Standard Chlorine

Kearny, New Jersey
EPA Facility ID: NJD002175057
Basin: Hackensack-Passaic
HUC: 02030103

Executive Summary

The Standard Chlorine site in Kearny, Hudson County, New Jersey, is bordered by the Hackensack River. From the early 1900s to the 1990s, the site was used by multiple owners to manufacture naphthalene products, creosote-based disinfectants, batteries, rubber products, solvents, chlorobenzene-based mothballs, and other chemical products. The primary contaminants of concern to NOAA are metals, dioxins, PAHs, and chlorobenzenes. The habitats of primary concern to NOAA are the lower Hackensack River and Newark Bay. NOAA trust resources found near the site in the lower Hackensack River include anadromous, catadromous and estuarine fish, and invertebrates. The primary pathways for the migration of contaminants from the site to NOAA trust resources are surface water transport via a buried drainage pipe and a drainage ditch on the site, which discharge to the Hackensack River, and surface water runoff into the Hackensack River. Groundwater is a secondary pathway for migration of contaminants to NOAA trust resources.

Site Background

The Standard Chlorine site (Standard Chlorine) in Kearny, Hudson County, New Jersey (Figure 1) was used by multiple owners from the early 1900s to the 1990s for chemical manufacturing and processing. The Standard Chlorine property, which encompasses approximately 10 ha (25 acres), is bordered to the east by the Hackensack River, to the west by the Belleville Turnpike, to the north by the former Diamond Shamrock Corp Superfund site, and to the south by the Koppers Co Inc/Seaboard Plant hazardous waste site, where cleanup is being lead by the state of New Jersey.

The Standard Chlorine property has been used for producing naphthalene products, creosote-based disinfectants, batteries, rubber products, solvents, chlorobenzene-based mothballs, and other chemical products. The general layout of the property is shown on Figure 2. Several buildings, two waste lagoons, a drainage ditch, and a buried drainage pipe are still present on the site property. When the Standard Chlorine facility was active, waste from the chemical manufacturing process was disposed of in the two waste lagoons (USEPA 2003). The drainage ditch and drainage pipe discharge into the Hackensack River via the south and north outfalls, respectively.

Environmental investigations have been conducted at the Standard Chlorine site since the 1980s (USEPA 2008a); the most recent investigation was an expanded site inspection, which was completed in April 2003. The site was placed on the U.S. Environmental Protection Agency's (USEPA) National Priorities List on September 19, 2007 (USEPA 2008a). The site is currently included in a remedial investigation of the Hackensack River Study Area (BBL 2005), which also includes the former Diamond Shamrock Corp Superfund site and the Koppers Co Inc/Seaboard Plant state-lead hazardous waste site.

