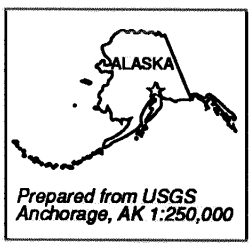
Elmendorf Air Force Base

Anchorage, Alaska
Region 10
AK8570028649

Site Exposure Potential

Elmendorf Air Force Base (AFB) occupies a 5,300-hectare site just north of Anchorage, Alaska (Figure 1). The base began operations in 1940 as Fort Richardson and Elmendorf Field, and has been known as Elmendorf AFB since 1948. Since the mid-1940s, industrial operations have resulted in the discharge and disposal of potentially hazardous substances, including waste oils, fuels, solvents, and other chemicals. The major sources of hazardous wastes on the base include industrial shops, fire training facilities, fuel storage facilities, and landfills (Black and Veatch 1989).

Spent solvents and waste oils were disposed of in storm and sanitary sewers or floor drains that discharged directly to dry wells or surface drainage ditches. Combustible chemicals, such as oils, fuels, and solvents were used as fuel for fire training drills.



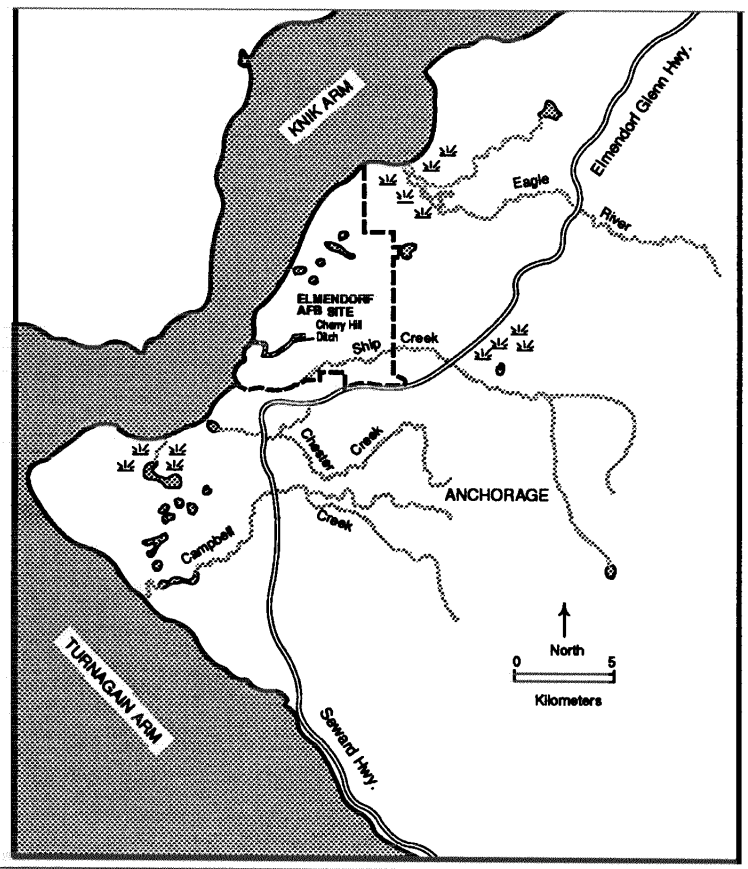


Figure 1.
Elmendorf AFB site, Anchorage, Alaska.

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Site Exposure Potential, *cont.*

Since the mid-1970s, waste liquids have been stored on the site for periodic removal and off-site disposal.

Ship Creek and Cherry Hill Ditch form the major surface drainages for the Elmendorf AFB. Ship Creek flows along the southern boundary of the base for 7 km before discharging to Knik Arm. Several on-site waste disposal operations are located near Ship Creek. Another proposed NPL site, Standard Steel, is located on Ship Creek immediately south of the base boundary. Cherry Hill Ditch flows southwest from the runway area of the base and discharges to Knik Arm. This ditch is composed primarily of surface runoff and storm drain discharge from much of the base. Occasional oily sheens and foam have been observed on water flowing from the ditch (Black and Veatch 1989).

Groundwater is extremely shallow at Elmendorf AFB, often occurring at the ground surface. Flow is generally south to southwest toward Ship Creek. The shallow aquifer and Ship Creek share a complex relationship. Ship Creek provides much of the groundwater recharge to the shallow aquifer in the mid- and upper reaches of the creek. However, in the lower reaches of Ship Creek, groundwater discharges to the creek.

