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DIOXIN SEDIMENT AND TISSUE SAMPLING IN HOUSTON SHIP CHANNEL AND UPPER GALVESTON BAY

FINAL REPORT

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1.0 INTRODUCTION

This project is to support an ongoing Total Maximum Daily Load (TMDL) study to address tissue dioxin levels in the Houston Ship Channel (HSC) and upper Galveston Bay (GB). The areas to be covered under this project are water quality segments on the 303(d) list for dioxin impairment, including segments 1001 (San Jacinto River Tidal), 1005 (HSC/San Jacinto River Tidal), 1006 (HSC Tidal), 1007 (HSC/Buffalo Bayou Tidal), 2421 (Upper GB), 2426 (Tabbs Bay), 2427 (San Jacinto Bay), 2428 (Black Duck Bay), 2429 (Scott Bay), 2430 (Burnett Bay), 2436 (Barbours Cut), and 2438 (Bayport Channel). The TMDL is initiated by a seafood advisory issued by the Texas Department of Health (TDH) in 1990 for the consumption of catfish and crabs in HSC and upper GB due to tissue dioxin levels.

Under a contract with the Texas Natural Resource Conservation Commission (TNRCC), a TMDL study has been ongoing by the University of Houston, PBS&J, and Parsons Engineering Science (PES) to analyze the issue and develop a plan to correct the problem. Historical data gathered in the TMDL study show that only one station has been sampled for dioxin levels in water, while 17 stations were sampled for sediment. Much of these data were collected between 1992 and 1994. A review of the historical data for water, tissue, and sediment suggested the need for additional monitoring data for developing a TMDL for the HSC.

The objective of this project is to collect more data to begin to characterize the extent and level of dioxin in sediment and tissue of HSC (including San Jacinto River Tidal) and upper Galveston Bay. One purpose is to initially screen to determine if dioxin levels have changed since the original listing and to focus future sampling efforts.

The project includes the following main tasks:

1. Development of a Quality Assurance Project Plan (QAPP)
2. Field collection of sediment and tissue samples
3. Dioxin analysis of collected sediment and tissue samples
4. Analysis of collected data
5. Reporting

This report summarizes the sampling effort and the results obtained. Section 2.0 documents the development and approval of QAPP, including the selection of sampling stations, sampling procedures, analytical methods, and QA/QC procedures. Section 3.0 describes the field sampling efforts. Section 4.0 presents the laboratory results, and Section 5.0 presents an analysis and discussion of the results. Section 6.0 provides a list of references cited in the report.

2.0 DEVELOPMENT OF QUALITY ASSURANCE PROJECT PLAN

2.1 TIMELINE OF QAPP DEVELOPMENT

The project started on January 22, 2001. A draft QAPP was prepared in early March. A conference call among H-GAC, TNRCC, and PBS&J took place on March 12 to discuss the draft QAPP. PBS&J then developed a meeting summary with action items based on the conference call. After contacting TDH and WSU, PBS&J modified the QAPP and submitted a final draft to H-GAC on April 2, 2001. H-GAC then processed and submitted the QAPP to TNRCC for review and approval.

Comments on the draft QAPP were provided by TNRCC in mid-May. A conference call between H-GAC and PBS&J was conducted on May 18 to discuss the comments. The QAPP was then updated according to the comments and the conference call. The revised QAPP was submitted to H-GAC on May 29, 2001. H-GAC then processed and submitted the revised QAPP to TNRCC on June 6, 2001, for review and approval.

TNRCC approved the QAPP on June 26 and issued a go-ahead for the fieldwork. The PBS&J/Parsons crew started the field effort on June 27.

2.2 SELECTION OF SAMPLING STATIONS

The overall goal of the sampling is to obtain additional tissue and sediment data in support of, but independent from, an ongoing TMDL effort. Additional data are needed in many areas, but a finite budget required choices to be made. The first choice was to emphasize tissue over sediment by roughly a 70:30 ratio. The second consideration was to include as many 303(d) segments with dioxin impairment as possible. The third consideration was to sample on existing SWQM stations as much as possible. The fourth consideration was the need to sample areas where crab and catfish are harvested by the public so that dioxin levels in organisms caught by citizens can be assessed.

The tissue sites were selected to both include some of the sites that had been sampled in earlier efforts and to specifically include the smaller segments which had no previous data. The oyster sampling stations were specifically picked in upper Galveston Bay only, as the likelihood of finding oysters upstream of Morgan's Point was considered small.

The sediment stations were selected to cover a range of geographic locations from the main turning basin to Galveston Bay, and to include both the deeper navigation channels and shallow side bays. The deep navigation channels are areas with relatively rapid sediment deposition. Therefore, more of the sediment sampling stations are designated along the channel.

As a result, as listed in Table 2-1, 18 stations for sediment, 19 stations for fish and crab tissue, and two stations for oyster tissue in HSC and upper GB were selected for sampling. Appendix A shows the locations of these selected stations that includes four oyster stations. However, only two stations were sampled based on the availability of oysters and the geographic separation of the sites. In addition, two sediment and two oyster tissue duplicate samples were collected.

During the field sampling effort, it was found that oyster availability was significantly impacted by Tropical Storm Allison. The selected oyster stations were then changed to new locations south of the original locations. These stations were GPS located and compared against SWQM database for station identification numbers. It was found that one of the two new stations was at Station 14568 and the other was close to 16521. These two stations where oyster sampling took place are listed in Table 2-1 and shown in Appendix B.

2.3 SELECTION OF SAMPLING PARAMETERS

Measurements conducted in the field include sampling locations recorded using a Global Positioning System (GPS) unit, standard water parameters (water depth, dissolved oxygen, pH, salinity, and water temperature), physical water conditions, physical description of the sediment, and ambient weather conditions. Measurements conducted in the laboratory include sediment moisture content, % solids, % volatile solids, and total organic carbon (TOC), as well as sediment and tissue polychlorinated dibenzo-p-dioxins (PCDD's) and polychlorinated dibenzofurans (PCDF's). Table 2-1 provides a description of selected sampling parameters.

TABLE 2-1
SELECTED SAMPLING STATIONS AND PARAMETERS

TNRCC Station ID	Segment	Monitoring Station Descriptions	Sediment	Crab & Catfish Tissue	Oyster Tissue	Parameters
SELECTED STATIONS:						
11193	1001	San Jacinto River Tidal IH 10 bridge East of Channelview		X		water depth, DO, pH, salinity, water temperature, PCDDs, and PCDFs
11261	1005	Houston Ship Channel San Jacinto River at Lynchburg Ferry	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
11287	1007	Houston Ship Channel/Buffalo Bayou at confluence with Sims Bayou	X			water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
11292	1007	Houston Ship Channel/Buffalo Bayou in middle of Turning Basin	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
13309	2421	Upper Galveston Bay at HSC CM 83/84	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
13337	2426	Tabbs Bay Mid-Bay at Ruined Bridge	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
13339	2427	San Jacinto Bay at Buoy 15	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
13340	2428	Black Duck Bay at Mid-Bay	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
13342	2429	Scott Bay at Mid-Bay	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
13344	2430	Burnett Bay at Mid-Bay	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
13355	2436	Barbours Cut midway between mouth and terminus	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
13363	2438	Bayport Channel midway between mouth and terminus	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
14560	2421	Upper Galveston Bay at HSC Marker 75	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC

TABLE 2-1
SELECTED SAMPLING STATIONS AND PARAMETERS

TNRCC Station ID	Segment	Monitoring Station Descriptions	Sediment	Crab & Catfish Tissue	Oyster Tissue	Parameters
SELECTED STATIONS:						
14566	2421	Upper Galveston Bay at HSC Marker 59	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
15464	2421	Upper Galveston Bay near shore, 0.2 Km South of Clear Creek Channel at Kemah	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
15906	2421	Upper Galveston Bay at 96GB011, 4.7 mi. SE of Houston Pt.		X	X	water depth, DO, pH, salinity, water temperature, PCDDs, and PCDFs
15909	2421	Upper Galveston Bay at 96GB014, 3.1 mi. NE of HSC CM68		X	X	water depth, DO, pH, salinity, water temperature, PCDDs, and PCDFs
15913	2421	Upper Galveston Bay at 96GB018, 2.4 mi. SE of Seabrook CM7			X	water depth, DO, pH, salinity, water temperature, PCDDs, and PCDFs
15932	1007	Houston Ship Channel, 50 ft. from Armco Discharge, 1.1 mi. upstream of Greens Bayou	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
15934	1006	Houston Ship Channel, 50 ft. from Shell Refinery's outfall 007, approx. 300 yds; upstream of CM142 and 1.2 mi. downstream of Beltway 8	X			water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
16213	2421	Upper Galveston Bay at 97GB019, 5.25 mi. north of the HL&P H. Robinson outfall			X	water depth, DO, pH, salinity, water temperature, PCDDs, and PCDFs
16618	1005	Houston Ship Channel/San Jacinto River West of Exxon docks and North of Alexander Island	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
16622	1001	San Jacinto River Tidal at Banana Bend Road at end of pavement in Houston	X	X		water depth, DO, pH, salinity, water temperature, PCDDs, PCDFs, moisture content, % solids, % volatile solids, and TOC
ACTUAL STATIONS FOR OYSTER SAMPLING:						
14568	2439	Lower Galveston Bay at HSC CM 53			X	water depth, DO, pH, salinity, water temperature, PCDDs, and PCDFs
015 (16521)	2439	(Lower Galveston Bay 800yds SSW of HSC51, 800yds NW of HSC49)			X	water depth, DO, pH, salinity, water temperature, PCDDs, and PCDFs

2.4 SAMPLE COLLECTION PROCEDURES AND ANALYTICAL METHODS

All tissue sample collections were conducted using modified procedures that are consistent with those documented in the TNRCC Surface Water Quality Manual (SWQM) (1999 or subsequent editions), the Texas Department of Health (TDH) Standard Operations Procedures (SOP) (2000), and the approved QAPP. Sediment collections and standard water parameters were also collected using methods outlined in the SWQM and the QAPP.

The sediment and tissue samples were analyzed by the Wright State University (WSU) laboratory located at 3640 Colonel Glenn Highway, Dayton, Ohio, 45435-0001. Method 1613 (1994) was used for analyzing PCDD's and PCDF's.

Sediment analyses for solids, moisture content, and TOC were conducted by the North Water District Laboratory (NWDLS) located at 9391 Grogans Mill Road, Suite A-4, The Woodlands, Texas, 77380. These analyses were done using EPA methods (1979, 1996) and/or Standard Method (1989 or subsequent editions).

In addition, the sampling effort was conducted under Texas Parks & Wildlife Department's (TPWD) Scientific Collection Permit, SPR-0690-121. All crab and catfish traps set up in the water were clearly labeled to identify the traps from other commercial and private traps nearby.

3.0 FIELD SAMPLING EFFORT

3.1 FIELD SAMPLING PROCEDURES

After TNRCC approved the QAPP on June 26 and issued a go-ahead for the fieldwork, the PBS&J/PES crew started the field effort immediately on June 27. Speed is necessary to complete the project by the end of biennium of August 31, 2001. The field effort continued until July 25, 2001. Table 3-1 presents a list of data collection dates, times, sample type, and days sent to the laboratories. Appendix C provides a collection of photos taken during the sampling effort.

Sediment samples were collected at selected stations using a stainless steel Ponar dredge. The selection of a Ponar dredge to obtain sediment samples was made by field personnel based on the characteristics of the sediment. Prior to collection at each sample station, the dredge, stainless steel spoon, and polyethylene trays were rinsed with deionized water, then ambient water. A total of three sediment samples were collected at each station and deposited into a clean, linear, polyethylene pan. Within the Houston Ship Channel (HSC), sediment samples were taken approximately 150 feet off of each bank and at the centerline in order to collect a cross-section composite sample.

The physical nature (color, vertical variations in color, and/or odor) of each sediment grab was noted. Using only the top 5 centimeters of sediment from each Ponar grab, the three samples were then homogenized using a clean stainless steel spoon in a separate polyethylene pan. This mixture was then deposited into a labeled, pre-cleaned, amber glass jar with a Teflon seal for analysis at the WSU laboratory. A separate sample of the same mixture was also collected for analysis of percent solids, volatile solids, total Kjeldahl nitrogen, and total organic carbon at NWDLS. In addition, at each sediment station additional samples were collected and will be stored for a period of approximately four months for potential future analysis of sediment particle size distribution. Directly after collection, all samples were placed into coolers and packed with ice. Sediment samples for dioxin analysis were packed in dry ice and shipped to the WSU Laboratory.

TABLE 3-1
SUMMARY OF TISSUE AND SEDIMENT SAMPLING FOR DIOXIN

Date	Time	Station Number	Tissue			Sediment		Date Sent To Labs
			Fish	Crab	Oyster	WSU	NWDLS	
06/29/01	9:25	11193		X				07/11/01
6/29/01, 7/12/01	NA, 15:45	11193	X					07/19/01
06/28/01	10:43	11261		X				07/11/01
07/11/01	12:32	11261				X	X	07/19/01
7/11/01, 7/15/01	16:45, 18:00	11261	X					07/25/01
07/11/01	10:22	11287				X	X	07/19/01
06/28/01	8:20	11292		X				07/11/01
07/11/01	8:41	11292				X	X	07/19/01
07/25/01	**NA**	**11292**	**0**					**NA**
07/12/01	10:00	13309		X				07/19/01
07/12/01	10:15	13309				X	X	07/19/01
7/9/01, 7/20/01	16:57, 13:45	13309	X					07/25/01
07/09/01	12:15	13337		X				07/11/01
07/12/01	9:17	13337				X	X	07/19/01
7/09/01,7/15/01	17:20, 18:50	13337	X					07/19/01
06/28/01	16:17	13339		X				07/11/01
07/09/01	14:00	13339	X					07/11/01
07/11/01	14:27	13339				X	X	07/19/01
06/28/01	17:01	13340		X				07/11/01
07/09/01	12:00	13340	X					07/19/01
07/11/01	14:50	13340				X	X	07/19/01
06/28/01	14:53	13342		X				07/11/01
07/09/01	13:10	13342	X					07/11/01
07/11/01	13:38	13342				X	X	07/19/01
06/28/01	NA	13344	X					07/19/01
06/29/01	10:45	13344		X				07/11/01
07/11/01	13:21	13344				X	X	07/19/01
06/29/01	11:43	13355		X				07/11/01
07/12/01	9:45	13355				X	X	07/19/01
7/12/01, 7/20/01	9:17, 12:30	13355	X					07/25/01
07/12/01	13:30	13363				X	X	07/19/01
07/13/01	13:20	13363		X				07/19/01

TABLE 3-1
SUMMARY OF TISSUE AND SEDIMENT SAMPLING FOR DIOXIN

Date	Time	Station Number	Tissue			Sediment		Date Sent To Labs
			Fish	Crab	Oyster	WSU	NWDLS	
7/12/01, 7/15/01, 7/20/01	13:30, 16:00, 16:30	13363	X					07/25/01
07/12/01	10:50	14560		X				07/19/01
07/12/01	11:00	14560				X	X	07/19/01
07/20/01	17:05	14560	X					07/25/01
07/12/01	11:51	14566				X	X	07/19/01
07/13/01	14:00	14566		X				07/19/01
07/13/01	14:30	14566	X					07/19/01
07/12/01	12:50	15464				X	X	07/19/01
07/13/01	9:05	15464		X				07/19/01
07/20/01	18:15	15464	X					07/25/01
07/13/01	12:15	15906		X				07/19/01
7/13/01, 7/20/01	13:33, 9:30	15906	X					07/25/01
07/13/01	10:16	15909		X				07/19/01
7/13/01, 7/20/01	12:00, 9:45	15909	X					07/25/01
06/28/01	9:37	15932		X				07/11/01
07/11/01	11:09	15932				X	X	07/19/01
07/25/01	**NA**	**15932**	**0**					**NA**
07/11/01	11:49	15934				X	X	07/19/01
06/29/01	11:05	16618		X				07/11/01
07/09/01	10:35	16618	X					07/11/01
07/11/01	13:54	16618				X	X	07/19/01
06/29/01	10:15	16622		X				07/11/01
06/29/01	9:55	16622	X					07/25/01
07/12/01	18:00	16622				X	X	07/19/01
07/13/01	15:15	14568			X			07/19/01
07/13/01	15:15	14568 DUP			X			07/19/01
07/13/01	15:45	015 (16521)			X			07/19/01
07/13/01	15:45	015 DUP			X			07/19/01
07/11/01	14:50	13340 DUP				X	X	07/19/01
07/12/01	13:30	13363 DUP				X	X	07/19/01
06/27/01	**NA**	**Setup**	**0**					**NA**
Totals			**17**	**19**	**4**	**20**	**20**	**60**

Fish tissue was collected from the fish species based on the following order: hardhead catfish (*Arius felis*), blue catfish (*Ictalurus furcatus*), gafftopsail catfish (*Bagre marinus*), and channel catfish (*Ictalurus punctatus*). A trotline or throw line was baited with available bait (shrimp, crab, squid, or cut bait) to catch enough catfish to obtain 50-100 grams of edible muscle tissue. Where possible, a minimum of three catfish were collected from each selected sample station to give a representative sample. The target total length of each catfish species was 300 mm. After a specimen was obtained at each particular station, the date, time, length, weight, and species of the specimen was recorded. Before moving to another station, the fish were placed into a plastic Ziploc bag labeled with station number, time of capture, and date. The labeled Ziploc bag with the fish specimen was then placed into a cooler with ice until transported back to the lab for the preparation of tissue. Special care was taken so that water from the melted ice did not inundate any of the samples.

Preparation of tissue samples was performed by PBS&J personnel in a clean working area at PBS&J's Environmental Toxicology Laboratory located in Houston. Prior to sample preparation, all equipment, including cutting board, stainless steel knives, scales, etc., were washed and cleaned with acetone and allowed to air dry. Samples were prepared on a polypropylene cutting board that had been covered in heavy-duty aluminum foil with the dull side of the foil exposed. This foil was discarded and replaced with new foil after each sample preparation. A stainless steel knife with a plastic handle was used to prepare the samples and was cleaned between samples. These equipment and procedures were in accordance with the TDH SOP.

During specimen preparation, caution was taken not to puncture any internal organs. Fillets were taken from the left and right side of the each fish. All left-side fillets were sent to the lab for testing and the right-side fillets will be kept for a period not to exceed four months for further testing if the need should arise. During the initial samples, weights of each fillet were measured to ensure that sufficient amounts of tissue would be sent to the WSU laboratory and to predict an approximate weight of tissue based on total length of each fish for additional collections. After the preparation of each fish sample, the fish tissue was wrapped in clean foil with the dull side facing the tissue and placed into individual labeled Ziploc bags. Every individual Ziploc bag was labeled with station number, date, times of capture, species name, and fillet side. All samples for each station were then placed into a larger Ziploc bag labeled with station number, dates of capture, times of capture, species name, how many individual bags were contained within, and fillet side. All samples were

frozen immediately after the fish tissue preparation was completed. All collected fish samples were packed in dry ice and shipped to WSU.

Crab tissue was collected exclusively from blue crabs (*Callinectes sapidus*) at selected stations. Both male and female crabs were sampled from the stations. Standard four-eye crab pots were baited with available bait to catch enough crabs to obtain 50-100 grams of crab muscle tissue. A minimum of three blue crabs were collected from each selected sample station to give a representative sample. Blue crabs with a maximum carapace width of 125 mm were the target length for collection. At each designated station, the carapace width and weight were collected for each individual crab collected. The crabs were then placed in a plastic container labeled with date, time, and station number, and then placed into a cooler with ice until transported back to the PBS&J Environmental Toxicology Laboratory. Special care was taken so that water from the melted ice did not inundate any of the samples.

At the PBS&J laboratory, crabs were cleaned by removing the carapace and shaking out all internal organs. The remaining crab was then squeezed with a plastic crab-squeezing device to remove as much muscle tissue as possible. The plastic crab-squeezing device is commercially available and is used by professional crabbers and the food industry. All equipment was cleaned and rinsed with deionized water between every sample. All the crabmeat from each individual crab per station was combined and the total weight was recorded. This measurement of weight was taken to ensure that sufficient amounts of tissue would be sent to the WSU laboratory and to also predict the amount of tissue per crab according to carapace width for additional collection. The crabmeat composite was then transferred into a labeled, precleaned, amber glass jar with a Teflon seal and frozen. All collected crab samples were packed in dry ice and shipped to the WSU laboratory.

Oyster tissue was collected from eastern oysters (*Crassostrea virginica*) on oyster reefs at selected sample stations. Oysters were collected using an oyster dredge in order to obtain a minimum of three oysters to total 50-100 grams of tissue from each selected sample station. Oysters with a total length of 75 mm were the target size for collection. After station collection, oysters were sorted for size and scrubbed with ambient water and placed in a plastic container labeled with station number, date, and time of collection. The containers were placed in a cooler of ice in such a way that no water would seep into the specimen container. According to each station number, oysters were shucked with a clean stainless steel oyster knife on a polypropylene cutting board that had been covered in heavy-

duty aluminum foil with the dull side of the foil exposed. All equipment was cleaned and rinsed with deionized water and new foil was placed on the cutting board between each sample. All prepared oyster samples were placed into labeled, pre-cleaned, amber glass jars and frozen. All oyster samples were packed in dry ice and shipped to the WSU laboratory.

