

HEALTH CONSULTATION

LCP Chemical

Brunswick, Georgia

August 22, 1994

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia**

BACKGROUND AND STATEMENT OF ISSUES

LCP Chemical Site (LCP) is located on 550 acres along tidal marshlands in Brunswick, Glynn County, Georgia. The facility ceased operations on February 1, 1994. From 1957 to 1994, the facility produced chlorine, sodium hydroxide and muriatic acid by electrolysis of sodium chloride using mercury cells. Contaminated areas include process and building structures, impoundments, debris, surface soils, surface water, sediments and groundwater (7).

LCP received a National Pollution Discharge Elimination System (NPDES) permit that allowed the facility to discharge treated process wastewater. The wastewater was contaminated with polychlorinated biphenyls (PCBs) and mercury. The discharge point was an on-site pond located near Purvis Creek that carried treated process water to the salt marsh (see Attachment 1). Georgia Environmental Protection Division (EPD) reports that LCP Chemical was in violation of their permit about one-third of the time while in operation. In 1991, the EPD Toxic Substances Stream Monitoring Project and the Fish and Wildlife Service took fish, water and sediment samples from areas around LCP and found elevated levels of mercury and PCBs in sediment samples collected from Purvis Creek. In response to the sediment contamination results, crabs and oysters were collected in December 1991 for testing. Mercury and PCBs were found in crabs and oysters in Turtle River, Purvis Creek and a tributary to Purvis Creek downstream of LCP. Some mercury and PCB levels exceeded the action levels set by the Food and Drug Administration (FDA). In reaction to sampling results and regular fish consumption in the area, EPD issued an advisory against the consumption of crabs, oysters and other seafood harvested in downstream areas of Turtle Creek and Purvis River in March of 1992 (see Attachment 2). Also in March, the Department of Natural Resources (DNR) closed the area to commercial seafood harvest and closed shrimping zones in Gibson and Purvis Creeks (1).

In spring 1992, Coastal Resources Division (CRD) joined EPD in formulating an expanded sampling protocol to include shrimp, bottom-feeding finfish and predator finfish. The tissues sampled were parts subject to human consumption. The data revealed mercury present in every sample of every species collected from the Turtle River. Every sample with the exception of one were at or above the FDA Action Level (ppm). The Purvis Creek shrimp samples revealed mercury above the FDA Action Level. PCB 1268 was detected in five of thirteen samples (1).

In Fall 1992, the closure area was re-posted with permanent metal "commercial closure/seafood consumption" advisory signs. In June 1993, CRD and EPD formulated an expanded study plan for sampling up and downriver of the current closure area. The latest advisory issued by EPD, warning against consumption of seafood harvested in the closure area, occurred in June of 1993. In summer 1993, CRD collected finfish, bluecrabs and shrimp for testing. The preliminary data did not indicate a need to further expand the closure area.

Currently, EPA has a sampling team taking environmental samples. The sampling work plan includes sampling of off-site private wells and on-site sediments.

ATSDR received a petition for thirteen sites, which included LCP Chemical. The petitioner expressed concerns about potential health effects posed by these sites to nearby residents.

This health consultation will evaluate the public health implications of exposure to mercury- and PCB-contaminated fish along areas of the Purvis Creek and the Turtle River.

DISCUSSION

Site Description

The LCP Chemical site is surrounded by six-foot barbed-wired fences on all sides except for the back of the site which faces the Purvis Creek. Purvis Creek is accessible from the Turtle River. Oyster beds could be seen along the banks of Purvis Creek. Crab traps were found earlier on the Purvis Creek by EPA, but none were noted during a site visit by ATSDR representatives on July 25, 1994. While on site, the back of an advisory sign was spotted on a deteriorated pier located on the coastal end of the site at the confluence of Purvis Creek and Turtle River.

The closest residential area is 200 yards north of the site and consists mainly of trailer parks and low income housing. The local health department reported that there have been no health complaints or inquiries about the site or fishing advisory from residents or local health care providers.

Food Chain Issues

Crab tissue samples taken in 1991, 1992 and 1993, reveal a possible trend in mercury and PCB contamination. In 1991, the mean mercury concentration in crab tissue was 0.45 parts per

million (ppm), which is below the FDA action level (1.00 ppm). In 1992, the mean mercury concentration rose to 6.53 ppm, exceeding the FDA Action Level, but dropped off in 1993 with a concentration of 0.25 ppm. Fish data revealed a similar trend. In 1992, the mean mercury concentration was 3.25 ppm and in 1993 the concentration dropped to 0.13 ppm. PCB tissue concentrations have had a declining trend over the three years. In 1991, the mean concentration in crab tissue was 9.9 ppm, exceeding the FDA Action Limit (2.00 ppm). In 1992, the concentration dropped to less than 0.1 ppm, and in 1993, PCB levels were at 0.04 ppm. Fish tissue concentrations also declined from 0.12 ppm in 1992 to 0.04 ppm in 1993 (see Attachment 3).

