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Austin Avenue Radiation Site

Lansdowne, Pennsylvania

CERCLIS #PAD987341716

Site Exposure Potential

The Austin Avenue Radiation Site is located in Lansdowne, Pennsylvania, about 1 km northeast of Darby Creek (Figure 1). The W.L. Cummings Radium Processing Company conducted a radium refining operation from 1915 to 1925 at a warehouse on the corner of Union and Austin avenues. Radium-containing ores were unloaded from rail cars and processed to remove the radium, with the wastes products (radium tailings) apparently stored at the warehouse for an unknown length of time (Grayson 1992). A residential duplex and a wood shop are near the warehouse, which, along with the backyard area, and a nearby railroad right-of-way, are believed to have been contaminated with radium tailings (Lee 1991).

Discarded radium tailings from the Austin Avenue site may have been used in the 1920s to make concrete, stucco, and mortar for sidewalks, homes, and other structures (Grayson 1992). The Austin Avenue warehouse is the suspected source of elevated radiation measured at 40 sites in Delaware County, Pennsylvania (Voltaggio 1992). These contaminated properties are located in six municipalities within a 4-km radius of the Austin Avenue site.

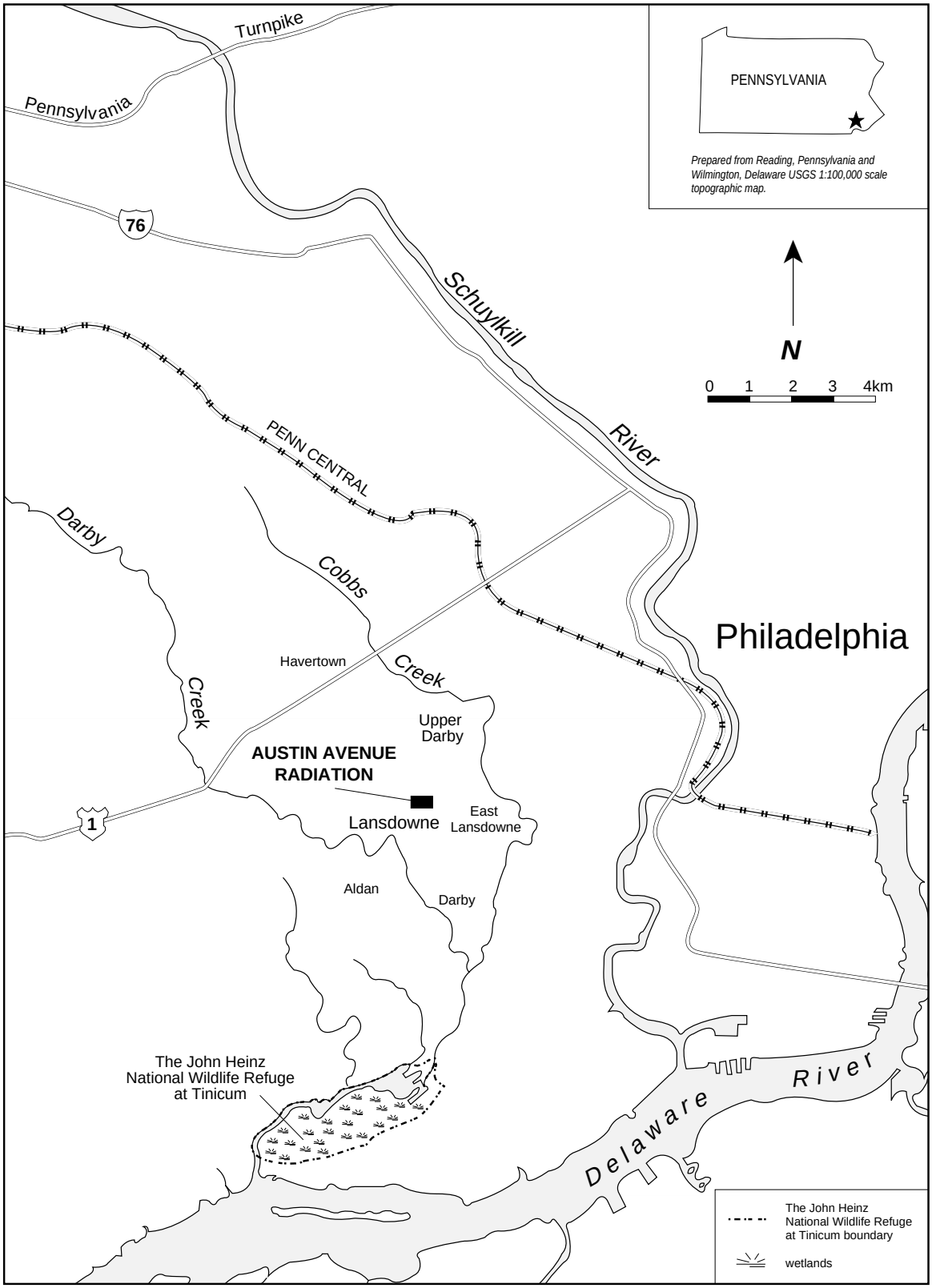

Figure 1. The Austin Avenue site in Lansdowne, Pennsylvania.

The structurally unsound warehouse was dismantled as part of an EPA Emergency Removal (U.S. EPA 1992). A public health advisory was issued by the Agency for Toxic Substances and Disease Registry in 1991 to inform EPA, the State of Pennsylvania, and the public of a potentially significant environmental hazard to human health in the vicinity of the Austin Avenue site (Johnson 1991).

Darby and Cobbs creeks are the two major surface water bodies near the site. Darby Creek is about 1 km southwest of the site, and Cobbs Creek is about 2 km east of the site. Cobbs Creek joins Darby Creek approximately 4 km south of the site, and Darby Creek continues for another 10 km before it enters the Delaware River. The Delaware River flows into the Atlantic Ocean approximately 150 km downstream from Darby Creek. Surface runoff and groundwater migration pathways from the site to Darby or Cobbs Creek were not described in any of the available documents.

NOAA Trust Habitats and Species

