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Jackson Park Housing Complex

Bremerton, Washington
CERCLIS #WA3170090044

Site Exposure Potential

Jackson Park Housing Complex occupies 120 hectares approximately three km northwest of Bremerton, Washington (Figure 1). The site is bordered on the south by forest, on the west by State Highway 3, on the north by the community of Erlands Point, and on the east by Ostrich Bay. Ostrich Bay is in Dyes Inlet, an embayment of central Puget Sound. Dyes Inlet drains into Sinclair Inlet via the Port Washington Narrows and flows approximately 11 km before entering the main Puget Sound basin. The site includes housing, community services, and related infrastructures such as paved streets, sewer systems, and other utilities. It is partially wooded with isolated areas of dense vegetation in the northern and southern portions (URS Consultants [URS] 1992).

The facility was established in 1904 as the Naval Magazine Puget Sound and operated as an ammunition storage facility from 1908 to 1947. In later years it also served as a location for ordnance demilitarization. During development of nearby Naval Ammunition Depot Bangor and Naval Torpedo Station Keyport in 1948, the Jackson Park facility was reauthorized as Bremerton Annex. In 1959, it was decommissioned and placed on caretaker status (URS 1992).

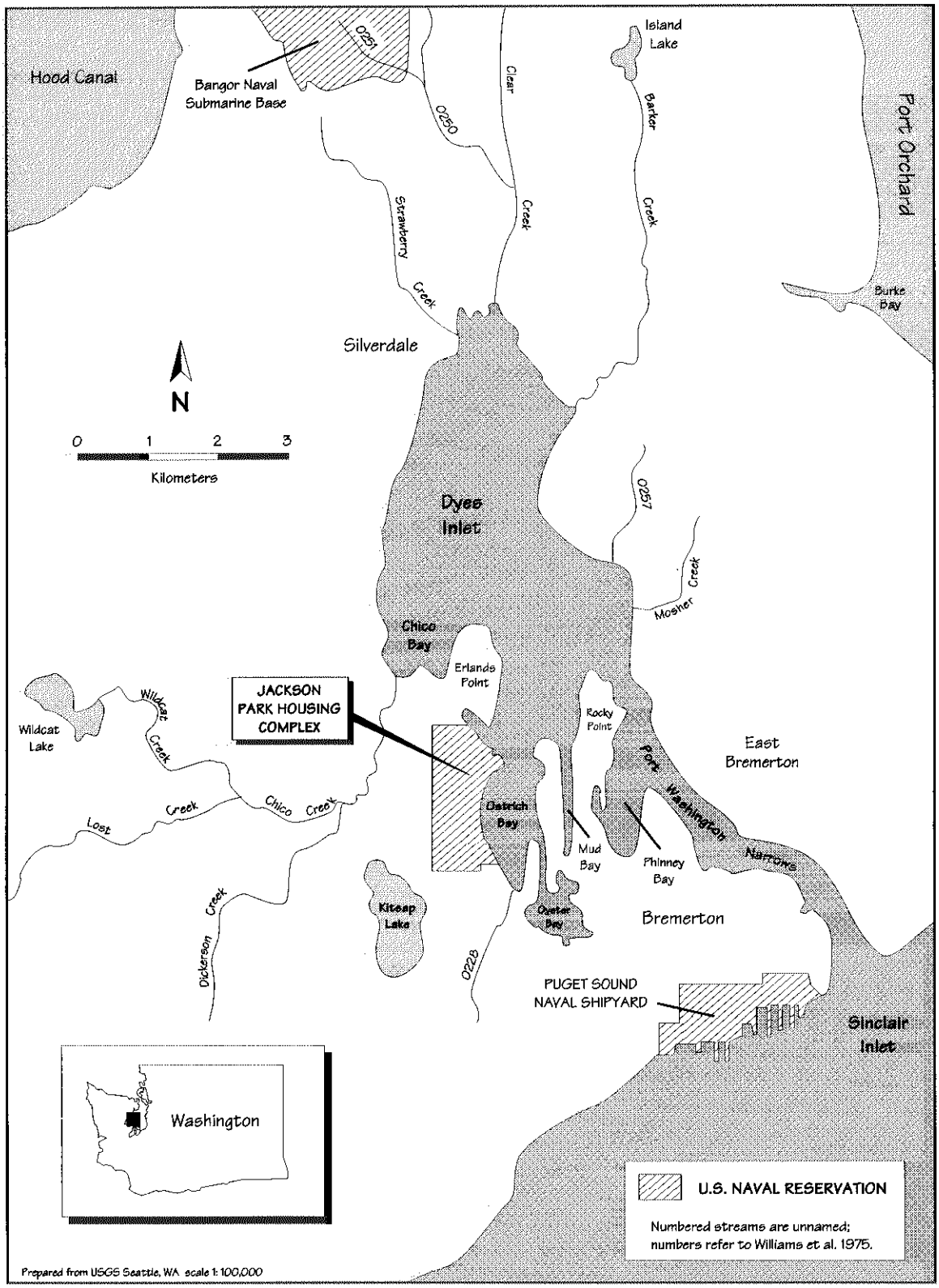

Figure 1. Site location of Jackson Park Housing Complex showing key waterways.

Past activities at the site included ordnance production, demilling, and storage, as well as disposal of ordnance dusts and liquid wastes. During World War II, dry ordnance wastes were collected and flash-burned in an area at Elwood Point near the present baseball field (Figure 2). During this time a permanent burn structure replaced the former burn area and more than 900 kg of ordnance compounds were burned monthly (URS 1992). Both ordnance and non-ordnance wastes were landfilled along the shoreline north of Elwood Point from 1910 to 1959. Composition of the non-ordnance wastes is