The primary pathways for contaminant migration are groundwater and surface runoff. Contaminated groundwater eventually discharges to Ship Creek. Surface runoff and storm drainage patterns have not been investigated. Observations made during the Remedial Investigation suggest that the majority of the surface runoff discharges to Cherry Hill Ditch and Knik Arm. Sites near Ship Creek may discharge directly to the creek.

Site-Related Contamination

The contaminants of concern at Elmendorf AFB include arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, and several PAHs. These substances were found at elevated concentrations in the groundwater and sediment of Cherry Hill Ditch. PAHs were not widespread but moderate concentrations of several of these compounds were observed in the sediment collected at one site in Cherry Hill Ditch. Groundwater contaminated with trace elements may eventually discharge to Ship Creek at concentrations toxic to aquatic resources present in the stream. Sediments contaminated with these same elements and PAHs

Site-Related Contamination, *cont.*

observed in Cherry Hill Ditch may be transported to Knik Arm during periods of erosion (e.g., during heavy precipitation events).

Elevated concentrations of arsenic, cadmium, chromium, copper, lead, mercury, nickel, or zinc were measured in most of the groundwater samples collected (Table 1; Black and Veatch 1989). Lead and mercury concentrations exceeded screening levels established for surface waters in samples from Cherry Hill Ditch. Concentrations of most trace elements in the soil were similar to background levels established for U.S. soil (Lindsay 1979). Concentrations of trace elements in the sediment of Cherry Hill Ditch were measured at levels above the low end of the range in which effects had been observed in studies reviewed by Long and Morgan (1990).

Table 1. Maximum concentrations of major contaminants at Elmendorf AFB site compared with applicable screening levels.

	Water			Soil		Sediment	
	Ground-water µg/l	Surface Water µg/l	AWQC[1] µg/l	Soil mg/kg	Average U.S. Soil[2] mg/kg	Sediment mg/kg	ER-L[3] mg/kg
INORGANIC SUBSTANCES							
arsenic	715	17	190	31	5	70	33
cadmium	13	ND	1.1+	ND	0.06	8	5
chromium	1300	ND	11	57	100	117	80
copper	5500	10	12+	35	30	190	70
lead	222	10	3.2+	39	10	852	35
mercury	17	0.2	0.012	0.2	0.03	1.35	0.15
nickel	3300	ND	160+	39	40	75	30
zinc	3100	ND	110+	70	50	455	120
ORGANIC COMPOUNDS							
Total PAHs	ND	ND	NA	37	NA	170	NA

1: Ambient water quality criteria for the protection of aquatic life, freshwater chronic criteria presented (EPA 1986).
2: Lindsay (1979).
3: 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).
+ Hardness-dependent criteria; 100 mg/l $CaCO_3$ used.
ND: Not detected at method detection limit; detection limit not reported
NA: Screening level not available

PAHs were the primary organic compounds of concern observed at Elmendorf AFB. PAHs were generally not found in groundwater at the base, but naphthalene (280 µg/l) and 2-methylnaphthalene (500 µg/l) were observed in low concentrations in one monitoring well. Low concentrations (<10 mg/kg) of phenanthrene, benzo(a)anthracene, benzo(a)pyrene, and benzo(k)fluoranthene

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Site-Related Contamination, *cont.*

were measured in the soil taken at several sites. PAHs were observed in one sediment sample from Cherry Hill Ditch at high concentrations.

NOAA Trust Habitats and Species

Ship Creek and Knik Arm in upper Cook Inlet form the primary habitats of concern to NOAA. Intermittent pockets of riparian wetlands are found along Ship Creek from the mouth of the creek to the site (Brna personal communication 1990).

Ship Creek is a spawning ground and migratory corridor for anadromous Dolly Varden and adult chinook, coho, pink, sockeye, and chum salmon. Chinook and coho salmon use the creek for spawning and early juvenile rearing. Knik Arm is a juvenile rearing area. Anadromous Dolly Varden may spawn in the vicinity of the site (Wiedmer personal communication 1990).

Prior to 1989, the Alaska Department of Health and Human Services posted signs along Ship Creek stating, "The municipality of Anchorage recommends against the eating of fish taken from these waters because of chemical contamination of stream sediment." The signs were removed in 1989 for administrative reasons.

Cook Inlet is one of eight recognized wintering areas worldwide for beluga whales. The Cook Inlet population is resident year-round, and may contain 300 to 500 whales. No comprehensive surveys have been done, so these numbers may be conservative (Morris 1988). Belugas are known to concentrate at the mouth of Ship Creek and feed on anadromous fish there from mid-May through September (Smith personal communication 1990).

References

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