA	U.S. Environmental Protection Agency
ERL	effects range - low
ERM	effects range - median
HMX	cyclotetramethylene tetranitramine
HRS	Hazard Ranking System
kg	kilogram
km	kilometer
L	liter
LNAPL	light, non-aqueous phase liquid
LOEL	lowest observed effects level
m	meter
m^3/second	cubic meter per second
µg/g	micrograms per gram (ppm)
µg/kg	micrograms per kilogram (ppb)
µg/L	micrograms per liter (ppb)
µR/hr	microroentgens per hour
mg	milligram
mg/kg	milligrams per kilogram (ppm)
mg/L	milligrams per liter (ppm)
mR/hr	milliroentgens per hour
NAPL	non-aqueous phase liquid
NFA	no further action
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OU	operable unit
PAH	polynuclear aromatic hydrocarbon
PA/SI	Preliminary Assessment/Site Investigation
PCB	polychlorinated biphenyl
PCE	perchloroethylene (aka tetrachloroethylene)

Table 2 (cont.)

PCP	pentachlorophenol
PNRS	Preliminary Natural Resource Survey
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand or parts per trillion
PRP	Potentially Responsible Party
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RDX	cyclonite
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SVOC	semi-volatile organic compound
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TCL	Target Compound List
TNT	trinitrotoluene
TPH	total petroleum hydrocarbons
TSS	total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VOC	volatile organic compound
<	less than
>	greater than

Table 3. Glossary of terms frequently used in Coastal Hazardous Waste Site Reviews

Anadromous	fish are species that spawn (breed and lay eggs) in freshwater environments but spend at least part of their adult life in a seawater environment. Examples are salmon, river herring (alewife), and striped bass.
Catadromous	fish are species that spawn (breed and lay eggs) in a seawater environment but spend at least part of their adult lives in a freshwater environment. An example is the American eel.
One hectare	is equal to 10,000 square meters, or 2.471 acres.
NPL	identifies locations throughout the United States where hazardous wastes have been found in the environment and the initial evaluation shows a significant risk of harm to human health or ecology. National Priorities List (NPL) sites are frequently called "Superfund" sites, because Superfund money can be used by EPA to investigate and cleanup these sites.
Partitioning	of contaminants is the process of moving between environmental phases, such as a contaminant that is spilled on the ground and then is dissolved by rain and carried in solution to surface water or groundwater.
Superfund	Money collected from a special tax on chemical feedstocks and raw petroleum that is appropriated by Congress to investigate, evaluate and clean up the worst hazardous waste sites in the US. These sites are identified on the NPL.
Trustee	of natural resources is someone who has the responsibility to care for the original characteristics of our lands and waters and the native organisms that live there. NOAA is a federal natural resource trustee for marine resources. Marine resources are any native species that spends at least part of its life cycle in a seawater environment.

1

General Electric-Housatonic River

Pittsfield, Massachusetts
CERCLIS #MAD002084093

Site Exposure Potential

The General Electric (GE) Housatonic River site extends from the GE facility on the East Branch of the Housatonic River in Pittsfield, Massachusetts, to Rising Pond, an impoundment on the river approximately 35 km downstream (Figure 1). The Housatonic River flows into Long Island Sound approximately 200 km from Pittsfield. The site also encompasses Silver Lake, next to the GE facility and hydraulically connected to the Housatonic River via a concrete conduit (Figure 2; BBL 1996).

The GE Pittsfield facility manufactured transformer products containing PCBs from 1932 until 1977. There are numerous contaminant source areas associated with the site, including a PCB spill at Building 68; eleven former oxbows (Oxbows A through K) that were filled with soil containing facility wastes; two landfills (in Unkamet Brook Area, and in Hill 78 Landfill Area); and several areas of contaminated soils along East Street, Newell Street, Lyman Street, and at Allendale School. In addition, there are about 13 km of PCB-contaminated floodplain soils downstream from the facility that are potential sources of PCB contamination to the river. Table 1 describes these source areas. Figure 2

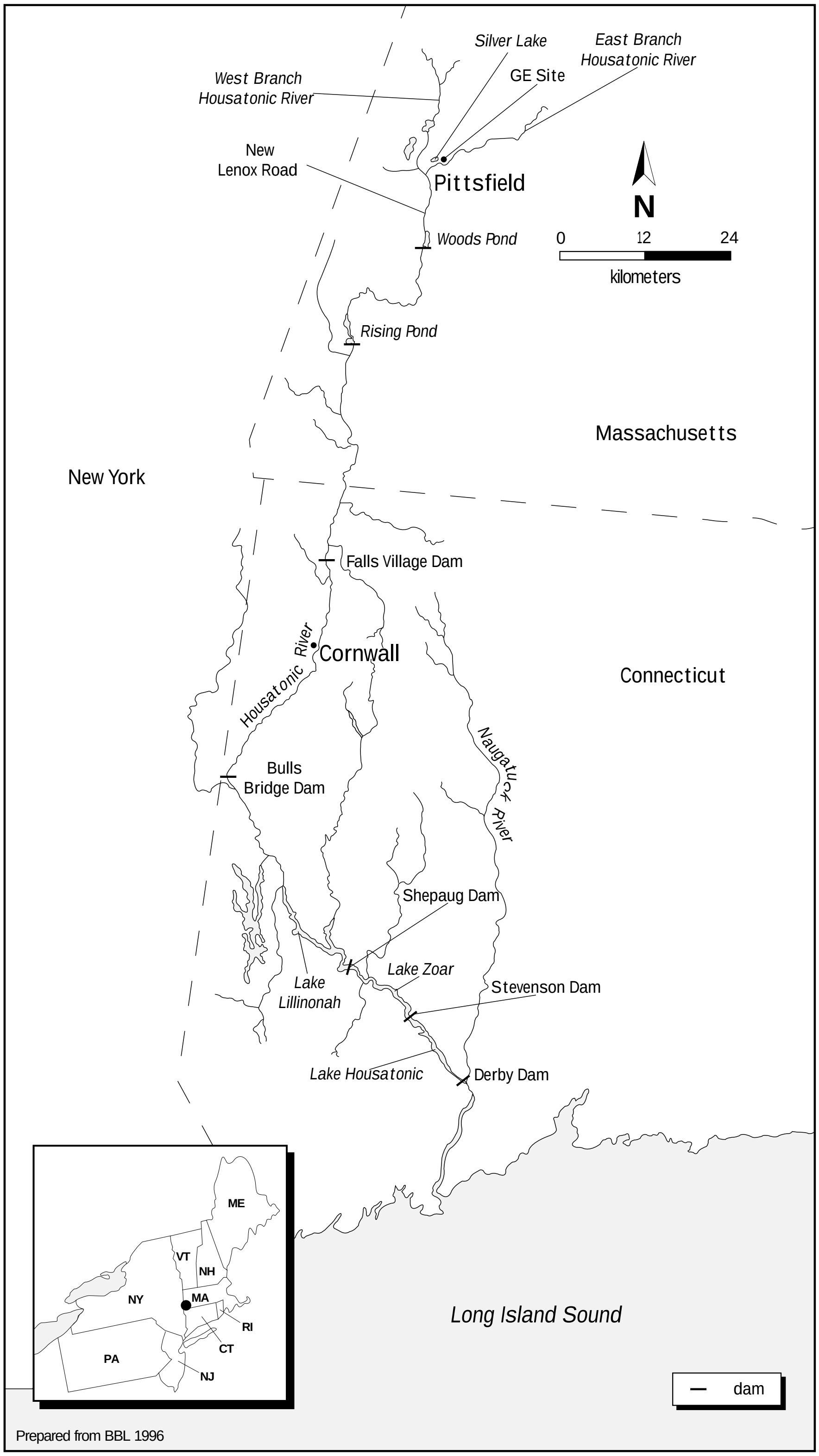

Figure 1. Location of the GE Housatonic site.

Table 1. Contaminant source areas associated with the GE facility (EPA 1994; BBL 1997).

Contaminant Source Area	Size	Description	Nature and Extent of Contamination
Building 68	NA	A storage tank at building 68 containing Aroclor 1260 collapsed in the late 1960s, releasing a portion of its contents onto adjacent soils and river sediments. Approximately 3,800 L of PCBs were released. Impacted surface rocks and sediments were removed to the extent possible but substantial contamination remains.	Concentrations of PCBs up to 102,000 mg/kg were found in riverbank soils and up to 54,000 mg/kg in river sediment.
Other Former Oxbows (A, B, C, E, F, J, K)	6.9 ha	These oxbows include seven of eleven oxbows that were filled during a rechanneling project in the early 1940s. Filling from various sources continued into the 1980s.	PCBs were measured at concentrations up to 1,800 mg/kg. Metals, SVOCs, dioxins, and furans also have been detected.
Lyman Street Parking Lot (contains Oxbow D)	1.6 ha	This area is an inactive GE auxiliary parking lot. An oil and groundwater pump and treat system was installed to minimize PCB seepage into the river.	Coal tar wastes and PCB oils are present in LNAPL and DNAPL in groundwater. Elevated VOCs, SVOCs, dioxins/furans, and PCBs have been detected in groundwater.
Newell Street Area I (Oxbow I)	4.4 ha	This oxbow was filled during the 1940 rechanneling project and is now used by various commercial facilities. Limited soil removal and capping has been completed.	PCBs were measured in subsurface soils at concentrations up to 290,000 mg/kg. Soils contain elevated concentrations of trace elements, VOCs, SVOCs, dioxins, and furans.
Newell Street Area II (Parking Lot) (Oxbow G)	1.2 ha	This area is an oxbow filled with various types of materials from various sources. The site is an inactive GE auxiliary parking lot.	PCBs were measured in subsurface soils at concentrations up to 80,000 mg/kg.
East Street Area I	20 ha	This area includes part of the GE facility and some adjacent commercial property.	LNAPL layer is present in groundwater.
East Street Area II (contains Oxbow H)	54 ha	This area includes the former Berkshire Gas plant. A slurry wall was installed to minimize PCB oil seepage into the River. An oil and groundwater pump and treat system retrieves approximately 3,800 L of PCB-contaminated oil per month.	LNAPL and DNAPL are present. Elevated concentrations of VOCs, SVOCs, dioxins and furans, and metals were found in groundwater and soil. PCB concentrations in subsurface soils were as high as 4,500 mg/kg.
Unkamet Brook Area	51 ha	This area includes the former GE Ordnance plant (now Martin Marietta). Unkamet Brook flows through the area, which contained a former unlined waste lagoon and landfill area.	A dissolved VOC plume is present in groundwater, containing benzene, toluene, methylene chloride, and chlorobenzene; a maximum concentration of 230,000 mg/kg total VOCs was detected. PCB oil has been found in groundwater.
Hill 78 Landfill Area	23 ha	GE facility landfill between 1940 and 1980, currently the Altresco power plant. Soils containing less than 50 mg/kg PCBs from excavations of other facility areas were stored here from 1980 to 1990. The area was capped and is currently inactive.	PCBs were measured in sub-surface soils at concentrations up to 120,000 mg/kg.
Allendale Schoolyard	4.9 ha	Contaminated fill was used to grade the schoolyard in the 1950s. Area was capped in 1991 to minimize exposure, and is now an active schoolyard.	PCBs were detected in subsurface soils at concentrations up to 1,100 mg/kg.

shows the locations of the source areas, except for the contaminated floodplain areas, the Lyman Street Parking Lot, and the associated Oxbow D. Specific locations for the latter three source areas could not be found in the reviewed documents.

EPA ordered GE to remove contaminated sediments near Building 68, and a work plan was submitted in February 1997 (BBL 1997). In September 1997 the Housatonic River downstream of GE Pittsfield was proposed for the National Priorities List.

The primary pathways for migration of PCBs to the Housatonic River are flow of non-aqueous phase liquid, both LNAPL and DNAPL; groundwater flow; surface runoff; and erosion. Following the Building 68 spill, PCB contamination was redistributed when PCB-contaminated soils were used to fill oxbows. These contaminated soils release PCBs to the river, especially during floods. PCBs reportedly were discharged to sewers leading directly to the river (ChemRisk 1997), but locations for these sewer outfalls were not provided in the reviewed documents. Currently, stormwater runoff from the GE facility drains to Silver Lake, which has a piped overflow to the river.

Groundwater is also an important potential pathway for contaminants to migrate from the site. Geology in the upper Housatonic basin consists of soluble carbonate limestone and dolomite bedrock, overlain by a deep layer of unconsolidated, well-sorted, coarse-grained sand and gravel. Both formations are highly permeable (BBL 1991). Water table depths were not provided, but some contaminated areas have been identified as discharging groundwater to the Housatonic, including the Unkamet Brook Area, East Street Area II, Newell Street Area, and the Lyman Street Parking Lot (BBL 1991).

In September 1998 the various Federal, state, and local governments, and GE concluded an Agreement in Principle for cleanup actions at the site. Beginning in June 1999, GE will remove and restore the first 0.8 km of river and riverbank below the plant. The agreement also commits the parties to conduct a coordinated cleanup of the remainder of the river, its banks, the former oxbows, and the ten-year floodplain in subsequent years (EPA 1998).

NOAA Trust Resources and Habitats

The habitats of concern to NOAA are the Housatonic River from the East Branch on the upper watershed to the River's mouth on Long Island Sound, and the associated riparian and nearshore areas. The Housatonic basin covers approximately 5,000 km^2 in three states (Massachusetts, New York, and Connecticut). None of the dams on the river provide for migratory fish passage. The larger dams form the impoundments of Woods Pond, Rising Pond, Falls Village Impoundment, Bulls Bridge Impoundment, Lake Lillinonah, Lake Zoar, and Lake Housatonic (Figure 1). Most of the river is estuarine below Derby Dam.

The catadromous American eel, several anadromous fish species, and numerous estuarine species are the NOAA trust species of concern (Table 2). The American eel, which can traverse most dam structures, are found throughout much of the watershed, including near the site. Anadromous fish are blocked at the Derby Dam, approximately 20 km upstream from the river mouth (Figure 1). There are estuarine fish throughout the lower river, except for the first few kilometers below Derby Dam, which are freshwater tidal.

Ten anadromous fish species use the lower Housatonic River below the Derby Dam (Table 2). Five of the species—white perch, blueback herring, alewife, American shad, and gizzard shad—spawn during the spring in tidal freshwater areas below the dam. White perch complete their

Table 2. Common NOAA trust species of concern in the Housatonic River and estuary.

Species		Habitat			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm. Fishery	Recr. Fishery
ANADROMOUS/CATADROMOUS FISH						
Alewife	*Alosa pseudoharangus*	♦	♦			
American eel	*Anguilla rostrata*		♦			♦
American shad	*Alosa sapidissima*	♦	♦			♦
Brown trout	*Salmo trutta*		♦			
Blueback herring	*Alosa aestivalis*	♦	♦			
Gizzard shad	*Dorosoma cepidianum*	♦	♦			
Hickory shad	*Alosa mediocris*		♦			
Sea lamprey	*Petromyzon marinus*		♦			♦
Striped bass	*Morone saxatilis*		♦			♦
White perch	*Morone americana*	♦	♦	♦		
ESTUARINE FISH						
Atlantic menhaden	*Brevoortia tyrannus*		♦	♦		♦
Atlantic tomcod	*Microgadus tomcod*	♦	♦	♦		
Bay anchovy	*Anchoa mitchilli*		♦	♦		♦
Bluefish	*Pomatomus saltatrix*		♦			
Cunner	*Tautoga onitis*	♦	♦	♦		
Goby	*Gobiosoma* sp.	♦	♦	♦		
Killifish	*Fundulus* sp.	♦	♦	♦		
Red hake	*Urophycis chuss*		♦			
Sheepshead minnow	*Cyprinodon variegatus*	♦	♦	♦		
Skates	*Raja* sp.	♦	♦	♦		
Silversides	*Menidia* sp.	♦	♦	♦		
Tautog	*Tautogolabrus adspersus*	♦	♦	♦		♦
Weakfish	*Cynoscion nebulosus*		♦			
Windowpane flounder	*Scophthalmus aquosus*	♦	♦	♦		♦
Winter flounder	*Pleuronectes americanus*	♦	♦	♦		
INVERTEBRATES						
Bay shrimp	*Crangon septemspinosa*	♦	♦	♦		
Blue crab	*Callinectes sapidus*	♦	♦	♦		
Blue mussel	*Mytilus edulis*	♦	♦	♦		♦
Eastern oyster	*Crassostrea virginica*	♦	♦	♦	♦	
Grass shrimp	*Palaemonetes pugio*	♦	♦	♦		♦
Northern quahog	*Mercenaria mercenaria*	♦	♦	♦		♦
Soft shell clam	*Mya arenaria*	♦	♦	♦		

life cycle within the more saline reaches of the estuary, so Housatonic River populations likely spawn, rear, and reside in the lower river. Adult blueback herring, alewife, American shad, and gizzard shad reside in coastal areas of Long Island Sound and migrate into the river during spawning runs. Juveniles of these four species use the river as a nursery before returning to the Sound (Gephard personal communication 1998).

Numerous estuarine fish and invertebrate species occupy the Housatonic estuary and Long Island Sound (Table 2). Eastern oyster and northern quahog are the most common mollusks in the Sound's intertidal and subtidal waters. Grass and bay shrimp also are abundant, year-round residents of nearshore estuaries (Stone et al. 1994).

Several small forage species, including Atlantic menhaden, bay anchovy, sheepshead minnow, killifish, goby, and silversides, are abundant in Long Island Sound and probably inhabit the estuary, as well. Adult menhaden and anchovy move offshore seasonally, but populations of the other four species probably reside in the estuary year-round (Stone et al. 1994; Gephard personal communication 1998). Atlantic tomcod are inshore, shallow-water fish that spawn in low-salinity, and even fresh water, during the late fall and early winter. Red hake are found in the lower estuary and near coastal areas (Scott and Scott 1988). Both are common within Long Island Sound. It is likely that tomcod spawn in the lower Housatonic (Stone et al. 1994; Gephard personal communication 1998). Cunner and tautog are common, medium-sized fish in Long Island Sound associated with complex estuarine habitats such as rocky areas, mollusk beds, wharves, and submerged seaweed. Winter flounder, windowpane flounder, and skate are common demersal species that spawn and reside in nearshore estuaries of the Sound. Larger predators such as bluefish and weakfish are common coastal dwellers of the Sound that use estuaries and embayments as nurseries (Scott and Scott 1988; Stone et al. 1994).

The State of Connecticut tentatively plans to place fish passage facilities on the Derby Dam allowing anadromous fish access to Lake Housatonic and its tributaries. While fish passage construction around Derby Dam is not yet scheduled, the State currently is restoring the Naugatuck River, a tributary that discharges to the Housatonic River below the dam. Restoration of the Naugatuck would likely increase the number of anadromous fish using the Housatonic estuary. Currently, there are no plans to provide fish passage around the dams farther up the Housatonic (Gephard personal communication 1998).

There are recreational fisheries for several estuarine and anadromous species in the lower Housatonic River. Commercial fisheries in the lower river are limited, but commercial oyster beds are present. The states of Connecticut and Massachusetts have health advisories over the entire river below the GE site due to PCB contamination of edible fish (Gephard personal communication 1998).

Site Contamination

Data were available to characterize contaminant concentrations in soils along the riverbank near Building 68 and in the downgradient river floodplain (Table 1). Riverbank soils collected around Building 68 are highly contaminated with PCBs, with a maximum concentration of 102,000 mg/kg and an average surficial (0-5 cm) concentration of 720 mg/kg (BBL 1997). Floodplain soils also are highly contaminated with PCBs. Maximum concentrations were 377 mg/kg between the GE facility and New Lenox Road Bridge, 430 mg/kg between the New Lenox Road Bridge and Woods Pond, and 16 mg/kg downstream from Woods Pond (BBL 1996).

Sediment contaminant data are available from over 1,500 samples collected from Pittsfield to Long Island Sound to define the horizontal and vertical extent of PCB contamination (ChemRisk 1997). The highest concentrations of PCBs in river sediment were found in samples collected in 1996 from the Building 68 area (Table 3; BBL 1997). The maximum concentration of PCBs in these samples was 54,000 mg/kg and the area-weighted average concentration was 1,500 mg/kg. Sediment PCB concentrations up to 160 mg/kg were measured as far downstream as Woods Pond (BBL 1996). The maximum reported surficial sediment PCB concentration was 26 mg/kg in Rising Pond.

In 1994, sediment data collected in Silver Lake showed concentrations of PCBs as high as 3,100 mg/kg at depths between 30 and 36 cm. Concentrations were measured at 18,000 mg/kg at depths between 1.8 and 2 m (BBL 1996). The maximum PCB concentration in sediment from the 0- to 30-cm horizon was 350 mg/kg.

Other contaminants, including trace elements, PAHs, and dioxins were analyzed in a limited number of sediment samples collected in 1994 from Silver Lake and from the East Branch downstream to the confluence with the West Branch (BBL 1996). Maximum concentrations of these contaminants are shown in Table 3. Concentrations of lead (15,000 mg/kg) in sediment collected downstream from the GE facility were substantially higher than the TEL (35.0 mg/kg). Concentrations of chromium, copper, lead, mercury, nickel, and zinc in Silver Lake sediment all were notably higher than their respective TEL concentrations.

Concentrations of PAHs in sediment from the Housatonic River and Silver Lake were substantially higher than the TEL. Total dioxin and furan concentrations converted to toxic equivalent (TEQ) concentrations of 2,3,7,8-TCDD using TEQ factors from both EPA and the Massachusetts Department of Environmental Protection (MDEP) are reported in Table 3 (BBL 1996). The highest total TEQ concentrations (1.3 and 0.37 μg/kg) were found near the Lyman Street Bridge, exceeding the EPA interim sediment quality guideline (0.060 μg/kg) for low risk to fish (EPA 1993a). A TEQ summation for Silver Lake sediments was not reported.

Table 3. Maximum concentrations of contaminants in sediment (mg/kg except where noted) and surface water (µg/L) detected in Housatonic River and Silver Lake compared to NOAA screening guidelines.

Contaminant	Sediment[a]: Upstream from Building 68	Building 68 to Elm St. Bridge	Elm St. Bridge to W. Branch Confluence	Silver Lake	TEL[b]	Surface Water[a]: Upstream from Unkamet Brook	Unkamet Brook to Dawes Ave. Bridge	Silver Lake	AWQC[c]
Trace Elements									
Arsenic	5.1	7.4	ND	12	5.9	<2.5	<2.5	5.2	190
Chromium	18	33	18	180	37	<1.8	5.1	NA	NA
Copper	31	130	23	2,000	36	3.5	9.2	13	11[g]
Lead	73	16,000	210	3,900	35	1.5	3.6	8.4	3.2[g]
Mercury	0.38	0.28	0.67	5.2	0.17	ND	ND	ND	0.012
Nickel	18	24	11	200	18	<3.6	<3.6	ND	160[g]
Silver	3.8	ND	ND	24	1.0[i]	ND	ND	ND	0.12
Zinc	110	160	96	1,900	120	12	16	31	110[g]
Organic Compounds									
PCBs	6.0	54,000[d]	96	3,100	0.00227	0.13	0.54	0.34	0.014
PAHs	7.4	13	42	91	4.0[i]	NA	NA	NA	300[h]
Dioxins/furans (ug/kg) (EPA TEQs)	0.013	1.3	0.091	0.055[e]	0.06[f]	NA	NA	NA	NA
Dioxins/furans (ug/kg) (MDEP TEQs)	0.0018	0.37	0.042	0.055[e]	0.06[f]	NA	NA	NA	NA

a: Data from BBL (1996) except where noted. Data are presented for sediment collected to a maximum depth of 61 cm.
b: Threshold effect level; concentration below which adverse effects were rarely observed (geometric mean of the 15% concentration in the effects dataset) as compiled by Smith et al. (1996).
c: Freshwater chronic ambient water quality criteria (EPA 1993b).
d: Data from BBL (1997).
e: Value presented is concentration of 2,3,7,8-TCDD only; TEQ for sum of dioxins/furans not calculated.
f: Interim value representing low risk to fish (EPA 1993a).
g: Hardness-dependent criterion; 100 mg/L $CaCO_3$ assumed.
h: Lowest observed effects level.
i: Freshwater TEL not available, marine effects-range low (ERL) provided instead (Long et al. 1995).
NA: Not available.
ND: Not detected; detection limit not reported.

Table 3 presents maximum surface water concentrations collected in 1995 (BBL 1996). Surface water concentrations of lead in the Housatonic River and Silver Lake, and copper in Silver Lake, slightly exceeded their respective freshwater chronic AWQC concentrations. Concentrations of PCBs in Housatonic River and Silver Lake surface waters exceeded the chronic AWQC by more than an order of magnitude.

Several sampling rounds from the Massachusetts portion of the river provide data on PCBs in fish tissue (Tables 4 and 5). Young-of-year fish from New Lenox Road, Woods Pond, and near the Connecticut border were collected from 1994 to 1996 and analyzed as composite, whole-body samples. The maximum PCB concentration in these samples was 58 mg/kg in yellow perch from Woods Pond (BBL 1996; ChemRisk 1997). Between 1984 and 1992, the Academy of Natural Sciences of Philadelphia analyzed PCBs in adult fish from the Connecticut portion of the River (ANSP 1993). They found maximum PCB concentrations in brown trout from Cornwall (29 mg/kg) and in American eel from Lake Zoar (28 mg/kg) (BBL 1996).

Table 4. Maximum concentrations of PCBs (mg/kg wet weight) in composite young-of-year fish collected from the Housatonic River in Massachusetts in 1994 and 1996 (BBL 1996; ChemRisk 1997).

