Pease Air Force Base

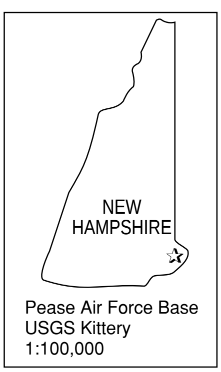
Portsmouth, New Hampshire
Region 1
NH7570024847

Site Exposure Potential

Pease Air Force Base (Pease AFB) is located on a peninsula in the Piscataqua River drainage basin near the city of Portsmouth, New Hampshire (Figure 1). The base is bordered by Great Bay to the west and Little Bay to the northwest. The Piscataqua River is less than 1 km east of the base.

Past activities at Pease AFB supported aircraft maintenance operations and generated hazardous wastes, including degreasers, solvents, paint strippers, and jet fuels. Historically, these liquid wastes were burned during fire department training exercises or hauled off site by contractors. Since 1982, jet fuel has typically been reclaimed and returned to bulk storage on-site. Solid wastes generated from housing, administration, and maintenance activities were either hauled off-base by contractors, or disposed of at six landfills and two construction waste dumps located on the base (Weston 1989).

The site is transected by numerous small streams, ditches, and storm sewers that drain radially from the base's central plateau. These surface waters drain three main areas on the base and are defined by the receiving water body: Great Bay, Little Bay, and the Piscataqua River. Peverly and McIntyre brooks



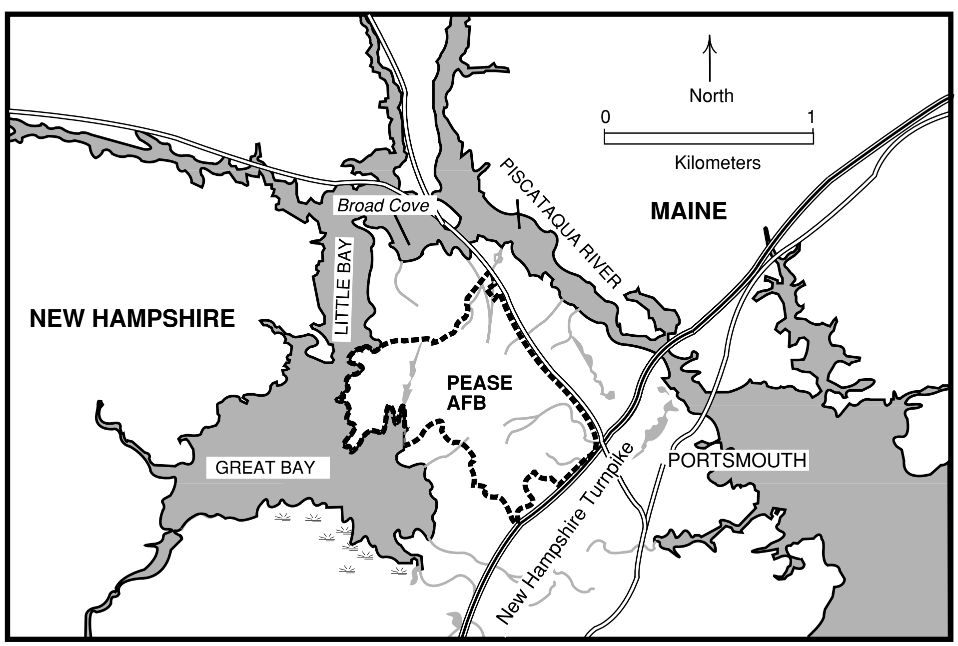


Figure 1. Pease Air Force Base, Portsmouth, New Hampshire.

Site Exposure Potential, *cont.*

drain into Great Bay. Pickering Brook and Railway Ditch enter Flagstone Brook, which discharges to Little Bay near its confluence with the Piscataqua River. Newfields and Grafton ditches and Harveys Creek enter Hodgson Brook, which flows into the North Mill Pond and, ultimately, the Piscataqua River. Pauls Brook drains directly to the Piscataqua River.

Regional groundwater hydrology is also defined by the maximum land elevation. Hydraulic low points are represented by Great Bay, Little Bay, and the Piscataqua River. Groundwater movement on the site reflects surface topography and flows towards the nearest downgradient surface water.

Based on site characteristics and historical practices, both surface water and groundwater movement represent potential pathways of contamination to NOAA resources and associated habitats.

Site-Related Contamination

Surface water, groundwater, soil, and sediment were analyzed during Stages I and II of the Installation Restoration Program (Weston 1989). Trace elements, cyanide, PAHs, DDT and its metabolites, total petroleum hydrocarbons, and some volatile organic compounds were detected in the matrices sampled. Contaminants found in surface water and groundwater that were considered a risk to NOAA resources are presented in Table 1 with applicable screening criteria (Weston 1989).

Trace elements were the major contaminants found in surface water samples. Copper, lead, mercury, nickel, and zinc concentrations exceeded their AWQC (EPA 1986) in all three major drainage areas. The highest levels of trace elements occurred in Harveys Creek and Newfields Ditch; cyanide levels were extremely high. Organic compounds were detected in few surface water samples with the exception of samples from Newfields Ditch. Concentrations of several semi-volatile organic compounds in these samples were measured at levels exceeding the lowest observed effect level. Bis(2-ethylhexyl)phthalate was also measured at high concentrations in samples from Newfields Ditch. DDT, DDD, and other pesticides were detected in surface water samples from the Little Bay and Piscataqua drainage areas at concentrations shown to be toxic in other studies.

