Martin Aaron, Inc.

Camden, New Jersey

EPA Facility ID: NJD014623854

Basin: Lower Delaware

HUC: 02040202

Executive Summary

The Martin Aaron site is approximately 1 km (0.6 mi) east of the Delaware River. From 1969 to 1998, a drum reconditioning facility was operated on the property. Drum residues were discharged directly onto the ground or to the storm sewer system. Environmental investigations at the property show that soil, groundwater, and sewer basin sediment are contaminated with metals, PAHs and other SVOCs, pesticides, and PCBs at concentrations that exceed screening guidelines. No investigation-related sampling occurred in the Delaware River or in areas downgradient of the property. The tidal, freshwater reach of the Delaware River in the vicinity of the Martin Aaron property provides spawning, nursery, and adult habitat for numerous NOAA trust resources. The NOAA habitats of concern are the surface waters and sediments of the Delaware River.

Site Background

The Martin Aaron, Inc., site in Camden, New Jersey, is an approximately 1-ha (2.2-acre) site about 1 km (0.6 mi) east of the Delaware River (Figure 1) (USEPA 1993a).

From 1969 to 1998, a drum reconditioning facility was operated on the property (Weston 1999). Volatile organic compounds (VOCs), acids, bases, and fuel oils were used in the drum reconditioning process (Kimball 1999). Figure 2 depicts a schematic layout of the facility. Residues from rinsate runoff and steam blowdown were collected in drainage tanks and floor drains that discharged into four settling basins. Basins 1, 2, and 3 are not connected to the storm sewer system, which means that effluents could have been directly discharged from these basins to the subsurface. Basin 4 discharges to the storm sewer system through a permitted outflow. The remainder of the property consists of paved and unpaved surfaces where drums were stored.

In 1988, the U.S. Environmental Protection Agency (USEPA) conducted a site inspection that revealed buried drums containing hazardous wastes and soils contaminated with hazardous substances (USEPA 1988). A remedial investigation was completed in 1999 (Kimball 1999). Numerous past discharges of contaminants and hazardous substances to the soil and the storm sewer system have been documented. In addition, contamination on the South Jersey Port Corporation's adjacent property has been attributed to past operations at Martin Aaron, Inc. In September 1999, the USEPA proposed that the site be placed on the National Priorities List.

Groundwater discharge and direct discharge through the storm sewer system are the primary pathways for the migration of contaminants from the site to NOAA trust resources. Groundwater beneath the site is part of the Potomac-Raritan-Magothy aquifer system found at a depth of 1.0 to 2.3 m (3.5 to 7.5 ft) below ground surface, and flows east and southeast. Although groundwater flows parallel to and away from the Delaware River, groundwater may be intercepted by Newton

Creek, a tidal tributary approximately 1.6 km (1 mi) south of the Martin Aaron property. In addition, the property is located in the 100-year floodplain of the Delaware River. The facility has a permitted outfall, which allows effluent to enter the storm sewer system. Runoff in the storm sewer system is treated before being discharged into the Delaware River except during periods of heavy flow and high dilution; during those periods, untreated waters are discharged directly to the river (USEPA 1993a).