Primary habitats of concern to NOAA are the surface water, bottom substrates, and associated wetland habitats of Darby Creek and the Delaware River. Cobbs Creek is the secondary habitat of concern. The John Heinz National Wildlife Refuge at Tinicum extends 2 km upstream from the confluence of Darby Creek and the Delaware River and continues northeast to 6 km downstream from the site. This approximately 205-hectare wetland area represents the largest freshwater tidal marsh in Pennsylvania (Tiner and Wilen 1988; Mitchell 1992). Tidal amplitude in the lower portions of the refuge range from 1.5 to 2.0 m. Salinities in the refuge commonly range from 0 to 5 ppt and fluctuate throughout the year, depending on rainfall, saltwater intrusion, and urban runoff. The upper limit of tidal influence extends into Darby Creek, approximately 3 km downstream from the site. Bottom substrates in Darby Creek are mostly gravel and sand with areas of mixed cobble. The creek averages 12 m wide near the site. The stream gradient of Darby Creek is about 3 meters per kilometer. Cobbs Creek's water quality has been degraded by the extensive residential and commercial development in riparian areas (Kaufmann 1992).

Wetland vegetation of the John Heinz National Wildlife Refuge at Tinicum is dominated by the invasive emergent species common reed (*Phragmites australis*). Other wetland vegetation species less widely distributed in the refuge include cattail (*Typha* spp.), wild rice (*Zizania aquatica*), tearthumb (*Polygonum arifolium*), and purple loosestrife (*Lythrum salicaria*). The marsh area has been subject to considerable habitat disturbance, including discharge from a sewage treatment plant, discharges of stormwater runoff, industrial and residential development, and the presence of Route 95, a major interstate highway (Nugent 1992).

The Delaware River has been a spawning site for over 60 species of fish (De Sylva et al. 1962). Near the site, Darby Creek, including the John Heinz National Wildlife Refuge at Tinicum, and the Delaware River support diverse and abundant populations of NOAA trust resources (Table 1; Kaufmann 1992; Lupine 1992; Mitchell 1992). These species are likely to migrate into Darby Creek and reside for extended periods during sensitive life stages. Shallow bays and creek channels in the marsh area provide productive spawning and nursery habitat for numerous anadromous and resident freshwater fishes. Trust resources commonly found in the marsh area include alewife, blueback herring, white perch, striped bass, and mummichog (Kaufmann 1992; Mitchell 1992). Anadromous blueback herring and alewife use the tidal marsh area as a spawning and nursery habitat. Blue crab are also abundant in the marsh and have been identified in Darby Creek several kilometers upstream of the wildlife refuge (Kaufmann 1992). American eel are abundant throughout the drainage (Kaufmann 1992; Mitchell 1992). Atlantic sturgeon are rare and use the Philadelphia reach of the Delaware River as a migratory corridor (Kaufmann 1992).

