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## Zschiegner Refining Company

Howell Township, New Jersey  
CERCLIS #NJ0986643153

### ■ Site Exposure Potential

The Zschiegner Refining Company occupies approximately 2.5 hectares in Howell Township, Monmouth County, New Jersey (Figure 1). Haystack Brook and its associated wetlands drain from north to south across the eastern portion of the facility, and an unnamed tributary drains the southern site area before it joins Haystack Brook. Haystack Brook flows for 5.3 km to Muddy Ford Brook, which ends 1.1 km downstream at the North Branch Metedeconk River. The North Branch joins the Metedeconk River proper 2.9 km farther downstream before meandering another 10 km to Barnegat Bay and the Atlantic Ocean.

Zschiegner conducted secondary (recovery) refining of precious metals from 1964 to 1992. These operations included chemical stripping of precious metals from watchbands, film, and electrical components. The documents reviewed did not indicate whether the recovered metals were smelted at the facility. Site operations also included manufacturing of methamphetamine, a controlled drug. It is not known when drug manufacturing began, but these activities were confirmed by a Drug Enforcement Agency (DEA) search on October 31, 1992. DEA agents found approximately 3,000 chemicals improperly stored throughout the site, including sodium peroxide, cyanide salts, caustics, and acids.

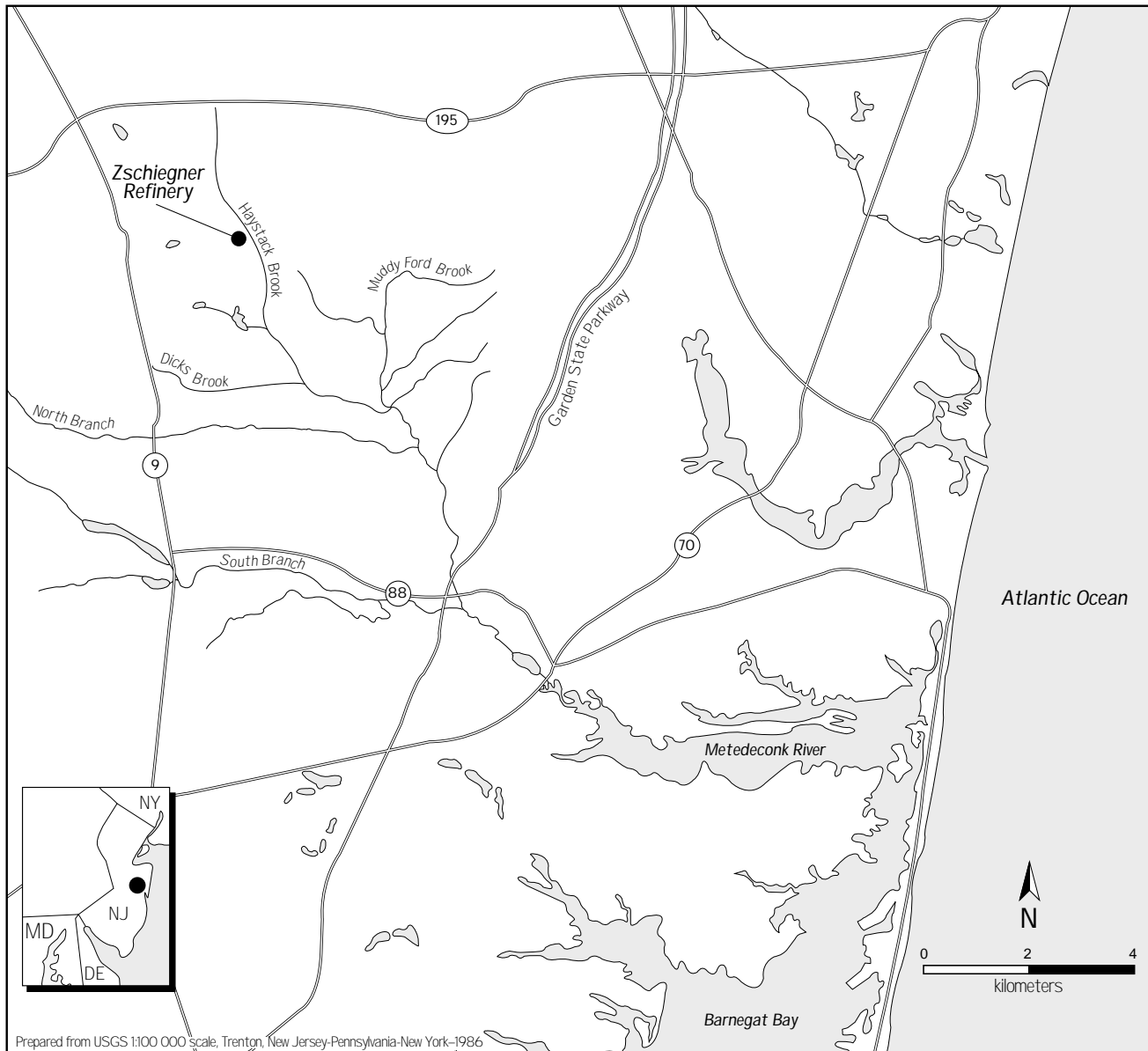


Figure 1. Location of the Zschiegner Refinery site

In 1992, EPA removed about 7,600 L of acidic solutions and 6,100 L of caustic (basic) solutions from the site, and lab-packed another 1,400 small containers of hazardous substances. An EPA removal action in 1993 properly disposed of the lab-packed hazardous substances (EPA 1996; 1998).

The potential pathways of contaminant transport into Haystack Brook are surface water runoff, erosion, and groundwater migration. During a site reconnaissance in 1995, overland runoff was observed from the chemical handling facility through the wetlands to the unnamed tributary

and Haystack Brook (Figure 2; EPA 1996). Groundwater sampling to identify impacts from site-related contaminants has not yet been completed. Depth to groundwater is believed to be very shallow, as indicated by the permanence of Haystack Brook and its associated wetlands. Groundwater flow is expected to be east toward Haystack Brook (EPA 1996).