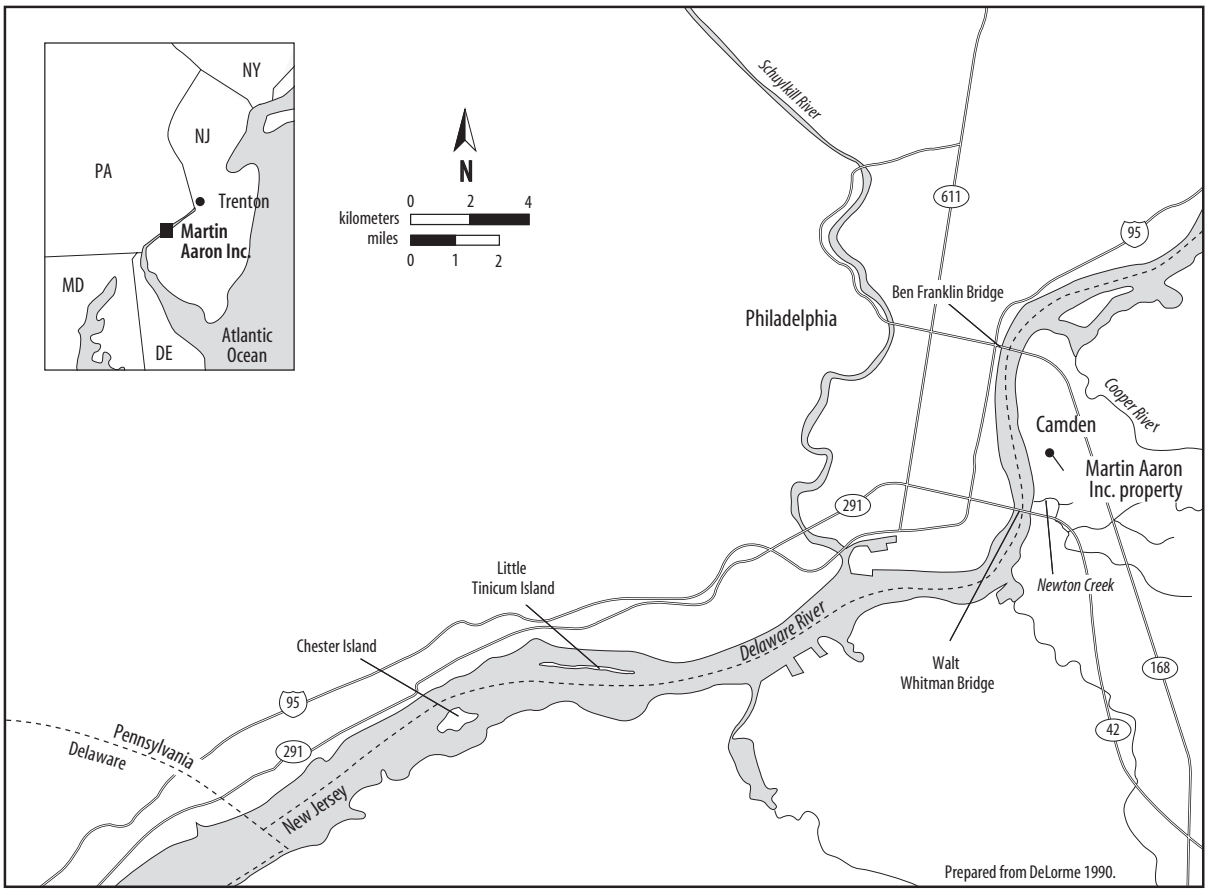

Figure 1. Location of Martin Aaron Inc., Camden, New Jersey.

NOAA Trust Resources

The NOAA habitats of concern in the vicinity of the Martin Aaron property are the surface waters and sediments of the Delaware River. This tidal, freshwater reach of the Delaware River measures approximately 900 m (3,000 ft) in width with depths ranging from 9 to 15 m (30 to 50 ft). Both shores of the river are heavily developed in this area, with piers and seawalls and few tideflats. Periodic dredging maintains a navigation channel (USACE 2002). Bottom substrates (sediments) range from silty sands to rocky debris (EA Engineering 1998). NOAA trust resources that use this reach of the river for spawning, nursery, or adult habitat are anadromous, catadromous, and marine/estuarine fish and invertebrates tolerant of fresh water (Table 1).

