
Brandywine DRMO

Brandywine, Maryland

EPA Facility ID: MD9570024803

Basins: Lower Potomac

HUCs: 02070011

Executive Summary

The Brandywine Defense Reutilization and Marketing Office facility in Brandywine, Prince George's County, Maryland, was used as a storage area for hazardous waste and electrical equipment. Substantial concentrations of PCBs and pesticides have been detected in soils and surface water at the site. Surface water runoff flows from the property into ditches that border the perimeter of the site; the ditches flow into a culvert that flows toward Timothy Branch. Groundwater in the surface aquifer beneath the site flows toward Timothy Branch and Mattawoman Creek. Data from sediment and surface water collected from wetland areas draining to Timothy Branch indicate that PCBs are migrating from the site toward NOAA trust resources. The NOAA trust habitats of concern are the headwater reaches of Timothy Branch, Mattawoman Creek, and Mataponi Creek. Mattawoman and Mataponi creeks contain American eel and suitable spawning habitat for anadromous blueback herring.

Site Background

The Brandywine Defense Reutilization and Marketing Office (DRMO) site occupies approximately 3 ha (8 acres) in Brandywine, Prince George's County, Maryland. The site is located on the groundwater divide between the Potomac River and Patuxent River basins, both of which flow into the Chesapeake Bay (Figure 1).

From 1955 until 1988, the Brandywine DRMO was used by the U.S. Department of Defense as a storage area for surplus electrical equipment and hazardous waste, including solvents and waste oil containing polychlorinated biphenyls (PCBs) (USEPA 1998). Waste material was stored in tanks, drums, warehouses, aboveground storage tanks, and underground storage tanks. Capacitors and transformers containing oil contaminated with PCBs were stored in concrete bins in the north-east portion of the site. Evidence indicates that burn pits were once used at the site. In 1993, approximately 14,500 metric tons (16,000 tons) of contaminated soil and debris were excavated and removed from the Brandywine DRMO site (USEPA 1998). The site was placed on the National Priorities List in May 1999 (USEPA 2000).

Surface water flow and groundwater migration are the primary pathways for transport of contaminants to NOAA trust resources. Surface water runoff at the site flows into ditches around the perimeter; the ditches flow north and west toward a culvert (Figure 2). Approximately 150 meters (500 ft) north of the site, the culvert discharges to a natural highly braided channel system. These channels eventually form a tributary to Timothy Branch, which joins Mattawoman Creek approximately 7.2 km (4.5 mi) downstream. Mattawoman Creek discharges to the Potomac River about 35 km (22 mi) west (Dames and Moore 1996; USEPA 1998).