Species	New Lenox Road	Woods Pond	Connecticut Border
Bluegill or pumpkinseed	31	26	4.2
Largemouth bass	36	37	4.8
Yellow perch	35	58	4.6

Summary

Activities at the GE facility in Pittsfield, Massachusetts have contaminated the Housatonic River with PCBs and other substances. Sediment, surface water, riverbank soils, and floodplain soils are highly contaminated near the site. PCBs have been measured in sediment as far downstream as Rising Pond at concentrations substantially exceeding the ERL. Catadromous American eel is the only NOAA trust resource inhabiting the river upstream of the Derby Dam, although tentative plans to provide fish passage around this dam will allow anadromous fish to access Lake Housatonic. Concentrations of PCBs as high as 28 mg/kg have been detected in American eel collected from Lake Zoar, which is separated from Lake Housatonic by the Stevenson Dam. An Agreement in Principle among the government agencies and the General Electric Company provides for cleanup of the river, its banks, and floodplain beginning in June 1999.

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Table 5. Maximum concentrations of PCBs (mg/kg wet weight) in composite fish samples from the Housatonic River in Connecticut from 1984 to 1992 (ANSP 1993).

Species	Cornwall	Bulls Bridge	Lake Lillinonah	Lake Zoar
American eel	NA	NA	NA	28
Bluegill	NA	NA	1.8	1.3
Brown trout	29	NA	NA	NA
Pumpkinseed	NA	NA	0.37	0.51
Redbreast sunfish	NA	NA	1.9	0.61
Smallmouth bass	14	5.7	7.3	3.3
Sunfish	NA	NA	1.9	1.3
White perch	NA	NA	NA	7.1
Yellow perch	NA	6.3	1.2	0.99

NA: Data not available.

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2

Cornell Dubilier Electronics, Inc.

South Plainfield, New Jersey
CERCLIS #NJ981557879

Site Exposure Potential

The Cornell Dubilier Electronics (CDE) property consists of approximately 10 hectares in South Plainfield, Middlesex County, New Jersey. An unnamed stream traverses wetlands on the southeast corner of the property, and then flows northwest approximately 1 km to Bound Brook. Bound Brook flows through New Market Pond, then joins Green Brook and discharges to the lower Raritan River approximately 10 km downstream from the site. From its confluence with Green Brook, the Raritan River flows approximately 25 km southeast to discharge into Raritan Bay (Figure 1; EPA 1997).

CDE manufactured electronic parts and components, including capacitors, from 1936 to 1962. In addition, the company tested transformer oils on the property for an unknown period of time. It has been alleged that CDE dumped transformer oils containing PCBs directly onto site soils, and buried transformers behind the facility. Soils at the rear of the property are reported to be saturated with PCB transformer oils. During a 1996 site investigation, discarded electrical and transformer parts were found in an uncovered, fenced area (EPA 1997). Site visits conducted between 1985 and 1994 revealed several aboveground storage tanks and areas of stained soil (EPA 1995; Figure 2).

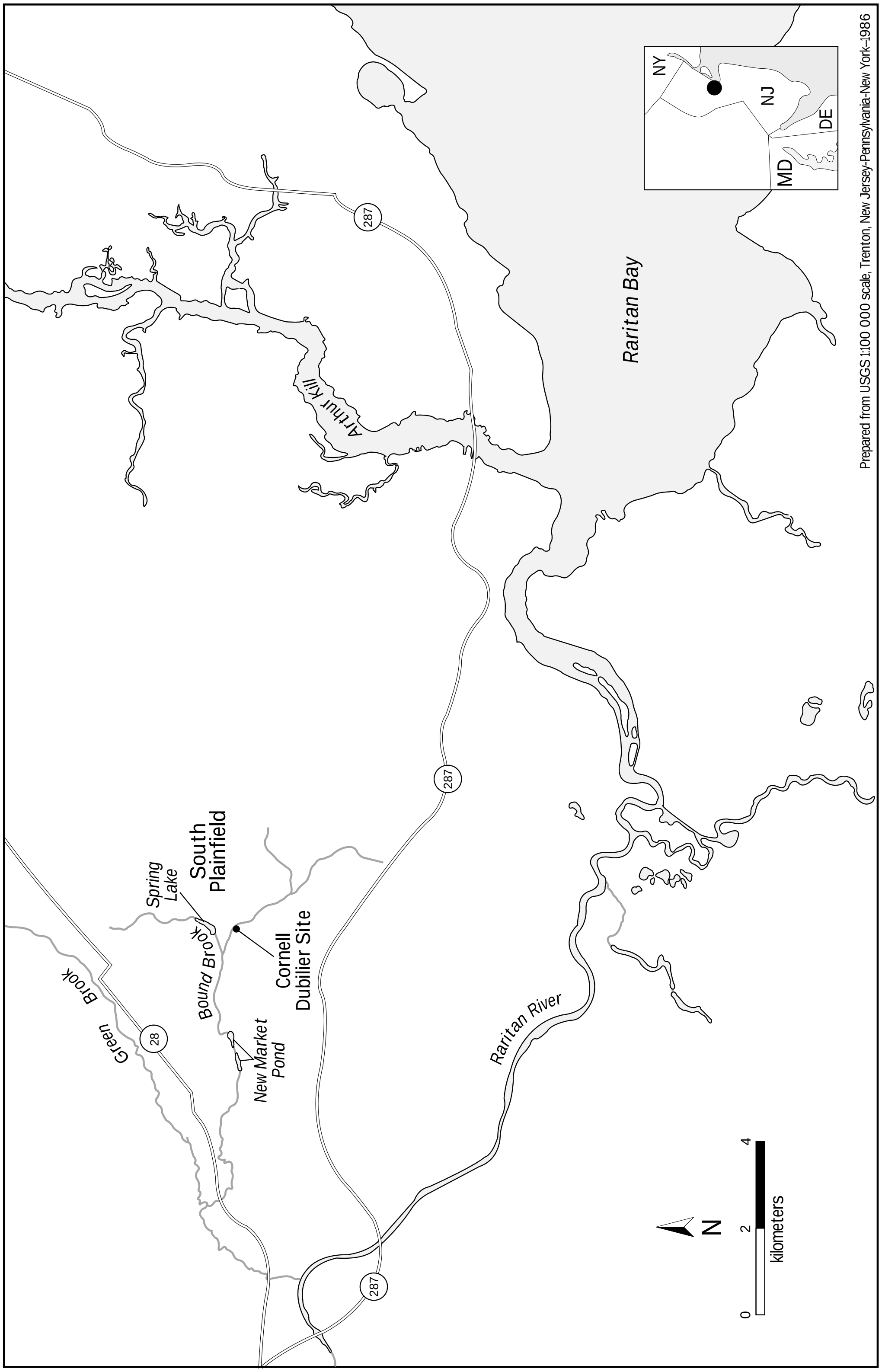

Figure 1. The Cornell-Dubilier Electronics site study area.

The site was proposed for addition to the NPL in September 1997. A Site Inspection Report, Removal Site Evaluation, and a Hazard Ranking Document were completed in 1995 and 1996 (EPA 1996). A contaminant pathway evaluation has not been completed, but site-related contamination may migrate from site source areas to the unnamed stream via erosion, stormwater runoff, and / or migration of NAPL and groundwater. Groundwater investigations have not yet been conducted, but test pit excavations in source areas have encountered groundwater at 1.4 to 2.7 m below ground surface.

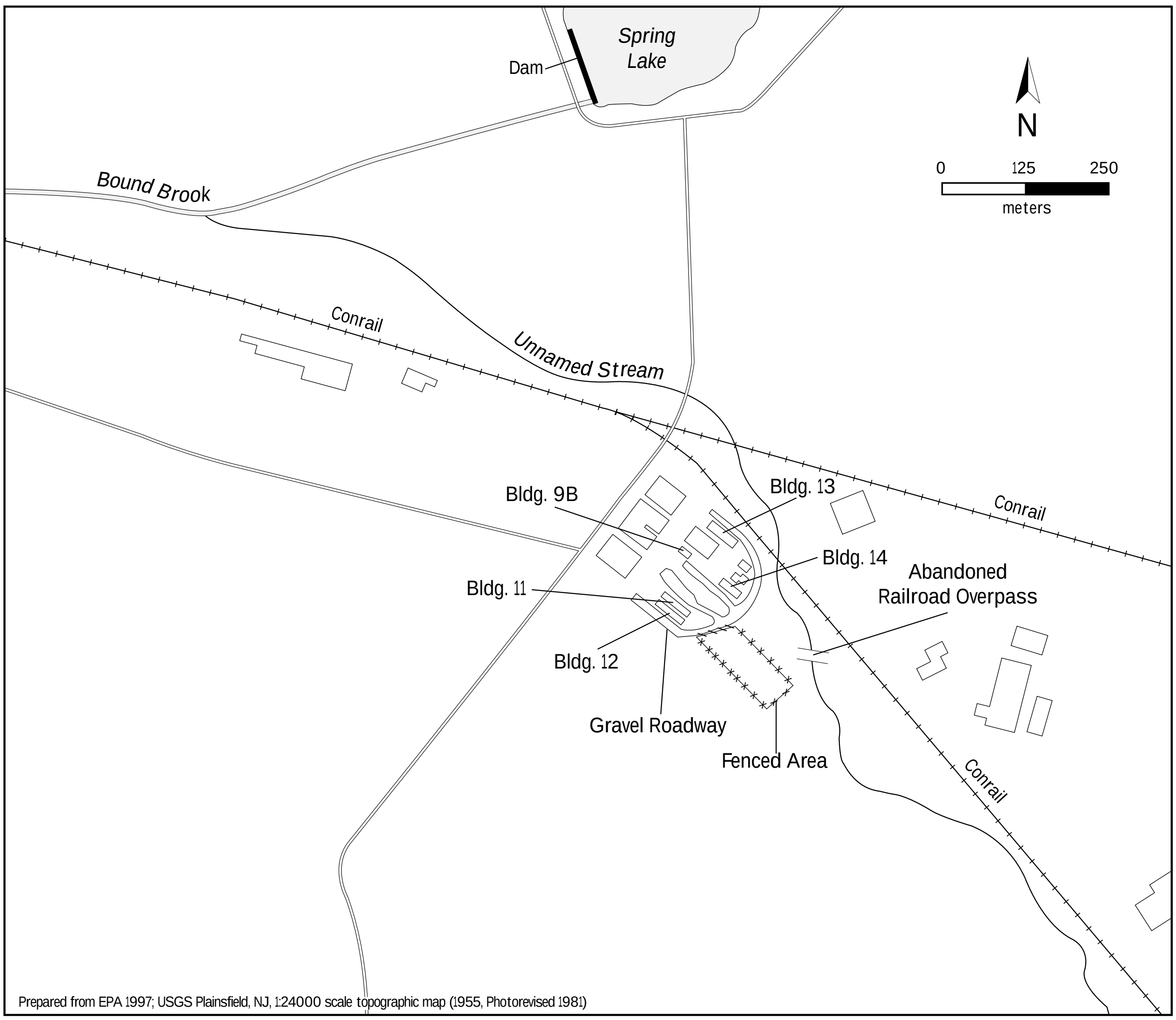

Figure 2. The Cornell Dubilier Electronics site.

NOAA Trust Resources

The NOAA trust habitats of concern are the surface water and sediments in the unnamed stream, Bound Brook, New Market Pond, Green Brook, and the Raritan River. The unnamed stream on the southeast corner of the facility is between 3 and 6 m wide, and 0.3 to 1 m deep (EPA 1997). Bound Brook is slightly larger. Both are low-gradient streams, characterized by a warmwater fish assemblage including sunfish, shiners, bullhead catfish, and carp (Barno 1997). Approximately 2.5 km downstream from the site, Bound Brook is controlled by a dam constructed without provision for fish passage. This dam creates New Market Pond.

The catadromous American eel is the only trust resource documented in Bound Brook. American eel are found throughout the Brook and can traverse the dam that forms New Market Pond. No fishery surveys have been conducted on the unnamed tributary that traverses the site, but eel have access to this stream as well (Barno 1997).

Although the New Jersey Department of Environmental Protection has no current plans to restore Bound Brook above New Market Pond for use by anadromous fish species, there is active restoration in the Raritan River. These restoration efforts are designed to build upon recent water quality improvements (Barno 1997).

The Raritan River and Raritan Bay serve as habitat for a variety of NOAA trust species. The Raritan River is included in the New York / New Jersey Harbor Management Area under the National Estuary Program, a federal program designed to create management plans for estuaries of national significance (Rosman 1998).

Over the past several years, adult American shad have been stocked in the Raritan River in efforts to re-establish a spawning population. Shad prefer large rivers and are unlikely to spawn in Bound Brook. However, other anadromous species, such as alewife and blueback herring which formerly spawned in the Raritan basin, also may recover as water quality continues to improve. Habitats in Bound Brook and the unnamed stream at the site are suitable for spawning of alewife and blueback herring (Boriek 1997).

In 1997, the New Jersey Department of Environmental Protection issued a consumption advisory for all fish taken from Bound Brook because of PCB contamination (New Jersey 1998).

Site-Related Contamination

Data collected during field investigations indicate contamination of soils, surface water, and sediments at the CDE site. Over thirty surface and subsurface soil samples were collected during the Site Inspection and Removal Site Evaluation. Four co-located surface water and sediment samples were collected in the unnamed tributary adjacent to the site. The Site Inspection noted a 1989 investigation consisting of three soil and two sediment samples, but exact sampling locations were not known, so these data are not included in this review. Groundwater sampling has not yet been undertaken.

The primary contaminants of concern to NOAA are PCBs and several trace elements found in widespread source areas on the facility, in the unnamed stream, and in Bound Brook. PAHs also have been detected, although less frequently. Maximum contaminant concentrations are summarized in Table 1, along with appropriate screening guidelines.

PCBs were the most widely detected hazardous substances at the site. High PCB concentrations were found in the fenced area, the gravel roadway near Buildings 11 and 12, and along a footpath between the fenced area and an abandoned railroad overpass (Figure 2). Soil in the northeast corner of the fenced area, where exposed electrical and transformer parts were found, had PCB concentrations at percent levels (e.g. 51,000 mg/kg or 5.1 percent). Surficial soil samples collected in other portions of the fenced area had PCB concentrations ranging from 98 to 4,700 mg/kg. Surface soils in the gravel roadway had PCB concentrations up to 340 mg/kg, and samples collected immediately beneath the surface of the road had PCB concentrations up to 22,000 mg/kg. Between the fenced area and railroad overpass, PCB concentrations ranged from 90 to 3,000 mg/kg.

PCB concentrations in sediment samples from the unnamed stream exceeded NOAA screening guidelines. The maximum sediment concentration (550 mg/kg) was from a sample collected near the abandoned railroad overpass. Other stream sediment samples had concentrations ranging from 0.064 to 140 mg/kg.

PCBs were measured in surface-water samples of the unnamed stream at concentrations above EPA ambient water quality criteria. One surface water sample collected near the overpass contained 24 µg/L (ppb) of Aroclor 1254 and 20 µg/L (ppb) of Aroclor 1248.

Concentrations of seven trace elements were observed in source area soils at concentrations exceeding screening guidelines. Lead and cadmium had the greatest guideline exceedances. Percent-level concentrations of lead (67,000 mg/kg) were observed in the fenced area, and samples collected in the gravel road had concentrations ranging from 1,700 to 7,500 mg/kg. Concentrations of cadmium exceeded 200 mg/kg in these two areas.

Other trace elements were measured in sediment from the unnamed stream at concentrations exceeding screening guidelines. Concentrations of arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc in stream sediment exceeded their respective TEL concentrations. Stream water samples exceeded EPA ambient water quality criteria for cadmium, chromium, copper, lead, mercury, , silver, and zinc.

Table 1. Maximum concentrations of contaminants of concern observed in environmental media at the Cornell Dubilier Electronics site (EPA 1996, 1997, 1999).

Contaminant	Site Soils mg/kg	Mean U.S. Soil mg/kg[a]	Stream Sediments mg/kg	TEL mg/kg[b]	Surface Water µg/L	Chronic AWQC µg/L[c]
TRACE ELEMENTS						
Arsenic	35	5.0	24.0	5.9	16.0	190.0
Cadmium	370	0.06	25.0	.60	15.0	1.1
Chromium	280	100.0	78.0	37.0	26.0	11.0
Copper	12,000	30.0	220.0	36.0	90.0	12.0
Lead	67,000	10.0	550.0	35.0	180.0	3.2
Mercury	72	0.03	0.91	0.17	0.23	0.012
Nickel	150	40.0	52.0	18.0	41.0	160.0
Silver	27	0.05	11.0	1.0	3.8	0.12
Zinc	2,000	50.0	800.0	123.0	990.0	110.0
ORGANIC COMPOUNDS						
PCBs	51,000t	NA	550	0.034	44d	0.014t
Benz(a)anthracene	9.5	NA	8.3	0.032	1.0	NA
Benzo(a)pyrene	9.7	NA	13.0	0.032	ND	NA
Benzo(b)fluoranthene	15	NA	8.2	NA	2.0	NA
Benzo(g,h,i)perylene	6.4	NA	9.0	NA	ND	NA
Benzo(k)fluoranthene	4.2	NA	9.1	NA	0.6	NA
Chrysene	11.0	NA	9.4	0.057	2.0	NA
Dibenz(a,h)anthracene	1.0	NA	2.4	NA	ND	NA
Fluoranthene	12.0	NA	16.0	0.111	2.0	NA
Indeno(1,2,3-c,d)pyrene	6.0	NA	4.7	NA	ND	NA
Phenanthrene	9.4	NA	14	0.042	1.0	6.3p
Pyrene	16.0	NA	17	0.053	2.0	NA

NA: Data not available.
ND: Not detected; detection limits not available.
a Shacklette and Boerngen (1984), except for silver and cadmium which are average concentrations in the earth's crust as reported by Lindsay (1979).
b Threshold effect level; concentration below which adverse effects were rarely observed (geometric mean of the 15% concentration in the effects dataset) as compiled by Smith et al. (1996).
c Ambient Water Quality Criteria, freshwater (EPA 1993).
d Sum of Aroclor 1254 (24 µg/L) and Aroclor 1248 (20 µg/L).
p Proposed criterion.
t Sum of class.

Low to moderate concentrations of several PAHs were observed in site soil samples, although these substances were not as widespread as the PCBs or trace elements. Concentrations of individual PAHs in soil were generally below 2 mg/kg.

Higher concentrations were observed in sediment from the unnamed stream. Nine individual PAHs were observed in sediment at concentrations exceeding TELs. In all cases, concentrations in sediment were higher than those found in soils.

Summary

The CDE site is located on an unnamed tributary of Bound Brook within the Raritan River basin. Soils, stream surface water, and stream sediment on the site are widely contaminated with PCBs and trace elements at concentrations greatly exceeding NOAA screening guidelines, posing a threat to NOAA trust resources. The catadromous American eel, a NOAA trust species, is found in Bound Brook and is likely present in the unnamed tributary. Ongoing projects to restore water quality and anadromous populations in the Raritan River could bring spawning alewife and blueback herring to the suitable habitats found in Bound Brook. New Jersey maintains a fish consumption advisory for all fish taken from Bound Brook because of PCB contamination.

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2

LCP Chemicals, Inc.

Linden, New Jersey
CERCLIS #NJD079303020

Site Exposure Potential

The LCP Chemicals Inc. (LCP) property covers about 10 hectares in an industrial area of the Tremley Point Peninsula next to the Arthur Kill in Linden, Union County, New Jersey (Figure 1). The site is drained by South Branch Creek, which flows southeast for about 0.5 km before entering Arthur Kill, which then flows southward about 16 km before discharging into Raritan Bay (Figure 1).

The manufacturing facility was used for chlorine production from 1952 to 1985, but wasn't acquired by LCP until 1972 (Simmons, 1998). LCP operated mercury electrolysis cells to produce chlorine, sodium hydroxide, hydrochloric acid, and anhydrous hydrogen chloride. These processes generated mercury-tainted sludge, which was placed into the brine sludge lagoon (BSL; Figure 2).

As much as 18 metric tons of combined sludges from the mercury cell process and wastewater treatment were placed into the BSL daily. Supernatant from the southeast corner of the lagoon was piped to the wastewater treatment system. Stormwater runoff, equipment washdown and structure washdown also were sent to the wastewater treatment system (Eder Associates 1992). Under a NJPDES permit, treated wastewater discharged through an outfall extending into the

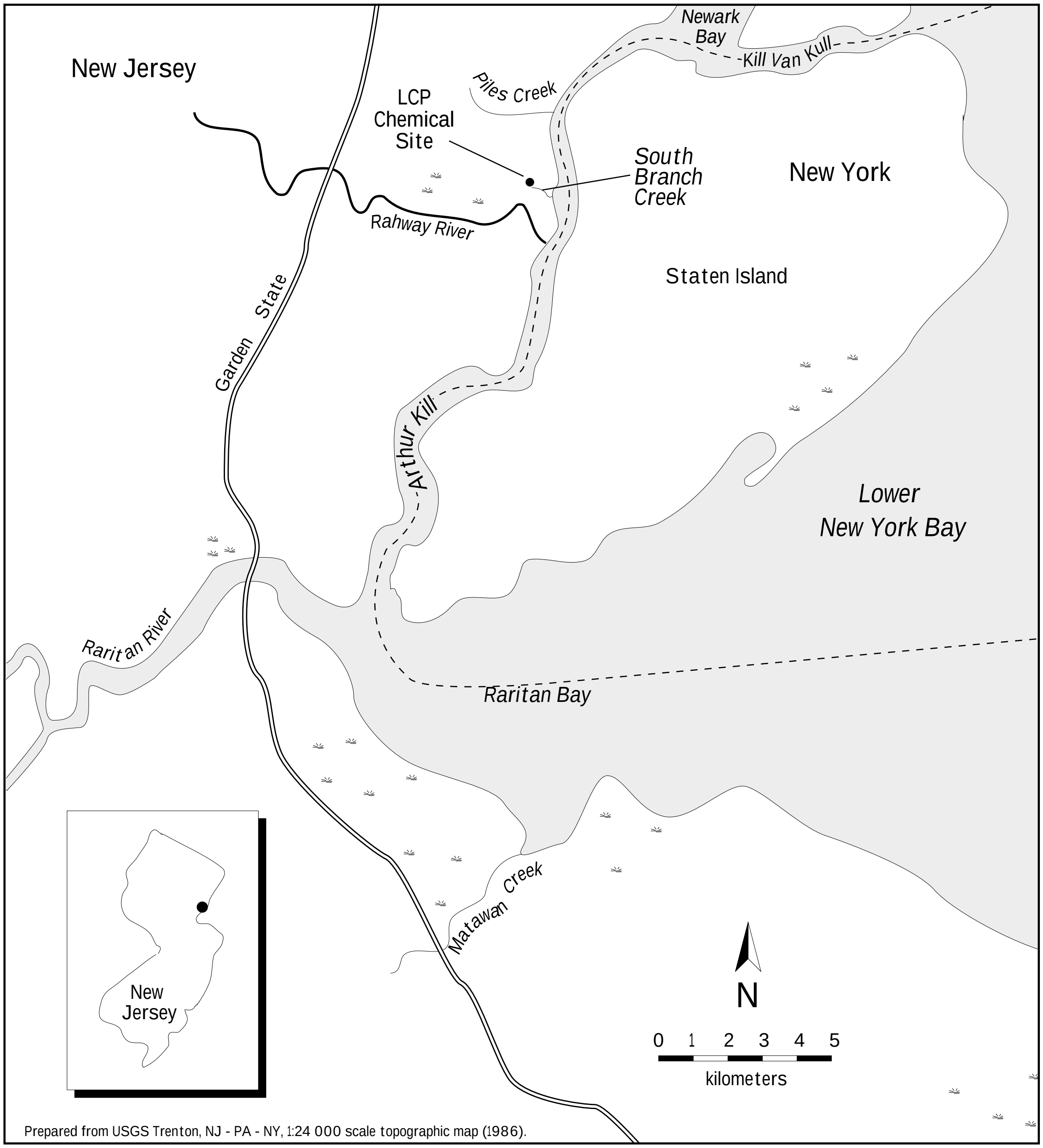

Figure 1. Location of LCP Chemicals site in Linden, New Jersey.

head of South Branch Creek (Figure 2). Unpermitted overland discharges of brine from the BSL to South Branch Creek were documented on four occasions from 1972 to 1979. These discharges probably contributed to documented contamination in soils downslope of the BSL and in South Branch Creek sediments next to the site.

