TMDLS FOR TURBIDITY FOR SUBSEGMENTS 090106, 090201, 090202, AND 090501 IN THE PEARL RIVER BASIN, LOUISIANA

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US EPA Region 6
Water Quality Protection Division
Oversight and TMDL Team
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

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Prepared by

FTN Associates, Ltd.
3 Innwood Circle, Suite 220
Little Rock, AR 72211

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EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to identify water bodies that are not meeting water quality standards, and to develop total maximum daily pollutant loads for those water bodies. A total maximum daily load (TMDL) is the amount of pollutant that a water body can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be allocated to point sources and nonpoint sources discharging to the water body. This report presents TMDLs that have been developed for turbidity for subsegments 090106 (Holmes Bayou), 090201 (West Pearl River–from the headwaters to the confluence with Holmes Bayou), 090202 (West Pearl River–from the confluence with Holmes Bayou to the Rigolets (includes east and west mouths)), and 090501 (Bogue Chitto River).

All of these subgements are located in the Pearl River basin in southeastern Louisiana and are described below, going north to south. Bogue Chitto River (subsegment 090501) begins in southern Mississippi, flows south from the Louisiana state line, and enters the Pearl River Navigation Canal 12 miles northwest of Picayune, Mississippi. The area of this subsegment is 225 mi^2 and is primarily wetlands, pasture, and forest. West Pearl River, from the headwaters to Holmes Bayou (subsegment 090201), is located in the Bogue Chitto Wildlife Refuge, near the Louisiana-Mississippi state line. The area of this subsegment is 17 mi^2, and is mainly wetlands. Holmes Bayou (subsegment 090106) is located entirely in the southern end of the Bogue Chitto Wildlife Refuge. The area of this subsegment is less than 2 mi^2, and is predominantly wetlands. West Pearl River, from Holmes Bayou to Rigolets (subsegment 090202), is located east of Slidell. The area of this subsegment is 79 mi^2, with the majority of the land used for wetlands, forest, and developed areas (Slidell).

These water bodies were included on the Louisiana Department of Environmental Quality (LDEQ) final 2004 303(d) list as not supporting their fish and wildlife propagation and outstanding natural resource waters designated uses, and were ranked as priority #2 for TMDL development. The suspected source varied for the subsegments, but all of the subsegments cited sources outside of Louisiana as a cause (Mississippi), along with natural sources (all

subsegments except 090202), silviculture (subsegments 090202 and 090501), and gravel mining (subsegment 090202).

LDEQ historical water quality data at five monitoring locations associated with the subsegments were analyzed for long-term trends, seasonal patterns, relationships between concentration and stream flow, and relationships between turbidity and TSS. No historical trends, seasonal patterns, nor relationships with flow were apparent in these data.

Because turbidity cannot be expressed as a mass load, these turbidity TMDLs were expressed using TSS as a surrogate for turbidity. A regression between TSS and turbidity was developed for each of the water quality stations. Target TSS concentrations for the subsegments were calculated using the resulting regression equations and numeric criteria for turbidity in the Louisiana water quality standards.

All four TMDLs were developed using the load duration curve methodology. This method illustrates allowable loading at a wide range of stream flow conditions. The steps for applying this methodology for the TMDLs in this report were:

1. Developing a flow duration curve,
2. Converting the flow duration curve to load duration curves,
3. Plotting observed loads with load duration curves,
4. Calculating the TMDL components, and
5. Calculating percent reductions.

For these TMDLs, an implicit margin of safety (MOS) was incorporated through the use of conservative assumptions. The primary conservative assumption was to treat TSS as a conservative parameter that does not settle out of the water column. In addition to the implicit MOS, an explicit MOS was established as 10% of the TMDL. Another 10% of the TMDL was set aside for future growth (FG).

Because point sources were considered to have a negligible effect on existing violations of the water quality standard, all of the load reductions were assigned to nonpoint sources. The wasteload allocation (WLA) for point sources, the load allocation (LA) for nonpoint sources, and the nonpoint source percent reduction needed for each TMDL are summarized in Table ES.1.

Table ES.1 Summary of four TMDLs for turbidity.

Subsegment	Stream Name	Loads (tons/day of TSS)					Percent Reduction Needed
		WLA	LA	MOS	FG	TMDL	
090501	Bogue Chitto River	0.12	203.4	25.4	25.4	254.3	66%
090201	West Pearl River	0	693.9	86.7	86.7	867.3	89%
090106	Holmes Bayou	0	231.7	29.0	29.0	289.7	89%
090202	West Pearl River	311.205	646.3	119.7	119.7	1196.9	78%

The wasteload allocation for subsegment 090202 includes allowable loading for runoff from within the Slidell city limits because this runoff is regulated by a Municipal Separate Storm Sewer System (MS4) permit.

