

McGlynn Laboratories Inc.
Report of Hydrological Results
Bayou Point



For: Bayou Point, Calloway, FL.

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Report Date: Wednesday, May 1, 2006

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Page 1 of 27

McGlynn Laboratories Inc.
Report of Hydrological Results
Bayou Point



Table of Contents

Introduction	page 4
Physical/Chemical Field Data and Discussion	page 15
Flow Measurements	page 16
Dye Study	page 18
Discussion and Conclusions	page 23
References	page 26

List of Tables

Table 1: Physical/Chemical Field Data	page 13
Table 2: flood tide flow measurements	page 16
Table 3: ebb tide flow measurements	page 17
Table 4: Fixed point dye study at station BP2	page 19
Table 5: Fixed point dye study at station BP2	page 20
Table 6: Leading Edge dye study at station BP2	page 21
Table 7: Leading Edge dye study at station BP2.	page 22

List of Figures

Figure 1: Satellite imagery of the Bayou Point site.	page 5
Figure 2: Satellite imagery of the Bayou Point site	page 6
Figure 3: Satellite imagery of the Bayou Point site	page 7
Figure 4: The study site	page 8
Figure 5: Site location, Bayou Point, near Calloway, Fl.	page 9
Figure 6: Bayou Point, view north	page 10
Figure 7: Bayou Point, view, to south	page 10
Figure 8: Bayou Point, view east	page 11
Figure 9: Bayou Point view west	page 11
Figure 10: Summary Graph.	page 14
Figure 11: Tidal fluctuations, March and April 2006	page 14
Figure 12: Bayou Point, station BP-2, dye study, 3/30/06, 10 seconds.	page 24

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Page 2 of 27

McGlynn Laboratories Inc.
Report of Hydrological Results
Bayou Point



Figure 13: Bayou Point, station BP-2, dye study, 3/30/06, 40 seconds. page 24
Figure 14: Bayou Point, station BP-2, dye study, 3/30/06, 75 seconds. page 25

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Page 3 of 27

McGlynn Laboratories Inc.
Report of Hydrological Results
Bayou Point



Introduction

The Bayou Point Development is located on a peninsula in a Bayou in the Panama City area between Calloway and Tyndall Air Force Base. The distance from the site to open water in East Bay is approximately 0.58 miles. By boat it is 5.84 miles to St. Andrews Bay and 9.72 miles to the pass and the Gulf of Mexico. The depth of the channel at Bayou Point is 10 feet.

At the time of this study flow was dominated by tidal influences and wind. There had been no measurable rainfall in the previous month. The Bayou Point watershed includes the developed areas of Parker and Calloway in the Greater Panama City area. This is a heavily urbanized watershed. Water quality in the area seems to be improving since the implementation of the Clean Water Act. The area has the prospects of further improvement as long as best management practices are employed.

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Page 4 of 27

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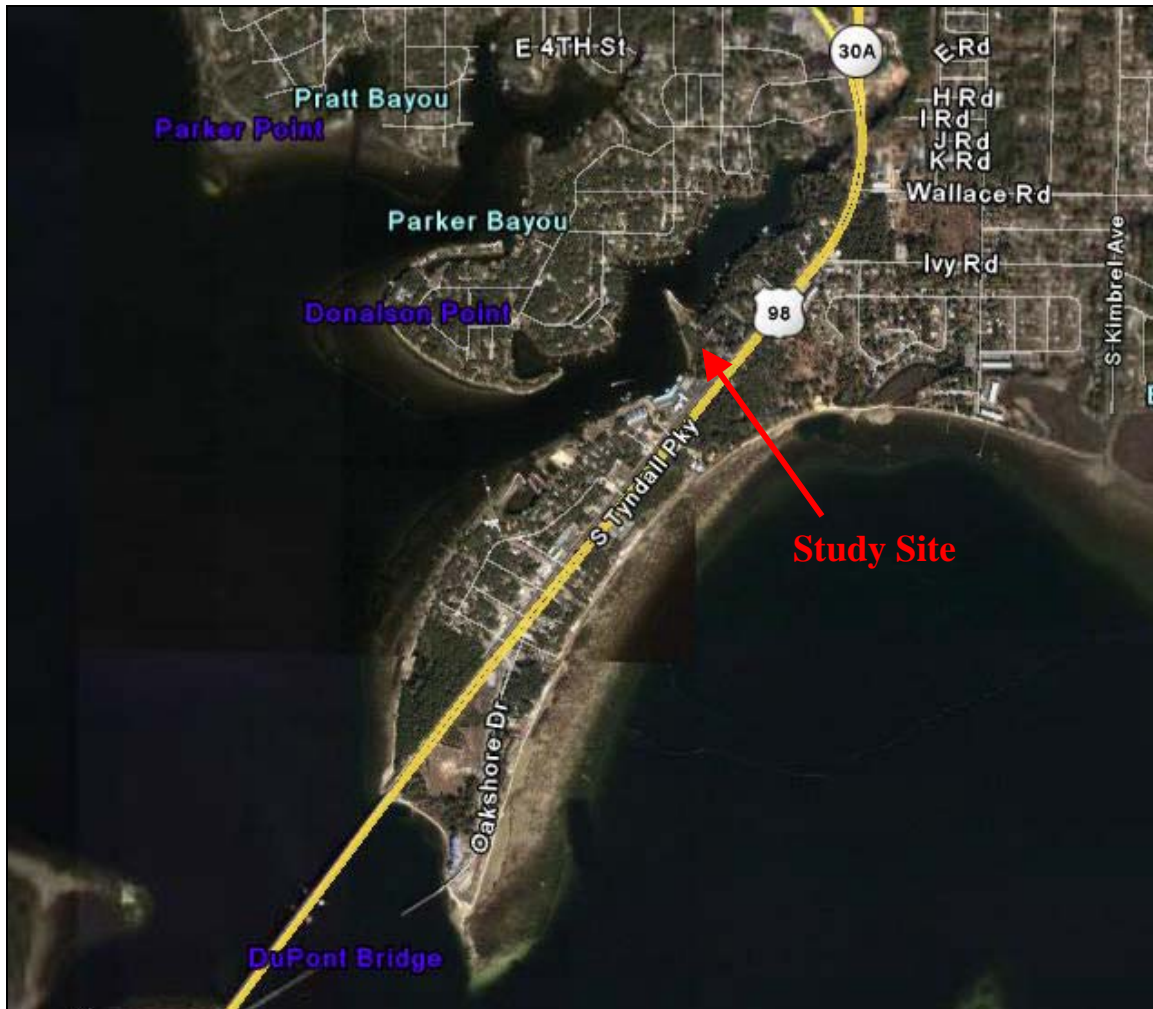