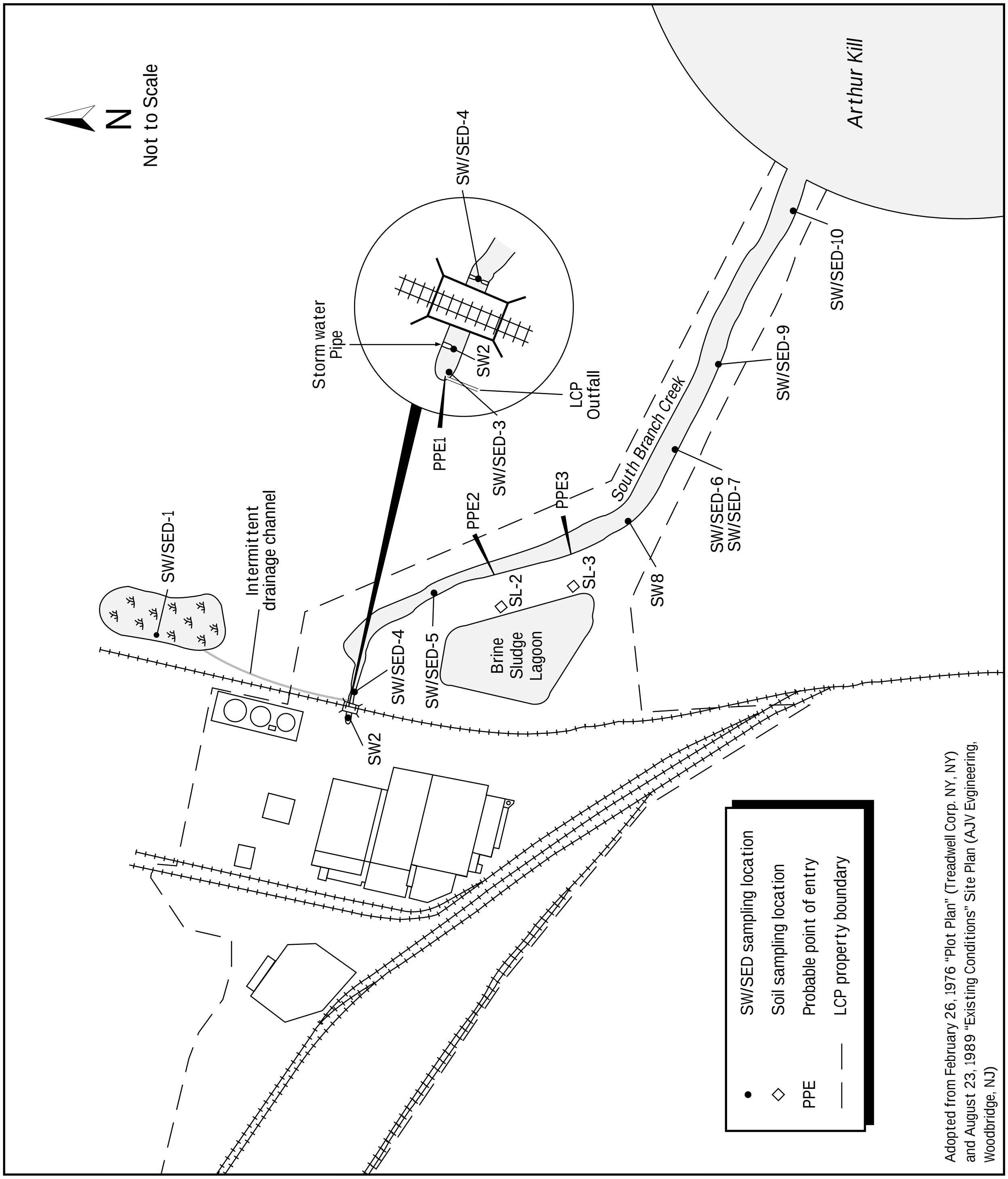

Figure 2. Details of the LCP Chemicals site in Linden, New Jersey.

Closure of the BSL in 1984 consisted of lagoon dewatering, sediment compaction, and placement of a multi-layer cap. The cap consisted of 60-cm of clay, 15 cm of drainage media, 15 cm of soil, and vegetative cover. Although production facilities also were closed in 1984, the site continued to operate as a storage and transfer station, west of the BSL, for hydrochloric acid, sodium hydroxide, potassium hydroxide, and methylene chloride produced at other LCP facilities.

Contaminants migrated from the site to South Branch Creek via overland runoff and erosion associated with overflows and breaches of the BSL, and permitted discharges through the outfall. Overland runoff resulted in numerous probable points of entry (PPEs) into the creek, two of which (PPE2 and PPE3 in Figure 2) were evaluated in greater detail during EPA's Hazard Ranking System (HRS) evaluation (EPA 1997). The groundwater pathway was not evaluated for the HRS analysis because human contact with potentially contaminated groundwater was considered unlikely. The water table is 1.7 to 3.4 m below ground surface and is located in a layer of unconsolidated fill consisting of mixed silt, sand, gravel, cinders, and crushed stone and brick (Geraghty and Miller 1982). Groundwater from the site discharges directly to South Branch Creek (Eder Associates 1992).

NOAA Trust Habitats and Species

The habitats of concern to NOAA are the sediments, intertidal mudflats, and wetlands associated with South Branch Creek and Arthur Kill. Arthur Kill is a heavily industrialized tidal estuary that includes extensive intertidal mudflats and salt marsh wetlands. Many of these wetlands were damaged in a 1990 oil spill and are being restored under the direction of the New York Department of Parks and Recreation (Packer 1998). There are salt marshes on both banks of South Branch Creek (EPA 1997). Important shallow-water habitats along the shorelines of both Arthur Kill and South Branch Creek generally have unconsolidated bottoms of silt or sand that are suitable habitat for a benthic community including polychaetes, mud crabs, and other shellfish species (U.S. ACOE 1997).

Despite the widespread anthropogenic influence on the Arthur Kill estuary, there are numerous anadromous and marine / estuarine fish species there (Table 1). Arthur Kill is a migration corridor between the New York Bight and the Newark Bay / Upper New York Bay estuary (U.S. ACOE 1997). Many transient marine / estuarine species enter the area on a seasonal basis from nearby coastal waters (U.S. ACOE 1997). A small number of species (e.g., striped bass, winter flounder, summer flounder, bay anchovy) dominate the fish community on a seasonal basis, but numerous other species occur as small resident populations.

Table 1. NOAA trust species using habitats associated with the Arthur Kill estuary near the site.

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm. Fishery	Recr. Fishery
<u>ANADROMOUS/CATADROMOUS SPECIES</u>						
Atlantic sturgeon	*Acipenser oxyrhynchus*			♦		
Blueback herring	*Alosa aestivalis*		♦	♦		
Alewife	*Alosa pseudoharengus*		♦	♦		
American shad	*Alosa sapidissima*		♦	♦		
American eel	*Anguilla rostrata*		♦	♦		
Striped bass	*Morone saxatilis*			♦		
Rainbow smelt	*Osmerus mordax*		♦	♦		
<u>MARINE/ESTUARINE SPECIES</u>						
Bay anchovy	*Anchoa mitchilli*		♦	♦		
Atlantic menhaden	*Brevoortia tyrannus*		♦	♦		♦
Crevalle jack	*Caranx hippos*		♦	♦		
Atlantic herring	*Clupea harengus*		♦			
Weakfish	*Cynoscion regalis*		♦	♦		
Gizzard shad	*Dorosoma cepedianum*		♦	♦		
Mummichog	*Fundulus heteroclitus*	♦	♦	♦		
Striped killifish	*Fundulus majalis*	♦	♦	♦		
Gobies	*Gobiosoma* spp.	♦	♦	♦		
Spot	*Leiostomus xanthurus*		♦	♦		
Inland silverside	*Menidia beryllina*	♦	♦	♦		
Atlantic silverside	*Menidia menidia*	♦	♦	♦		
Atlantic tomcod	*Microgadus tomcod*	♦	♦	♦		♦
Atlantic croaker	*Micropogonius undulatus*		♦			
White perch	*Morone americana*	♦	♦	♦		♦
Grubby	*Myoxocephalus aenaeus*	♦	♦	♦		
Summer flounder	*Paralichthys dentatus*		♦	♦		♦
Butterfish	*Peprilus triacanthus*		♦			
Winter flounder	*Pleuronectes americanus*	♦	♦	♦		♦
Black drum	*Pogonias cromis*		♦			
Bluefish	*Pomatus saltatrix*		♦	♦		♦
Northern searobin	*Prionotus carolinus*		♦			
Scup	*Stenotomus chrysops*	♦	♦	♦		
Northern pipefish	*Syngnathus fuscus*	♦	♦	♦		
Tautog	*Tautoga onitis*		♦			
Cunner	*Tautogolabrus adspersus*		♦			
Hogchoker	*Trinectes maculatus*		♦			
Red hake	*Urophycis chuss*		♦			
<u>INVERTEBRATE SPECIES</u>						
Blue crab	*Callinectes sapidus*	♦	♦	♦		♦
Sand shrimp	*Crangon septemspinosa*	♦	♦	♦		
Hardshell clam	*Mercenaria mercenaria*	♦	♦	♦		
Softshell clam	*Mya arenaria*	♦	♦	♦		
Grass shrimp	*Palaemonetes pugio*	♦	♦	♦		
Brown shrimp	*Penaeus aztecus*			♦		
Source: Bragin (1988), USACOE (1997)						

White perch, American eel, mummichog, and shrimp, are NOAA trust species that are likely to be found in South Branch Creek. Although no fish community data could be located for the Creek, these species have been observed in other small creek systems entering Arthur Kill (Byrne 1998; Packer 1998).

The New Jersey Department of Health maintains consumption advisories for striped bass, bluefish, white catfish, American eel, white perch, and blue crab because of high PCB and dioxin/furan concentrations in fish and crabs from Arthur Kill and its tributaries (NJ Dept. of Fish & Wildlife 1998). In spite of this advisory, some recreational fishing continues from easily accessible points along the banks of Arthur Kill (Byrne 1998).

Site-Related Contamination

Data on site-related contamination were obtained from the HRS evaluation (EPA 1997), which included results of a 1995 EPA site inspection (SI), and summarized results from previous investigations. All data in the HRS report before the SI are at least ten years old except for monitoring well data. While the older data documents historical conditions and releases, it may not accurately characterize current exposure potential. Therefore, only the SI data are presented in this review. The HRS report indicates that mercury is the primary contaminant of concern. However, several other trace elements and PCBs have been measured at concentrations exceeding screening guidelines (Table 2).

Maximum concentrations of mercury exceeded screening guidelines by factors of almost 2,000 for soil and over 7,000 for surface water and sediment. The ratios by which concentrations of other trace elements exceeded screening guidelines were much lower; most did not exceed 100. Mercury concentrations in soil immediately downslope of the BSL exceeded 100 mg/kg. During a 1982 investigation, mercury concentrations in surface soil adjacent to the BSL were as high as 1,580 mg/kg (Geraghty and Miller 1982). The maximum mercury concentrations in surface water and sediment were found in South Branch Creek next to the outfall. Mercury concentrations generally declined in a downstream direction (toward Arthur Kill), but concentrations at the station farthest downstream (SW-SED-10) still exceeded screening guidelines by factors of over 300 for both surface water and sediments. Therefore, it has been estimated that estuarine emergent wetlands located along approximately 0.74 km of South Branch Creek shoreline (measuring each bank separately) are located within the zone of high mercury contamination (EPA 1997).

Groundwater was monitored quarterly after the closure of the BSL, and it is reported that these data do not indicate a release of mercury from the lagoon to groundwater. However, these data were not available for review (Eder Associates 1992). Because the tidal cycle causes reversing hydraulic gradients, i.e., tidal pumping, and because salt water and fresh water are mixed within the surface aquifer, groundwater data from this site are difficult to interpret. That is, the reversing hydraulic (tidal) gradient may carry contaminants to hydrologically “upgradient” locations, making it difficult to establish background concentrations at this site (Geraghty and Miller 1982).

Table 2. Maximum contaminant concentrations of concern in soil, sediment, and surface water samples from 1995 site investigation at the LCP Chemicals site compared to NOAA screening guidelines (EPA 1997) .

	Soil mg/kg	Avg. U.S. [a] mg/kg	Surface water µg/L	AWQC[b] µg/L	Sediment mg/kg	ERL[c] mg/kg
PCBs	12.0	NA	NT	0.03	NT	22.7
Antimony	5.4	0.48	ND	500.0[p]	7.0	NA
Arsenic	17.0	5.2	336.0	36.0	318.0	8.2
Barium	2,110.0	440.0	9,580.0	NA	36,300.0	NA
Cadmium	0.44	0.06[a]	33.0	9.3	132.0	1.2
Chromium	19.1	37.0	231.0	50.0	263.0	81.0
Cobalt	17.9	6.7	22.9	NA	32.8	NA
Copper	156.0	17.0	520.0	2.9[d]	389.0	34.0
Iron	16,500.0	18,000.0	53,800.0	NA	57,300.0	NA
Lead	304.0	16.0	446.0	8.5	617.0	46.7
Mercury	110.0	0.058	93.0	0.025	1,060.0	0.15
Nickel	20.8	13.0	60.6	8.3	52.9	20.9
Selenium	0.89	0.26	4.9	71.0	10.2	NA
Silver	37.0	0.05[a]	8.3	0.92[p]	4.9	1.0
Zinc	833.0	48.0	1,440.0	86.0	12,500.0	150.0

NA Not Available.
NT Not tested.
a: Shacklette and Boerngen (1984), except for silver and cadmium which are averge concentrations in the earth's crust as reported by Lindsay (1979).
b: Ambient Water Quality Criteria, Marine Chronic unless noted otherwise (EPA 1993).
c: Effects Range-Low: The 10th percentile concentration for the dataset in which effects were observed or predicted as compiled by Long et al (1995)
d: Acute criterion; chronic criterion not available.
p: Proposed criterion.

Environmental samples were not analyzed for organic contaminants during the recent SI. Solvents were used for cleaning machine parts (e.g., carbon tetrachloride, acetone, and methyl ethyl ketone) and may be present at the site (Eder Associates 1992). Unidentified organic vapors were noted in the headspace of several monitoring wells during 1987 and 1989 site inspections (Eder Associates 1992). Volatile organic compounds also were noted in soil samples collected near the BSL during a 1988 investigation (Eder Associates 1992). In addition, Aroclor 1254, a commercial mixture of

PCB congeners, was measured in soil samples collected near the BSL at concentrations as high as 12 mg/kg during a 1992 investigation (Eder Associates 1992). Surface water and sediment samples were not analyzed for PCBs.

Summary

LCP Chemicals used a mercury cell electrolysis process to produce chlorine and other chemicals. Mercury-tainted sludge from the process was placed in the brine sludge lagoon, next to a small tributary of the Arthur Kill called South Branch Creek. Several anadromous and marine/estuarine fish species may be found in Arthur Kill; mummichog, white perch, American eel, and shrimp are likely to be found in South Branch Creek. Very high concentrations of mercury and several other trace elements have been reported from surface waters and sediments in South Branch Creek. PCBs and VOCs have been observed at the site, but site surface water and sediment have not been tested for these contaminants.

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2

Peter Cooper

Gowanda, New York
CERCLIS #NYD980530265

Site Exposure Potential

The 20-hectare Peter Cooper facility is located on Cattaraugus Creek in Gowanda, Cattaraugus County, New York (Figure 1). Cattaraugus Creek empties into Lake Erie approximately 29 km downstream from the site (Roy F. Weston 1997).

In about 1904, the Eastern Tanners Glue Company began manufacturing animal glue at the facility. The Peter Cooper Corporation took over on an unknown date and continued processing chromium-contaminated hides and cookhouse sludge for protein glue until 1972. Industrial adhesives were produced from 1972 until the facility closed in 1985 (EPA 1997).

Peter Cooper disposed of sludges high in chromium, arsenic, zinc, and organic compounds from 1925 to 1970 in an unlined landfill on the northwest portion of the property (Figure 2). By 1966, the landfill extended into Cattaraugus Creek. In 1971, the New York State Supreme Court ordered both removal of the waste pile and termination of waste discharges to Cattaraugus Creek. In response, Peter Cooper switched to production of industrial adhesives, and moved approximately 35,000 metric tons of waste from the Gowanda facility to their Markhams, New York facility. The remaining contaminated fill, with an estimated volume of 56,000 m^3, was covered and contained by an armored concrete

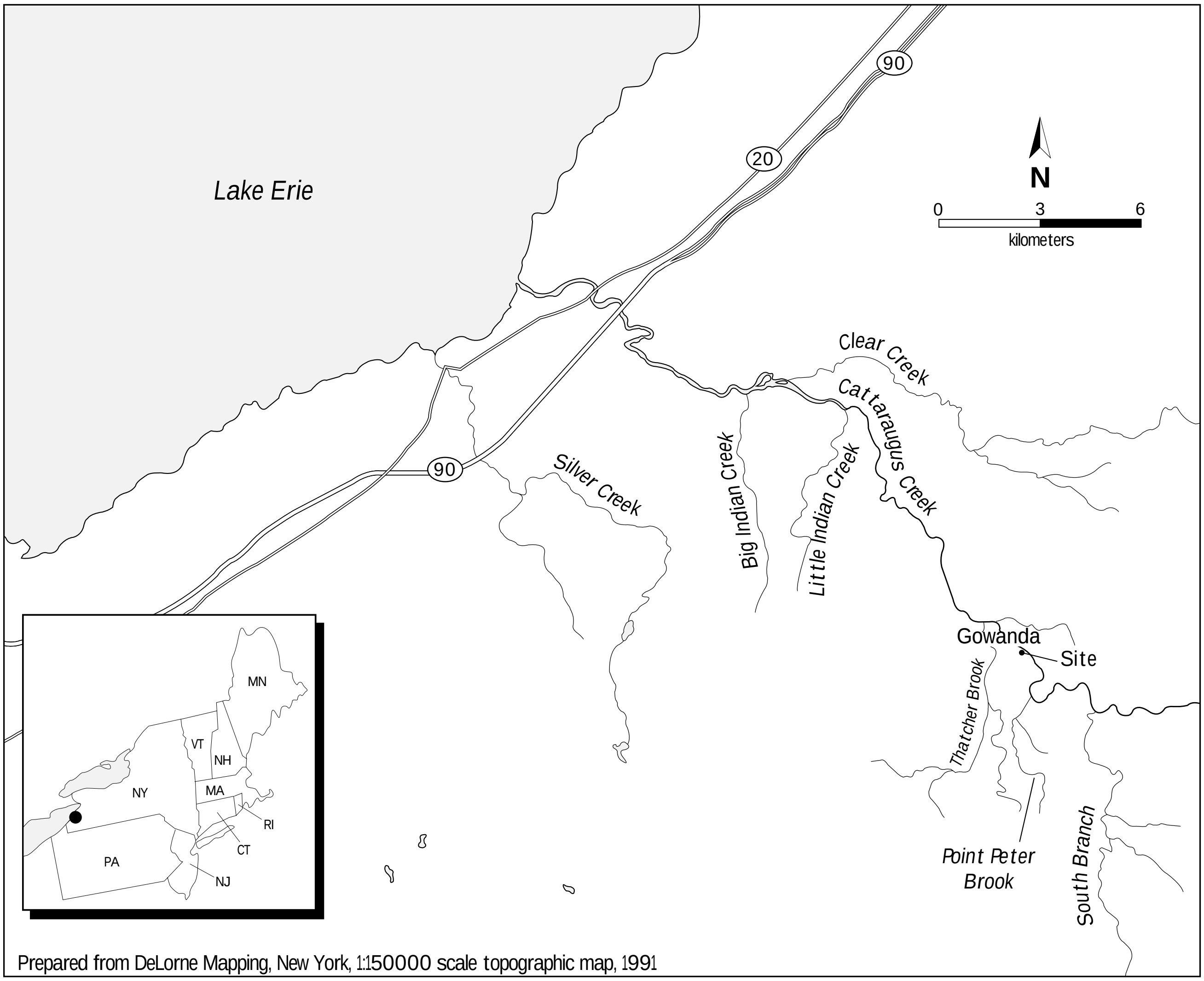

Figure 1. Location of the Peter Cooper site in Gowanda, New York.

wall along the creek. In 1976, the Rousselot Gelatin Corporation purchased the name, assets, and liabilities of the Peter Cooper Corporation and continued operations until the plant was closed in 1985 (Roy F. Weston 1997).

Investigations conducted since 1981 document that the cover material has eroded, exposing the waste pile. In addition, part of the concrete retaining wall collapsed and leachate was observed discharging along 260 m of Cattaraugus Creek (Roy F. Weston 1997). New riprap armored erosion control was constructed in January 1997 under an EPA Administrative Order (EPA 1997).

Surface water runoff, erosion, leachate migration, and groundwater discharge are the potential

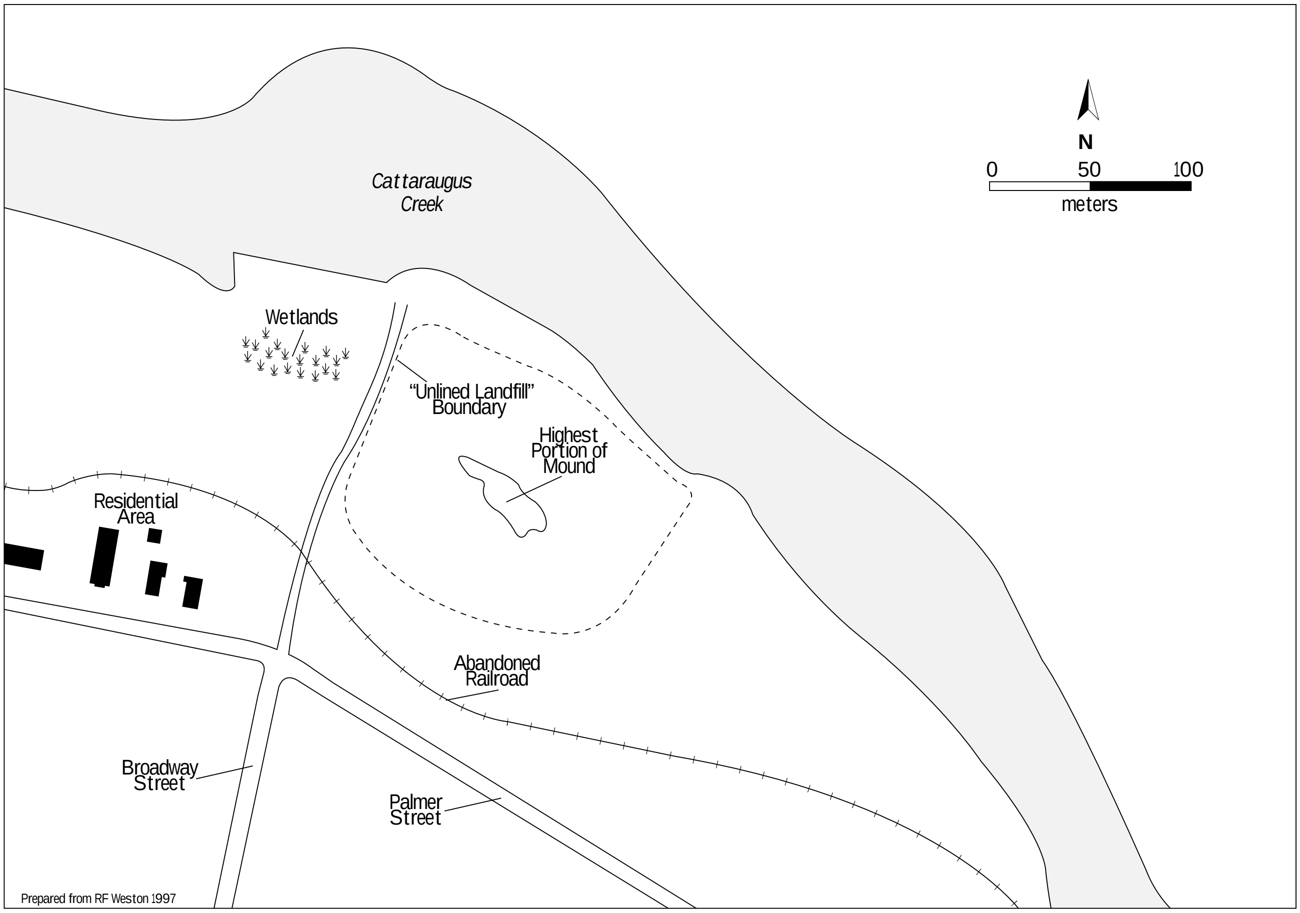

Figure 2. Detail of the Peter Cooper site.

pathways of contaminant transport from the site to NOAA trust resources and associated habitats. The mounded wastes slope to the shoreline of Cattaraugus Creek, helping surface runoff and eroded materials to flow into the creek (EPA 1997; Roy F. Weston 1997).

Groundwater is encountered about 1.5 m below the surface. Groundwater flow is northerly toward Cattaraugus Creek, through both the 3.3-m surface formation of unconsolidated sand, gravel, and silt; and through the deeper shale bedrock. Bedrock slopes down to the north toward the creek. Leachate seeps have been observed where bedrock intersects the creek channel (O'Brien and Gere Engineers, Inc. 1989).

NOAA Trust Habitats and Species

The NOAA trust habitat of concern is Cattaraugus Creek, a medium-sized, moderate-gradient, cold-water stream that discharges into eastern Lake Erie. Near the site, the creek is generally between 50 and 75 m wide and 0.5 to 3 m deep. Mean yearly flow is 740 cfs (Roy F. Weston 1997). Riffle, pool, and run habitats predominate below the site. Substrates range from cobble and rubble in riffle areas to fine sands in pools (Cornelius personal communication 1998).

The creek near the site is designated a Class B and C stream by the New York State Department of Environmental Conservation (NYSDEC). At the site, the creek is designated Class C waters, suitable for fish propagation and survival based on the standards for a trout fishery. Water quality also is suitable for primary and secondary contact recreation, although other factors may limit this use (NYSDEC 1994, 1997).

NOAA trust species found in Cattaraugus Creek include steelhead trout, alewife, chinook salmon, and coho salmon. Cattaraugus Creek is an important recreational salmonid fishery, with recreational anglers observed standing in leachate seeps in order to fish (Roy F. Weston 1997; Pomeroy personal communication 1998). Cattaraugus Creek has been described as "the top salmonid spawning stream of Lake Erie tributaries" (EPA 1998). While migrations of hatchery-bred chinook and coho salmon still occur, the state recently decided to manage the stream for steelhead only (Cornelius personal communication 1998).

Adult steelhead reside in Lake Erie for one to three years before migrating up tributaries during annual spawning runs. Spawning runs are greatest during the fall and winter, but extend from October through April. Eggs incubate in cobble redds over the spring. Juvenile steelhead typically emerge from redds during the late spring and summer, overwinter the following year, and outmigrate as one-year-old fish. The naturally reproducing population of steelhead is supplemented each year by the state (Cornelius personal communication 1998).

Cattaraugus Creek adjacent to the site is a migratory corridor for both spawning and juvenile steelhead. Spawning steelhead have been observed in the tributary streams but have not been documented in the mainstem near the site. Juvenile steelhead are known to use the watershed for more than a year before outmigrating to Lake Erie (Cornelius personal communication 1998).