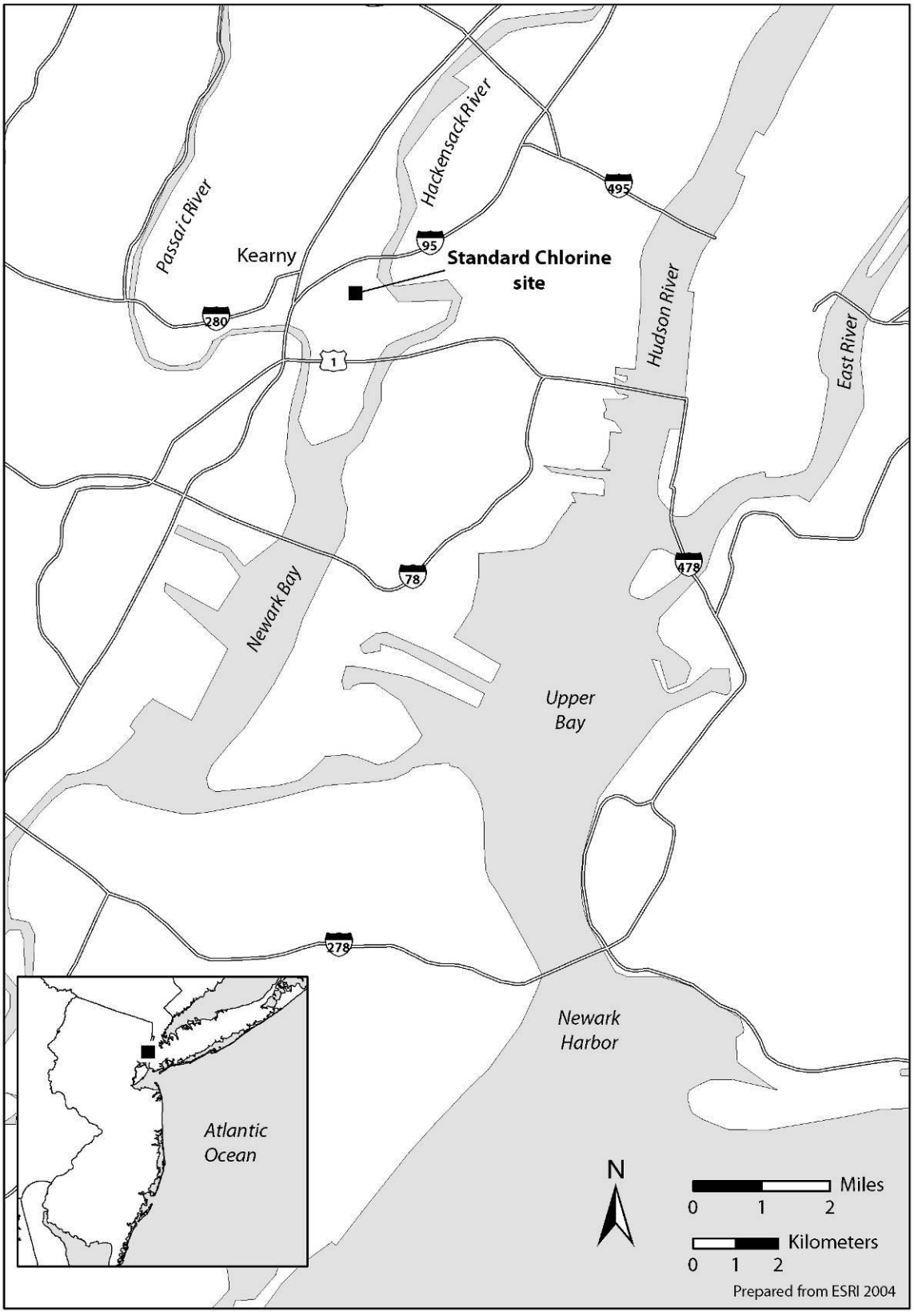

Figure 1. Location of the Standard Chlorine site, Kearny, New Jersey.