Figure 1: Satellite imagery of the Bayou Point site located near Calloway, Florida. It is located between Donalson Point and Long Point. Bayou Point empties into East Bay near the DuPont Bridge across the Bay from Tyndall Air Force Base.

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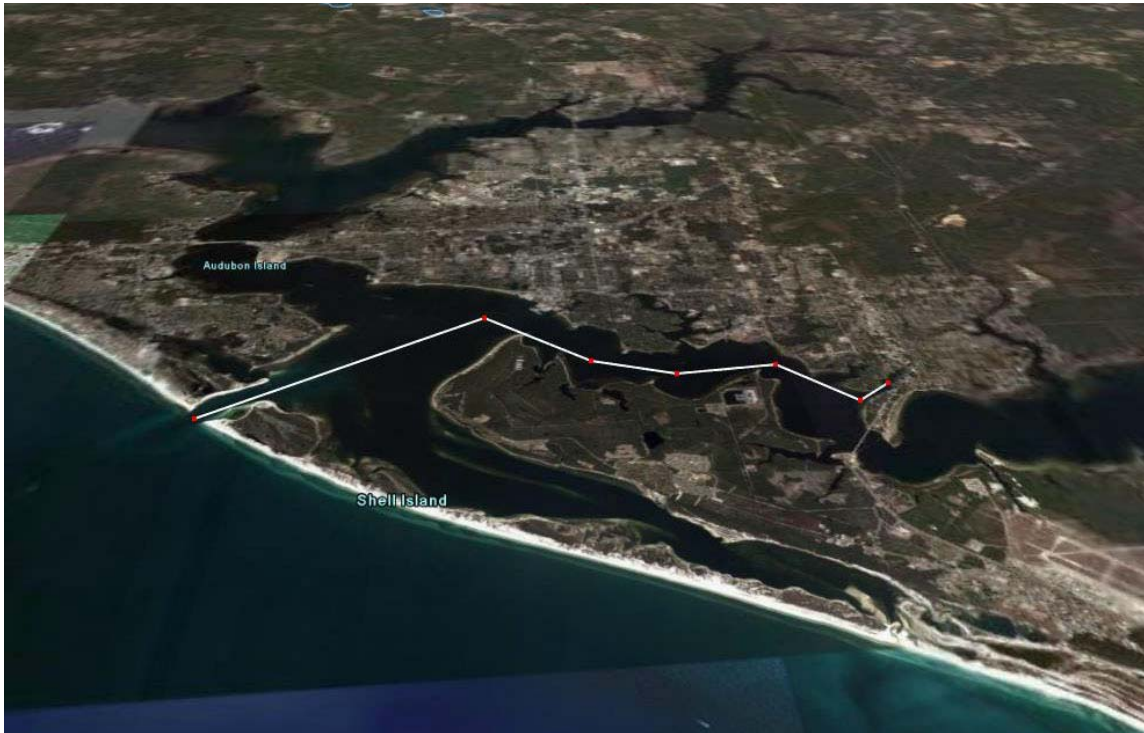


Figure 2: Satellite imagery of the Bayou Point site (near Calloway, Florida). Bayou Point empties into East Bay, joins St. Andrews Bay and empties into the Gulf of Mexico at the pass near Grand Lagoon, approximate 9.72 miles from the Gulf of Mexico by water.

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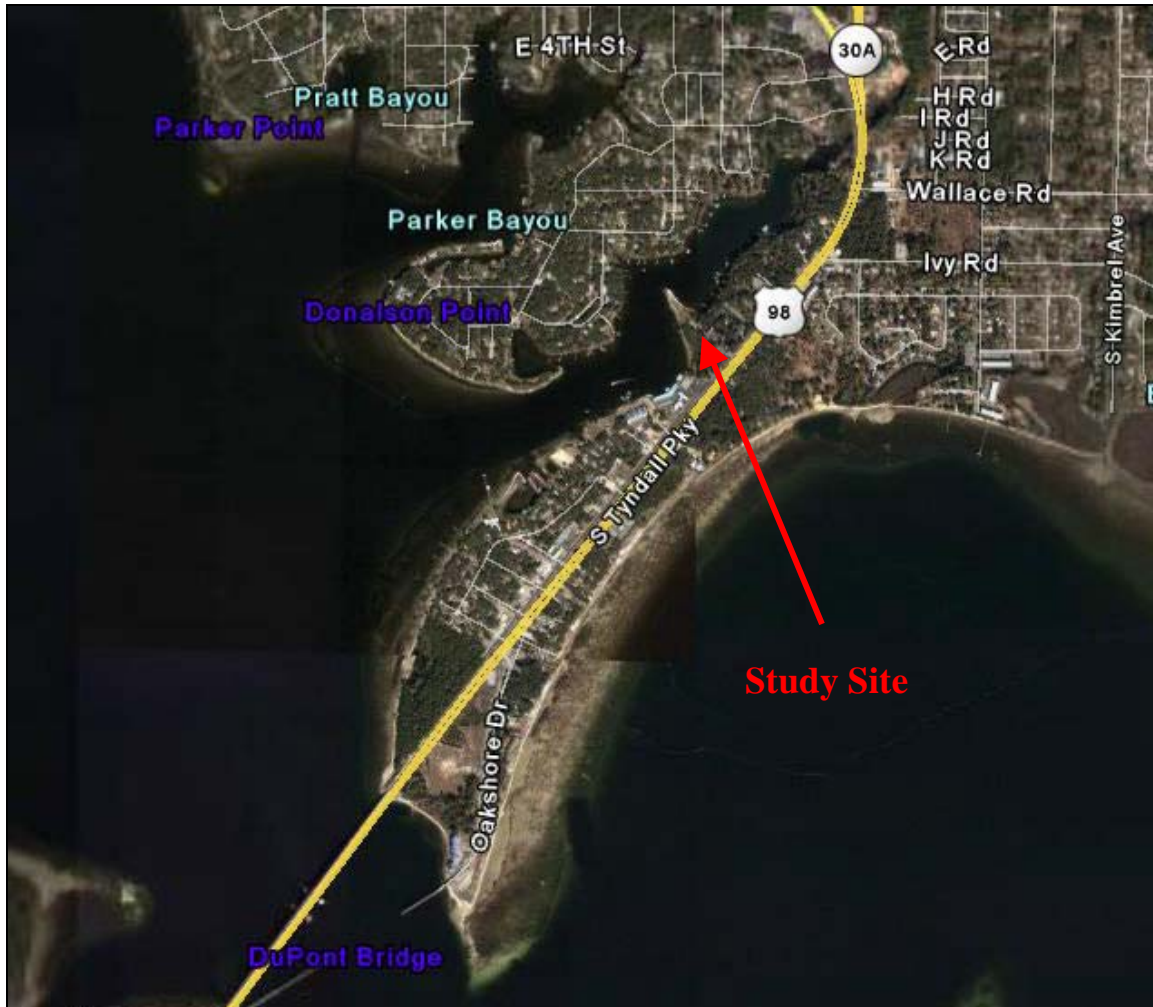


