

NOAA Hazardous Waste Site Report

Old Brine Sludge (III-8)
Delaware City, Delaware
April 13, 1984

Location and Nature of Site:

The Old Brine Sludge site covers 55 acres north of Delaware City, Delaware, adjacent to Red Lion Creek and the Delaware River (Figure 1). The site is located on the grounds of the Delaware City Works of the Diamond Shamrock Corporation which is a chlorine and caustic production facility. Presently on the site are four inactive disposal areas and one active landfill. An adjacent facility, a PVC plant, was also owned by Diamond Shamrock until 1982.

The primary area of concern at Diamond Shamrock is the Old Brine Sludge landfill. The waste stream that was disposed of in this landfill is currently being disposed of in the new Brine Sludge landfill. The primary constituent of these wastes is 95% brine sludge consisting of inorganic impurities removed in the salt purification process. The other 5% is mercury treatment filter cake from the waste water treatment process. The landfill reportedly was operated from the early 1970's until the late 1970's. It is approximately 2 acres in size and 10 feet deep. In 1979, the area was capped with clay and revegetated.

Other areas of concern at Diamond Shamrock include three waste lakes:

Waste Lake 1 was used as a settling basin for impurities recovered from the salt used in chlorine production. Waste Lake 1 was approximately one acre in size; it was closed in 1979 and 1980, capped with clay, and seeded. Between 1966 and 1974, Lake 1 also received other wastes including storm water drainage, caustic tank car and truck washings, cooling tower blowdown, PVC plant wastes (until 1971), and mercury contaminated waste water. Sludges that were present in the lake include PVC solids, barium sulfate, calcium sulfate, various carbonates and chlorides, and mercury in the form of mercuric hydroxide and mercuric chloride.

Waste Lake 2 was a 45 acre, diked lagoon which used to receive overflow from Lake 1. Lake 2 also received storm water run-off from the plant complex and intermittently discharged these waters as part of the combined plant waste flow. Draining and drying of the lagoon began in 1977 and all but one section (approximately 3-5 acres) are capped.

Waste Lake 3 was used for disposal of PVC waste water until 1973 and was subsequently used for the storage of PVC sludge. Lake 3 was approximately 2.5 acres in size and has been closed, capped, and seeded.

