Andrews Air Force Base

Camp Springs, Maryland

EPA Facility ID: MD0570024000

Basin: Middle Potomac-Anacostia-Occoquan

HUC: 02070010

Executive Summary

Numerous sources of contamination have been identified at the Andrews Air Force Base (AAFB) in Camp Springs, Maryland. The primary sources of concern to NOAA are three former landfills that drain into Piscataway Creek, which is the NOAA habitat of concern. Samples of environmental media collected from Piscataway Creek near the landfills show concentrations of trace elements (metals), PAHs, PCBs, and pesticides that exceed screening guidelines. Alewife, blueback herring, white perch, and yellow perch are NOAA trust species that spawn in Piscataway Creek; however, these species are not found within 15 km (9 mi) of AAFB. American eel is the NOAA trust resource likely to use habitat in the vicinity of the site.

Site Background

Andrews Air Force Base (AAFB) is an active facility in Camp Springs, Maryland. The installation was established in 1942 as the Camp Springs Army Airfield and has since served as the headquarters of the Continental Air Command, the Strategic Air Command, the Military Air Transport Service, and the Air Force Systems Command. The facility currently supports worldwide airlift operations for the President of the United States and other high-ranking officials, as well as the flight operation of more than 100 aircraft. AAFB occupies approximately 1,740 ha (4,300 acres) and is situated on a drainage divide that separates the watersheds of the Potomac and Patuxent Rivers (Figure 1).

Under the U.S. Air Force's Installation Restoration Program (IRP), more than 20 potential sources of contamination have been identified on the main base of AAFB, as shown on Figure 2 (I.T. Corporation 1998). Table 1 lists the types of waste present at the sources of concern.

In determining the site's hazard ranking score, the U.S. Environmental Protection Agency (USEPA) evaluated four of the potential sources of contamination identified under the IRP (LF05, LF07, FT02, and FT03), as well as an additional potential source, the Sludge Disposal Area (also shown on Figure 2) (USEPA 1998). For this waste site report, data were available only for the evaluation of those five potential sources, as well as for potential source LF06. Although other potential sources are listed in Table 1, data were not available for their evaluation.

On the basis of the types of activities conducted, the proximity to NOAA trust resources, and the availability of data, the primary sources of concern to NOAA are the three former landfills: LF05, LF06, and LF07. The landfills were used from the late 1950s to the late 1980s for the disposal of spent solvents, chemical reagents, process wastes, waste oils, sewage sludge, general refuse, construction rubble, and medical wastes.