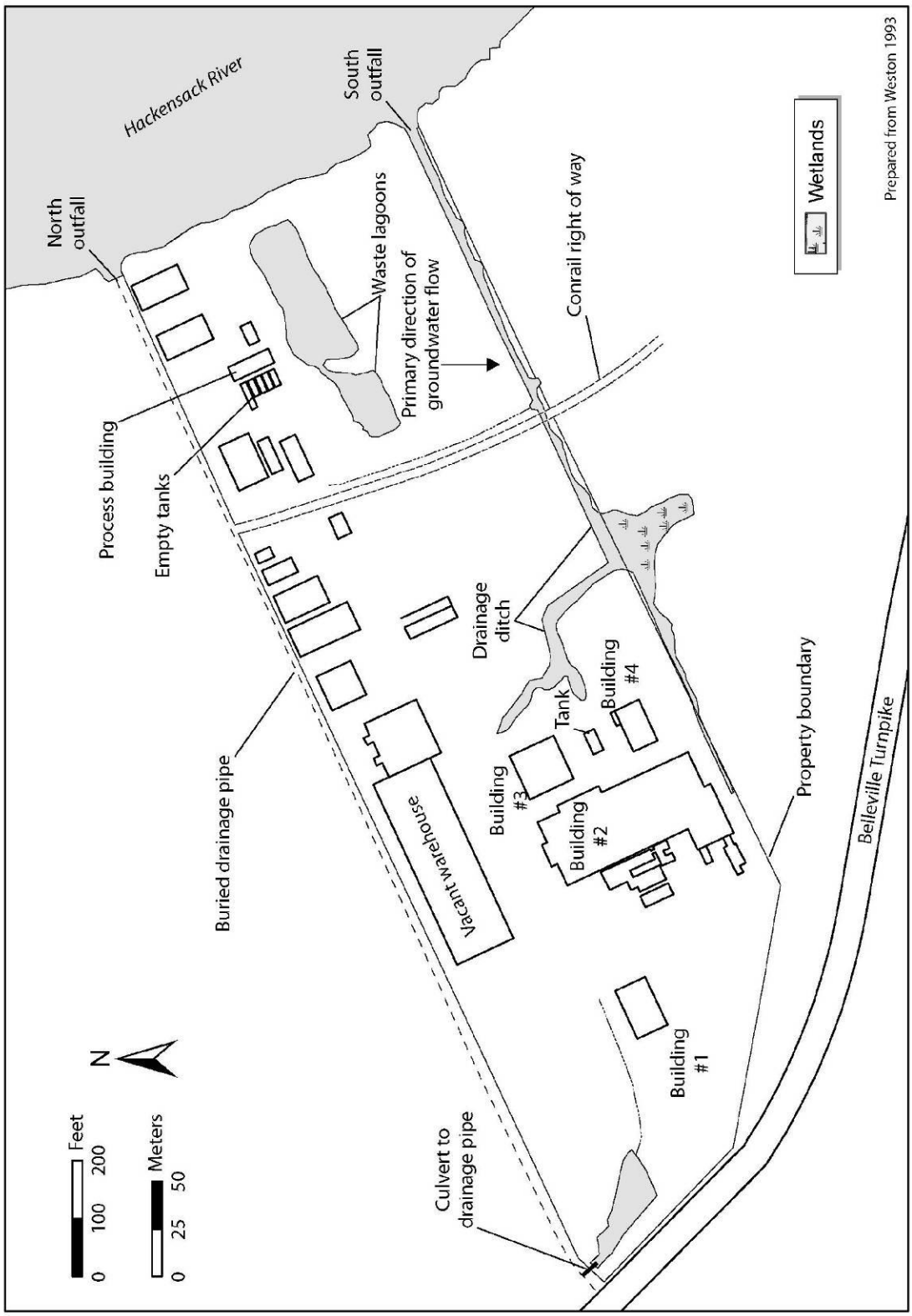

Figure 2. Detail of the Standard Chlorine property.

The primary pathways for the migration of contaminants from the Standard Chlorine site to NOAA trust resources are surface water transport to the Hackensack River via the drainage pipe and drainage ditch, and surface water runoff into the Hackensack River. Groundwater is a secondary pathway for migration of contaminants to NOAA trust resources. Surface water runoff from most of the property is collected in the drainage ditch at the southeast side of the property (Figure 2). The ditch also receives runoff from the adjacent property to the south, drainage ditches along the Belleville Turnpike, and other areas. Surface water runoff from the northwest section of the property flows through a culvert into the buried drainage pipe and is then discharged to the Hackensack River via the north outfall (USEPA 2003). Groundwater at the site is encountered within a few feet of the surface and flows mostly to the south (Weston 1993). Soil at the site consists of a layer of fill 2.4 to 3 m (8 to 10 ft) in thickness; the fill is composed of slag and silty sand (Weston 1993).

NOAA Trust Resources

The habitats of primary concern to NOAA are the lower Hackensack River, which is adjacent to the site, and Newark Bay, which is approximately 6 km (4 mi) south of the site. The site drains to the lower Hackensack River, which flows into Newark Bay (Figure 1).

The Standard Chlorine site is located within the Hackensack Meadowlands, a U.S. Fish and Wildlife Service (USFWS) Significant Habitat Complex. The lower Hackensack River is identified as Essential Fish Habitat for 14 species by the National Marine Fisheries Service, and the Hackensack Meadowlands has been designated an Aquatic Resource of National Importance by the USEPA and other federal agencies (USFWS 2006).