unknown. Liquid wastes were collected and transported to a recycling system at one of the buildings formerly located between Pier 2 and Elwood Point. Wastewater from the recycling plant was collected periodically and disposed off-site. Ordnance residues were washed into building floor drains that discharged directly into Ostrich Bay (URS 1992).

Site investigations conducted in 1992 included soil, groundwater, surface water, sediments, and crab and bivalve tissue sampling. Benthic community assessments were also performed (URS 1992).

Surface-water runoff and groundwater are the primary pathways for contaminant transport to Ostrich Bay. A drainage system connected to floor drains in buildings that have since been demolished is of secondary concern. Site topography slopes toward the bay with elevations ranging from 60 m to sea level. Although the shoreline is fairly level, there are steep grades in the south, west, and central areas. Two unnamed tributaries flow east across the southeast tip of the site, but are diverted into stormwater drains before reaching Ostrich Bay. Overland runoff could also flow toward the bay, although no direct pathways are evident (Starkes personal communication 1992). Average precipitation is 120 cm each year (URS 1992).

Groundwater near the site is in a surficial aquifer 7 m above sea level and is tidally influenced. Groundwater is estimated to flow eastward at 0.06 to 0.72 cm per day. Discharge of groundwater has been observed at the shoreline in several locations south of Elwood Point (Starkes personal communication 1992).

In the past, the ordnance buildings' floor drain systems were a direct pathway for waste ordnance transport. Where still intact, this system may provide continuing pathways for surface-water runoff and groundwater transport to the bay. A storm drain system also collects stormwater runoff from paved areas. The complete configuration and extent of the floor drains and the storm water systems are unknown. Approximately 23 tile or concrete outfalls discharge directly into Ostrich Bay (URS 1992).