Figure 3: Satellite imagery of North Bay including the Bayou Point site. This is an urban watershed.

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Figure 4: The study site is located on a peninsula located at the approximate mid-point of the Bayou, 0.6 miles from the headwaters of the Bayou and 0.58 miles from open water in East Bay. The Bayou is 0.11 miles wide where the peninsula extends 0.06 miles into the Bayou.

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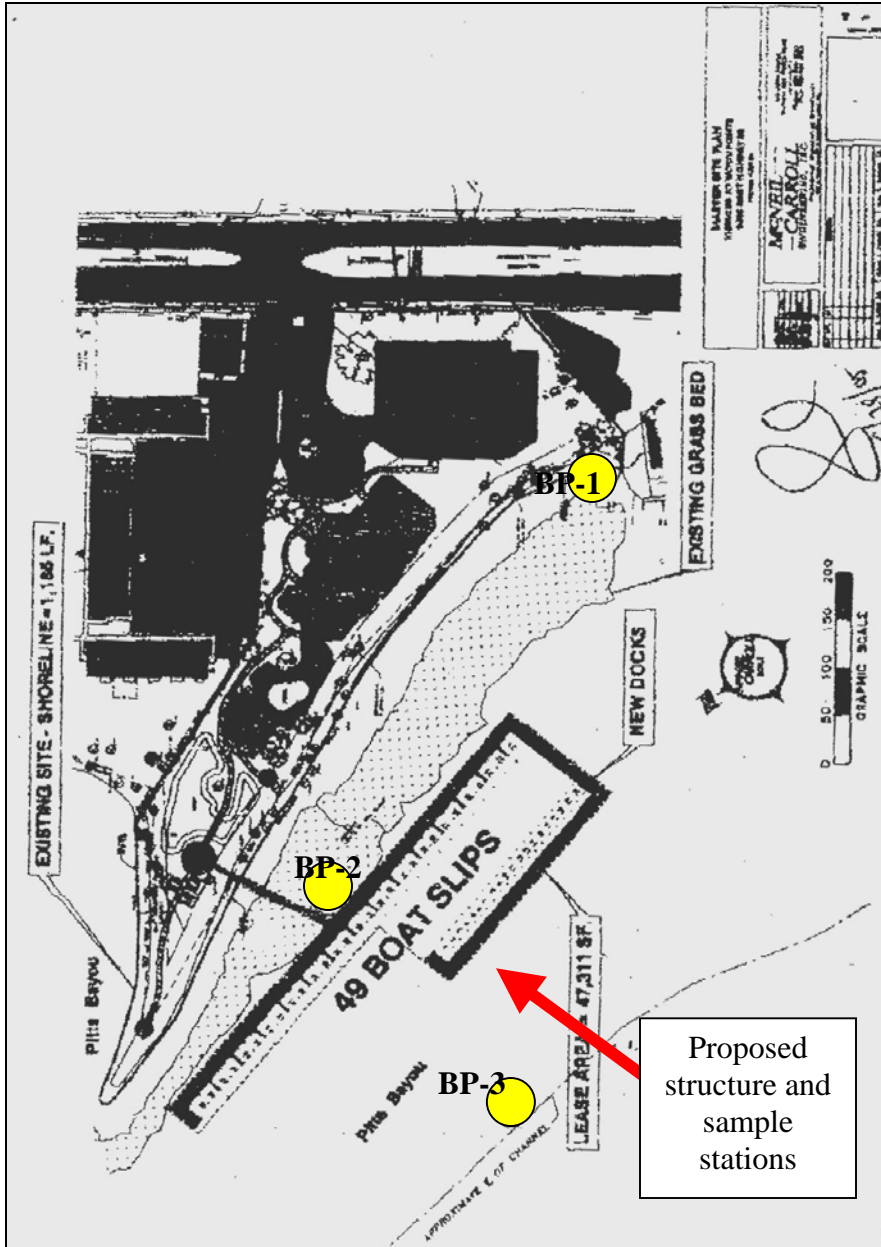


Figure 5: Locations of structure proposed for Bayou Point.

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Figure 6: Bayou Point, view northwest from shore



Figure 7: Bayou Point, view southwest of the site looking toward East Bay.

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Page 10 of 27

McGlynn Laboratories Inc.
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Figure 8: Bayou Point, view northeast, towards the head of the bayou.



