Aluminum Company of America (ALCOA)
Vancouver, Washington
Region 10
WAD009045279

Site Exposure Potential

The ALCOA facility lies on the northern bank of the Columbia River, 4 km west of Vancouver, Washington, in an area that is primarily industrial or undeveloped (Figure 1). In 1940, the facility began operating a primary aluminum smelter and support facilities (Hart Crowser 1987b). As part of the aluminum production process, waste materials were generated that consisted of spent potlining and reclaimed alumina insulation containing cyanide, fluoride, and trace metals (Hart Crowser 1987a). From the early 1950s to 1973,

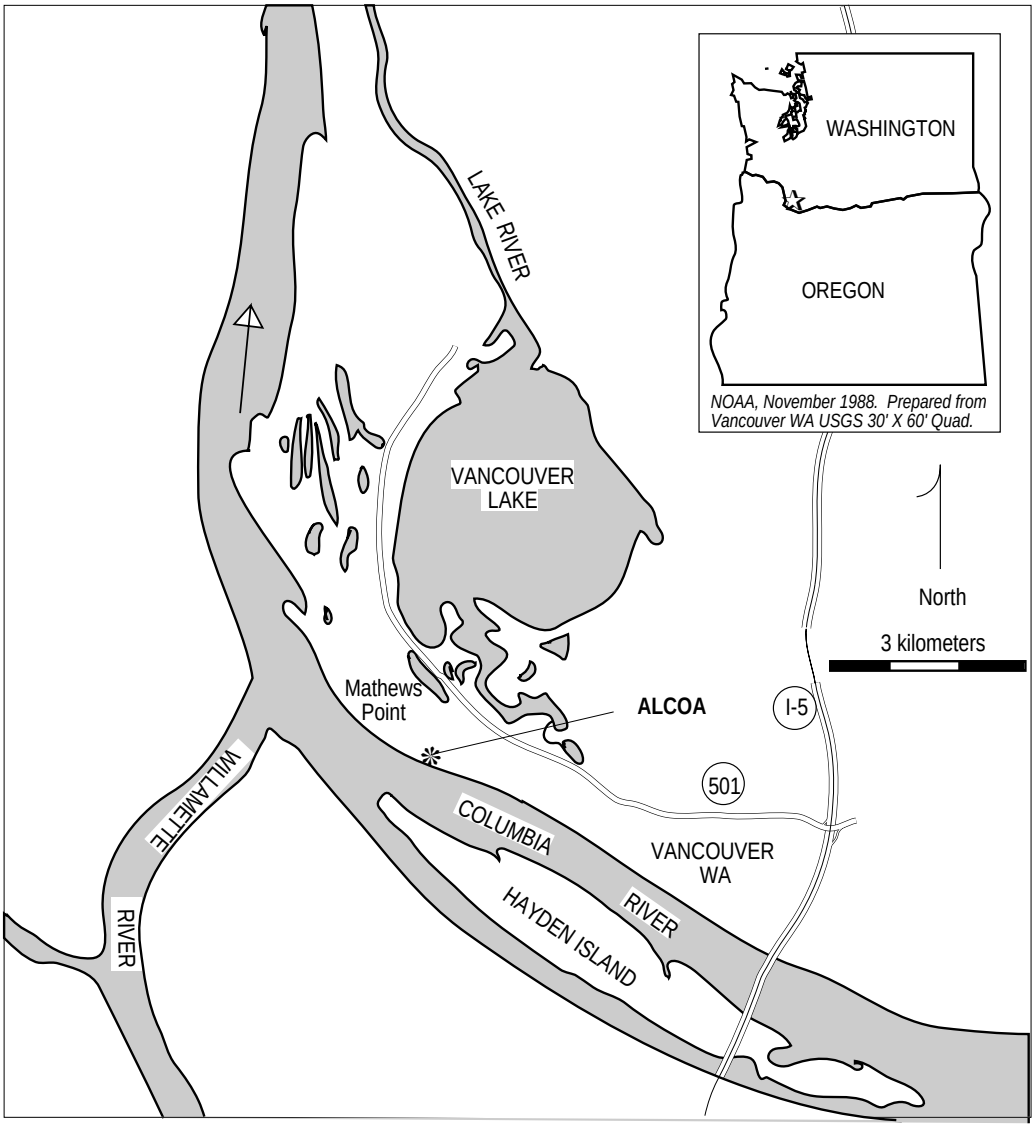

Figure 1. The ALCOA site in Vancouver, Washington.

these waste materials were shipped to Longview, Washington. Between 1973 and 1981, the waste materials were stored on-site in three waste piles estimated to be 43,500; 9,100;

and 7,300 metric tons, respectively (Hart Crowser 1987b). These waste piles were covered with impermeable polyvinyl chloride caps, soil covers, and revegetated in 1978 and 1981. The caps do not extend past the toes of the piles; surface drainage has infiltrated the piles along the perimeters. Precipitation may infiltrate the piles, which are 90 to 150 meters north of the Columbia River.