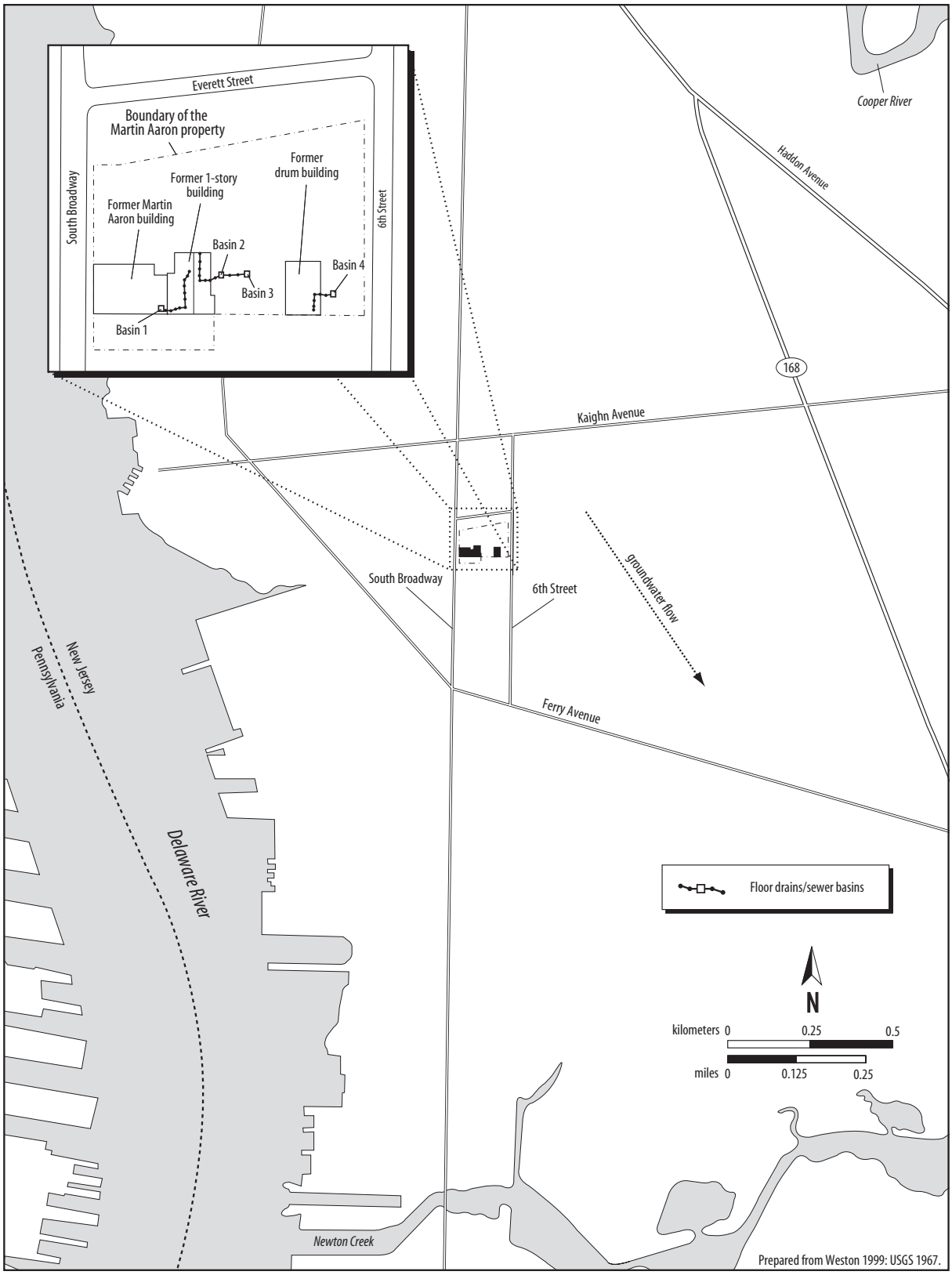

Figure 2. Detail of the Martin Aaron, Inc. property.

Table 1. NOAA trust resources found in tidal freshwater portions of the Delaware River in the vicinity of Martin Aaron, Inc. (Stone et al. 1994; EA Engineering 1998).

Species		Habitat Use			Fisheries	
Common Name	Scientific Name	Spawning Area	Nursery Area	Adult Habitat	Comm.	Rec.
ANADROMOUS FISH						
Alewife	*Alosa pseudoharengus*		◆			
American shad	*Alosa sapidissima*	◆	◆			
Atlantic sturgeon	*Acipenser oxyrinchus*		◆			
Blueback herring	*Alosa aestivalis*		◆			
Gizzard shad	*Dorosoma cepedianum*		◆			
Shortnose sturgeon	*Acipenser brevirostrum*		◆			
Striped bass	*Morone saxatilis*	◆	◆			◆
White perch	*Morone americana*		◆			◆
CATADROMOUS FISH						
American eel	*Anguilla rostrata*		◆			
MARINE/ESTUARINE FISH						
Atlantic croaker	*Micropogonias undulatus*		◆	◆		
Atlantic menhaden	*Brevoortia tyrannus*		◆	◆		
Banded killifish	*Fundulus diaphanus*	◆	◆	◆		
Bay anchovy	*Anchoa mitchilli*		◆	◆		
Hogchoker	*Trinectes maculatus*		◆	◆		
Inland silverside	*Menidia beryllina*	◆	◆	◆		
Mummichog	*Fundulus heteroclitus*		◆	◆		
Naked goby	*Gobiosoma bosci*		◆	◆		
Rough silverside	*Membras martinica*		◆	◆		
INVERTEBRATES						
Blue crab	*Callinectes sapidus*		◆	◆		◆

Finfish surveys indicate that the anadromous white perch is the most abundant species in the area, followed by anadromous blueback herring and American shad and the estuarine bay anchovy and banded killifish. These species composed nearly 70 percent of the fish community sampled. Surveys also found a high proportion of juvenile fish, indicating substantial use of the area as a rearing nursery, particularly for American shad, blueback herring, hogchoker, and white perch. Juvenile American eel were observed as well, but not in large numbers. Catadromous American eel probably use the area more as a migratory corridor to upstream residential areas. Juvenile shortnose sturgeon, a federally endangered species, and Atlantic sturgeon, a candidate for federal protection, have also been observed in the area (EA Engineering 1998).