Most of Cattaraugus Creek downstream of Gowanda, New York flows through lands of the Seneca Indian Nation. Downstream areas support both subsistence and sport fishing. Non-Native American anglers can access tribal waters by purchasing a license from the tribe (Cornelius personal communication 1998).

The New York State Department of Health (NYSDOH) recently issued a health advisory for all of the Lake Erie basin due to elevated concentrations of PCBs in fish tissue. The advisory recommends that the general population consume no more than one meal per week of chinook salmon longer than 19 inches; or burbot, rock bass, or yellow perch of any size; that women of childbearing age and children under 15 consume no more than one meal per month of these fish; and that pregnant or nursing mothers not consume any fish from the Lake Erie basin (NYSDOH 1998).

Site-Related Contamination

The primary contaminants of concern to NOAA at the Peter Cooper site are the trace elements chromium, arsenic, and zinc, and phenolic organic compounds. Data collected during the remedial investigation in 1988 and subsequent site investigations in 1995 and 1996 indicate that exposed landfill wastes, on-site soils, groundwater, surface water in Cattaraugus Creek, and leachate from the site all contain elevated concentrations of site-related contaminants. Maximum concentrations of these contaminants from the most recent sampling effort are presented in Table 1, along with screening guidelines.

Maximum concentrations of the trace elements arsenic, chromium, and zinc in the landfill and in soil close to the creek exceeded average concentrations for U.S. soils by 5 to 1,000 times (Table 1). Zinc concentrations in groundwater exceeded the chronic AWQC by two orders of magnitude, and were twice the AWQC in creek water collected next to the landfill. Total chromium concentration in samples of the leachate observed discharging to Cattaraugus Creek was nearly three times greater than the AWQC for trivalent ($^{+3}$) chromium, the less toxic valence state. An AWQC for total chromium was not found. However, the available data did not indicate excessive metal concentrations in Creek sediment.

Phenol and phenolic compounds were detected in landfill wastes, on-site soils, groundwater, and surface water (Table 1). No screening guidelines are available for these organic compounds in soil, and although phenol was detected in groundwater at an elevated concentration, it was less than an order of magnitude above the LOEL. Leachate and sediments were not analyzed for phenols.

Several PAHs, including benzanthracene, benzo(a)pyrene, benzo(k)fluoranthene, chrysene, fluoranthene, phenanthrene, and pyrene, were detected in landfill wastes, soils, and sediments at the site, but the reviewed data indicated PAH concentrations below sample quantitation limits, which were less than screening levels.

Summary

Elevated concentrations of the trace elements arsenic, chromium, and zinc have been found in landfill wastes, soils, groundwater, creek water, and leachate from the Peter Cooper site. These

Table 1. Maximum concentrations of contaminants of concern detected in affected media at the Peter Cooper site (Roy F. Weston 1997).

	Soil (mg/kg)			Water (µg/L)				Sediment (mg/kg)	
	Landfill Waste	Soils	Average U.S. [a]	Ground-water	Creek Surface Water	Leachate	AWQC[b]	Creek Sediment	TEL[c]
Trace Elements									
arsenic	33	25	5.2	100	123	99	190	7	5.9
Chromium +6 (hexavalent)	<10	<9.1	NA	60	8	NR	11	<0.74	NA
chromium +3 (trivalent)	NR	NR	NA	NR	NR	NR	210	NR	NA
total chromium	37,000	750	37	1,100	225	607	NA	12	37
zinc	5,200	520	48	11,000[d]	274	39	110	NR	120
Organic Compounds									
4-methyl phenol	6.4	NR	NA	42,000J	NR	NR	NA	NR	NA
phenol	0.79	97	NA	8,000J	160	NR	2,560[e]	NR	NA

a: Shacklette and Boerngen (1984).
b: Quality Criteria for Water (EPA 1993). Freshwater chronic criteria, unless otherwise noted, 100 mg/L $CaCO_3$ assumed.
c: Threshold effects level; concentration below which adverse biological effects were rarely observed (geometric mean of the 15% concentration in the effects dataset) as compiled by Smith et al. (1996).
d: O'Brien and Gere Engineers, Inc. 1989.
e: Lowest observed effects level, freshwater chronic (EPA 1993).
NA: Screening guidelines not available.
ND: Not detected; detection limit not reported.
NR: Not reported/analyzed.
J: Estimated concentration; not all quality control criteria were met for this sample.

trace element concentrations exceeded screening guidelines for each media in many cases. Phenolic organic compounds also were detected in soils, groundwater, and surface water. Observed releases of leachate seeping from the site into bordering Cattaraugus Creek indicate that contaminants from the site are migrating into trust habitats. Contaminants entering the creek pose a risk to resident juvenile and spawning steelhead trout, and migrating salmon.

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2

Puchack Well Field

Camden, New Jersey
CERCLIS #NJD981084767

Site Exposure Potential

The Puchack Well Field hazardous waste site consists of six public water supply wells that are owned and operated by the city of Camden, New Jersey. The well field is located northeast of the city of Camden in Pennsauken Township, Camden County (Figure 1). The northernmost well, P1, is about 0.8 km from the Delaware River. One of the seven original wells, P4, was destroyed when the Betsy Ross Bridge was built (U.S. EPA 1997a).

Delaware River tributaries nearest to the site are Pennsauken Creek, 1.3 km to the north, and the Cooper River, 5.7 km to the south. Puchack Creek, immediately north of the well field, is a channelized stream that carries excess water from the public water supply distribution system during non-storm conditions (Nicholson personal communication 1998).

Contamination with trichloroethylene, 1,2-dichlororethane, tetrachloroethylene, and chromium (including hexavalent) was first documented in the early 1970s, resulting in the closure of all Puchack wells, except P1. In 1996, the New Jersey Department of Environmental Protection (NJDEP) collected groundwater from the wells for analysis of VOCs and trace metals. Results indicated contamination with mercury, copper and silver, in addition to the contamina-

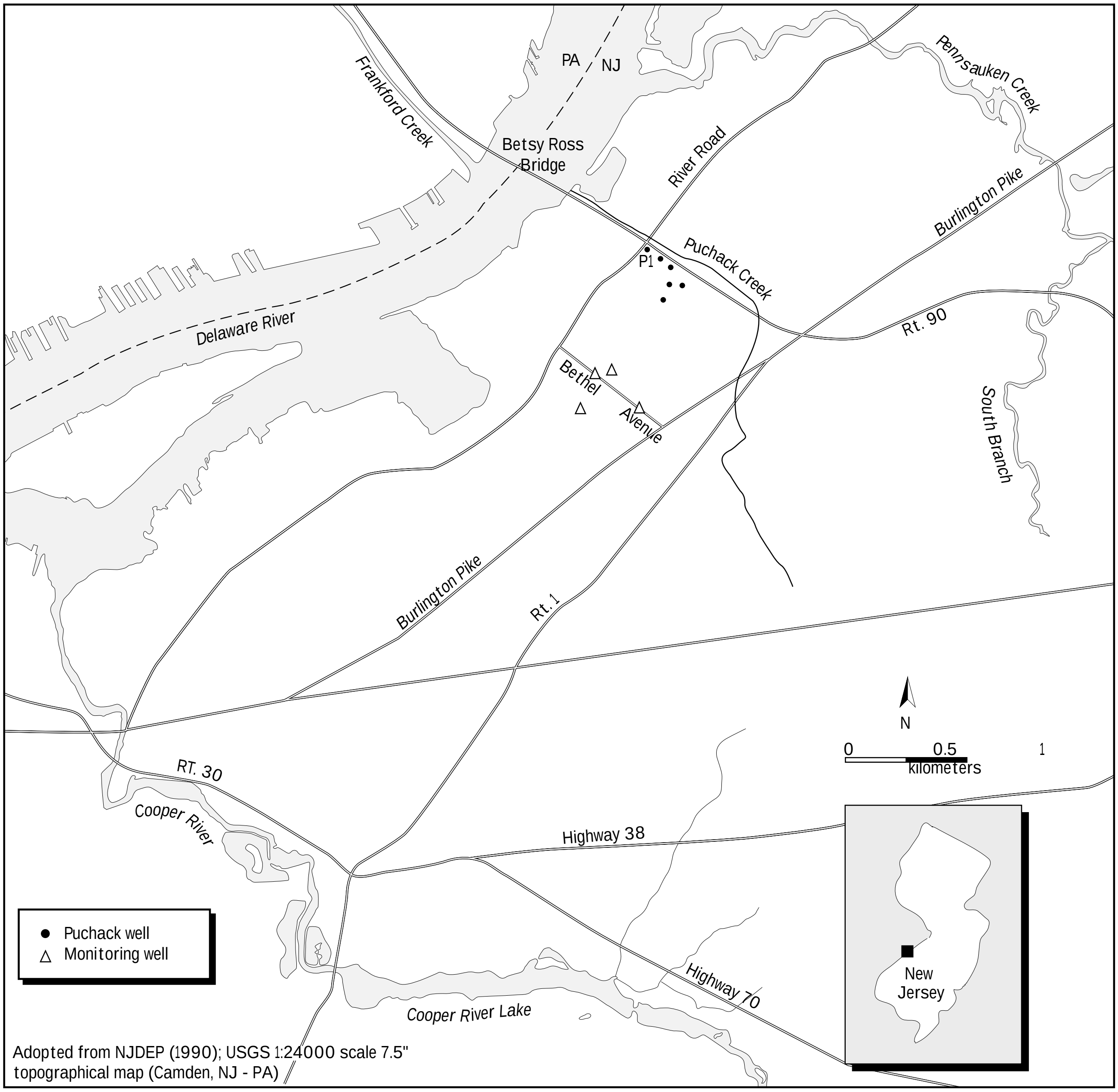

Figure 1. Location of the Puchack Well Field site in Pennsauken Township, Camden County, New Jersey.

tion with VOCs and chromium identified twenty years earlier.

Until May 1998, the City of Camden continued to pump Well P1 to prevent the contaminated groundwater migrating to other area public supply wells. Water from Well P1 was mixed with potable water from other wells before distribution, or was wasted to the Delaware River via the Puchack Creek channel. The Puchack wells that have been removed from service are all located within an approximately 4.1-hectare area.

In October 1991, NJDEP alerted several facilities of their potential liability for the documented contamination. Investigations of likely contaminant sources continue (EPA 1997a).

The Puchack Well Field is situated in an outcrop area of the Potomac-Raritan-Magothy aquifer system. The sand and gravel aquifer system is subdivided into the upper, middle, and lower aquifers, separated by two confining units composed of mixed silt and clay. The Puchack wells are screened in the lowest aquifer, which is believed to receive recharge from the Delaware River and the middle aquifer. Regional groundwater flow within the lowest aquifer is to the south or southeast under static (non-pumping) conditions. However, groundwater gradients were to the southwest during hydrogeologic investigations (pump tests) at sites northeast of the Puchack well field (NJDEP 1990).

Potential contaminant migration pathways to NOAA trust resources are the discharge of contaminated groundwater into the Delaware River, and the historic discharge of contaminated water into Puchack Creek. The degree to which groundwater may enter the Delaware River under well-pumping and non-pumping conditions has not yet been determined. Although there aren't any monitoring wells between the Puchack Well Field and the river, a study of groundwater flow over the entire region has been initiated (Nicholson personal communication 1998).

Although Puchack Creek is situated directly above the contaminated aquifer, groundwater is not expected to enter the creek because the maximum water table elevation is 20 m deeper than the creek bottom. In addition, the creek is lined with concrete over most of its length (Nicholson personal communication 1998).

NOAA Trust Habitats and Species

The primary habitats of concern to NOAA include the wetlands and mudflats of the Delaware River north and west of the site, the submerged shallow habitat immediately offshore of the river banks, and river habitat upstream and downstream within the tidally influenced region of the river. Most of Puchack Creek has been channelized and lined with concrete, so it no longer provides suitable habitat for trust resources (Nicholson personal communication 1998).

The Delaware River extends approximately 170 km from the head of tide at Trenton, New Jersey, to its confluence with Delaware Bay near Bombay Hook, Delaware. The Puchack Well Field is located approximately 145 river km from Delaware Bay, in the tidally influenced freshwater reach of the river. Several tributaries enter the Delaware River within 3 km upstream of the site. These tributaries, as well as the main river channel, provide resident and seasonal habitat for numerous species of migratory and estuarine fish, including the shortnose sturgeon, a federally listed endangered species. Atlantic sturgeon and American shad, which also use this river reach, are listed by New Jersey as species of concern (Table 1).

Near Philadelphia and Pennsauken Township, the Delaware River provides important nursery and spawning habitats for American shad, herring, striped bass, and white perch (NOAA 1994; Byrne personal communication 1998). Species of special interest to NOAA because of their commercial importance or abundance in the region are striped bass, American shad, alewife, herring, anchovy, white perch, American eel, and blue crab (Table 1). The two most abundant species in the Delaware River system are blueback herring and bay anchovy, which provide food for larger predators such as striped bass (Byrne personal communication 1998). The shortnose sturgeon, a federally listed endangered species, spawns in the Delaware River approximately 40 river km north of the site, and uses habitat near the site throughout early lifestages (NOAA 1994; Byrne personal communication 1998).

Coastal commercial fisheries for American shad, alewife, herring, and striped bass are subject to National Marine Fisheries Service resource management plans. American shad and striped bass are under special interstate management programs because of declining stocks.

Table 1. NOAA trust species using habitats in the Delaware River near the Puchack Well Field site (NOAA 1994; Byrne 1998).

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm. Fishery	Recr. Fishery
ANADROMOUS/CATADROMOUS SPECIES						
Alewife	*Alosa pseudoharengus*	♦	♦	♦		♦
American eel	*Anguilla rostrata*			♦	♦	♦
American shad*	*Alosa sapidissima*	♦	♦	♦		♦
Atlantic sturgeon*	*Acipenser oxyrhynchus*		♦	♦		
Blueback herring	*Alosa aestivalis*	♦	♦	♦		♦
Shortnose sturgeon**	*Acipenser brevirostrum*		♦	♦		
Striped bass	*Morone saxatilis*	♦	♦	♦		♦
MARINE/ESTUARINE SPECIES						
Atlantic menhaden	*Brevoortia tyrannus*		♦	♦		
Bay anchovy	*Anchoa mitchilli*		♦	♦		
Hogchoker	*Trinectes maculatus*		♦	♦		
Striped killifish	*Fundulus majalis*	♦	♦	♦		
White perch	*Morone americana*	♦	♦	♦		♦
INVERTEBRATE SPECIES						
Blue crab	*Callinectes sapidus*	♦	♦	♦	♦	♦

*New Jersey species of concern
**federally endangered

There are recreational fisheries for most of the species found in the river, including striped bass, American shad, herring, white perch, hogchoker, American eel, and blue crab. White perch is the fish most commonly caught and eaten by sport fishermen in the Delaware River estuary (Byrne personal communication 1998). A fish consumption advisory based on excessive mercury contamination is in place for largemouth bass and chain pickerel in the Delaware River. In addition, the New Jersey Department of Environmental Protection (NJDEP) prohibits the sale of, and recommends against any consumption of fish, shellfish, or crustaceans from Pennsauken Creek, the Cooper River, and Cooper River Lake because of contamination in the edible tissues of these resources. (U.S. EPA 1997b; NJDEP 1998).

Site-Related Contamination

Data on site-related contamination were obtained from the Hazard Ranking System (HRS) evaluation (U.S. EPA 1997a), which reported results from NJDEP sampling in 1996 and briefly reviewed results from previous investigations. According to the HRS evaluation, chromium is the primary contaminant of concern at the site. However, copper, mercury, and silver also have been measured at concentrations ten times or more greater than the freshwater chronic AWQC (Table 2). Volatile organic compounds were found at concentrations that exceed drinking water criteria, but the reported concentrations do

Table 2. Comparison of freshwater chronic AWQC to maximum contaminant concentrations found in groundwater at the Puchack Well Field site during the 1996 NJDEP investigation.

	Groundwater (µg/L)		
	Monitoring wells south of well field	Puchack Well Field	AWQC[a] (µg/L)
Trace Elements			
Cadmium	2.1	0.4	1.1
Chromium	9,530	4,180[b]	11
Copper	23.9	183	12
Mercury	1.1	2.0[c]	0.012
Silver	1.6	1.3 U	0.12
Zinc	215	38.4	110

a: Ambient water quality criteria for the protection of aquatic organisms. Freshwater chronic criteria presented and hardness assumed at 100 mg/L calcium carbonate (EPA 1993).
b: From sample collected 10/23/89 (NJDEP 1990); measured as hexavalent chromium.
c: From sample collected 12/13/85 (NJDEP 1990).
U: Estimated concentration, less than sample quantitation limit.

not exceed applicable AWQC. Groundwater samples were analyzed only for VOCs, trace metals, and cyanide.

The 1996 investigation found maximum trace element concentrations (with the exception of copper) in monitoring wells south of the site, not in the Puchack wells (Table 2). All samples contained chromium at concentrations exceeding the freshwater chronic AWQC, and the maximum total chromium concentration was 860 times greater than the AWQC. Mercury concentrations were up to 100 times greater than the AWQC; silver and copper concentrations were up to ten times greater than the AWQC.

Summary

The Puchack Well Field, located less than a kilometer east of the Delaware River, used water from one of the most productive aquifers in New Jersey. The Delaware River near the site contains several anadromous and marine/estuarine species of concern to NOAA, including the shortnose sturgeon, a federally listed endangered species. Atlantic sturgeon and American shad, which are species of special concern to New Jersey, also are found near the site. Groundwater samples from every well near the site have had total chromium concentrations much greater than AWQC. Mercury, copper, and silver concentrations in groundwater also have been reported an order of magnitude, or more, greater than the AWQC.

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2

Zschiegner Refining Company

Howell Township, New Jersey
CERCLIS #NJD986643153

Site Exposure Potential

The Zschiegner Refining Company occupies approximately 2.5 hectares in Howell Township, Monmouth County, New Jersey (Figure 1). Haystack Brook and its associated wetlands drain from north to south across the eastern portion of the facility, and an unnamed tributary drains the southern site area before it joins Haystack Brook. Haystack Brook flows for 5.3 km to Muddy Ford Brook, which ends 1.1 km downstream at the North Branch Metedeconk River. The North Branch joins the Metedeconk River proper 2.9 km farther downstream before meandering another 10 km to Barnegat Bay and the Atlantic Ocean.

Zschiegner conducted secondary (recovery) refining of precious metals from 1964 to 1992. These operations included chemical stripping of precious metals from watchbands, film, and electrical components. The documents reviewed did not indicate whether the recovered metals were smelted at the facility. Site operations also included manufacturing of methamphetamine, a controlled drug. It is not known when drug manufacturing began, but these activities were confirmed by a Drug Enforcement Agency (DEA) search on October 31, 1992. DEA agents found approximately 3,000 chemicals improperly stored throughout the site, including sodium peroxide, cyanide salts, caustics, and acids.

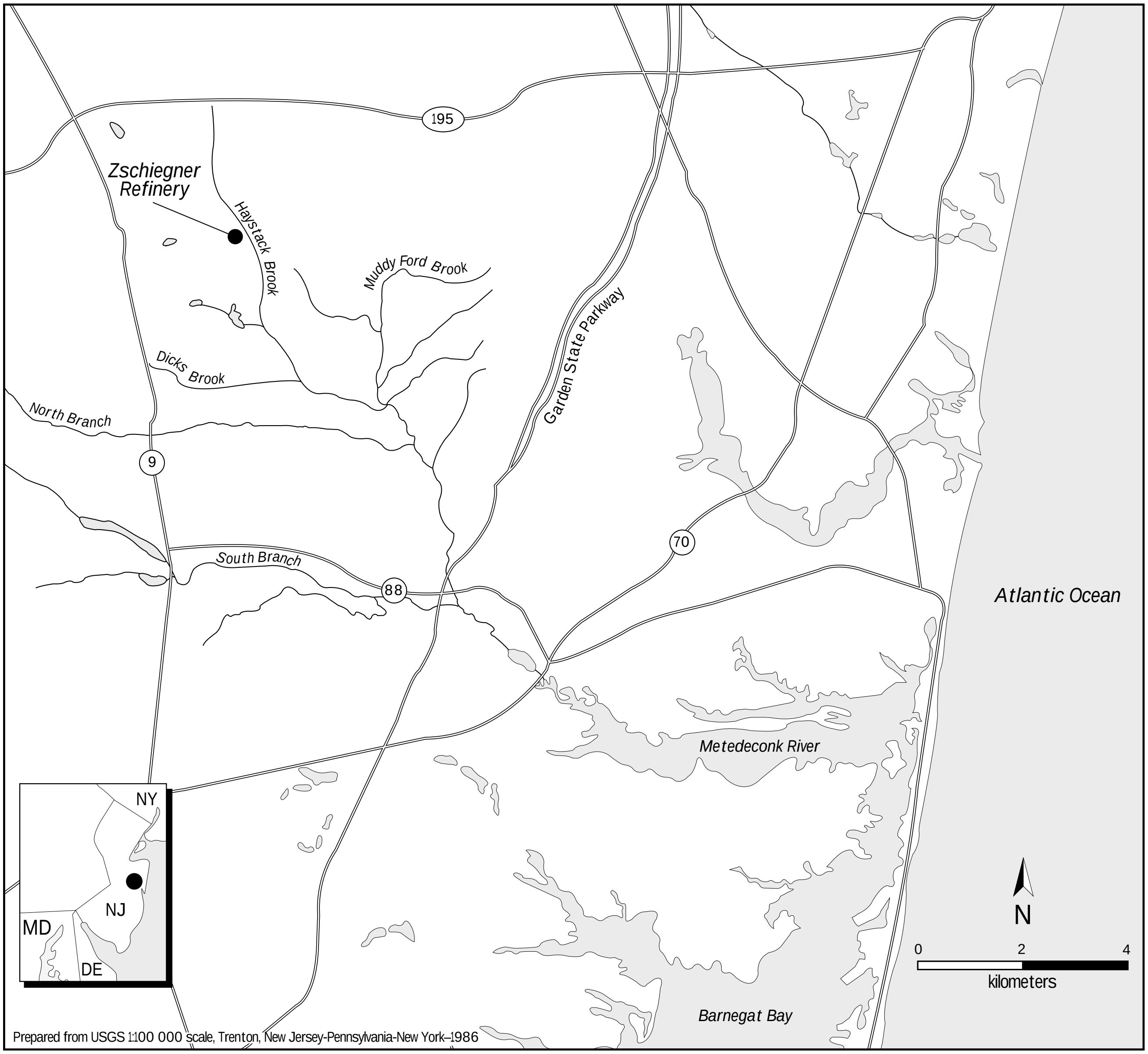

Figure 1. Location of the Zschiegner Refinery site

In 1992, EPA removed about 7,600 L of acidic solutions and 6,100 L of caustic (basic) solutions from the site, and lab-packed another 1,400 small containers of hazardous substances. An EPA removal action in 1993 properly disposed of the lab-packed hazardous substances (EPA 1996; 1998).

The potential pathways of contaminant transport into Haystack Brook are surface water runoff, erosion, and groundwater migration. During a site reconnaissance in 1995, overland runoff was observed from the chemical handling facility through the wetlands to the unnamed tributary and Haystack Brook (Figure 2; EPA 1996). Groundwater sampling to identify impacts from site-related contaminants has not yet been completed. Depth to groundwater is believed to be very shallow, as indicated by the permanence of Haystack Brook and its associated wetlands. Groundwater flow is expected to be east toward Haystack Brook (EPA 1996).

NOAA Trust Habitats and Species

The NOAA trust habitats potentially affected by the Zschiegner Refining site are Haystack Brook, its unnamed tributary, the North Branch Metedeconk River, and the associated wetlands and riparian corridors. Haystack Brook is a lowland, spring-fed stream that is less than 15 m wide and 2 m deep near the site. Palustrine, forested wetlands are dominant in the riparian zone from the site downstream to the North Branch Metedeconk River (EPA 1996).

An unsuccessful proposal to build a dam in 1972 provided limited information about fish species within Haystack Brook. The proposal reported that no anadromous fish were present. Catadromous American eel probably use Haystack Brook, since they are found throughout the Barnegat Bay watershed. There are no impediments to fish migration between the site and Barnegat Bay. The North Branch Metedeconk River supports recreational fisheries for warmwater resident species such as bass and sunfish, but there are no known fisheries for anadromous or catadromous species (Boriek personal communication 1998).

The North Branch Metedeconk River downstream of Haystack Brook is a small to moderate-sized, low-gradient stream with average flows of about 60 cfs (EPA 1996). The New Jersey Department of Environmental Protection (NJDEP) collected anadromous blueback herring and alewife where Highway 88 crosses the river, approximately 8 km downstream of the site. NJDEP considers the North Branch Metedeconk River to be an anadromous watershed and manages the stream for these two species. Anadromous runs in the North Branch have access to Haystack Brook (Boriek personal communication 1998).

Site-Related Contamination

Data from EPA site investigations indicate elevated concentrations of site-related contaminants in soils, surface water, and sediment at the Zschiegner Refinery site (EPA 1994; 1996). Table 1 summarizes contaminant concentrations found during the 1995 site investigation. Contaminants of concern to NOAA include PAHs, solvents, pesticides, and trace elements. Data collected during the 1992 removal action did not meet EPA standards, and were not included in the site evaluation (EPA 1996).