For the purpose of checking the accuracy and reproducibility of the measurements, a number of oysters at a station were collected, shucked, and then placed in a single bowl. The contents were stirred to assure near uniformity, and then divided into two sample containers. Two such samples were collected to serve as tissue duplicates. The test results should yield a measure of the reproducibility that is one dimension of QC, instead of doing equipment blanks. One additional sample from each station was also taken and archived at the PBS&J laboratory.

As a note, the Quality Assurance Officer of H-GAC, Mr. Chuck Wemple, joined the field crew on July 11, 2001, to observe a sediment and tissue sampling event and conduct a monitoring system audit. The audit confirmed that the field sampling efforts were conducted in accordance with the TNRCC approved QAPP. A similar audit on the tissue processing and preparation efforts was conducted at the PBS&J Environmental Toxicology Laboratory on July 10, 2001. Compliance of tissue preparation efforts with the QAPP was also confirmed.

3.2 FIELD SAMPLING RESULTS

A total of 20 stations were designated for sediment collection. Sediment collections were completed over a two-day period for which one duplicate sample was taken randomly each day. Based on the field effort, the sediment collected was generally characterized by silty clay mud within the HSC, sand in the upper San Jacinto River, and silty sand with an abundance of shell in upper Galveston Bay.

Fish tissue samples were initially proposed to be collected at 19 designated stations. However, due to unfavorable conditions (impacts from Tropical Storm Allison), fish tissues were collected from only 17 stations. The two stations where no fish were caught occurred at the uppermost reach of the HSC (Stations 11292 and 11287). The reason for no fish capture at these stations is anticipated to be the result of very low salinities and the lack of dissolved oxygen. Both of these parameters appear to be directly influenced by severe rains caused by Allison. An abundance of debris

and household trash was continuously observed on the surface of the water at these stations during the time of the field effort.

All crabs needed for laboratory analysis were collected from all 19 stations. At the two uppermost stations in the HSC where no fish were captured, very few large crabs were observed. A crab pot was placed overnight at the uppermost station of the HSC at Station 11292. Upon checking the trap the next day, it was noted that all crabs (three total) that had entered the trap were dead. Other crabs observed in the vicinity of this station were all at the surface of the water clinging to bulkheads and floating debris. Upon internal inspection of the captured crabs, it was noted that the gills and what appeared to be fatty tissue were abnormally black in color. The cause of the dead crabs is not known. All other crab collected at other stations were abundant and appeared healthy.

At the time of the field effort, no oysters could be found at the pre-selected stations identified in the QAPP. In order to collect oyster samples, the field crew shifted the locations approximately one mile farther south and southwest to known existing oyster reefs. These new oyster locations were still taken from either side of the HSC in order to keep a consistent spatial distribution with the original stations. The new sample stations were documented and GPS coordinates were recorded for each. The GPS coordinates recorded during the dioxin sampling effort are listed in Table 3-2. Appendix B shows the locations of stations where sampling took place. Appendix D provides a copy of field sampling data sheets.

TABLE 3-2
GPS COORDINATES OF DIOXIN SAMPLING STATIONS

Station	Segment	Description	Latitude (North)			Longitude (West)		
			°	'	"	°	'	"
11193	1001	San Jacinto River Tidal IH 10 bridge East of Channelview	29	47	32.9	95	3	43.7
11261	1005	Houston Ship Channel San Jacinto River at Lynchburg Ferry	29	45	42.9	95	4	53.3
11292	1007	Houston Ship Channel/Buffalo Bayou in middle of Turning Basin	29	45	6.5	95	17	21.5
13309	2421	Upper Galveston Bay at HSC CM 83/84	29	39	7.3	94	58	10.7
13337	2426	Tabbs Bay Mid-Bay at Ruined Bridge	29	42	14.7	94	59	10.9
13339	2427	San Jacinto Bay at Buoy 15	29	42	24.8	95	2	32.3
13340	2428	Black Duck Bay at Mid-Bay	29	42	59.9	95	0	18.4
13342	2429	Scott Bay at Mid-Bay	29	2	29.6	95	2	29.6
13344	2430	Burnett Bay at Mid-Bay	29	46	15.1	95	3	6.6
13355	2436	Barbours Cut midway between mouth and terminus	29	40	55.9	94	59	45.1
13363	2438	Bayport Channel midway between mouth and terminus	29	36	49.1	95	0	26.5
14560	2421	Upper Galveston Bay at HSC Marker 75	29	36	8.6	94	56	57.2
14566	2421	Upper Galveston Bay at HSC Marker 59	29	31	47.9	94	53	54.2
14568 [1]	2439	Lower Galveston Bay at HSC CM 53	29	29	46.6	94	51	43.8
15464	2421	Upper Galveston Bay near shore, 0.2 Km South of Clear Creek Channel at Kemah	29	32	48.7	95	0	48.8
15906	2421	Upper Galveston Bay at 96GB011, 4.7 mi. SE of Houston Pt.	29	36	10.4	94	51	54.3
15909	2421	Upper Galveston Bay at 96GB014, 3.1 mi. NE of HSC CM68	29	35	32.9	94	53	10.0
15932	1007	Houston Ship Channel, 50 ft. from Armco Discharge, 1.1 mi. upstream of Greens Bayou	29	44	40.3	95	11	3.9
015 (16521) [1]	2439	(Lower Galveston Bay 800yds SSW of HSC51, 800yds NW of HSC49)	29	29	2.7	94	51	59.7
16618	1005	Houston Ship Channel/San Jacinto River West of Exxon docks and North of Alexander Island	29	43	39.5	95	1	38.1
16622	1001	San Jacinto River Tidal at Banana Bend Road at end of pavement in Houston	29	50	44.8	95	6	19.0

Note: [1]Replacement sites for stations: 15913, 16213, 15909, 15906. [2]GPS Map Datum WGS 1984.

4.0 SAMPLING RESULTS

This section provides a summary of data collected during this sediment and tissue sampling effort. The collected data include physical characteristics of tissue and sediment, measurements of water parameters (dissolved oxygen [DO], pH, salinity, and water temperature) within the water column and dioxin levels of the collected samples.

Table 4-1 provides a summary of species, gender, weight and length of each individual blue crab captured. It also provides sampling date and time, as well as water parameter measurements obtained during the sampling of blue crabs and oysters. Table 4-2 provides similar data collected during the sampling of catfish.

Table 4-3 provides date, time, and water column profiles of water parameters obtained during the sediment sampling effort. Documentation of sediment characteristics noticeable in the field is also provided in Table 4-3.

Sediment samples collected under this project were sent to NWDLS for analysis of moisture, total solids, volatile solids, and TOC. The results reported by NWDLS are summarized in Table 4-4. In addition, a separate sediment sampling effort was conducted in HSC on July 19, 2001, as a part of the 2001 HSC Intensive Survey. Sediment samples collected during the Intensive Survey were sent to NWDLS for analysis of total solids, volatile solids, TOC, and total Kjeldahl nitrogen (TKN), and to ANACON, Inc., for grain size analysis. Due to the proximity of both sampling efforts, a summary of the Intensive Survey results is also provided in Table 4-4 for comparison purposes. As can be seen, both sampling efforts provide similar sediment analysis results.

A summary of dioxin levels reported by WSU is provided in Tables 4-5 and 4-6. Table 4-5 lists the levels of total dioxin and furans in tissue and sediment. Table 4-6 lists the levels of substituted 2, 3, 7, 8 dioxin and furans. Using Toxicity Equivalency Factors (TEF's) listed in the Texas Surface Water Quality Standards, a set of Toxicity Equivalency Concentrations (TEC's, also called TEQ's) is calculated and presented in Table 4-7. In addition, using the TEF's provided by the EPA in its Dioxin Exposure Assessment (USEPA, 2000), another set of TEQ's is calculated and provided in Table 4-8.

TABLE 4-1

CRAB AND OYSTER TISSUE SAMPLES COLLECTED FROM HSC & UPPER GALVESTON BAY

Station	Date	Time	Water Parameters					Sample 1			Sample 2			Sample 3			Sample 4			Sample 5			Average	
			DO (mg/L)	pH (SU)	Salinity (‰)	Temp (°C)	Depth (ft)	Sex	Wt. (oz)	Leng (in)	Sex	Wt. (oz)	Leng (in)	Sex	Wt. (oz)	Leng (in)	Sex	Wt. (oz)	Leng (in)	Sex	Wt. (oz)	Leng (in)	Wt. (oz)	Leng (in)
Crab Samples (C. sapidus):																							
11193	06/29/01	09:25					3.3	M	11.0	6.7	M	6.0	6.0	M	3.0	5.4								
11193	07/11/01	16:20	7.0	8.0	2.0	32.4	4.3	M	10.0	7.0	M	11.0	5.9	M	8.0	6.8	M	7.0	6.2	M	6.0	6.4	7.75	6.30
11261	06/28/01	10:43					3.8	M	8.0	5.3	M	8.0	6.3	M	11.0	6.5	M	7.0	6.1	M	10.0	7.2	8.80	6.28
11292	06/28/01	08:35					16.6	M	5.0	5.8	M	3.0	5.5											
11292	06/28/01	09:00					9.0	M	2.0	4.9	M	1.0	4.2	M	4.0	5.6	M	1.0	4.6	M	1.0	3.8	2.43	4.91
13309	07/12/01	10:07					7.0	M	9.0	6.5	M	12.0	6.4	M	8.0	5.6	M	8.0	5.8	M	12.0	7.1	9.80	6.28
13337	07/09/01	12:15	8.7	8.7	6.9	30.6	4.4	M	4.0	5.4	M	11.0	6.1	M	4.0	5.3	M	3.0	5.3				5.50	5.53
13339	06/28/01	16:17					6.7	M	7.0	5.1	M	9.0	6.0	M	12.0	6.1							9.33	5.73
13340	06/28/01	17:01					5.3	M	8.0	5.8	M	8.0	5.5	M	8.0	6.1	M	9.0	5.9					
13340	07/09/01	12:00						F	17.0	16.2		19.0	15.3										11.50	9.13
13342	06/28/01	14:50					7.6	M	7.0	5.2	F	8.0	6.5	F	7.0	6.8	M	10.0	6.4				8.00	6.23
13344	06/29/01	10:40						M	11.0	6.9	M	12.0	5.7	M	11.0	6.2	M	10.0	6.7	M	10.0	6.1	10.80	6.32
13355	06/29/01	11:43					5.2	M	9.0	5.8	M	6.0	5.2	F	8.0	6.0	M	5.0	5.0	M	5.0	5.2	6.60	5.44
13363	07/15/01	13:35						M	11.0	6.5	M	8.0	5.5	M	8.0	6.3	M	9.0	5.8	M	8.0	6.3	8.80	6.05
14560	07/12/01	10:50					8.0	M	7.0	5.6	M	9.0	5.8	M	5.0	5.9	M	5.0	5.1	M	7.0	5.2	6.60	5.52
14566	07/13/01	14:00	7.3	8.4	11.4	32.5	12.2	M	9.0	5.4	M	9.0	7.1	M	10.0	6.8	M	9.0	6.9				9.25	6.55
15464	07/13/01	09:05	4.2	7.9	9.3	30.6	6.3	M	9.0	6.2	F	8.0	6.2	F	7.0	6.3	M	6.0	5.8	M	3.0	5.1	6.60	5.92
15906	07/13/01	12:15	7.2	8.4	2.3	30.2	10.0	M	6.0	5.8	M	3.0	5.1	M	2.0	5.2	M	3.0	5.3				3.50	5.35
15909	07/13/01	10:25	6.6	8.3	6.9	30.0	10.5	M	6.0	6.0	M	6.0	6.1	M	3.0	5.2	M	3.0	5.7				4.50	5.75
15932	06/27/01	11:00					4.9	M	3.0	4.8														
15932	06/28/01	09:37					4.9	M	3.0	5.0	M	3.0	4.9										3.00	4.90
16618	06/29/01	11:05					6.3	M	12.0	7.0	M	9.0	5.6	M	8.0	6.0	M	10.0	6.5	M	9.0	6.2	9.60	6.26
16622	06/29/01	10:15						M	7.0	6.1	M	5.0	5.6	M	6.0	6.1	M	6.0	5.8	M	6.0	5.7	6.00	5.86
Oyster Samples (C. virginica):																							
14568	07/13/01	15:07	18.1	8.4	11.3	32.8																		
015 (16521)	07/13/01	15:45	8.6	8.4	13.7	32.4	7.2																	

TABLE 4-2
CATFISH TISSUE SAMPLES COLLECTED FROM HSC & UPPER GALVESTON BAY

Station	Date	Time	Water Parameters					Sample 1				Sample 2				Sample 3				Average	
			DO (mg/L)	pH (SU)	Salinity (‰)	Temp (°C)	Depth (ft)	Species	Sex	Wt. (oz)	Leng (in)	Species	Sex	Wt. (oz)	Leng (in)	Species	Sex	Wt. (oz)	Leng (in)	Wt. (oz)	Leng (in)
11193	06/28/01	11:40					3.3	I. furcatus		25.0	17.3	I. furcatus		15.0	14.3						
11193	07/12/01	15:45					24.0	I. furcatus		12.0	13.0	I. furcatus		9.0	12.5					15.25	14.25
11261	07/11/01	16:46						I. furcatus		17.0	15.3										
11261	07/15/01	18:00	6.6	7.9	7.5	31.6	26.0	I. furcatus		13.0	13.5	I. furcatus		5.0	9.8	I. furcatus		5.0	10.5	10.00	12.25
11292																					
13309	07/09/01	16:57					8.2	A. felis		15.0	14.8										
13309	07/20/01	13:45						A. felis		13.0	14.0	A. felis		5.0	11.5	A. felis		3.0	9.0	9.00	12.33
13337	07/09/01	17:24						A. felis		16.0	14.8	A. felis		7.0	12.0						
13337	07/15/01	18:45	7.5	8.2	10.7	31.0	6.3	A. felis		27.0	17.5	A. felis		6.0	12.0					14.00	14.06
13339	07/09/01	14:00	9.8	8.4	5.4	32.2	7.6	A. felis		24.0	16.5	A. felis		14.0	14.0	A. felis		13.5	14.0	17.17	14.83
13340	06/28/01							A. felis		14.0	14.0									14.00	14.00
13342	07/09/01	13:10	5.8	7.6	4.4	30.0	6.9	A. felis		15.0	13.5	A. felis		20.0	15.5	A. felis		10.0	12.5	15.00	13.83
13344	06/28/01	14:15					9.0	A. felis		17.0	17.3	A. felis	F	24.0	15.0	A. felis		12.0	13.5	17.67	15.25
13355	07/12/01	09:17						A. felis		17.0	15.0										
13355	07/20/01	12:30	10.4	8.5	13.0	31.1	7.5	A. felis		3.0	9.5	A. felis		10.0	12.8					10.00	12.42
13363	07/12/01	13:30					40.0	A. felis		11.0	12.0										
13363	07/15/01	16:00						A. felis		4.0	10.5										
13363	07/20/01	16:30	9.2	8.4	13.2	32.0		A. felis		4.0	10.5	A. felis		5.0	10.5					6.00	10.88
14560	07/20/01	17:05	9.8	8.6	11.4	31.9		A. felis		7.0	11.3	A. felis		10.0	12.5	A. felis		3.0	9.0	6.67	10.92
14566	07/13/01	14:30	7.3	8.4	11.4	32.5	12.2	A. felis		14.0	13.3	A. felis		5.0	9.5	A. felis		5.0	9.3	8.00	10.67
15464	07/20/01	18:15	3.9	8.1	11.8	31.3		A. felis		13.0	13.0	A. felis		9.0	12.5	A. felis		12.0	13.5	11.33	13.00
15906	07/13/01	13:33	6.7	8.3	1.3	31.1	10.6	A. felis		6.0	10.5	A. felis		8.0	12.0						
15906	07/20/01	09:30	7.2	8.3	11.6	30.4	12.0	A. felis		10.0	13.0									8.00	11.83
15909	07/13/01	12:00	6.8	8.2	5.1	30.4	11.0	A. felis		11.0	12.5	A. felis		4.0	9.5						
15909	07/20/01	09:45	7.2	8.3	11.7	30.5	8.5	A. felis		8.0	12.0									7.67	11.33
15932																					
16618	07/09/01	10:30						A. felis		14.0	13.8	A. felis		16.0	14.8	A. felis		19.0	15.3	16.33	14.58
16622	06/29/01	09:55						A. felis		13.0	13.8									13.00	13.75

TABLE 4-3
WATER MEASUREMENTS TAKEN DURING SEDIMENT SAMPLING

Station	11261			
Water	Date:	07/11/01	Time:	12:39
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	3.77	7.44	4.81	30.17
2.0	3.25	7.42	5.72	30.03
11.0	3.02	7.46	7.21	30.01
21.0	3.02	7.51	8.04	30.04
31.0	2.10	7.58	9.96	30.11
41.0	2.83	7.59	9.78	30.10
46.0	2.04	7.63	13.19	30.18
51.0				
Remark:	Silty red clay			

Station	11287			
Water	Date:	07/11/01	Time:	10:22
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	3.37	7.34	1.96	30.37
5.0	1.51	7.16	2.44	29.62
15.0	1.22	7.14	2.70	29.59
25.0	0.39	7.06	3.88	29.54
35.0	0.69	7.08	4.63	29.63
40.0	1.04	7.09	4.99	29.66
45.0				
Remark:	Silty			

Station	11292			
Water	Date:	07/11/01	Time:	08:41
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	2.51	7.12	0.71	29.84
4.0	1.44	7.04	1.27	29.75
14.0	0.19	6.94	2.54	28.90
24.0	0.23	6.90	2.84	28.80
29.0	0.32	6.90	2.84	28.89
34.0				
Remark:	Debris in sediment			

Station	11292			
Water	Date:	07/11/01	Time:	09:52
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	2.77	7.08	0.88	29.95
5.0	0.27	7.02	1.62	29.53
15.0	0.19	6.95	2.37	28.87
25.0	0.23	6.90	2.80	28.74
30.0	0.40	6.90	3.01	28.87
35.0				
Remark:				

Station	13309			
Water	Date:	07/12/01	Time:	10:15
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	5.86	8.21	10.49	30.66
5.0	4.68	8.05	11.31	30.38
15.0	4.34	7.98	13.30	30.49
25.0	4.37	7.99	15.93	30.32
35.0	4.27	7.89	15.94	30.32
40.0	3.98	7.81	18.04	30.02
45.0				
Remark:	Some shell hash w/ sand			

Station	13337			
Water	Date:	07/12/01	Time:	09:17
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	5.38	7.89	7.86	30.37
3.0	5.35	7.87	7.84	30.36
4.0				
Remark:	Silty			

Station	13339			
Water	Date:	07/11/01	Time:	14:27
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	9.76	8.59	6.08	32.50
3.0				
Remark:	Silty w/ some sand & shell hash			

Station	13340			
Water	Date:	07/11/01	Time:	14:50
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	9.62	8.92	5.83	34.10
3.0	9.95	8.85	6.06	33.90
4.0				
Remark:	Silty w/ organic smell.			