Figure 9: Bayou Point, view south showing nearby boat yards and the site of the proposed dock.

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Page 11 of 27



Diel Oxygen

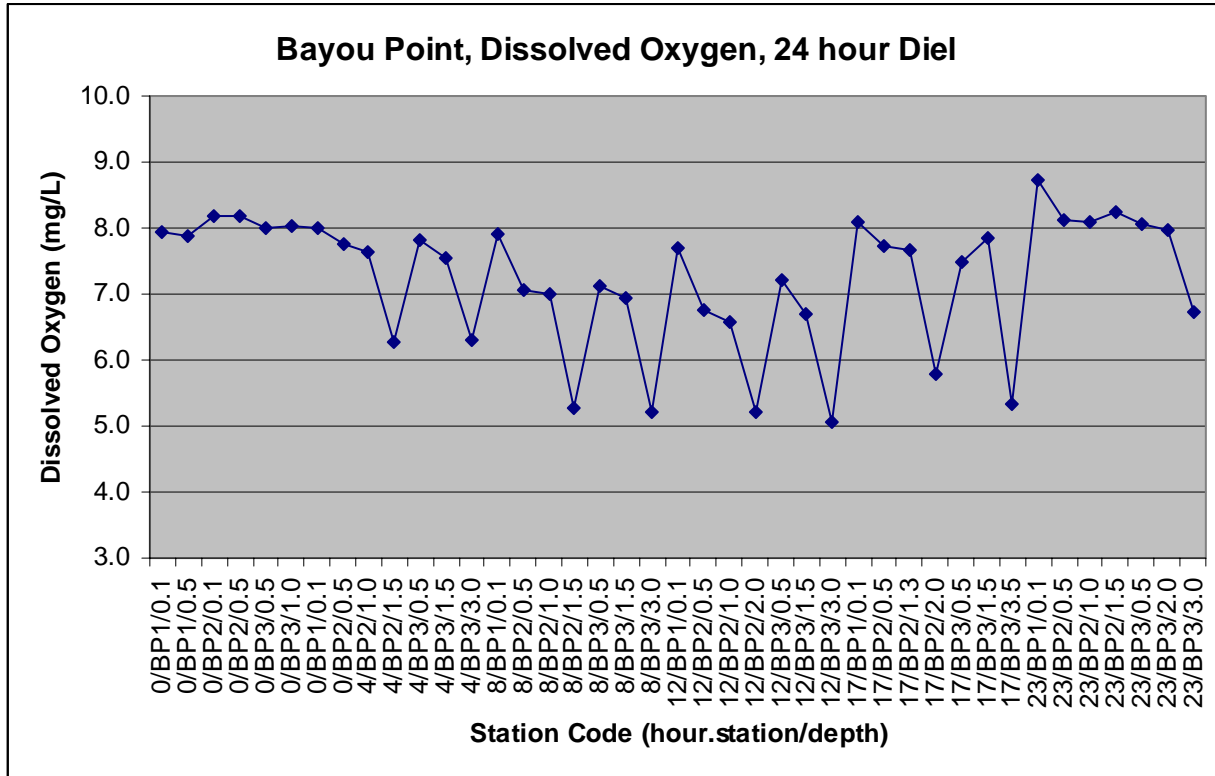


Figure 10: Summary Graph of the seven discrete samplings at all three stations, surface, mid-water and bottom for dissolved oxygen. Stations were sampled at approximate 4 hour intervals for 24 hours. The sample location, arranged chronologically is displayed on the y-axis. The stations code is as follows hour of sampling (0 – 24), station name and depth in meters. The dissolved oxygen is displayed on the y-axis in mg/L. According to 62-302.530, Criteria for Surface Water Quality Classifications, for Class III waters (predominantly marine), dissolved oxygen concentrations must not average below 5.0 mg/L in a 24 hour period and shall never be less than 4.0 mg/L. *These analytical results meet these requirements.*

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Chart 1: Physical Chemical Data, including salinity.

Station Reading 4	Date MMDDYY	Time HHMMSS	Station Depth meters	Temp degC	pH units	SpCond uS/cm	Salin ppt	DO mg/l	DO %Sat	Reading Depth meters
BP-1	03/30/06	7:11	0.4	18.79	8.30	41219	25.15	7.71	100.12	0.10
BP-2	03/30/06	7:11	2.2	18.91	8.30	40619	24.73	6.75	89.40	0.50
				19.21	8.30	40751	24.83	6.57	87.39	1.20
				18.80	8.32	48612	30.33	5.21	72.20	2.00
BP-3	03/30/06	7:11	3.4	19.87	8.30	40719	24.80	7.21	94.54	0.50
				19.11	8.27	41912	25.64	6.71	88.95	1.50
				18.81	8.31	48911	30.54	5.07	70.63	3.00

Station Reading 5	Date MMDDYY	Time HHMMSS	Station Depth meters	Temp degC	pH units	SpCond uS/cm	Salin ppt	DO mg/l	DO %Sat	Reading Depth meters
BP-1	03/30/06	12:25	0.4	20.31	8.36	41006	26.25	8.08	105.70	0.10
BP-2	03/30/06	12:25	2.4	20.19	8.34	41166	26.42	7.74	101.70	0.50
				19.08	8.35	42077	27.01	7.68	99.70	1.30
				18.67	8.20	48563	31.76	5.79	76.10	2.00
BP-3	03/30/06	12:25	3.7	19.22	8.31	40704	26.09	7.50	97.10	0.50
				18.71	8.34	41328	26.50	7.86	101.40	1.50
				18.60	8.24	48035	32.04	5.33	71.00	3.50

