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Island Chemical Company

St. Croix, U.S. Virgin Islands
CERCLIS #VID980651095

Site Exposure Potential

The Island Chemical Company site occupies about 1.2 hectares in south-central St. Croix, U.S. Virgin Islands (Figure 1). The site is bordered to the northeast and southeast by River Gut, an intermittent stream that originates north of the site. River Gut flows approximately 240 m before merging with Bethlehem Gut, forming Fair Plain Gut, which discharges to the Caribbean Sea approximately 1.4 km downstream from the site (Figure 1). Flow in River Gut near the site generally occurs only during the rainy season between September and December, but the gut becomes perennial before reaching Fair Plain Gut (NUS Corporation 1991).

Charles H. Steffey, Inc. purchased the site in 1968; it is now owned by the same corporation, which changed its name to CHS Holding Corporation (CHS) sometime before 1982. Between 1968 and 1982, the site was leased by numerous chemical companies and their subsidiaries, including Caribe Chemical Company, Pierrel S.p.a., Cooper Laboratories, Island Chemical Company, Berlex, and the Virgin Island Chemical Company. The plant was closed in 1982 and is now vacant (EPA 1994).

Chemicals produced and/or disposed at the site include pyridine, acids, solvents, benzyl chloride,

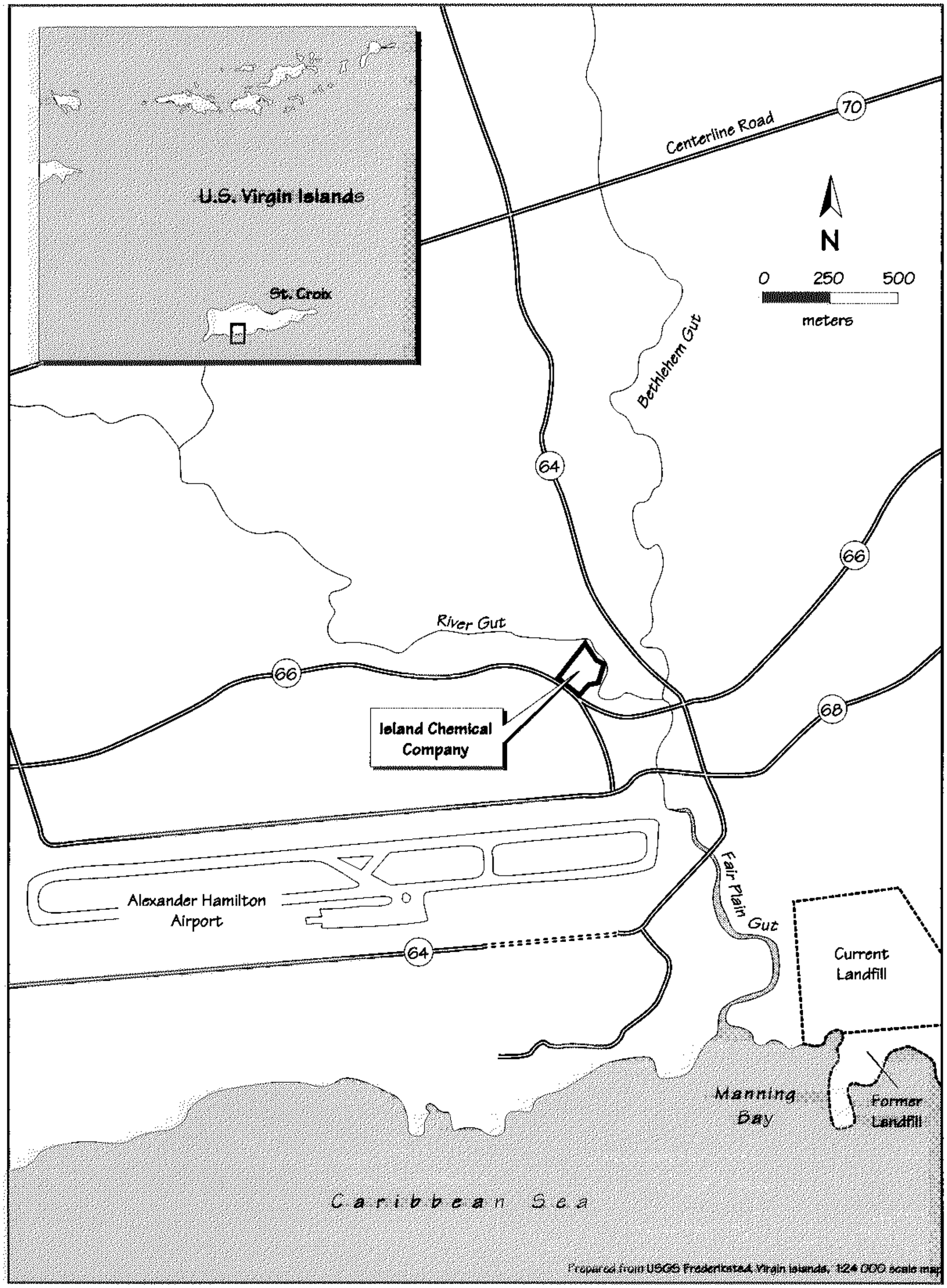

Figure 1. The Island Chemical Company site in St. Croix, U.S. Virgin Islands.

benzyl salicylate, phenacetin, ethoxyquin, quinine, quinidine, and toluene. Table 1 describes six areas of potential environmental concern.

When Island Chemical occupied the facility, it discovered that hazardous materials had been left on-site by the previous tenant. Between 1982 and 1983, about 100,000 liters of toluene and 26,000 liters of xylenes were removed from the site. In 1985, 192 drums of waste were disposed off-site by Island Chemical. In addition, contaminated soils were excavated and removed near the above-ground storage tanks (ASTs), and beneath the concrete pad near the ASTs. According to the RI Work Plan, toluene and pyridine represented the largest volume of releases at the site, based on previous studies (Harding Lawson Associates 1995).

