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Fort Eustis

Newport News, Virginia
CERCLIS #VA6210020321

Site Exposure Potential

Fort Eustis is located in the city of Newport News in southeastern Virginia. Fort Eustis is bounded to the west and south by the James River and to the east by the Warwick River, a tributary of the James River. The James River flows into Chesapeake Bay about 35 km from the site (Figure 1).

The 3,350-hectare facility is the transportation training center for the U.S. Army. Investigations of the facility have focused on eight RI sites (Figure 2): the Fire Training Area (Site 11B), the Central Heating Plant (Site 9), the Oil/Sludge Holding Pond (Site 11C), Browns Lake (Site 16), Baileys Creek (Site 17A - PCB Area), Baileys Creek (Site 17B - Lead Area), Milstead Island Creek (Site 18), and Felker Army Airfield Fuel Farm (Site FA). Contamination at these sites may have resulted from past fire training activities, spillage or release of fuel oil, disposal of contaminated dredge spoil, leakage from underground and above-ground storage tanks, stormwater runoff from vehicle maintenance facilities, aviation fueling activities, and lead contamination from a skeet range (Montgomery Watson 1994). See Table 1 for a summary of waste disposal and removal actions at the RI sites.

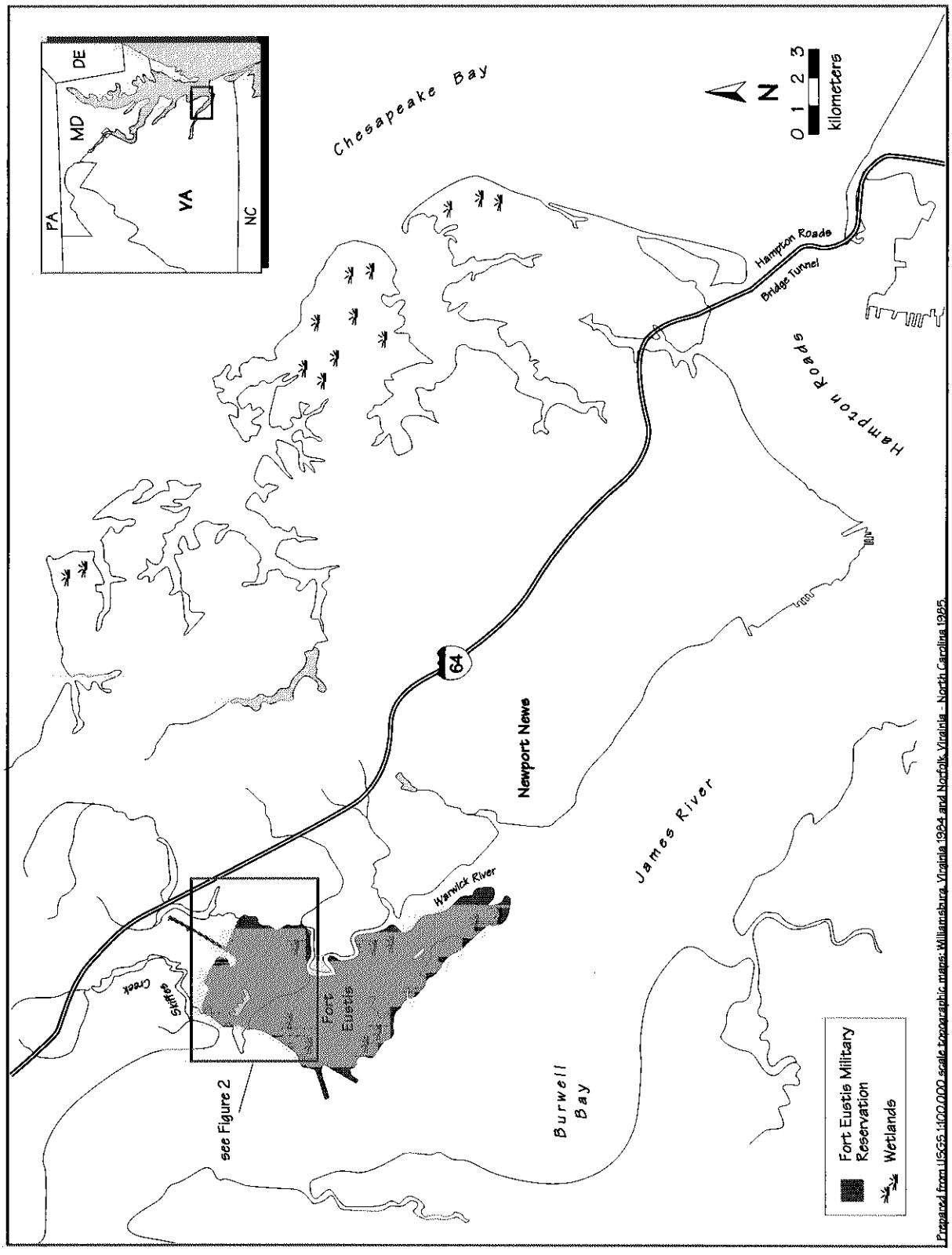

Figure 1. Location of the Fort Eustis Military Reservation in Newport News, Virginia.