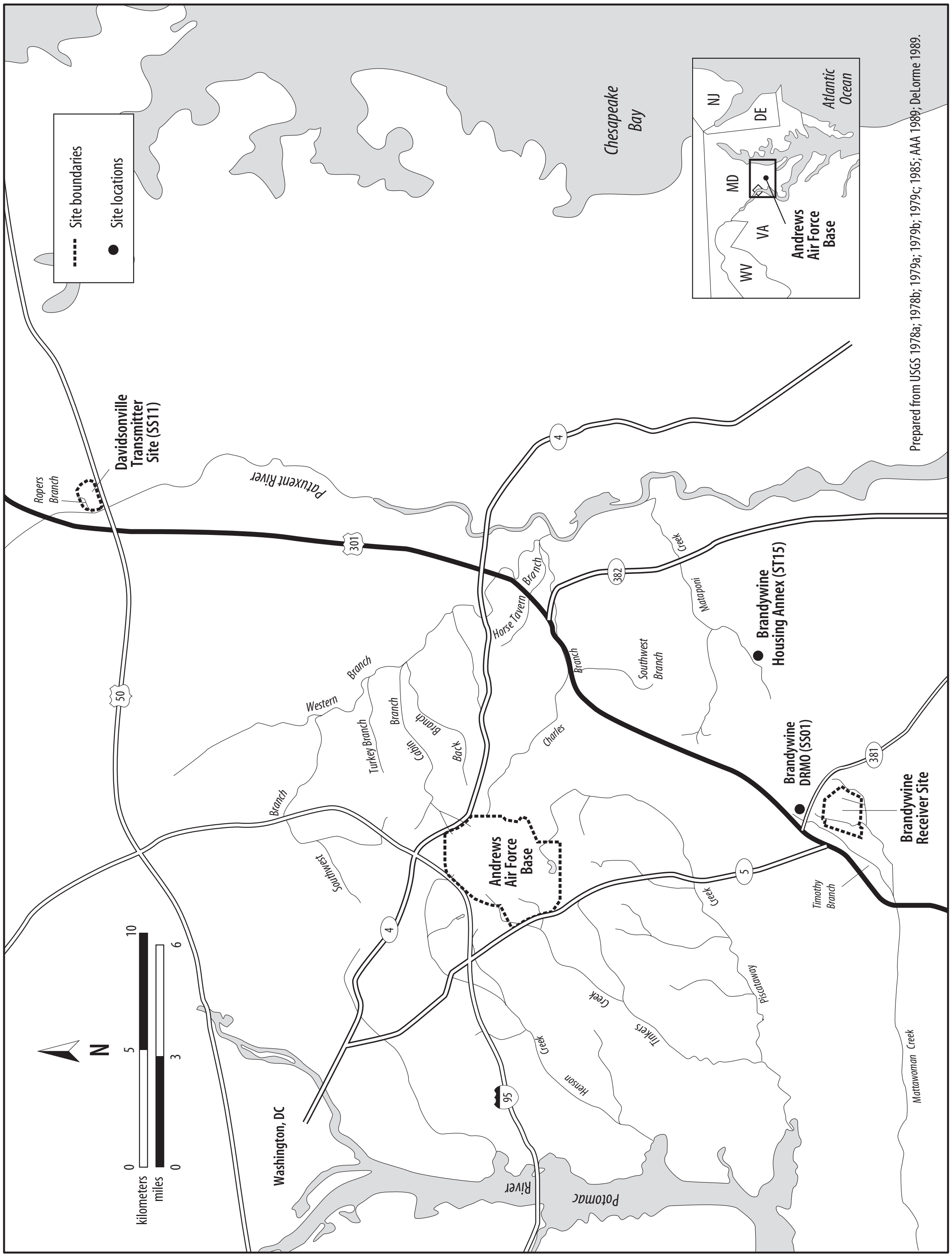

Figure 1. Andrews Air Force Base, Camp Springs, Maryland and associated base facilities.