A possible contaminant migration pathway to NOAA trust resources is groundwater discharge from the waste piles to the Columbia River.

Site-Related Contamination

The contaminants of concern to NOAA are fluoride and cyanide. High concentrations of both of these substances have been detected in the groundwater and in soils on-site (Table 1). Moderate levels of cyanide have been detected in standing water on the site. Fluoride measurements in the groundwater on-site greatly exceed concentrations that have been observed to be toxic to salmonids. Acute toxicity in rainbow trout was observed at fluoride concentrations ranging from 2,700 to 4,700 μg/l (Neuhold and Sigler 1960). Significant avoidance behavior in adult salmonids has been observed at concentrations as low as 500 μg/l (Damkaer and Dey, in press). Cyanide is probably present as free cyanide and cyanides complexed with iron formed during the electrolytic smelting process. Free cyanide is very toxic to aquatic organisms; concentrations measured in the groundwater on site greatly exceeded AWQC.

In addition to fluoride and cyanide, low to moderate levels of arsenic, cadmium, chromium, copper, and zinc have been detected in the groundwater (Table 1). Maximum concentrations detected were within an order of magnitude of the applicable AWQC.

Table 1. Maximum concentrations of selected contaminants at the ALCOA site (Hart Crowser 1987); AWQC for the protection of freshwater aquatic life (EPA 1986); concentrations for water in μg/l and for soil in mg/kg.

		Water Table Aquifer			Deeper	Surface	AWQC	
Contaminant	Soil	Shallow	Intermediate	Deep	Aquifer	Water	Acute	Chronic
INORGANIC SUBSTANCES								
Trace Metals								
arsenic	N/A	40	350	20	20	N/A	360	190
cadmium	N/A	1	10	1	1	N/A	3.9	1.1*
chromium	N/A	4	48	1	1	N/A	16	11
copper	N/A	43	210	3	3	N/A	18*	12*
zinc	N/A	32	65	36	54	N/A	120*	110*
Other								
cyanide	91.9	73,200	320,000	73,000	530	37	22	5.2
fluoride	3,450	700,000	1,340,000	33,000	55	N/A	N/A	N/A

* Hardness-dependent (based on 100 mg/l $CaCO_3$)
N/A: Not available

NOAA Trust Habitats and Species in Site Vicinity

The lower Columbia River is a tidally influenced, continuously flowing, low-gradient river system with a drainage area of 622,080 km^2. The river near the site has an unconsolidated sand/silt bottom that is unsuitable substrate for salmonid spawning.

There are five salmon species, and steelhead trout, smelt, American shad, and white sturgeon in the Columbia River near the site (Table 2) (Beccasio et al. 1981; King 1988). Adult salmonid, and shad immigrants and juvenile outmigrants use the river near the site as a migratory corridor. In addition, juvenile salmonids and shad may use the area as a nursery and for foraging. White sturgeon and smelt may use the deeper pools near the site as spawning grounds.

Table 2. NOAA trust resource use of the Columbia River near the ALCOA site (Beccasio et al. 1980; King 1988).

Species	Spawning Area	Nursery Area	Adult Habitat	Migratory Route	Recreational Fishery	Commercial Fishery
American shad				X	X	
chinook salmon		X		X	X	X
chum salmon		X		X	X	X
coho salmon		X		X	X	X
pink salmon		X		X	X	X
smelt	X	X		X	X	
sockeye salmon		X		X	X	X
white sturgeon	X	X		X	X	X

There are commercial fisheries on the Columbia River near the site for chinook, coho, sockeye, and chum salmon; white sturgeon; and American shad (Bennett 1988). Up to 55,087 salmonids; 1,303 white sturgeon; and 16,218 American shad were harvested each year between 1982 and 1987. There are recreational fisheries on the Columbia River for chinook salmon, steelhead, white sturgeon, and shad. Up to 577 chinook salmon, 614 steelhead, 945 white sturgeon, and 191 shad were harvested each year between 1982 and 1987 by Washington bank and boat anglers.

Response Category: State Enforcement Lead

Current Stage of Site Action: RI/FS Workplan

State Site Manager

Ted Mix 206-438-7012

NOAA Coastal Resource Coordinator

Lew Consiglieri 206-442-2101

References

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