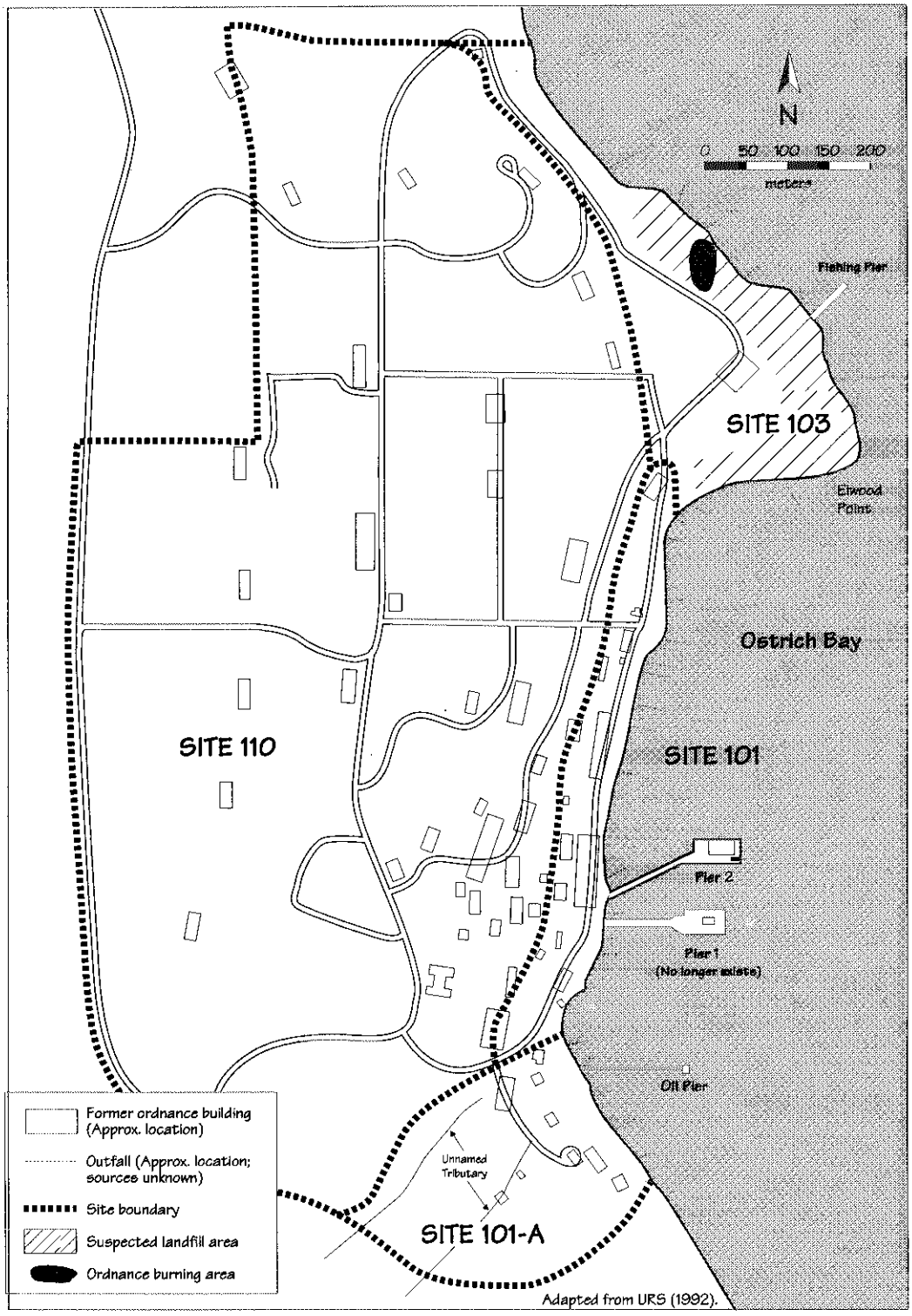

Figure 2. Location of former ordnance buildings at Jackson Park Housing Complex, Bremerton, Washington.

NOAA Trust Habitats and Species

The habitats of concern to NOAA are the nearshore water and sediment of Dyes Inlet and Ostrich Bay. Dyes Inlet is relatively shallow, averaging 13 to 22 m deep, and is surrounded by approximately 43.5 km of shoreline. The substrate is predominantly mud, with areas of mixed sediments (sand, gravel, and mud) along the eastern shore. Salinities range from 24 to 31 ppt and surface water is oxygen-sufficient (average 7.9 mg/l). However, water quality for the inlet is below average because of industrial discharges, non-point source runoff, and high organic inputs from septic systems (Melvin personal communication 1991). Wetland areas within Dyes Inlet are classified primarily as estuarine open water rimmed by narrow fringes of intertidal emergent marsh, estuarine-emergent beach/bar, and estuarine intertidal mudflats (U.S. Fish and Wildlife Service 1980). These wetlands are excellent habitat for fish and invertebrates (Williams et al. 1975).