Table 1 lists some of the NOAA trust resources commonly found in the lower Hackensack River, which provides spawning, nursery, and adult habitat for numerous estuarine and anadromous fish species, including alewife, Atlantic silverside, Atlantic tomcod, mummichog, striped bass, striped killifish, and white perch. The lower Hackensack River is brackish, due in part to the Oradell Dam, located upstream of the site, which reduces freshwater flow to the tidal portion of the river. The dam presents a barrier to anadromous fish species accessing their freshwater spawning grounds (Bragin et al. 2005). The dominant fish in the lower Hackensack River are resident estuarine fish tolerant of fluctuations in salinity and water quality. The lower Hackensack River contains contaminated sediments, and dissolved oxygen concentrations in the river are low during the summer months (USFWS 1997).

Striped bass are fished recreationally in the lower Hackensack River (Papson 2006). There are no commercial fisheries in the lower Hackensack River and crabbing is illegal. A fish consumption advisory is in effect for American eel, blue crab, striped bass, white catfish, and white perch in the tidal Hackensack River and the Newark Bay complex because of polychlorinated biphenyls (PCBs), dioxins, and mercury. The advisory recommends limited consumption of striped bass and white catfish and no consumption of American eel, blue crab, and white perch for the general public (NJDEP 2006).

Table 1. NOAA trust resources present in the lower Hackensack River near the Standard Chlorine Chemical Company, Inc. site (USFWS 1997, Kiviat and MacDonald 2004, Bragin et al. 2005, Papson 2006).

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*			♦		
Blueback herring	*Alosa aestivalis*			♦		
Gizzard shad	*Dorosoma cepedianum*			♦		
Striped bass	*Morone saxatilis*	♦	♦	♦		♦
White perch	*Morone americana*	♦	♦	♦		
CATADROMOUS FISH						
American eel	*Anguilla rostrata*			♦		
MARINE/ESTUARINE FISH						
Atlantic menhaden	*Brevoortia tyrannus*	♦	♦	♦		
Atlantic silverside	*Menidia menidia*	♦	♦	♦		
Atlantic tomcod	*Microgadus tomcod*	♦	♦	♦		
Bluefish	*Pomatomus saltatrix*	♦	♦	♦		
Inland silverside	*Menidia beryllina*	♦	♦	♦		
Mummichog	*Fundulus heteroclitus*	♦	♦	♦		
Striped killifish	*Fundulus majalis*	♦	♦	♦		
INVERTEBRATES						
Blue crab	*Callinectes sapidus*	♦	♦	♦		
Grass shrimp	*Palaemonetes pugio*	♦	♦	♦		
Mysid shrimp	*Neomysis americana*	♦	♦	♦		
Sevenspine bay shrimp	*Crangon septemspinosa*	♦	♦	♦		
Estuarine mud crab	*Rhithropanopeus harrisii*	♦	♦	♦		

Site-Related Contamination

Surface water, sediment, groundwater, and soil samples were collected from the Standard Chlorine site during multiple investigations (Weston 1993, ERM 1997, Key 1999, Brown and Caldwell 2001, Salkie 2002, BBL 2005). Surface water and sediment samples were collected from the Hackensack River, the drainage ditch on the property, and wetlands south of the property. Groundwater samples were collected from monitoring wells throughout the property, and soil samples were also collected throughout the property. Based on the results of laboratory analyses of these samples, the primary contaminants of concern to NOAA are metals, polycyclic aromatic hydrocarbons (PAHs), chlorobenzenes, and dioxins, specifically 2,3,7,8-TCDD.

Table 2 summarizes the maximum concentrations of contaminants of concern to NOAA detected during the site investigations and compares them to relevant screening guidelines. Site-specific or regionally specific screening guidelines are always included when available.

In the absence of such guidance, the screening guidelines for groundwater and surface water are the ambient water quality criteria (AWQC; USEPA 2006); the screening guidelines for sediment in a freshwater environment are the threshold effects concentrations (TECs; MacDonald et al. 2000); the screening guidelines for soil are the Oak Ridge National Laboratory final preliminary remediation goals (ORNL-PRGs; Efroymson et al. 1997) and the USEPA's ecological soil screening guidelines (USEPA 2008b). Exceptions to these screening guidelines, if any, are noted in Table 2. Only maximum concentrations that exceeded relevant screening guidelines or for which no screening guidelines are currently available, are discussed below. When known, the general sampling locations are also provided.