The primary pathways of contaminant transport from the site are surface water runoff into River Gut and groundwater migration. All surface runoff from the site drains into the gut (Figure 2). The surface slopes gently across the site to the northeast. A berm partially separates the ASTs in the western portion of the facility from the remainder of the site. On the western side of the berm, runoff flows from southwest to northeast. On the eastern portion of the site, runoff from concrete and paved areas is channeled into three storm drains which empty into River Gut (Figure 2; Harding Lawson Associates 1995).

Groundwater occurs in the surficial aquifer at approximately 6 m below ground surface. Groundwater flow near the site is to the north and southeast (Harding Lawson Associates 1995). This alluvial aquifer consists of permeable

Table 1. Areas of environmental concern at Island Chemical Company.

Area	Description	Contaminants of Potential Concern
A	Laboratory and warehouse building	Environmental samples were not collected from this area.
B	Aboveground storage tank farm	Benzoquinone, fluorenone, benzophenone, toluene, xylenes, hydroxyfuranocoumarin, p-phenetidine in ASTs. Toluene, quinidine gluconate, quinine sulfate, trace elements (lead, copper, and zinc), and numerous pesticides in soils.
C	Former process pit	Trace elements in sludge. Pesticides and trace elements (lead and zinc) in sediment from storm drain leading from the pit.
D	Loading dock and former lab pit area	Pyridine, toluene, quinidine gluconate, quinine sulfate, and trace elements in soils.
E	Soil beneath concrete pad near ASTs	Five soil samples were collected in 1984 and analyzed for toluene, pyridine, quinidine gluconate, and quinine sulfate. These substances were not detected.
F	Concrete storage pad	Environmental samples have not been collected from this area. This pad was used for storage of drums of raw materials when the facility was in operation.