The reach of the Delaware River near the site also supports an estimated 10,000 federally endangered shortnose sturgeon (Kaufmann personal communication 1993; O'Herron personal communication 1993). Although shortnose sturgeon commonly stay in the deeper central channels of the river, field investigations have tracked individuals by radio-telemetry into nearshore habitats farther upstream in the metropolitan core of Philadelphia. Although unconfirmed, shortnose sturgeon may use the shallow water habitats of Darby Creek for foraging during adult and juvenile life stages (O'Herron personal communication 1993).

Except for small harvests of blue crab, American shad, and blueback herring, there is minimal commercial fishing in the reach of the Delaware River near the site. Most commercial fishing begins about 90 km south of the site where the Delaware River begins to widen into Delaware Bay and brackish conditions predominate. High levels of marine traffic in the Delaware River limit commercial fishing activity. There is a significant sport fishing effort in Darby Creek and the Delaware River. In Darby Creek, a put-in / take-out rainbow trout and brown trout fishery receives the greatest sport effort. A total of 6,600 rainbow and brown trout, which are not NOAA trust resources, are annually released in Darby Creek approximately 900 m from the site (Kaufmann 1992). Striped bass is the favored recreational species in the Delaware River near Darby Creek. Alewife and blueback herring are also fished recreationally. In recent years, a sport fishery for the white perch has developed in the Delaware River and is expected to increase (Lupine 1992). The majority of sport fishing near the wildlife refuge is directed toward carp and catfish; neither species is under NOAA's trust (Mitchell 1992).

The Pennsylvania Bureau of Water Quality currently has an advisory on the human consumption of several species that are fished for recreational purposes in the Delaware River due

to excessive levels of PCBs and chlordane. White perch, blue crab, and American eel are NOAA trust resources included in the advisory (Kaufmann 1992; Soldo 1992).

Site-Related Contamination

Limited sampling was conducted at the Austin Avenue Radiation site. The Pennsylvania Department of Environmental Protection visited the site twice in 1991. During the site visits, radon monitoring was conducted and an unknown number of soil samples were collected from the vicinity of the warehouse (Lee 1991).

Gamma radiation was detected in the warehouse, associated structures, and the tailings pile at the Austin Avenue site. Gamma radiation dose rates ranged from 190 μR/hr to a maximum rate of 1,200 μR/hr measured in the tailings pile (Voltaggio 1991).

In 1991, EPA tested over 100,000 residences in Lansdowne and surrounding towns for gamma radiation. Elevated radiation levels were detected at 29 sites, with 800 μR/hr the maximum radiation dose measured. (The EPA action level for human health is 0.1 REM/year for gamma radiation, equivalent to 11.4 μR/hr [Lee 1991]). The warehouse at Austin Avenue is believed to be the source of the radiation.

Radium-226, radium-228, and uranium-238 were measured in soil samples at concentrations of 10.5, 3.3, and 6.8 pCi/g, respectively (Lee 1991). The estimated background level of both radium and uranium in Pennsylvania soils is 1.2 pCi/g. Federal regulations state that the concentrations of radium-226 in soils shall not exceed the background concentration by more than 5 pCi/g, averaged over the first 15 cm of soil below the surface of an area of 100 m^2 (Johnson 1991). The regulations do not specify which background values should be used (regional, state, or local), however.

No data were provided regarding sampling of groundwater or surface water near the site. From the documents reviewed, it did not appear that water sampling was conducted. Screening guidelines for gamma radiation in aquatic environments were not available in the literature.

Summary

The site is believed to be the source of elevated levels of gamma radiation in the area: elevated levels of radium-226, radium-228 and uranium-238 were detected in samples taken within a 4-km radius of the site. Two streams that join and ultimately empty into the Delaware River are within this radius. One of these streams and the Delaware River are considered primary habitat for NOAA trust resources and the other stream is

considered secondary habitat. While no data currently exist there is a potential that radiation contamination could have migrated to these streams either via surface water runoff or groundwater.

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