Solitron Microwave

Port Salerno, Florida

EPA Facility ID: FLD045459526

Basin: Everglades

HUC: 03090202

Executive Summary

The Solitron Microwave site conducted plating operations and manufactured microwave components, solid state resistors, and cable from 1963 to 1987. Soils, groundwater, surface water, and sediments on the site are contaminated with several trace elements at concentrations exceeding screening guidelines, but neither surface pathways nor groundwater off the site have been investigated. Surface runoff from the site flows to a ditch that in turn flows to a tributary of the Manatee Pocket, an estuarine embayment of the Indian River estuary. Groundwater also flows toward the Manatee Pocket. NOAA trust fish and invertebrate species use the Manatee Pocket and the Indian River estuary. Commercial and recreational fisheries are active in the estuary. The estuary also provides habitat for the federally endangered Florida manatee.

Site Background

The Solitron Microwave site consists of nearly 8 ha (20 acres) in Port Salerno, Martin County, Florida. The site is about 400 m (437 yd) from an unnamed tributary, which flows for an additional 800 m (875 yd) before discharging to the Manatee Pocket, an estuarine embayment of the St. Lucie River. The St. Lucie River flows northward for an additional 2 km (1.2 mi) before discharging to the Indian River estuary (Figures 1 and 2).

The Solitron Microwave site conducted plating operations and manufactured microwave components, solid state resistors, and cable from 1963 to 1987 under two different owners (Solitron and General R.F. Fittings; Weston 1999b). Hazardous wastes generated by the site included cadmium, cyanide, chromic acid, acetone, mixed solvents, mineral spirits, toluene, and caustic waste. Until 1965 all acid and plating room wastes were discharged to a drainage ditch leading to the Manatee Pocket. From 1968 to 1970, wastes were diverted to a 4,500 L (1,190 gal) tank for cyanide treatment followed by acid treatment and sand filtering, before discharging to the drainage ditch. After 1970, treated wastes were discharged to an unlined percolation pond (Figure 2). In 1989, approximately 200 m^3 (260 yd^3) of sediment were removed from the pond (Weston 1999b).

In July 1998, the Solitron Microwave site was placed on the EPA's National Priorities List (Weston 1999b). In December 1999, a Remedial Investigation and Screening Ecological Risk Assessment were completed on the site (Weston 1999b, Weston 1999a).

There are both surface and groundwater contaminant transport pathways off the site. The surface pathway is via site discharges to a drainage ditch along Cove Road that flows to an unnamed tributary of the Manatee Pocket. The shallow water table aquifer beneath the site is 0.6 m (0.6 yd) below ground surface and flows north-northeast towards the unnamed tributary and Manatee Pocket (Weston 1999b).