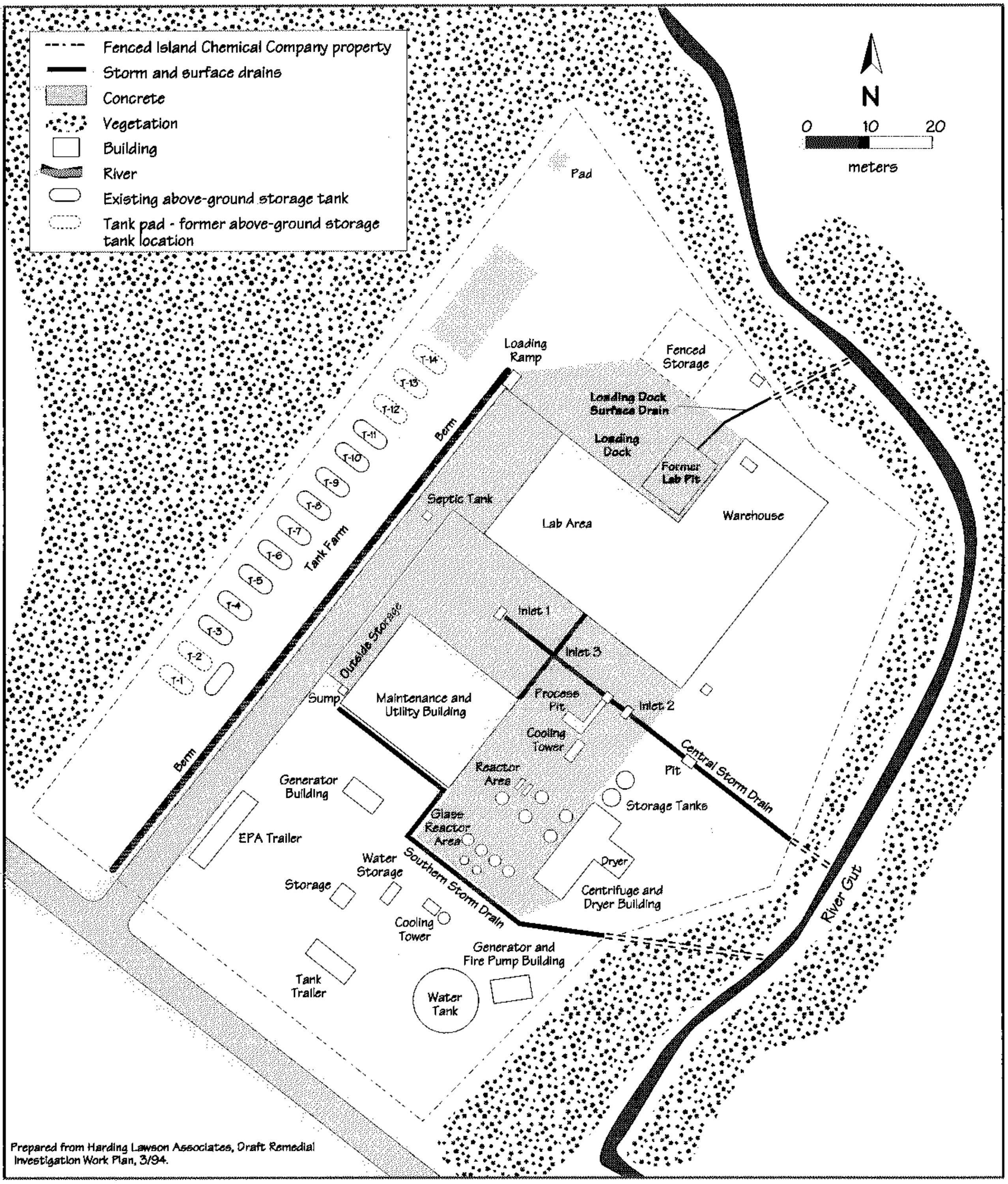

Figure 2. Detail of Island Chemical site.

layers of sand and gravel, ranging from 0.3 to 2.4 m thick, intermixed with low-permeability clay. The interconnection between the permeable layers is not known, but is believed to be isolated and limited. During a pumping test, ponded water in River Gut exhibited no elevation change, indicating that water in the gut may be perched above groundwater (NUS Corporation 1991).

NOAA Trust Habitats and Species

Principal habitats of concern to NOAA are the surface waters and bottom substrates associated with River Gut and Fair Plain Gut. The estuarine waters and reef habitats of Manning Bay are also a concern because of their high species abundance and diversity.

River Gut receives terrestrial runoff from a watershed of 2,700 hectares. The gut is at least partially submerged throughout the year and supports healthy red mangrove (*Rhizophora mangle)* communities. There is a natural buildup of sand deposits at the mouth of Fair Plain Gut due to longshore currents, wind, and wave energy. The berm is approximately 0.9 m high and 6 m wide. This berm is broken only during periods of heavy rains, high seas, or sewage overflows and otherwise blocks the flow of water from Fair Plain Gut to Manning Bay (Department of Planning and Natural Resources 1990; Adams 1995). In spite of the berm, biologists reported numerous fish in the gut. The guts are usually hyperhaline (saltier than the ocean; Adams 1995). Red, black and white mangroves (*Rhizophora mangle, Avicennia germinans, and Laguncularia racemosa* respectively), buttonwood (*Conocarpus erectus)*, and shrubs (*Acacious*) provide dense cover along the shoreline of both guts (Department of Planning and Natural Resources 1990). Information on depth, width, and substrate of both River and Fair Plain Guts was not available, but a high nutrient content is assumed in Fair Plain Gut due to sewage discharges (Department of Planning and Natural Resources 1987 and 1990).

The nearest reef visible from the shoreline is approximately 1.2 km offshore. Manning Bay is a high-salinity environment with a predominantly sandy substrate. There are sea grasses and scattered rubble towards the reef and habitat conditions appear to support complex fish and invertebrate communities. The tidal range averages 0.1 m a day, with an annual range of 6 m.