The summer of 1993 was the last period of sampling in the Purvis Creek and Turtle River. Samples were obtained upstream and downstream from the LCP Chemical site, including areas starting at the mouth of Hillery Creek to upstream of the Turtle River (see Attachment 2). Only one sample of blue crabs (1.1 ppm) exceeded the FDA Action Limit for mercury (1.00 ppm). The rest of the samples were below FDA Action Limits for mercury and PCB's. The results, as assessed by EPD, indicated no need to expand the closure areas; however, the advisory should still stand in effect.

The major source of mercury contamination came from the disposal of elemental mercury into nearby waters where it bound to dissolved or fine particulate matter (8). Reactions took place in sediments along the Purvis Creek and Turtle River bed where mercury changed to methylmercury and bioaccumulated in fish.

Many factors determine the nature and extent of potential adverse health effects, including, dose, duration, route or pathway of exposure, and individual characteristics (e.g, age, gender)(8). Low-level organic mercury exposure, whether short term or long term, can affect the nervous system. Long-term exposure may cause permanent damage to the brain, kidney or the growing fetus (8). In 1992, mean mercury levels in fish at this site (3.25 ppm) were above mercury levels found to cause developmental effects in children whose mothers had consumed fish with a mercury concentration of up to 1.84 ppm during a critical period of their pregnancy (10). At this site, these effects, if any, cannot be determined because the amount of contaminated food consumed is unknown (7). Because of the depressed economic state, there is a possibility of subsistence fishing occurring in the area, although there is no evidence to that effect.

A major source of human exposure to PCBs comes from eating certain kinds of fish from polluted waters. At this site, electrical wastes consisting of PCB-1268 anodes had been dumped

on the banks of an on-site pond. The pond drains directly into Purvis Creek, thereby transporting PCBs downstream where it bioaccumulated in fish. PCBs are stored in fatty tissue, blood serum, human milk and other tissues. PCB studies involving long-term exposure to animals show PCBs are carcinogenic to some animals. On the basis of these animal studies, PCBs are classified as a probable human carcinogen, and may pose an increased risk for those residents consuming fish over a lifetime (9). In human studies, there is no reliable epidemiological evidence that PCBs cause cancer in humans at PCB exposure levels estimated at this site. ATSDR's policy assumes that a chemical that causes cancer in animals may cause cancer in humans; therefore, it would be prudent to minimize human exposure to PCBs (11).

Groundwater and other Media

Private wells have been sampled around the LCP Chemical Site, and results are pending. Residential wells are hydraulically upgradient from the site; therefore, exposure is considered unlikely. Additional sampling is currently being conducted. Sediment and surface waters have been contaminated by mercury and PCB's on site and in Purvis Creek. Unless trespassers have entered the site and ingested pond or Purvis Creek sediments and surface water, it is unlikely there has been or will be mercury or PCB exposure from this pathway. EPA has not observed any evidence of frequent trespassing on site; thus, the pathway of exposure (ingestion of sediment and surface waters) was eliminated.

CONCLUSIONS

Based on the data and information reviewed, ATSDR concludes that there was a past and possibly a current and future public health hazard at the LCP Chemical site. Specifically:

1. Residents who have consumed fish and shellfish from Purvis Creek and the closure areas may have been exposed to unsafe levels of PCB and mercury prior to the fishing advisory.
2. Exposures to mercury- and PCB-contaminated fish may be ongoing due to noncompliance or lack of awareness of the existing fishing advisory.
3. Fish and shellfish may continue to bioaccumulate mercury and

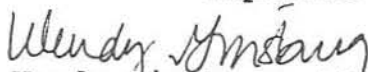
PCBs until the source of contamination is removed.

4. There is no evidence of exposure to residents from on-site or off-site surface water and sediment contamination.
5. Since off-site private wells are upgradient from the site, it is unlikely that offsite wells are contaminated.

RECOMMENDATIONS

1. Raise awareness about the fishing advisory among residents and health care providers.
2. Improve the fishing advisory signs so that they are more easily seen.
3. Maintain the fishing advisory until the source of contamination is removed.
4. ATSDR will review any environmental data as needed and as it becomes available.
5. The health consultation for the LCP Chemical Site was reviewed by the Health Activities Recommendation Panel on August 17, 1994. Based on the recommendations of the panel, the following statement is included in the health consultation.

