Riverbank Army Ammunition Depot
Riverbank, California
Region 9
CA7210020759

Site Exposure Potential

The Riverbank Army Ammunition Depot (RBAAD) site is located on 70 hectares in Riverbank, 16 km northeast of Modesto, on the northern border of Stanislaus County, California (Figure 1). The main facility covers 59 hectares, including a landfill area. The remaining 11 hectares are occupied by four unlined industrial waste treatment ponds (ATHMA 1980).

RBAAD was built by the Aluminum Company of America in 1942 as an aluminum reduction plant for the U.S. military. The plant was closed in August 1944 and reopened in 1951 as an industrial metal-working plant manufacturing cartridge cases, grenades, and projectiles. These activities generated corrosive wastes, solvents, and wastewater containing metals. Liquid wastes were discharged to the industrial waste treatment ponds, which flooded in the 1950s, 1960s, and 1970s (ATHMA 1980). Landfill dumping activities occurred on-site until 1966.

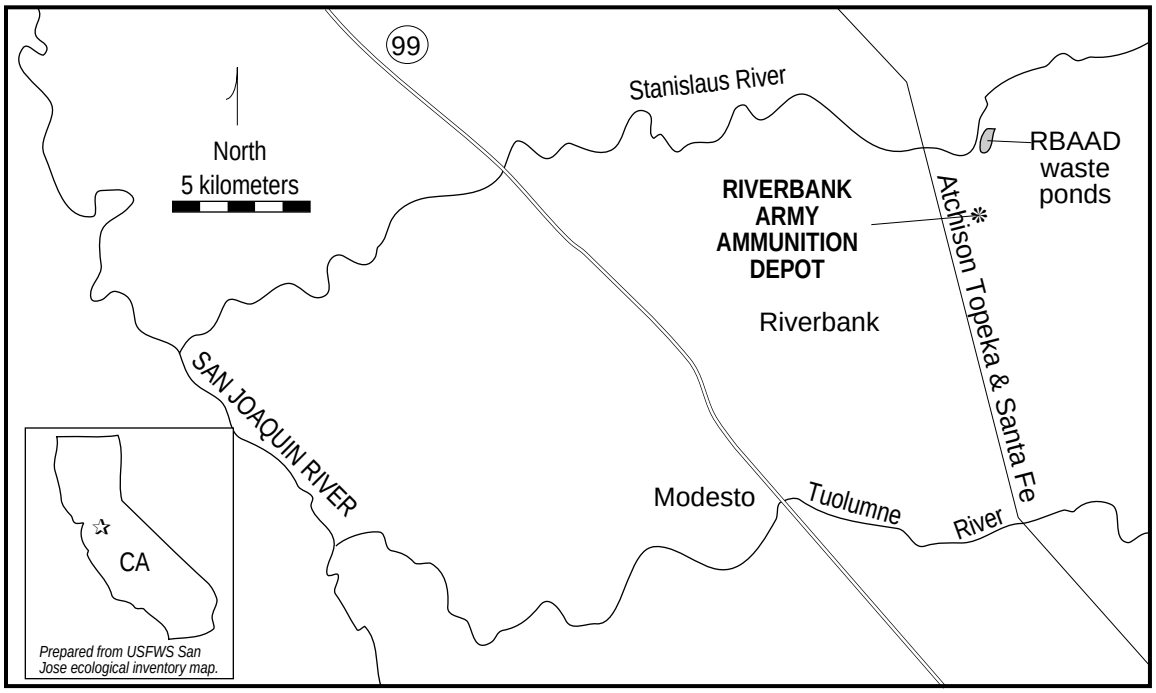

Figure 1. The Riverbank Army Ammunition Depot (RBAAD) site in Riverbank, California.

Dumped materials included oils, greases, solvents, hospital wastes, industrial sludges, and aluminum-reduction process wastes. The hazardous waste quantity has been estimated to be at least 19,563,000 metric tons. Spills reportedly occurred on-site in 1956, 1972, and 1978 (ATHMA 1980).