EPA is negotiating with the St. Croix Port regarding mitigation for the destruction of mangrove habitat near the Alexander Hamilton Airport. Approximately 0.2 hectares of mangroves were bulldozed, including 107 m along Fair Plain Gut.

A great variety of NOAA trust species use Fair Plain Gut and Manning Bay (Table 2). Mangroves provide vital habitat for juvenile marine fishes and juvenile sea turtles because the interconnecting root systems and shallow water

Table 2. Primary fish and invertebrate species that use Fair Plain Gut and Manning Bay.

Common Name	Scientific Name	Habitat			Fisheries	
		Spawning Mating Nesting	Nursery	Adult Forage	Comm.	Recr.
FISHES						
Surgeonfishes	*Acanthuridae*	◆	◆	◆	◆	◆
Cardinalfishes	*Apogonidae*	◆	◆	◆		
Leatherjackets	*Balistidae*	◆	◆	◆	◆	◆
Jacks	*Carangidae*	◆	◆	◆	◆	◆
Snook	*Centropomus undecimalis*	◆	◆	◆	◆	◆
Butterflyfishes	*Chaetodontidae*	◆	◆	◆	◆	◆
Flying gurnard	*Dactylopterus volitans*	◆	◆	◆		
Cubbyu	*Equetus acuminatus*	◆	◆	◆		
Jackknife-fish	*Equetus lancealatus*	◆	◆	◆		
Spotted drum	*Equetus punctatus*	◆	◆	◆		
Mosquitofish	*Gambusia affinis*	◆	◆	◆		
Mojarras	*Gerreidae*	◆	◆	◆	◆	◆
Grunts	*Haemulidae*	◆	◆	◆	◆	◆
Squirrelfishes	*Holocentridae*	◆	◆	◆	◆	◆
Wrasses	*Labridae*	◆	◆	◆	◆	◆
Snappers	*Lutjanidae*	◆	◆	◆	◆	◆
Sand tilefish	*Malacanthus plumieri*	◆	◆	◆		
Tarpon	*Megalops atlantica*	◆	◆	◆		◆
Goatfishes	*Mullidae*	◆	◆	◆	◆	◆
Morays	*Muraenidae*	◆	◆	◆	◆	◆
Garden eel	*Nystactichthys halis*	◆	◆	◆	◆	◆
Angelfishes	*Pomacanthidae*	◆	◆	◆	◆	◆
Damselfishes	*Pomacentridae*	◆	◆	◆	◆	◆
Greater soapfish	*Rypticus saponaceus*	◆	◆	◆	◆	
Sea basses	*Serranidae*	◆	◆	◆	◆	◆
Porgies	*Sparidae*	◆	◆	◆	◆	◆
Parrotfishes	*Sparisoma sp*	◆	◆	◆		
	Scarus sp	◆	◆	◆		
Barracudas	*Sphyraenidae*	◆	◆	◆	◆	◆
Tilapia	*Tilapia sp*	◆	◆	◆	◆	◆
INVERTEBRATES						
Blue crab	*Callinectes sapidus*	◆	◆	◆	◆	◆
Spiny lobster	*Panulirus argus*	◆	◆	◆	◆	◆
Queen conch	*Strombus gigas*	◆	◆	◆	◆	◆
REPTILES						
Green sea turtle*	*Chelonia mydas*	◆	◆	◆		
Hawksbill sea turtle*	*Ertmochelys impricata*	◆	◆	◆		

*Federally listed Endangered Species

provide extensive cover. Tilapia occur in large numbers and are considered ubiquitous. Other dominant fish species include snapper, jack, barracuda, sea bass, butterflyfish, mojarra, mosquitofish, grunt, and wrasse (Adams 1995).

All primary species listed in Table 2 use reef habitats for spawning, nursery, and adult forage (Adams 1995). Turtle grass (*Thalassia testudinum*) colonizes the flat sandy substrates (Adey et al. 1977). Other sea grasses include *Valacia, Syrangodium, Halimeda,* and *Penicillus.* Sea grasses provide both forage and protective cover for sea turtles and nursery habitat for other marine species, including spiny lobster and queen conch (Adams 1995).

Of particular concern to NOAA are two federally endangered species of sea turtle, which are known to forage in Manning Bay and surrounding coastal waters. Turtle surveys have not been conducted near the site, but it is likely that turtles nest along the shoreline in Manning Bay because nesting is extremely common throughout St. Croix (Adams 1995).