Table 2. Maximum concentrations of contaminants of concern to NOAA at the Standard Chlorine Chemical Company, Inc. site (Weston 1993, ERM 1997, Key 1999, Brown and Caldwell 2001, Salkie 2002, BBL 2005). Contaminant values in bold exceed or are equal to screening guidelines.

	Soil (mg/kg)		**Water (µg/L)**			**Sediment (mg/kg)**	
Contaminant	Soil	ORNL-PRG[a]	Groundwater	Surface Water	AWQC[b]	Sediment	TEC[c]
METALS/INORGANICS							
Arsenic	**42**	9.9	**250**	73	150	**120**	9.79
Cadmium	**4.2**	0.36[d]	**170**	**9.3**	0.25[e]	**3.3**	0.99
Chromium	**35,000**	0.4	**100,000**	**8,600**	11[f]	**14,000**	43.4
Copper	**340**	60	**570**	**460**	9[e]	**1,300**	31.6
Lead	**650**	40.5	**21,000**	**12,000**	2.5[e]	**740**	35.8
Mercury	**0.5**	0.00051	**140**	**8.8**	0.77[g]	**9.1**	0.18
Nickel	**52**	30	**6,700**	**200**	52[e]	**310**	22.7
Selenium	ND	0.21	**25**	ND	5.0[h]	2.0	NA
Silver	ND	2	**10**	**8.1**	3.2[e,i]	2.8	4.5[j]
Zinc	**3,700**	8.5	**12,000**	**1,100**	120[e]	**610**	121
PAHs							
Acenaphthene	0.5	20	**2,900**	38	520[k]	**25**	0.290[j]
Acenaphthylene	0.1	NA	190	3	NA	**50**	0.160[j]
Anthracene	0.6	NA	69	4	NA	**130**	0.0572
Benz(a)anthracene	1.6	NA	ND	7.6	NA	**300**	0.108
Benzo(a)pyrene	0.4	NA	ND	9.1	NA	**280**	0.15
Benzo(b)fluoranthene	0.7	NA	ND	12	NA	390	NA
Benzo(k)fluoranthene	0.2	NA	ND	4.3	NA	**130**	13.4[j]
Chrysene	1.6	NA	ND	8.6	NA	**260**	0.166
Dibenz(a,h)anthracene	0.5	NA	ND	ND	NA	**61**	0.033
Fluoranthene	3.5	NA	30	16	NA	**740**	0.423
Fluorene	0.2	NA	300	9	NA	**46**	0.0774
Indeno(1,2,3-cd)pyrene	0.9	NA	ND	6.5	NA	**190**	0.330[j]
2-Methylnaphthalene	ND	NA	ND	80	NA	190	NA

Table 2 continued on next page

Table 2, *cont.*

	Soil (mg/kg)		Water (µg/L)			Sediment (mg/kg)	
Contaminant	Soil	ORNL-PRG[a]	Ground-water	Surface Water	AWQC[b]	Sediment	TEC[c]
Naphthalene	2,400,000	NA	**58,000**	260	620[k]	**4,600**	0.176
Phenanthrene	2.4	NA	290	7.8	NA	**520**	0.204
Pyrene	6.9	NA	22	19	NA	**580**	0.195
CHLOROBENZENES							
1,2-Dichlorobenzene	9,200	NA	**30,000**	450	763[k]	5,300	NA
1,3-Dichlorobenzene	1,700	NA	27,000	430	NA	3,900	NA
1,4-Dichlorobenzene	4,800	NA	**29,000**	610	763[k]	6,000	NA
1,2,4-Trichlorobenzene	100,000	NA	**26,000**	**200**	50[k]	2,900	NA
PESTICIDES/PCBs							
4,4'-DDE	ND	NA	ND	ND	1,050[i,k]	**0.03**	0.00316
4,4'-DDT	ND	NA	ND	ND	0.001[l]	**0.04**	0.00416
Dieldrin	ND	0.000032[d]	ND	ND	0.056	**0.07**	0.0019
Endrin	ND	NA	ND	ND	0.036	**0.09**	0.00222
Heptachlor	ND	NA	ND	ND	0.0038	**0.11**	0.010[j]
Heptachlor Epoxide	ND	NA	ND	ND	0.0038	**0.56**	0.00247
Total PCBs	0.3	0.371	ND	ND	0.014	**0.21**	0.0598
DIOXINs/FURANs							
TEQ (Toxic Equivalent Value)[m]	**0.3**	3.15×10^{-6}	ND	NA	1.0×10^{-8}[k]	**9.6×10^{-5}**	3.18×10^{-6}[n]