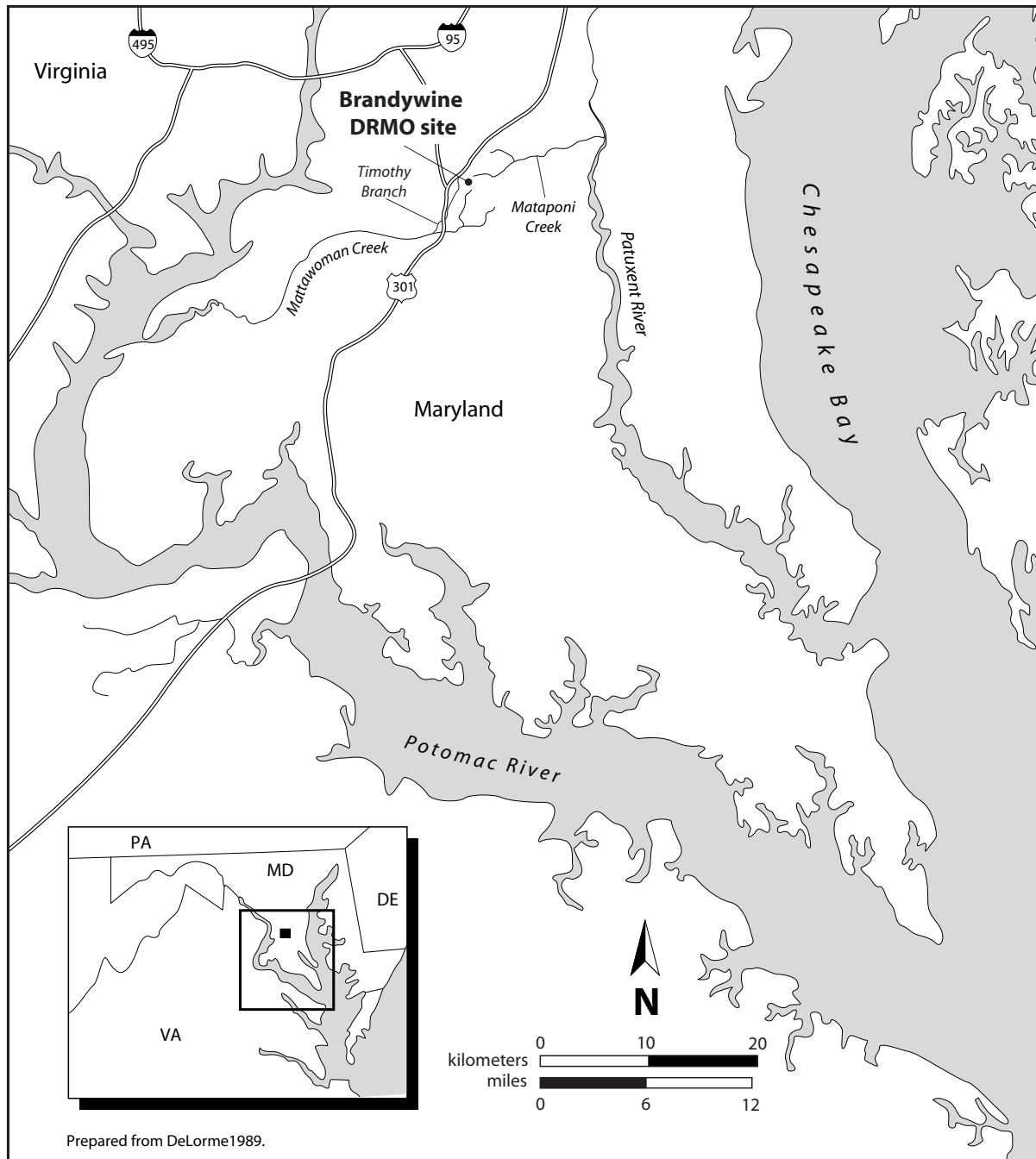


Figure 1. Location of Brandywine DRMO site, Brandywine, Maryland.