Commercial fisheries are considered artisinal and subsistence in nature. Fishes and invertebrates that are harvested both commercially and recreationally include grunt, snapper, jack, surgeonfish, leatherjacket, barracuda, sea bass, butterflyfish, goatfish, mojarra, cardinalfish, porgy, moray, and wrasse, blue crab, spiny lobster, and queen conch (Adams 1995).

Lower Fair Plain Gut receives any overflow from the nearby sewage lift station. Documented fish kills relating to these events have been reported in 1981, 1985, 1987, 1988, and 1990. No health advisories have been documented from the sewage overflow events (Department of Planning and Natural Resources 1990).

Site-Related Contamination

Data collected during previous investigations indicate that groundwater, soils, sludge, storm drains, and sediment in River Gut contain elevated concentrations of site-related contaminants (Harding Lawson Associates 1994, 1995). Table 3 summarizes the contaminants found during previous investigations. The primary contaminants of concern to NOAA at the Island Chemical site are trace elements, organic compounds, and pesticides.

Trace elements, organic compounds, and pesticides have been detected in on-site soils (Table 3; Harding Lawson Associates 1995). Sludge samples taken from the former processing pit contained high concentrations of trace elements and toluene. No other contaminants were reported from the sludge samples, but complete analytical results were not available (Harding Lawson Associates 1995).

VOCs and SVOCs were detected in groundwater sampled during the RI, but at concentrations that would not threaten NOAA trust resources. Of the 15 Target Compound List (TCL) pesticides detected in groundwater, only gamma-chlordane and 4,4'-DDE were detected during both sampling events. Although organic compounds were detected in soils, there were no data to indicate whether they were measured or detected in groundwater. Trace elements were detected in 20 filtered groundwater samples and 21 unfiltered groundwater samples. Chromium, copper, lead, and zinc were detected in filtered samples from all

Table 3. Maximum concentrations of contaminants (mg/kg) detected in environmental media collected from the Island Chemical site during investigations conducted from 1984 to 1991.

	Source Areas			Pathways			
	Soil	Sludge[1]	Avg. Earth's Crust[2]	Storm Drains	River Gut Sediment	ERL[3]	ERM[4]
Trace Elements							
Arsenic	9.1	40	5	5.5	4.1	8.2	70
Cadmium	NR	23	0.06	4.5	2.4	1.2	9.6
Chromium	49	590	100	110	41	81	370
Copper	100	330	30	370	70	34	270
Lead	320	690	10	470	46	47	220
Mercury	NR	2.7	0.03	NR	NR	0.15	0.71
Nickel	34	130	40	48	32	21	52
Zinc	390	3,600	50	1,500	870	150	410
Organic Compounds							
Pyridine	3,000	NR	N/A	NR	NR	NA	NA
Quinidine gluconate	8,200	NR	N/A	NR	NR	NA	NA
Quinine sulfate	2,600	NR	N/A	NR	NR	NA	NA
Toluene	13,900	1,600	N/A	5,600	NR	NA	NA
Pesticides							
Aldrin	30	NR	N/A	0.02	NR	NA	NA
alpha-Chlordane	10	NR	N/A	NR	NR	0.0005	NA
gamma-Chlordane	5.8	NR	N/A	0.024	NR	0.0005	NA
p,p'-DDE	7.5	NR	N/A	0.016	NR	0.002	0.27
Heptachlor epoxide	4	NR	N/A	NR	NR	NA	NA

1: This sludge sample was collected from the former process pit.
2: EPA (1983).
3: Effects range-low, Long and MacDonald (1992).
4: Effects range-median, Long and MacDonald (1992).
NA: Not available.
NR: Data not reported.
N/A: Not applicable.

four monitoring wells during the 1995 sampling events, but data were not presented (Harding Lawson Associates 1995). It could not be determined from the available data whether surface water samples have been collected from storm drains or River Gut.

Sediments from storm drains which lead to River Gut were contaminated with trace elements, pesticides, and organic compounds, primarily toluene. Copper and lead concentrations in the storm drains exceeded ERL guidelines by an order of magnitude. Concentrations of cadmium, copper, nickel, and zinc in sediments from River Gut exceeded ERL guidelines, and zinc exceeded ERM guidelines as well (Harding Lawson Associates 1995). No data were available for organic compounds.

Summary

Results from site investigations indicate that former activities at the Island Chemical site have contaminated soil, sediment, and groundwater. All surface runoff from the site is channeled through storm drains to River Gut, which flows into Fair Plain Gut and discharges to the Caribbean Sea approximately 1.4 km downstream from the site. Primary and secondary habitats close to the site support species of concern to NOAA, including two species of sea turtle that are federally listed endangered species.

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