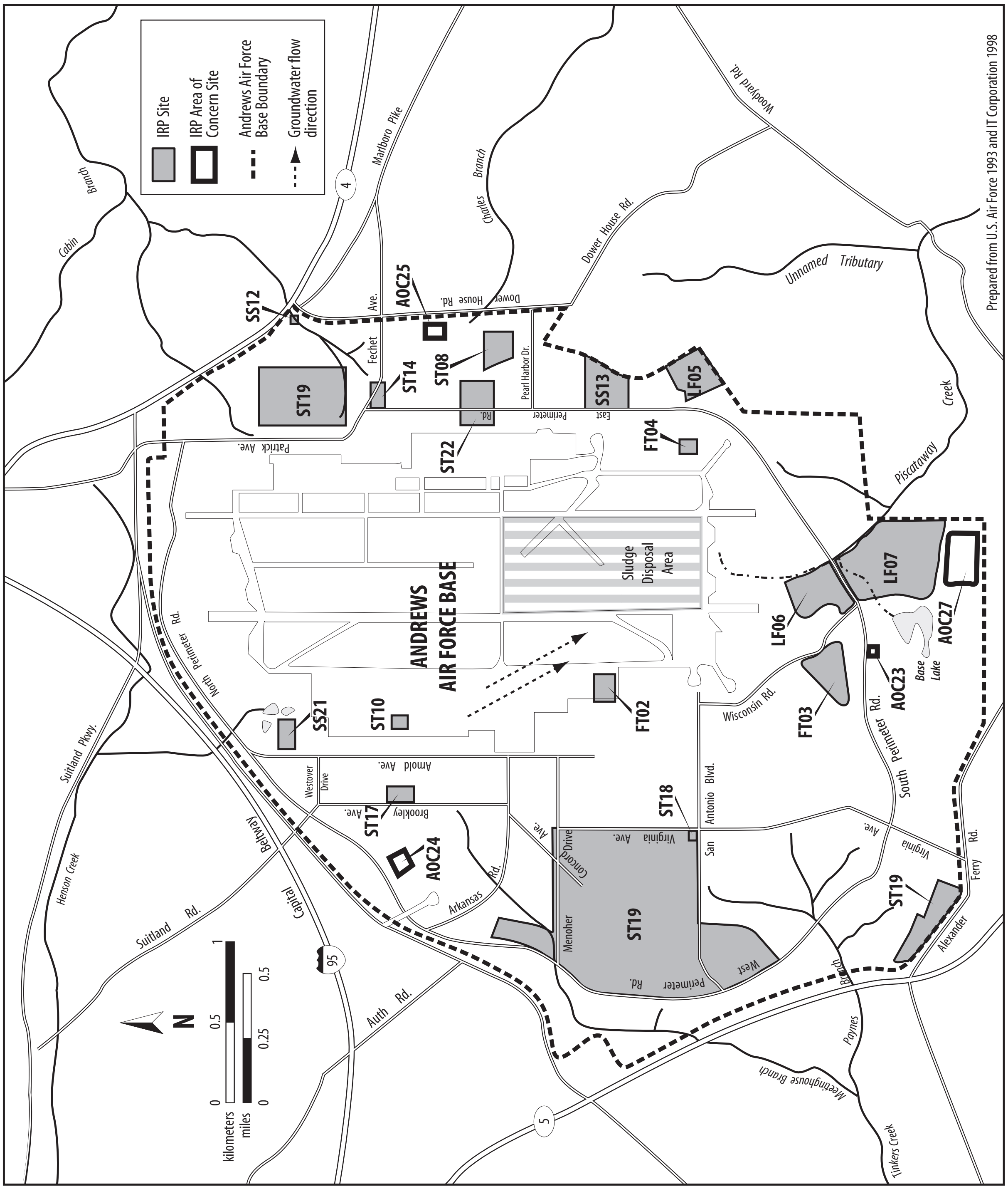

Figure 2. Detail of the Andrews Air Force Base site (only the main base sites are shown).

Table 1. Description of potential sources of contamination at Andrews AFB (Radian Corporation 1992; USEPA 1998).

Site ID	Site Name	Description
LF05	D1 Landfill/Leroy's Landfill	Solvents, oils, dilute process wastes, fly ash, and sewage sludge were disposed; approximately 7,500 liters of shop wastes were dumped each week.
LF06	D3 Landfill	Construction debris, equipment, and unknown quantities of shop wastes were disposed.
LF07	D4 Landfill	Construction debris, hospital waste, chemical reagents, and general refuse were disposed.
FT02	Fire Training Area No. 1	Fuels and waste oils were burned during training exercises.
FT03	Fire Training Area No. 2	Waste oil, jet fuel, paint thinner and other liquid waste were poured on the ground and ignited.
FT04	Fire Training Area No. 4	Jet fuel and motor oil were burned weekly; spent oil and remains flowed into an oil interceptor and then into a gravel-bottomed pond.
SS13	POL Yard	Petroleum, oils, and lubricants (POL) leaked from underground storage tanks (USTs) and aboveground storage tanks (ASTs).
SS12	JP-4 Spill	Approximately 3,800 liters of JP-4 (jet fuel) spilled from a puncture in a pressurized delivery line.
SS21	NA	NA
ST08	MOGAS UST Leak	Gasoline and solvents leaked from USTs at a military gas station.
ST10	PD 680 Spill	An estimated 19,000 liters of PD 680 solvent leaked from UST.
ST14	East Side Service Station	Petroleum products leaked from USTs. Trichloroethylene (TCE) from unknown sources was found in groundwater.
ST17	AAFES Gas Station	Petroleum products leaked from USTs.TCE from unknown sources was found in groundwater.
ST18	2132 Richmond Drive	Fuel oil leaked from a UST.
ST19	Base-Wide Heating Oil USTs	Fuel oil leaked from USTs.
ST22	NA	NA
AOC23	NA	NA
AOC24	NA	NA
AOC25	NA	NA
AOC27	NA	NA
NA	Sludge Disposal Area	Sludge from the Blue Plains Waste Treatment Plant and AAFB waste treatment plant was spread between the runways

NA: Information was not available in the documents reviewed.