Hurricane Katrina made landfall on Monday, August 29, 2005 as a Category 4 hurricane with the center of the storm passing through the Pearl River basin. The storm brought heavy winds and rain to southeast Louisiana, causing much flooding and washing large amounts of debris into waterbodies throughout the Pearl River basin in Louisiana (not just along the coast). Some of the coastal areas that were flooded in Hurricane Katrina were re-flooded by the storm surge from Hurricane Rita. Both Hurricanes Katrina and Rita have caused a significant amount of change in water quality in south Louisiana. Many wastewater treatment facilities were temporarily or permanently damaged. Some wastewater treatment facilities will rebuild while others will relocate. Observations and field data collection by LDEQ and other organizations have shown that the wildlife and fisheries in the Pearl River basin were significantly impacted by the hurricanes. The hurricanes expedited the loss of coastal land and modified the hydrology of some of the coastal water bodies. Several federal and state agencies including the Environmental Protection Agency (EPA) and LDEQ are engaged in collecting environmental data and assessing the recovery of the Gulf of Mexico waters. Most of the data used to develop the TMDLs in this report were collected prior to these hurricanes. Therefore, the post-hurricane conditions and other factors may require modifications of these TMDLs prior to their implementation. Any deviation from implementation of these TMDLs should be justified based on site-specific data and/or information.

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1.0 INTRODUCTION

This report presents total maximum daily loads (TMDLs) for turbidity for Holmes Bayou (subsegment 090106), the West Pearl River (subsegments 090201 and 090202), and Bogue Chitto River (subsegment 090501). All four of these subsegments are located in southeastern Louisiana in the Pearl River basin. These subsegments were included on the final 2004 303(d) list (LDEQ 2005) as not supporting their designated uses of fish and wildlife propagation and outstanding natural resource waters. Suspected sources of contamination and causes of impairment from the 303(d) list are shown in Table 1.1. Although the 303(d) list includes impairments due to mercury for all four of these subsegments, only the impairments due to turbidity are addressed in this report. The TMDLs in this report were developed in accordance with Section 303(d) of the Federal Clean Water Act and United States Environmental Protection Agency (EPA) regulations in 40 CFR 130.7.

The purpose of a TMDL is to determine the pollutant loading that a waterbody can assimilate without exceeding the water quality standard for that pollutant, and to establish the load reduction that is necessary to meet the water quality standard in that waterbody. The TMDL is the sum of the wasteload allocation (WLA), load allocation (LA), future growth (FG), and a margin of safety (MOS). The WLA is the load allocated to point sources of the pollutant of concern. The LA is the load allocated to nonpoint sources, including natural background. The FG allows for future growth in loads to the waterbody. The MOS is a percentage of the TMDL that takes into account uncertainty concerning the relationship between pollutant loadings and water quality.

Table 1.1. Final 2004 303(d) listing for impairments addressed in this report.

Subsegment Number	Subsegment Name	Impaired Uses *	Suspected Cause of Impairment	Suspected Sources of Impairment	TMDL Priority (1 = highest)
090106	Holmes Bayou – From the Pearl River to the West Pearl River (Scenic)	FWP, ONR	Turbidity	Natural sources; Sources outside state jurisdiction or borders	2
090201	West Pearl River – From Headwaters to confluence with Holmes Bayou (Scenic)	FWP, ONR	Turbidity	Natural sources; Sources outside state jurisdiction or borders	2
090202	West Pearl River – From confluence with Holmes Bayou to the Rigolets (includes east and west mouths) (Scenic)	FWP, ONR	Turbidity	Sand/gravel/rock mining or quarries; Silviculture harvesting; Sources outside state jurisdiction or borders	2
090501	Bogue Chitto River – From Mississippi State Line to Pearl River Navigation Canal (Scenic)	FWP, ONR	Turbidity	Natural sources; Silviculture harvesting; Sources outside state jurisdiction or borders	2

*Note: FWP=Fish and Wildlife Propagation, ONR=Outstanding Natural Resource waters

2.0 BACKGROUND INFORMATION

2.1 General Information

The study area for this report consists of the four subsegments listed in Table 1.1. These subsegments are located in southeastern Louisiana in the Pearl River basin (see Figure A.1 in Appendix A).

The Bogue Chitto River originates in Mississippi about 40 miles north of the Louisiana state line. In Louisiana, the Bogue Chitto River flows in a generally southerly and then southeasterly direction before crossing the Pearl River Navigation Canal at the downstream end of subsegment 090501. The drainage area of the Bogue Chitto River at the downstream end of subsegment 090501 is approximately 1,225 mi^2.