Station	13342			
Water	Date:	07/11/01	Time:	13:30
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	6.51	7.88	4.75	31.84
5.0	5.35	7.59	4.92	29.95
6.0				
Remark:	Silty, no odor			

TABLE 4-3
WATER MEASUREMENTS TAKEN DURING SEDIMENT SAMPLING

Station	13344			
Water	Date:	07/11/01	Time:	13:21
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	8.92	8.73	3.59	21.93
5.7	6.06	7.97	4.01	29.90
6.7				
Remark:	Silty w/ shell hash			

Station	13355			
Water	Date:	07/12/01	Time:	09:45
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	5.76	8.12	9.29	30.67
5.5	5.41	8.07	10.06	30.54
15.5	4.48	8.07	11.71	30.49
25.5	3.90	7.99	13.24	30.36
30.5	3.49	7.95	13.76	30.03
35.5				
Remark:	Silty			

Station	13363			
Water	Date:	07/12/01	Time:	13:30
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	11.00	8.61	11.44	32.93
6.0	4.02	8.10	13.49	31.07
16.0	2.62	7.96	15.04	30.33
26.0	2.35	7.91	17.44	30.14
36.0	2.31	7.89	18.09	30.09
41.0	1.90	7.81	19.10	29.97
46.0				
Remark:	Silty			

Station	14560			
Water	Date:	07/12/01	Time:	11:00
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	7.02	8.49	11.41	30.35
13.0	5.43	8.31	13.46	30.29
23.0	4.78	8.20	16.23	30.26
33.0	3.89	8.09	18.72	30.20
38.0	3.54	8.02	20.13	30.07
43.0				
Remark:	Abundant shell			

Station	14566			
Water	Date:	07/12/01	Time:	11:51
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	6.72	8.29	10.39	30.76
10.0	4.76	8.10	15.54	30.32
20.0	3.80	7.97	21.24	30.00
30.0	2.91	7.89	24.78	29.69
35.0	2.76	7.87	25.68	29.58
40.0				
Remark:	Lots of shell			

Station	15464			
Water	Date:	07/12/01	Time:	12:50
Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	6.78	8.39	9.51	31.97
7.2	4.32	8.14	9.80	30.48
8.2				
Remark:	Lots of shell			

TABLE 4-3
WATER MEASUREMENTS TAKEN DURING SEDIMENT SAMPLING

Station	15932				Station	15934				Station	16618			
Water	Date:	07/11/01	Time:	11:00	Water	Date:	07/11/01	Time:	11:56	Water	Date:	07/11/01	Time:	14:11
Depth	DO	pH	Salinity	Temp	Depth	DO	pH	Salinity	Temp	Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)	(ft)	(mg/L)	(SU)	(‰)	(°C)	(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	2.72	7.26	3.06	30.42	1.0	3.09	7.30	4.39	30.11	1.0	5.49	7.82	6.82	31.67
10.0	2.25	7.22	3.21	29.88	9.0	2.52	7.26	4.76	29.84	15.0	4.04	7.75	8.26	30.45
20.0	1.85	7.20	3.61	29.78	19.0	2.16	7.25	5.57	29.87	25.0	4.12	7.79	9.84	30.38
30.0	1.65	7.18	4.77	29.79	29.0	2.14	7.29	6.62	29.91	35.0	3.32	7.71	11.91	30.26
40.0	1.39	7.23	7.20	29.93	39.0	2.06	7.33	8.25	30.02	40.0	2.83	7.82	16.74	30.08
45.0	1.64	7.21	6.05	29.89	44.0	1.87	7.37	9.66	30.08	45.0				
50.0					49.0									
Remark:	Silty w/ slight oil smell, stratified sed layer				Remark:	Straitified w/ light on top, oil/organic odor				Remark:	Very silty and dark, w/ some sand			
Station	16622				Station					Station				
Water	Date:	07/12/01	Time:	18:00	Water	Date:		Time:		Water	Date:		Time:	
Depth	DO	pH	Salinity	Temp	Depth	DO	pH	Salinity	Temp	Depth	DO	pH	Salinity	Temp
(ft)	(mg/L)	(SU)	(‰)	(°C)	(ft)	(mg/L)	(SU)	(‰)	(°C)	(ft)	(mg/L)	(SU)	(‰)	(°C)
1.0	7.66	8.61	0.10	32.60										
7.0	7.33	8.52	0.10	32.48										
12.0	5.31	7.75	0.10	30.95										
17.0	4.81	7.71	0.11	30.67										
21.0	5.07	7.70	0.12	30.66										
22.0														
Remark:	Sandy clay				Remark:					Remark:				

TABLE 4-4
CHARACTERISTICS OF SEDIMENT SAMPLES FROM DIOXIN AND HSC INTENSIVE SURVEY

Station	Description	Distance[1] from Morgan's Pt. (km)	Dioxin Sediment Sampling NWDLS[2]					HSC Intensive Survey NWDLS[2]					HSC Intensive Survey ANACON[3]			
			Date	Moisture (%)	Tot Solids (%)	Vol Solids (%)	TOC (%)	Date	Total Solids (%)	Vol Solids (%)	TOC (%)	TKN (mg/kg)	Total Solids (%)	Size Distribution % Sand	% Silt	% Clay
11252	HSC @ Morgan's Point	0.0						7/19/01	30.5	8.0	1.23	1,653	31.1	3.7	40.1	56.2
11254	HSC @ Hwy 146 Bridge	4.8						7/19/01	36.9	9.6	1.30	1,396	39.2	4.6	22.2	73.2
11258	HSC @ CM12 Scott Bay	11.5						7/19/01	41.0	4.8	0.90	1,047	44.7	21.7	38.0	40.3
11258-DUP	HSC @ CM12 Scott Bay	11.5						7/19/01	38.9	5.4	1.03	1,088				
11260	HSC @ Lynchburg Ferry	13.5		DATA NOT RECORDED DURING DIOXIN STUDY				7/19/01	31.6	6.1	1.03	1,206	42.6	35.4	24.6	40.0
11263	HSC Near Battleship	15.9						7/19/01	27.4	8.4	1.32	1,591	27.9	1.0	25.3	73.7
11265	HSC Near Patrick Bayou	18.0						7/19/01	40.2	6.6	1.17	1,083	43.1	11.7	47.9	40.4
11269	HSC @ Beltway 8	22.9						7/19/01	41.5	6.2	1.22	1,120	42.0	14.6	51.1	34.3
11271	HSC Near Greens Bayou	25.5						7/19/01	57.2	3.9	0.85	624	60.9	42.2	37.4	20.4
11271-DUP	HSC Near Greens Bayou	25.5						7/19/01	59.4	3.5	0.88	677				
11281	HSC Near Hunting Bayou	29.2						7/19/01	50.2	6.6	1.74	962	47.8	29.7	41.8	28.5
11287	HSC Near Sims Bayou	33.9	7/11/01	46.4	53.6	4.4	1.56	7/19/01	45.1	6.4	1.68	1,303	45.4	20.7	44.6	34.7
11288	HSC @ IH 610	36.4						7/19/01	53.9	4.7	1.56	1,160	52.2	26.1	45.0	28.9
11292	HSC @ Turning Basin	40.0	7/11/01	32.4	67.6	2.9	1.30	7/19/01	73.8	2.3	0.73	480	68.1	63.9	25.9	10.2
11261	HSC @ San Jacinto River	15.0	7/11/01	39.4	60.6	2.4	0.69									
13309	Upper Galveston Bay @ HSC	-5.0	7/12/01	58.4	41.6	5.8	0.98									
13337	Tabbs Bay Mid-Bay @ Ruined Bridge	1.4	7/12/01	58.6	41.4	5.8	1.02									
13339	San Jacinto Bay @ Buoy 15	7.3	7/11/01	70.3	29.7	6.6	1.13									
13340	Black Duck Bay @ Mid Bay	4.8	7/11/01	72.2	27.8	7.2	1.32									
13340-DUP	Black Duck Bay @ Mid Bay	4.8	7/11/01	71.7	28.3	8.2	1.36									
13342	Scott Bay @ Mid Bay	9.6	7/11/01	72.7	27.3	9.2	0.99									
13344	Burnet Bay @ Mid Bay	13.1	7/11/01	73.2	26.8	9.0	1.33									
13355	Barbours Cut Midway between Mouth and Terminus	1.8	7/12/01	68.8	31.2	8.2	0.95			DATA NOT RECORDED DURING HSC INTENSIVE SURVEY						
13363	Bayport Channel between Mouth & Terminus	-6.5	7/12/01	61.9	38.1	7.4	1.09									
13363-DUP	Bayport Channel between Mouth & Terminus	-6.5	7/12/01	64.9	35.1	8.1	1.12									
14560	Upper Galveston Bay @ HSC Marker 75	-9.2	7/12/01	62.0	38.0	6.6	1.18									
15464	Upper Galveston Bay Near Shore	-11.3	7/12/01	34.0	66.0	2.4	0.44									
14566	Uper Gal Bay @ HSC Marker 59	-19.7	7/12/01	49.6	50.4	4.9	0.90									
15932	HSC 50' from Armco discharge	27.4	7/11/01	61.1	38.9	8.3	2.19									
15934	HSC 56' from Shell's outfall 007	21.0	7/11/01	49.1	50.9	5.6	1.15									
16618	HSC/San Jacinto River West of Exxon docks	7.9	7/11/01	48.6	51.4	4.1	0.61									
16622	San Jacinto River Tidal @ Banana Bend	15.1	7/12/01	21.5	78.5	1.9	0.18									

Note: [1] Negative values indicate distance downstream from Morgan's Point

[2] North Water District Labarotory Service.

[3] Anacon, Inc., a laboratory.

TABLE 4-5
TOTAL DIOXIN AND FURANS LEVELS REPORTED BY WRIGHT STATE UNIVERSITY

Station ID	Sample Type	Tetra CDDs (pg/g)	Penta CDDs (pg/g)	Hexa CDDs (pg/g)	Hepta CDDs (pg/g)	Octa CDDs (pg/g)	Total CDDs (pg/g)	Total CDDs/CDFs (pg/g)	Tetra CDFs (pg/g)	Penta CDFs (pg/g)	Hexa CDFs (pg/g)	Hepta CDFs (pg/g)	Octa CDFs (pg/g)	Total CDFs (pg/g)
13342	Blue Crab	5.56	< 0.1	2.06	< 0.074	2.12	9.74	19.5	8.59	0.97	0.225	< 0.048	< 0.064	9.79
13337	Blue Crab	5.38	0.123	1.56	0.484	1.95	9.5	21.3	11.4	0.275	0.146	< 0.05	< 0.061	11.8
13339	Blue Crab	7.3	0.48	2.47	0.523	1.02	11.8	21	8	1.22	< 0.069	< 0.051	< 0.071	9.22
13355	Blue Crab	4.55	0.139	1.75	0.71	1.98	9.13	17.1	7.43	0.232	0.352	< 0.04	< 0.051	8.01
13344	Blue Crab	3.73	0.202	0.637	0.491	1.69	6.75	14.1	5.86	0.987	0.459	< 0.044	< 0.059	7.31
15932	Blue Crab	3.92	< 0.069	1.03	2.27	2.95	10.2	20.3	6.58	1.77	1.79	< 0.044	< 0.058	10.1
13340	Blue Crab	1.13	< 0.091	< 0.053	0.634	1.29	3.06	5.72	1.79	0.872	< 0.047	< 0.047	< 0.065	2.66
11292	Blue Crab	3.48	< 0.092	< 0.059	0.814	< 0.086	4.29	8.76	1.53	2.27	0.675	< 0.048	< 0.06	4.47
16618	Blue Crab	8.05	0.553	1.27	2.15	2.79	14.8	30.2	13.3	1.58	0.501	< 0.04	< 0.08	15.4
11193	Blue Crab	7.79	< 0.091	0.718	0.616	2.41	11.5	28.6	14.5	1.85	0.59	0.159	< 0.072	17.1
16622	Blue Crab	0.377	< 0.1	0.601	0.39	2.35	3.72	4	< 0.021	< 0.085	0.286	< 0.066	< 0.096	0.286
11261	Blue Crab	4.79	< 0.1	1.21	0.376	1.35	7.73	18.2	9.47	0.811	0.21	< 0.055	< 0.091	10.5
13309	Blue Crab	1.98	< 0.11	< 0.068	0.755	1.98	4.72	8.64	3.54	0.38	< 0.065	< 0.048	< 0.079	3.92
13363	Blue Crab	1.96	0.363	0.644	< 0.072	0.928	3.89	6.73	2.84	< 0.052	< 0.055	< 0.05	< 0.07	2.84
14560	Blue Crab	2.8	< 0.092	0.563	0.34	1.65	5.36	11	4.71	0.516	0.416	< 0.05	< 0.071	5.64
14566	Blue Crab	3.03	< 0.1	1.88	0.711	1.29	6.91	12.9	5.05	0.886	0.077	< 0.049	< 0.089	6.01
15464	Blue Crab	0.984	0.216	0.901	0.763	1.13	3.99	6.58	1.92	0.519	0.154	< 0.05	< 0.06	2.59
15906	Blue Crab	0.766	0.344	2.33	0.765	1.7	5.91	7.32	1.31	< 0.076	0.0966	< 0.058	< 0.083	1.4
15909	Blue Crab	1.88	< 0.074	2.2	1.14	< 0.1	5.22	8.4	2.66	0.518	< 0.057	< 0.047	< 0.073	3.18
13342	Catfish	16.3	< 0.089	0.767	< 0.064	2.33	19.4	22.2	1.2	1.32	0.267	< 0.036	< 0.049	2.78
13339	Catfish	8.22	< 0.078	0.137	< 0.063	1.8	10.2	11.8	1.2	0.446	< 0.046	< 0.05	< 0.048	1.64
16618	Catfish	8.48	< 0.079	0.942	0.67	1.22	11.3	11.9	< 0.01	0.387	0.206	< 0.039	< 0.052	0.593
11193	Catfish	6.1	0.363	< 0.066	1.34	3.32	11.1	13.1	2.02	< 0.042	< 0.082	< 0.049	< 0.068	2.02
11261	Catfish	8.34	< 0.11	0.506	< 0.086	1.52	10.4	12	1.04	0.562	< 0.071	< 0.05	< 0.077	1.61
13337	Catfish	4.14	< 0.11	< 0.085	< 0.073	2.2	6.34	7.39	0.295	< 0.068	0.761	< 0.051	< 0.086	1.06
13340	Catfish	2.48	< 0.081	0.169	0.569	3.49	6.71	7.62	0.356	< 0.05	0.447	< 0.041	0.106	0.909
13344	Catfish	6.35	< 0.099	< 0.15	< 0.082	3.54	9.89	10	< 0.014	< 0.063	< 0.15	0.127	< 0.078	0.127
14566	Catfish	2.29	0.22	0.711	1.74	5.47	10.4	13.5	2.38	0.388	0.305	< 0.042	< 0.052	3.07
16622	Catfish	2.08	0.248	0.261	< 0.078	1.33	3.91	3.91	< 0.017	< 0.054	< 0.08	< 0.057	< 0.077	0
15909	Catfish	1.1	< 0.086	1.49	1.9	3.5	7.99	9.63	1.05	0.343	0.251	< 0.048	< 0.056	1.64
13363	Catfish	5.15	< 0.1	1.06	< 0.063	1.21	7.42	9.3	1.73	< 0.036	0.153	< 0.047	< 0.055	1.88
13309	Catfish	2.07	< 0.089	0.824	1.09	1.8	5.78	6.47	0.459	0.179	< 0.072	0.0567	< 0.046	0.694
13355	Catfish	8.35	< 0.12	1.32	1.19	3.12	14	15.6	1.4	< 0.066	0.178	< 0.046	< 0.082	1.58
14560	Catfish	0.606	0.225	0.764	1.33	4.17	7.09	8.26	0.364	0.382	0.34	0.0849	< 0.06	1.17
15906	Catfish	0.975	< 0.1	1.05	0.91	2.08	5.01	5.77	< 0.013	0.541	0.217	< 0.04	< 0.066	0.758
15464	Catfish	2.51	< 0.099	2.25	2.82	5.05	12.6	14.1	1.49	< 0.025	< 0.076	< 0.046	< 0.061	1.49
11292	Catfish	(Sample could not be obtained.)												
15932	Catfish	(Sample could not be obtained.)												
14568	Oyster	1.08	0.799	3.06	3.43	16.6	25	26.5	1.4	< 0.062	0.0926	< 0.048	< 0.071	1.5
14568 Dup	Oyster	1.17	0.323	3.38	3.08	11	18.9	21.6	2.12	< 0.034	0.245	< 0.039	0.248	2.61
015 (16521)	Oyster	1.02	< 0.079	4	3.63	10.2	18.8	20.3	1.16	0.301	< 0.036	0.0421	< 0.066	1.5
015 Dup	Oyster	0.724	0.312	3.03	1.81	8.18	14	15.8	1.25	0.292	0.0808	< 0.033	0.167	1.79

TABLE 4-5
TOTAL DIOXIN AND FURANS LEVELS REPORTED BY WRIGHT STATE UNIVERSITY

Station ID	Sample Type	Tetra CDDs (pg/g)	Penta CDDs (pg/g)	Hexa CDDs (pg/g)	Hepta CDDs (pg/g)	Octa CDDs (pg/g)	Total CDDs (pg/g)	Total CDDs/CDFs (pg/g)	Tetra CDFs (pg/g)	Penta CDFs (pg/g)	Hexa CDFs (pg/g)	Hepta CDFs (pg/g)	Octa CDFs (pg/g)	Total CDFs (pg/g)
11261	Sediment	23.6	0.617	42.7	190	1624	1881	2156	78.5	13.7	16.2	28	139	275
11287	Sediment	33.3	4.75	148	995	4514	5695	6346	65.2	36.2	88.4	218	243	651
11292	Sediment	11.1	4.23	88	611	3126	3840	4214	24.4	39.3	65.1	124	121	374
13309	Sediment	29.4	12.2	123	422	3076	3663	3985	35.6	7.97	22.7	45.9	211	323
13337	Sediment	36.2	10.5	112	447	3587	4194	4893	73.8	19.5	43.4	76.2	486	699
13339	Sediment	42	17.8	183	643	5620	6505	6934	62.7	15.5	33.1	58.5	259	429
13340	Sediment	21.6	10.2	162	578	4514	5287	5497	21.2	10.2	28	46.4	105	210
13340 Dup	Sediment	15.6	11.9	142	480	3995	4644	4831	14.8	12.4	26.8	44.7	88.7	187
13342	Sediment	51.9	10.9	198	705	7292	8258	8858	83.8	23.2	43.3	72	378	601
13344	Sediment	33.7	1.08	135	555	5546	6270	6723	51.9	17.4	34.3	60	289	452
13355	Sediment	38.2	7.69	157	678	5339	6220	6694	76.6	19.6	38.3	71.1	269	474
13363	Sediment	12	7.88	94.4	318	3725	4158	4238	9.11	2.59	4.97	15.8	47.3	79.8
13363 Dup	Sediment	13.4	15	105	350	3817	4301	4386	9.83	2.8	6.77	17	48.4	84.8
14560	Sediment	23.8	30.1	185	426	2397	3062	3157	10	4.64	9.55	20.5	49.6	94.3
14566	Sediment	25.2	26.9	193	319	1302	1867	1885	0.846	0.805	1.15	6.41	8.94	18.1
15464	Sediment	2.91	1.32	32.4	135	775	946	984	1.85	1.28	4.16	10	20.2	37.5
15932	Sediment	100	6.12	159	1105	5315	6685	7835	309	73.1	104	184	479	1149
15934	Sediment	36.7	0.91	75.7	415	3417	3945	4692	131	32.9	48.6	83.5	451	747
16618	Sediment	23	8.51	87.8	266	1913	2298	2492	50.9	5.47	12	22.8	103	194
16622	Sediment	0.429	< 0.11	7.57	52.9	681	742	751	< 0.023	0.302	0.85	3.82	3.64	8.61