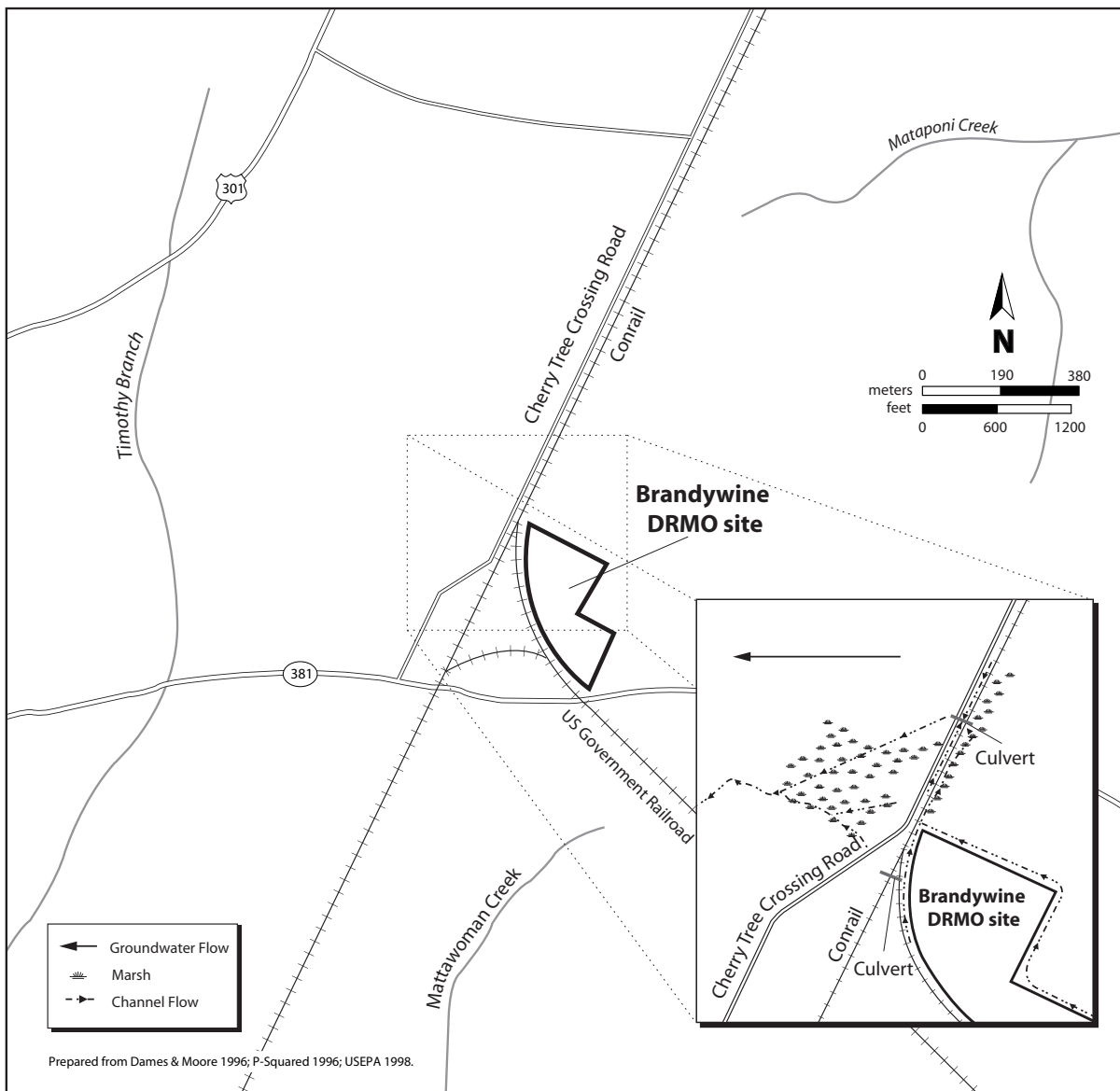


Figure 2. Detail of the Brandywine DRMO site.

The uppermost aquifer beneath the site is approximately 4 to 12 m (13 to 38 ft) thick and composed of silty clay overlying a sandy gravel layer. Beneath the surface aquifer lies the clay Calvert Formation, which acts as a barrier to downward groundwater flow. Groundwater flows from the surface aquifer to perennial streams near the site, which include Mattawoman Creek to the south and Timothy Branch to the west (Figure 2) (P-Squared 1996). The groundwater beneath the site is approximately 0.6 to 3 m (2 to 10 ft) below ground surface (Dames and Moore 1996).

NOAA Trust Resources

The NOAA trust habitats of concern are the headwater reaches of Timothy Branch, Mattawoman Creek, and Mataponi Creek (Figure 1). These streams generally range from 3 to 10 m (10 to 33 ft) in

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width, are shallow, and have low to moderate grades. Riffle, run, and pool environments predominate, so sediments range from silt in depositional pools to gravel in shallow riffles (Stribling et al. 1999).

NOAA trust resources found in the vicinity of the Brandywine DRMO site are listed in Table 1. The catadromous American eel is present in the headwater reaches of Mattawoman and Mataponi creeks. Catadromous eel enter streams as juveniles and spend most of their adult lives in fresh water (Mowrer 2003)

Table 1. NOAA trust resources found in the vicinity of the Brandywine DRMO site (MDNR 1999; Stribling et al. 1999; Mowrer 2003).