Dyes Inlet supports diverse, abundant populations of NOAA trust resources near the site (Table 1; U.S. Fish and Wildlife Service 1981; Freymond personal communication 1991; Fyfe personal communication 1991; Washington Department of Fisheries 1991; Zichke personal communications 1991 and 1992). Species of special interest to NOAA are chinook, chum, and coho salmon, as well as steelhead and cutthroat trout. Salmon production in Dyes Inlet is outstanding in spite of the relatively small number of total stream kilometers within the drainage basin (Williams et al. 1975; Zichke personal communication 1992). Dyes Inlet is also excellent bivalve habitat (Fyfe personal communication 1991).

Salmonids use Dyes Inlet as a migratory corridor, a nursery for juveniles, and as a forage area for adults. In general, the stream habitats surrounding Dyes Inlet are highly favored as spawning grounds for salmonids (Williams et al. 1975; Zichke personal communication 1992). The most important spawning habitats include Chico, Clear, Barker, and Mosher creeks. Chico Creek, the largest stream draining into Dyes Inlet, is approximately 4 km north of the site, and supports runs of wild coho and chum salmon, winter steelhead, and cutthroat trout. Chum salmon is the most abundant and widely distributed anadromous species in the area. Cutthroat trout and steelhead are less abundant than the other salmonids.

Several estuarine fish species use Dyes Inlet for spawning, nursery, and adult forage habitat (U.S. Fish and Wildlife Service 1981). Surf smelt spawn over sand/gravel beach bars contiguous to the shoreline of the site (PSWQA 1992). Pacific herring spawn over shallow intertidal beds in Dyes Inlet, approximately 2 km north of the site, and rear their young in surface water near the site (Zichke personal communication 1991; PSWQA 1992). Many other fish species use Dyes Inlet for seasonal nursery and adult forage habitat (Zichke personal communication 1992). The broad intertidal flats and bars of Dyes Inlet also provide excellent habitat for molluscs.

Table 1. NOAA trust resources that use Dyes Inlet, Washington.

Species		Habitat			Fisheries	
Common Name	Scientific Name	Spawning Ground	Nursery Ground	Adult Forage	Comm. Fishery	Recr. Fishery
ANADROMOUS FISH						
Cutthroat trout	*Oncorhynchus clarki*	♦	♦	♦		♦
Steelhead trout	*Oncorhynchus mykiss*	♦	♦	♦		♦
Chum salmon	*Oncorhynchus keta*	♦	♦	♦	♦	♦
Coho salmon	*Oncorhynchus kisutch*	♦	♦	♦	♦	♦
Chinook salmon	*Oncorhynchus tshawytscha*	♦	♦	♦	♦	♦
MARINE FISH						
Sablefish	*Anoplopoma fimbria*			♦	♦	♦
Arrow goby	*Clevelandia ios*	♦	♦	♦		
Pacific herring	*Clupea harengus pallasi*		♦	♦	♦	♦
Shiner perch	*Cymatogaster aggregata*		♦	♦	♦	♦
Striped sea perch	*Embiotoca lateralis*		♦	♦	♦	♦
Buffalo sculpin	*Enophrys bison*		♦	♦		
Pacific cod	*Gadus macrocephalus*		♦		♦	♦
3-spine stickleback	*Gasterosteus aculeatus*	♦	♦	♦		
Silver smelt	*Hypomesus pretiosus*	♦	♦	♦	♦	♦
Rock sole	*Lepidopsetta bilineata*		♦	♦	♦	♦
Pacific staghorn sculpin	*Leptocottus armatus*		♦	♦		
Pacific hake	*Merluccius productus*			♦	♦	♦
Dover sole	*Microstomus pacificus*		♦	♦	♦	♦
Ling cod	*Ophidon elongatus*			♦	♦	♦
English sole	*Parophyrs vetulus*		♦	♦	♦	♦
Starry flounder	*Platichthys stellatus*		♦	♦	♦	♦
Sand sole	*Psettichthys melanostictus*		♦	♦	♦	♦
Cabezon	*Scorpaenichthys marmoratus*		♦	♦		
Rockfish	*Sebastes spp.*		♦	♦		♦
Pile perch	*Rhacochilus vacca*		♦	♦	♦	♦
INVERTEBRATE SPECIES[AB]						
Dungeness crab	*Cancer magister*		♦	♦		
Red rock crab	*Cancer productus*		♦	♦		
Horse clam	*Clinocardium nuttali*	♦	♦	♦		
Pacific oyster	*Crassostrea gigas*	♦	♦	♦		
Kumamoto oyster	*Crassostrea gigas kumamoto*	♦	♦	♦		
Pacific coast squid	*Loligo opalescens*			♦		
Sea cucumber	*Parastichopus californicus*	♦	♦	♦		
Littleneck clam	*Protothaca staminea*	♦	♦	♦		
Kelp crab	*Pugettia gracilis*		♦	♦		
Butter clam	*Saxidomus giganteus*	♦	♦	♦		
Manila clam	*Venerupis japonica*	♦	♦	♦		