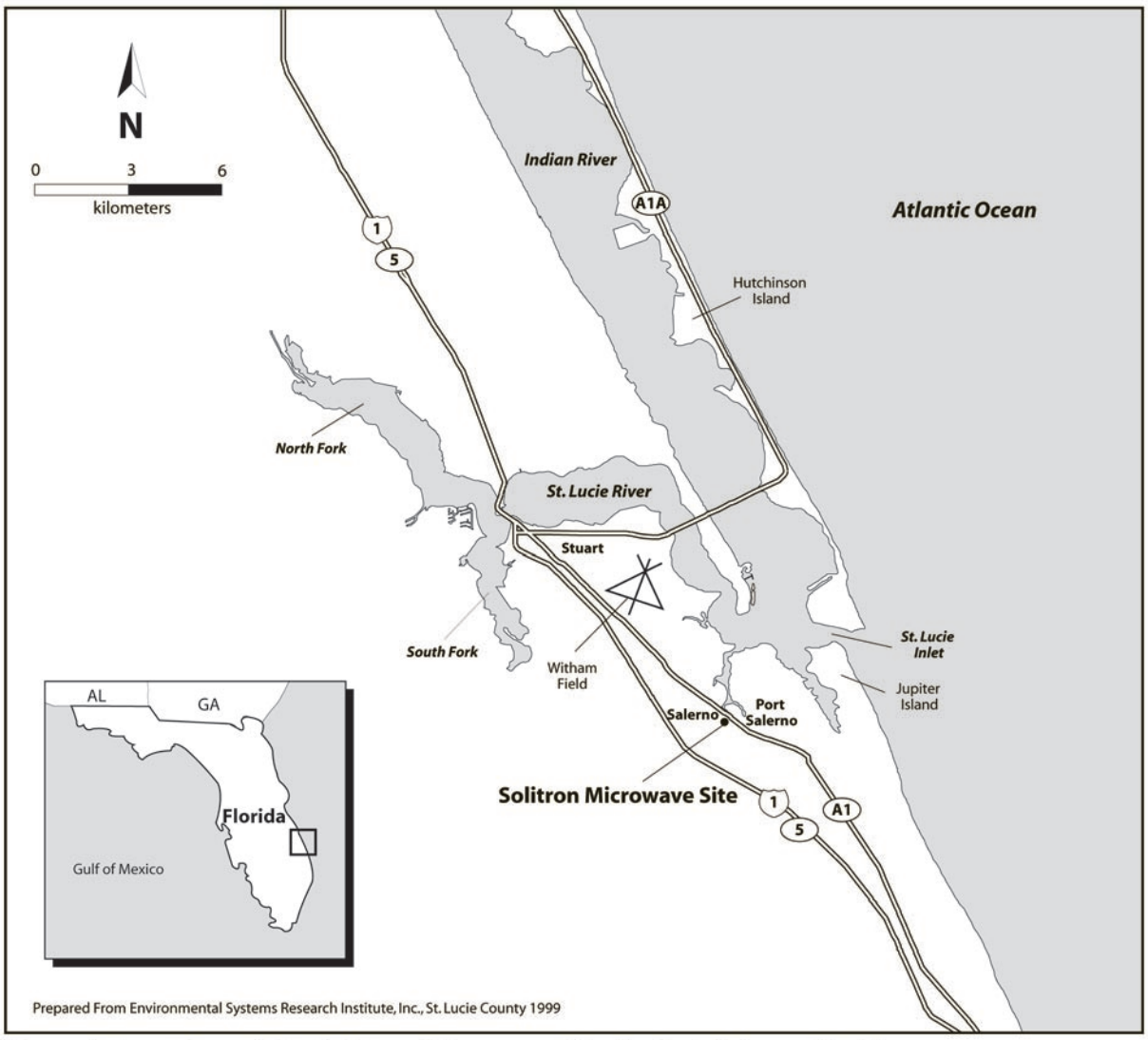

Figure 1. Location of the Solitron Microwave Site in Port Salerno, Florida.

NOAA Trust Resources

The NOAA habitats of concern are the unnamed tributary stream, Manatee Pocket, St. Lucie River, and Indian River, all of which are tidal estuarine habitats of the Atlantic Ocean. Estuarine areas are generally less than 5 m (5.4 yd) deep (NOAA 1997), while sediments range from silty sands to fine grain sands. Salinities range from under 10 parts per thousand (ppt) in the unnamed tributary to 32 ppt in the Indian River. The unnamed tributary is tidally influenced at Cove Road. In tidally influenced areas of the stream, the riparian zone is composed of estuarine wetlands dominated by scrub-shrub and broadleaf vegetation (Weston 1999a). Shore habitats in the Manatee Pocket are composed primarily of sheltered rocky shores and seawalls with some exposed estuarine wetlands and sand beaches. Sand beaches dominate the St. Lucie and Indian rivers near the site, with some areas of exposed tidal flats and estuarine wetlands. For its entire length, the Indian River is a long shallow estuary that parallels the coast, separated from the Atlantic Ocean by a series of barrier islands (RPI 1996).