The West Pearl River originates near the middle of subsegment 090201 where Wilson Slough (which gets most of its flow from the Bogue Chitto River) becomes the West Pearl River. The drainage area at the downstream end of subsegment 090201 is unknown due to the interconnectivity of flow between the Bogue Chitto River, West Pearl River, and Pearl River.

Holmes Bayou originates at the northern end of subsegment 090106 as a distributary of the Pearl River (water from the Pearl River generally contributes flow into Holmes Bayou rather than vice versa). Holmes Bayou flows into the West Pearl River at the boundary between subsegments 090201 and 090202.

Downstream of the mouth of Holmes Bayou, the West Pearl River continues flowing in a generally southerly direction to The Rigolets (the downstream end of subsegment 090202). This portion of the West Pearl River has braided channels in some places and is also interconnected with other streams, primarily along the east side of subsegment 090202.

2.2 Soils

Soil textures for the study are were compiled from the STATSGO database, which was developed by the USDA Natural Resources Conservation Service (NRCS). Table 2.1 summarizes soil textures for each subsegment in the study area. Soils in the study area are primarily loams.

Table 2.1. Soil textures in each subsegment.

Texture Name	Percent Coverage			
	090106	090201	090202	090501
Fine sandy loam	4.0%	7.5%	16.3%	66.2%
Mucky silt loam	1.0%	1.0%	24.5%	1.8%
Muck	0.0%	0.0%	9.6%	0.0%
Silt loam	85.0%	81.6%	39.4%	22.2%
Other textures	1.0%	1.9%	1.7%	8.3%
Submerged	9.0%	8.0%	8.5%	1.5%
Total	100.0%	100.0%	100.0%	100.0%

2.3 Land Use

Land use data for the study area were compiled from the National Land Cover Dataset 2001 (United States Geological Survey (USGS) 2006a). These data were based on satellite imagery from 2001 and they represent the most recent land use data for this area. The spatial distribution of these land uses is shown on Figure A.2 (located in Appendix A) and land use percentages are shown in Table 2.2. These data indicate that the predominant land use in the southern three subsegments (090106, 090201, and 090202) is wetlands while subsegment 090501 has a greater variety of land uses. Most of the developed land is in Slidell (subsegment 090202) and Franklinton (subsegment 090501).

Table 2.2. Land use percentages for subsegments in the study area.

Land Use	Percent Coverage			
	090106	090201	090202	090501
Water	14.7%	7.8%	4.8%	2.6%
Developed	0.0%	0.0%	18.8%	6.2%
Barren	0.0%	1.5%	0.5%	1.6%
Forest	0.0%	2.7%	17.4%	23.1%
Grass/shrub	0.0%	0.4%	7.2%	18.3%
Pasture/hay	0.0%	0.1%	1.8%	12.2%
Cultivated crops	0.0%	0.0%	0.1%	3.0%
Wetlands	85.3%	87.5%	49.4%	33.0%
Total	100.0%	100.0%	100.0%	100.0%

2.4 Stream Flow Data

Three USGS stream flow gages were used to estimate daily stream flows for the four subsegments addressed in this report. Section 4.4 provides details of how the flow data at the gages were used to estimate flows for each subsegment. Information and selected statistics for these gages are presented in Table 2.3. The locations of the flow gages are shown on Figure A.1 in Appendix A.

Table 2.3. Information for USGS stream flow gaging stations (USGS 2006b).

Gage name:	Pearl River near Bogalusa, LA	Bogue Chitto River near Bush, LA	Pearl River at Pearl River, LA
Gage number:	02489500	02492000	02492600
Descriptive location:	Highway 10 bridge, 2.0 miles east of Bogalusa	Highway 21 bridge, 1.4 miles north of Bush	700 ft upstream of Interstate 59 bridge, 0.8 miles northeast of town of Pearl River
Period of record:	10/1/1938 – present	10/1/1937 – present	10/1/1963 – 9/30/1970
Drainage area:	6,573 mi^2	1,213 mi^2	8,494 mi^2
Mean daily flow:	10,060 cfs	2,018 cfs	9,470 cfs
Median daily flow:	4,610 cfs	1,140 cfs	4,940 cfs *

*Computed from daily data because median flow value was not provided in USGS Water Data Report.