Site-Related Contamination, *cont.*

Table 1. Maximum concentrations of major contaminants in surface water and ground-water samples from drainage areas on the site.

	Surface Water			Groundwater			Criteria
	Great Bay µg/l	Little Bay µg/l	Piscataqua River µg/l	Great Bay µg/l	Little Bay µg/l	Piscataqua River µg/l	AWQC[1] Marine µg/l
INORGANIC SUBSTANCES							
arsenic	5.4	<5	<5	180	NR	500	36
copper	<30	34	79	63	NR	NR	2.9
cyanide	<20	<20	440	NR	NR	NR	1
lead	<5	400	19	NR	NR	NR	5.6
mercury	0.3	<1	<1	0.3	<0.2	NR	0.025
nickel	29	150	220	72	45	33	8.3
zinc	110	130	180	220	100	170	86
ORGANIC COMPOUNDS							
benzene	NR	NR	2,800	NR	NR	1,100	700
ethylbenzene	NR	NR	480	1,400	NR	600	430
xylenes	NR	NR	2,600	5,500	NR	600	NA
bis(2-ethyl hexyl) phthalate	NR	NR	360	150	NR	1,300	NA
trichloro-ethylene	NR	NR	NR	NR	NR	10,000	[a]2,000*
toluene	NR	NR	4,300	NR	NR	NR	2,130*
DDD	NR	0.13	0.19	NR	NR	NR	NA
DDT	NR	0.14	<0.10	NR	NR	NR	0.001
lindane	NR	NR	0.25	NR	NR	NR	[a]0.16
chlordane	NR	NR	0.12	NR	NR	NR	0.004

1: Ambient water quality criteria for the protection of aquatic organisms. marine chronic criteria presented (EPA 1986).
a: AWQC marine acute criteria, no chronic criteria available (EPA 1986).
*: Insufficient data to develop criteria. Value presented is the Lowest Observed Effect Level (LOEL).
NR: Results not reported
NA: Criteria not available

Arsenic, copper, and mercury concentrations measured in groundwater samples were high. These substances are of concern because groundwater discharges to habitats supporting NOAA resources. Copper, lead, mercury, nickel, and zinc in surface water exceeded their respective AWQC. Ethylbenzene, xylenes, bis-(2-ethylhexyl)phthalate, and trichloroethylene were detected in groundwater at levels greater than those measured in surface water.

Contaminants of concern occurring in sediments and soils are presented together with applicable comparison values in Table 2 (Weston 1989). Cadmium, mercury, and zinc were detected in soil at concentrations exceeding background levels in U.S. soil (Lindsay 1979). Organic compounds were also detected in on-site soil samples. PAHs and other semi-volatile organic compounds were above background levels in soil samples from the Piscataqua drainage area.

Site-Related Contamination, *cont.*

Several inorganic substances, including arsenic, cadmium, mercury, nickel, and zinc, were measured in stream sediments at levels shown to be associated with deleterious biological effects (Long and Morgan 1990). Elevated concentrations of PAHs and several semi-volatile organic compounds were also found in sediment samples. Concentrations of DDT and its metabolites were high in sediment from all areas sampled.

Table 2. Maximum concentrations of contami-nants in soil and sediment from drainage areas at the site. (No results were reported for soil in Great Bay drainage).

	Soil			Sediment			
	Little Bay	Piscataqua River	Average[1] U.S. Soil	Great Bay	Little Bay	Piscataqua River	ER-L[2] Levels
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
INORGANIC SUBSTANCES							
antimony	NR	NR	1	NR	35	NR	2
arsenic	NR	NR	5	15	56	16	33
cadmium	5.2	8.7	0.06	NR	NR	<26	5
mercury	2.5	NR	0.03	NR	NR	<0.18	0.15
nickel	NR	NR	40	52	31	70	30
zinc	140	NR	50	190	120	203	120
ORGANIC COMPOUNDS							
4,4 DDT	NR	NR	ND	4.2	0.09	<1.8	0.001
4,4 DDE	NR	NR	ND	<0.05	0.12	<1.8	0.002
4,4 DDD	NR	0.02	ND	0.10	0.21	NR	0.002

1: Lindsay (1979).
2: Effective range-low; the concentration representing the lowest 10 percentile value for the data in which effects were observed or predicted in studies compiled by Long and Morgan (1990).
NR: Results not reported
ND: Not detected at the method detection limit

NOAA Trust Habitats and Species

The marine and estuarine habitats surrounding the site harbor numerous species of finfish and invertebrates (Table 3; New Hampshire Fish and Game 1981). Fifty-two species of marine finfish were identified in the Great Bay estuary by the New Hampshire Department of Fish and Game, including residents, anadromous species, and migrants. Of these, the most abundant species were Atlantic silverside, rainbow smelt, killifish, river herring, Atlantic tomcod, white perch, and smooth flounder (New Hampshire Fish and Game 1981). Great Bay is a planned National Estuarine Reserve (Fawcett personal communication 1990).

There is limited commercial fishing in the area for river herring, eel, smelt, and sea scallop. Striped bass, smelt, winter flounder, alewife, and coho salmon are important recreational fisheries. The Great Bay area also contains valuable invertebrate resources. Lobster and rock crab are harvested commer-

NOAA Trust Habitats and Species, *cont.*

cially, and soft-shell clams, mussels, and oysters are harvested in recreational fisheries. Major oyster beds are found in Great Bay, the Oyster River, the Bellamy River, and the Piscataqua River (Weston 1989).

Table 3. Species and habitat use in the Piscataqua River, Great Bay, and Little Bay.

Table available in hardcopy

References

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