a: Oak Ridge National Laboratory (ORNL) final preliminary remediation goals (PRG) for ecological endpoints (Efroymson et al. 1997).

b: Ambient water quality criteria for the protection of aquatic organisms (USEPA 2006). Freshwater chronic criteria presented.

c: Threshold effects concentration (TEC). Concentration below which harmful effects are unlikely to be observed (MacDonald et al. 2000).

d: Ecological soil screening guidelines (USEPA 2008b).

e: Criterion expressed as a function of total hardness; concentrations shown correspond to hardness of 100 mg/L $CaCO_3$.

f: Screening guidelines represent concentrations for $Cr.^{+6}$

g: Derived from inorganic, but applied to total mercury.

h: Criterion expressed as total recoverable metal.

i: Chronic criterion not available; acute criterion presented.

j: Freshwater upper effects threshold (UET) for bioassays. The UET represents the concentration above which adverse biological impacts would be expected.

k: Lowest observable effects level (LOEL) (USEPA 1986).

l: Expressed as total DDT.

m: Maximum toxic equivalent (TEQ) value is provided. Each dioxin/furan is assigned a toxic equivalency factor (TEF) relative to 2,3,7,8-tetrachlorodibenzodioxin, which is the most toxic in this group of compounds. In order to determine the toxicity of a mixture of dioxin/furan compounds, the measured concentration of the individual dioxins/furans is multiplied by the assigned TEF. The results are summed to produce a TEQ.

n: Regional-specific biota-sediment accumulation factor (BSAF; Wintermyer and Cooper 2003).

NA: Screening guidelines not available.

ND: Not detected.

Surface Water

Eight metals were detected in surface water samples collected from the Standard Chlorine site at maximum concentrations that exceeded screening guidelines (Table 2). The maximum concentration of lead, which was detected in a sample taken from the wetlands south of the property (Figure 2), exceeded the AWQC by three orders of magnitude. The maximum concentration of chromium, which was detected in a sample collected from the western portion of the drainage ditch, exceeded the AWQC by two orders of magnitude. The maximum concentrations of cadmium, copper, mercury, nickel, silver, and zinc were detected in samples collected from the Hackensack River adjacent to the Standard Chlorine site. The maximum concentrations of cadmium, copper, and mercury exceeded the AWQC by one order of magnitude. The maximum concentrations of silver, nickel, and zinc exceeded the AWQC by factors of 2.5, four, and nine, respectively.

Thirteen PAHs were detected in surface water samples collected from the Standard Chlorine site (Table 2). The maximum concentrations of acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene were detected in samples taken from the Hackensack River adjacent to the site. The maximum concentrations of fluorene and phenanthrene were detected in samples taken from the eastern portion of the drainage ditch. The maximum concentration of 2-methylnaphthalene was detected in a sample taken from the western portion of the drainage ditch. Screening guidelines are not currently available for comparison to the maximum concentrations of any of the PAHs that were detected in the surface water samples.

One chlorobenzene was detected at a maximum concentration that exceeded the relevant screening guideline, and a second chlorobenzene was also detected for which no screening guideline is currently available (Table 2). The maximum concentrations of 1,2,4-trichlorobenzene and 1,3-dichlorobenzene were detected in surface water samples collected from the drainage ditch (Figure 2). The maximum concentration of 1,2,4-trichlorobenzene exceeded the AWQC by a factor of four. No screening guideline is currently available for comparison to the maximum concentration of 1,3-dichlorobenzene detected in the surface water samples.