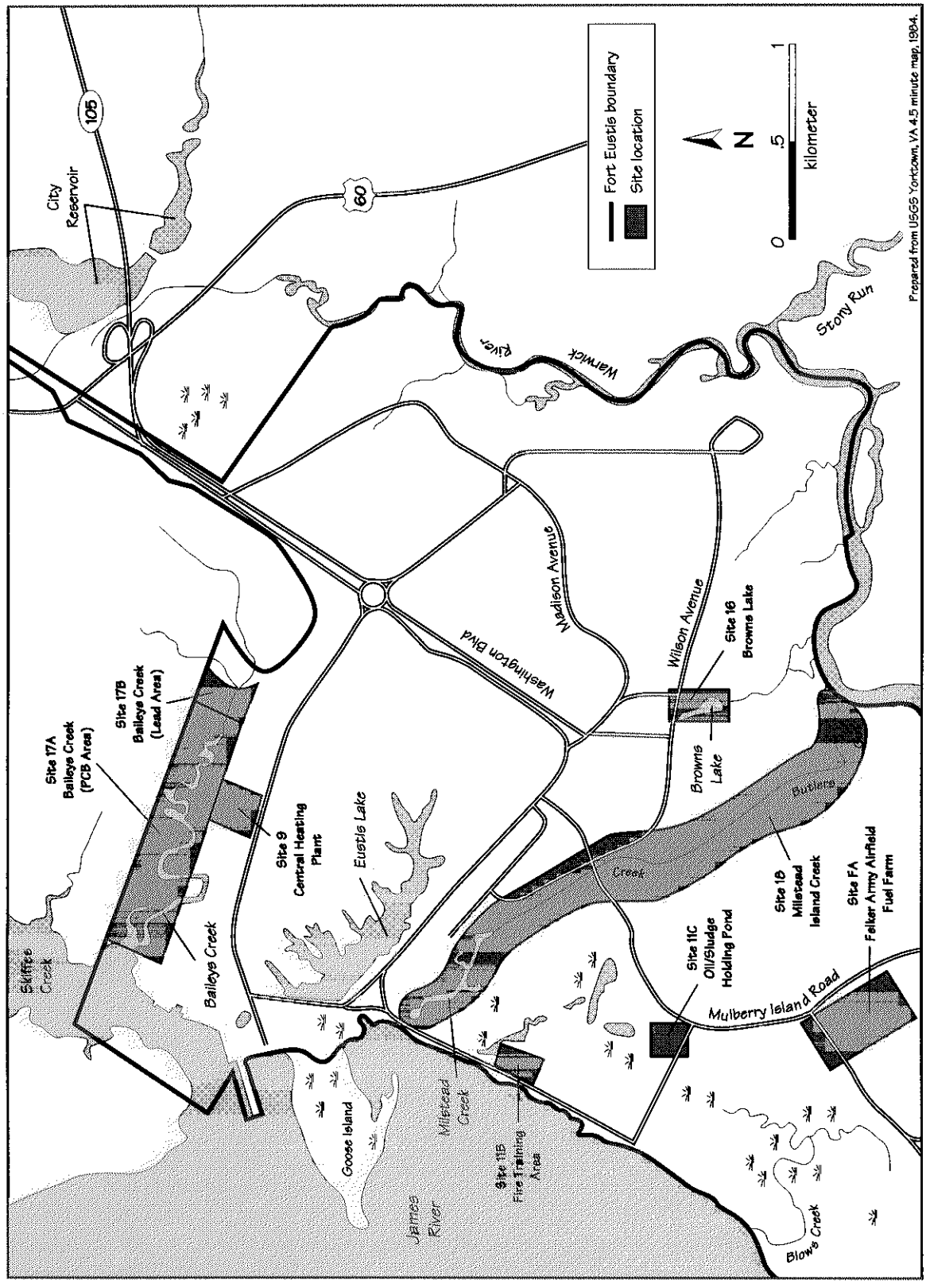

Figure 2. Location of Remedial Investigation sites at Fort Eustis.