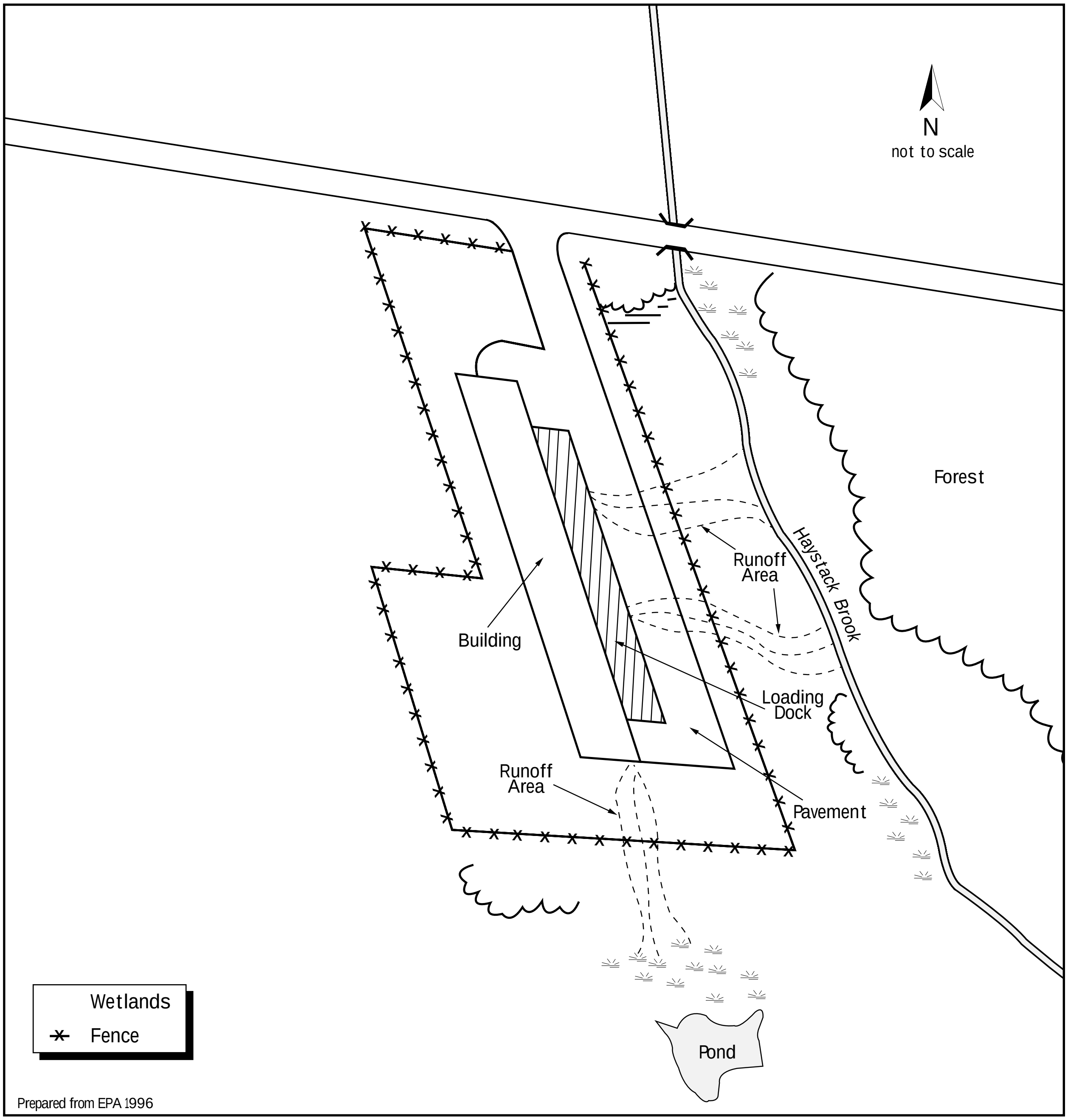

Figure 2. Detail of the Zschiegner Refinery site.

The data suggest soils are contaminated with both trace elements and organic contaminants at the Zschiegner site (Table 1; EPA 1996). Most of these samples were collected between the site and Haystack Brook. Trace elements were found at concentrations substantially above average U.S. soil concentrations. The highest concentrations

Table 1. Maximum concentrations of contaminants of concern to NOAA at Zschiegner Refining Company site, Howell Township, New Jersey.

	Soils		Water		Sediment	
CONTAMINANT	On-Site Soils (mg/kg)	Mean U.S.[a] (mg/kg)	Surface Water (µg/L)	AWQC[b] (µg/L)	Sediments (mg/kg)	TEL[d] (mg/kg)
INORGANIC						
Arsenic	21	5.2	2.0	190	5.0	5.9
Beryllium	20.5	0.63	0.5	5.3	3.1	NA
Cadmium	4.0	0.06	2.0	1.1 c	1.0	0.60
Chromium, total	15000	37	12	NA	610	37
Copper	12000	17	84	12 c	990	36
Cyanide (HCN)	6380	NA	NA	5.2	7.8	0.1g
Lead	150	16	13	3.2 c	47	35
Mercury	1.2	0.058	NA	0.012	NA	0.18
Nickel	670	13	14	160 c	170	18
Selenium	4.6	0.26	NA	71	3.4	NA
Silver	1100	0.05	5.0	0.12	NA	NA
Zinc	540	48	35	110 c	87	120
ORGANIC						
4,4,'-DDE	0.04	NA	ND	1050 f	ND	NA
4,4'-DDT	0.06	NA	ND	0.001	ND	0.007t
Acetone	2.6	NA	10	NA	64	NA
Aldrin	0.02	NA	ND	3.0 e	ND	NA
alpha-Chlordane	0.02	NA	ND	0.0043	0.03	NA
Anthracene	ND	NA	ND	NA	0.09	NA
Benzo(a)anthracene	0.26	NA	ND	NA	0.5	0.032
Benzo(a)pyrene	0.21	NA	ND	NA	0.6	0.032
Benzo(b)fluoranthene	0.52	NA	ND	NA	1.3	NA
Benzo(g,h,i)perylene	0.17	NA	ND	NA	0.48	NA
Benzo(k)fluoranthene	0.19	NA	ND	NA	0.39	NA
Dieldrin	ND	NA	ND	0.0019	0.02	0.0029
Di-n-butyl phthalate	0.14	NA	NA	3.0 f	0.1	NA
Fluoranthene	0.55	NA	ND	NA	2.0	0.111
Fluorene	ND	NA	ND	NA	0.06	NA
gamma-Chlordane	ND	NA	ND	NA	0.03	0.0045t
Indeno(1,2,3-c,d)pyrene	0.18	NA	ND	NA	0.46	NA
Pentachlorophenol	ND	NA	ND	13 pH	0.09	NA
Phenanthrene	0.48	NA	ND	6.3	0.84	0.042
Pyrene	0.62	NA	ND	NA	1.2	0.053

NA Not available
ND: Not detected; detection limits not available.
a: Shacklette and Boerngen (1984), except for silver and cadmium, which are from Lindsay (1979).
b: Quality Criteria for Water (EPA 1993). Freshwater chronic criteria, unless otherwise noted;
c: Hardness-dependent criterion, hardness of 100 mg/L calcium carbonate assumed.
d: Threshold effect level; concentration below which adverse biological effects were rarely observed (geometric mean of the 15% concentration in the effects dataset) as compiled by Smith et al. (1996).
e: AWQC acute value, chronic not available.
f: Lowest Observed Effect Level (EPA 1993).
g: Open water disposal guideline (Persaud 1993).
pH: Criterion is pH-dependent; pH of 7.8 assumed (EPA 1993).
t: Criterion for total concentration for chemical class, e.g., sum of DDT, DDD, and DDE isomers.

were found predominantly between the main buildings and Haystack Brook. Nationally accepted screening values for organic contaminants in soil are not available. Groundwater samples were not collected.

Surface water in both Haystack Brook and the tributary had concentrations of cadmium, copper, lead, and silver greater than their respective AWQC. In general, concentrations downstream of the site were substantially higher than upstream concentrations.

Sediments collected in Haystack Brook and the tributary were contaminated with trace elements and organic compounds. Concentrations of total chromium, copper, and nickel significantly exceeded freshwater TEL guidelines. PAH compounds were also measured in sediments at concentrations that exceed freshwater TEL guidelines, including benzo(a)pyrene, fluoranthene, and phenanthrene. Acetone, a volatile solvent, was measured at 64 mg/kg in sediment. The limited available data indicate potential contamination with other types of organic contaminants, including phthalates, and pesticides. In general, concentrations in samples collected downstream of the facility were substantially higher than upstream samples.

Summary

EPA site investigations indicate that soil, surface water, and sediments are contaminated with trace elements and organic compounds downstream of the Zschiegner Refining site. NOAA trust habitats potentially impacted by the Zschiegner site are Haystack Brook, an unnamed tributary to the Brook, the North Branch Metedeconk River, and the associated wetlands and riparian zones. Surface-water runoff from the site flows into Haystack Brook and its tributary. Haystack Brook is a lowland, spring-fed stream which flows to the North Branch Metedeconk River, which is managed for anadromous blueback herring and alewife by the State of New Jersey.

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3

Central Chemical Corporation

Hagerstown, Maryland
CERCLIS #MDD003061447

Site Exposure Potential

The approximately 7.7-hectare Central Chemical Corporation is located within an area of mixed industrial, commercial, residential, and agricultural uses in Hagerstown, Maryland. The site is about 1.6 km from Marsh Run 2, which flows an additional 2.4 km to Antietam Creek. Antietam Creek discharges to the Potomac River approximately 24 km farther south (Figure 1; Woodward-Clyde 1997). From its confluence with Antietam Creek, the Potomac River flows about 140 km to Chesapeake Bay.

Central Chemical blended agricultural pesticides and fertilizers from the 1930s until the early 1960s. A fire destroyed pesticide operations in 1965. The facility resumed fertilizer manufacture from 1968 until 1984, when all operations ceased. Pesticides and fertilizers were handled in buildings on the northwestern and southwestern portions of the site (Figure 2). Pesticides blended at the site included DDT, aldrin, dieldrin, chlordane, endrin, methoxychlor, malathion, and lead arsenate. Fertilizer manufacturing used feedstocks of potash, superphosphate, ammonium sulfate, and nitrogen solutions (Woodward-Clyde 1997).

Aerial photographs from 1952 show two connected surface borrow areas. Former employees report discharges of lime sulfur slurry,

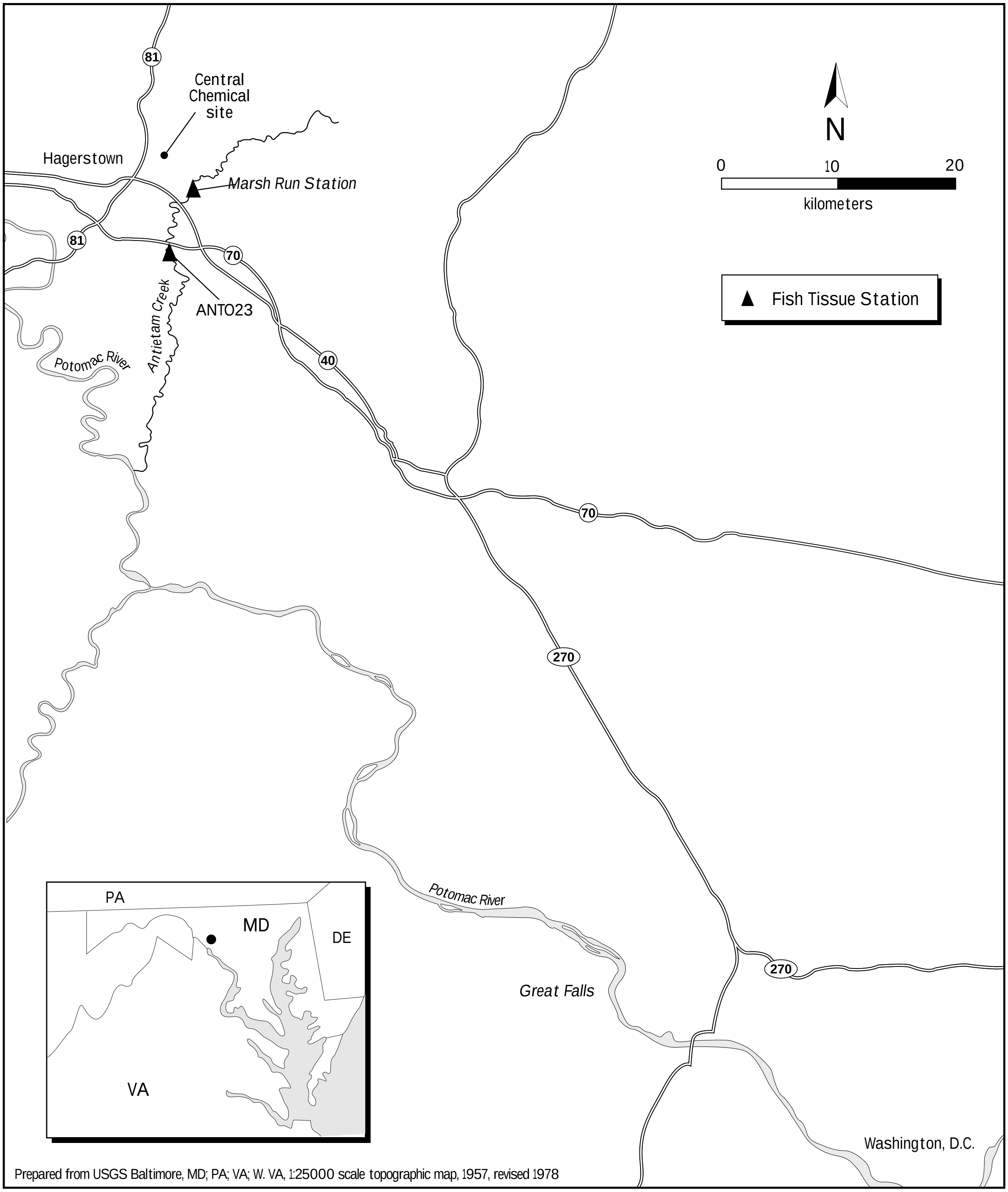

Figure 1. The Central Chemical Corporation study area.

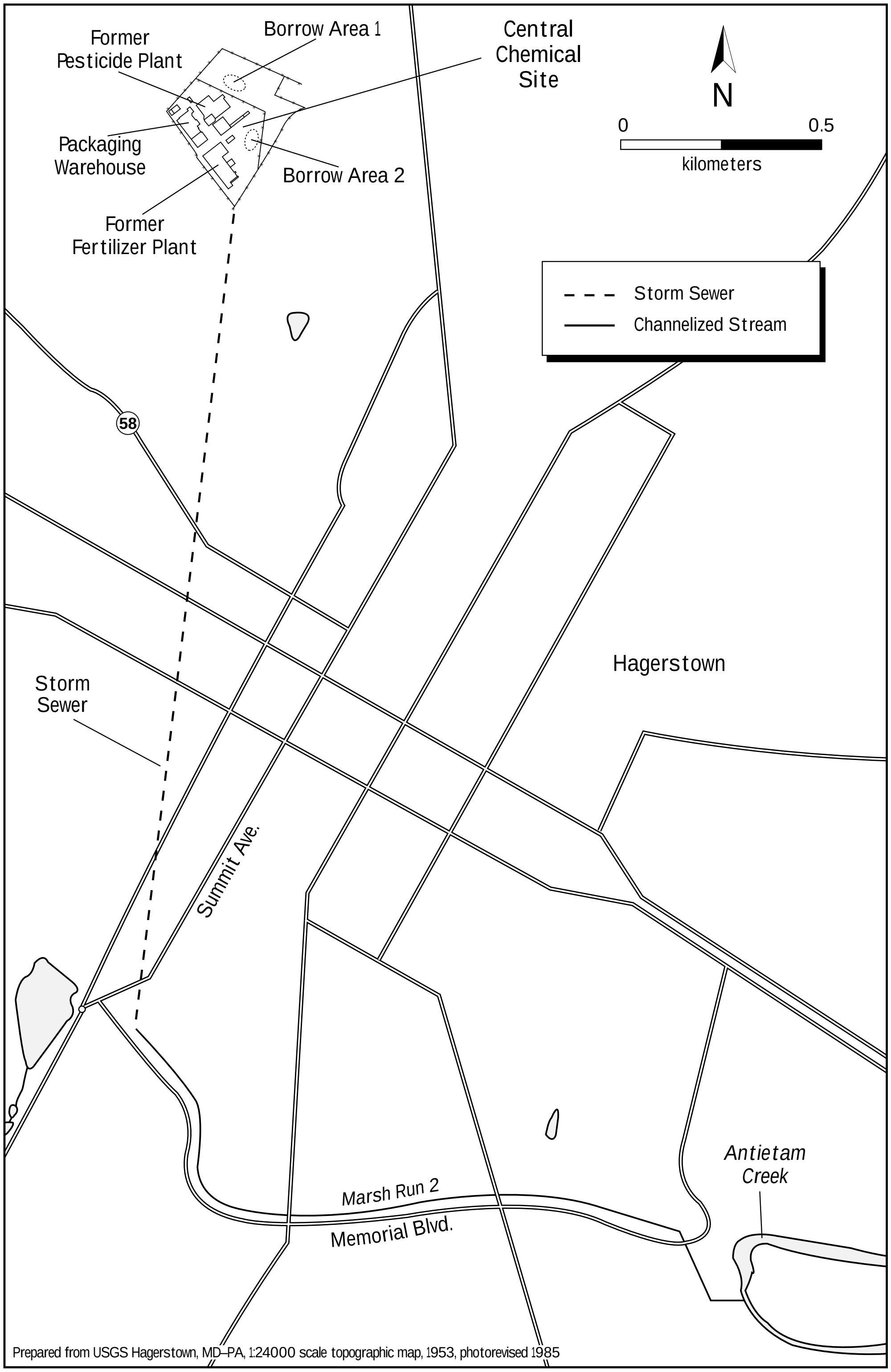

Figure 2. The Central Chemical Corporation site in Hagerstown, Maryland (Woodward-Clyde 1997).

pesticide residues, and waste acids to the larger borrow area. These surface borrow areas were capped with clay and soil and revegetated between 1976 and 1979 (Woodward-Clyde 1997). Now most of the site is vacant and overgrown.

The site was added to the National Priorities List in September 1997, based upon data from a Preliminary Assessment and Screening Site Investigation in 1989, and Site Assessments and Site Inspections conducted between 1992 and 1996. A workplan for a Remedial Investigation/Feasibility Study was submitted to EPA in December 1997.

Stormwater runoff, associated erosion, and groundwater transport of co-solvents are potential transport pathways for site-related contamination to offsite receptors. Some surface runoff from the property enters a storm drain that runs south for approximately 1.6 km, and is believed to discharge to Marsh Run 2. Groundwater, which has been encountered at 4.6 to 9.8 m below ground surface, flows to the southeast and may discharge into Antietam Creek.

NOAA Trust Resources

The NOAA trust habitat of concern is Antietam Creek, a moderate-sized tributary of the Potomac River with an average annual flow of about 200 cfs. The stream is low- to moderate-grade, about 15 m wide, and 1 to 2 m deep near the site. Typical riffle, run, and pool habitats predominate along most of its length, although several dams on the stream form large pools. A warmwater fish assemblage, which typically includes smallmouth bass, sunfish, rockbass, cyprinid minnows, suckers, and redhorse are found in the stream. The State of Maryland manages the stream for recreational trout and smallmouth bass fisheries. The trout are stocked (natural reproduction is doubtful), but bass are indigenous (Mullican personal communication 1998).

Marsh Run 2 flows through Hagerstown and is a small, highly channeled stream that provides degraded habitat for aquatic organisms (Woodward-Clyde 1997).

The catadromous American eel has been documented throughout Antietam Creek, where it is the only trust species. Eel can traverse the lowhead dams on Antietam Creek, and populations are likely in Marsh Run 2, despite the degraded habitat. Approximately 70 km downstream of the Potomac River's confluence with Antietam Creek, Great Falls forms a natural barrier to anadromous fish migration into Antietam Creek (Mullican personal communication 1998).

Site Contamination

Site evaluations indicate that soils on the site and sediments in Marsh Run 2 both contain elevated concentrations of the hazardous substances used by Central Chemical. The contaminants of concern are chlorinated pesticides and trace elements, which have been detected at high concentrations in source areas, and are widespread at lower concentrations in surrounding soils and sediment within Marsh Run 2 (Woodward-Clyde 1997).

Fish tissue collected in Antietam Creek shows elevated concentrations of site-related pesticides. Table 1 summarizes maximum concentrations of contaminants at the site along with appropriate screening guidelines and local background concentrations for each medium. Table 2 summarizes contaminant concentrations measured in fish tissue.

Soil samples indicate that the two surface borrow areas are the most contaminated areas on the site, with DDT and DDD at maximum concentrations of 76,000 and 22,000 mg/kg, respectively. The maximum reported DDE concentration was 1,200 mg/kg (Woodward-Clyde 1997). Releases of DDT to the environment have been shown to slowly degrade to DDE and DDD (EPA 1980).

Three benzene hexachloride (BHC) isomers were each detected at concentrations above 100 mg/kg. Elevated trace element concentrations were measured in the surface borrow areas, where copper and lead both exceeded

Table 1. Maximum concentrations of contaminants of concern in soils and sediment detected on or near the Central Chemical site.

Contaminant	Soil (mg/kg)[a] Site	Soil (mg/kg)[a] Background[b]	Sediment (mg/kg)[a] Marsh Run 2	Sediment (mg/kg)[a] Antietam Creek	Sediment (mg/kg)[a] Background[c]	TEL[d]
Pesticides						
alpha BHC	110	NR	0.00024	0.00042	ND	NA
beta BHC	790	NR	0.00054	0.00074	ND	NA
delta BHC	260	NR	ND	ND	ND	NA
DDD	22000	NR	0.034	0.074	0.00043	0.0035
DDE	1200	NR	0.014	0.028	0.0031	0.0014
DDT	76000	NR	0.091	0.14	0.0036	0.0070t
Trace Elements						
Arsenic	310	10	3.8	4.7	4.4	5.9
Cadmium	1.1	ND	ND	ND	ND	0.60
Chromium	47	32	20	28	6.9	37
Copper	1200	23	30	29	ND	36
Lead	1300	29	41	150	59	35
Mercury	0.91	ND	0.71	ND	ND	0.17
Nickel	39	42	16	11	6.3	18
Zinc	650	82	69	160	61	120

a: Woodward-Clyde (1997).
b: Local background soil samples collected upgradient of the site.
c: Local background sediment samples collected in Antietam Creek upstream of the confluence with Marsh Run 2.
d: Threshold effect level; concentration below which adverse biological effects were rarely observed; (geometric mean of the 15% concentration in the effects dataset) as compiled by Smith et al. (1996).
t: Criterion for sum of contaminant class, e.g., total concentration for all DDD, DDE and DDT isomers.
NR: Not reported.
ND: Not detected; detection limits not available.
NA: Screening guidelines not available.

Table 2. Concentrations of DDT, DDE, and DDD in fish collected from Antietam Creek from 1979 to 1995.

Year	Station	Sample Species	Tissue	Concentration (mg/kg wet weight) DDD	DDE	DDT	Total DDTs
1979	ANT023	white sucker	whole	0.1	0.14	0.1	0.34
1980	ANT023	white sucker	whole	0.25	0.13	0.12	0.5
1981	ANT023	white sucker	whole	0.04U	0.07U	0.02U	0
1981	ANT023	white sucker	fillet	0.04U	0.07U	0.02U	0
1982	ANT023	white sucker	whole	0.06	0.24	0.02U	0.3
1983	ANT023	white sucker	whole	0.26	0.1	0.02U	0.38
1984	ANT023	white sucker	whole	0.15	0.13	0.045	0.32
1985	ANT023	white sucker	whole	0.04U	0.12	0.02U	0.12
1985	ANT023	rock bass	whole	0.75	0.14	0.205	1.1
1987	ANT023	white sucker	whole	0.005	0.68	0.006	0.69
1989	ANT023	white sucker	whole	0.004	0.025	0.006	0.035
1989	ANT023	rock bass	fillet	0.0043U	0.15	0.0057U	0.15
1993	ANT023	white sucker	whole	0.084	0.06	0.075	0.22
1993	ANT023	white sucker	fillet	0.012	0.004	NA	0.016
1993	ANT023	rock bass	fillet	0.024	0.14	0.59	0.76
1993	ANT023	rainbow trout	fillet	0.011	0.014	NA	0.025
1995	Marsh Run	white sucker	fillet	0.037	0.092	0.1	0.23
1995	Marsh Run	rock bass	fillet	0.014	0.026	0.025	0.065

ANT023 Maryland Department of the Environment monitoring station located 8.5 km downstream of the confluence of Antietam Creek and Marsh Run 2, as reported in Woodward-Clyde (1997).
Marsh Run: Expanded Site Inspection station located at the confluence of Antietam Creek and Marsh Run 2, as reported in Woodward-Clyde (1997).
U: Undetected at the detection limit shown.
NA: Not analyzed.

1,000 mg/kg and arsenic and zinc exceeded 300 mg/kg. Concentrations of pesticides are lower outside of the borrow areas, where, for example, the maximum DDT concentration was 1,400 mg/kg (Woodward-Clyde 1997).

Severe contamination has not been detected in groundwater at the site. While several pesticides were detected, only one reported concentration (dieldrin at 5.6 µg/L) exceeded its ambient water quality criterion (0.0019 µg/L).

Concentrations of DDT and DDE exceeded screening guidelines (TEL) in the sediment of Marsh Run 2 and Antietam Creek. Sediment samples collected in Antietam Creek upstream of Marsh Run 2 had lower contaminant concentrations, suggesting that Marsh Run 2 is the source of the creek's sediment contamination (Woodward-Clyde 1997).

The Maryland Department of the Environment's fish-monitoring program has collected fish tissue from Antietam Creek since 1979 and analyzed samples for DDT, DDD, and DDE. These data indicate that low levels of total DDTs continue to accumulate in fish near the site. The fish-collection stations are at the confluence of Marsh Run 2 and Antietam Creek (Station Marsh Run) and about 8 km downstream of the confluence (Station ANT023; Table 2). Fish samples collected in Antietam Creek approximately 16 km upstream of Marsh Run 2 show non-detectable concentrations of total DDTs (Woodward-Clyde 1997).