The primary pathways for the migration of contaminants to NOAA trust resources are surface water runoff and groundwater transport. Potential sources LF06 and LF07 are adjacent to Piscataway Creek, which originates several hundred meters upstream of the landfills (Figure 2). Potential source LF05 is located approximately 500 m (0.3 mi) from an unnamed tributary that enters Piscataway Creek just downstream of the landfill (Figure 2).

Shallow groundwater beneath AAFB occurs within the Brandywine Formation and the underlying Calvert Formation, which forms a significant regional aquitard separating the shallow aquifer from deeper aquifers. Together these formations range from 20 to 45 m (65 to 150 ft) in thickness. The depth at which groundwater is encountered at the site ranges from approximately 1 to 9 m (3 to 28 ft) below ground surface. Groundwater in the surficial aquifer flows horizontally at a velocity of approximately 1 to 14 m/yr (3 to 46 ft/yr) (Dames and Moore 1992a). In general, the direction of groundwater flow at AAFB is toward Piscataway Creek.

NOAA Trust Resources

The NOAA trust habitat of concern is Piscataway Creek. Piscataway Creek originates on AAFB and flows for about 25 km (16 mi) before entering the Potomac River. The lower 10 km of the creek is considered low salinity estuarine habitat, with salinities generally ranging from 0.5 to 5 parts per thousand (USFWS 1980). NOAA trust resources found in Piscataway Creek include alewife, American eel, blueback herring, white perch, and yellow perch (Table 2) (Kazyak 2001; King 2001). American eel is the species likely to use habitat in the vicinity of AAFB; the other species have only been observed 15 km (9 mi) downstream from AAFB.

Table 2. NOAA trust resources inhabiting Piscataway Creek (Kazyak 2001; King 2001).

Species		**Habitat Use**			**Fisheries**	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Forage	Comm. Fishery	Rec. Fishery
ANADROMOUS/CATADOMOUS FISH						
Alewife	*Alosa pseudoharengus*	◆	◆	◆		
American eel	*Anguilla rostrata*		◆	◆		
Blueback herring	*Alosa aestivalis*	◆	◆	◆		◆
White perch	*Morone americana*	◆	◆	◆		◆
Yellow perch	*Perca flavescens*	◆	◆	◆		

Blueback herring and alewife are small anadromous fish that spend their adult lives at sea and return to fresh water to spawn. They have been documented spawning in Piscataway Creek several kilometers upstream of its confluence with Tinkers Creek (Kazyak 2001). White perch are semi-anadromous fish that migrate to tidal fresh water and slightly brackish water each spring to spawn. The confluence with Tinkers Creek is the upstream limit of documented spawning for white perch in Piscataway Creek (Kazyak 2001). Yellow perch are generally freshwater fish, although they have adapted to estuarine waters in Maryland. Yellow perch have been observed spawning at the mouth of Piscataway Creek (Kazyak 2001). American eel are catadromous fish that spawn at sea and use freshwater habitats as adults.

There are no commercial fisheries in Piscataway Creek. There is recreational fishing of blueback herring and white perch in Piscataway Creek (Borras 2001). The most popular fishing areas are near Piscataway Creek's confluence with Tinkers Creek or downstream (Borras 2001). There are no fish consumption advisories currently in effect for Piscataway Creek.

Site-Related Contamination

A variety of investigations have been conducted at the three landfills of concern. For a groundwater contamination survey conducted in 1991, nine to 11 groundwater samples were collected from monitoring wells at each of the three landfills (Dames and Moore 1992a). For remedial investigations in 1992 and 1993, four to six soil samples and two to three surface water and sediment samples were collected at each of the three landfills (Dames and Moore 1992b; Dames and Moore 1992c; Dames and Moore 1993). For an additional remedial investigation in 1995 at LF05, six surface soil samples, 43 subsurface soil samples, and four sediment samples were collected, as well as five groundwater samples from monitoring wells (EA Engineering 1996). In 1993, four paired sets of surface water and sediment samples were collected from Piscataway Creek to assess potential impacts on the creek from the landfills (USAF 1993).

Table 3 summarizes maximum concentrations of contaminants detected in soil and groundwater from the landfills and in sediment and surface water from landfill locations or from Piscataway Creek in the vicinity of the landfills.