Species		Habitat Use			Fisheries	
		Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
Common Name	Scientific Name					
CATADROMOUS FISH						
American eel	<i>Anguilla rostrata</i>		◆	◆		
ANADROMOUS FISH						
Alewife	<i>Alosa pseudoharengus</i>	◆	◆	◆		◆
Blueback herring	<i>Alosa aestivalis</i>	◆	◆	◆		◆
Hickory shad	<i>Alosa mediocris</i>	◆	◆	◆		
Striped bass	<i>Morone saxatilis</i>	◆	◆	◆		◆
White perch	<i>Morone americana</i>	◆	◆	◆		◆
Yellow perch	<i>Perca flavescens</i>	◆	◆	◆		◆

Several anadromous fish species including striped bass, blueback herring, white perch, alewife, and hickory shad spawn and rear their young in Mattawoman Creek in the vicinity of the Brandywine DRMO site (Mowrer 2003). White perch and striped bass are also present in the Potomac and Patuxent rivers, approximately 42 and 15 km (26 and 9 mi) downstream of the facility, respectively (MDNR 1999). No anadromous fish are present in Mataponi Creek in the vicinity of the site because numerous beaver dams keep them from migrating upstream of the creek mouth (Mowrer 2003)

Recreational fishing of several anadromous fish including striped bass, blueback herring, white perch, and alewife occurs in limited quantities in the upper reaches of Mattawoman Creek (Mowrer 2003). Recreational fishing is more substantial in tidal portions of Mattawoman Creek about 25 km (16 mi) downstream of the facility. Striped bass, white perch, and freshwater resident species are targeted in these areas (CCAM 2000). No commercial fishing takes place in the vicinity of the site.

A fish consumption advisory is in effect for the Patuxent and Potomac Rivers downstream of the site. The advisory recommends that no more than one meal per month of American eel be consumed. A second advisory is in effect for the Patuxent River, which recommends that no more than two meals per month of white perch be consumed (MDE 2003):

Site-Related Contamination

The primary contaminants of concern at the site are PCBs, pesticides, and polynuclear aromatic hydrocarbons (PAHs). Soil, groundwater, and surface water samples were collected from the Brandywine DRMO site during several investigations (Dames and Moore 1996; Halliburton NUS Corporation 1995). In 1991, surface water and sediment samples were collected from the wetland areas on each side of the culvert under Cherry Tree Crossing Road (USEPA 1998). Maximum concentrations of contaminants of concern detected in environmental media collected at the site are summarized in Table 2.

Table 2. Maximum concentrations of contaminants of concern detected in soil, groundwater, surface water, and sediment at the Brandywine DRMO site (Halliburton NUS Corporation 1995; Dames and Moore 1996; USEPA 1998).

Contaminant	Soil (mg/kg)	Water (µg/L)			Sediment (mg/kg)	
	Soil	Ground-water	Surface Water	AWQC ^a	Sediment	TEC ^b
PAHs/PHENOLS						
Total PAHs	29	N/A	ND	300 ^{c,d}	N/A	1.61
PESTICIDES/PCBs						
Chlordane	10	ND	1.5	0.00215	N/A	0.00324
DDD	5.1	ND	<0.03	0.6 ^{d,e}	N/A	0.00488
DDE	12	ND	<0.01	NA	N/A	0.00316
DDT	41	ND	<0.02	0.0005	N/A	0.00416
PCBs (as Aroclors)	2,300	ND	10	0.014	7.5	0.0598
VOLATILE ORGANIC COMPOUNDS						
Dichloroethylene 1,2-trans	N/A	12000	<2	11600 ^{d,f}	N/A	NA
Tetrachloroethylene	N/A	150	<2	840 ^d	N/A	NA
Trichloroethylene	N/A	65000	<1	12900 ^d	N/A	NA

a: Ambient water quality criteria for the protection of aquatic organisms (USEPA 1993, 1999). Freshwater chronic criteria presented.

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

c: Value for the chemical class.

d: Lowest Observable Effects Level (LOEL).

e: Chronic criterion not available; acute criterion presented.

f: Value for summation of the isomers.

NA: Screening guidelines not available.

N/A: Analyte not analyzed for.

ND: Not detected.