## ■ NOAA Trust Habitats and Species

The NOAA trust habitats potentially affected by the Zschiegner Refining site are Haystack Brook, its unnamed tributary, the North Branch Metedeconk River, and the associated wetlands and riparian corridors. Haystack Brook is a lowland, spring-fed stream that is less than 15 m wide and 2 m deep near the site. Palustrine, forested wetlands are dominant in the riparian zone from the site downstream to the North Branch Metedeconk River (EPA 1996).

An unsuccessful proposal to build a dam in 1972 provided limited information about fish species within Haystack Brook. The proposal reported that no anadromous fish were present. Catadromous American eel probably use Haystack Brook, since they are found throughout the Barnegat Bay watershed. There are no impediments to fish migration between the site and Barnegat Bay. The North Branch Metedeconk River supports recreational fisheries for warmwater resident species such as bass and sunfish, but there are no

known fisheries for anadromous or catadromous species (Boriek personal communication 1998).

The North Branch Metedeconk River downstream of Haystack Brook is a small to moderate-sized, low-gradient stream with average flows of about 60 cfs (EPA 1996). The New Jersey Department of Environmental Protection (NJDEP) collected anadromous blueback herring and alewife where Highway 88 crosses the river, approximately 8 km downstream of the site. NJDEP considers the North Branch Metedeconk River to be an anadromous watershed and manages the stream for these two species. Anadromous runs in the North Branch have access to Haystack Brook (Boriek personal communication 1998).

## ■ Site-Related Contamination

Data from EPA site investigations indicate elevated concentrations of site-related contaminants in soils, surface water, and sediment at the Zschiegner Refinery site (EPA 1994; 1996). Table 1 summarizes contaminant concentrations found during the 1995 site investigation. Contaminants of concern to NOAA include PAHs, solvents, pesticides, and trace elements. Data collected during the 1992 removal action did not meet EPA standards, and were not included in the site evaluation (EPA 1996).