The soil data indicate a source of trace element (metals) contamination when maximum detected concentrations are compared to soil screening guidelines. Arsenic, chromium, and copper exceeded the soil screening guidelines by less than an order of magnitude. Lead, mercury, nickel, and zinc exceeded by one order of magnitude. No soil screening guidelines are available for comparison to the maximum concentrations of cadmium and silver in soil. The presence of polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and pesticides also indicate a source of contamination. There are no soil screening guidelines available for comparison to the maximum concentrations of those contaminants.

Groundwater samples contained trace elements and several pesticides. Trace elements detected in groundwater at maximum concentrations that exceeded the applicable ambient water quality criteria (AWQC) by one order of magnitude were cadmium and silver. Lead, nickel, and zinc exceeded by less than an order of magnitude. Maximum concentrations of arsenic, chromium, copper, and mercury did not exceed their AWQCs. Four pesticides were detected in groundwater. Chlordane exceeded its AWQC by two orders of magnitude; endrin aldehyde by one order of magnitude; dieldrin by less than an order of magnitude; and the maximum concentration of DDD did not exceed the AWQC. PAHs and PCBs were not detected.

In surface water from Piscataway Creek, concentrations of cadmium, copper, lead, and zinc exceeded their respective freshwater AWQCs by less than an order of magnitude. Maximum concentrations of arsenic, chromium, and nickel did not exceed their AWQCs. Mercury and silver were not detected. The only organic compound detected in surface water from Piscataway Creek was dieldrin, but its concentration did not exceed the AWQC.

In sediment, arsenic, cadmium, lead, mercury, nickel, silver, and zinc were detected at maximum concentrations that exceeded their respective threshold effect levels (TELs) by less than an order of magnitude. Chromium and copper were also detected, but at concentrations less than their TELs. In addition, concentrations of PCBs, total PAHs, and three pesticides exceeded TELs by less than an order of magnitude. The highest concentration of PAHs in sediment was detected in a sample collected from Piscataway Creek between LF06 and LF07.

Table 3. Maximum concentrations of contaminants of concern detected in media collected from potential sources of contamination (LF05, LF06, and LF07) and Piscataway Creek during site investigations (Dames and Moore 1992a; 1992b; 1992c; 1993; USAF 1993; EA Engineering 1996).

	Soil (mg/kg)		Water (µg/L)			Sediment (mg/kg)	
Contaminant	Soil	Mean U.S.[a]	Ground-water	Surface water	AWQC[b]	Sediment	TEL[c]
TRACE ELEMENTS							
Arsenic	23	5.2	19	3.7	150	6.2	5.9
Cadmium	12	NA	140	2.7	2.2	1.8	0.596
Chromium	120	37	29	7.3	74	10	37.3
Copper	160	17	7.8	11	9	29	35.7
Lead	780	16	17	20	2.5	69	35
Mercury	1.5	0.058	0.4	ND	0.77	0.19	0.174
Nickel	190	13	61	27	52	21	18
Silver	280	NA	3.1	ND	0.12	1.8	0.73[f]
Zinc	800	48	500	195	120	210	123.1
SEMI-VOLATILE ORGANIC COMPOUNDS							
PCBs	3.7	NA	ND	ND	0.014	0.18	0.0341
Total PAHs	130	NA	ND	ND	NA	13.4	1.684[f]
PESTICIDES							
DDD	0.0088	NA	0.11	ND	0.6[d]	0.0037	0.00354
Dieldrin	0.066	NA	0.17	0.015	0.056	0.0052	0.00285
Endrin Aldehyde	ND	NA	0.54	ND	0.036[e]	0.0033	0.00267[e]
Chlordane	0.006	NA	0.78	ND	0.00215	ND	0.0045

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

b: Ambient water quality criteria for the protection of aquatic organisms (USEPA 1993; USEPA 1999). Freshwater chronic criteria presented. Criterion expressed as a function of total hardness with the exception of arsenic and silver; concentrations shown correspond to hardness of 100 mg/L.

c: Threshold effects level (TEL) 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: Freshwater acute lowest observable effect level.

e: Endrin value used.

f: Freshwater TEL not available, marine TEL used.

ND: Not detected.

NA: Value not available.

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