Station Reading 6	Date MMDDYY	Time HHMMSS	Station Depth meters	Temp degC	pH units	SpCond uS/cm	Salin ppt	DO mg/l	DO %Sat	Reading Depth meters
BP-1	03/30/06	16:25	0.4	23.13	8.41	38350	24.55	8.74	118.7	0.10
BP-2	03/30/06	16:25	1.6	19.69	8.30	40704	26.07	8.13	102.9	0.50
				19.66	8.30	40696	26.07	8.10	102.9	1.00
				19.17	8.30	42612	27.48	8.25	104.0	1.50
BP-3	03/30/06	16:25	3.3	20.04	8.27	40835	26.17	8.06	103.2	0.50
				19.42	8.27	41736	26.66	7.96	101.0	2.00
				18.82	8.23	48688	31.90	6.72	87.0	3.00

Date: 3/30/06

Water Depth: BP-1, 0.5 meters; BP-2, 2.0 meters, BP-3, 3.5 meters

Wind Direction: north, 5 – 10 knots

Sea State: calm, this is a sheltered area

Cloud Coverage: 5%

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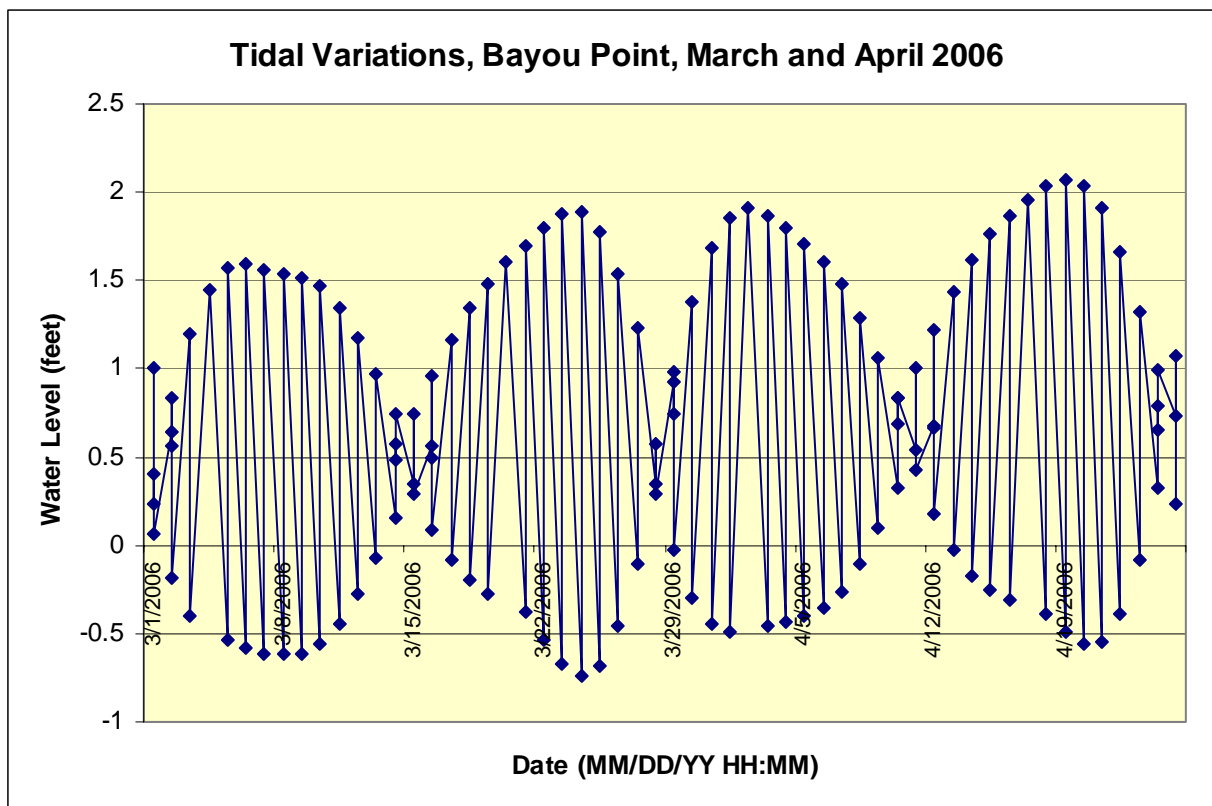


Figure 11: The tidal fluctuations for the months of March and April 2006 at Bayou Point. During this period the average tidal fluctuation in Bayou Point was 1.45 feet.

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Discussion

The profiling data shows healthy dissolved oxygen and that the waters of Bayou Point are quite saline, probably originating in the nearby Gulf of Mexico. The healthy dissolved oxygen values at the three stations imply good mixing and exchange (Table 1). The salinity data indicates minimal fresh water input at this time. There are adequate tidal fluctuations in Bayou Point (Figure 14) an average tidal range of 1.45 feet.

Conclusions: No oxygen readings were at low or compromised levels, saline waters and adequate tidal fluctuations, as well as proximity to open waters (East Bay is 0.58 miles away) indicate that that Bayou Point is not stagnant but has good mixing/exchange of water with East Bay, St Andrews Bay and the Gulf of Mexico.

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Page 15 of 27

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Flow Measurements: Flow was measured with a Marsh McBurney 201D portable current flow meter according to FDEP protocols (DEP-SOP-001/02, FT 1800, Field Measurement of Water Flow and Velocity). The mean tidal range in Grand Lagoon is 1.45 feet for March and April 2006. Tides are diurnal.