TABLE 4-6
SUBSTITUTED 2,3,7,8 DIOXIN AND FURANS LEVELS REPORTED BY WRIGHT STATE UNIVERSITY

Station ID	Sample Type	2378 TCDD (pg/g)	12378 PeCDD (pg/g)	123478 HxCDD (pg/g)	123678 HxCDD (pg/g)	123789 HxCDD (pg/g)	1234678 HpCDD (pg/g)	OCDD (pg/g)	2378 TCDF (pg/g)	12378 PeCDF (pg/g)	23478 PeCDF (pg/g)	123478 HxCDF (pg/g)	123678 HxCDF (pg/g)	234678 HxCDF (pg/g)	123789 HxCDF (pg/g)	1234678 HpCDF (pg/g)	1234789 HpCDF (pg/g)	OCDF (pg/g)
13342	Blue Crab	4.69	< 0.21	0.162	0.329	0.221	< 0.45	2.12	5.71	< 0.26	< 0.28	0.225	< 0.13	< 0.074	< 0.078	< 0.16	< 0.056	< 0.12
13337	Blue Crab	5.08	< 0.099	< 0.083	0.392	< 0.27	0.484	1.95	6.61	< 0.26	0.275	< 0.15	< 0.085	< 0.098	< 0.065	< 0.19	< 0.058	< 0.13
13339	Blue Crab	4.05	< 0.1	< 0.077	< 0.3	< 0.24	< 0.46	1.02	5.23	< 0.16	0.25	< 0.08	< 0.089	< 0.076	< 0.089	< 0.18	< 0.057	< 0.18
13355	Blue Crab	3.92	0.139	< 0.06	0.313	< 0.17	< 0.37	1.98	4.66	< 0.19	0.232	0.146	< 0.09	< 0.057	< 0.063	< 0.18	< 0.044	< 0.051
13344	Blue Crab	3.73	< 0.091	< 0.055	< 0.24	0.18	< 0.35	1.69	4.91	0.202	< 0.14	< 0.1	0.0634	< 0.061	< 0.059	< 0.11	< 0.049	< 0.068
15932	Blue Crab	3.76	< 0.0584	< 0.068	0.445	< 0.19	0.738	2.95	5.76	0.688	< 0.36	0.497	< 0.16	< 0.069	< 0.064	< 0.34	< 0.049	< 0.058
13340	Blue Crab	0.86	< 0.094	< 0.065	< 0.14	< 0.056	0.283	1.29	1.34	< 0.055	< 0.11	< 0.052	< 0.5	< 0.052	< 0.058	< 0.042	< 0.054	< 0.065
11292	Blue Crab	0.717	< 0.093	< 0.062	< 0.32	< 0.2	< 0.5	< 0.086	0.991	< 0.17	< 0.12	< 0.13	< 0.094	< 0.058	< 0.061	< 0.18	< 0.053	< 0.063
16618	Blue Crab	4.92	< 0.11	< 0.066	< 0.27	< 0.23	0.831	2.79	7.33	0.278	< 0.23	< 0.22	< 0.061	< 0.072	< 0.071	< 0.27	< 0.066	< 0.085
11193	Blue Crab	6.17	< 0.12	< 0.066	< 0.2	< 0.17	< 0.28	2.41	12.6	< 0.21	0.392	0.187	0.105	< 0.055	< 0.059	0.159	< 0.055	< 0.076
16622	Blue Crab	0.377	< 0.13	< 0.087	0.329	< 0.08	0.39	2.35	< 0.025	< 0.079	< 0.12	< 0.085	< 0.077	< 0.091	< 0.09	< 0.06	< 0.076	< 0.099
11261	Blue Crab	4.79	< 0.12	< 0.075	< 0.26	< 0.074	0.376	1.35	7.02	< 0.064	< 0.19	< 0.077	< 0.071	< 0.078	< 0.082	< 0.071	< 0.06	< 0.091
13309	Blue Crab	1.98	< 0.11	< 0.073	< 0.069	< 0.067	0.335	1.98	2.93	< 0.053	< 0.084	< 0.066	< 0.059	< 0.0065	< 0.072	< 0.056	< 0.07	< 0.079
13363	Blue Crab	1.52	< 0.12	< 0.067	< 0.062	< 0.06	< 0.074	0.928	1.99	< 0.058	< 0.098	< 0.063	< 0.057	< 0.061	< 0.067	< 0.057	< 0.056	< 0.07
14560	Blue Crab	2.8	< 0.11	< 0.07	0.205	< 0.067	0.34	1.65	3.56	< 0.061	< 0.084	0.131	< 0.055	< 0.065	< 0.068	< 0.13	< 0.058	< 0.071
14566	Blue Crab	2.81	< 0.14	< 0.079	< 0.12	< 0.12	0.252	1.29	3.96	< 0.093	< 0.13	< 0.07	0.077	< 0.074	< 0.077	< 0.046	< 0.053	< 0.12
15464	Blue Crab	0.881	< 0.1	< 0.067	< 0.066	< 0.058	0.218	1.13	0.861	< 0.055	< 0.067	< 0.073	< 0.057	< 0.06	< 0.064	< 0.044	< 0.057	< 0.06
15906	Blue Crab	0.766	< 0.13	< 0.085	< 0.074	< 0.073	< 0.28	1.7	1.04	< 0.07	< 0.087	< 0.067	< 0.063	< 0.073	< 0.076	< 0.054	< 0.066	< 0.083
15909	Blue Crab	1.88	< 0.089	< 0.063	0.288	< 0.17	0.436	< 0.1	2.24	< 0.082	< 0.056	< 0.059	< 0.053	< 0.059	< 0.064	< 0.12	< 0.053	< 0.073
13342	Catfish	16.3	< 0.35	< 0.53	0.767	< 0.21	< 0.79	2.33	1.14	< 0.051	0.963	< 0.094	< 0.038	< 0.0042	< 0.048	< 0.026	< 0.04	< 0.049
13339	Catfish	8.22	< 0.25	< 0.058	< 0.5	0.137	< 0.47	1.8	0.864	< 0.034	0.446	< 0.15	< 0.068	< 0.075	< 0.072	< 0.14	< 0.054	< 0.05
16618	Catfish	8.48	< 0.27	< 0.049	0.942	< 0.21	0.67	1.22	< 0.22	< 0.034	0.387	< 0.054	< 0.046	< 0.052	< 0.059	< 0.11	< 0.047	< 0.052
11193	Catfish	6.1	0.251	< 0.073	< 0.42	< 0.26	1.34	3.32	1.64	< 0.087	< 0.38	< 0.13	< 0.085	< 0.081	< 0.078	< 0.15	< 0.06	< 0.068
11261	Catfish	8.34	< 0.29	< 0.19	0.506	< 0.16	< 0.73	1.52	0.907	< 0.076	0.562	< 0.12	< 0.061	< 0.075	< 0.081	< 0.14	< 0.06	< 0.077
13337	Catfish	4.14	< 0.25	< 0.092	< 0.4	< 0.32	< 0.82	2.2	< 0.14	< 0.08	< 0.28	< 0.13	< 0.093	< 0.094	< 0.087	< 0.08	< 0.057	< 0.086
13340	Catfish	2.48	< 0.098	< 0.062	< 0.19	0.169	0.569	3.49	0.356	< 0.051	< 0.27	0.0962	< 0.05	< 0.056	< 0.065	< 0.084	< 0.046	0.106
13344	Catfish	6.35	< 0.2	< 0.17	< 0.14	< 0.14	< 0.47	3.54	< 0.19	< 0.056	< 0.22	< 0.21	< 0.16	< 0.21	< 0.22	< 0.12	< 0.066	< 0.078
14566	Catfish	2.29	< 0.43	< 0.22	0.711	< 0.37	1.41	5.47	1.98	< 0.13	0.388	0.191	< 0.068	< 0.064	< 0.067	< 0.091	< 0.048	< 0.052
16622	Catfish	2.08	0.248	< 0.079	< 0.41	0.261	< 0.58	1.33	< 0.018	< 0.051	< 0.18	< 0.17	< 0.085	< 0.092	< 0.089	< 0.13	< 0.064	< 0.12
15909	Catfish	1.1	< 0.3	< 0.062	1.06	0.427	1.71	3.5	0.965	< 0.043	0.343	< 0.19	< 0.062	< 0.069	< 0.078	< 0.057	< 0.052	< 0.06
13363	Catfish	5.15	< 0.24	0.201	0.596	0.265	< 0.75	1.21	0.613	< 0.039	< 0.34	< 0.074	< 0.071	< 0.081	< 0.069	< 0.11	< 0.05	< 0.056
13309	Catfish	2.07	< 0.2	< 0.082	0.824	< 0.23	1.09	1.8	0.459	< 0.033	0.179	< 0.099	< 0.069	< 0.072	< 0.069	< 0.061	< 0.045	< 0.049
13355	Catfish	8.35	< 0.47	< 0.11	0.889	0.426	1.19	3.12	0.708	< 0.059	< 0.55	< 0.17	< 0.12	< 0.12	< 0.11	< 0.076	< 0.048	< 0.082
14560	Catfish	0.606	0.225	< 0.2	0.764	< 0.3	1.33	4.17	0.364	< 0.042	< 0.17	< 0.15	< 0.07	< 0.075	< 0.07	< 0.047	< 0.042	< 0.064
15906	Catfish	0.975	< 0.22	< 0.073	0.825	0.223	0.91	2.08	< 0.24	< 0.044	0.252	< 0.12	< 0.069	< 0.072	< 0.071	< 0.066	< 0.042	< 0.066
15464	Catfish	2.51	< 0.8	< 0.56	1.45	0.8	2.82	5.05	1.24	< 0.048	< 0.54	< 0.091	< 0.084	< 0.082	< 0.084	< 0.046	< 0.05	< 0.065
11292	Catfish	(Sample could not be obtained.)																
15932	Catfish	(Sample could not be obtained.)																
14568	Oyster	0.518	0.152	< 0.066	0.42	< 0.25	1.08	16.6	0.934	< 0.056	< 0.07	< 0.059	< 0.07	< 0.06	< 0.067	< 0.13	< 0.055	< 0.14
14568 Dup	Oyster	0.431	< 0.088	< 0.052	< 0.23	0.181	0.95	11	1.1	< 0.038	< 0.047	< 0.046	< 0.041	0.147	< 0.05	< 0.1	< 0.045	0.248
015 (16521)	Oyster	< 0.24	< 0.096	< 0.064	< 0.12	< 0.2	1.01	10.2	1.03	< 0.076	< 0.1	< 0.061	< 0.054	< 0.061	< 0.11	< 0.11	< 0.078	< 0.16
015 Dup	Oyster	< 0.24	< 0.09	< 0.053	< 0.31	0.2	< 0.69	8.18	0.87	< 0.048	< 0.095	< 0.062	< 0.048	< 0.055	< 0.062	< 0.076	< 0.038	0.167

TABLE 4-6
SUBSTITUTED 2,3,7,8 DIOXIN AND FURANS LEVELS REPORTED BY WRIGHT STATE UNIVERSITY

Station ID	Sample Type	2378 TCDD (pg/g)	12378 PeCDD (pg/g)	123478 HxCDD (pg/g)	123678 HxCDD (pg/g)	123789 HxCDD (pg/g)	1234678 HpCDD (pg/g)	OCDD (pg/g)	2378 TCDF (pg/g)	12378 PeCDF (pg/g)	23478 PeCDF (pg/g)	123478 HxCDF (pg/g)	123678 HxCDF (pg/g)	234678 HxCDF (pg/g)	123789 HxCDF (pg/g)	1234678 HpCDF (pg/g)	1234789 HpCDF (pg/g)	OCDF (pg/g)
11261	Sediment	16.4	< 0.36	0.874	1.7	2.38	58.8	1624	44.8	2.86	2.39	4.66	1.28	0.582	0.149	11.9	1.4	139
11287	Sediment	16.9	1.45	3.51	11.7	9.53	404	4514	31	2.83	2.57	9	4.11	2.18	< 0.52	68.8	5.07	243
11292	Sediment	0.783	0.89	1.76	7.48	4.59	215	3126	2.86	1.06	1.42	4.04	2.95	1.72	< 0.33	37.6	2.47	121
13309	Sediment	11.9	< 0.63	6.31	6.49	7.02	122	3076	22.6	1.7	1.26	4.49	1.41	0.697	< 0.15	18.7	1.4	211
13337	Sediment	19.6	< 0.87	2.06	5.12	6.44	140	3587	33.1	2.51	2.27	7.53	2.89	1.14	< 0.28	34.1	2.74	486
13339	Sediment	18.7	< 0.98	3.09	5.33	9.68	192	5620	33.4	2.07	2.27	5.24	2.05	1.14	< 0.21	25.6	2.5	259
13340	Sediment	4.91	1.15	3.22	4.95	8.03	180	4514	8.02	1.05	1.59	3.12	1.62	1.17	< 0.31	21.6	1.58	105
13340 Dup	Sediment	4.62	0.692	2.85	4.49	7.05	150	3995	7.48	1.05	1.27	2.2	1.54	1.1	< 0.36	20.7	1.49	88.7
13342	Sediment	26.4	1.34	3.12	6.31	10.1	220	7292	43.5	3.05	2.65	6.95	2.48	1.48	< 0.35	32.2	3.01	378
13344	Sediment	17.4	< 0.84	2.25	4.43	7.24	173	5546	26.1	2.19	2.12	5.58	2.27	1.19	0.296	26.9	2.78	289
13355	Sediment	19.5	1.08	3.48	6.23	8.71	214	5339	37.2	2.48	2.19	7.08	2.32	1.36	0.341	29.8	2.64	269
13363	Sediment	2.52	0.594	1.49	2.97	4.71	94.4	3725	4.3	< 0.51	0.425	1.23	0.657	< 0.21	< 0.2	7.57	0.58	47.3
13363 Dup	Sediment	2.88	0.68	1.22	2.97	5.4	104	3817	4.86	0.382	< 0.4	1.21	0.645	< 0.45	< 0.2	8.3	0.717	48.4
14560	Sediment	2.74	< 0.66	1.81	2.89	7.65	116	2397	6.14	< 0.71	0.67	2.07	0.953	< 0.37	< 0.13	9.33	0.793	49.6
14566	Sediment	0.348	0.65	1.86	1.95	6.76	76.3	1302	0.653	< 0.092	< 0.067	< 0.32	< 0.18	< 0.074	< 0.074	2.95	< 0.18	8.94
15464	Sediment	0.75	< 0.14	0.5	0.952	1.64	37	775	1.12	< 0.13	< 0.12	0.616	0.354	0.469	< 0.071	4.5	0.401	20.2
15932	Sediment	69.3	2.24	4.05	13.2	11	374	5315	154	10.3	7.96	19	6.5	2.74	< 0.51	66.3	5.32	479
15934	Sediment	29.3	< 1.01	1.75	6.91	5.54	161	3417	64.3	3.05	3.85	11.2	2.87	1.67	< 0.3	36.5	3.74	451
16618	Sediment	14	< 0.52	1.43	2.83	3.96	81.9	1913	27.2	0.963	1.1	2.17	0.885	< 0.34	< 0.15	10.8	< 0.79	103
16622	Sediment	< 0.12	< 0.11	< 0.099	< 0.44	< 0.55	18.1	681	< 0.26	< 0.061	< 0.071	< 0.34	0.239	< 0.081	< 0.083	1.98	< 0.11	3.64

TABLE 4-7
2,3,7,8 TCDD TEQs CALCULATED USING TNRCC TEFs

Station ID	TEF = / Sample Type	1 2378 TCDD (pg/g)	0.5 12378 PeCDD (pg/g)	0.1 123478 HxCDD (pg/g)	0.1 123678 HxCDD (pg/g)	0.1 123789 HxCDD (pg/g)	1234678 HpCDD (pg/g)	OCDD (pg/g)	0.1 2378 TCDF (pg/g)	0.05 12378 PeCDF (pg/g)	0.5 23478 PeCDF (pg/g)	0.1 123478 HxCDF (pg/g)	0.1 123678 HxCDF (pg/g)	0.1 234678 HxCDF (pg/g)	0.1 123789 HxCDF (pg/g)	1234678 HpCDF (pg/g)	1234789 HpCDF (pg/g)	OCDF (pg/g)	Total TEQ (pg/g)
13342	Blue Crab	4.69	0	0.016	0.033	0.022	0	0	0.571	0	0	0.023	0	0	0	0	0	0	5.355
13337	Blue Crab	5.08	0	0	0.039	0	0	0	0.661	0	0.138	0	0	0	0	0	0	0	5.918
13339	Blue Crab	4.05	0	0	0	0	0	0	0.523	0	0.125	0	0	0	0	0	0	0	4.698
13355	Blue Crab	3.92	0.07	0	0.031	0	0	0	0.466	0	0.116	0.015	0	0	0	0	0	0	4.617
13344	Blue Crab	3.73	0	0	0	0.018	0	0	0.491	0.01	0	0	0.006	0	0	0	0	0	4.255
15932	Blue Crab	3.76	0	0	0.045	0	0	0	0.576	0.034	0	0.05	0	0	0	0	0	0	4.465
13340	Blue Crab	0.86	0	0	0	0	0	0	0.134	0	0	0	0	0	0	0	0	0	0.994
11292	Blue Crab	0.717	0	0	0	0	0	0	0.099	0	0	0	0	0	0	0	0	0	0.816
16618	Blue Crab	4.92	0	0	0	0	0	0	0.733	0.014	0	0	0	0	0	0	0	0	5.667
11193	Blue Crab	6.17	0	0	0	0	0	0	1.26	0	0.196	0.019	0.011	0	0	0	0	0	7.655
16622	Blue Crab	0.377	0	0	0.033	0	0	0	0	0	0	0	0	0	0	0	0	0	0.410
11261	Blue Crab	4.79	0	0	0	0	0	0	0.702	0	0	0	0	0	0	0	0	0	5.492
13309	Blue Crab	1.98	0	0	0	0	0	0	0.293	0	0	0	0	0	0	0	0	0	2.273
13363	Blue Crab	1.52	0	0	0	0	0	0	0.199	0	0	0	0	0	0	0	0	0	1.719
14560	Blue Crab	2.8	0	0	0.021	0	0	0	0.356	0	0	0.013	0	0	0	0	0	0	3.190
14566	Blue Crab	2.81	0	0	0	0	0	0	0.396	0	0	0	0.008	0	0	0	0	0	3.214
15464	Blue Crab	0.881	0	0	0	0	0	0	0.086	0	0	0	0	0	0	0	0	0	0.967
15906	Blue Crab	0.766	0	0	0	0	0	0	0.104	0	0	0	0	0	0	0	0	0	0.870
15909	Blue Crab	1.88	0	0	0.029	0	0	0	0.224	0	0	0	0	0	0	0	0	0	2.133
13342	Catfish	16.3	0	0	0.077	0	0	0	0.114	0	0.482	0	0	0	0	0	0	0	16.972
13339	Catfish	8.22	0	0	0	0.014	0	0	0.086	0	0.223	0	0	0	0	0	0	0	8.543
16618	Catfish	8.48	0	0	0.094	0	0	0	0	0	0.194	0	0	0	0	0	0	0	8.768
11193	Catfish	6.1	0.126	0	0	0	0	0	0.164	0	0	0	0	0	0	0	0	0	6.390
11261	Catfish	8.34	0	0	0.051	0	0	0	0.091	0	0.281	0	0	0	0	0	0	0	8.762
13337	Catfish	4.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.140
13340	Catfish	2.48	0	0	0	0.017	0	0	0.036	0	0	0.01	0	0	0	0	0	0	2.542
13344	Catfish	6.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.350
14566	Catfish	2.29	0	0	0.071	0	0	0	0.198	0	0.194	0.019	0	0	0	0	0	0	2.772
16622	Catfish	2.08	0.124	0	0	0.026	0	0	0	0	0	0	0	0	0	0	0	0	2.230
15909	Catfish	1.1	0	0	0.106	0.043	0	0	0.097	0	0.172	0	0	0	0	0	0	0	1.517
13363	Catfish	5.15	0	0.02	0.06	0.027	0	0	0.061	0	0	0	0	0	0	0	0	0	5.318
13309	Catfish	2.07	0	0	0.082	0	0	0	0.046	0	0.09	0	0	0	0	0	0	0	2.288
13355	Catfish	8.35	0	0	0.089	0.043	0	0	0.071	0	0	0	0	0	0	0	0	0	8.552
14560	Catfish	0.606	0.113	0	0.076	0	0	0	0.036	0	0	0	0	0	0	0	0	0	0.831
15906	Catfish	0.975	0	0	0.083	0.022	0	0	0	0	0.126	0	0	0	0	0	0	0	1.206
15464	Catfish	2.51	0	0	0.145	0.08	0	0	0.124	0	0	0	0	0	0	0	0	0	2.859
11292	Catfish	(Sample could not be obtained.)																	
15932	Catfish	(Sample could not be obtained.)																	
14568	Oyster	0.518	0.076	0	0.042	0	0	0	0.093	0	0	0	0	0	0	0	0	0	0.729
14568 Dup	Oyster	0.431	0	0	0	0.018	0	0	0.11	0	0	0	0	0.015	0	0	0	0	0.574
015 (16521)	Oyster	0	0	0	0	0	0	0	0.103	0	0	0	0	0	0	0	0	0	0.103
015 Dup	Oyster	0	0	0	0	0.02	0	0	0.087	0	0	0	0	0	0	0	0	0	0.107

TABLE 4-7
2,3,7,8 TCDD TEQs CALCULATED USING TNRCC TEFs

Station ID	TEF = / Sample Type	1 2378 TCDD (pg/g)	0.5 12378 PeCDD (pg/g)	0.1 123478 HxCDD (pg/g)	0.1 123678 HxCDD (pg/g)	0.1 123789 HxCDD (pg/g)	1234678 HpCDD (pg/g)	OCDD (pg/g)	0.1 2378 TCDF (pg/g)	0.05 12378 PeCDF (pg/g)	0.5 23478 PeCDF (pg/g)	0.1 123478 HxCDF (pg/g)	0.1 123678 HxCDF (pg/g)	0.1 234678 HxCDF (pg/g)	0.1 123789 HxCDF (pg/g)	1234678 HpCDF (pg/g)	1234789 HpCDF (pg/g)	OCDF (pg/g)	Total TEQ (pg/g)
11261	Sediment	16.4	0	0.087	0.17	0.238	0	0	4.48	0.143	1.195	0.466	0.128	0.058	0.015	0	0	0	23.381
11287	Sediment	16.9	0.725	0.351	1.17	0.953	0	0	3.1	0.142	1.285	0.9	0.411	0.218	0	0	0	0	26.155
11292	Sediment	0.783	0.445	0.176	0.748	0.459	0	0	0.286	0.053	0.71	0.404	0.295	0.172	0	0	0	0	4.531
13309	Sediment	11.9	0	0.631	0.649	0.702	0	0	2.26	0.085	0.63	0.449	0.141	0.07	0	0	0	0	17.517
13337	Sediment	19.6	0	0.206	0.512	0.644	0	0	3.31	0.126	1.135	0.753	0.289	0.114	0	0	0	0	26.689
13339	Sediment	18.7	0	0.309	0.533	0.968	0	0	3.34	0.104	1.135	0.524	0.205	0.114	0	0	0	0	25.932
13340	Sediment	4.91	0.575	0.322	0.495	0.803	0	0	0.802	0.053	0.795	0.312	0.162	0.117	0	0	0	0	9.346
13340 Dup	Sediment	4.62	0.346	0.285	0.449	0.705	0	0	0.748	0.053	0.635	0.22	0.154	0.11	0	0	0	0	8.325
13342	Sediment	26.4	0.67	0.312	0.631	1.01	0	0	4.35	0.153	1.325	0.695	0.248	0.148	0	0	0	0	35.942
13344	Sediment	17.4	0	0.225	0.443	0.724	0	0	2.61	0.11	1.06	0.558	0.227	0.119	0.03	0	0	0	23.505
13355	Sediment	19.5	0.54	0.348	0.623	0.871	0	0	3.72	0.124	1.095	0.708	0.232	0.136	0.034	0	0	0	27.931
13363	Sediment	2.52	0.297	0.149	0.297	0.471	0	0	0.43	0	0.213	0.123	0.066	0	0	0	0	0	4.565
13363 Dup	Sediment	2.88	0.34	0.122	0.297	0.54	0	0	0.486	0.019	0	0.121	0.065	0	0	0	0	0	4.870
14560	Sediment	2.74	0	0.181	0.289	0.765	0	0	0.614	0	0.335	0.207	0.095	0	0	0	0	0	5.226
14566	Sediment	0.348	0.325	0.186	0.195	0.676	0	0	0.065	0	0	0	0	0	0	0	0	0	1.795
15464	Sediment	0.75	0	0.05	0.095	0.164	0	0	0.112	0	0	0.062	0.035	0.047	0	0	0	0	1.315
15932	Sediment	69.3	1.12	0.405	1.32	1.1	0	0	15.4	0.515	3.98	1.9	0.65	0.274	0	0	0	0	95.964
15934	Sediment	29.3	0	0.175	0.691	0.554	0	0	6.43	0.153	1.925	1.12	0.287	0.167	0	0	0	0	40.802
16618	Sediment	14	0	0.143	0.283	0.396	0	0	2.72	0.048	0.55	0.217	0.089	0	0	0	0	0	18.446
16622	Sediment	0	0	0	0	0	0	0	0	0	0	0	0.024	0	0	0	0	0	0.024