Surface-water runoff and groundwater discharge are the potential pathways of contaminant transport from the site to NOAA resources and associated habitats. Surface drainage within the area of Fort Eustis that contains the sites of concern is controlled and directed to the James or Warwick rivers by creeks, storm sewers, or open ditches. The major waterways within the area of concern are Baileys Creek, Milstead Creek, Island Creek, and Blows Creek. Baileys Creek is tidally influenced and flows in a westerly direction and empties into Skiffes Creek, a James River tributary.

The geology of the Fort Eustis area is characterized by Virginia Coastal Plain sediments more than 550 m thick. These generally consist of unconsolidated, interbedded sands and clays with minor occurrences of gravel and shell fragments, all underlain by crystalline basement rocks. The uppermost aquifer in the area, the Columbia Aquifer, is about 9 m thick and consists primarily of silty to clayey fine sand, interbedded with lenses of silty clay, fine sand, and peat. Surficial formations in the region are mostly fluvial-estuarine deposits. Groundwater flow varies depending on the site of concern, though most flow is directed either to the James or Warwick rivers. The water table at several of the sites is

Table 1. Summary of Waste/Removal Actions at Remedial Investigation sites at Fort Eustis.

Site	Types of Waste/Removal Actions
Central Heating Plant (Site 9)	An estimated 23,000 to 30,000 liters of No. 4 fuel oil were released in 1984. Visibly stained soil was removed in a cleanup action, but the amount of soil removed is not known. Other fuel releases, including one in 1990, have been reported. Visibly stained soil was also removed after the 1990 release.
Fire Training Area (Site 11B)	Fire training activities were performed monthly at the site until 1980. These activities reportedly involved pouring 150 to 190 liters of JP-4 jet fuel into an unlined pit and igniting the fuel. The initiation date was not known.
Oil/Sludge Holding Pond (Site 11C)	In 1979 a mixture of oil, digested sewage, and fuel residues was placed in the holding pond and later covered with 3 to 3.5 m of fill.
Browns Lake (Site 16)	The lake was constructed in the 1950s as a holding pond to prevent contaminant releases to the Warwick River. Storm water from vehicle maintenance facilities and a locomotive shop north of Browns Lake discharges to a stream that leads directly to the lake.
Baileys Creek (Site 17A; PCB Area)	The 1990 RI identified Site 9 as the probable source of PCB contamination in Baileys Creek at site 17A.
Baileys Creek (Site 17B; Lead Area)	This site is near a skeet range. High lead concentrations are probably from lead shot.
Milstead Island Creek (Site 18)	This site was a natural waterway until it was dredged by the U.S. Army Corps of Engineers and Fort Eustis personnel to construct a drainage canal between the James and Warwick rivers. Contaminant sources to the creek include a sewage treatment plant and several warehouses.
Felker Army Airfield Fuel Farm (Site FA)	Two 114,000-liter, aboveground fuel storage tanks are on the property. During a remedial action in 1993 and 1994, some contaminated soil was removed and replaced with clean soil.

tidally influenced. Information on the depth to groundwater was available for only one of the RI sites, the Fire Training Area (Site 11B), where the water table was encountered about 1.2 m from the surface (Montgomery Watson 1994).

NOAA Trust Habitats and Species

Habitats of concern to NOAA are the surface waters, wetlands, and tidal creeks associated with the Warwick and James rivers. The Warwick River meanders approximately 10 km from the site before joining the James River. Salinities in the James River near the site range from 5 to 15 ppt and fluctuate throughout the year, depending on rainfall, saltwater intrusion, and urban runoff (Norman personal communication 1992). James River substrate is mainly silt and sand (Eades personal communication 1992), while Warwick River substrate is primarily mud (Lancaster personal communication 1992). Little or no submerged aquatic vegetation is present in the James River contiguous to the military reserve (Nowak personal communication 1992). The site is approximately 35 km upstream from the Chesapeake Bay.

The James and Warwick rivers support diverse, abundant populations of NOAA trust resources (Table 2; Eades personal communication 1992). Numerous species may migrate close to the site and reside for extended periods during sensitive life stages. The shortnose sturgeon, a federally listed endangered species, and the state-protected Atlantic sturgeon historically used this reach of the James River as a migratory corridor, but neither species has been seen in recent years (Travelstead personal communication 1992). Six additional species of anadromous fish are known to use the James River as a migratory corridor: alewife, American shad, blueback herring, hickory shad, striped bass, and white perch. Significant numbers of hogchoker, weakfish, and oyster toadfish also reside in the James River. In addition, the catadromous American eel is found throughout the James River drainage (Eades personal communication 1992).