2.5 Water Quality Standards

Water quality standards for Louisiana are included in the Title 33 Environmental Regulatory Code (LDEQ 2007a). Designated uses for all four subsegments addressed in this report are primary and secondary contact recreation, fish and wildlife propagation, and outstanding natural resource waters. All four subsegments are classified as scenic. The Louisiana

water quality standards specify the following numeric criteria for turbidity (LAC 33: IX.1113.B.9.b):

> "As a guideline, maximum turbidity levels, expressed as nephelometric turbidity units (NTU), are established and shall apply for the following named waterbodies and major aquatic habitat types of the state:
>
> i. Red, Mermentau, Atchafalaya, Mississippi, and Vermilion Rivers and Bayou Teche — 150 NTU;
>
> ii. estuarine lakes, bays, bayous, and canals — 50 NTU;
>
> iii. Amite, Pearl, Ouachita, Sabine, Calcasieu, Tangipahoa, Tickfaw, and Tchefuncte rivers — 50 NTU;
>
> iv. freshwater lakes, reservoirs, and oxbows — 25 NTU;
>
> v. designated scenic streams and outstanding natural resource waters not specifically listed in Clauses B.9.b.i-iv of this Section — 25 NTU; and
>
> vi. for other state waters not included in Clauses B.9.b.i-v of this Section, and in waterbody segments where natural background turbidity exceeds the values specified in these clauses, turbidity in NTU caused by any discharges shall be restricted to the appropriate background value plus 10 percent. This shall not apply to designated intermittent streams."

The numeric turbidity criterion that applies to the four subsegments in this report is 25 NTU because each subsegment is classified as scenic and has the designated use of outstanding natural resource waters. The criterion of 50 NTU in Clause B.9.b.iii above applies only to the main stem of the named rivers; it does not apply to their tributaries.

The Louisiana water quality standards also include an antidegradation policy (LAC 33: IX.1109.A). This policy states that waters exhibiting high water quality should be maintained at that high level of water quality. If this is not possible, water quality of a level that supports designated uses of the waterbody should be maintained. Changing the designated uses of a waterbody to allow a lower level of water quality can only be achieved through a use attainability study.

2.6 Nonpoint Sources

For the four subsegments addressed in this report, the suspected nonpoint sources of turbidity that were specified in the final 2004 303(d) list were:

- Natural sources (subsegments 090106, 090201, and 090501);
- Sources outside Louisiana (i.e., inflows from Mississippi) (all four subsegments);
- Silviculture harvesting (subsegments 090202 and 090501); and
- Sand/gravel/rock mining or quarries (subsegment 090202).

Based on a review of land use data and topographic maps, the silviculture harvesting and mining/quarries in subsegment 090202 appear to be limited to the northern part of the subsegment.

An inventory and assessment of non-coal surface mines (primarily sand and gravel mines) was conducted for the entire state of Louisiana (LDEQ 2002). The numbers of mines and their acreages in each subsegment are shown in Table 2.4. The mines are divided into groups by the level of observed impact on water quality based on investigations conducted from 1988 through the early 1990's in the Pearl River basin. Although these investigations were conducted more than a decade ago, the results are consistent with the identification of sand and gravel mining in the 303(d) list as a suspected source of turbidity in parts of the Pearl River basin.

Table 2.4. Inventory and assessment of non-coal surface mines.

Observed Impact on Water Quality	090106		090201		090202		090501	
	No. of sites	Acres	No. of sites	Acres	No. of sites	Acres	No. of sites	Acres
None	0	-	0	-	1	30	25	1,064
Low level	0	-	1	2	1	50	13	1,390
Moderate level	0	-	1	10	1	40	16	2,355
High Level	0	-	0	-	1	320	10	3,820
TOTALS	0	-	2	12	4	440	64	8,629

The results of the LDEQ surface mining study also show that subsegment 090501 (Bogue Chitto River) has much more surface mining than the other three subsegments. The conclusions of this study stated that the impacts of surface mining on water quality in the Bogue Chitto River

were similar to the level of impact in several other streams in southeastern Louisiana which were characterized as having “severe adverse ecological impacts” and “adequate adverse ecological impacts ... to warrant prohibition or severe regulation of such practices” (referring to surface mining in flood plains).

In addition to anthropogenic sources of turbidity, natural sources of turbidity occur due to large natural organic loads from vast areas of swamps and marshes, particularly in the lower portion of the Pearl River basin.

2.7 Point Sources

A list of point sources in the four subsegments addressed in this report was developed using data from LDEQ's internal point source databases with additional information obtained from LDEQ’s Electronic Document Management System (EDMS). The point source discharge permits that were identified for these four subsegments are listed in Table B.1 and their locations are plotted on Figure B.1 (both in Appendix B). Many of the permits were for discharges in the Slidell area. A total of 85 permits were found in these four subsegments (none in subsegment 090106, 1 in subsegment 090201, 71 in subsegment 090202, and 13 in subsegment 090501). Flow rates and total suspended solids (TSS) permit limits are listed in Table B.1 for those discharges where that information was available in EDMS. Assumptions and procedures concerning wasteload allocations for point sources are described in Section 4.8.