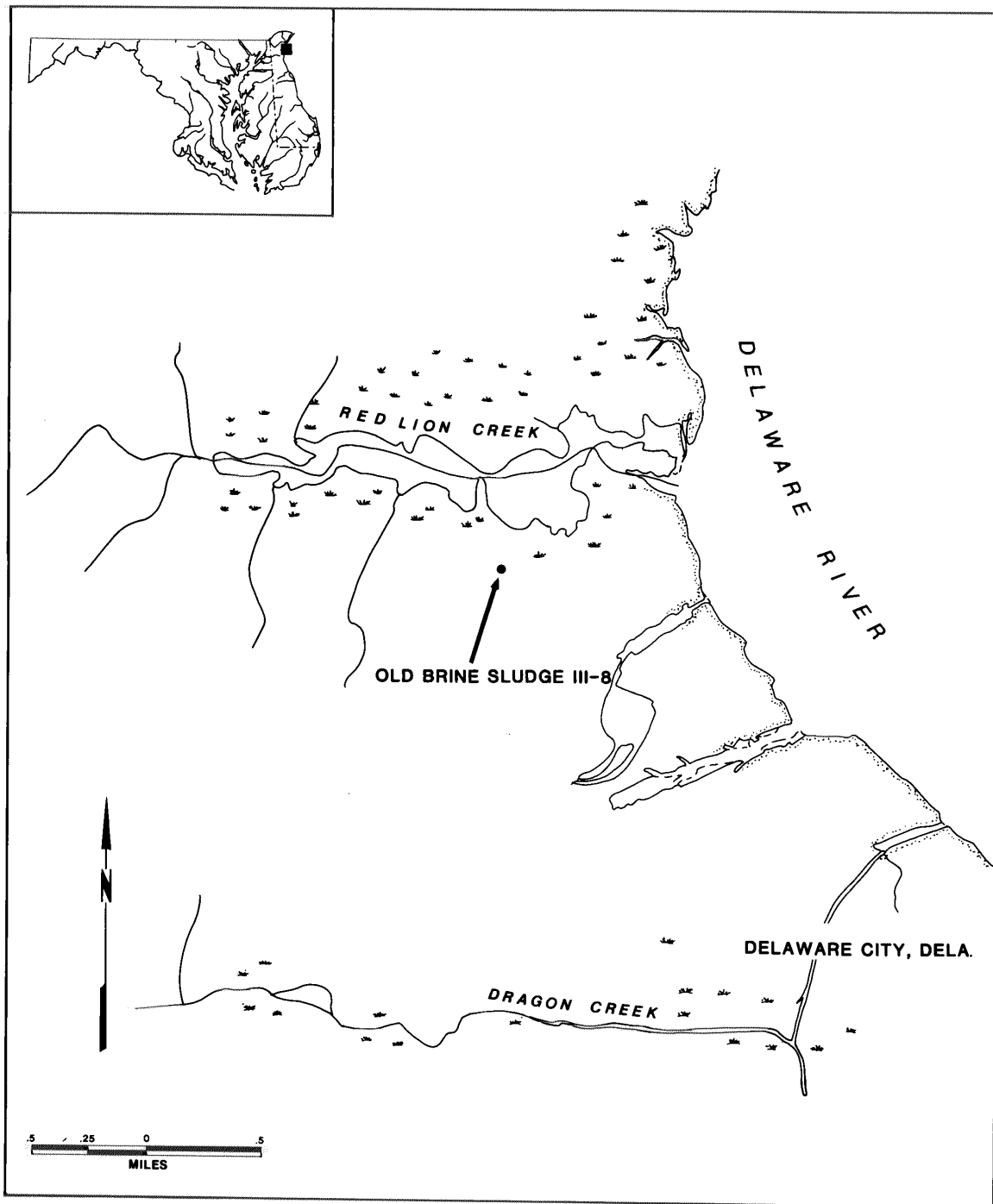


FIGURE 1. Site location.

Tybouts Corner Landfill (NOAA III-9) is located on Red Lion Creek approximately 1.5 miles from Diamond Shamrock.

Proximity of Chemical Hazard to Marine Resources:

The Delaware River and Red Lion Creek are adjacent to the eastern and northern boundaries of the plant, respectively.

Aqueous samples taken from the Red Lion Creek area have revealed limited contamination by organic and inorganic pollutants. It is evident from the analytical results that organic and inorganic contaminants found in groundwater samples are appearing in the tidal stream, and are also present in the highest concentrations in the samples taken near the mouth of the creek. Very little was detected in samples taken upstream, however, there is some possibility that observed contamination may be associated with a 1982 spill of monochlorobenzene near the site or effluent from the Tybouts Corner Landfill. One recovery well is in operation.

Organic priority pollutants identified with confidence in water and sediment samples from Red Lion Creek appear to be limited to chlorinated benzenes (up to 230 ug PCBs/l in the aqueous phase and up to about 58,000 ug/kg in the south shore sediment), acetone, trace levels of the suspected carcinogen 1,2-dichloroethane (15 ug/l), benzene (480 ug/kg) in the south shore sediment, the human carcinogen bis (2-chloromethyl) ether (less than detection limits of 400 ug/kg in the leachate sediment sample), and the plasticizer 2-diethylhexylphtalate (up to 1100 ug/kg).

The chlorinated benzenes (primarily 1,4- and 1,2- dichlorobenzene) comprise the major pollutants detected. The mono-, di-, and tri-chlorinated benzenes occurring in Red Lion Creek are less toxic, less persistent and more volatile than the more highly chlorinated derivatives.

Mercury contamination of Red Lion Creek appears at the highest levels (up to 11.9 mg/kg) in sediments nearest Diamond Shamrock and in the aqueous samples (2,2 ug/l) taken near the mouth of the creek, which exceeds the ambient water quality criterion for protection of human health from ingestion of contaminated fish. These levels also exceed standards to protect freshwater and saltwater aquatic life.

It would appear that the Old Brine Sludge site may have contributed significant levels of contaminants to the tidal portions of Red Lion Creek and the Delaware River.