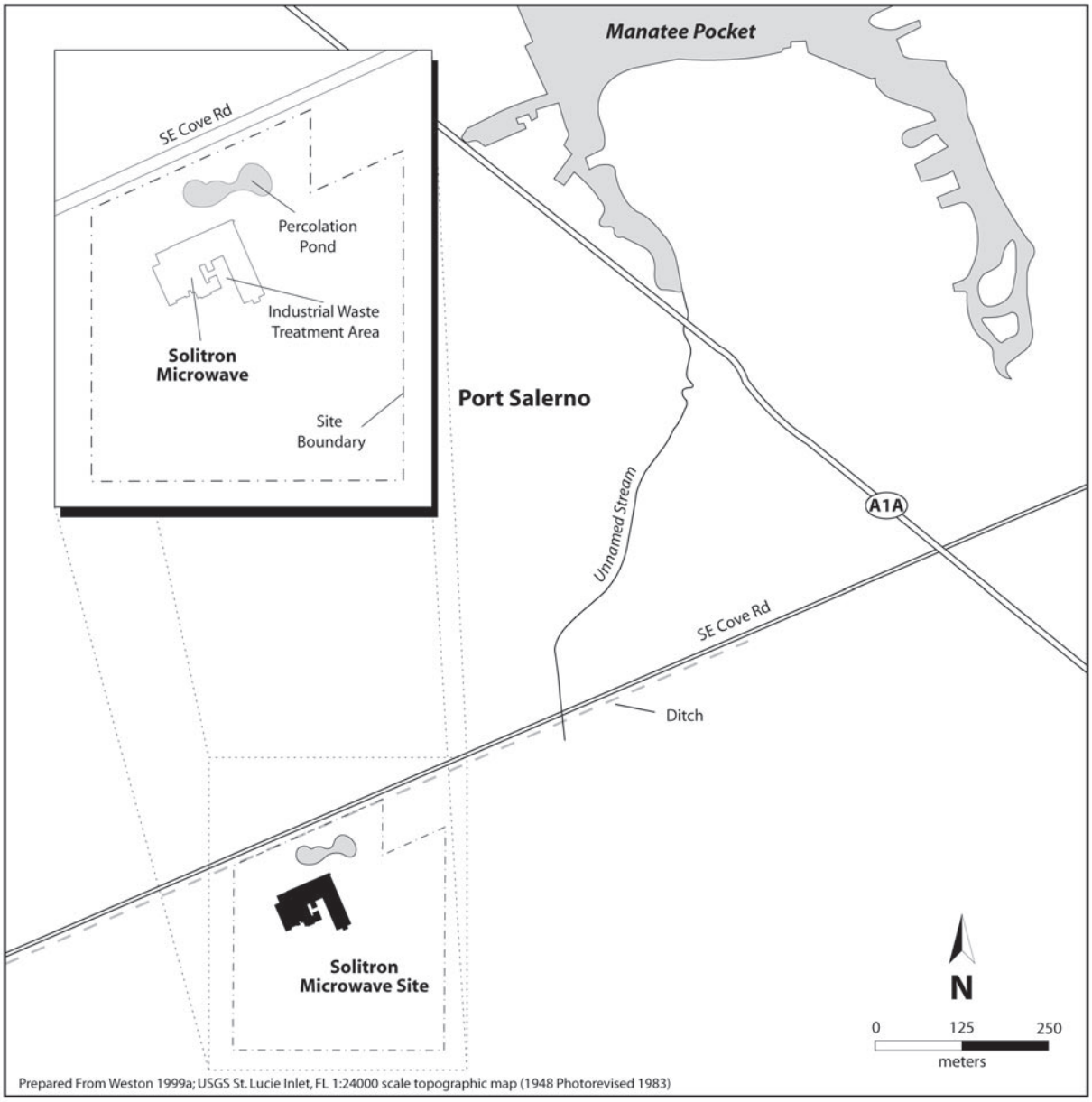

Figure 2. Detail of the Solitron Microwave Site.

Estuarine fish and invertebrate species use the Manatee Pocket, St. Lucie River, and Indian River (Table 1). Small foraging fish such as sheepshead minnow, bay anchovy, hardhead catfish, pinfish, and silversides generally spend their entire lives in estuaries. They also are common to small tidal streams and likely use the lower reaches of the unnamed tributary to Manatee Pocket (Nelson et al. 1991).

Many of the larger fish use the estuaries of the Manatee Pocket and St Lucie River as a juvenile nursery and seasonal adult habitat with spawning and larval stages generally occurring in coastal or offshore waters. The Scianids (seatrout, drums, croaker, spot, and kingfish), mullets, and groupers usually spawn in coastal waters where eggs hatch and larvae develop. The juvenile stages are transported to estuaries where they develop and the adults spend varying times within the estuary. Adult seatrout, drums, and mullet can occupy estuaries nearly year-round while croaker, spot, and kingfish usually make seasonal migrations (Nelson et al. 1991).

Table 1. Fish and invertebrate species in estuarine waters of the Manatee Pocket, St. Lucie River, and Indian River (Krum 2000 and Nelson 1991).