Tide: flood tide (rising)

Date: 3/30/06

Time: 8:10 CST

Water Depth: BP-1, 0.5 meters; BP-2, 1.0 meters, BP-3, 1.5 meters

Wind Direction: none

Sea State: calm

Cloud Coverage: 5%

Direction of Flow: north

Table 2: flood tide flow measurements

Station BP-1	Depth	Flow
mid-depth	0.25m	0.24 ft/sec
Total Depth	0.5m	

Station BP-2	Depth	Flow
20% depth	0.4m	0.40 ft/sec
60% depth	1.2m	0.45 ft/sec
80% depth	1.6m	0.43 ft/sec
Total Depth	2.0m	

Station BP-3	Depth	Flow
20% depth	0.6m	0.43 ft/sec
60% depth	1.8m	0.43 ft/sec
80% depth	2.4m	0.41 ft/sec
Total Depth	3.0m	

2006-03-30 10:31 CST 1.38 feet High Tide

2006-03-30 20:34 CST -0.30 feet Low Tide

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Tide: ebb tide (falling)

Date: 3/29/06

Time: 14:08 CST

Water Depth: BP-1, 0.5 meters; BP-2, 2.0 meters, BP-3, 3.0 meters

Wind Direction: south, 5 – 10 knots

Sea State: calm, this is a sheltered area

Cloud Coverage: 5%

Direction of Flow: south

Table 3: ebb tide flow measurements

Station BP-1	Out	Flow
mid-depth	0.25m	0.32 ft/sec
Total Depth	0.5m	

Station BP-2	Out	Flow
20% depth	0.4m	0.36 ft/sec
60% depth	1.2m	0.34 ft/sec
80% depth	1.6m	0.29 ft/sec
Total Depth	2.0m	

Station BP-3	Out	Flow
20% depth	0.6m	0.35 ft/sec
60% depth	1.8m	0.37 ft/sec
80% depth	2.4m	0.29 ft/sec
Total Depth	3.0m	

2006-03-29 10:31 CST 0.98 feet High Tide

2006-03-29 19:15 CST -0.03 feet Low Tide

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Dye Study

To ascertain the time needed for flushing of a single event spill a 'Fixed Point Study' was employed. In the 'Fixed Point Study' dye was injected at a single point and sampling at the injection point to determine the time necessary for flushing. 100 grams of water soluble Rhodamine WT dye was dumped at a location near station BP-1, in Bayou Point on 03/30/06 at flood and ebb tides. The wind was calm in the morning for the flood tide measurements but began blowing from the north at 5-10 knots in the afternoon for the ebb tide measurements. Fluorescence was measured in the field with a hydrolab data sonde equipped with a fluorescence Rhodamine wt dye detector.

The 'Fixed Point Dye Study' was performed on an Ebb and Flood Tide on 3/30/06. In both studies the initial concentration of the dye plume was at 10% of its original concentration in less than a minute. Flow was measured at 0.14 to 0.35 feet per seconds. Graphical representations of the data and regressions are depicted in Tables 4 and 5.

A 'Leading Edge Dye Study' was also performed on both Ebb and Flood Tide on 3/30/06. The day was pleasant, approximately 72 degrees F, relatively cloudless and windless until the afternoon. Rhodamine dye was release at the surface of the water near station BP-2. The initial dye concentration was reduced to 10% of its initial concentration in less than 2 minutes. Graphical representations of the data and regressions are depicted in Tables 6 and 7.

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Page 18 of 27

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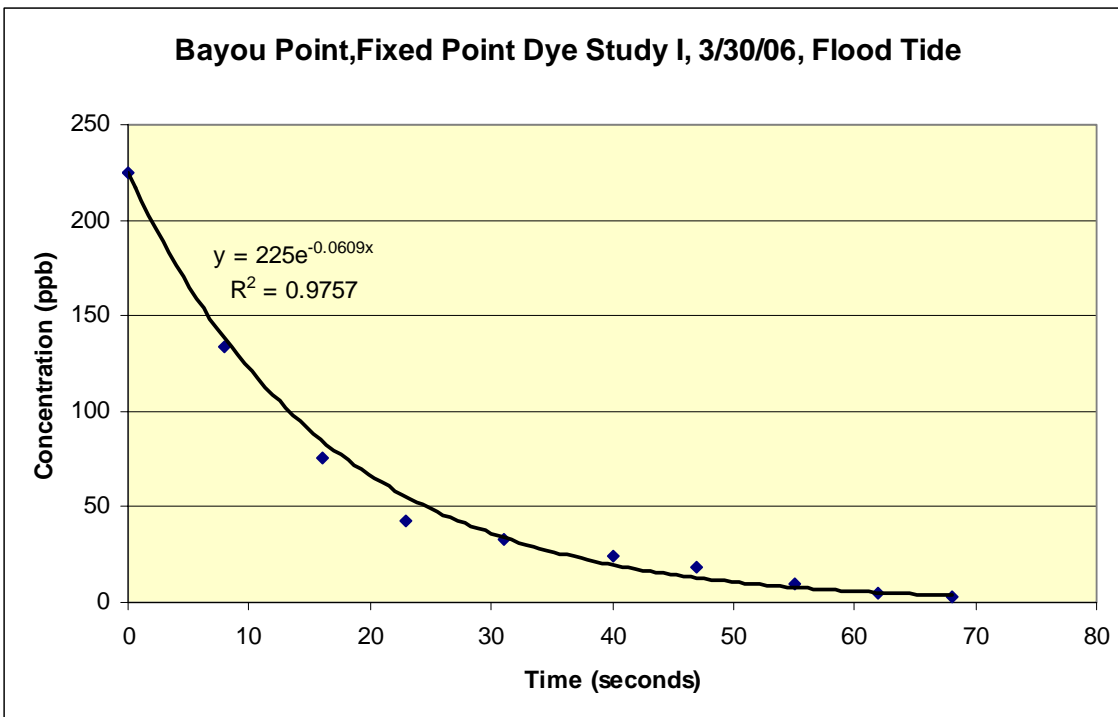
Table 4: Fixed point dye study at station BP-2.