TABLE 4-8
2,3,7,8 TCDD TEQs CALCULATED USING EPA TEFs

Station ID	TEF =	1	0.5	0.1	0.1	0.1	0.01	0.001	0.1	0.05	0.5	0.1	0.1	0.1	0.1	0.01	0.01	0.001	
	Sample Type	2378 TCDD (pg/g)	12378 PeCDD (pg/g)	123478 HxCDD (pg/g)	123678 HxCDD (pg/g)	123789 HxCDD (pg/g)	1234678 HpCDD (pg/g)	OCDD (pg/g)	2378 TCDF (pg/g)	12378 PeCDF (pg/g)	23478 PeCDF (pg/g)	123478 HxCDF (pg/g)	123678 HxCDF (pg/g)	234678 HxCDF (pg/g)	123789 HxCDF (pg/g)	1234678 HpCDF (pg/g)	1234789 HpCDF (pg/g)	OCDF (pg/g)	Total TEQ (pg/g)
13342	Blue Crab	4.69	0	0.016	0.033	0.022	0	0.002	0.571	0	0	0.023	0	0	0	0	0	0	5.357
13337	Blue Crab	5.08	0	0	0.039	0	0.005	0.002	0.661	0	0.138	0	0	0	0	0	0	0	5.924
13339	Blue Crab	4.05	0	0	0	0	0	0.001	0.523	0	0.125	0	0	0	0	0	0	0	4.699
13355	Blue Crab	3.92	0.07	0	0.031	0	0	0.002	0.466	0	0.116	0.015	0	0	0	0	0	0	4.619
13344	Blue Crab	3.73	0	0	0	0.018	0	0.002	0.491	0.01	0	0	0.006	0	0	0	0	0	4.257
15932	Blue Crab	3.76	0	0	0.045	0	0.007	0.003	0.576	0.034	0	0.05	0	0	0	0	0	0	4.475
13340	Blue Crab	0.86	0	0	0	0	0.003	0.001	0.134	0	0	0	0	0	0	0	0	0	0.998
11292	Blue Crab	0.717	0	0	0	0	0	0	0.099	0	0	0	0	0	0	0	0	0	0.816
16618	Blue Crab	4.92	0	0	0	0	0.008	0.003	0.733	0.014	0	0	0	0	0	0	0	0	5.678
11193	Blue Crab	6.17	0	0	0	0	0	0.002	1.26	0	0.196	0.019	0.011	0	0	0.002	0	0	7.659
16622	Blue Crab	0.377	0	0	0.033	0	0.004	0.002	0	0	0	0	0	0	0	0	0	0	0.416
11261	Blue Crab	4.79	0	0	0	0	0.004	0.001	0.702	0	0	0	0	0	0	0	0	0	5.497
13309	Blue Crab	1.98	0	0	0	0	0.003	0.002	0.293	0	0	0	0	0	0	0	0	0	2.278
13363	Blue Crab	1.52	0	0	0	0	0	9E-04	0.199	0	0	0	0	0	0	0	0	0	1.720
14560	Blue Crab	2.8	0	0	0.021	0	0.003	0.002	0.356	0	0	0.013	0	0	0	0	0	0	3.195
14566	Blue Crab	2.81	0	0	0	0	0.003	0.001	0.396	0	0	0	0.008	0	0	0	0	0	3.218
15464	Blue Crab	0.881	0	0	0	0	0.002	0.001	0.086	0	0	0	0	0	0	0	0	0	0.970
15906	Blue Crab	0.766	0	0	0	0	0	0.002	0.104	0	0	0	0	0	0	0	0	0	0.872
15909	Blue Crab	1.88	0	0	0.029	0	0.004	0	0.224	0	0	0	0	0	0	0	0	0	2.137
13342	Catfish	16.3	0	0	0.077	0	0	0.002	0.114	0	0.482	0	0	0	0	0	0	0	16.975
13339	Catfish	8.22	0	0	0	0.014	0	0.002	0.086	0	0.223	0	0	0	0	0	0	0	8.545
16618	Catfish	8.48	0	0	0.094	0	0.007	0.001	0	0	0.194	0	0	0	0	0	0	0	8.776
11193	Catfish	6.1	0.126	0	0	0	0.013	0.003	0.164	0	0	0	0	0	0	0	0	0	6.406
11261	Catfish	8.34	0	0	0.051	0	0	0.002	0.091	0	0.281	0	0	0	0	0	0	0	8.764
13337	Catfish	4.14	0	0	0	0	0	0.002	0	0	0	0	0	0	0	0	0	0	4.142
13340	Catfish	2.48	0	0	0	0.017	0.006	0.003	0.036	0	0	0.01	0	0	0	0	0	1E-04	2.551
13344	Catfish	6.35	0	0	0	0	0	0.004	0	0	0	0	0	0	0	0	0	0	6.354
14566	Catfish	2.29	0	0	0.071	0	0.014	0.005	0.198	0	0.194	0.019	0	0	0	0	0	0	2.792
16622	Catfish	2.08	0.124	0	0	0.026	0	0.001	0	0	0	0	0	0	0	0	0	0	2.231
15909	Catfish	1.1	0	0	0.106	0.043	0.017	0.004	0.097	0	0.172	0	0	0	0	0	0	0	1.537
13363	Catfish	5.15	0	0.02	0.06	0.027	0	0.001	0.061	0	0	0	0	0	0	0	0	0	5.319
13309	Catfish	2.07	0	0	0.082	0	0.011	0.002	0.046	0	0.09	0	0	0	0	0	0	0	2.301
13355	Catfish	8.35	0	0	0.089	0.043	0.012	0.003	0.071	0	0	0	0	0	0	0	0	0	8.567
14560	Catfish	0.606	0.113	0	0.076	0	0.013	0.004	0.036	0	0	0	0	0	0	0	0	0	0.849
15906	Catfish	0.975	0	0	0.083	0.022	0.009	0.002	0	0	0.126	0	0	0	0	0	0	0	1.217
15464	Catfish	2.51	0	0	0.145	0.08	0.028	0.005	0.124	0	0	0	0	0	0	0	0	0	2.892
11292	Catfish	(Sample could not be obtained.)																	
15932	Catfish	(Sample could not be obtained.)																	
14568	Oyster	0.518	0.076	0	0.042	0	0.011	0.017	0.093	0	0	0	0	0	0	0	0	0	0.757
14568 Dup	Oyster	0.431	0	0	0	0.018	0.01	0.011	0.11	0	0	0	0	0.015	0	0	0	2E-04	0.595
015 (16521)	Oyster	0	0	0	0	0	0.01	0.01	0.103	0	0	0	0	0	0	0	0	0	0.123
015 Dup	Oyster	0	0	0	0	0.02	0	0.008	0.087	0	0	0	0	0	0	0	0	2E-04	0.115

TABLE 4-8
2,3,7,8 TCDD TEQs CALCULATED USING EPA TEFs

Station ID	Sample Type	TEF =	1	0.5	0.1	0.1	0.1	0.01	0.001	0.1	0.05	0.5	0.1	0.1	0.1	0.1	0.01	0.01	0.001	
			2378 TCDD (pg/g)	12378 PeCDD (pg/g)	123478 HxCDD (pg/g)	123678 HxCDD (pg/g)	123789 HxCDD (pg/g)	1234678 HpCDD (pg/g)	OCDD (pg/g)	2378 TCDF (pg/g)	12378 PeCDF (pg/g)	23478 PeCDF (pg/g)	123478 HxCDF (pg/g)	123678 HxCDF (pg/g)	234678 HxCDF (pg/g)	123789 HxCDF (pg/g)	1234678 HpCDF (pg/g)	1234789 HpCDF (pg/g)	OCDF (pg/g)	Total TEQ (pg/g)
11261	Sediment		16.4	0	0.087	0.17	0.238	0.588	1.624	4.48	0.143	1.195	0.466	0.128	0.058	0.015	0.119	0.014	0.139	25.865
11287	Sediment		16.9	0.725	0.351	1.17	0.953	4.04	4.514	3.1	0.142	1.285	0.9	0.411	0.218	0	0.688	0.051	0.243	35.690
11292	Sediment		0.783	0.445	0.176	0.748	0.459	2.15	3.126	0.286	0.053	0.71	0.404	0.295	0.172	0	0.376	0.025	0.121	10.329
13309	Sediment		11.9	0	0.631	0.649	0.702	1.22	3.076	2.26	0.085	0.63	0.449	0.141	0.07	0	0.187	0.014	0.211	22.225
13337	Sediment		19.6	0	0.206	0.512	0.644	1.4	3.587	3.31	0.126	1.135	0.753	0.289	0.114	0	0.341	0.027	0.486	32.530
13339	Sediment		18.7	0	0.309	0.533	0.968	1.92	5.62	3.34	0.104	1.135	0.524	0.205	0.114	0	0.256	0.025	0.259	34.012
13340	Sediment		4.91	0.575	0.322	0.495	0.803	1.8	4.514	0.802	0.053	0.795	0.312	0.162	0.117	0	0.216	0.016	0.105	15.996
13340 Dup	Sediment		4.62	0.346	0.285	0.449	0.705	1.5	3.995	0.748	0.053	0.635	0.22	0.154	0.11	0	0.207	0.015	0.089	14.130
13342	Sediment		26.4	0.67	0.312	0.631	1.01	2.2	7.292	4.35	0.153	1.325	0.695	0.248	0.148	0	0.322	0.03	0.378	46.164
13344	Sediment		17.4	0	0.225	0.443	0.724	1.73	5.546	2.61	0.11	1.06	0.558	0.227	0.119	0.03	0.269	0.028	0.289	31.367
13355	Sediment		19.5	0.54	0.348	0.623	0.871	2.14	5.339	3.72	0.124	1.095	0.708	0.232	0.136	0.034	0.298	0.026	0.269	36.004
13363	Sediment		2.52	0.297	0.149	0.297	0.471	0.944	3.725	0.43	0	0.213	0.123	0.066	0	0	0.076	0.006	0.047	9.363
13363 Dup	Sediment		2.88	0.34	0.122	0.297	0.54	1.04	3.817	0.486	0.019	0	0.121	0.065	0	0	0.083	0.007	0.048	9.865
14560	Sediment		2.74	0	0.181	0.289	0.765	1.16	2.397	0.614	0	0.335	0.207	0.095	0	0	0.093	0.008	0.05	8.934
14566	Sediment		0.348	0.325	0.186	0.195	0.676	0.763	1.302	0.065	0	0	0	0	0	0	0.03	0	0.009	3.899
15464	Sediment		0.75	0	0.05	0.095	0.164	0.37	0.775	0.112	0	0	0.062	0.035	0.047	0	0.045	0.004	0.02	2.529
15932	Sediment		69.3	1.12	0.405	1.32	1.1	3.74	5.315	15.4	0.515	3.98	1.9	0.65	0.274	0	0.663	0.053	0.479	106.214
15934	Sediment		29.3	0	0.175	0.691	0.554	1.61	3.417	6.43	0.153	1.925	1.12	0.287	0.167	0	0.365	0.037	0.451	46.682
16618	Sediment		14	0	0.143	0.283	0.396	0.819	1.913	2.72	0.048	0.55	0.217	0.089	0	0	0.108	0	0.103	21.389
16622	Sediment		0	0	0	0	0	0.181	0.681	0	0	0	0	0.024	0	0	0.02	0	0.004	0.909

5.0 DATA DISCUSSION

A brief discussion of collected data is presented in this section. Detailed analysis is beyond the scope of this project that will be performed in the TMDL project.

The first point involves comparing sediment characteristics against historical data to appreciate effects of Tropical Storm Allison on sediment composition. Figures 5-1, 5-2, 5-3, and 5-4 show the collected sediment % total solids, % volatile solids, TOC, and TKN, respectively, along with similar data collected in 1988 (City of Houston Wastewater System Design and Operating Strategy, Volume IV). These plots show that recent sediment samples contain higher % total solids but lower % volatile solids and TOC than those collected during 1988. This finding suggests that recent flooding has brought a significant amount of new sediment into the HSC. These new sediments are in general lower in organic content than the old ones. The plots also suggest that the upstream end of the HSC (the main turning basin) has higher % total solids than the more downstream sections. Where the main turning basin has historically had high organic content sediments with a low percentage of solids, the new samples at this station were high in sand and low in organic content. These upper channel sediment samples may not be typical of data over the longer term.

Figures 5-5, 5-6, and 5-7 show dioxin levels in blue crabs, catfish, and sediment, respectively. These provide some indication of spatial patterns and the effect of using different sets of TEF's in calculating TEQ values. For comparison purposes, the EPA criterion of 0.7 ppt for tissue is also plotted in Figures 5-5 and 5-6. This EPA value was derived assuming a 10^{-5} risk level and a 6.5 g/day ingestion rate. This value is plotted in Figures 5-5 and 5-6 for reference only, because a suitable target level is still evolving and is to be addressed in the TMDL process. More analysis of these data in relation to historical samples will be required.