Sediment

Eight metals were detected in sediment samples taken from the Standard Chlorine site at maximum concentrations that exceeded the TECs, and one metal was also detected for which no screening guideline is currently available (Table 2). The maximum concentrations of cadmium, chromium, and nickel were detected in samples collected from the Hackensack River adjacent to the Standard Chlorine property. The maximum concentration of chromium and nickel exceeded the TEC by two orders of magnitude and one order of magnitude, respectively. The maximum concentration of cadmium exceeded the TEC by a factor of three. The maximum concentrations of copper, lead, selenium, and zinc were detected in samples collected from the Hackensack River upstream of the property. The maximum concentrations of copper and lead exceeded the TECs by one order of magnitude. The maximum concentration of zinc exceeded the TEC by a factor of five. No screening guideline is currently available for comparison to the maximum concentration of selenium detected in the sediment samples. The maximum concentrations of arsenic and mercury were detected in a sample collected from the Hackensack River downstream of the site and both exceeded the TECs by one order of magnitude.

Fourteen PAHs were detected in sediment samples taken from the Standard Chlorine site at maximum concentrations that exceeded the TECs, and two PAHs were also detected for which no screening guidelines are currently available (Table 2). The maximum concentrations of acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene were detected in samples collected from the Hackensack River adjacent to the southwest end of the property. The maximum concentration of naphthalene exceeded the TEC by four orders of magnitude. The maximum concentrations of anthracene, benz(a)anthracene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, fluoranthene, phenanthrene, and pyrene exceeded the TECs by three orders of magnitude. The maximum concentrations of acenaphthylene, fluorene, and indeno(1,2,3-cd)pyrene exceeded the TECs by two orders of magnitude. The maximum concentration of benzo(k)fluoranthene exceeded the TEC by one order of magnitude. No screening guideline is currently available for comparison to the maximum concentration of benzo(b)fluoranthene detected in the sediment samples. The maximum concentrations of acenaphthene and 2-methylnaphthalene were detected at in a sample collected from the Hackensack River downstream of the property. The maximum concentration of acenaphthene exceeded the TEC by one order of magnitude. No screening guideline is currently available for comparison to the maximum concentration of 2-methylnaphthalene detected in the sediment samples.

Four chlorobenzenes were detected at maximum concentrations in sediment samples collected from the drainage ditch (Figure 2). No screening guidelines are currently available for comparison to the maximum concentrations of 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and 1,2,4-trichlorobenzene detected in the sediment samples.

Six pesticides and PCBs were detected in sediment samples collected from the Standard Chlorine site at maximum concentrations that exceeded the TECs (Table 2). The maximum concentrations of the pesticides 4,4'-DDE, 4,4'-DDT, dieldrin, and endrin, which were detected in samples collected from the wetlands south of the property (Figure 2), exceeded the TECs by approximately one order of magnitude. The pesticides heptachlor and heptachlor epoxide, and total PCBs were detected at maximum concentrations in samples collected from the Hackensack River approximately 300 m (1,000 ft) downstream of the property. The maximum concentration of heptachlor epoxide exceeded the TEC by two orders of magnitude; heptachlor exceeded the TEC by one order of magnitude. The maximum concentration of total PCBs exceeded the TEC by a factor of 3.5.

The maximum concentrations of dioxins were detected in sediment samples collected from the Hackensack River adjacent to the Standard Chlorine property. The maximum toxic equivalent value (TEQ) calculated for dioxins exceeded the region-specific biota-sediment accumulation factor (BSAF) by one order of magnitude (.

Groundwater

Ten metals were detected in groundwater samples collected from monitoring wells on the Standard Chlorine site at maximum concentrations that exceeded the AWQC (Table 2). The maximum concentrations of cadmium, lead, mercury, and selenium were detected in samples taken near the waste lagoons (Figure 2). The maximum concentration of lead exceeded the AWQC by three orders of magnitude; cadmium and mercury exceeded the AWQC by two orders of magnitude. The maximum concentration of selenium exceeded the AWQC by a factor of five. The maximum concentration of chromium, which was detected in

a sample collected from the northeast portion of the site, exceeded the AWQC by three orders of magnitude. The maximum concentrations of arsenic, copper, nickel, and zinc were detected in samples collected from the southeast corner of the site. The maximum concentrations of nickel and zinc exceeded the AWQC by two orders of magnitude. The maximum concentration of copper exceeded the AWQC by one order of magnitude. The maximum concentration of arsenic exceeded the AWQC by a factor of approximately 1.5. The maximum concentration of silver, which was detected in several samples from different locations, exceeded the AWQC by a factor of three.