Limited data were available regarding resource useof the creeks within the site, although tidal exchange and proximity of the creeks to the James and Warwick rivers suggest that there are NOAA trust resources within site boundaries. Species likely to use the creeks include weakfish, silversides, bay anchovy, American eel, banded killifish, and mummichog. All six of the anadromous species present in the James River may also use the aquatic habitats near the site as adult forage and nursery habitat. Although stocks have substantially diminished in recent years, eastern oyster, hard-shell clam, and soft-shell clam were historically abundant in this reach of the James River (Eades personal communication 1992). Hard- and soft-shell clam still use the Warwick River. Blue crab is abundant throughout the Warwick River drainage (Lancaster personal communication 1992).

Table 2. Major species that use the James River near Fort Eustis.

Species		Habitat			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm. Fishery	Recr. Fishery
ANADROMOUS /CATADROMOUS SPECIES						
Atlantic sturgeon [1,2]	*Acipenser oxyrhynchus*			♦		
Shortnose sturgeon [1,3]	*Acipenser brevirostrum*			♦		
Blueback herring	*Alosa aestivalis*		♦	♦	♦	
American shad	*Alosa sapidissima*		♦	♦	♦	
Hickory shad	*Alosa mediocris*		♦	♦		
Alewife	*Alosa pseudoharengus*		♦	♦	♦	
American eel	*Anguilla rostrata*		♦	♦	♦	
White perch	*Morone americana*		♦	♦		♦
Striped bass	*Morone saxatilis*		♦	♦	♦	♦
ESTUARINE /MARINE FISH						
Bay anchovy	*Anchoa mitchilli*	♦	♦	♦		
Atlantic manhaden	*Brevoortia tyrannus*		♦	♦		
Weakfish	*Cynoscion regalis*	♦	♦	♦		♦
Gizzard shad	*Dorosoma cepedianum*		♦	♦		
Banded killifish	*Fundulus diaphanus*	♦	♦	♦		
Mummichog	*Fundulus heteroclitus*	♦	♦	♦		
Spot	*Leiostomus xanthurus*		♦	♦	♦	♦
Silversides	*Menidia spp.*		♦	♦		
Atlantic croaker	*Micropongonias undulatus*		♦	♦	♦	♦
Oyster toadfish	*Opsanus tau*	♦	♦	♦		
Summer flounder	*Paralichthys dentatus*	♦	♦	♦		♦
Bluefish	*Pomatomus saltatrix*		♦	♦		♦
Northern puffer	*Sphoeroides maculatus*		♦	♦		
Hogchoker	*Trinectes maculatus*	♦	♦	♦		
INVERTEBRATE SPECIES						
Blue crab	*Callinectes sapidus*	♦	♦	♦		♦
Hardshell clam [4]	*Mercenaria mercenaria*	♦	♦	♦		♦
Softshell clam [4]	*Mya arenaria*	♦	♦	♦		♦

1: Rare and infrequent in the James River. Species historically used the area as a migratory corridor.
2: State-protected species.
3: Federally protected species.
4: Harvesting restrictions apply for the capture of shellfish originating from surface waters surrounding the site.

There are numerous commercial and recreational fisheries in the James River. A moratorium on striped bass fishing has been lifted, allowing an annual, six-week recreational and commercial season in the James River. Blue crab are intensively fished both recreationally and commercially. American shad are commercially harvested in the main stem of the James River near the site. A smaller commercial effort is directed toward spot and Atlantic croaker. Recreational fishing is popular in the Warwick and James rivers. The Warwick River is actively fished during the striped bass season. There is a popular public boat landing and fishing pier approximately 5 km

upstream from the mouth of the Warwick River. Sport fishing efforts in the lower reaches of the Warwick River also are directed toward Atlantic croaker, summer flounder, spot, and weakfish (Lancaster personal communication 1992). Fishing from the James River Bridge is also popular (Eades personal communication 1992).

Since the 1970s, kepone contamination has been responsible for a consumption advisory for all fish from the James River and its tributarie. The advisory extends from the fall line at Richmond, approximately 140 km upstream from Fort Eustis, to the Hampton Norfolk Bridge tunnel (Lanham-Ridley personal communication 1995). Migrating fish, such as spot and croaker, which come in from Chesapeake Bay and the Atlantic Ocean, are known to be harvested and consumed by local fishermen. Shellfish have been included in the consumption advisory in the past, but were removed in recent years (Perry personal communication 1995).