Summary

The Central Chemical Corporation site is a former pesticide manufacturer and fertilizer blender located about 3 km from Antietam Creek within the Potomac River basin. Soils on the site are highly contaminated with chlorinated pesticides and trace elements. Sediments within Antietam Creek are contaminated with DDT and its degradation products at concentrations exceeding screening guidelines, potentially posing a threat to NOAA trust resources. DDT and its metabolites are found in resident fish species collected in the stream. The catadromous American eel, a NOAA trust resource, is found in Antietam Creek and may also inhabit Marsh Run 2.

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3

USN Norfolk Naval Shipyard

Norfolk, Virginia
CERCLIS #VA1170024813

Site Exposure Potential

The Norfolk Naval Shipyard (NNSY) is a 530-hectare facility in Portsmouth, Virginia extending 3.25 km north of Paradise Creek on the Southern Branch of the Elizabeth River, approximately 24 river km from Chesapeake Bay (Figure 1). The NNSY began operations as a merchant shipyard in 1767 and is the oldest continuously operated shipyard in the United States. Table 1 lists major source areas and associated hazardous materials. The NNSY surrounds Atlantic Wood Industries, Inc. (AWII), a former wood treating facility that is being remediated under the authority of CERCLA (Figure 2; Baker Environmental Inc. 1997). NOAA did not have any information about the St. Helena Annex portion of NNSY, which is on the east side of the Southern Branch of the Elizabeth River.

The NNSY is located on relatively flat land, approximately 3 m above mean sea level. Surface runoff and shallow groundwater flow from higher site areas into Paradise Creek and the Southern Branch of the Elizabeth River. The water table is 1.5 m to 0.3 m below ground surface (bgs). Mean tidal range at the site is approximately 1 m (Baker Environmental Inc. 1997).

Surface water runoff, groundwater transport, and soil erosion are potential sources of contaminant transport to Paradise Creek and the Southern

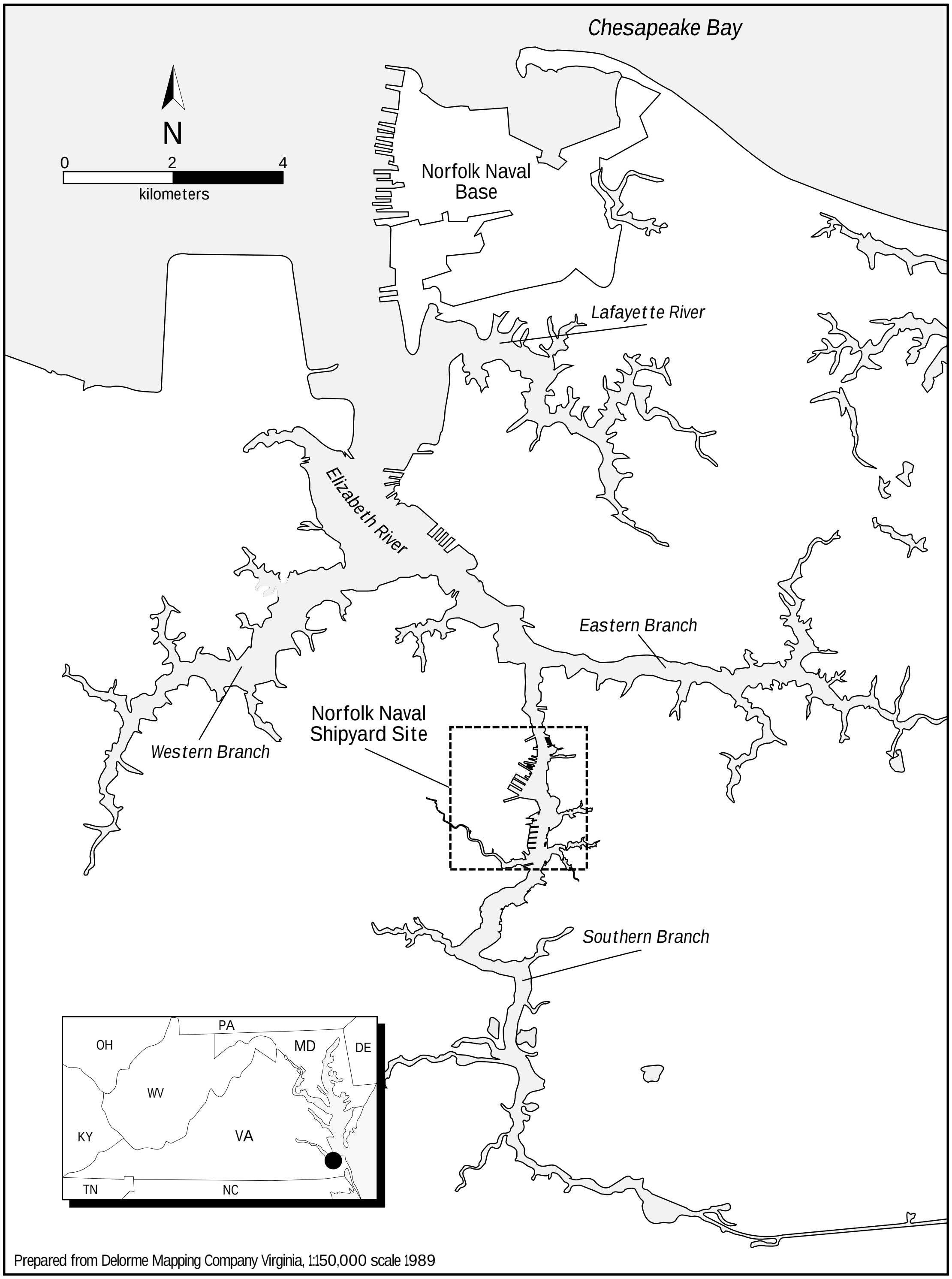

Figure 1. Norfolk Naval Shipyard study area.

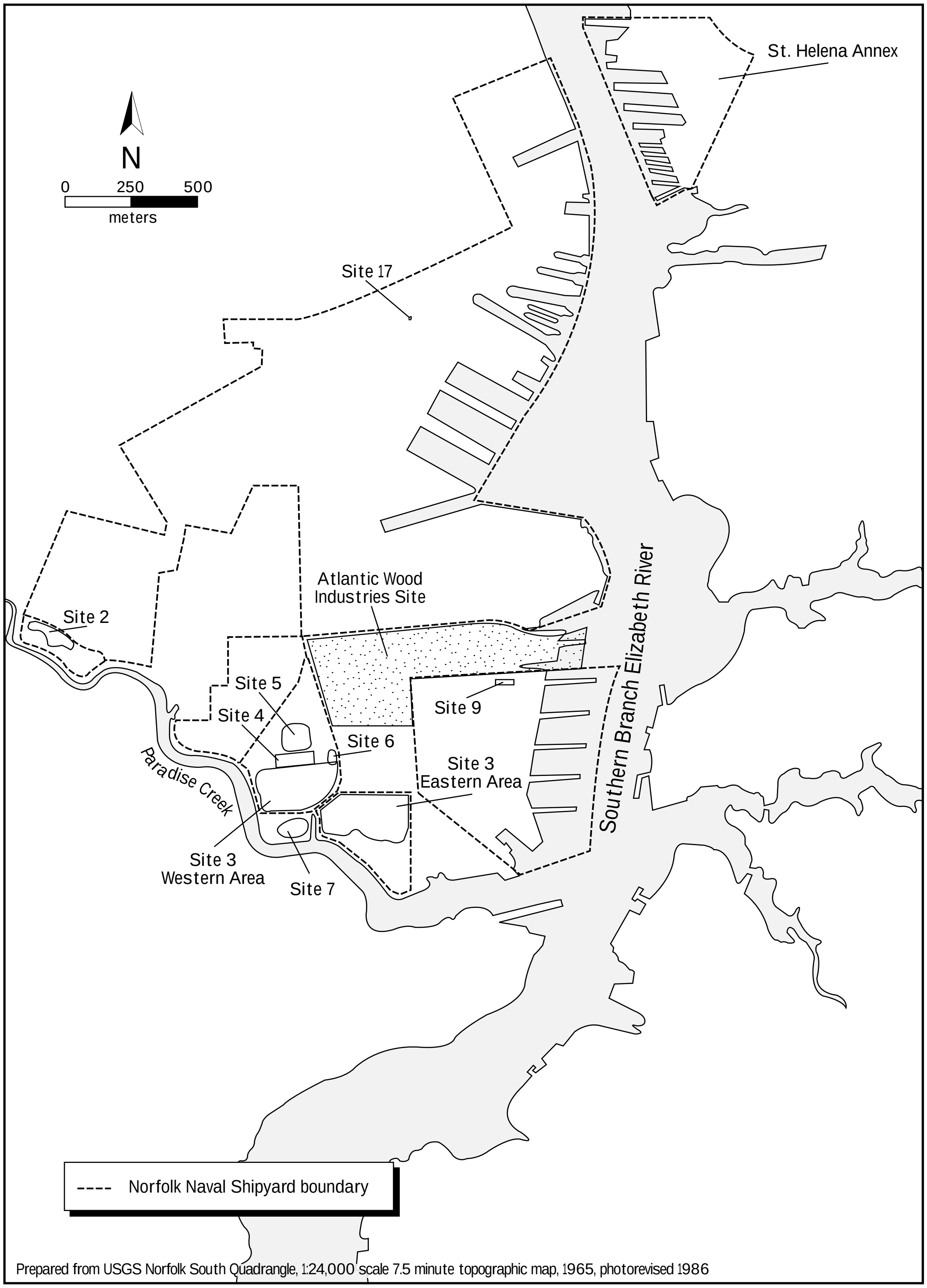

Figure 2. The Norfolk Naval Shipyard site in Portsmouth, Virginia

Table 1. Norfolk Naval Shipyard Site Descriptions.

Site No.	Site Description	Dates Used	Materials Deposited
2	Scott Center Landfill	Unknown	Drydock wastes, including abrasive blast media, paint residues, sanitary waste, and other industrial residues.
3	Sanitary Landfill	1954 - Present	Salvage waste, abrasive blast grit, boiler fly and bottom ash, industrial wastewater treatment plant sludge, and other wastes.
4	Chemical Disposal Pits	Approx. 1963 - 1978	Chemical wastes including cyanides, acids, degreasers, solvents, alkali, and other toxic wastes.
5	Oil Reclamation Area	Approx. 1963 - 1982	Waste petroleum oil lubricants.
6	Chemical Disposal Pits	Mid - 1960s - 1977	Chemical wastes including cyanides, acids, degreasers, solvents, alkali, and other toxic wastes.
7	Bermed Disposal Area	Approx. late 1960s to late 1970s	Unknown. Same material as listed for Sites 4 and 6 is suspected.
9	Waste Lime Pit	Approx. 1942-1971	Waste lime.
17	Building 195 (Electroplating)	Late 1800 - present	Electroplating chemical spills, coal pile residue, and leachate.

Branch of the Elizabeth River (Baker Environmental Inc. 1997).

The site was proposed for inclusion on the U.S. EPA National Priority List on March 6, 1998 (63 FR 11340). Groundwater, surface water, soil, and sediment recently were sampled for an ecological risk assessment (CH2M Hill 1998).

NOAA Trust Resources and Habitats

Habitats of concern to NOAA are surface waters and associated bottom substrates of Paradise Creek, the Southern Branch of the Elizabeth River, and downstream areas of Chesapeake Bay (Figure 1). Anadromous fish, estuarine fish, and invertebrates are the resources of concern (Table 2). Estuarine habitats in this area range from shallow sand / mud flats and tidal streams less than 1 m deep to trenches up to 13 m deep (USGS 1964, 1965). Salinities range from 14 to 20 parts per thousand and sediments range from silts to sands. Riparian wetlands are located along the southern and western sections of NNSY, adjacent to Paradise Creek (Majumdar et al. 1987).

Trawl surveys by the Virginia Institute of Marine Science (VIMS) indicate that the Southern Branch of the Elizabeth River provides habitat for numerous estuarine and marine fish species. Year-round residents include bay anchovy, oyster toadfish, sheepshead minnow, killifishes, silversides, pipefish, gobies, and hogchoker (VIMS 1989). All life stages of these species are spent within the estuary and several of the species are highly abundant. Other species, such as bluefish, mullets, pinfish, butterfish, and the sciaenids (croaker, weakfish, seatrout, spot, and drum) spawn offshore in coastal waters. These species migrate to the estuary as juveniles, where they may spend several years foraging and maturing.

Table 2. NOAA trust fish and invertebrate species that use the Elizabeth River, Hampton Roads, and Chesapeake Bay.

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm. Fishery	Recr. Fishery
<u>ANADROMOUS/CATADROMOUS SPECIES</u>						
Alewife	*Alosa pseudoharengus*		◆			
American eel	*Anguilla rostrata*		◆		◆	
American shad	*Alosa sapidissima*		◆			
Blueback herring	*Alosa aestivalis*		◆			
Striped bass	*Morone saxatilis*		◆	◆	◆	
White perch	*Morone americana*		◆	◆		
<u>MARINE/ESTUARINE FISH SPECIES</u>						
Atlantic croaker	*Micropogonias undulatus*		◆	◆		◆
Atlantic herring	*Clupea harengus*		◆	◆		
Atlantic menhaden	*Brevoortia tyrannus*		◆	◆		
Bay anchovy	*Anchoa mitchilli*		◆	◆		
Black drum	*Pogonias cromis*		◆	◆		
Black sea bass	*Centropristis striata*		◆	◆		
Bluefish	*Pomatomus saltatrix*		◆	◆		◆
Butterfish	*Peprilus triacanthus*		◆	◆		
Cownose ray	*Rhinoptera bonasus*		◆	◆		
Gobies	*Gobiosama* spp.	◆	◆	◆		
Hogchoker	*Trinectes maculatus*	◆	◆	◆		
Killifish	*Fundulus* spp.	◆	◆	◆		
Mullets	*Mugil* spp.		◆			
Northern pipefish	*Syngnathus fuscus*	◆	◆	◆		
Northern searobin	*Prionotus carolinus*		◆			
Pinfish	*Lagodon rhomboides*		◆	◆		
Red drum	*Sciaenops ocellatus*		◆	◆		◆
Red hake	*Urophycis chuss*		◆			
Oyster toadfish	*Opsanus tau*	◆	◆	◆		
Scup	*Stenotomus chrysops*		◆			
Spotted seatrout	*Cynoscion nebulosus*		◆	◆		◆
Sheepshead minnow	*Cyprinodon variegatus*	◆	◆	◆		
Silversides	*Menidia* spp.	◆	◆	◆		
Skates	*Raja* spp.		◆	◆		
Spot	*Leiostomus xanthurus*		◆	◆		◆
Summer flounder	*Paralichthys dentatus*		◆	◆		◆
Tautog	*Tautoga onitis*		◆	◆		
Weakfish	*Cynoscion regalis*		◆	◆		
Windowpane flounder	*Scophthalmus aquosus*		◆	◆		
<u>INVERTEBRATE SPECIES</u>						
Bay shrimp	*Crangon septemspinosa*	◆	◆	◆		
Blue crab	*Callinectes sapidus*	◆	◆	◆	◆	◆
Blue mussel	*Mytilus edulis*	◆	◆	◆		
Eastern oyster	*Crassostrea virginica*	◆	◆	◆		◆
Grass shrimp	*Palaemonetes pugio*	◆	◆	◆		
Northern quahog	*Mercenaria* spp.	◆	◆	◆		◆

Even as adults, these migratory species are found within the estuary seasonally. Bluefish, spot, and Atlantic croaker are particularly abundant in the area (Stone et al. 1994).

Several anadromous fish species use the estuary during part of their life cycle. Juvenile and adult white perch are abundant in the estuary, and spawn in tidal freshwater reaches upstream of the site. Striped bass, particularly juvenile stages, are common in the Southern Branch of the Elizabeth River. Adult striped bass may spend time in the area as well, but most probably move seaward (Stone et al. 1994). American shad, blueback herring, and alewife also spawn in freshwater upstream of the site (VIMS 1989). Atlantic sturgeon are considered rare near the site and in Chesapeake Bay. No threatened or endangered fish species have been observed near the site. The catadromous American eel is found throughout the Chesapeake basin, with juvenile life stages present near the site (Stone et al. 1994).

Blue crab, grass shrimp, eastern oyster and northern quahog also are common in the estuary. Both juvenile and adult blue crab are abundant. After mating in estuarine waters, female blue crab usually migrate offshore to brood and release eggs. The larvae and juvenile stages migrate back onshore to mature in the estuary. All life stages of grass shrimp, oyster, and quahog are found within the estuary (Stone et al. 1994).

Hampton Roads, near the Elizabeth River outlet in Chesapeake Bay, supports substantial commercial and recreational fisheries. Popular recreational catches are bluefish, croaker, spot, weakfish, flounder, blue crab, oyster, and quahog (Majumdar et al. 1987). Commercial landings from the Elizabeth River for 1996 were over 100,000 kg. Most of this harvest was blue crab. American eel and striped bass also are harvested in significant quantity (O'Reilly 1998). The Virginia Department of Health restricts bivalve harvests surrounding the shipyard as well as at the Norfolk Naval Base near the mouth of the river (Wright 1998).

Site-Related Contamination

Elevated concentrations of trace elements and organic compounds, including PAHs, VOCs, and SVOCs, have been measured in groundwater, surface water, soil, and sediment from NNSY and nearby portions of Paradise Creek and the Elizabeth River (Huggett et al. 1987; Baker Environmental Inc. 1994; Foster Wheeler 1994; Baker Environmental Inc. 1997; CH2M Hill 1997, 1998).

The maximum concentrations of trace elements in all media were found in the western and southern portions of NNSY, including Paradise Creek. In these areas, maximum reported concentrations of copper, lead, mercury, and zinc exceeded applicable guidelines by at least an order of magnitude. Mercury in Paradise Creek sediment exceeded the ERL by more than three orders of magnitude (Table 3).

The western and southern portions of the site and Paradise Creek also had high concentrations of organic compounds. In surface water, the highest measured concentrations of the PAH compounds acenaphthene, naphththalene, 2-methyl-naphthalene, and phenanthrene were in Paradise Creek. However, the highest organic contaminant concentrations in soil and groundwater were predominantly on eastern NNSY, near the Southern Branch of the Elizabeth River. Maximum sediment concentrations of the PAH compounds anthracene, fluorene, fluoranthene, and pyrene, were from Southern Branch samples. The highest sediment concentrations relative to guidelines were for anthracene and fluorene, also in samples from the Southern Branch. Sediment samples from both Paradise Creek and the Southern Branch had high concentrations of pesticides (Table 3).

Summary

Concentrations of trace elements and organic chemicals much greater than screening guidelines have been measured in groundwater, surface water, soil, and sediment at NNSY. Maximum trace element concentrations were found in the western and southern portions of the site, and adjacent Paradise Creek. Maximum reported PAH concentrations in sediments were in the Southern Branch of the Elizabeth River. Substantial populations of anadromous fish, estuarine fish, and invertebrates use habitats in the Southern Branch of the Elizabeth River and Paradise Creek. There are important commercial and recreational fisheries next to the site and downstream of the site in the Chesapeake Bay.

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Table 3. Maximum concentration of contaminants of concern found at the Norfolk Shipyard (Huggett et al. 1987; Foster Wheeler 1994; Baker Environmental Inc. 1994; Baker Environmental Inc. 1997; CH2M Hill 1997, 1998).

	Water (µg/l)					Soil (mg/kg)			Sediment (mg/kg)		
	Ground-Water	Location	Surface Water	Location	AWQC [a]	Soils	Location	Mean U.S. [b]	Sediment	Location	ERL [c]
Trace Elements											
Arsenic	342	Site 3	123	PC-Site 3	36	303	Site 2	5.2	52.7	PC	8.2
Cadmium	35.4	Site 3	5.5	PC-Site 2	9.3	57.2	Site 3	0.06	4	PC	1.2
Chromium	356	Site 3	163	PC-Site 2	50	664	Site 3	37	284	PC	81
Copper	5520	Site 3	657	PC-Site 2	2.9 [e]	72700	Site 3	17	1390	PC	34
Lead	4370	Site 3	2700	PC-Site 2	8.5	46640	Site 7	16	593	PC	46.7
Mercury	23.9	Site 9	1.2	PC-Site 2	0.025 [d]	12.3	Site 3	0.058	886	PC	0.15
Nickel	1440	Site 3	452	PC-Site 2	8.3	2600	Site 3	42	247	PC	20.9
Selenium	40.4	Site 3	13.6	PC-Site 3	71	14.5	Site 2	NA	3.7	PC	NA
Silver	15	Site 3	4	PC-Site 3	0.92 [P]	52.9	Site 3	0.05	3	PC	1.0
Zinc	7900	Site 3	1460	PC-Site 2	86	30400	Site 3	48	3000	PC	150
Organic Compounds											
Acenaphthylene	10	Site 3	5.0	PC	NA	2.9	Site 9	NA	2.7	ER	0.044
Acenaphthene	60	Site 3	60	PC-Site 3	NA	36	Site 9	NA	1.186	ER	0.016
Anthracene	18	Site 3	18	PC-Site 3	NA	310	Site 9	NA	27.2	ER	0.085
Benz(a)anthracene	10	Site 3	5.0	PC	NA	150	Site 9	NA	2	PC	0.26
Chlordane	0.1	Site 2	0.028	PC-Site 2	0.0043	0.011	Site 7	NA	0.014	PC	0.0005
Chrysene	10	Site 3	5.0	PC	NA	8	Site 7	NA	3.5	ER	0.38
DDT	0.1	Site 2	0.050	PC	0.001	8.8	Site 3	NA	0.012	PC	0.00158
DDE	0.1	Site 2	0.050	PC	NA	0.550	Site 3	NA	0.180	PC	0.0022
Dibenz(a,h)anthracene	10	Site 2	5.0	PC	NA	18	Site 9	NA	0.34	PC	0.063
Dieldrin	0.1	Site 2	0.050	PC	0.0019	0.130	Site 3	NA	0.009	PC	NA
Endosulfan	0.1	Site 9	0.025	PC	0.087	0.0095	Site 3	NA	0.038	PC	NA
Endrin	0.1	Site 2	0.050	PC	0.0023	0.034	Site 3	NA	1.8	PC	NA
Fluoranthene	24	Site 3	11	PC-Site 3	NA	17	Site 9	NA	27.300	ER	0.60
Fluorene	42	Site 9	28	PC-Site 3	NA	51	Site 3	NA	24.530	ER	0.019
Heptachlor	0.1	Site 2	0.025	PC	0.0036	0.007	Site 2	NA	0.007	PC	NA
Heptachlor Epoxide	0.1	Site 2	0.025	PC	0.0036	0.0033	Site 3	NA	0.0011	PC	NA
2-Methylnaphthalene	59	Site 3	59	PC-Site 3	NA	31	Site 9	NA	0.813	ER	0.07
Naphthalene	460	Site 9	83	PC-Site 3	NA	40	Site 9	NA	1.4	PC	0.16
PCBs (as Aroclors)	1	Site 3	0.500	PC	0.03	21	Site 3	NA	0.160	PC	0.023
Pentachlorophenol	25	Site 2	12.5	PC	7.9	3.3	Site 2	NA	3.5	PC	NA
Phenanthrene	75	Site 9	75	PC-Site 3	NA	270	Site 9	NA	5.85	ER	0.24
Pyrene	10	Site 2	8	PC-Site 3	NA	270	Site 9	NA	18.5	ER	0.67
Toxaphene	5.0	Site 2	2.5	PC	0.0002	6.6	Site 3	NA	0.700	PC	NA

a: Marine chronic ambient water quality criteria for the protection of aquatic organisms, unless noted otherwise (EPA 1993).
b: Average trace element concentrations in U.S. soils (Shacklette and Boerngen 1984), except for cadmium and silver which are average concentrations in the earth's crust (Lindsay 1979).
c: Effects Range-Low: The 10th percentile concentration for the dataset in which effects were observed or predicted as compiled by Long et al (1995)
d: Criterion expressed as total recoverable metal.
e: Chronic criterion not available; acute criterion presented.
P: Proposed criterion.
NA: Screening guidelines not available.
PC: Paradise Creek (no specific location given unless noted otherwise).
ER: Elizabeth River

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3

Washington Naval Yard

Washington, D.C.
CERCLIS #DC91700243100

Site Exposure Potential

The Washington Naval Yard (WNY) is located on 25 hectares in a mixed residential / industrial area bordering the Anacostia River in southwestern Washington, D.C. The Anacostia River feeds into the Potomac River 2.4 km downstream from the site, and the Potomac River discharges to Chesapeake Bay approximately 180 km farther downstream (Figure 1). The WNY began operations as a shipbuilding yard in 1799, making it the longest continuously operating Federal facility in the country (CH2M Hill 1998a). A dredged navigation channel is maintained at 90 to 180 m wide, and 6.1 m deep, from just upstream of the site to the mouth of the River (USGS 1982a, b, c).

Activities at the WNY varied greatly over the past two centuries. Ship construction predominated until the mid-1800s, when ordnance research and production began. Ordnance production was the primary site activity from early in this century until the end of World War II, when administrative activities became dominant (CH2M Hill 1998a). Because of the variety of site activities, numerous bulk hazardous materials have been used at the site (Mahmud 1994; Baker Environmental, Inc. 1996). Table 1 provides a description of the hazardous wastes associated with the investigative sites at WNY.