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In 1987, 50 soil samples were collected from across the site. PCB concentrations in soil samples ranged from 25 to 2,300 mg/kg. Fifteen of the 50 samples were analyzed for pesticides; one of those samples contained 12 mg/kg of DDE (the maximum concentration of DDE), 4.9 mg/kg of DDD, and 41 mg/kg of DDT (the maximum concentration of DDT). The pesticide chlordane was detected in several soil samples following soil remediation activities in 1993; the maximum concentration of chlordane was 10 mg/kg. In the one sample that was analyzed for dioxins, 2,3,7,8-TCDD was not detected above a detection limit of 0.0047 µg/kg. The maximum detected concentration of total PAHs was 29 mg/kg. No screening guidelines are available for comparison to the maximum concentrations of PCBs, pesticides, and PAHs in soil.

Pesticides and PCBs were not detected in groundwater samples collected from the site. Volatile organic compounds were detected in groundwater at concentrations that exceeded the ambient water quality criteria (AWQC) screening guidelines by less than one order of magnitude.

Four surface water samples collected from the Brandywine DRMO property contained PCBs at concentrations ranging from 2.1 to 10 µg/L. Surface water samples collected from the wetlands northwest of the facility contained PCB concentrations ranging from 1.5 to 3.0 µg/L. The maximum PCB concentration in surface water exceeded the AWQC screening guideline by two orders of magnitude. One sample contained chlordane at a maximum concentration that exceeded the AWQC by two orders of magnitude.

Sediment samples collected from the wetlands contained PCB concentrations ranging from 5.0 to 7.5 mg/kg. The maximum PCB concentration exceeded the threshold effects concentration (TEC) screening guideline by two orders of magnitude (USEPA 1998).

References

- Coastal Conservation Association of Maryland (CCAM). 2000. Fishing reports. Available: www.ccamd.org.
- Dames & Moore Inc. and Hazardous Waste Remedial Actions Program (Dames and Moore). 1996. Engineering evaluation/cost analysis (EE/CA) of the remediation of trichloroethene-contaminated groundwater at the Brandywine Defense Reutilization and Marketing Office site. Andrews Air Force Base, Maryland: U.S. Department of the Air Force.
- DeLorme. 1989. Virginia atlas and gazetteer. 1:150,000. DeLorme. Freeport, ME.
- Halliburton NUS Corporation. 1995. Remedial action report, soil and tank removal - Brandywine DRMO, Andrews Air Force Base, Camp Springs, Maryland. Brooks Air Force Base, TX: Air Force Center for Environmental Excellence.
- MacDonald, D., C. Ingersoll, T. Berger. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. *Archives of Environmental Contamination and Toxicology* 39:20-31.
- Maryland Department of Natural Resources (MDNR). 1999. State of the streams 1995–1997. Maryland biological stream survey results. Annapolis, MD: Chesapeake Bay and Watershed Programs.
- Maryland Department of the Environment (MDE). 2003. Consumption advisories for only recreationally caught fish species. Available: http://www.mde.state.md.us/assets/document/fish/advisory_summary.pdf.

References, cont.

Mowrer, J. Fisheries biologist for the Maryland Department of Natural Resources. Baltimore, MD. Personal communication May 28, 2003.

P-SQUARED Technologies Inc. (P-Squared). 1996. Development of a calibrated groundwater flow model and evaluation of remediation alternatives at Brandywine Defense Reutilization and Marketing Office site, Andrews Air Force Base, Maryland. Oak Ridge, TN: Hazardous Waste Remedial Actions Program. 36.

Stribling, J., E. Leppo, and C. Daley. 1999. Biological assessment of the streams and watersheds of Prince George's County, Maryland. Spring index period 1999. Largo, MD: Prince George's County, Department of Environmental Resources, Programs and Planning Division.

U.S. Environmental Protection Agency (USEPA). 1993. Water quality criteria. Washington, DC: Office of Water, Health and Ecological Criteria Division. 294 pp.

U.S. Environmental Protection Agency (USEPA). 1998. HRS documentation record, Brandywine Defense Reutilization and Marketing Office. Philadelphia, PA: U.S. Environmental Protection Agency, Region 3. 84.

U.S. Environmental Protection Agency (USEPA). 1999. National recommended water quality criteria—correction: U.S. Environmental Protection Agency, Office of Water.

U.S. Environmental Protection Agency (USEPA). 2000. NPL site narrative at listing, Brandywine DRMO. Available: <http://www.epa.gov/superfund/sites/npl/nar1512.htm>.