The topography of the Riverbank area ranges from low hills (three to six meters high) to nearly flat land. The four waste ponds are adjacent to the Stanislaus River, 4 km north of the main facility. The Stanislaus River flows for 35 km before entering the San Joaquin

River. The San Joaquin River enters Suisun Bay 95 km below the site. Suisun Bay then flows into San Pablo Bay and San Francisco Bay. A portion of the surface runoff from the main facility has been reported to flow via aqueducts and irrigation channels to the Tuolumne River 11 km south of the main facility. The Tuolumne River empties into the San Joaquin River 30 km west of the plant. Groundwater flows west towards the San Joaquin River (ATHMA 1980).

Possible contaminant migratory pathways to NOAA trust resources include surface water runoff, flooding of the waste treatment ponds, and groundwater flow to the Stanislaus and Tuolumne rivers.

Site-Related Contamination

The contaminants at the site of concern to NOAA are trace metals and cyanide. Concentrations of chromium, copper, lead, and zinc exceeding AWQC for the protection of freshwater aquatic life were measured in waste pond surface water. Chromium and cyanide were also measured in on-site groundwater at levels exceeding chronic AWQC by up to three orders of magnitude (Table 1) (ATHMA 1980; EPA 1986).

Table 1. Maximum concentrations of contaminants at the RBAAD site (ATHMA 1980); AWQC for the protection of freshwater aquatic life (EPA 1986); concentrations in μg/l.

Contaminant	On-site Groundwater	Off-site Groundwater	Waste Pond Surface Water	AWQC Acute	AWQC Chronic
INORGANIC SUBSTANCES					
Trace metals					
chromium	2,000	<50	1,200	16†	11†
copper	N/A	N/A	100	18†	12†
lead	N/A	N/A	80	82†	3.2†
zinc	N/A	N/A	840	120†	110†
Other					
cyanide	22,600	<11	N/A	22	5.2

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

NOAA Trust Habitats and Species in Site Vicinity

The Stanislaus and Tuolumne rivers are low-gradient river systems. The Stanislaus River has an average width of 40 meters and and average depth of one meter near the site. The Tuolumne River is larger, with an average width of 70 meters and average depth of 1.5 meters. The substrate in both rivers is gravel and cobble in the riffle areas and silty sand in the pooled areas. The water quality in both rivers is generally good (Loudermilk 1989).

The Stanislaus and Tuolumne rivers support fall runs of chinook salmon (Table 2). The run in the Stanislaus River consisted of 16,000 adults in 1988; the run in the Tuolumne River, 3,000 adults. Normally, the run in the Tuolumne River is the larger of the two. In addition, the Stanislaus River supports a small run of steelhead trout. The area of the Stanislaus River next to the four waste ponds is used by both species as a nursery area and a migratory route. There are recreational fisheries of chinook salmon, steelhead trout, and rainbow trout on both rivers (Loudermilk 1989).

Table 2. NOAA trust resource use of the Stanislaus, Tuolumne, and San Joaquin rivers (Loudermilk 1989).

Species	Stanislaus River	Tuolumne River	San Joaquin River
American shad			S,N,M
chinook salmon	S,N,M	S,N,M	S,N,M
steelhead trout	S,N,M	S,N,M	S,N,M
striped bass			S,N,M
white sturgeon			S,N,M

S : Spawning area N : Nursery M : Migratory route

Response Category: Federal Facility Lead

Current Stage of Site Action: RI/FS is expected to be released for comment very soon and finalized by July 1989.

EPA Site Manager

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References

ATHMA. 1980. Installation Assessment of Riverbank Army Ammunition Plant. Aberdeen Proving Grounds, Maryland: U.S. Army Toxic and Hazardous Materials Agency. Report No. 144.

EPA. 1986. Quality Criteria for Water. Washington, D.C.: Office of Water Regulations and Standards, Criteria and Standards Division. EPA 440/5-86-001.

Loudermilk, B., California Department of Fish and Game, Fresno, California, personal communication, January 19, 1989.