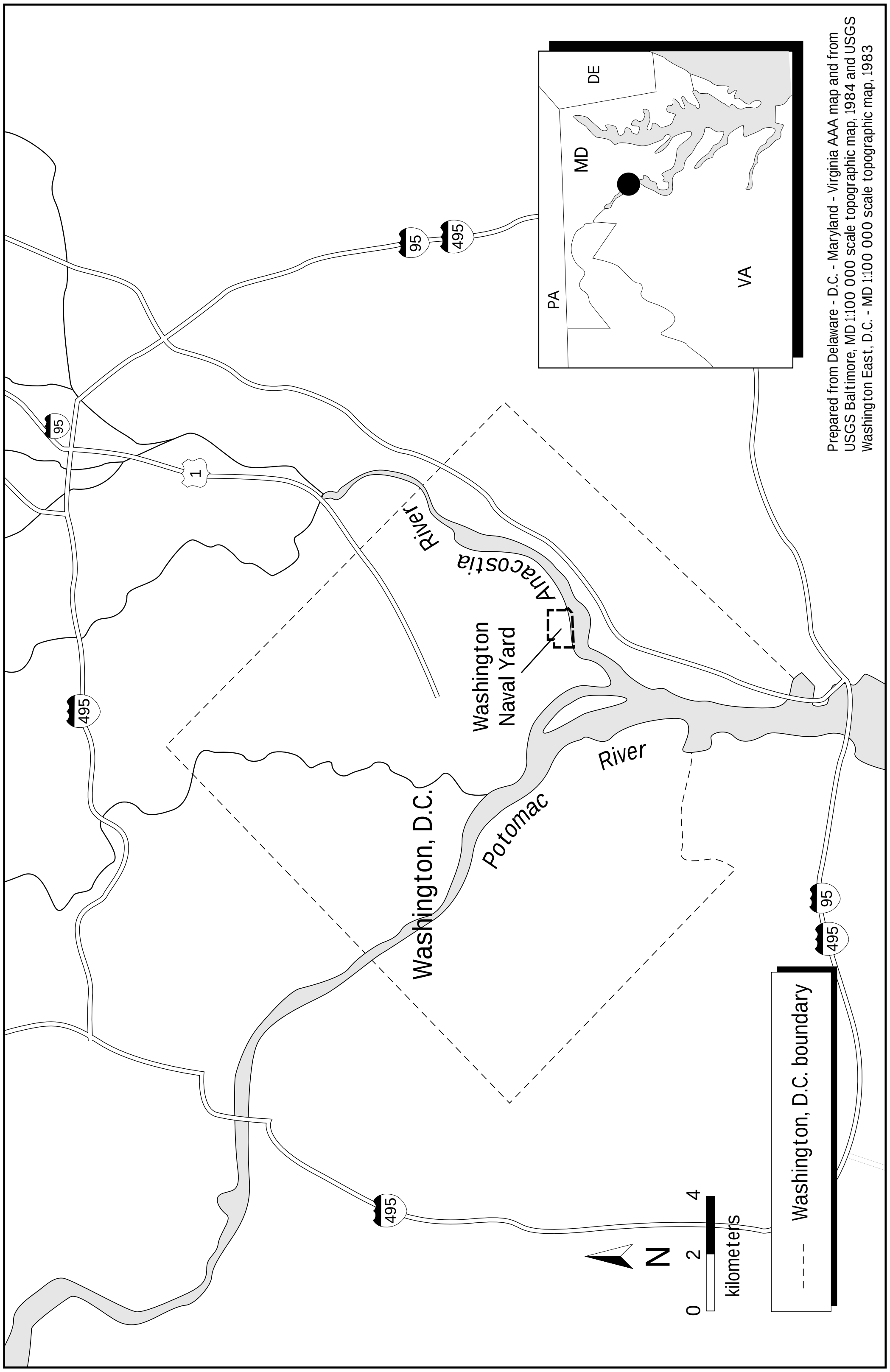

Figure 1. Location of Washington Naval Yard, Washington D.C.

On July 16, 1997, EPA and the Navy entered into a consent order to perform a RCRA Facility Investigation (RFI) at WNY (CH2M Hill 1998a). Under RCRA authority, stormwater drains at sites 6 and 14 were removed in late 1997 (Figure 2). A soil removal is planned at several locations identified as site 10, a series of residential buildings (CH2M Hill 1998a,b,c).

The WNY was proposed for inclusion on the National Priorities list on March 6, 1998 (63 FR 11340).

The WNY is characterized by relatively low, flat, deeply dissected topography. The site lies on terrace deposits of alluvial clay, silt, sand, and gravel and filled areas of the Anacostia River.

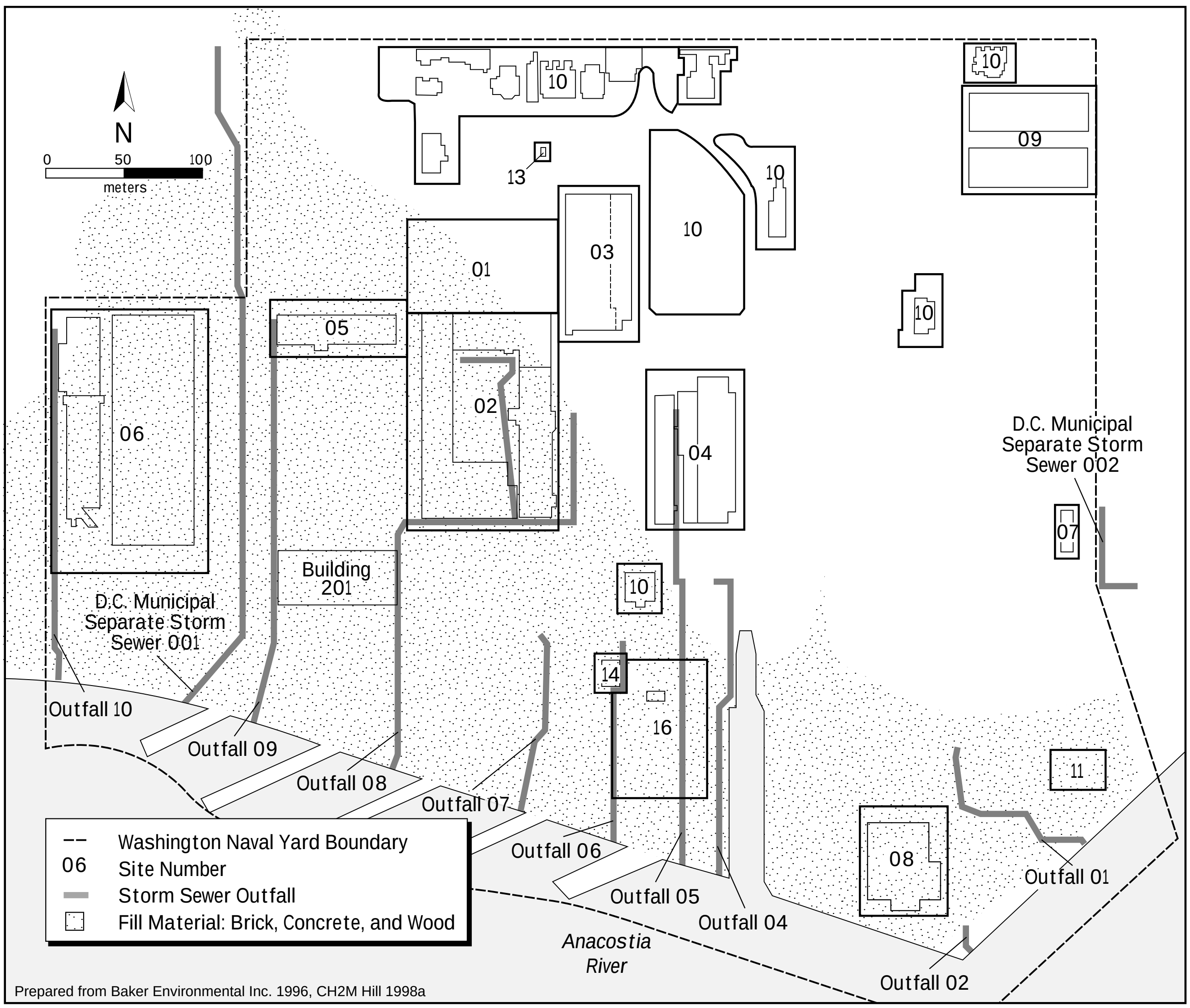

Figure 2. The Washington Naval Yard study area.

Table 1. Activities at the Washington Naval Yard.

Site No.	Dates Used	Materials Deposited	Type of Activities (past)	Type of Activities (present/future)
1	1850 - present	heavy metals, solvents, perchloroethylene, carbon tetrachloride, dichloroethane, vinyl chloride	Foundry, machine shop, and a laundry facility	Racquetball, offices
2	1855 - present	solvents (including carbon tetrachloride), metals, acids	Gun cartridge shop and machine shop	Offices
3	1887 - 1977	heavy metals, acids, cleaners, caustics, solvents	Plating and gun shop	Demolished
4	late 1840's - present	oils, paints, solvents, acids, lacquer, phenols, cyanide, metals (lead, chromium, cadmium, antimony)	Copper rolling mill, cartridge case shop, metal pressing shop, chemical laboratory, seamen shop, primer shop, furnace room, metal pressing shop, Naval Exchange center	Naval Exhibit Center, offices
5	1845 - present	solvents, phenols, metals	Gun mount shop, metal fabricating	Offices
6	1904 - present	boiler blowdown, PCBs, fly ash, dioxins, solvents, metals (lead, chromium, cadmium, antimony)	Boiler house, Incinerator	NA
7	1911 - 1938	solvents (perchloroethylene, carbon tetrachloride, dichloroethene, vinyl chloride)	Receiving station laundry	Parking structure
8	1942 - present	paint, oil	Paint and oil storage	The CPO Club
9	1944 - present	mercury, laboratory solvents, mineral oil	Chemical and gauge laboratories	Offices
10	Late 1800's - present	lead	Residential structures (20+).	Residential housing, Historic Society Center
11	NA	NA	Former incinerator	Parking lot and offices
13	? - present	PCBs	Equipment storage	NA
14	? - present	PCBs	Equipment storage	NA
16	? - 1994	petroleum hydrocarbons, mercury, BTEX	Underground storage tanks	NA
Bldg. 201	? - present	Ash, metals, freon 11, compressor oil, waste paint, and thinners	Incinerator	NA

NA = not available
Source: Mahmud 1994, Baker Environmental Inc. 1996; CH2M Hill 1998a,b,c; EPA 1999.

The fill ranges from approximately 1.5 to 5 m thick, and consists primarily of poorly sorted silt, sand, and some gravel with brick, concrete, wood, and other debris. In general, the site slopes gradually southward to the river (CH2M Hill 1998a).

The water table varies from about 5 m bgs in the northern part of the facility to 1 m bgs in the southern part. General groundwater transport is south-southwest, toward the Anacostia River (CH2M Hill 1998a).

NOAA Trust Habitats and Species

The habitat of primary concern to NOAA is the lower Anacostia River, a relatively short but wide tributary of the Potomac River (Figure 1). The lower river adjacent to the WNY is tidal freshwater, approximately 400 m wide, with a sand and silt substrate. The NOAA trust resources of concern in the Anacostia River are the anadromous alewife, blueback herring, American shad, white perch, and striped bass (Table 2). The catadromous American eel also uses the watershed (Leasner 1998).

Alewife, blueback herring, and American shad enter the Potomac and Anacostia rivers from March through May to spawn in upstream tributaries. Juveniles return to the ocean and the lower Chesapeake Bay by the following fall. Striped bass also enter the Potomac and lower Anacostia rivers in the spring and typically spawn in tidal freshwater areas in the basin. Spawning has not been documented near the site, but the tidal freshwater habitats near the site appear to have suitable flows and depths for spawning bass. White perch are found in tidal fresh- to estuarine waters within the basin and are common near the site. The catadromous American eel is found throughout the Chesapeake Bay basin and is likely found near the site (Leasner 1998).

There are numerous recreational fisheries in the Potomac and lower Anacostia rivers. Both shoreline and boat angling are popular year-round near the confluence of the two rivers about 2 km downstream of the site. White perch and striped bass are heavily fished during their spring residence near the site. The nearest commercial fishery is in estuarine portions of the Potomac River approximately 60 km downstream of the site (Leasner 1998). The Distict of Columbia advises against any consumption of catfish, carp, or eel taken from the Anacostia River from its confluence with the Potomac River to the Maryland border because of PCB

Table 2. Anadromous and catadromous fish species in the Anacostia River near the Washington Naval Yard (Leasner 1998).

SPECIES		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Area	Adult Forage	Comm. Fishery	Recr. Fishery
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*			◆		

and chlordane concentrations in edible tissue (Collier 1999).

Site-Related Contamination

Data collected during several recent site investigations indicated that groundwater, soil, outfalls, and sediments at the WNY contained elevated concentrations of trace elements and organic compounds, including PAHs and PCBs (Clark and Gower 1995; Baker Environmental 1996; CH2M Hill 1998a,b). Table 3 summarizes the maximum reported contaminant concentrations, along with appropriate screening guidelines.

The highest concentrations of most trace elements in soil were found near the eastern or western site boundary, and the highest trace element concentrations in groundwater also were found along the western boundary WNY (Table 3). Soil lead concentrations near the western boundary were more than 1000 times higher than the mean U.S. concentration, and may result primarily from paint chips in the soil (Dinardo 1999). The maximum sediment concentrations of lead, were at AR-SED01, also near the western boundary of the site. Sediment also was collected from stormwater outfalls draining the site. The maximum reported concentrations of mercury in sediment were from outfall 10 and at nearby station AR-SED01 (Table 3). Recent data suggest free-phase elemental mercury at Site 16, less than 25 m from the Anacostia River.

High sediment concentrations of phenanthrene, a PAH compound, and PCBs were found in sediment samples from the Anacostia River. The maximum PCB concentration in sediment was found at AR-SED01, near outfall 10, which had higher PCB concentrations than any other outfall at the site (CH2M Hill 1998a).

Sediments from the WNY had elevated concentrations of cadmium, copper, lead, mercury, zinc, PCBs, and phenanthrene compared to samples collected about 1.2 km upstream.

Summary

Elevated concentrations of trace elements are found in soil, groundwater, and sediment at the Washington Navy Yard. Lead concentrations were more than one thousand times screening guidelines for soil and sediment. PCB concentrations one hundred times screening guidelines were found in the stormwater drainage system and in Anacostia River sediment near outfall discharges. WNY is located along the freshwater tidal reach of the Anacostia River. Anadromous alewife, blueback herring, American shad, white perch, and striped bass are found in the river, and both striped bass and white perch likely spawn near the site.

Table 3. Maximum concentrations of selected contaminants measured at the Washington Naval Yard (Clark and Gower 1995; Baker Environmental 1996; CH2M Hill 1998a,b).

	Water (µg/l)				Soil (mg/kg)			Outfalls (mg/kg)			Sediment (mg/kg)		
	Detection Limit	Ground Water	Location	AWQC [a]	Soils	Location	Mean U.S. [b]	Outfalls	Location	Detection Limit	Sediment		TEL [c]
Trace Elements													
Arsenic	10	61.7	Site 5	190	83.6	Site 5	5.2	144	2	2	9.2	AR-SED04	5.9
Cadmium	5	5.8	Site 6	1.0 [d]	2.5	Site 6	0.06	8.2	4	1	1.8		0.60
Copper	25	3910	Site 5	11 [d]	1130	Site 6	17	1480	4	5	260	AR-SED01	35.7
Lead	3	1080	Site 5	2.5 [d]	18700	Site 10	16	5060	2	0.6	234	AR-SED01	35
Mercury	0.2	0.55	Site 5	0.012 [e]	5	Site 11	0.058	31.7	10	0.1	2.7	AR-SED01	0.17
Nickel	40	3190	Site 5	160 [d]	199	Site 5	13	362	7	8.0	40.7	AR-SED02	18
Silver	10	ND	ND	3.4 [d,f]	0.49	Site 5	0.05	13.0	8	2.0	3.4	AR-SED02	NA
Zinc	20	6570	Site 5	100 [d]	609	Site 11	48	5520	4	4.0	415	AR-SED02	123.1
Organic Compounds													
PCBs	1.0	ND	ND	0.014	20	Site 14	NA	87.81	10	0.008	12	AR-SED01	0.034
Phenanthrene	10	ND	ND	NA	22	Site 7	NA	NM	NM	0.330	12	AR-SED01	0.042
Toxaphene	5	ND	ND	0.0002	ND	ND	NA	NM	NM	0.02	ND	ND	NA

a: Ambient water quality criteria for the protection of aquatic organisms (EPA 1993). Freshwater chronic criteria presented

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

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

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

e: Criterion expressed as total recoverable metal

f: Chronic criterion not available; acute criterion presented

ND: Not detected; detection limit not available.

NA: Screening guidelines not available.

NM: Not measured

AR-SED: Anacosta River Sediment Sampling Locations

Table 4. Comparison of maximum sediment concentration at the Washington Naval Yard and locations approximately 1.2 km upstream.

	Upstream [a]	Sediment (mg/kg) Washington Navy Yard	TEL [b]
Trace Elements			
Arsenic	NM	9.2	5.9
Cadmium	1.72	1.8	0.60
Chromium	103.4	45.5	37.3
Copper	75.6	260	35.7
Lead	138.9	234	35
Mercury	0.341	2.7	0.17
Nickel	NM	40.7	18
Silver	NM	3.4	NA
Zinc	355.0	415	123.1
Organic Compounds			
PCBs	0.7119	12	0.034
Phenanthrene	0.59195	12	0.042

a: Upstream values (Velinsky et al. 1992) AR-1 is downstream of Sousa Bridge, northside of river, upstream from Washington Naval Yard.
b: Threshold Effects Level; concentration below which adverse biological effects were rarely observed; geometric mean of the 15th percentile in the data set) as compiled by Smith et al. 1996.
NA: Screening guidelines not available.
NM: Not measured

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4

Camilla Wood Preserving

Camilla, Georgia
CERCLIS #GAD008212409

Site Exposure Potential

The Camilla Wood Preserving facility is located within the Flint River basin, in Camilla, Mitchell County, Georgia (Ecology and Environment 1997). The 20-hectare site is a filled cedar swamp, about 2 km from a tributary of Big Slough, which flows south approximately 45 km to the Flint River (EPA 1998). The Flint River joins the Chattahoochee River to form the Apalachicola River, which flows south to Apalachicola Bay on the Gulf of Mexico (Figure 1).

The Camilla Wood Preserving facility treated wood with creosote or PCP from 1947 until operations ceased in 1991. Creosote was the only preservative used from the start of operations until the 1970s, when a second treatment process using ten-percent PCP in diesel fuel was added. The facility now consists of filled surface impoundments, a soil mound, a former tank farm, and a former treatment area. Immediately east of the wood preserving facility is the former Camilla Drum Site, which produced PCP and transferred the wood preservative to the wood treatment facility via an underground pipeline (Ecology and Environment 1997; Figure 2). The evaluation of contamination at the Camilla Wood Preserving facility includes the Camilla Drum property.

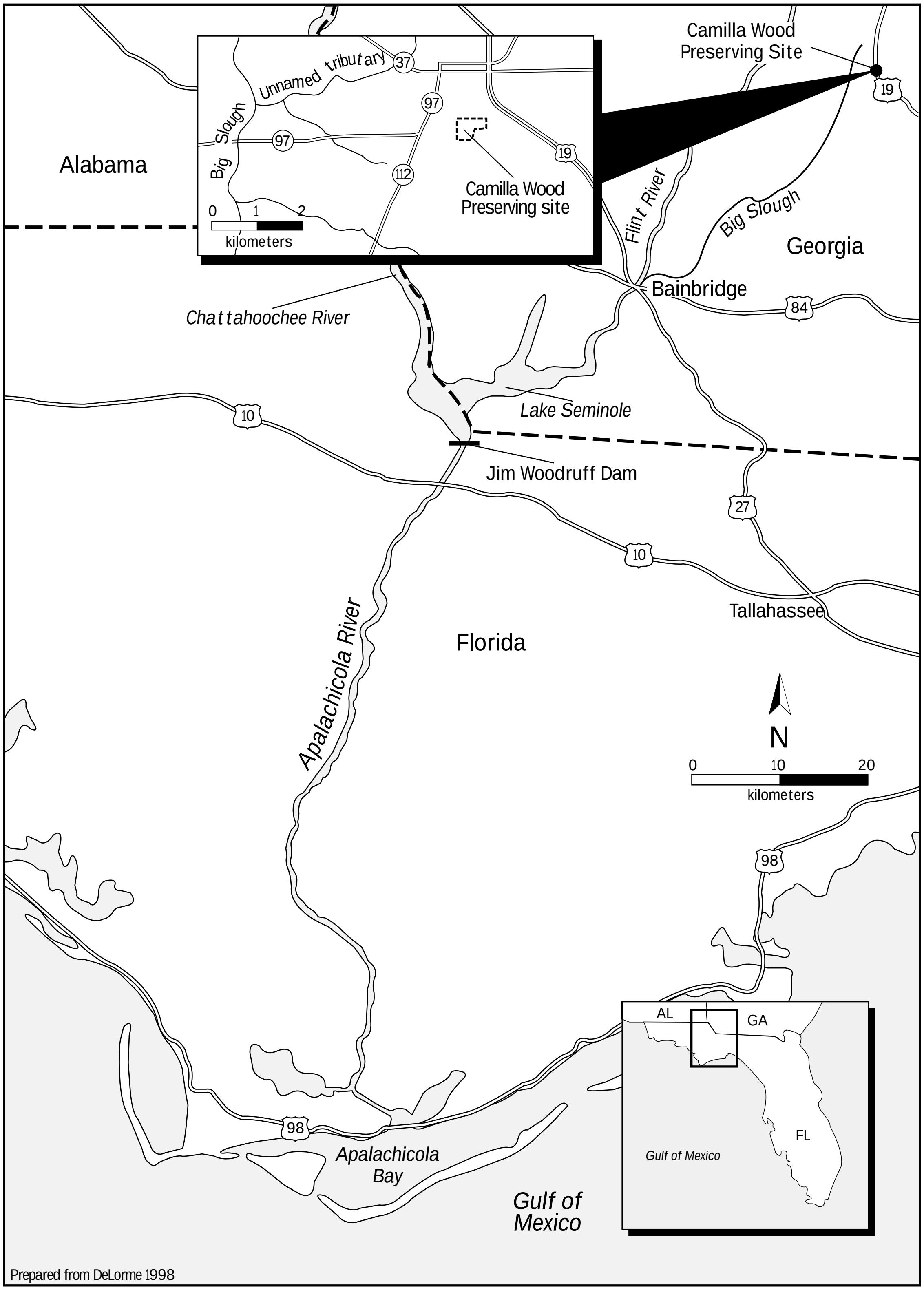

Figure 1. The Camilla Wood Preserving site and the Flint River Basin.

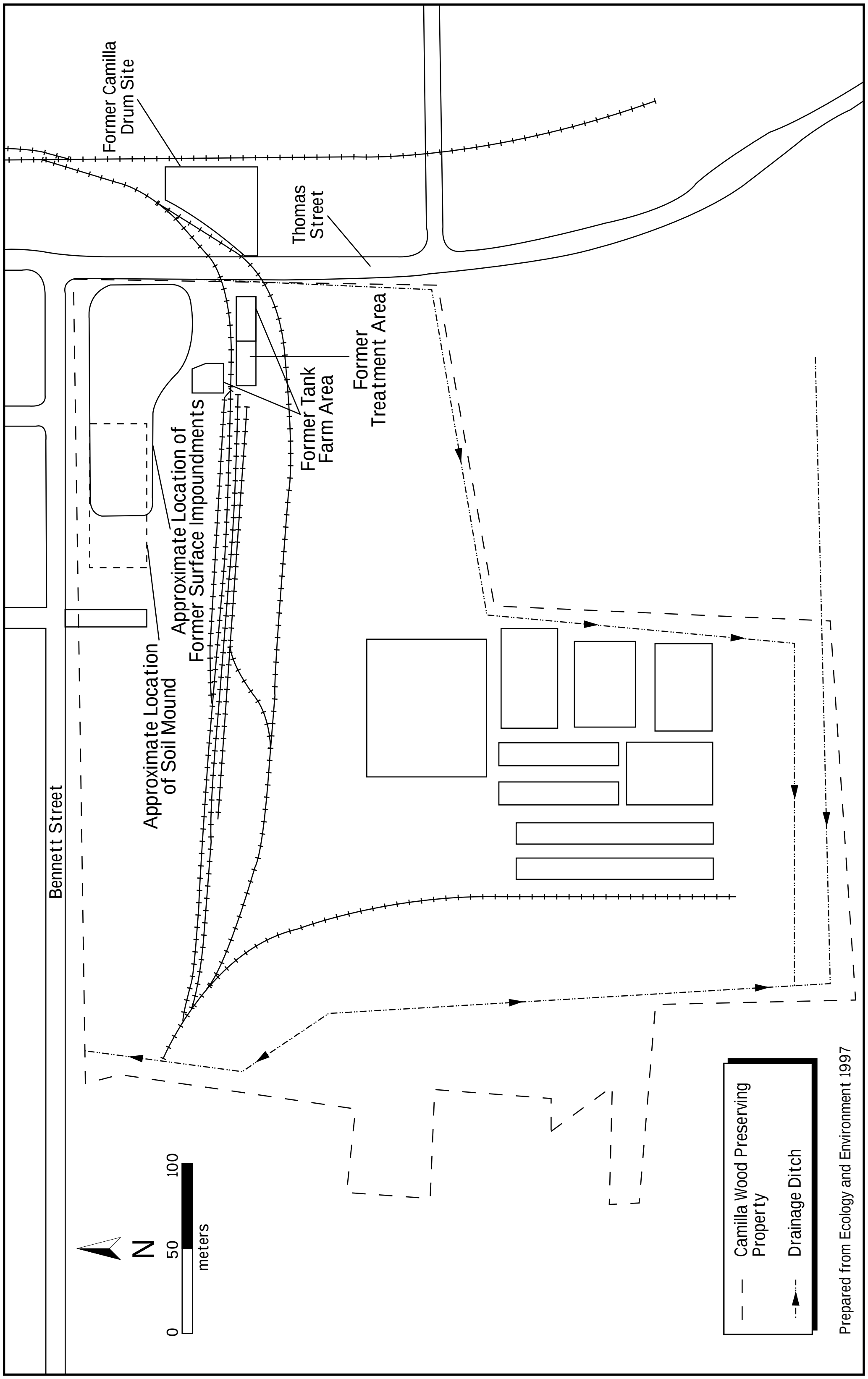

Figure 2. The Camilla Wood Preserving site in Camilla, Georgia.