Storm runoff from areas within the Slidell city limits is classified as a point source for this TMDL because the City of Slidell has a Municipal Separate Storm Sewer System (MS4) permit. The Urbanized Area for Slidell (EPA 2002) extends into subsegment 090202 and covers approximately 20.7 square miles of the subsegment (26% of the subsegment). This MS4 permit does not set numeric limits for the quality of storm runoff from urban areas, but it does require the City of Slidell to identify and implement best management practices (BMPs) to minimize pollutants in storm runoff.

3.0 EXISTING WATER QUALITY FOR TURBIDITY AND TSS

3.1 General Description of Data

Turbidity and TSS data have been collected by LDEQ at five water quality stations located in the four subsegments that are addressed in this report. These stations are listed in Tables 3.1 and 3.2 and their locations are shown on Figure A.1 (located in Appendix A). Table 3.1 summarizes the turbidity data, including percentages of values above the turbidity criterion of 25 NTU. Table 3.2 summarizes TSS data for the same water quality stations. Since there are no numerical criteria for TSS, there are no references to water quality standards in Table 3.2. The TSS data are included in this summary because TSS is needed as a surrogate parameter for expressing the turbidity TMDLs. These data were obtained from LDEQ.

Table 3.1. Turbidity data for subsegments 090106, 090201, 090202, and 090501.

	Station 64	**Station 65**	**Station 105**	**Station 1041**	**Station 1042**
Station Description	Bogue Chitto River near Bush, Louisiana	Bogue Chitto River at Franklinton, Louisiana	Pearl River (West) southeast of Slidell, Louisiana	Holmes Bayou at West Pearl River	West Pearl River upstream from Pearl River Barge Canal Lock No. 1
Subsegment	090501	090501	090202	090106	090201
Period of Record	3/6/1978 - 3/29/2006	5/1/1966 - 4/13/1998	3/7/1978 - 3/28/2006	1/2/2001 - 3/21/2006	1/2/2001 - 3/21/2006
No. of Values	284	420	325	14	14
Minimum (NTU)	2	1.8	3.2	20	15
Maximum (NTU)	110	136	80	170	140
Median (NTU)	12	25	24	38	35
No. Values > 25 NTU	50	206	138	12	11
% Values > 25 NTU	18%	50%	42%	86%	79%

Table 3.2. TSS data for subsegments 090106, 090201, 090202, and 090501.

	Station 64	Station 65	Station 105	Station 1041	Station 1042
Station Description	Bogue Chitto River near Bush, Louisiana	Bogue Chitto River at Franklinton, Louisiana	Pearl River (West) southeast of Slidell, Louisiana	Holmes Bayou at West Pearl River	West Pearl River upstream from Pearl River Barge Canal Lock No. 1
Subsegment	090501	090501	090202	090106	090201
Period of Record	3/6/1978 - 3/29/2006	5/1/1966 - 4/13/1998	3/7/1978 - 3/28/2006	1/2/2001 - 3/21/2006	1/2/2001 - 3/21/2006
No. of Values	263	291	311	14	14
Minimum (mg/L)	2	2	4	25.3	23
Maximum (mg/L)	128	446	4,258	200	216
Median (mg/L)	18	16	27.5	43	46.15

3.2 Long Term Patterns

Figures C.1-C.5 and Figures C.16-C.20 show time series plots of the TSS and turbidity data. No long term trends were noticeable at any of the stations. Although, the long term turbidity for station 105 (Pearl River (West) southeast of Slidell) does seem to show that observed turbidity after the late 1980s is smaller than those values before the late 1980s, this does not seem to be significant.

3.3 Seasonal Patterns

There were no seasonal patterns in the TSS data for any of the stations (Figures C.6 through C.10). Although the minimum TSS does seem to be a bit higher during the summer at station 105 (Figure C.8), the maximum TSS concentrations stay the same throughout the year.

However, the turbidity data (Figures C.21 through C.25) at the three long term stations do seem to show that higher turbidities are usually measured in the beginning of each year (the later part of winter) than in the rest of the year (including the early portion of winter). Neither the TSS nor the turbidity patterns are considered significant based on a visual analysis.

3.4 Relationships of Turbidity and TSS vs. Flow

Plots of turbidity and TSS versus estimated stream flow were also developed to examine any correlation between these water quality parameters and stream flow rates (Figures C.11 through C.15 and Figures C.26 through C.30). For the most part, these plots do not show a significant correlation between turbidity or TSS and stream flow.