Species		Habitat Use			Fisheries	
Common Name	**Scientific Name**	Spawning Ground	Nursery Area	Adult Forage	Comm. Fishery	Recr. Fishery
ESTUARINE FISH						
Atlantic menhaden	*Brevootia tyrannus*	◆	◆	◆		
Atlantic croaker	*Micropogonias undulatus*		◆	◆		◆
Bay anchovy	*Anchoa mitchilli*	◆	◆	◆		
Black drum	*Pogonias cromis*		◆	◆		◆
Bluefish	*Pomatomus saltatrix*		◆			
Crevalle jack	*Caranx hippos*		◆			
Florida pompano	*Trachinotus carolinus*		◆			
Gag	*Mycteroperca microlepis*		◆			◆
Gray snapper	*Lutjanus griseus*		◆	◆		◆
Hardhead catfish	*Arius felis*	◆	◆	◆		◆
Jewfish	*Epinephelus itajara*		◆	◆		◆
Ladyfish	*Elops saurus*		◆	◆		◆
Lane snapper	*Lutjanus synagris*		◆	◆		
Permit	*Trachinotus falcatus*		◆			◆
Pigfish	*Orthopristis chrysoptera*		◆	◆		◆
Pinfish	*Lagodon rhomboides*	◆	◆			
Red grouper	*Epinephelus morio*		◆			◆
Red drum	*Sciaenops ocellatus*		◆	◆		◆
Sand seatrout	*Cynoscion arenarius*		◆	◆		◆
Sheepshead	*Archosargus probatocephalus*		◆	◆		◆
Sheepshead minnow	*Cyprinodon variegatus*	◆	◆	◆		
Silversides	*Menidia spp.*	◆	◆	◆		
Snook	*Centropomus undecimalis*		◆	◆		◆
Southern kingfish	*Menticirrhus americanus*		◆	◆		◆
Spanish mackerel	*Scomberomorus maculatus*		◆			
Spot	*Leiostomus xanthurus*		◆	◆		◆
Spotted seatrout	*Cynoscion nebulosus*		◆	◆		◆
Striped mullet	*Mugil cephalus*		◆	◆		◆
White grunt	*Haemulon plumieri*		◆	◆		◆
White mullet	*Mugil curema*		◆	◆		◆
INVERTEBRATES						
American oyster	*Crassostrea virginica*	◆	◆	◆	◆	◆
Blue crab	*Callinectes sapidus*		◆	◆	◆	◆
Grass shrimp	*Paleomonetes pugio*	◆	◆	◆		
Pink shrimp	*Penaeus duorarum*		◆			
Spiny lobster	*Panulirus argus*		◆	◆		◆
Stone crab	*Menippe mercenaria*	◆	◆	◆	◆	◆

Other fish such as snook, tarpon, ladyfish, and snappers (including the grunts and gag) have juvenile stages that are often associated with tidal stream, canal, and mangrove habitats and likely are present within the upper tidal reaches of the Manatee Pocket or lower portions of the unnamed stream. Adults are present seasonally in the St. Lucie and Indian rivers. Species such as bluefish, permit, crevalle jack, pompano, and Spanish mackerel are coastal species, but juveniles are known to inhabit the St. Lucie and Indian rivers (Nelson et al. 1991).

Several invertebrate species are found commonly in the Manatee Pocket, St. Lucie River, and Indian River estuary (Table 1). All life stages of oyster and grass shrimp are found in the estuary. Blue crabs spend juvenile and adult stages in the estuary although spawning females usually migrate offshore. Stone crabs spend all life stages in the estuary. Post-larvae and juvenile pink shrimp use the estuary. Adult shrimp generally move to coastal areas where larval development, foraging and spawning occur. Adult spiny lobsters are found in the estuary seasonally, but the species is highly migratory and little is known of their migratory habits (Nelson et al. 1991).

Recreational fisheries are present in the Indian and St Lucie rivers for most of the larger species, concentrating on the Scianids, snappers, and groupers, with shellfisheries for blue crab, stone crab, and oyster. There are commercial fisheries for crab and oyster near the confluence of the St. Lucie and Indian rivers (RPI 1996). There are no consumption advisories for the estuary (Krum 2000).

The federally endangered manatee uses the Indian River year-round and resides in the estuary. The federally endangered green, leatherback, and loggerhead sea turtles are found in coastal waters of the Atlantic Ocean on the eastern side of the barrier island that forms the Indian River. The sea turtles spawn on the sandy beaches of the barrier island, but would not likely be affected by site-related contaminants because they generally do not enter estuaries (RPI 1996).

Site Related Contamination

Data collected during field investigations detected contamination in soils, surface water, and sediments at the site. Nineteen soil borings were collected in source areas during the Remedial Investigation. Groundwater samples were collected from 62 monitoring and Direct Push Technology wells on and immediately off the site. Six surface water samples were collected in concrete tanks and the percolation pond on the site. Three sediment samples were collected in the percolation pond. No surface water or sediment samples were collected in the Manatee Pocket, unnamed tributary, or the drainages leading to the tributary (Weston 1999b).