American shad and possibly striped bass spawn in this reach of the Delaware River. American shad spawn over a large area between Trenton and Camden and, in recent years, downstream of Camden. Spawning striped bass have not been observed in the vicinity of the property, but their

presence can be inferred by the presence of juvenile fish (under one year old) several kilometers downstream near Little Tinicum and Chester Islands (Figure 1) (EA Engineering 1998).

Banded killifish and inland silversides are residents known to live on the freshwater side of the fresh-salt transition zone, while the remaining estuarine species commonly dwell where salinity is low, moving into tidal fresh waters on an occasional or seasonal basis. Blue crab, particularly juveniles and adult males, often migrate into tidal fresh waters on a seasonal basis (Stone et al. 1994).

There is no commercial fishing in the vicinity of the Martin Aaron property; commercial fisheries are limited to Delaware Bay approximately 100 km (60 mi) downstream. There is recreational fishing in the Delaware River, primarily of blue crab, striped bass, and white perch (PADH 1999).

A fish consumption advisory is in effect for the Delaware River in the vicinity of the Martin Aaron property because of elevated concentrations of polychlorinated biphenyls (PCBs) in edible tissues of several fish species. The advisory encompasses the Delaware River from Delaware Bay to the end of the tidal section of the river near Trenton, New Jersey. The advisory limits the consumption of striped bass and white catfish to one meal per month and the consumption of channel catfish to one meal every two months. It also advises against the consumption of American eel in the area (State of New Jersey 2002).

Site-Related Contamination

Data collected during field investigations indicate that former operations and disposal practices have contaminated soils and shallow groundwater on the Martin Aaron property and adjacent properties. The primary contaminants of concern to NOAA are inorganic compounds (metals); semivolatile organic compounds (SVOCs), including polynuclear aromatic hydrocarbons (PAHs); pesticides; and PCBs.

More than 100 soil samples, two storm sewer sediment samples, and groundwater samples from 14 monitoring wells were collected on the Martin Aaron property and adjacent properties for chemical analysis during the 1999 remedial investigation. No sampling occurred in the Delaware River or in areas down-gradient of the property (Kimball 1999; USEPA 1988). Table 2 summarizes the maximum concentrations detected of the primary contaminants of concern to NOAA, and compares them to relevant screening guidelines.

In soil samples, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc were detected at concentrations that exceeded soil screening guidelines by a range of one to three orders of magnitude. The greatest concentrations were detected in samples collected in the vicinity of the drum processing areas, where floor drains and sewer basins are located. Concentrations of several metals detected in samples from adjacent properties also exceeded the soil screening guidelines, although concentrations were not as elevated as in the drum processing areas. Excepting silver, all maximum concentrations of metals detected in the soil samples also exceeded another set of screening guidelines, the Oak Ridge National Laboratory Preliminary Remediation Goals (ORNL PRGs). The maximum concentration of mercury exceeded the ORNL PRG by four orders of magnitude; arsenic and zinc exceeded ORNL PRGs by three orders of magnitude (Efroymson et al. 1997). No ORNL PRG is available for silver. Elevated concentrations of SVOCs (including PAHs), several pesticides, and PCBs were also detected in soils from the property. Soil screening guidelines are not available for comparison to the maximum concentrations of SVOCs, pesticides, and PCBs. The maximum PCB concentration exceeded the ORNL PRG guideline by two orders of magnitude (Efroymson et al. 1997).

Table 2. Maximum concentrations of primary contaminants of concern found at Martin Aaron, Inc. (Kimball 1999).