3.5 Relationships Between TSS and Turbidity

Plots of TSS versus turbidity for each station (Figures C.31 through C.35) show a noticeable correlation, with higher turbidity values tending to correspond with higher TSS concentrations. Linear regressions were preformed on the natural logarithms of turbidity and TSS for each of the water quality stations. The results of these regressions are summarized in Table 3.3. The regressions were performed using the natural logarithms of the data (rather than the raw data values) because turbidity and TSS usually fit a lognormal distribution better than a normal distribution.

Table 3.3. Summary of results of turbidity and TSS regressions.

Sampling Station	Regression Equation	Number of Data	R^2	Significance Level (P value)
64	$Turbidity=1.7529*TSS^{0.6892}$	262	0.566	4.31×10^{-49}
65	$Turbidity=4.3077*TSS^{0.4236}$	290	0.285	9.99×10^{-23}
105	$Turbidity=13.679*TSS^{0.1576}$	310	0.056	2.58×10^{-5}
1041	$Turbidity=1.4409*TSS^{0.8572}$	14	0.767	4.09×10^{-5}
1042	$Turbidity=0.9797*TSS^{0.9427}$	14	0.887	4.86×10^{-7}

The strength of the linear relationship is measured by the coefficient of determination (R^2) calculated during the regression analysis (Zar 1996). The R^2 value is the percentage of the total variation in turbidity that is explained or accounted for by the fitted regression (TSS). For example, for station 1042, 89% of the variation in TSS is accounted for by turbidity and the remaining 11% of variation in turbidity is unexplained. The unexplained portion is attributed to factors other than TSS. The correlations between TSS and turbidity were somewhat variable, with R^2 values ranging from 0.056 (very poor) to 0.887 (good).

The statistical significance for each regression was evaluated by computing the "P value" for the slope for each regression. The P value is essentially the probability that the slope of the regression line is really zero. Thus, a low P value indicates that a non-zero slope calculated from the regression analysis is statistically significant. For these regressions, the P values were all less than 0.05, which is considered statistically significant.

4.0 TMDL DEVELOPMENT

4.1 Seasonality and Critical Conditions

EPA regulations at 40 CFR 130.7 require the determination of TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. Also, both Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to consider seasonal variations for meeting water quality standards. Therefore, the historical data and analyses discussed in Section 3.0 were used to evaluate whether there were certain flow conditions or certain periods of the year that could be used to characterize critical conditions.

For these TMDLs, no significant relationships were found between turbidity or TSS and estimated stream flow. Although turbidity and TSS values appeared to be slightly higher during the winter at some of the water quality stations, there was not enough data at these stations to confirm the pattern. Based on these analyses, the TMDLs in this report were not developed on a seasonal basis. The methodology used to develop these TMDLs (load duration curve) addresses a wide range of flow conditions.

4.2 Water Quality Targets

Turbidity is an expression of the optical properties in a water sample that cause light to be scattered or absorbed and is caused by suspended matter, such as clay, silt, finely divided organic and inorganic matter; soluble colored organic compounds; and plankton and other microscopic organisms (Standard Methods 1999). Turbidity cannot be expressed as a load as preferred for TMDLs. To achieve a load-based value, turbidity is often correlated with a surrogate parameter such as TSS that can be expressed as a load. For the turbidity TMDLs, the relationships between turbidity and TSS presented in Section 3.4 were used to develop target TSS concentrations (i.e., numeric endpoints for the TMDLs) for all of the stations except 105. Due to the low R^2 for station 105 (less than 0.06) its regression was not used. The criterion for station 105 was set equal to 31 mg/L because most of the upstream flow (more than 70%) in this subsegment will come from subsegment 090201 and it is unreasonable to assume that subsegment 090202 could meet a criterion lower than that of subsegment 090201 since there are no major inflows into the

Pearl River in subsegment 090202. The target TSS concentrations calculated from the turbidity criterion of 25 NTU are presented in Table 4.1.

Table 4.1. Target TSS concentrations for turbidity TMDLs.

Water Quality Station	Regression Equation	Subsegment	Turbidity Criterion	Target TSS Concentration
64	Turbidity=1.7529*TSS$^{0.6892}$	090501	25 NTU	47 mg/L
105	see note 1	090202	see note 1	31 mg/L
1041	Turbidity=1.4409*TSS$^{0.8572}$	090106	25 NTU	28 mg/L
1042	Turbidity=0.9797*TSS$^{0.9427}$	090201	25 NTU	31 mg/L

1. See Section 4.2 for a discussion of this target.

4.3 Methodology for TMDL Calculations

The methodology used for all of the TMDLs in the report is the load duration curve. Because loading capacity varies as a function of the flow present in the stream, these TMDLs represent a continuum of desired loads over all flow conditions, rather than fixed at a single value. The basic elements of this procedure are documented on the Kansas Department of Health and Environment (KDHE) web site (2005). This method was used to illustrate allowable loading at a wide range of flows. The steps for how this methodology is applied for the TMDLs in this report can be summarized as follows:

1. Develop a flow duration curve (Section 4.4).
2. Convert the flow duration curve to load duration curve (Section 4.5).
3. Plot observed loads with the load duration curves (Section 4.6).
4. Calculate the TMDL, MOS, FG, WLA, and LA (Sections 4.7 through 4.9).
5. Calculate percent reductions required to meet assessment criteria (Section 4.10).