FIGURE 5-1
VARIATION OF % TOTAL SOLIDS ALONG HSC

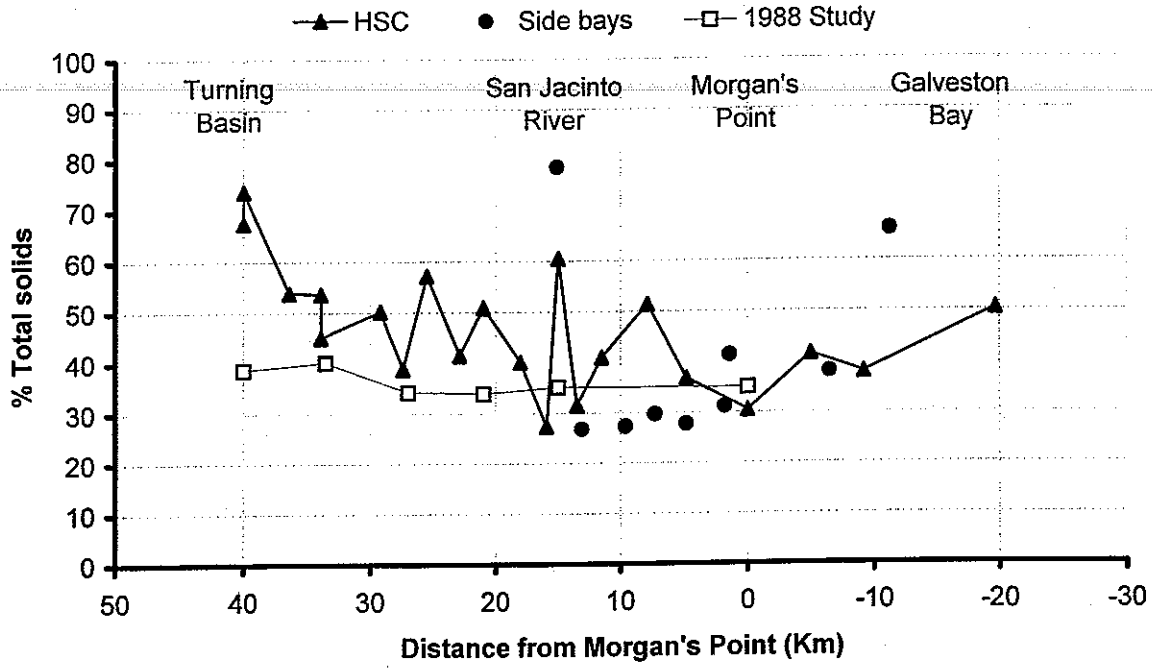


FIGURE 5-2
VARIATION OF % VOLATILE SOLIDS ALONG HSC

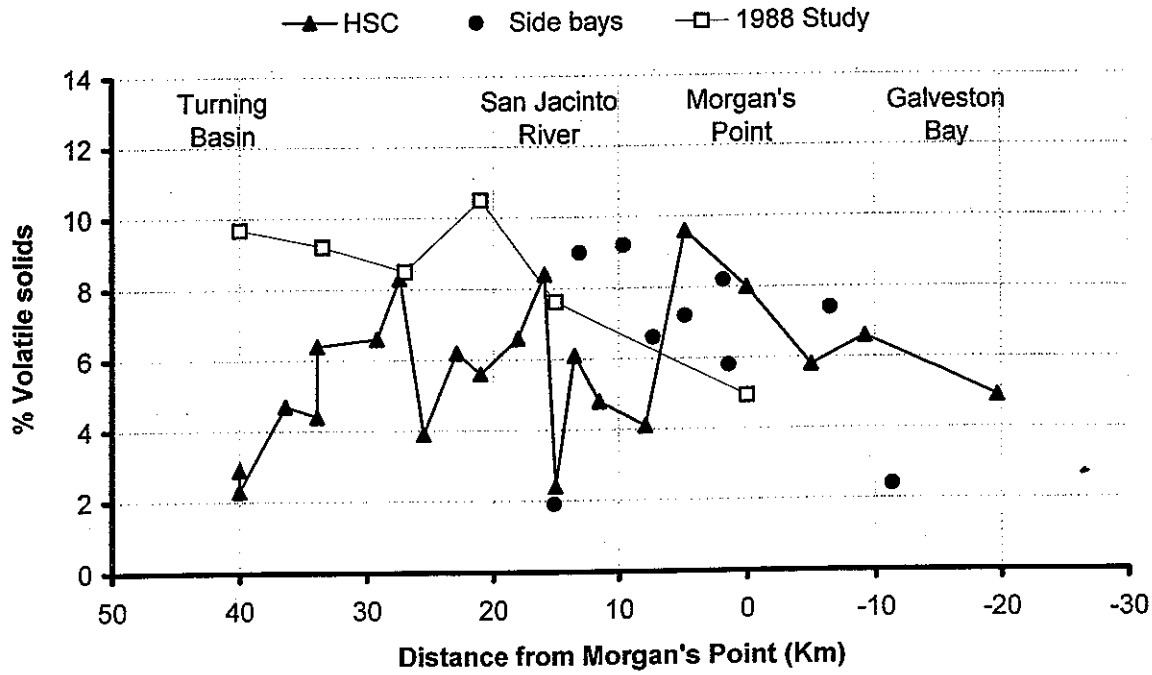


FIGURE 5-5
DIOXIN LEVELS IN BLUE CRABS

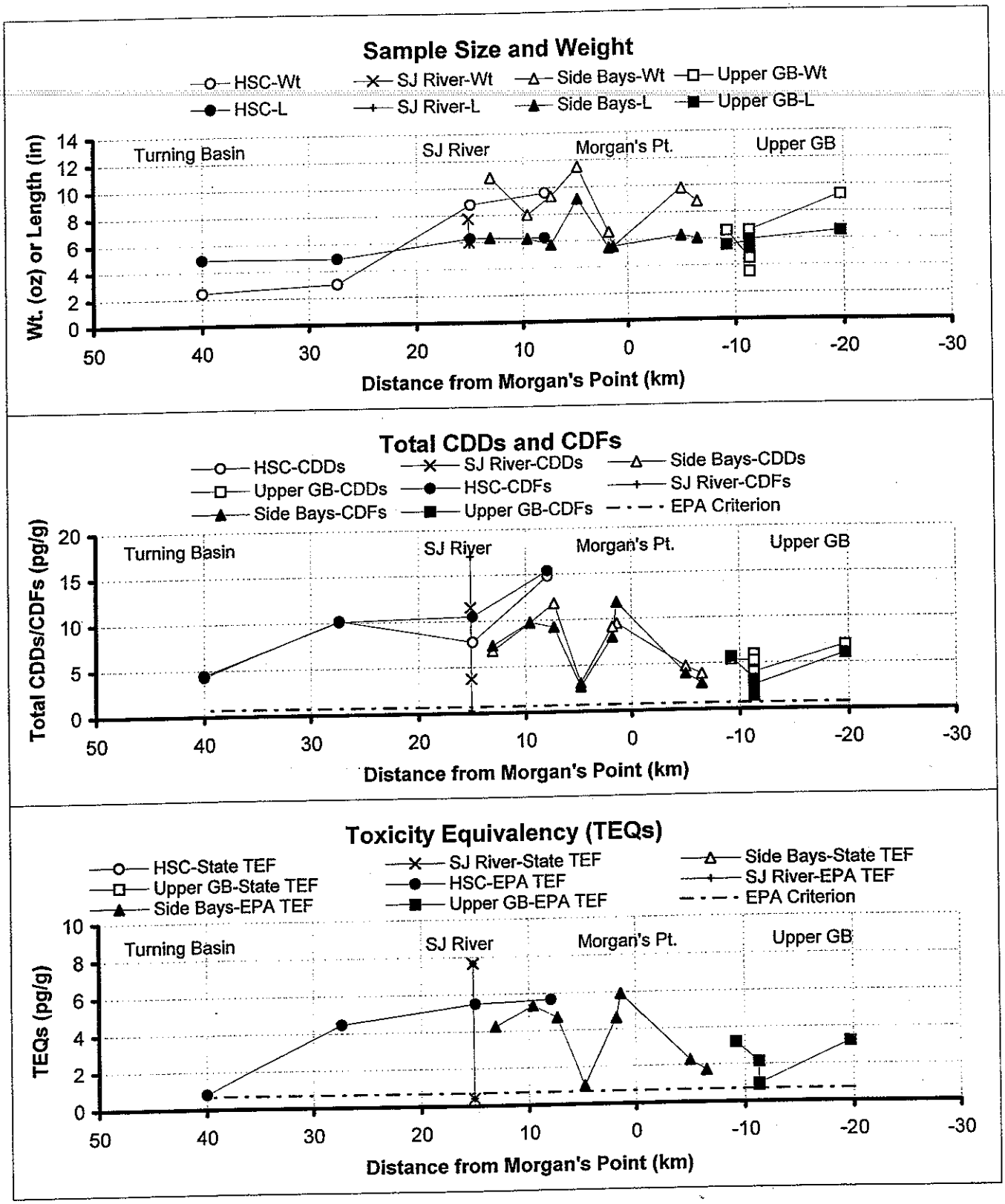


FIGURE 5-6
DIOXIN LEVELS IN CATFISH

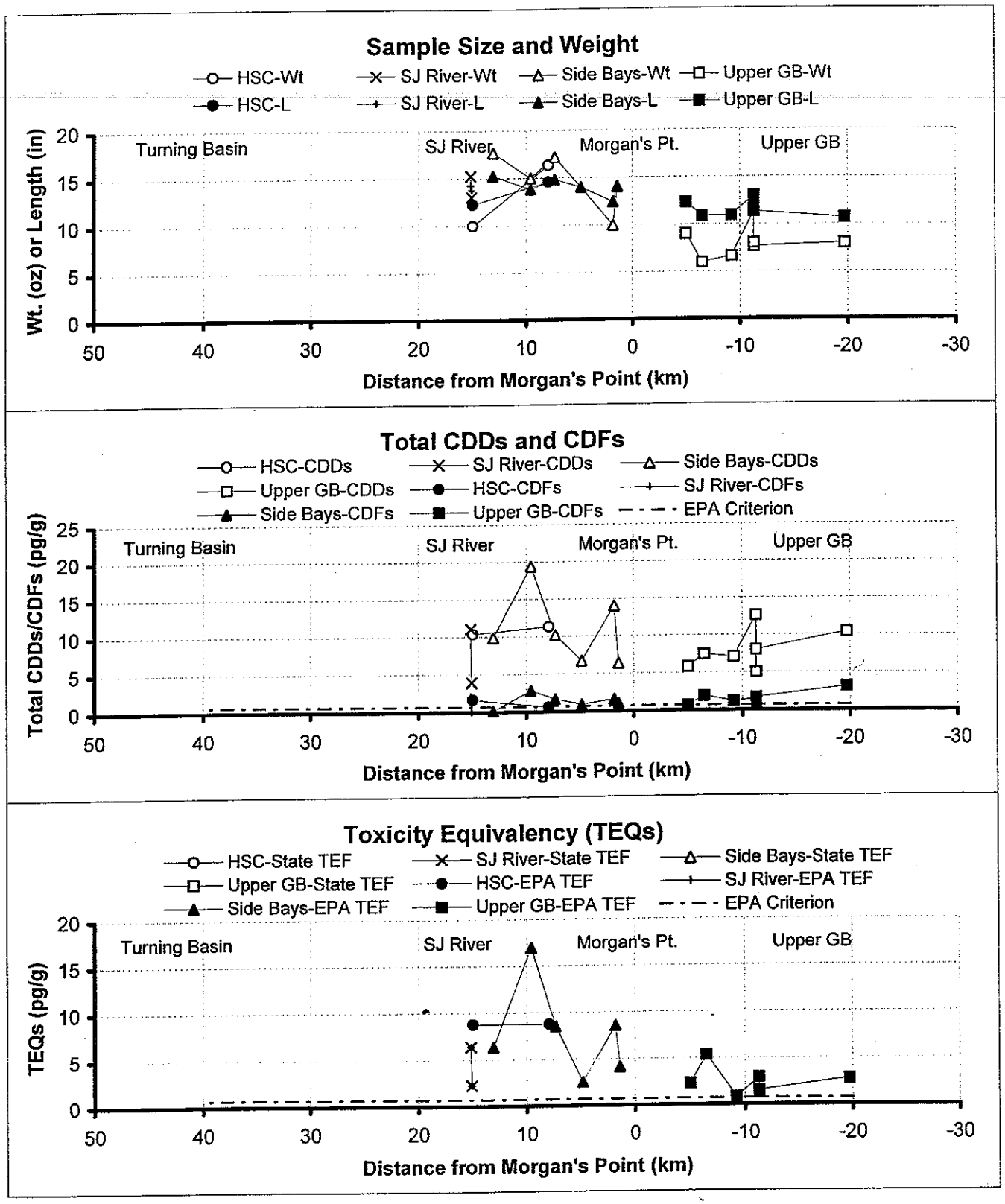
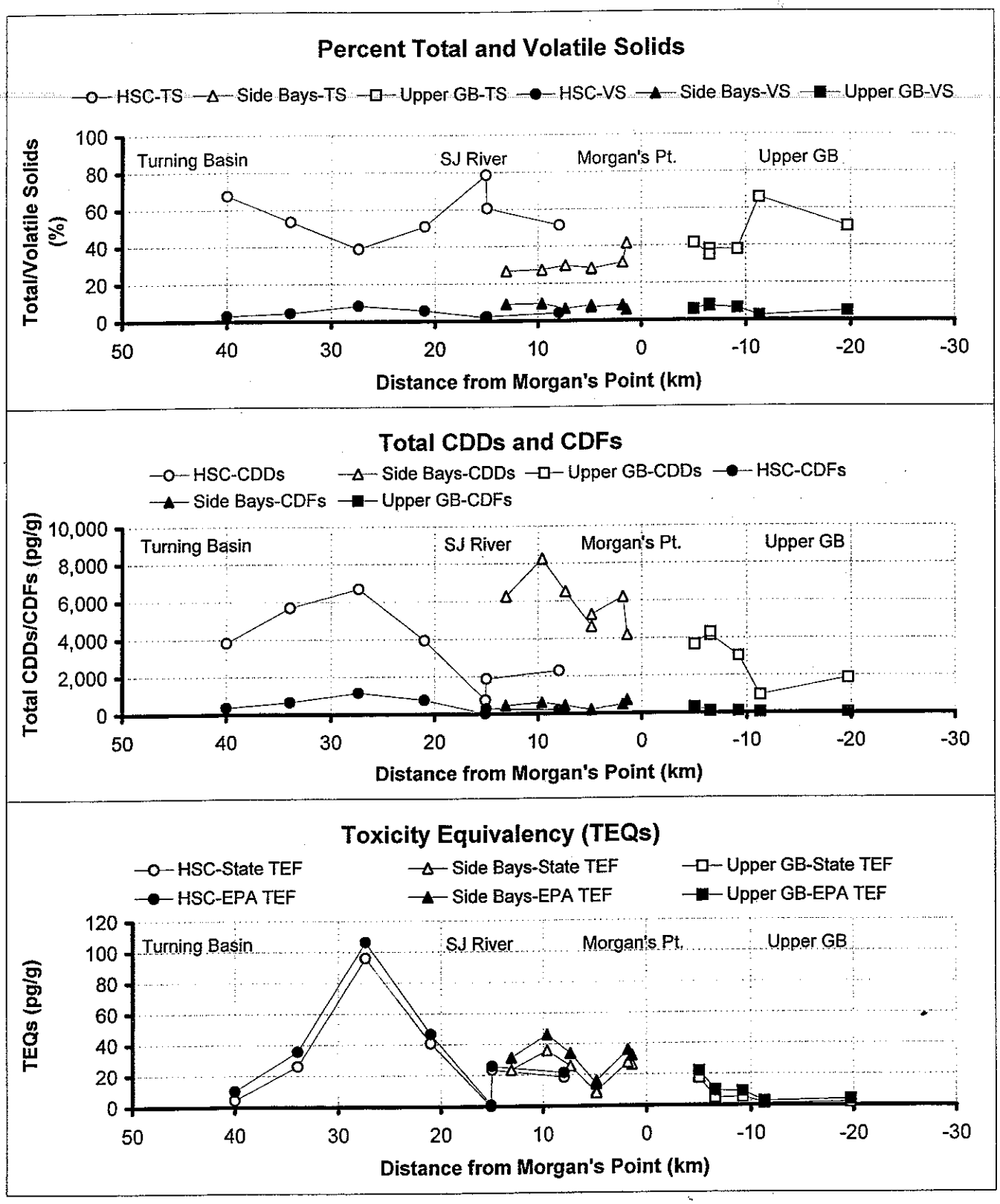


FIGURE 5-7
DIOXIN LEVELS IN SEDIMENT



6.0 REFERENCES

Method 1613, Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS, USEPA, Office of Water, October 1994.

Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1989 or subsequent editions.

TDH SOP - Standard Operating Procedures and Quality Control/Assurance Manual for Fish and Shellfish Tissue Collection, January 2000.

TNRCC SOP - TNRCC Surface Water Quality Monitoring Procedures Manual, June 1999 or subsequent editions.

United States Environmental Protection Agency (US EPA) "Methods for Chemical Analysis of Water and Wastes," Manual #EPA-600/4-79-020, 1979.

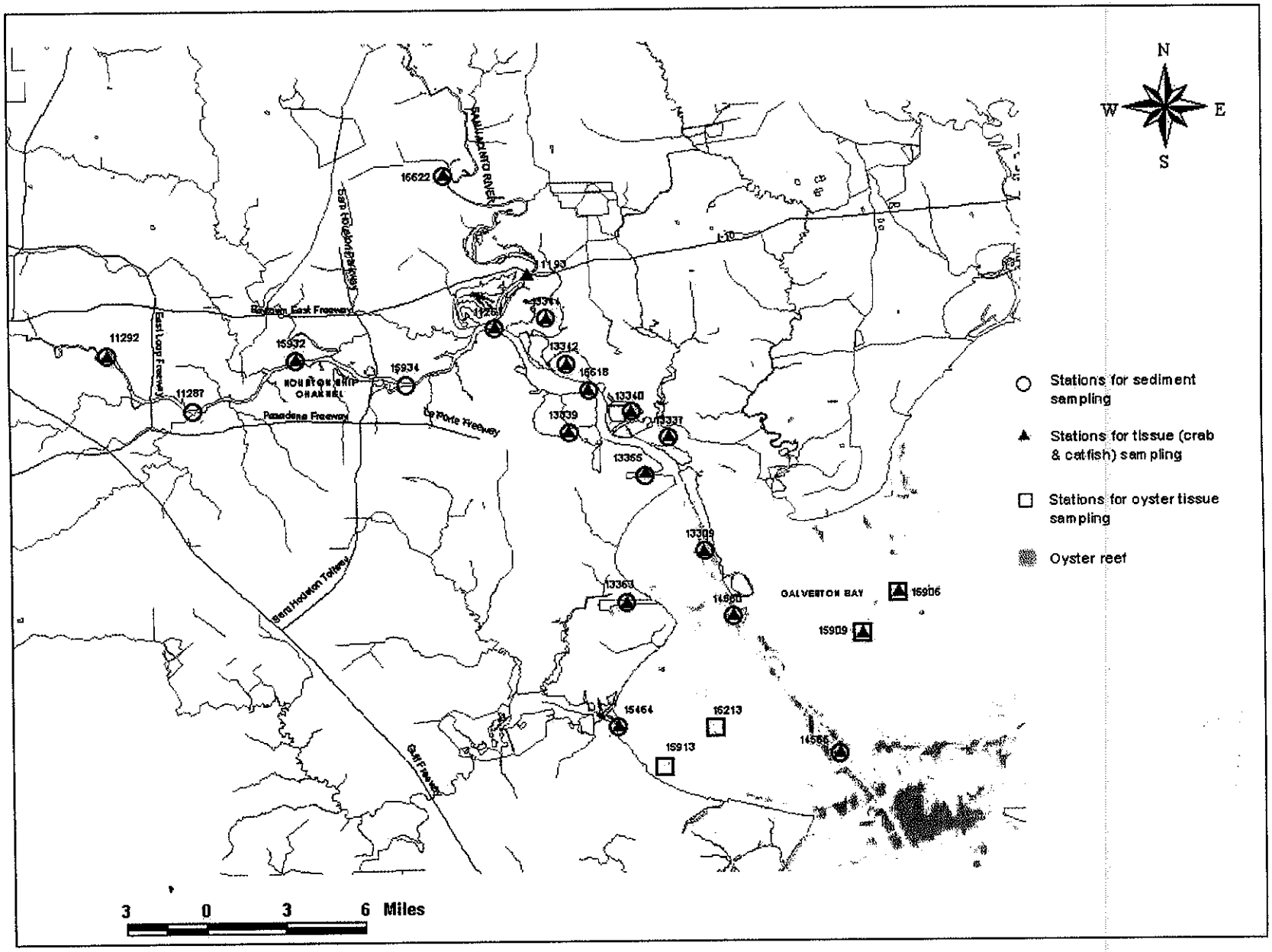
U.S. Environmental Protection Agency (USEPA): Test Methods for Evaluating Solid Waste, Physical/ Chemical Methods (SW-846), Third Ed. (and subsequent updates), 1996.

U.S. Environmental Protection Agency. "Exposure and Human Health Reassessment of 2, 3, 7, 8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds. Part I: Estimating Exposure to Dioxin-Like Compounds. Volume 3: Properties, Environmental Levels, and Background Exposures." EPA/600/P-00/001Ac, 2000.

APPENDIX A

SELECTED SAMPLING STATIONS

PBSJ

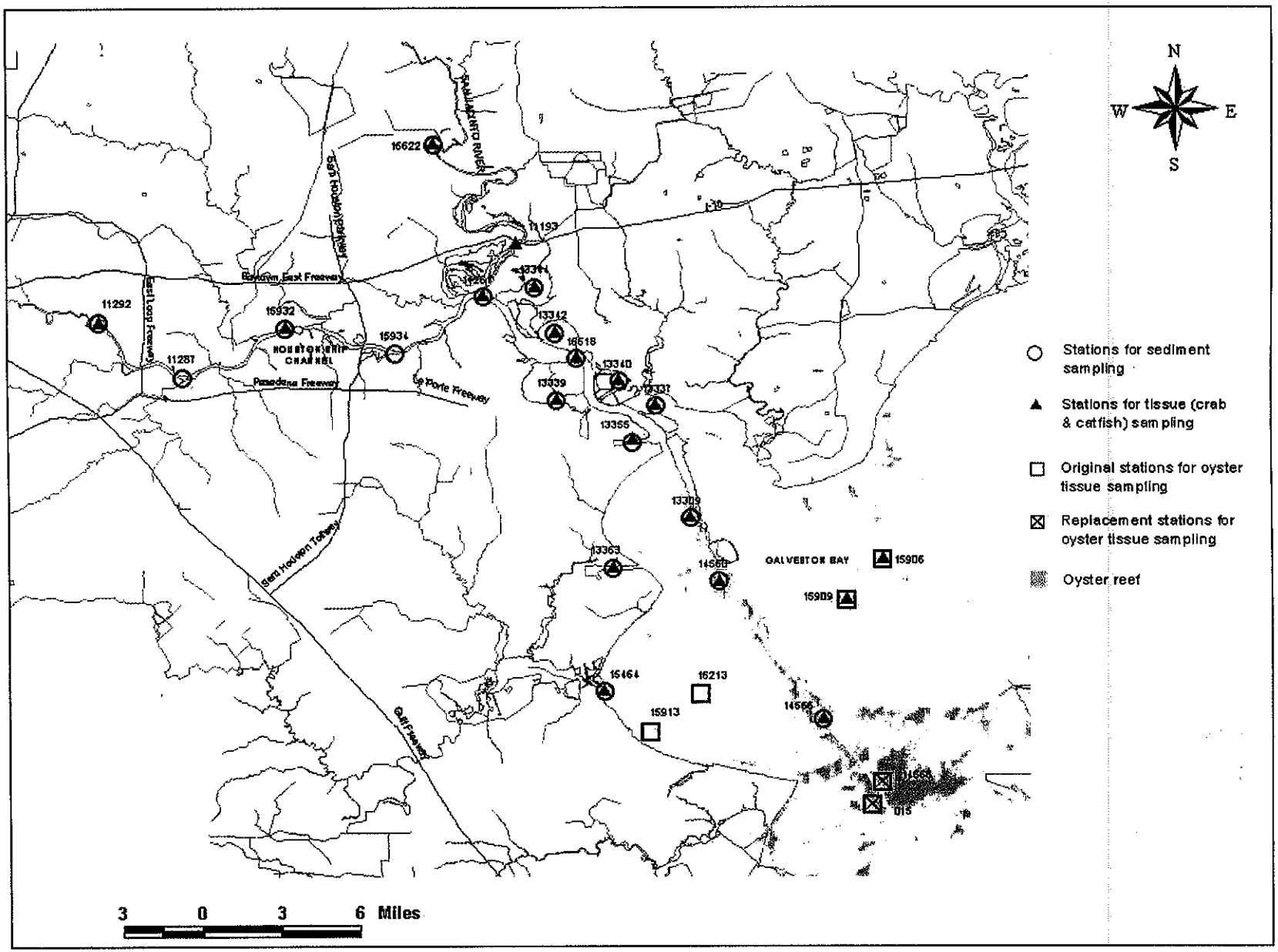

N
W
E
S
Stations for sediment sampling
Stations for tissue (crab & catfish) sampling
Stations for oyster tissue sampling
Oyster reef
16622
11293
11292
15932
15934
11287
13341
13342
16618
13340
13339
13337
13365
13309
13363
14660
16906
15909
15464
16213
15913
14566
BUFFALO BAYOU
HOUSTON SHIP CHANNEL
Pasadena Freeway
La Porte Freeway
Sam Houston Tollway
East Loop Freeway
Eastex Freeway
GALVESTON BAY
3 0 3 6 Miles

APPENDIX B

STATIONS ACTUALLY SAMPLES

PBS&J

460338.00 / 010267

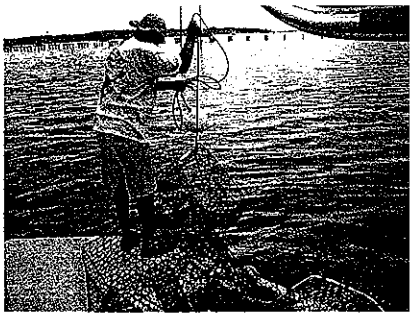


APPENDIX C

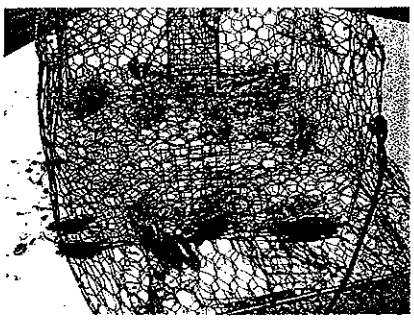
PHOTOS OF FIELD SAMPLING EFFORT

PBS&J sampling crew at work.

Preparing trotline and praying for luck in catching catfish.

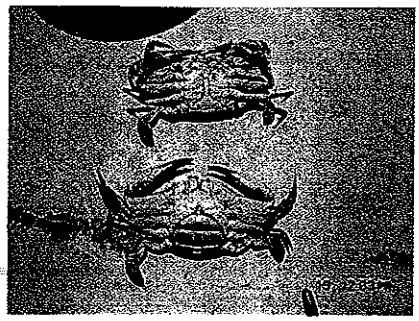


Picking up a crab pot.