A: There is no commercial harvest of invertebrates in Dyes Inlet because of fecal coliform contamination.
B: Advisory against recreational harvest of shellfish.

Commercial fisheries in Dyes Inlet are limited. Although there were commercial salmon fisheries in Dyes Inlet in the past, none have been scheduled for a number of years. The Suquamish Tribe schedules fall chum harvest in Port Orchard waters, which includes Dyes Inlet. Dyes Inlet also supports native and non-native fisheries for a variety of bottomfish species. Because of resource limitations, however, there has been little commercial harvesting of bottomfish by either fishing group (Zichke personal communication 1992). Sportfishing is said to be light, but quantitative catch data were unavailable. Invertebrate species, including oysters, manila clams, and sea cucumbers, were extensively harvested before Dyes Inlet was closed to shellfishing (Zichke personal communication 1995). In 1968 the Bremerton-Kitsap County Health District issued a health advisory against harvest of shellfish because of potential contamination by fecal coliform bacteria. There is also concern about trace elements and other toxic substances, but such contamination has not been adequately addressed (Washington State Department of Ecology 1991). The Suquamish Tribe also recommends against harvesting shellfish for subsistence. There is also an advisory against eating bottomfish harvested along the western shoreline of Ostrich Bay (Jones personal communication 1993). Signs posted by order of the Commander of Puget Sound Naval Shipyard prohibit the harvest of shellfish because of potential accumulations of toxic chemicals (Starkes personal communication 1992).

Site-Related Contamination

The primary contaminants of concern to NOAA are ordnance compounds and their precursors and degradation products (hereafter referred to collectively as "ordnance compounds"). These compounds include nitrobenzene; 1,3-dinitrobenzene; 1,3,5-trinitrobenzene; 3,3'-dichlorobenzidine; 2,4-dinitrotoluene; 2,6-dinitrotoluene; 2,4,6-trinitrotoluene (TNT); picric acid, trinitrophenylmethylnitramine (Tetryl); hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX); and propylene glycol dinitrate (Otto fuel). Trace elements are of secondary concern.

During a 1991-92 RI/FS, groundwater, surface water, soil, sediment, and crab and bivalve tissues were sampled at the site and nearby in Ostrich Bay. Crab and bivalve tissues and sediment samples from Chico Bay in Dyes Inlet and Semiahmoo Bay in northern Puget Sound were collected as reference samples. Only concentrations of contaminants that exceeded screening levels identified in the RI/FS were reported (URS 1992).

To identify substances that might pose a threat to resources of concern to NOAA, the concentrations of contaminants in water samples were compared to marine AWQC for the protection of aquatic organisms for those substances for which such criteria have been developed (U.S. EPA 1993). Concentrations of contaminants in sediments were compared to ERL and ERM guidelines (Long and MacDonald 1992).

Ordnance compounds were present in all media tested (Table 2). Most of the soil contamination was observed at Sites 101 and 101A. More ordnance compounds were detected in surface water offshore of the site and at higher concentrations than were detected in groundwater. Many of the ordnance compounds were also detected in sediments offshore of the site. However, the concentrations of some of these compounds were similar or higher in samples from the reference areas. Ordnance compounds were detected in bivalve and crab tissue samples offshore of the site

Table 2. Concentrations of contaminants of concern in soil, sediment, groundwater, and surface water near Jackson Park Housing Complex (URS 1992).