Bayou Point, Fixed Point Dye Study I, 3/30/06, Flood Tide

Total Time (Sec)	Conc. (ppb)	Conc. (%)	Time CST (HHMMSS)
0	225.25	100.0%	8:20:04
8	134.12	59.5%	8:20:12
16	75.68	33.6%	8:20:20
23	42.58	18.9%	8:20:27
31	32.71	14.5%	8:20:35
40	24.56	10.9%	8:20:44
47	18.47	8.2%	8:20:51
55	9.43	4.2%	8:20:59
62	5.11	2.3%	8:21:06
68	2.45	1.1%	8:21:12

2006-03-30 10:31 CST 1.38 feet High Tide

2006-03-30 20:34 CST -0.30 feet Low Tide



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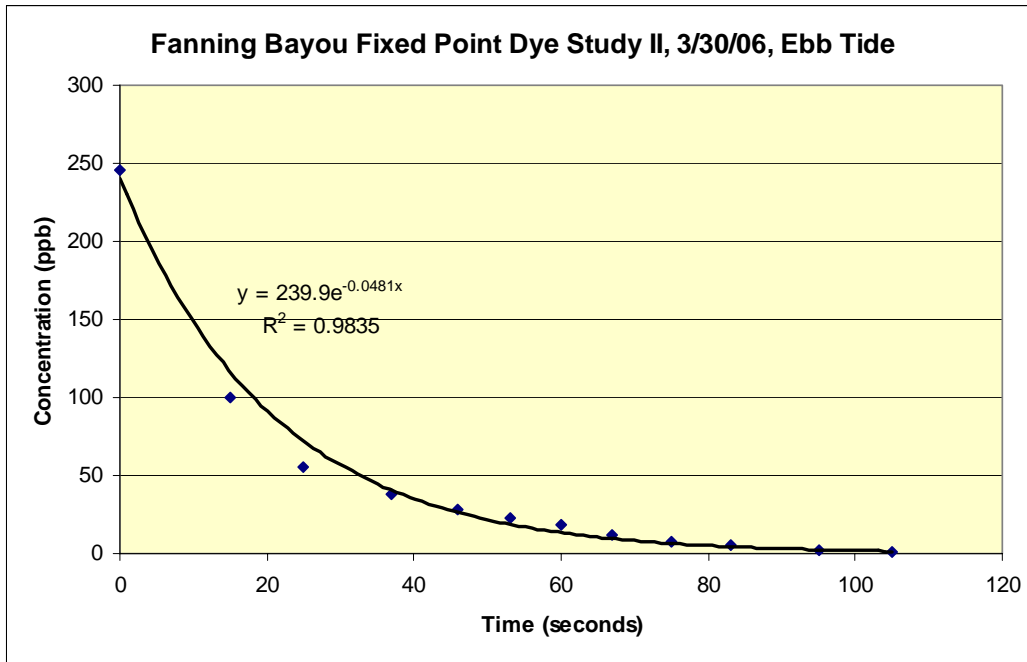
Table 5: Fixed point dye study at station BP-2.

Fanning Bayou Fixed Point Dye Study II, 3/30/06, Ebb Tide

Total Time (Sec)	Conc. (ppb)	Conc. (%)	Time CST (HHMMSS)
0	245.23	100.0%	14:23:24
15	99.50	40.6%	14:23:39
25	55.16	22.5%	14:23:49
37	37.57	15.3%	14:24:01
46	27.81	11.3%	14:24:10
53	22.64	9.2%	14:24:17
60	18.11	7.4%	14:24:24
67	11.92	4.9%	14:24:31
75	7.07	2.9%	14:24:39
83	5.11	2.1%	14:24:47
95	1.97	0.8%	14:24:59
105	1.16	0.5%	14:25:09

2006-03-30 10:31 CST 1.38 feet High Tide

2006-03-30 20:34 CST -0.30 feet Low Tide



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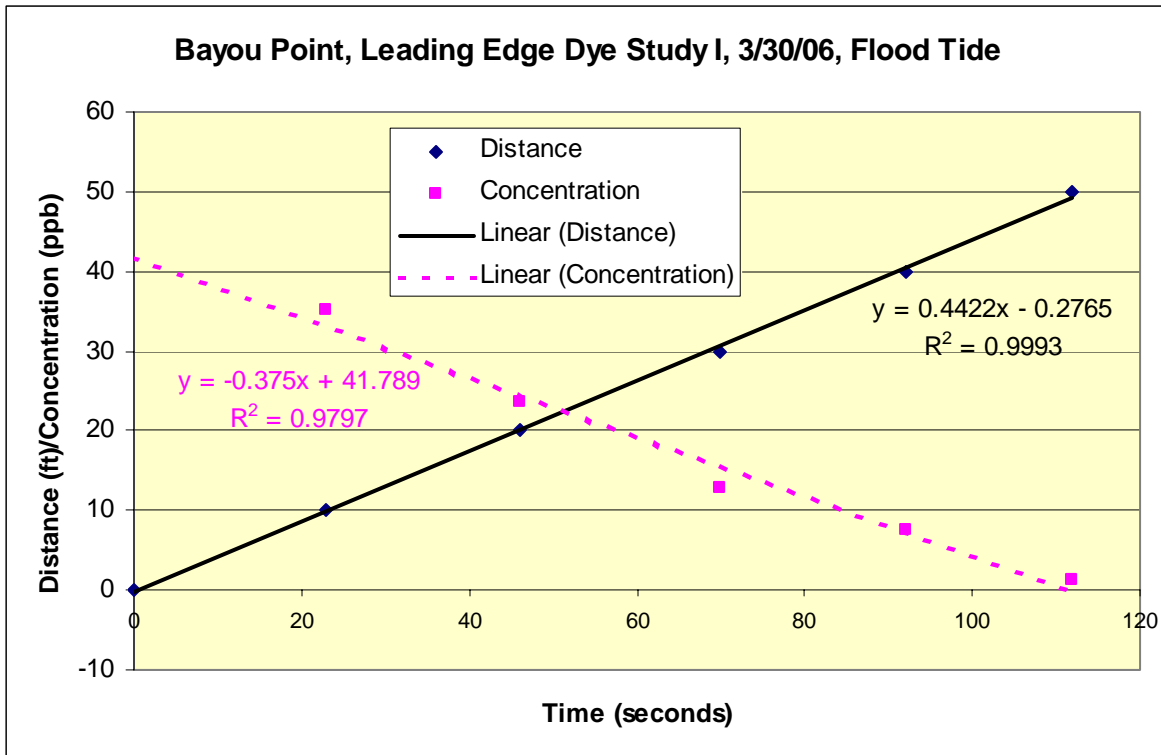
Table 6: Leading Edge dye study at station BP-2.