The data and information in the LCP Chemical Public Health Review has been evaluated for appropriate public health actions. Past, current, and future exposures via ingestion of fish containing elevated levels of mercury and PCB's are possible for the Brunswick community. Local health professionals in Brunswick seek guidance in recognizing and mitigating adverse health outcomes related to mercury and PCB exposure. The Health Activities Recommendation Panel (HARP) has determined that site specific environmental health education is needed to raise awareness about the fishing advisory and adverse health effects that may occur from mercury and PCB exposure. Target populations include pregnant women and subsistence fishermen. Based on the outcomes of the Division of Health Education (DHE) activities, HARP may consider also recommending an exposure survey, and or, Biological Indicators of Exposure Study (BIE).

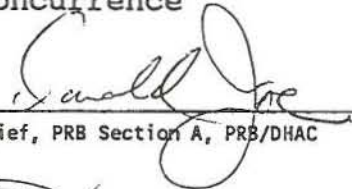

Wendy Ginsburg, EHS intern


Lynelle Phillips, RN MPH

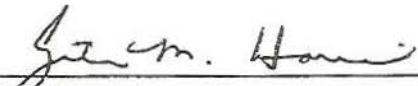
DOCUMENTS REVIEWED

1. Chronological summary of Purvis Creek Environmental Sampling, Results and Marine Resource Management Actions.
2. Fish advisory. Georgia Department of Natural Resources.
3. Kimbrough, Renate D. The Human Health Effects of Polychlorinated Biphenyls.
4. 1992 Information summary of Toxic substances stream monitoring project.
5. 1992 Results of Analysis of seafood from Turtle River and Purvis Creek from EPD. Table I, II.
6. 1993 Results of Analysis of seafood from Turtle River and Purvis Creek.
7. Superfund Removal Update. U.S. EPA. Region IV. LCP Chemical Site. Brunswick, Georgia.
8. ATSDR. The Toxicological Profile for Mercury. October 1992.
9. ATSDR. The Toxicological Profile for PCB's. April 1993.
10. ATSDR. Health consultation for the Consultation for mercury regarding the Sulphur Bank Mercury Mine Site. Richard A. Canady, Ph.d. July 1994.
11. ATSDR. Public Health Assessment Guidance Manual. 1992.