Crabs in a crab pot.

Captured softshell turtles.

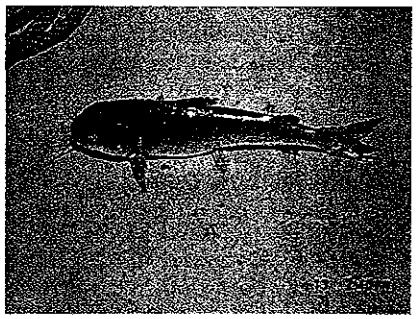


Male (top) and female (bottom) crabs.

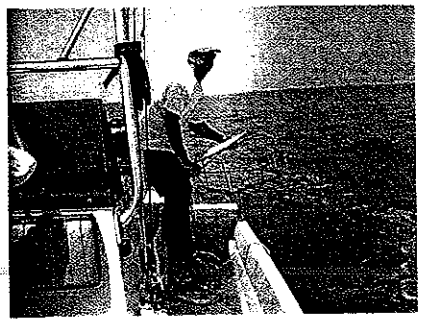
Measuring a crab.

Weighing a crab.

Catching a catfish.

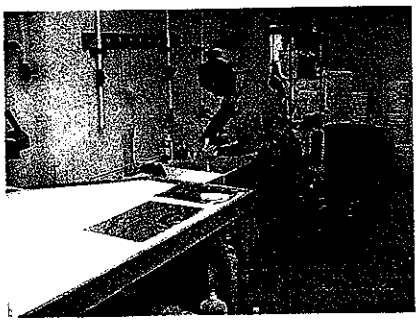


A hardhead catfish.

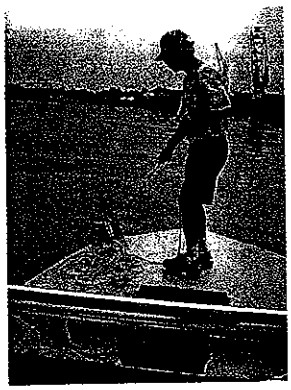


Oyster dredge used.

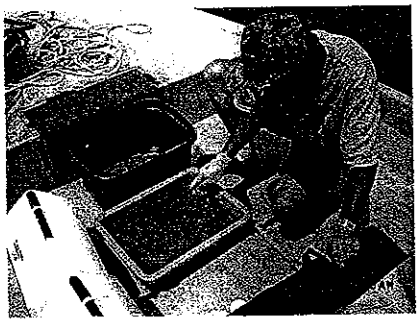
Oyster harvesting.



Processing tissue samples.



Sediment sampling with a Ponar dredge.



Compositing sediment samples.

APPENDIX D

COPIES OF FIELD SAMPLING DATA SHEETS

PBS&J

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, ~~S. Kennedy~~ S. Kennedy C. Wemple

PBS&J Station No.	7-T	7-T	7-T	7-T				
Station	11193	11193	11193	11193				
Time	11:40	09:25	15:45	14:20				
Wind Direction / Speed	SSE 5-7	NNE	SSW 5-7	SSW 5-10				
Weather condition	clear	Pcloud	Pcloud	Pcloud				
Water condition	calm	choppy	calm	choppy				
Days since last rain	6	7	5	4				
Date	6-28-01	6.29.01	7-12-01	7-11-01				
Water Depth (ft.)	3.3	3.3	24	4.3				
Do (mg/L)				7.03				
Ph (SU)				7.99				
Salinity (‰)				1.9				
Water Temp.				32.35				
Air Temp. (° C)	33.1			33.9				
Lat. (North)	29°47'32.9"							
Long. (West)	95°03'43.7"							
Sample Type	Tissue	Tissue	Tissue	Tissue				
Collection Method	Trotline	Crab Pot	Throwline	Crab Pot				
Species	I. furcatus	C. sapidus	I furcatus	C. sapidus				
Sex		♂ ♂ ♂		♂ ♂ ♂ ♂ ♂				
Weight (oz.)	25 15	11 6 3	12 9	10 11 8 7 6				
Length (inches)	12.5 14.25	6.7 6.0 5.4	13 12.5	7.0 5.9 6.0 6.2 6.4				
Remarks			Cashtunder Bridge					

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	5-ST	5-ST	5-ST					
Station	11261	11261	11261					
Time	10:43	18:00	16:46					
Wind Direction / Speed	SSE 5-7	SSE 0-5	SSW 5-10					
Weather condition	clear	cloudy rain	cloudy rain					
Water condition	calm	choppy	slight chop					
Days since last rain	6	8	4					
Date	6-28-01	7-15-01	7-11-01					
Water Depth (ft.)	3.8	26'						
Do (mg/L)		6.63						
Ph (SU)		7.92						
Salinity (‰)		7.54						
Water Temp.		31.57						
Air Temp. (° C)	36.3	30.90	32.9					
Lat. (North)	29°45'42.9"							
Long. (West)	95°04'53.3"							
Sample Type	Tissue	Tissue	Tissue					
Collection Method	Crab pot	Throw line	Trot line					
Species	C. Sapidus	A. felis	A. felis					
Sex	♂ ♂ ♂ ♂ ♂							
Weight (oz.)	8 8 11 7 10	13 5 5	17					
Length (inches)	5.3 6.3 6.5 6.1 7.2	13.5 9.75 10.5	15.25					
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	1-ST	1-ST						
Station	11292	11292						
Time	08:35	09:00						
Wind Direction / Speed	SSE 5-7	SSE 5-7						
Weather condition	clear	clear						
Water condition	calm	calm						
Days since last rain	6	6						
Date	6-28-01	6-28-01						
Water Depth (ft.)	16.6	9.0						
Do (mg/L)								
Ph (SU)								
Salinity (‰)								
Water Temp.								
Air Temp. (° C)	28.9							
Lat. (North)	29°45'06.5"							
Long. (West)	95°17'21.5"							
Sample Type	Tissue	Tissue						
Collection Method	Crab pot	Throw line						
Species	C. sapidus	C. sapidus						
Sex	♂ ♂	♂ ♂ ♂ ♂ ♂						
Weight (oz.)	5.0 3.0	2 1 4 1 1						
Length (inches)	5.7 5.5	4.9 4.2 5.6 4.6 3.0						
Remarks	Both dead in Trap overnight	parasites on gills						

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	15ST	15-ST	15-ST					
Station	13309	13309	13309					
Time	16:57	13:45	10:07					
Wind Direction / Speed		SSW 0-5	WSW 10-15					
Weather condition		Pcloud	Pcloud					
Water condition		calm	choppy					
Days since last rain	2	2	5					
Date	7-9-01	7-20-01	7-12-01					
Water Depth (ft.)	8.2		7.					
Do (mg/L)								
Ph (SU)								
Salinity (‰)								
Water Temp.								
Air Temp. (° C)								
Lat. (North)	29°39'07.3"							
Long. (West)	94° 58' 10.7"							
Sample Type	Tissue	Tissue	Tissue					
Collection Method	Trotline	Throwline	crabpot					
Species	A. felis	A. felis	C. sapidus					
Sex	♂		♂ ♂ ♂ ♂ ♂					
Weight (oz.)	15	13 5 3	9 14 8 8 12					
Length (inches)	148	14 11.5 9	6.5 6.4 5.6 5.8 7					
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, ~~S. Kennedy~~ S. Kennedy

PBS&J Station No.	13-ST	13-ST	13-ST					
Station	13337	13337	13337					
Time	12:15	19:45	17:24					
Wind Direction / Speed	SSW 5-7	SSW 5-10	SSW 5-7					
Weather condition		cloudy						
Water condition	choppy	calm	choppy					
Days since last rain	2	8	2					
Date	7-9-01	7-15-01	7-9-01					
Water Depth (ft.)	4.4	6.25						
Do (mg/L)	8.71	7.54						
Ph (SU)	8.70	8.24						
Salinity (‰)	6.87/12000b	10.72						
Water Temp.	30.57	30.98						
Air Temp. (° C)	33.3	29.8						
Lat. (North)	29°42'14.7"							
Long. (West)	94°59'10.9"							
Sample Type	Tissue	Tissue	Tissue					
Collection Method	Crab Pot	Trotline	Trotline					
Species	C. Sapidus	A. felis	A. felis					
Sex	♂ ♂ ♂ ♂							
Weight (oz.)	4 11 4 3	27 6	16 7					
Length (inches)	5.4 4.1 5.3 5.3	17.5 12.	14.75 12.0					
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	11-ST	11-ST						
Station	13339	13339						
Time	16:17	14:00						
Wind Direction / Speed	SSE 5-7	SSW 5-7						
Weather condition	clear							
Water condition	calm	choppy						
Days since last rain	6	2						
Date	6-28-01	7-9-01						
Water Depth (ft.)	6.7	7.6						
Do (mg/L)		9.83						
Ph (SU)		8.35						
Salinity (‰)		5.44						
Water Temp.		32.21						
Air Temp. (° C)	31.8	36.0						
Lat. (North)	29°42'24.8"	29°42'25.9"						
Long. (West)	95°02'32.3"	95°02'33.1"						
Sample Type	Tissue	Tissue						
Collection Method	Crab Pot	Trotline						
Species	C. sapidus	A. felis						
Sex	♂ ♂ ♂	~~♂ ♂ ♂~~						
Weight (oz.)	7 9 12	24 14 13.5						
Length (inches)	5.1 6.0 6.1	16.5 14.4 14.0						
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	12ST	12-ST	12-ST					
Station	13340	13340	13340					
Time	17:01		12:00					
Wind Direction / Speed	SSE 5-7	SSE 5-7						
Weather condition	clear	clear						
Water condition	calm	calm						
Days since last rain	6	6	2					
Date	6-27-01	6-28-01	7-9-01					
Water Depth (ft.)	5.3							
Do (mg/L)								
Ph (SU)								
Salinity (‰)								
Water Temp.								
Air Temp. (° C)	31.5		36.3					
Lat. (North)	29°42'59.9"		29°43'01.2"					
Long. (West)	95°00'18.4		95°00'19.1"					
Sample Type	Tissue	Tissue	Tissue					
Collection Method	Crab pot	Throw line	Trot line					
Species	C. sapidus	A. felis	A. felis					
Sex	♂ ♂ ♂ ♂		♀					
Weight (oz.)	8 8 8 9	14	17 19					
Length (inches)	5.8 5.5 6.1 5.9	14	16.2 15.3					
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	9.5T	9.5T						
Station	13342	13342						
Time	14:50	13:10						
Wind Direction / Speed	SSE 5-7	SSW 5-7						
Weather condition	clear							
Water condition	calm	choppy						
Days since last rain	6	2						
Date	6-28-01	7-9-01						
Water Depth (ft.)	7.6	6.9						
Do (mg/L)		5.81						
Ph (SU)		7.59						
Salinity (‰)		4.41 / 7888						
Water Temp.		29.99						
Air Temp. (° C)	32.0	34.3						
Lat. (North)	29°44'35.2"	29°44'36.0"						
Long. (West)	95°02'29.6"	95°02'30.4"						
Sample Type	Tissue	Tissue						
Collection Method	Crabpot	Trotline						
Species	C. sapidus	A. felis						
Sex	♂ ♀ ♀ ♂							
Weight (oz.)	7 8 7 10	15 20 10						
Length (inches)	5.2 6.5 6.8 6.4	13.5 15.5 12.5						
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	8-ST	8-ST						
Station	13344	13344						
Time	14:15	10:40						
Wind Direction / Speed	SSE 5-7	NNE						
Weather condition	clear	Pcloud						
Water condition	calm	choppy						
Days since last rain	6	7						
Date	6-28-01	6-29-01						
Water Depth (ft.)	9.0							
Do (mg/L)								
Ph (SU)								
Salinity (‰)								
Water Temp.								
Air Temp. (° C)	32.8							
Lat. (North)	29°46'15.1"							
Long. (West)	95°03' 06.6"							
Sample Type	Tissue	Tissue						
Collection Method	Throwline	Crab Pot						
Species	A. felis	C. sapidus						
Sex	♀	♂ ♂ ♂ ♂ ♂						
Weight (oz.)	17 24 12	11 12 11 10 10						
Length (inches)	17.25 15.0 13.5	6.9 5.7 6.2 6.7 6.1						
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S Kennedy

PBS&J Station No.	14-ST	14-ST	14-ST					
Station	13355	13355	13355					
Time	11:43	12:30	09:17					
Wind Direction / Speed	NNE	SSW 0-5	ENE 5-10					
Weather condition	P cloud	P cloud	cloudy					
Water condition	choppy	Calm	choppy					
Days since last rain	7	2	5					
Date	6-29-01	7-20-01	7-12-01					
Water Depth (ft.)	5.2	7.5						
Do (mg/L)		10.44						
Ph (SU)		8.50						
Salinity (‰)		12.97						
Water Temp.		31.04						
Air Temp. (° C)		30.09						
Lat. (North)	29°40'55.9"							
Long. (West)	94°59'45.1"							
Sample Type	Tissue	Tissue	Tissue					
Collection Method	Crab Pot	Throwline	Throwline					
Species	C. Sapidus	A. felis	A. felis					
Sex	♂ ♂ ♀ ♂ ♂							
Weight (oz.)	9 6 8 5 5	3 10	17					
Length (inches)	5.8 5.2 6.0 5.0 5.2	9.5 12.75	15					
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	16-ST	16-ST	16-ST	16-ST				
Station	13363	13363	13363	13363				
Time	13:30	13:35	16:00	16:30				
Wind Direction / Speed	S 0-3	SSE 0-5	SSE 0-5	SSW 0-5				
Weather condition	Pcloud	cloudy/showers	cloudy	Pcloud				
Water condition	calm	choppy	choppy	calm				
Days since last rain	5	8	8	2				
Date	7-12-01	7-15-01	7-15-01	7-20-01				
Water Depth (ft.)	40							
Do (mg/L)				9.15				
Ph (SU)				8.41				
Salinity (‰)				13.15				
Water Temp.				31.97				
Air Temp. (° C)	35.2			33.5				
Lat. (North)	29°36'49.1"							
Long. (West)	95°00'26.5"							
Sample Type	Tissue	Tissue	Tissue	Tissue				
Collection Method	Throwline	crab pot	throwline	throwline				
Species	Gaftopsail	C. sapidus	A. felis	A. felis				
Sex	I	♂ ♂ ♂ ♂ ♂						
Weight (oz.)	11	11 8 7 9 8	4	4 5				
Length (inches)	12	6.5 5.5 6.25 5.5 6.25	10.5	10.5 10.5				
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	17ST	17-ST						
Station	14560	14560						
Time	17:05	10:50	11:00					
Wind Direction / Speed	SSW 0-5	SW 10-15	SW 10-15					
Weather condition	Pcloud	Pcloud	Pcloud					
Water condition	Calm	0.5-1	0.5-1					
Days since last rain	2	8						
Date	7-20-01	7-12-01	7-12-01					
Water Depth (ft.)		8						
Do (mg/L)	9.79							
Ph (SU)	8.62							
Salinity (‰)	11.36							
Water Temp.	31.85							
Air Temp. (° C)								
Lat. (North)	29°36'08.6"							
Long. (West)	94°56'57.2"							
Sample Type	Tissue	Tissue						
Collection Method	Throwline	Crab pot						
Species	A. felis	C. sapidus						
Sex		♂ ♂ ♂ ♂ ♂						
Weight (oz.)	7 10 3	7 9 5 5 7						
Length (inches)	11.5 12.5 9	5.6 5.7 5.9 5.1 5.2						
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, YSU

PBS&J Station No.	235T	23-5T						
Station	14564	14566						
Time	14:00	14:30						
Wind Direction / Speed	SSW 3-5	SSW 3-5						
Weather condition	Pcloud	Pcloud						
Water condition	calm	Calm						
Days since last rain	6	6						
Date	7-13-01	7-13-01						
Water Depth (ft.)	12.2	12.2						
Do (mg/L)	7.28	7.28						
Ph (SU)	8:43	8.43						
Salinity (‰)	11.44	11.44						
Water Temp.	32.46	32.46						
Air Temp. (° C)	35.4	35.4						
Lat. (North)	29°31'47.9"							
Long. (West)	94°53'54.8"							
Sample Type	Tissue	Tissue						
Collection Method	Crabpot	throwline						
Species	C. sapidus	A. felis						
Sex	♂ ♂ ♂ ♂ ♂							
Weight (oz.)	9 9 10 9	14 5 5						
Length (inches)	5.4 7.1 6.9 6.9	13.25 9.5 9.25						
Remarks	Barnacles present							

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, Y. Su

PBS&J Station No.	18ST	18-ST						
Station	15464	15464						
Time	09:05	18:15						
Wind Direction / Speed	SSW 3-5	SSW 0-5						
Weather condition	PCloud	Pcloud						
Water condition	Calm	calm						
Days since last rain	6	2						
Date	7-13-01	7-20-01						
Water Depth (ft.)	6.3							
Do (mg/L)	4.18	3.94						
Ph (SU)	7.93	8.13						
Salinity (‰)	9.30	11.81						
Water Temp.	30.61	31.30						
Air Temp. (° C)	29.7							
Lat. (North)	29°32'48.7"							
Long. (West)	95° 00' 48.8"							
Sample Type	Tissue	Tissue						
Collection Method	Crab Pot	throwline						
Species	C. Sapidus	A. Felis						
Sex	♂ ♀ ♀ ♂ ♂							
Weight (oz.)	9 8 7 6 3	10 9 12						
Length (inches)	6.2 6.2 6.3 5.8 5.1	13 12.5 13.5						
Remarks		Inclear la Mg channel						

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, Y Su.

PBS&J Station No.	22-TO	22-TO	22-TO					
Station	15906	15906	15906					
Time	12:15	13:33	09:30					
Wind Direction / Speed	SSW 3-5	SSW 3-5	SSW 6-5					
Weather condition	P Cloud	P. Cloud	P Cloud					
Water condition	Calm	Calm	Calm					
Days since last rain	6	6	2					
Date	7-13-01	7-13-01	7-20-01					
Water Depth (ft.)	10	10.6	12					
Do (mg/L)	7.29	6.66	7.19					
Ph (SU)	8.38	8.25	8.33					
Salinity (‰)	2.30	1.27	11.56					
Water Temp.	30.19	31.10	30.43					
Air Temp. (° C)	33.3	37.6	31.5					
Lat. (Nórth)	29°36'10.4"							
Long. (West)	94°51'34.5"							
Sample Type	Tissue	Tissue	Tissue					
Collection Method	Crab pot	Throw line	Throw line					
Species	C. sapidus	A. felis	A. felis					
Sex	♂ ♂ ♂ ♂							
Weight (oz.)	6 3 2 3	6 8	10					
Length (inches)	5.2 5.1 5.2 5.3	10.5 12	13					
Remarks		Nearby well Collector Sta						

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, Y. SU

PBS&J Station No.	21-TO	21-TO	21-TO					
Station	15909	15909	15909					
Time	10:25	12:00	09:45					
Wind Direction / Speed	SSW 3-5	SSW 3-5	SSW 0-5					
Weather condition	Pcloud	Pcloud	Pcloud					
Water condition	Calm	Calm	calm					
Days since last rain	6	6	2					
Date	7-13-01	7-13-01	7-20-01					
Water Depth (ft.)	10.5	7.1	8.5					
Do (mg/L)	6.6	6.82	7.18					
Ph (SU)	8.33	8.22	8.33					
Salinity (‰)	6.91	5.14	11.71					
Water Temp.	30.02	30.39	30.51					
Air Temp. (° C)	30.6	35.5	31.8					
Lat. (North)	29°35'32.9"							
Long. (West)	94°53' 10.0"							
Sample Type	Tissue	Tissue	~~Tissue~~ Tissue					
Collection Method	Crab pot	throw line	Throwline					
Species	C. sapidus	A. felis	A. felis					
Sex	♂ ♂ ♂ ♂	—	—					
Weight (oz.)	6 6 3 3	11 4	8					
Length (inches)	6.0 6.1 5.2 5.7	12.5 9.5	12					
Remarks		gas well near site						

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	3-ST	3-ST						
Station	15932	15932						
Time	09:37	11:00						
Wind Direction / Speed	SSE 5-7	S 5-7						
Weather condition	clear	clear						
Water condition	calm	calm						
Days since last rain	6	5						
Date	6-28-01	6-27-01						
Water Depth (ft.)	4.9	4.9						
Do (mg/L)								
Ph (SU)								
Salinity (‰)								
Water Temp.								
Air Temp. (° C)	37.2							
Lat. (North)	29°44'40.3"							
Long. (West)	95°11'03.9"							
Sample Type	Tissue	Tissue						
Collection Method	Crab Pot	Crab pot						
Species	C. sapidus	C. sapidus						
Sex	♂ ♂	♂						
Weight (oz.)	3 3	3						
Length (inches)	5 4.9	4.8						
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	10ST	10ST						
Station	16618	16618						
Time	10:30	11:05						
Wind Direction / Speed	SSW 5-7	NNE						
Weather condition	~~Pcld~~	Pcloud						
Water condition	choppy	choppy						
Days since last rain	2	7						
Date	7-9-01	6-29-01						
Water Depth (ft.)		6.3						
Do (mg/L)								
Ph (SU)								
Salinity (‰)								
Water Temp.								
Air Temp. (° C)	36.9							
Lat. (North)	29°43'39.5"							
Long. (West)	95°01'38.1"							
Sample Type	Tissue	Tissue						
Collection Method	Trot line	Crabpot						
Species	A. felis	C. sapidus						
Sex		♂ ♂ ♂ ♂ ♂						
Weight (oz.)	14 16 19	4 9 8 10 9						
Length (inches)	13.75 14.75 15.25	7.0 5.6 6.0 6.5 6.2						
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, S. Kennedy