Contaminants	Site Soil (mg/kg)	Site Sediment (mg/kg)	ERL[a] (mg/kg)	ERM[a] (mg/kg)	Site Groundwater (µg/l)	Surface Water (µg/l)	AWQC[b] Marine chronic (µg/l)
INORGANIC SUBSTANCES							
Trace Elements							
Antimony	ND	26,000	NA	NA	ND	ND	500/p
Arsenic	ND	47	8.2	70	ND	ND	36
Cadmium	ND	16	1.2	9.6	ND	ND	9.3
Chromium	ND	110	81	370	ND	ND	50
Lead	ND	3,600	46.7	218	ND	ND	8.5
Mercury	ND	0.91	0.15	0.71	ND	ND	0.025
Nickel	ND	85	20.9	51.6	ND	ND	8.3
Silver	ND	9.5	1	3.7	ND	ND	2.3
Zinc	ND	230	150	410	ND	ND	86
Cyanide	ND	5.1	NA	NA	ND	ND	1.0+
ORGANIC COMPOUNDS							
Bis(2-ethylhexyl)phthalate[c]		170[c]	NA	NA	ND	ND	NA
Aroclor 1254	1.7	ND	NA	NA	ND	ND	NA
Ordnance Compounds							
Nitrobenzene	0.16	ND	NA	NA	0.29	0.3	6,680+
1,3-Dinitrobenzene	ND	0.051	NA	NA	ND	ND	NA
1,3,5-Trinitrobenzene	ND	0.49	NA	NA	0.13	0.082	NA
2,4-Dinitrotoluene	0.082	ND	NA	NA	0.049	23	370*
2,6-Dinitrotoluene	0.033	ND	NA	NA	ND	0.01	NA
2,4,6-Trinitrotoluene	0.04	0.055	NA	NA	ND	ND	NA
RDX	0.035	ND	NA	NA	ND	0.32	NA
Picric acid	ND	0.92	NA	NA	ND	ND	NA
Tetryl	ND	0.99	NA	NA	ND	2.53	NA
Otto fuel	ND	ND	NA	NA	ND	ND	NA

a: Effects range-low and Effects range-median (Long and MacDonald 1992).
b: Ambient water quality criteria (U.S. EPA 1993).
c: Concentration normalized to organic carbon and expressed as mg/kg organic carbon.
NA: Not available.
ND: Not detected or not detected above screening levels (URS 1992).
/p: Value is proposed criterion.
+: Value is marine acute criterion.
*: Value is Lowest Observed Effects Level (LOEL).

at concentrations that were similar to those observed at the reference stations (URS 1992).

Only concentrations of trace elements in on-site soils that exceeded Department of Defense screening guidelines were reported (URS 1992). Raw data reports were not available. Therefore, no determination could be made whether soil is a potential source of trace element contamination that could injure trustee resources. However, activities at other ordnance-production facilities have resulted in trace element contamination (Shineldecker 1992). Concentrations of trace elements in surface water were lower than applicable AWQC guidelines. However, the concentrations of most of the trace elements in the sediments of Ostrich Bay exceeded ERL guidelines (Table 2). Cadmium, lead, mercury, nickel, and silver concentrations also exceeded ERM guidelines but similarly high concentrations were observed in the sediments from reference areas.

Summary

Past activities at Jackson Park Housing Complex included ordnance production, demilling, storage, and waste disposal. Ordnance residues in the form of wastewater were released via floor drainage systems into Ostrich Bay. Ordnance compounds were detected in soil, surface water, groundwater, sediment, and biological tissues. Concentrations of cadmium, lead, mercury, nickel, and silver in sediments exceeded ERM concentrations. Ostrich Bay, an embayment of Dyes Inlet, provides habitat for several salmonid species that support tribal as well as commercial harvests. Dyes Inlet is also known to be a productive area for shellfish.

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