Concurrence



Chief, PRB Section A, PRB/DHAC



Chief, PRB/DHAC



Director, DHAC

PUBLIC HEALTH ACTION PLAN

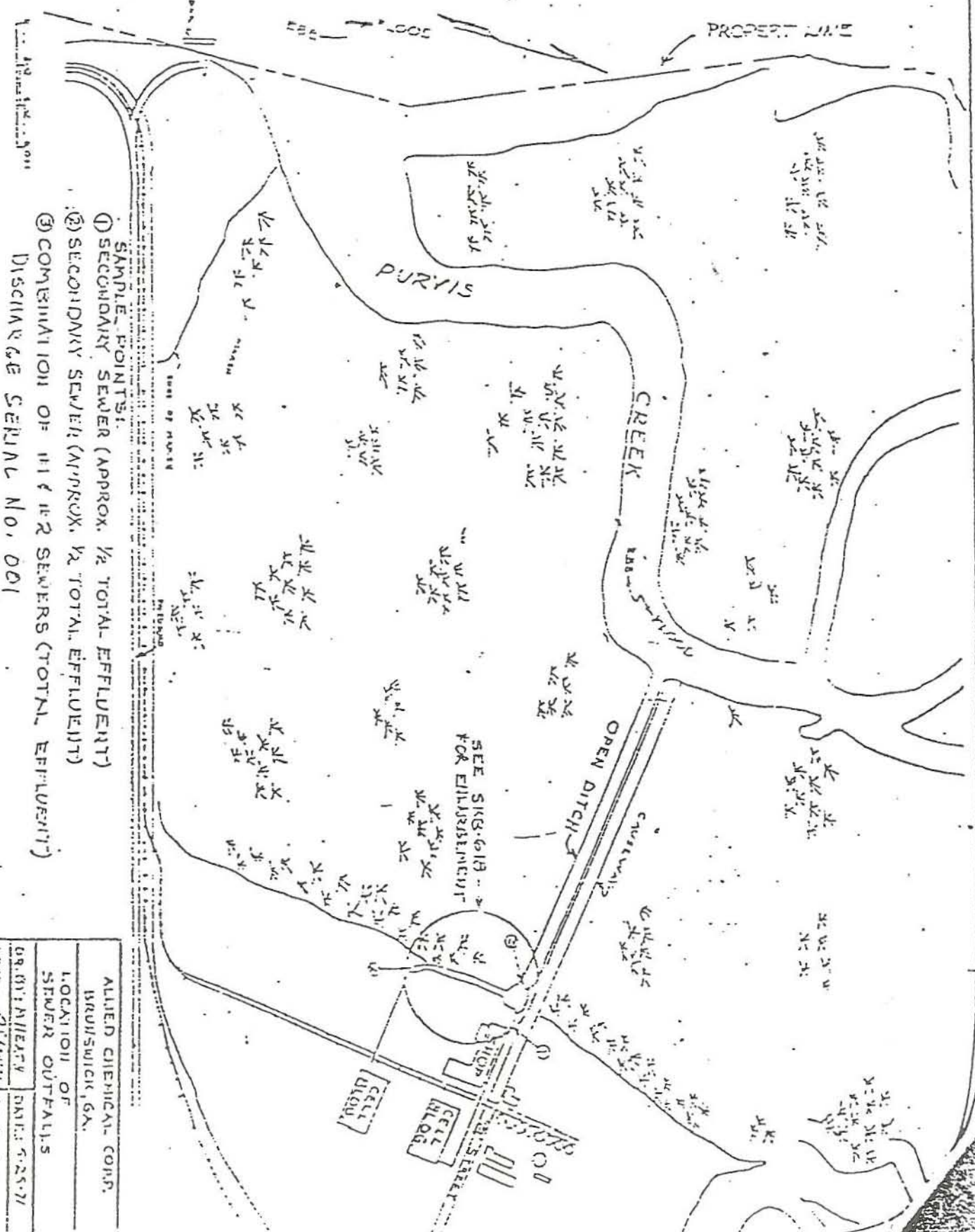
The Public Health Action Plan (PHAP) for LCP Chemical contains a description of actions to be taken by ATSDR at and in the vicinity of the site subsequent to the completion of this public health consultation. For those actions already taken at the site, please see the BACKGROUND section of this Public Health Consultation. The purpose of the PHAP is to ensure that this public health consultation not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of ATSDR to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by ATSDR are as follows:

1. The Division of Health Education will consider implementing environmental health education for local health care providers, focusing on pediatrics and OB/GYN, to assist health professionals in assessing possible adverse health outcomes associated with exposure to hazardous substances.
2. The Division of Health Education, in cooperation with local community members and health educators, will consider providing environmental health education for the community to assist residents in mitigating exposure to hazardous substances in Purvis Creek and Turtle River fish.
3. Based on the outcomes of the Division of Health Education activities, an exposure survey, and or, Biological Indicators of Exposure Study (BIE) will be considered by the Division of Health Studies.