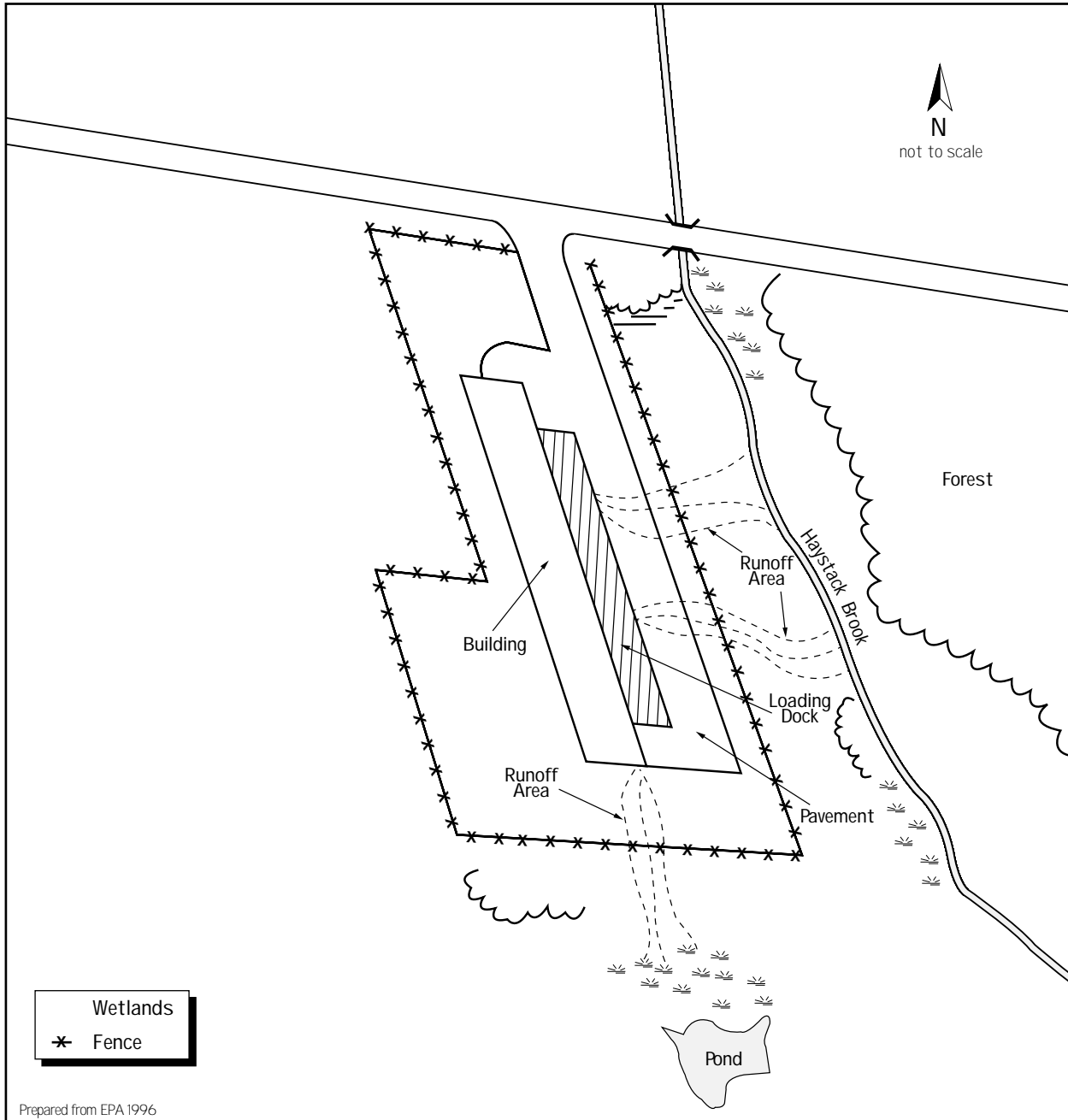


Figure 2. Detail of the Zschiegner Refinery site.

The data suggest soils are contaminated with both trace elements and organic contaminants at the Zschiegner site (Table 1; EPA 1996). Most of these samples were collected between the site

and Haystack Brook. Trace elements were found at concentrations substantially above average U.S. soil concentrations. The highest concentrations

Table 1. Maximum concentrations of contaminants of concern to NOAA at Zschiegner Refining Company site, Howell Township, New Jersey.