PBS&J Station No.	G-ST	6-ST						
Station	16622	16622						
Time	09:55	10:15						
Wind Direction / Speed	NNE	NNE						
Weather condition	Pclad	Pcloud						
Water condition	choppy	choppy						
Days since last rain	7	7						
Date	6-29-01	6-29-01						
Water Depth (ft.)								
Do (mg/L)								
Ph (SU)								
Salinity (‰)								
Water Temp.								
Air Temp. (° C)								
Lat. (North)	29°50'44.8"							
Long. (West)	95°06'19.0							
Sample Type	Tissue	Tissue						
Collection Method	Trotline	Crab Pot						
Species	I. punctatus	C. sapidus						
Sex		♂ ♂ ♂ ♂ ♂						
Weight (oz.)	13	7 5 6 6 6						
Length (inches)	13.75	6.1 5.6 6.1 5.8 5.7						
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, Y.S.U

PBS&J Station No.								
Station	001							
Time	15:07							
Wind Direction / Speed	SSW 3-5							
Weather condition	P.cloud							
Water condition	calm							
Days since last rain	6							
Date	7-13-01							
Water Depth (ft.)								
Do (mg/L)	10.07							
Ph (SU)	8.44							
Salinity (‰)	11.34							
Water Temp.	32.0							
Air Temp. (° C)	32.7							
Lat. (North)	29°29'46.6"							
Long. (West)	94°51'43.8"							
Sample Type	Tissue							
Collection Method	dredge							
Species	C. virginica							
Sex								
Weight (oz.)								
Length (inches)								
Remarks								

FIELD DATA SHEET

Project: H-GAC

PBS&J Job No. 460338.00

Name of Collectors: M. Heaney, N. Bossart, Y. SU

PBS&J Station No.								
Station	015							
Time	15:45							
Wind Direction / Speed	SSW 3-5							
Weather condition	P Cloud							
Water condition	Calm							
Days since last rain	6							
Date	7-13-01							
Water Depth (ft.)	7.2							
Do (mg/L)	7.55							
Ph (SU)	8.40							
Salinity (‰)	13.65							
Water Temp.	32.41							
Air Temp. (° C)	32.3							
Lat. (North)	~~29°29'46.6"~~	29°29'02.7"						
Long. (West)	~~94°~~	94°51'59.7"						
Sample Type	Tissue							
Collection Method	dredge							
Species	C. virginica							
Sex								
Weight (oz.)								
Length (inches)								
Remarks								

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: SW Wind Speed: 3-5

Weather and Water Conditions: Partly cloudy Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy, C. Wemple

Sample No.	5-ST								
Station	11261								
Time	12:32	12:39							12:49
Water Depth (ft.)	10'	5'							7
DO (mg/L)		2.04	2.83	2.90	3.02	3.02	3.25	3.77	
pH (SU)		7.63	7.59	7.58	7.51	7.46	7.42	7.44	
Salinity (‰)		13.19	9.78	9.96	8.04	7.21	5.72	4.21	
Water Temp. (°C)		30.18	30.10	30.11	30.04	30.01	30.03	30.17	
Air Temp. (°C)		35.4	35.9	36.2	36.2	36.1	36.0	35.9	
Lat. (North)	29°45'44.8"	29°45'50.7"							29°45'36.5"
Long. (West)	95°04'52.5	95°04'54.5							95°04'56.0"
Sample Type	Sed	Sed							Sed
Collection Method	Ponar	Ponar							Ponar
Species									
Sex									
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
									Strat w/ Sand
		Silty red clay in color							
REMARKS:		5'OB	10'OB	20'OB	30'OB	40'OB	50 OB	1' BS	

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: SSW Wind Speed: 0-3

Weather and Water Conditions: Partly cloudy Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy C: Wemple

Sample No.	25								
Station	11287								
Time	10:22							10:51	
Water Depth (ft.)	24	45						17.5	
DO (mg/L)		1.64	0.69	0.39	1.22	1.51	3.37		
pH (SU)		7.09	7.08	7.06	7.14	7.16	7.34		
Salinity (°/oo)		4.99	4.63	3.87	~~3~~2.70	2.44	1.96		
Water Temp. (°C)		29.66	29.63	29.54	29.59	29.62	30.37		
Air Temp. (°C)		33.3	33.2	33.3	33.3	33.4	33.6		
Lat. (North)	29°43'06.1"	29°43'09.2"						29°43'13.2"	
Long. (West)	95°14'28.1"	95°14'28.5"						95°14'29.6"	
Sample Type	Sed	Sed						Sed	
Collection Method	Ponar	Ponar						Ponar	
Species									
Sex									
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
	Red clay No grab	Tug passed							
	moved South	Silty							
REMARKS:		5'OB	10'OB	20'OB	30'OB	40'OB	1 BS		

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: WSW Wind Speed: 3-5

Weather and Water Conditions: Partly cloudy Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy C. Wample

Sample No.	1ST									
Station	11292									
Time	08:41									9:52
Water Depth (ft.)	34					35				
DO (mg/L)	0.32	0.23	0.19	1.44	2.51	0.40	0.23	0.19	0.27	2.77
pH (SU)	6.90	6.90	6.94	7.04	7.12	6.90	6.90	6.95	7.02	7.02
Salinity (°/oo)	2.84	2.84	2.54	1.27	0.71	3.01	2.20	2.37	1.62	0.88
Water Temp. (°C)	29.84	29.80	29.90	29.75	29.84	29.87	28.74	28.87	29.53	29.9
Air Temp. (°C)	29.4	29.4	29.7	29.7	29.7	30.40	30.6	30.6	30.6	30.6
Lat. (North)	29° →	29°45'02.1"								
Long. (West)	→	95°17'20.4"								
Sample Type	Sed					Sed				
Collection Method	Ponar					Ponar				
Species										
Sex										
Weight (Unit: lbs. oz)										
Length (Unit: inches)										
	Abundant debris in Sed									
REMARKS:	5'OB	10'OB	20'OB	30'OB	1'OS	5'OB	10'OB	20'OB	30'OB	1'OS

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-12-01 Tide, MLT:

Wind Direction: WSW Wind Speed: 10-15

Weather and Water Conditions: Partly cloudy choppy Days since last significant rainfall: 5
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy

Sample No.	15-ST								
Station	13309								
Time	10:15								
Water Depth (ft.)	45								
DO (mg/L)	3.98	4.27	4.37	4.34	4.69	5.94			
pH (SU)	7.81	7.89	7.99	7.92	8.05	8.21			
Salinity (‰)	18.04	15.94	15.93	13.30	11.31	10.49			
Water Temp. (°C)	30.02	30.32	30.32	30.49	30.38	30.66			
Air Temp. (°C)	31.1	31.0	31.0	31.0	31.4	31.4			
Lat. (North)	29°39'07.3"								
Long. (West)	94°58'10.4"								
Sample Type	Sed								
Collection Method	Ponar								
Species									
Sex									
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
	Some shell								
	Hash w/sand								
REMARKS:	5'OB	10'OB	20'OB	30'OB	40'OB	1'OS			

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-12-01 Tide, MLT:

Wind Direction: ENE Wind Speed: 5-10

Weather and Water Conditions: Slightly choppy Days since last significant rainfall: 5
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart

Sample No.	13-ST									
Station	13337									
Time	09:17									
Water Depth (ft.)	4.0									
DO (mg/L)	5.35	5.39								
pH (SU)	7.97	7.89								
Salinity (‰)	7.94	7.86								
Water Temp. (°C)	30.36	30.37								
Air Temp. (°C)	32.0	32.3								
Lat. (North)	29°42'14.2"									
Long. (West)	94°59'10.7"									
Sample Type	Sed									
Collection Method	Ponar									
Species										
Sex										
Weight (Unit: lbs. oz)										
Length (Unit: inches)										
	SILTY									
REMARKS:	1'0D	1'05								

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: SSW Wind Speed: 3-5

Weather and Water Conditions: clear calm Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy C. Wemple

Sample No.	H1-5T									
Station	13339									
Time	14:27									
Water Depth (ft.)	3									
DO (mg/L)	9.76									
pH (SU)	8.59									
Salinity (°/₀₀)	6.08									
Water Temp. (°C)	32.50									
Air Temp. (°C)	33.3									
Lat. (North)	29°42'25.6"									
Long. (West)	95°02'32.8"									
Sample Type	Sed									
Collection Method	Ponar									
Species										
Sex										
Weight (Unit: lbs. oz)										
Length (Unit: inches)										
	Silty w/ some									
	Sand & shell									
REMARKS:	Hash									

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: SSW Wind Speed: 3-5

Weather and Water Conditions: Calm Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy, C. Wemple

Sample No.	12-ST	—								
Station	13340	—								
Time	14:50									
Water Depth (ft.)	4									
DO (mg/L)	9.95	9.62								
pH (SU)	8.85	8.92								
Salinity (°/oo)	6.06	5.83								
Water Temp. (°C)	32.90	33.11								
Air Temp. (°C)	33.9	34.1								
Lat. (North)	29°43'01.7"									
Long. (West)	95°00'18.9"									
Sample Type	Sed									
Collection Method	Ponar									
Species										
Sex										
Weight (Unit: lbs. oz)										
Length (Unit: inches)										
	Silty w/organic smell									
REMARKS:	1'0B	1'0S								

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: SSW Wind Speed: 0-3

Weather and Water Conditions: Partly cloudy Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy R. Wemple

Sample No.	9-ST	—							
Station	13342	—							
Time	13:30								
Water Depth (ft.)	6.0								
DO (mg/L)	5.35	6.51							
pH (SU)	7.59	7.88							
Salinity (°/oo)	4.92	4.75							
Water Temp. (°C)	29.95	31.84							
Air Temp. (°C)	34.3	34.8							
Lat. (North)	29°44'34.8"								
Long. (West)	95°02'29.5"								
Sample Type	Sed								
Collection Method	Ponar								
Species									
Sex									
Weight (Unit: lbs, oz)									
Length (Unit: inches)									
	Silty No								
	odor								
REMARKS:	1'OB	1'OS							

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: SSW Wind Speed: 0-3

Weather and Water Conditions: Partly cloudy Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy C. Wemple

Sample No.	8-ST	—							
Station	13344	—							
Time	13:21								
Water Depth (ft.)	6.7								
DO (mg/L)	6.06	8.92							
pH (SU)	7.97	8.73							
Salinity (°/oo)	4.01	3.59							
Water Temp. (°C)	29.90	31.93							
Air Temp. (°C)	35.1	35.9							
Lat. (North)	29°46' 16.2"								
Long. (West)	95°03' 06.1								
Sample Type	Sed								
Collection Method	Ponar								
Species									
Sex									
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
	silty w/								
	shell Hash								
REMARKS:	1'08	1'05							

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-12-01 Tide, MLT:

Wind Direction: ENE Wind Speed: 5-10

Weather and Water Conditions: Slightly choppy Days since last significant rainfall: 5
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy

Sample No.	14-ST								
Station	13355								
Time	09:45								
Water Depth (ft.)	35.5								
DO (mg/L)	3.49	3.90	4.48	5.41	5.76				
pH (SU)	7.95	7.99	8.07	8.07	8.12				
Salinity (°/oo)	13.76	13.24	11.71	10.06	9.29				
Water Temp. (°C)	30.63	30.36	30.49	30.54	30.67				
Air Temp. (°C)	32.3	31.6	30.9	30.9	30.9				
Lat. (North)	29°40'56.1"								
Long. (West)	94°59'44.8"								
Sample Type	Sed								
Collection Method	Ponar								
Species									
Sex									
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
	silty								
REMARKS:	5'OB	10'OB	20'OB	30'OB	1'OS				

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-12-01 Tide, MLT:

Wind Direction: S Wind Speed: 0-3

Weather and Water Conditions: Partly cloudy Calm Days since last significant rainfall: 5
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart

Sample No.	16-57								
Station	13363								
Time	13:30								
Water Depth (ft.)	46'								
DO (mg/L)	1.90	2.31	2.35	2.62	4.02	11.0			
pH (SU)	7.91	7.89	7.91	7.96	8.10	8.61			
Salinity (‰)	19.10	18.09	17.44	15.04	13.49	11.44			
Water Temp. (°C)	29.97	30.09	30.14	30.33	31.07	32.93			
Air Temp. (°C)	35.2	35.4	35.3	35.1	34.8	34.3			
Lat. (North)	29°36'49.0"								
Long. (West)	95°00'26.4"								
Sample Type	Sed								
Collection Method	Ponar								
Species									
Sex									
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
	SILTY								
REMARKS:	5'OB	10'OB	20'OB	30'OB	40'OB	1'OS			

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-12-01 Tide, MLT:

Wind Direction: SW Wind Speed: 10-15

Weather and Water Conditions: Partly cloudy Choppy .5'-1' Days since last significant rainfall: 5
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart

Sample No.	175T								
Station	14560								
Time	11:00								
Water Depth (ft.)	43								
DO (mg/L)	3.54	3.89	4.78	5.43	7.02				
pH (SU)	8.02	8.09	8.20	8.31	8.49				
Salinity (°/oo)	20.13	18.72	16.23	13.46	11.41				
Water Temp. (°C)	30.07	30.20	30.26	30.29	30.35				
Air Temp. (°C)	31.6	31.6	31.8	31.6	31.8				
Lat. (North)	29°36'08.6"								
Long. (West)	94°56'57.1"								
Sample Type	Sed								
Collection Method	Ponar								
Species									
Sex									
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
	ABUNDANT SHELL HAD TO								
	MOVE AROUND TO GET SAMPLE								
REMARKS:	5' OB	10' OB	20' OB	30' OB	~~40' OB~~ 40' OB 1' BS	1' BS			

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-12-01 Tide, MLT:

Wind Direction: SE Wind Speed: 0-5

Weather and Water Conditions: Partly Cloudy Days since last significant rainfall: 5
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy

Sample No.	235T								
Station	14566								
Time	11:51								
Water Depth (ft.)	40'								
DO (mg/L)	2.76	2.91	3.80	4.76	6.72				
pH (SU)	7.87	7.99	7.97	8.10	8.29				
Salinity (°/oo)	25.68	24.78	21.24	15.54	10.39				
Water Temp. (°C)	29.58	29.69	30.00	30.32	30.74				
Air Temp. (°C)	32.5	32.1	32.5	32.6	32.6				
Lat. (North)	29°31'47.8"								
Long. (West)	94°53'53.7"								
Sample Type	Sed								
Collection Method	Ponar								
Species									
Sex									
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
	lots of shell	outside	of channel						
REMARKS:	5'OB	10'OB	20'OB	30'OB	1'OS				

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-12-01 Tide, MLT:

Wind Direction: SE Wind Speed: 0-5

Weather and Water Conditions: Partly cloudy Days since last significant rainfall: 5
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy

Sample No.	18-ST	—							
Station	15.464	—							
Time	12:50								
Water Depth (ft.)	8.2								
DO (mg/L)	4.32	6.78							
pH (SU)	8.14	8.39							
Salinity (°/oo)	9.30	9.51							
Water Temp. (°C)	30.48	31.97							
Air Temp. (°C)	34.2	33.9							
Lat. (North)	29°32'48.7"								
Long. (West)	95°00'48.7"								
Sample Type	Sed								
Collection Method	Ponar								
Species									
Sex									
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
		Lots of shell							
REMARKS:	1'GB	1'OS							

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: SSW Wind Speed: 0-3

Weather and Water Conditions: Partly cloudy Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy C. Wemple

Sample No.	3-5 T								
Station	15932								
Time	11:00							11:22	
Water Depth (ft.)	26'	50'						30'	
DO (mg/L)		1.64	1.39	1.65	1.25	2.25	2.72		
pH (SU)		7.21	7.23	7.19	7.20	7.22	7.26		
Salinity (‰)		4.05	7.20	4.77	3.61	3.21	3.06		
Water Temp. (°C)		29.89	29.93	29.79	29.72	29.88	30.42		
Air Temp. (°C)		33.8	33.5	33.7	33.9	34.3	36.6		
Lat. (North)	29°44'42.0"	29°44'40.6"						29°44'46.8"	
Long. (West)	95°11'02.9"	95°11'03.0"						95°11'04.2"	
Sample Type	Sed	Sed						Sed	
Collection Method	Ponar	Ponar						Ponar	
Species									
Sex									
Weight (Unit: lbs, oz)									
Length (Unit: inches)									
	Evident stratification in Sediment		Silty	w/ slight	oil smell			Stratified w silt upper Horizon	
	light surface	layer							
REMARKS:		5'OB	10'OB	20'OB	30'OB	40'OB	1' OS		

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: SSW Wind Speed: 0-3

Weather and Water Conditions: Partly cloudy Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy C. Wemple

Sample No.	45									
Station	13934									
Time	11:53	11:56						12:09		
Water Depth (ft.)	29'	49						37'		
DO (mg/L)		1.87	2.06	2.14	2.16	2.52	3.09			
pH (SU)		7.37	7.33	7.29	7.25	7.26	7.30			
Salinity (°/oo)		9.66	9.25	6.62	5.57	4.76	4.39			
Water Temp. (°C)		30.02	30.02	29.91	29.87	29.84	30.11			
Air Temp. (°C)		31.6	31.7	31.7	31.7	31.8	31.8			
Lat. (North)	29°43'55.6"	29°44'03.8"						29°44'09.8"		
Long. (West)	95°07'31.3"	95°07'30.1"						95°07'31.7		
Sample Type	Sed	Sed						Sed		
Collection Method	Ponar	Ponar						Ponar		
Species										
Sex										
Weight (Unit: lbs. oz)										
Length (Unit: inches)										
	Slight oil,	Barge traffic	Tough-	to get	samples:	Stratified	with light	Oily sheen on Sed	observed surface	
	organic odor		Sed on	top & Shell	Frag	mix		with petroleum smell		
REMARKS:		5'OB	10'OB	20'OB	30'OB	40'OB	1'BS			

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-11-01 Tide, MLT:

Wind Direction: SSW Wind Speed: 0-3

Weather and Water Conditions: Partly cloudy Days since last significant rainfall: 4
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart S. Kennedy C. Wemple

Sample No.	10-ST	—							
Station	1661 B	—							
Time	13:53	14:03	14:11						
Water Depth (ft.)	7.0	34	45						
DO (mg/L)			2.83	3.32	4.12	4.04	5.49		
pH (SU)			7.82	7.71	7.79	7.75	7.82		
Salinity (‰)			16.74	11.91	9.89	8.26	6.82		
Water Temp. (°C)			30.02	30.26	30.38	30.45	31.47		
Air Temp. (°C)			35.1	35.3	35.2	35.0	34.9		
Lat. (North)	29°43'49.3"		29°43'43.8"						
Long. (West)	95°01'35.4"		95°01'34.5						
Sample Type	Sed	Sed	Sed						
Collection Method	Ponar	Ponar	Ponar						
Species	—								
Sex	~~Fo Sandy~~								
Weight (Unit: lbs. oz)									
Length (Unit: inches)									
	Silty w/		very silty						
	Sand		& dark						
REMARKS:			5'OB	10'OB	20'OB	30'OB	1'OS		

FIELD DATA SHEET

Project: HGAC Dioxin PBS&J Job No. 460338.00

Date(s) Collected: 7-12-01 Tide, MLT:

Wind Direction: SSW Wind Speed: 5-7

Weather and Water Conditions: Calm Partly cloudy Days since last significant rainfall: 5
(Based on rain gage located at Hobby Airport)

Name of Collector(s): M. Heaney, N Bossart

Sample No.	6-ST								
Station	16622								
Time	17:00								
Water Depth (ft.)	22'								
DO (mg/L)	5.07	4.81	5.31	7.33	7.66				
pH (SU)	7.70	7.71	7.75	8.52	8.61				
Salinity (‰)	0.12	0.11	0.10	0.10	0.10				
Water Temp. (°C)	30.66	30.67	30.95	32.42	32.60				
Air Temp. (°C)									
Lat. (North)	29°50'44.6								
Long. (West)	95°06'19.9								
Sample Type	Sed								
Collection Method	Ponar								
Species									
Sex									
Weight (Unit: lbs, oz)									
Length (Unit: inches)									
	Sandy clay	Result of	flood						
	mud	east of	river channel						
REMARKS:	1'OB	5'OB	10'OB	15'OB	1'BS				