	Soil (mg/kg)		Water (µg/L)		Sediment (mg/kg)	
Contaminant	Soil	Mean U.S.[a]	Groundwater	AWQC[b]	Sediment	TEL[c]
INORGANIC COMPOUNDS						
Arsenic	14,000	5.2	9,800	150	39	5.9
Cadmium	230	0.06	33	2.2[d]	29	0.596
Chromium[m]	16,000	37	1,100	11	ND	37.3
Copper	1200	17	220	9[d]	ND	35.7
Lead	9000	16	530	2.5[d]	2,700	35
Mercury	16	0.058	2.7	0.77[k]	ND	0.174
Nickel	300	13	73	52[d]	820	18
Silver	17	0.05	15	0.12	ND	1.0[e]
Zinc	15,000	48	4,200	120[d]	3,100	123.1
SEMIVOLATILE ORGANIC COMPOUNDS						
2-Methylphenol	0.53	NA	2,100	NA	R	NA
4-Methylphenol	1.9	NA	3,100	NA	R	NA
Anthracene	26	NA	1	300[g,h]	R	0.0853[e]
Benz(a)anthracene	97	NA	1	300[g,h]	R	0.0317
Benzo(a)pyrene	75	NA	ND	300[g,h]	R	0.0319
Benzo(b)fluoranthene	82	NA	ND	300[g,h]	R	NA
Benzo(k)fluoranthene	69	NA	ND	300[g,h]	R	NA
Chrysene	100	NA	7	300[g,h]	R	0.0571
Fluoranthene	170	NA	ND	3,980[f,g]	R	0.111
Naphthalene	1,900	NA	12,000	620[g]	R	0.16[e]
Phenanthrene	73	NA	2	6.3[i]	R	0.0419
Pyrene	130	NA	ND	300[g,h]	R	0.053
PESTICIDES/PCBs						
Aldrin	45	NA	ND	3.0[f]	ND	NA
Chlordane	19	NA	ND	0.0043	0.62	0.0045
DDD	1.5	NA	ND	0.6[f,g]	ND	0.00354[o]
DDE	6.9	NA	ND	1050[f,g]	ND	0.00142[n]
DDT	0.21	NA	ND	0.001	ND	0.00698[l]
PCBs (Total)	110	0.371[j]	ND	0.014	ND	0.0341

NA: Screening guideline not available.
ND: Not detected; detection limit not available.
R: Data rejected; did not meet QA standards.
a: Shacklette and Boerngen (1984), except for silver and cadmium, which are average concentrations in the Earth's crust as reported by Lindsay (1979).
b: Ambient water quality criteria for the protection of aquatic organisms (USEPA 1993b, 1999). Freshwater chronic criteria presented.
c: Threshold effects level is the geometric mean of the 15th percentile of the effects data and the 50th percentile of the no-effects data. The TEL is intended to represent the concentration below which adverse biological effects rarely occurred (Smith et al. 1996).
d: Criterion expressed as a function of total hardness; concentrations shown correspond to hardness of 100 mg/L.
e: TEL not available; effects range-low (ER-L) value presented. The ERL represents the 10th percentile for the data set in which effects were observed or predicted in studies compiled by Long et al. 1998.
f: Chronic criterion not available; acute criterion presented.
g: Lowest Observable Effect Level (LOEL).
h: Value for chemical class; marine acute value is presented.
I: Proposed criteria.
j: Oak Ridge National Laboratory Preliminary Remediation Goals (ORNL PRGs) presented (Efroymson et al. 1997).
k: Criterion expressed as total recoverable metal.
l: Expressed as total DDT.
m: Screening guidelines represent concentrations for Cr.+6
n: Expressed as p,p'-DDE.
o: Expressed as p,p'-DDD.

In groundwater samples, arsenic, cadmium, chromium, copper, lead, silver, and zinc were detected at concentrations that exceeded the ambient water quality criteria (AWQC) by one to two orders of magnitude. Maximum concentrations of mercury and nickel exceeded the AWQC by factors of approximately three and 1.4, respectively. The greatest contamination was detected in samples collected in the vicinity of site operations, but concentrations exceeding guidelines were also detected in samples from adjacent properties. Naphthalene, a PAH, was detected in groundwater collected from beneath the property at a concentration exceeding the AWQC by one order of magnitude. Elevated concentrations of 2-methylphenol and 4-methylphenol were also detected in groundwater collected beneath the property; AWQC are not available for these SVOCs. Groundwater contamination was more prevalent in the shallow zone near the water table surface than in deeper zones of the aquifer.

In sediment samples collected from storm sewer deposits beneath Basins 1 and 4, cadmium, lead, nickel, and zinc were detected at concentrations that exceeded threshold effects levels (TELs) by one order of magnitude; the maximum concentration of arsenic exceeded the TEL by a factor of approximately six. Chromium, copper, mercury, and silver were not detected. The pesticide chlordane was the only organic compound detected; its maximum concentration exceeded the TEL by two orders of magnitude. Analytical results for SVOCs did not meet quality assurance standards and so were rejected, which means data are not available for evaluating SVOC concentrations in storm sewer sediment. Samples were not collected farther down-gradient in the storm sewer, so the extent of contamination was not determined.

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