CONTAMINANT	Soils		Water		Sediment	
	On-Site Soils (mg/kg)	Mean U.S. <sup>a</sup> (mg/kg)	Surface Water (µg/L)	AWQC <sup>b</sup> (µg/L)	Sediments (mg/kg)	TEL <sup>d</sup> (mg/kg)
<b>INORGANIC</b>						
Arsenic	21	5.2	2.0	190	5.0	5.9
Beryllium	20.5	0.63	0.5	5.3	3.1	NA
Cadmium	4.0	0.06	2.0	1.1 <sup>c</sup>	1.0	0.60
Chromium, total	15000	37	12	NA	610	37
Copper	12000	17	84	12 <sup>c</sup>	990	36
Cyanide (HCN)	6380	NA	NA	5.2	7.8	0.19
Lead	150	16	13	3.2 <sup>c</sup>	47	35
Mercury	1.2	0.058	NA	0.012	NA	0.18
Nickel	670	13	14	160 <sup>c</sup>	170	18
Selenium	4.6	0.26	NA	71	3.4	NA
Silver	1100	0.05	5.0	0.12	NA	NA
Zinc	540	48	35	110 <sup>c</sup>	87	120
<b>ORGANIC</b>						
4,4'-DDE	0.04	NA	ND	1050 <sup>f</sup>	ND	NA
4,4'-DDT	0.06	NA	ND	0.001	ND	0.007 <sup>t</sup>
Acetone	2.6	NA	10	NA	64	NA
Aldrin	0.02	NA	ND	3.0 <sup>e</sup>	ND	NA
alpha-Chlordane	0.02	NA	ND	0.0043	0.03	NA
Anthracene	ND	NA	ND	NA	0.09	NA
Benzo(a)anthracene	0.26	NA	ND	NA	0.5	0.032
Benzo(a)pyrene	0.21	NA	ND	NA	0.6	0.032
Benzo(b)fluoranthene	0.52	NA	ND	NA	1.3	NA
Benzo(g,h,i)perylene	0.17	NA	ND	NA	0.48	NA
Benzo(k)fluoranthene	0.19	NA	ND	NA	0.39	NA
Dieldrin	ND	NA	ND	0.0019	0.02	0.0029
Di-n-butyl phthalate	0.14	NA	NA	3.0 <sup>f</sup>	0.1	NA
Fluoranthene	0.55	NA	ND	NA	2.0	0.111
Fluorene	ND	NA	ND	NA	0.06	NA
gamma-Chlordane	ND	NA	ND	NA	0.03	0.0045 <sup>t</sup>
Indeno(1,2,3-c,d)pyrene	0.18	NA	ND	NA	0.46	NA
Pentachlorophenol	ND	NA	ND	13 pH	0.09	NA
Phenanthrene	0.48	NA	ND	6.3	0.84	0.042
Pyrene	0.62	NA	ND	NA	1.2	0.053
<p>NA: Not available  ND: Not detected; detection limits not available.  a: Shacklette and Boemgen (1984), except for silver and cadmium, which are from Lindsay (1979).  b: Quality Criteria for Water (EPA 1993). Freshwater chronic criteria, unless otherwise noted;  c: Hardness-dependent criterion, hardness of 100 mg/L calcium carbonate assumed.  d: Threshold effect level; concentration below which adverse biological effects were rarely observed (geometric mean of the 15% concentration in the effects dataset) as compiled by Smith et al. (1996).  e: AWQC acute value, chronic not available.  f: Lowest Observed Effect Level (EPA 1993).  g: Open water disposal guideline (Persaud 1993).  pH: Criterion is pH-dependent; pH of 7.8 assumed (EPA 1993).  t: Criterion for total concentration for chemical class, e.g., sum of DDT, DDD, and DDE isomers.</p>						

were found predominantly between the main buildings and Haystack Brook. Nationally accepted screening values for organic contaminants in soil are not available. Groundwater samples were not collected.

Surface water in both Haystack Brook and the tributary had concentrations of cadmium, copper, lead, and silver greater than their respective AWQC. In general, concentrations downstream of the site were substantially higher than upstream concentrations.

Sediments collected in Haystack Brook and the tributary were contaminated with trace elements and organic compounds. Concentrations of total chromium, copper, and nickel significantly exceeded freshwater TEL guidelines. PAH compounds were also measured in sediments at concentrations that exceed freshwater TEL guidelines, including benzo(a)pyrene, fluoranthene, and phenanthrene. Acetone, a volatile solvent, was measured at 64 mg/kg in sediment. The limited available data indicate potential contamination with other types of organic contaminants, including phthalates, and pesticides. In general, concentrations in samples collected downstream of the facility were substantially higher than upstream samples.

## ■ Summary

EPA site investigations indicate that soil, surface water, and sediments are contaminated with trace

elements and organic compounds downstream of the Zschiegner Refining site. NOAA trust habitats potentially impacted by the Zschiegner site are Haystack Brook, an unnamed tributary to the Brook, the North Branch Metedeconk River, and the associated wetlands and riparian zones. Surface-water runoff from the site flows into Haystack Brook and its tributary. Haystack Brook is a lowland, spring-fed stream which flows to the North Branch Metedeconk River, which is managed for anadromous blueback herring and alewife by the State of New Jersey.

## ■ References

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