4.4 Flow Duration Curve

A flow duration curve was developed for each subsegment. Daily streamflow measurements from the Pearl River at Pearl, Louisiana (USGS Gage Number 02492600) and the Bogue Chitto River near Bush, Louisiana (USGS Gage Number 02492000) were sorted in increasing order and the percentile ranking of each flow was calculated. Since the Pearl River flow gage was discontinued after 1970, flows at this gage were estimated from flows collected at the Pearl River near Bogalusa (USGS Gage Number 02489500). A ratio of the average flow at

the Pearl River near Pearl to the average flow at the Pearl River near Bogalusa during the overlapping period of record (1963-1970) was computed and then used to estimate flows for the Pearl River near Pearl using this ratio and the flow measured at the Pearl River near Bogalusa. Then the flow at the Pearl River gage was divided up into two flows, one for the flow in Holmes Bayou (27% of the total flow at the Pearl River gage) and one for the flow in the West Pearl River (73% of the flow at the Pearl River gage). These percentages were based on widths of Holmes Bayou and Pearl River measured from Digital Ortho Quarter Quads (DOQQs). The flows were estimated for the Pearl River gage because the load duration methodology requires that the same flow data be used for developing the flow duration as for calculating observed loads from sampling data.

4.5 Load Duration Curves

For each TMDL, the flows from the flow duration curves were multiplied by the appropriate TSS target concentration (from Section 4.2) to make an allowable load duration curve. Each load duration curve is a plot of pounds per day versus the percent exceedances from the flow duration curve. The load duration curves are presented in the following appendices:

APPENDIX D:	load duration curve for subsegment 090501 TSS
APPENDIX E:	load duration curve for subsegment 090201 TSS
APPENDIX F:	load duration curve for subsegment 090106 TSS
APPENDIX G:	load duration curve for subsegment 090202 TSS

The calculations for these load duration curves are shown in Tables D.1, E.1, F.1 and G.1. The load duration curve is beneficial when analyzing monitoring data with its corresponding flow information plotted as a load. This allows the monitoring data to be plotted in relation to its place in the flow continuum. Assumptions of the probable source or sources of the impairment can then be made from the plotted data.

The load duration curve shows the calculation of the TMDL at any flow rather than at a single critical flow. The official TMDL number is reported as a single number, but the curve is provided to demonstrate the value of the acceptable load at any flow. This will allow analysis of load cases in the future for different flow regimes.

4.6 Observed Loads

For each sampling station, observed loads were calculated by multiplying each observed concentration of TSS by the flow on the sampling day. These observed loads were then plotted versus the percent exceedances of the flow on the sampling day and placed on the same plot as the load duration curve. These plots are shown in the appendices of this report as follows:

Figure D.2:	plot of loads for TSS in subsegment 090501
Figure E.2:	plot of loads for TSS in subsegment 090201
Figure F.2:	plot of loads for TSS in subsegment 090106
Figure G.2:	plot of loads for TSS in subsegment 090202

These plots provide visual comparisons between observed and allowable loads under different flow conditions. Observed loads that are plotted above the load duration curve (identified as "TMDL" curve in the legend) represent conditions where observed water quality concentrations exceed the target concentrations. Observed loads below the load duration curve represent conditions where observed water quality concentrations were less than target concentrations (i.e., not violating water quality standards).

4.7 TMDL, MOS, and FG

Each TMDL was calculated as the area under the load duration curve. Both Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 require TMDLs to include a MOS to account for uncertainty in available data or in the actual effect that controls will have on the loading reductions and receiving water quality. The MOS may be expressed explicitly as unallocated assimilative capacity or implicitly through conservative assumptions used in establishing the TMDL. For these TMDLs an explicit MOS was established as 10% of the TMDL along with an implicit MOS assuming TSS is a conservative substance and does not settle out of the water column. In addition to the MOS, 10% of the TMDL was set aside for the FG component.