LCP

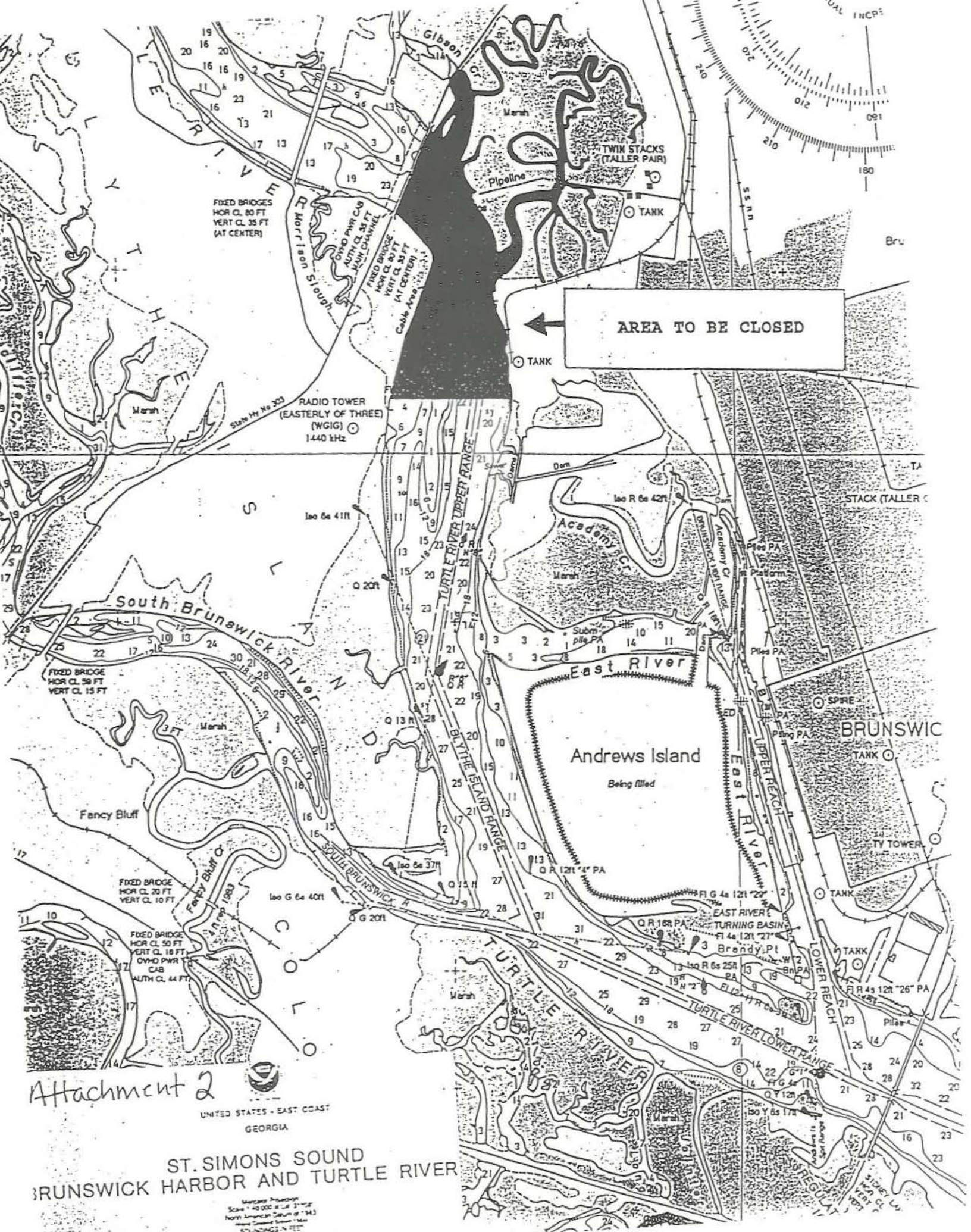
TURTLE RIVER

PROPERTY LINE



- SAMPLE POINTS:
- ① SECONDARY SEWER (APPROX. 1/2 TOTAL EFFLUENT)
 - ② SECONDARY SEWER (APPROX. 1/2 TOTAL EFFLUENT)
 - ③ COMBINATION OF 11 & 12 SEWERS (TOTAL EFFLUENT)
- DISCHARGE SERIAL NO. 001

ALLIED CHEMICAL CORP.	
IRWIN, GEORGIA	
LOCATION OF SEWER OUTFALLS	
DATE: 5-25-77	DATE: 5-25-77
APP: R. J. [unclear]	SK-R-217



AREA TO BE CLOSED

FIXED BRIDGES
HOR CL 80 FT
VERT CL 35 FT
(AT CENTER)

RADIO TOWER
(EASTERLY OF THREE)
(WGIG)
1440 kHz

FIXED BRIDGE
HOR CL 50 FT
VERT CL 15 FT

FIXED BRIDGE
HOR CL 20 FT
VERT CL 10 FT

FIXED BRIDGE
HOR CL 50 FT
VERT CL 18 FT
OVHD PWR CAB
ALTH CL 44 FT

Attachment 2

UNITED STATES - EAST COAST
GEORGIA

ST. SIMONS SOUND
BRUNSWICK HARBOR AND TURTLE RIVER

Scale 1:40,000 at Lat 31° 12' N
North American Datum of 1983
SOUNDINGS IN FEET
of Water, unless otherwise noted

Attachment 3

Oyster, Crab and Fish Data						
Oyster Data	1991		1992		1993	
	Mercury	PCB	Mercury	PCB	Mercury	PCB
# samples	5	5	ND	ND	ND	ND
mean	0.20	0.18				
max	0.50	0.44				
Crab Data	1991		1992		1993	
	Mercury	PCB	Mercury	PCB	Mercury	PCB
# samples	5	5	3	3	25	25
mean	0.45	3.13	6.53	<0.1	0.25	0.04
max	0.90	9.9	8.5	<0.1	1.1	0.24
Fish Data	1991		1992		1993	
	Mercury	PCB	Mercury	PCB	Mercury	PCB
# samples	ND	ND	10	10	79	79
mean			3.25	0.12	0.13	0.04
max			8.5	0.41	0.87	0.27

*all values in parts per million (ppm)

ND - No Data