The primary contaminants of concern to NOAA are trace elements and, possibly, the chlorinated pesticides, which were both measured at concentrations exceeding screening guidelines on the site. Several volatile organic compounds (VOCs) also were detected in environmental media on the site, but at concentrations below screening guidelines. Table 2 summarizes maximum contaminant concentrations in environmental media and lists the appropriate screening guidelines.

The maximum concentrations of cadmium, copper, nickel, silver, and zinc in soils exceeded soil guidelines; cadmium, copper, and silver exceeded the guidelines by one to three orders of magnitude. The greatest concentrations of trace elements were observed near the building in the industrial waste treatment area. Much lower concentrations, generally below soil screening guidelines, were measured in soil samples collected away from the main building nearer the percolation pond.

Table 2. Maximum contaminant concentrations of concern in soil, groundwater, and sediment at the Solitron Microwave site (Weston 1999a,1999b).

	Soils (mg/kg)		Water (µg/L)			Sediment (mg/kg)	
Contaminant	Soils	Mean Soils[a]	Ground-water	Surface Water	AWQC[b]	Sediment	ERL[g]
TRACE ELEMENTS							
Arsenic	ND	5.2	280	ND	36	ND	8.2
Cadmium	5.3	0.06	11	1	9.3	5.2	1.2
Chromium	39	37	3,300	27	50	23	81
Copper	1,300	17	2,200	100	2.4	240	34
Lead	4.4	16	32	7	8.1	2.6	46.7
Mercury	ND	0.058	1.7	ND	0.025[c]	ND	0.15
Nickel	120	13	1,600	120	8.2	340	20.9
Silver	110	0.05	48	ND	1.9[d]	14	1.0
Zinc	69	48	790	380	81	86	150
PESTICIDES							
Toxaphene	170	NA	ND	ND	ND	ND	NA
DDT	ND	NA	ND	ND	0.001	4.2	0.001
DDE	ND	NA	ND	ND	14[e]	2.4	0.002
VOCs							
1,1,1-Trichloroethane	15	NA	6.0	ND	31,200[e]	ND	NA
Trichloroethene	9.6	NA	4,100	ND	2,000[e]	ND	NA
Tetrachloroethene	35	NA	360	ND	9,320[f]	ND	NA
1,2-Dichloroethene	6.0	NA	5,000	ND	224,000[e]	ND	NA

NA: Data not available

ND: Not detected; detection limits not available

a: Shacklette and Boerngen (1984), except for silver and cadmium which are mean concentrations in the earth's crust as reported by Lindsay (1979).

b: Quality Criteria for Water (USEPA 1993). Marine chronic criteria presented unless otherwise noted.

c: Criterion expressed as total recoverable metal.

d: Chronic criterion not available; acute criterion presented.

e: Marine acute Lowest Observable Effects Level.

f: Freshwater acute Lowest Observable Effects Level.

g: Effects range-low; the concentration representing the lowest 10th percentile for the data in which effects were predicted in studies compiled by Long et al. (1995).

The pesticide toxaphene was detected in one soil sample in the main waste treatment area. In addition, several VOCs were measured in soils. The greatest VOC concentrations were in the industrial waste treatment area with very low concentrations away from the main building. Soil screening guidelines are not available for VOCs or pesticides.

The maximum concentrations of chromium, copper, nickel, and silver in groundwater samples exceeded AWQC screening guidelines by an order of magnitude or greater. Trace element contamination in the groundwater appears to be distributed downgradient of the site. One contaminated well is adjacent to the Solitron building, two more are near the percolation pond, and an additional two wells are to the northeast, adjacent to Cove Road. This is consistent with the northeasterly

flow of groundwater beneath the site. However, two wells located about 100 m (109 yards) southwest of the site, in an upgradient direction, also contained concentrations of several trace elements that exceeded screening guidelines. Several VOCs also were detected in the groundwater at concentrations below screening guidelines.

Surface water concentrations of copper and nickel in the Percolation Pond and copper, nickel, and zinc in tanks within the main waste treatment area exceeded screening guidelines. Organic compounds were not detected in surface water samples.

Sediment concentrations of cadmium, copper, nickel, and silver exceeded Screening guidelines in two of three sediment samples collected in the Percolation Pond (Long et al. 1995). In addition, sediment concentrations of the pesticide DDT and its metabolite DDE were found at concentrations exceeding screening guidelines in one of three sediment samples in the Percolation Pond.

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