Bayou Point, Leading Edge Dye Study I, 3/30/06, Flood Tide

Total Time (Sec)	Time Interval (HHMMSS)	Distance (ft)	Conc. (ppb)	Conc. (%)	Velocity (ft/s)	Time CST (HHMMSS)
0	0	0		100.0%		8:16:27
23	23	10	35.12	14.0%	0.43	8:16:50
46	23	20	23.57	9.4%	0.43	8:17:13
70	24	30	12.79	5.1%	0.42	8:17:37
92	22	40	7.54	3.0%	0.45	8:17:59
112	20	50	1.29	0.5%	0.50	8:18:19

2006-03-30 10:31 CST 1.38 feet High Tide

2006-03-30 20:34 CST -0.30 feet Low Tide



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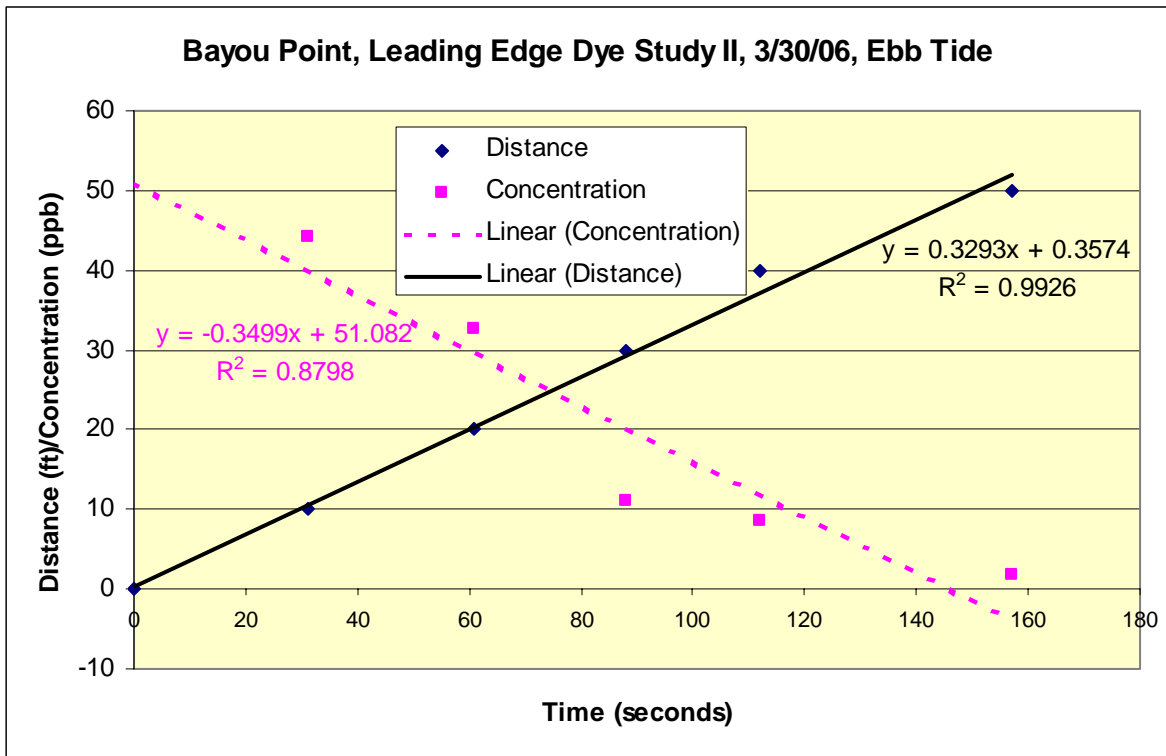
Table 7: Leading Edge dye study at station BP-2.

Bayou Point, Leading Edge Dye Study II, 3/30/06, Ebb Tide

Total Time (Sec)	Time Interval (HHMMSS)	Distance (ft)	Conc. (ppb)	Conc. (%)	Velocity (ft/s)	Time CST (HHMMSS)
0	0	0		100.0%		14:26:31
31	31	10	44.24	17.7%	0.32	14:27:02
61	30	20	32.76	13.1%	0.33	14:27:32
88	27	30	10.95	4.4%	0.37	14:27:59
112	24	40	8.54	3.4%	0.42	14:28:23
157	45	50	1.80	0.7%	0.22	14:29:08

2006-03-30 10:31 CST 1.38 feet High Tide

2006-03-30 20:34 CST -0.30 feet Low Tide



Sean E. My

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Discussion and Conclusions

The field data indicates that a potential pollutant released at the surface will be reduced to 10% of its initial concentration at the point of the spill in less than less than a minute. Flow was measured at between 0.14 to 0.35 feet per seconds on both ebb and flood tides at the site on Bayou Point. Fresh water inputs were minimal and water movement was primarily due to tidal and wind fluctuations. Dissolved oxygen measured in Bayou Point numerous times, including a 24 hour diel oxygen study, were optimal indicating good mixing and circulation of water. Salinity measurements indicate that there was a minimal salt wedge and that the water is rather saline indicating oceanic influence. Leading edge dye studies indicate that a plume of pollutants would be dispersed to less than 10% of its original concentration in less than 3 minutes.

It can be concluded that the flushing time for the proposed facility would fall well within the accepted four day flushing criteria. There is adequate flushing to thoroughly disperse a potential pollutant in a timely manner. Based on this study, the proposed facility on Bayou Point has adequate flushing characteristics to disperse potential pollutants within four days as set forth by Florida Statutes.

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Page 23 of 27

McGlynn Laboratories Inc.
Report of Hydrological Results
Bayou Point



Figure 12: Bayou Point, station BP-2, dye study, 3/30/06, 10 seconds.



Figure 13: Bayou Point, station BP-2, dye study, 3/30/06, 45 seconds.

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Figure 14: Bayou Point, station BP-2, dye study, 3/30/06, 75 seconds.

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Report of Hydrological Results
Bayou Point



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Page 26 of 27

McGlynn Laboratories Inc.
Report of Hydrological Results
Bayou Point



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Page 27 of 27