Marine Resources at Risk:

The Red Lion Creek, a small tributary of the Delaware River, is used as an industrial water supply, as a habitat for resident and anadromous fish, and for secondary contact recreation. The Delaware River and its tributaries provide significant habitat for a variety of finfish resources (see Table 1).

Table 1. Fishery Resources of Tidally Influenced Regions of the Delaware River (1, 2, 5)

Finfish Species	Adult Habitat	Spawning Area	Nursery Area	Comm. Fish.	Rec. Fish.	Migr. Route
<u>Anadromous</u>						
Alewife	x	x	x	x	x	x
Blueback herring	x	x	x	x	x	x
American shad	x	x	x	x	x	x
Shortnose sturgeon						x
Atlantic sturgeon		x				
Striped bass		x	x	x	x	x
Gizzard shad	x	x	x			
<u>Non-anadromous</u>						
Atlantic menhaden			x			
White perch		x	x	x	x	x
Flounder	x					
Northern kingfish	x					
Bluefish			x			
Atlantic croaker			x			
Spotted seatrout					x	
Channel catfish	x					
White catfish				x	x	
Brown bullhead				x	x	
Bluegill	x				x	
Black crappie	x				x	

Anadromous fish migrate through the Delaware Bay estuarine system during the early spring on their way to freshwater spawning grounds. For most of the anadromous fish of the Delaware Bay, this occurs upstream of Burlington, New Jersey, although some spawning does occur in freshwater tributaries (4). The adults return to the lower parts of Delaware Bay. Juvenile fish, hatched in the spring, remain in the upper parts of Delaware Bay until the late summer and early fall, when they also migrate back into the lower parts of the Bay (3).

Red Lion Creek has seasonal runs of striped bass and white perch that are caught by sport fishermen from the bridge on Highway 9.

The Red Lion Creek watershed is located within three miles of known spawning grounds of the Atlantic sturgeon at Supawna Meadows National Wildlife Refuge. The Atlantic sturgeon is a species of special concern to the State of Delaware. This site is located along a major migratory route for anadromous fish including the shortnose sturgeon, a species of special federal concern.

It is unknown to what extent other species of finfish utilize the Red Lion Creek watershed area, but this region of the Delaware River is unlikely to be an important nursery or spawning area for other anadromous fish due to the fairly high level of development in this area and to their preference for less saline waters for spawning.

Some tidal wetlands are present at the mouth of Red Lion Creek, and some species of fish may be harvested by recreational and commercial fishermen in the Delaware River adjacent to Red Lion Creek.

The Delaware Bay estuarine system is an important wintering area for many waterfowl and seabirds, particularly loons, grebes, and gannet. They tend to concentrate in coastal bays and wetland areas. Bald eagles nest at Augustine Wildlife Area and Appoquinimink Wildlife Area.

Several State and Federal Management Areas are located on the Delaware River in the vicinity of Red Lion Creek:

Chesapeake and Delaware Canal Wildlife Area	4 miles downstream
Augustine Wildlife Area	9 miles downstream
Ft. Mott State Park	3 miles downstream
Ft. Delaware State Park	3 miles downstream
Supawna Meadows National Wildlife Refuge	2 miles downstream
Appoquinimink Wildlife Area	11 miles downstream

Summary of Site-Related Actions:

A Site Inspection report of the Old Brine Sludge Landfill was completed in September 9, 1983 (6). Considerable sampling was performed in preparation of this report.

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References:

1. National Marine Fisheries Service, 1974. Anglers Guide to the United States Atlantic Coast.
2. U.S. Fish and Wildlife Service, 1980. Atlantic Coast Ecological Inventory.
3. Breder, C.M. and D.E. Rosen, 1966. Modes of Reproduction in Fishes. TFH Publications.
4. Byrne, D. Personal communication. Delaware River Anadromous Fishery Project, U.S. Fish and Wildlife Service.
5. Research Planning Institute. Environmental Sensitivity Index - Delaware. Unpublished.
6. U.S. Environmental Protection Agency, 1983. "A Study of Red Lion Creek, A Preliminary Report of the Quality of the Tidal Zone of Red Lion Creek." Site Investigation Report. September 1983.