The State of Virginia requires a statutory shellfishing buffer zone around all sewage outfalls. Consequently, shellfishing in the James and Warwick rivers near the site is restricted due to the sewage treatment plant at Fort Eustis (Wright personal communication 1992). The entire western boundary of the site is included in the restricted area (Virginia Department of Health 1993). Relaying of shellfish from this area for depuration is permitted when water temperatures exceed 50°F (Wright personal communication 1992).

Site-Related Contamination

Trace elements, PCBs, and pesticides are the primary contaminants of concern to NOAA. Elevated concentrations of these contaminants were found in on-site soil, surface water, and sediments (Montgomery Watson 1994). Table 3 presents the maximum concentrations of trace elements, PCBs, and pesticides detected in soil, surface water, groundwater, and sediment.

Maximum concentrations of trace elements detected in on-site soils exceeded average concentrations in U.S. soils, particularly at the Oil/Sludge Holding Pond (Site 11C) and the Central Heating Plant (Site 9). Lead was detected in groundwater at the Oil/Sludge Holding Pond at a dissolved concentration several orders of magnitude above its freshwater AWQC. Zinc was detected in surface water of a wetland next to the Fire Training Area (Site 11B) at a concentration that exceeded its AWQC. Lead was detected in sediment from Baileys Creek near Site 17B at 94,000 mg/kg, far exceeding its ERM screening guideline of 220 mg/kg (Long and MacDonald 1992; Montgomery Watson 1994).

PCBs were detected in soils at the Central Heating Plant (Site 9) and DDD was detected in soils at the Fire Training Area (Site 11B). No screening guidelines are available for these contaminants in soils. No pesticides were detected in surface water and no pesticides or PCBs were detected in groundwater at Fort Eustis. However, pesticides were detected above their respective screening

Table 3. Maximum concentrations of selected contaminants detected at Fort Eustis.

Contaminants	Soil (mg/kg)		Water (µg/l)			Sediment (mg/kg)		
	On-Site	Avg. U.S.[1]	Surface Water	Ground-water	AWQC[2]	Sediment	ERL[3]	ERM[4]
Trace Elements								
Arsenic	30	5	<10	50	190	38	8.2	70
Cadmium	19	0.06	<50	<10	1.1+	8.4	1.2	9.6
Chromium	60	100	<10	70	NA	60	81	370
Copper	510	30	<30	<30	12+	110	34	270
Lead	120	10	45	10	3.2+	94,000	46.7	218
Mercury	10	0.03	<2.0	0.0	0.012	0.39	0.15	0.71
Nickel	90	40	<40	<40	160+	25	20.9	51.6
Silver	170	0.05	<10	<10	0.12	1.3	1.0	3.7
Zinc	1,800	50	360	800	110+	440	150	410
Pesticides/PCBs								
DDD	0.02	N/A	ND	ND	NA	1.3	NA	NA
DDE	<0.004	N/A	ND	ND	NA	0.01	0.0022	0.027
DDT	<0.004	N/A	ND	ND	0.001	0.6	0.0016t	0.46t
Aroclor-1260	2.0	N/A	6.4	ND	NA	220	22.7*	180*

1: EPA (1983).
2: Ambient water quality criteria for the protection of aquatic organisms. Freshwater chronic criteria presented (EPA 1993).
3: Effects range-low (Long and MacDonald 1992).
4: Effects range-median (Long and MacDonald 1992).

NA: Not available.
ND: Not detected; detection limits not available.
N/A: Not applicable.
+: Hardness -dependent criteria (100 mg/l $CaCO_3$ used).
t: DDT total.
*: total PCBs

guidelines in sediments collected from Browns Lake (Site 16). PCBs were found at 220 mg/kg Bailey's Creek sediments near Site 17A. PCBs were also found in Bailey's Creek surface water near Site 17A (Montgomery Watson 1994).

Summary

High concentrations of PCBs and lead have been detected in Baileys Creek near Ft. Eustis Sites 17A and 17B, respectively. NOAA trust species that use Baileys Creek and the nearby wetlands could be at substantial risk from these contaminants. The degree to which these contaminants

have migrated from Baileys Creek to the James River has not been fully investigated. NOAA trust species that use tidal flat areas in the James River near Fort Eustis may also be at risk as a result of contaminant migration from Sites 11B and 11C.

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