Two PAHs were detected in groundwater samples collected from the Standard Chlorine site at maximum concentrations that exceeded the AWQC, and six PAHs were also detected for which no screening guidelines are currently available. The maximum concentrations of naphthalene and acenaphthene, which were detected in samples taken from the southeast portion of the site, exceeded the AWQCs by one order of magnitude and a factor of 5.5, respectively. The maximum concentrations of acenaphthylene and phenanthrene were detected in samples collected near the waste lagoons (Figure 2). The maximum concentrations of anthracene, fluoranthene, fluorene, and pyrene were detected in samples collected from the northeast portion of the site. No screening guidelines are currently available for comparison to the maximum concentrations of acenaphthylene, anthracene, fluoranthene, fluorene, phenanthrene, and pyrene detected in the groundwater samples.

Three chlorobenzenes were detected in groundwater at the site at maximum concentrations that exceeded the AWQCs, and a fourth chlorobenzene was also detected for which no screening guideline is currently available (Table 2). The maximum concentration of 1,2-dichlorobenzene, which was detected in a sample collected south of Building 2 (Figure 2), exceeded the AWQC by one order of magnitude. The maximum concentrations of 1,3-dichlorobenzene and 1,4-dichlorobenzene were detected in a sample collected near the wetlands south of the property. The maximum concentration of 1,4-dichlorobenzene exceeded the AWQC by one order of magnitude. No screening guideline is currently available for comparison to the maximum concentration of 1,3-dichlorobenzene detected in the groundwater samples. The maximum concentration of 1,2,4-trichlorobenzene, which was detected in a sample collected near the waste lagoons, exceeded the AWQC by two orders of magnitude.

Soil

Eight metals were detected in soil samples collected from the Standard Chlorine site at maximum concentrations that exceeded screening guidelines (Table 2). Chromium was detected in a sample collected from the north side of the site at a maximum concentration that exceeded the ORNL-PRG by four orders of magnitude. The maximum concentrations of arsenic, cadmium, copper, lead, mercury, nickel, and zinc were detected in samples collected from the southwest portion of the site. The maximum concentration of mercury exceeded the ORNL-PRG by nearly three orders of magnitude; zinc exceeded the ORNL-PRG by two orders of magnitude, and lead exceeded the ORNL-PRG by one order of magnitude. The maximum concentration of cadmium exceeded the USEPA's ecological soil screening guideline by one order of magnitude. The maximum concentrations of nickel, arsenic, and copper exceeded the ORNL-PRGs by factors of approximately two, four, and five, respectively.

Fourteen PAHs for which no screening guidelines are currently available, were detected in soil samples collected from the Standard Chlorine site (Table 2). The maximum concentrations of benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene were

detected in samples collected from the western portion of the site. The maximum concentrations of acenaphthylene, anthracene, benz(a)anthracene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene were all detected in a sample collected northwest of Building 1 (Figure 2). The maximum concentration of naphthalene was detected in a sample collected adjacent to the empty tanks.

Four chlorobenzenes for which no screening guidelines are currently available, were detected in soil samples collected from the site (Table 2). The maximum concentration of 1,2-dichlorobenzene was detected in a sample collected west of Building 2 (Figure 2). The maximum concentration of 1,3-dichlorobenzene was detected in a sample collected near the waste lagoons. The maximum concentrations of 1,4-dichlorobenzene and 1,2,4-trichlorobenzene were detected in a sample collected adjacent to the empty tanks.

The maximum dioxin TEQ was calculated for a soil sample collected near the waste lagoons. The maximum TEQ calculated for dioxins exceeded the ORNL-PRG by nearly five orders of magnitude.

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