Wastewater from steam treating of wood products, preservative recovery, and cleaning of drums, tanks, and storage areas was discharged to five surface impoundments located on the northeastern portion of the property during early operations. At a later, unspecified time, an on-site treatment system processed waste streams before discharging them to the City's wastewater treatment plant. In the 1960s, on-site drainage and some wastewater were discharged to two on-site injection wells, which are believed to be connected to the upper Floridan aquifer. The upper Floridan aquifer is a deep aquifer, below both the water table aquifer and the carbonate aquifer. These wells reportedly were sealed in 1971, but their exact location is unknown (Ecology and Environment 1997).

There have been several mitigation actions at the site. In 1982, stained soils from four of the surface impoundments were excavated and transferred to the fifth surface impoundment, the 620,000-L evaporation pond. The four remediated impoundments were backfilled. As a result, the exact size and location of these former impoundments is uncertain (State of Georgia 1996). In 1991 and 1992, the site perimeter was fenced, and 360,000 L of wastewater were treated on-site. Mitigation actions were then interrupted because of a lapse in funding (EPA 1998).

In 1994, nearly 2 million L of standing water were treated on-site and then directed to the evaporation pond. In addition, four drums of arsenic-containing waste, approximately 3,800 m^3 of contaminated soil, and 116,000 L of PCP and creosote from on-site storage tanks were shipped off-site for disposal. In October 1994, EPA collected dioxin samples from adjacent properties, and subsequently removed approximately 175,000 m^3 of soil (EPA 1998).

Potential contaminant transport pathways to NOAA trust resources are erosion and stormwater runoff to small, unnamed tributaries of Big Slough, and subsurface migration of groundwater and non-aqueous phase liquid (NAPL; Figure 1). The shallow groundwater aquifer is encountered within 2 meters bgs and flows westerly toward Big Slough. The deeper Upper Carbonate Aquifer is encountered about 18 m bgs and flows to the southwest. Drainage ditches on the southern and western perimeter of the site do not appear to discharge directly to tributaries of Big Slough (Figure 2; Ecology and Environment 1997).

The Camilla Wood preserving site was proposed for listing on EPA's National Priorities List on March 6, 1998 (63 FR 11340). A Site Assessment Report was completed in July 1997 (Ecology and Environment 1997).

NOAA Trust Habitats and Species

The NOAA trust habitat of concern near the site is Big Slough, a small, slow-flowing tributary of the Flint River. The low-gradient stream is generally less than 10 m wide and 0.5 to 3 m deep. Sediments are generally fine sands to silts (Partridge, personal communication, 1998).

The catadromous American eel is the only trust species that has been observed in Big Slough near the site. The species is found throughout the Flint River basin.

Striped bass have access to the slough and may occupy the lower reaches, but the species has not been documented near the site. There are striped bass in the Flint River, which runs parallel to Big Slough for most of its length (Figure 1; Partridge personal communication 1998).

There is neither recreational nor commercial fishing near the site, but there is recreational fishing on the lower slough near the confluence with the Flint River. There are no health advisories on the slough (Partridge personal communication 1998).

Site Related Contamination

Data collected during field investigations indicate that soils and groundwater on the site contain highly elevated concentrations of numerous PAHs associated with creosote, including naphthalene, phenanthrene, anthracene, fluoranthene, and pyrene (Ecology and Environment 1997). Other SVOCs such as PCP, dibenzofuran, and methyl-phenols also were observed at highly elevated concentrations. These complex organic substances and dioxins are the contaminants of concern to NOAA. In many source areas, soils are saturated with PAHs and contamination extends to over 10 m bgs. High PAH concentrations have also been observed in groundwater (Table 1).

PAHs have been detected in soils between the surface and 9 m bgs in an area that extends from the northern perimeter of the site along Bennett Street to the south-central corner near the former treatment area. Concentrations of individual PAHs within this area consistently exceed screening guidelines. Several individual PAH compounds had soil maxima above 1,000 mg/kg. Below 9 m, concentrations generally decreased to less than 1 mg/kg; except just north of the former Tank Farm Area, where percent-level concentrations (>10,000 mg/kg) were observed at 11 m bgs. This sample was collected in saturated soils containing dense non-aqueous phase liquid (DNAPL). Detectable concentrations of PAHs have been observed as deep as 17 m bgs. A similar areal and vertical distribution was observed for PCP and dibenzofuran.

PAHs were observed in over 90 percent of monitoring wells sampled during the Site Assessment (Ecology and Environment 1997). The highest concentrations were observed in the shallow aquifer on the northern and eastern portions of the site. Naphthalene consistently exceeded 10,000 mg/L while phenanthrene, pyrene, and fluoranthene consistently exceeded 1,000 mg/L. Naphthalene and phenanthrene exceeded AWQC by over an order of magnitude.

PAHs also were observed in the Upper Carbonate aquifer.

PCP was observed in over 90 percent of monitoring wells sampled. The maximum reported concentration was 19,000 mg/L. The distribution of PCP in groundwater was similar to the PAHs; however, high concentrations (up to 3,600 mg/L) also were observed beneath the former Camilla Drum portion of the site. Concentrations of PCP in the Upper Carbonate consistently exceeded screening guidelines by over an order of magnitude.

The extent of contaminated groundwater and DNAPL movement off the site, and the potential for discharge to Big Slough, have not been investigated. Surface water and sediment investigations in Big Slough have not been conducted in association with the site.

Summary

The Camilla Wood Preserving site is a former wood treating facility that used creosote and PCP from 1947 to 1991. Despite previous remedial actions, soils and groundwater at the site are highly contaminated with PAHs, PCP, and other phenols. Subsurface concentrations of PAHs and phenols indicate the presence of DNAPL contaminants. Chlorinated dioxins also may be present in site soils and NAPL. Groundwater concentrations of numerous individual PAHs, methyl-phenols, and PCP exceed ecological screening guidelines. Groundwater flow is toward a tributary of Big Slough, a NOAA trust habitat that supports populations of American eel and downstream populations of striped bass. Surface water and sediment in Big Slough have not been sampled.

Table 1. Maximum concentrations of contaminants of concern in groundwater and soils at the site (State of Georgia 1996; Ecology & Environment 1997).

	Groundwater (µg/L)	AWQC[a] (µg/L)	Site Soils (mg/kg)	Soil Guideline (mg/kg)
PAHs				
Acenaphthylene	380	NA	ND	NA
Acenaphthene	3,500	520[b]	4,800	NA
Anthracene	1,500	NA	2,900	NA
Benz(a)anthracene	1,000	NA	1,400	NA
Chrysene	820	NA	1,400	NA
Fluoranthene	3,900	3,980[c]	7,100	NA
Fluorene	3,600	NA	5,100	NA
2-Methylnaphthalene	3,100	NA	4,300	NA
Naphthalene	15,000	620[b]	12,000	NA
Phenanthrene	8,900	6.3[d]	11,000	NA
Pyrene	4,500	NA	3,800	NA
Phenolic Compounds				
2,4-Dimethylphenol	11,000	2,120[c]	2.7	1.0[f]
2-Methylphenol	8,000	NA	1.1	1.0[f]
4-Methylphenol	28,00	NA	4.2	1.0[f]
Pentachlorophenol	19,000	13[e]	9,900	0.035[g]

a: Ambient water quality criteria for the protection of aquatic organisms. Freshwater chronic criteria presented (EPA 1993).
b: Data are not sufficient to establish criteria, concentrations shown above are the lowest observed effect level for chronic toxicity (EPA 1993).
c: Data are not sufficient to establish criteria, concentrations shown above are the lowest observed effect level for acute toxicity (EPA 1993).
d: Proposed ambient water quality chronic criterion (EPA 1993).
e: Chronic criterion is pH-dependent; concentration shown above corresponds to pH of 7.8.
f: Remediation standard for recreational/residential use in British Columbia.
g: Remediation standard to protect adjacent aquatic habitat in British Columbia.

NA: Screening guidelines not available.

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6

State Marine

Port Arthur, Texas
CERCLIS #TXD099801102

Site Exposure Potential

The State Marine property occupies approximately 2.8 hectares in Port Arthur, Texas, on Pleasure Islet, a peninsula on the northwest shore of Sabine Lake, a 260-km^2 estuarine embayment of the Gulf of Mexico (Figure 1). State Marine cleaned barges that had been used to transport petroleum and other bulk chemicals. The State of Texas issued a permit for State Marine to discharge treated wastewater from barge cleaning operations to Sabine Lake in 1974. However, the State later found that the wastewater treatment system was being used for storage, not for treatment, and also documented direct discharges of barge contents to Sabine Lake. In addition, the holds of the work-barges leaked into the lake (TNRCC 1996). Barge wash-down operations ended in 1996. The facility includes a wastewater treatment plant, three unlined surface impoundments, above-ground storage tanks, and several work barges on Sabine Lake. The surface impoundments were backfilled sometime before 1996 (Figure 2).

Sampling of site soils suggests that the buried impoundments, the former tank farm, and an area adjacent to the Lake are contaminant source areas (Figure 2). The State conducted an Expanded Site Inspection in 1996 (TNRCC 1997); the site was proposed for inclusion on EPA's National Priorities List on March 6, 1998 (63 FR 11340).

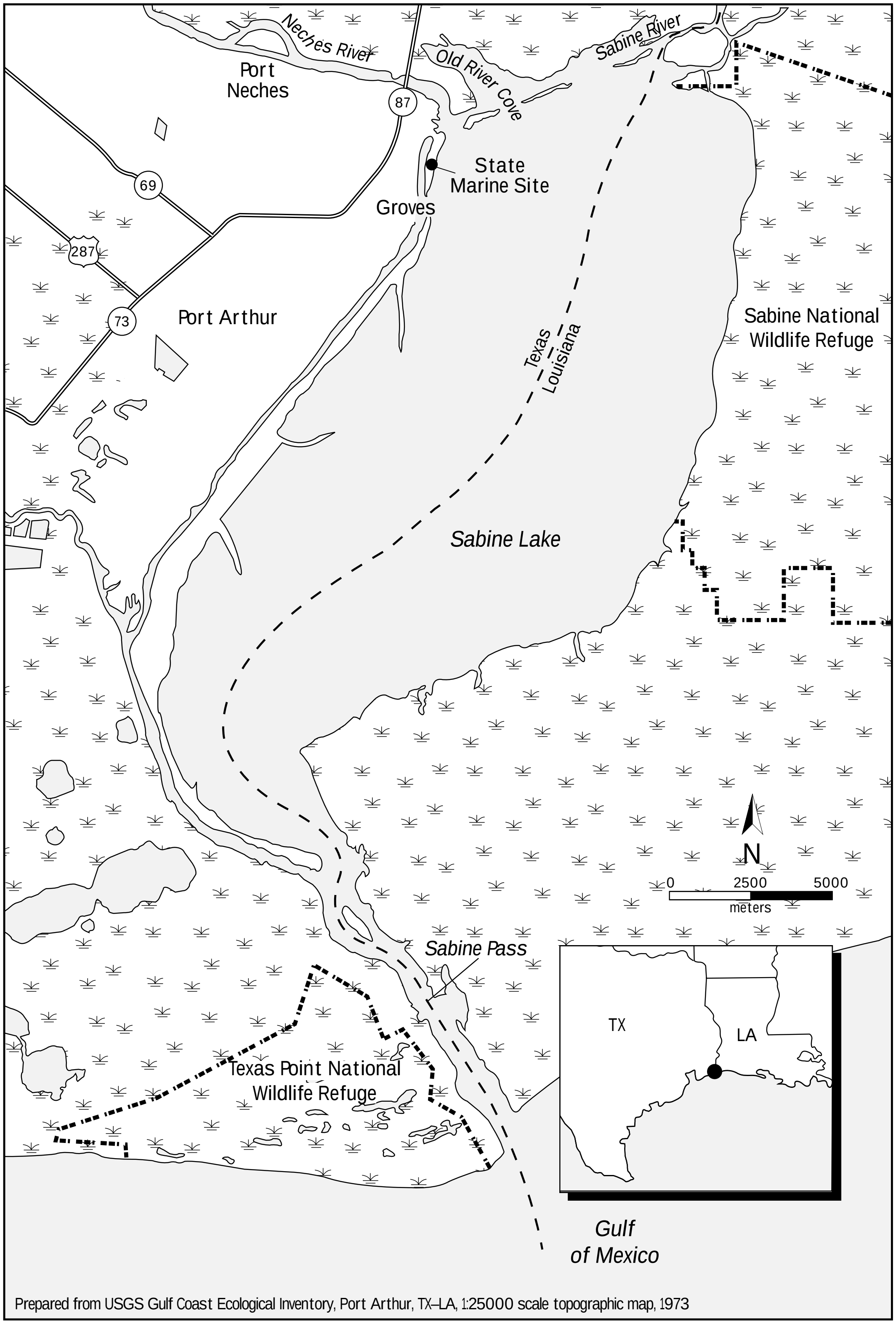

Figure 1. Sabine Lake and the State Marine study area.

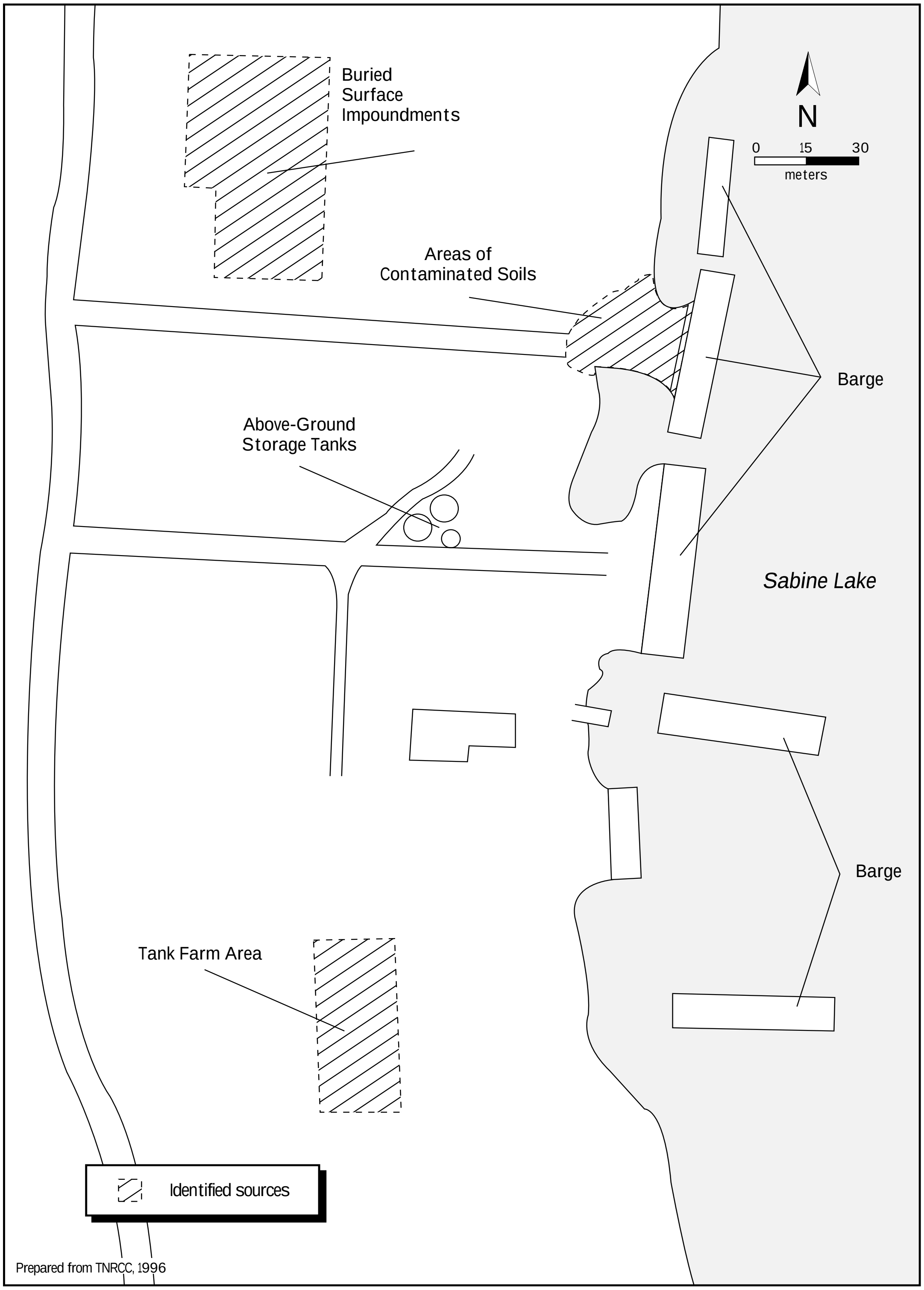

Figure 2. The State Marine site in Port Arthur, Texas.

Pathways for the transport of site-related contaminants to off-site receptors are the historic discharge of barge washwater into Sabine Lake, stormwater transport, and associated erosion. Groundwater at the site has not been sampled. No information was provided about cargo, fuel, or ballast on the barges (TNRCC 1996).

NOAA Trust Habitats and Species

The habitats of primary concern to NOAA are estuarine surface waters, associated wetlands, and bottom substrates of Sabine Lake and the lower Neches River. Numerous NOAA trust fish and invertebrate species use the estuary for spawning, rearing, and foraging (Nelson et al. 1992; Table 1). Of the major estuaries in Texas, Sabine Lake has one of the largest freshwater inflows, resulting in a low average salinity of 2.3 ppt. Water depth in Sabine Lake averages 1.8 m deep (Armstrong 1987; USFWS 1998).

Nearly 14,000 hectares of vegetated wetlands, dominated by saltgrass (*Distichlis spicata*) and cordgrass (*Spartina* spp.), border the estuary. The largest saltmarsh is to the south and west of Sabine Lake, with smaller marshes along the Sabine and Neches rivers at the head of the estuary (Armstrong 1987).

Two National Wildlife Refuges are associated with wetland areas of Sabine Lake. The Sabine National Wildlife refuge, a 50,000-hectare estuarine and freshwater wetland on the eastern border of the lake, extends from Sabine Lake to Lake Calcasieu, Louisiana (USFWS 1998). At the southern border of the lake, the Texas Point National Wildlife Refuge, a 3,600-hectare saltmarsh, is adjacent to Sabine Pass, which connects Sabine Lake to the Gulf of Mexico (Figure 1; US Fish and Wildlife Service 1998b).

Sabine Lake provides adult foraging, juvenile nursery, migratory, and spawning habitat to numerous fish species (Table 1). The anadromous gizzard shad uses Sabine Lake as a migratory corridor to the Neches and Sabine rivers during spring spawning runs. Small estuarine fish such as bay anchovy, sheepshead minnow, gulf killifish, hardhead catfish, and silversides spend their entire lives within the estuary. Adult southern flounder, spot, Atlantic croaker, sheepshead, and striped mullet use the estuary seasonally. Many other species spawn in more saline waters, but use the estuary as a juvenile nursery (Pattillo et al. 1997).

Blue crab are abundant in Sabine Lake as both adults and juveniles. Adult males remain in the estuary after mating, while females usually return to more saline water to brood eggs. Larvae are released offshore, and are subsequently transported back into estuaries where they settle to the bottom. Grass shrimp also are common in Sabine Lake, typically spending their entire lives in the estuary, where they prefer saltmarsh and oyster reef habitats. Brown and white shrimp use Sabine Lake and surrounding wetlands as nursery

Table 1. Principal NOAA trust species using habitats in Sabine Lake.

Species		Fisheries			Habitat Use	
Common Name	Scientific Name	Spawning Ground	Nursery Area	Adult Forage	Comm. Fishery	Recr. Fishery
ANADROMOUS SPECIES						
Gizzard shad	*Dorosoma cepedianum*		◆			
MARINE/ESTUARINE SPECIES						
Atlantic croaker	*Micropogonias undulatus*		◆	◆		◆
Bay anchovy	*Anchoa mitchilli*	◆	◆	◆		
Black drum	*Pogonias cromis*		◆	◆		◆
Gafftopsail catfish	*Bagre marinus*	◆	◆	◆		◆
Gulf killifish	*Fundulus grandis*	◆	◆	◆		
Gulf menhaden	*Brevoortia patronus*		◆			
Hardhead catfish	*Arius felis*	◆	◆	◆		
Pinfish	*Lagodon rhomboides*		◆	◆		
Red drum	*Sciaenops ocellatus*		◆			◆
Sheepshead	*Archosargus probatocephalus*		◆	◆		◆
Sheepshead minnow	*Cyprinodon variegatus*	◆	◆	◆		
Silver perch	*Bairdiella chrysoura*		◆	◆		
Silversides	*Menidia* spp.	◆	◆			
Southern flounder	*Paralichthys lethostigma*		◆	◆		◆
Spot	*Leiostomus xanthurus*		◆	◆		◆
Spotted sea trout	*Cynoscion nebulosus*		◆	◆		◆
Striped mullet	*Mugil cephalus*		◆	◆		◆
INVERTEBRATE SPECIES						
Blue crab	*Callinectes sapidus*	◆	◆	◆	◆	◆
Brown shrimp	*Penaeus aztecus*		◆	◆	◆	◆
Eastern oyster	*Crassostrea virginica*	◆	◆	◆		◆
Grass shrimp	*Palaemonetes pugio*	◆	◆	◆		
Rangia	*Rangia cuneata*	◆	◆	◆		◆
White shrimp	*Penaeus setiferus*		◆	◆	◆	◆

areas and then move offshore as juveniles. The most abundant bivalve species is the common rangia, followed by the eastern oyster. All oyster and rangia life stages are present within the estuary (Nelson et al. 1992; Pattillo et al. 1997).

Sabine Lake contains both recreational and commercial fisheries. Recreational catch includes blue crab, spotted sea trout, southern flounder, Atlantic croaker, gafftopsail catfish, and red and black drum. The freshwater inflow from the Neches River attracts many species, making the shoreline next to State Marine a popular area to fish, both from the bank and from boats. Sabine Lake supports commercial fisheries for blue crab, and both brown and white shrimp. No health advisories or restrictions on fishing or consumption have been issued (TNRCC 1997).

Site-Related Contamination

The limited available data indicate that soils on the facility and Sabine Lake sediments contain elevated concentrations of several PAH compounds and trace elements. Organic compounds and trace elements are contaminants of concern at the site. Table 2 summarizes the maximum measured contaminant concentrations, along with offsite (background) concentrations and appropriate screening guidelines.

Most individual PAH concentrations ranged from <1 to 8 mg/kg (ppm); however, a soil sample at the former tank farm contained 25 mg/kg pyrene. Highly elevated concentrations of copper, lead, and zinc also were observed in soils, particularly in the source area near the Lake. Maximum concentrations of these three elements exceeded 1,000 mg/kg in this area (TNRCC 1997).

Table 2. Maximum concentrations of contaminants of concern at State Marine.

	Soil (mg/kg)		Sediment (mg/kg)		
	Soils	Mean U.S. [a]	Sediment	ERL [b]	Offsite Sediment [c]
Trace Elements					
Copper	1670	17	NR	34	NR
Lead	4090	16	362	46.7	NR
Mercury	0.3	0.058	NR	0.15	NR
Nickel	243	13	NR	20.9	NR
Zinc	38700	48	3910	150	NR
Organic Compounds					
Anthracene	3.4	NA	2	0.085	ND
Phenanthrene	4.8	NA	7.1	0.24	0.040
Benzo(b)fluoranthene	4.6	NA	3.6	NA	0.036-0.064
Benzo(a)pyrene	3.9	NA	2.3	0.43	0.045
Pyrene	25	NA	8.8	0.67	0.024-0.18
Chrysene	8.4	NA	3.9	0.38	0.053-0.11
Fluoranthene	7.9	NA	9.1	0.60	0.094
Fluorene	1.2	NA	0.79	00.019	ND
Benz(a)anthracene	3.8	NA	0.86	0.26	ND

a: Mean U.S. soil trace element concentrations (Shacklette and Boerngen 1984).
b: Effects range-low; the concentration representing the 10th percentile for the dataset in which effects were observed or predicted in studies compiled by Long et al (1995).
c: The range of detectable concentrations observed in 8 sediment samples collected offsite, within the watershed (TNRCC 1996).
ND: Not detected; detection limit not available.
NA: Screening guidelines not available.
NR: Data were not reported.

Sediment samples collected in the Lake next to the facility had PAH concentrations that exceeded applicable ecological screening guidelines. Eight of the measured PAH compounds exceeded their respective ERLs by more than an order of magnitude. Concentrations of these compounds in sediment areas upgradient of the facility ranged from not detected for fluorene and anthracene to 0.18 mg/kg for pyrene (TNRCC 1997; Table 2).

Concentrations of lead and zinc in sediment also exceeded ecological screening guidelines by an order of magnitude. Sediment concentrations of other trace elements were not reported, even though they were significantly elevated in site soils.

Summary

State Marine operated a cleaning facility to remove residuals from tank barges that had been used to transport petroleum and bulk chemicals. The facility is located on the shore of Sabine Lake, a shallow, estuarine embayment of the Gulf of Mexico. The state has documented the direct discharge of barge wash water into Sabine Lake. Site soils and the sediments of Sabine Lake are contaminated with PAHs and trace elements. Groundwater and several on-site barges have not yet been investigated. Sabine Lake is a productive Gulf estuary with a variety of invertebrate and finfish species that support both commercial and recreational fisheries.

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