4.8 Point Source Loads

A complete list of all the point sources in all four subsegments is shown in Appendix B. However only a few of these point sources were included in the WLAs because most of the point sources discharge treated sanitary wastewater with TSS that is primarily organic rather than inorganic. The surrogate being used for turbidity (TSS) is considered to represent inorganic suspended solids (i.e., soil and sediment particles from erosion or sediment resuspension) rather than organic suspended solids such as TSS in treated sanitary wastewater. Discharges of TSS in treated sanitary wastewater are already addressed by LDEQ through their permitting of point sources to maintain water quality standards for dissolved oxygen.

Only subsegments 090202 and 090501 have WLAs because there are no point sources contributing inorganic TSS in the other two subsegments. Calculations for the WLAs are shown in the appendices as follows:

Table D.3:	WLA for TSS in subsegment 090501
Table G.3:	WLA for TSS in subsegment 090202

Runoff from areas within the City of Slidell is regulated by an MS4 permit (see Section 2.6) and is therefore classified as a point source. The allowable loading from the MS4 area was set to 26% of the allowable loading for subsegment 090202 because the MS4 area covers 26% of the subsegment.

4.9 Nonpoint Source Loads

For each of the TMDLs in this report, the LA for nonpoint sources was set equal to the TMDL minus the MOS, FG, and the WLA. Calculations for the TMDLs and their individual components are shown in the appendices as follows:

Table D.2:	calculations for TSS for subsegment 090501
Table E.2:	calculations for TSS for subsegment 090201
Table F.2:	calculations for TSS for subsegment 090106
Table G.2:	calculations for TSS for subsegment 090202

4.10 Percent Reductions

In addition to calculating allowable loads, estimates were made for percent reductions of point and nonpoint source loads that would be needed for all of the observed loads to be on or below the "TMDL - FG - MOS" line on the graphs (this line takes into account the MOS and FG components of the TMDL). The observed loads of TSS at each sampling station were reduced until none of the loads were above "TMDL - FG - MOS" line. The results of these percent reduction calculations are shown below in Table 4.2. Since the point source loads are negligible (subsegments 090501 and 090202) or zero (subsegments 090106 and 090201) these percent reductions should be considered a nonpoint source reduction.

Table 4.2. Summary of turbidity TMDLs.

Subsegment	Stream Name	Loads (tons/day of TSS)					Percent Reduction Needed
		WLA	LA	MOS	FG	TMDL	
090501	Bogue Chitto River	0.12	203.4	25.4	25.4	254.3	66%
090201	West Pearl River	0	693.9	86.7	86.7	867.3	89%
090106	Holmes Bayou	0	231.7	29.0	29.0	289.7	89%
090202	West Pearl River	311.205	646.3	119.7	119.7	1196.9	78%

5.0 OTHER RELEVANT INFORMATION

This TMDL has been developed to be consistent with the State antidegradation policy (LAC 33:IX.1109.A).

LDEQ will work with other agencies such as local Soil Conservation Districts to implement nonpoint source best management practices in the watershed through the 319 programs. LDEQ will also continue to monitor the waters to determine whether standards are being attained.

In accordance with Section 106 of the federal Clean Water Act, and under the authority of the Louisiana Environmental Quality Act, the LDEQ has established a comprehensive program for monitoring the quality of the State's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the State's surface waters, to develop a long-term data base for water quality trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program is used to develop the State's biennial 305(b) report (Water Quality Inventory) and the 303(d) list of impaired waters. This information is also utilized in establishing priorities for the LDEQ nonpoint source program.

The LDEQ has implemented a watershed approach to surface water quality monitoring. Through this approach, the entire state is sampled over a 4-year cycle. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the 4-year cycle. Sampling is conducted on a monthly basis to yield approximately 12 samples per site each year the site is monitored. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, approximately one half of the State's waters are newly assessed for each 305(b) and 303(d) listing biennial cycle, with sampling occurring statewide each year. The 4-year cycle follows an initial 5-year rotation that covered all basins in the state according to the TMDL priorities. This will allow the LDEQ to determine whether there has been any improvement in water quality

following implementation of the TMDLs. As the monitoring results are evaluated at the end of each year, waterbodies may be added to or removed from the 303(d) list.

Hurricane Katrina made landfall on Monday, August 29, 2005 as a Category 4 hurricane with the center of the storm passing through the Pearl River basin. The storm brought heavy winds and rain to southeast Louisiana, causing much flooding and washing large amounts of debris into waterbodies throughout the Pearl River basin in Louisiana (not just along the coast). Some of the coastal areas that were flooded in Hurricane Katrina were re-flooded by the storm surge from Hurricane Rita. Both Hurricanes Katrina and Rita have caused a significant amount of change in water quality in south Louisiana. Many wastewater treatment facilities were temporarily or permanently damaged. Some wastewater treatment facilities will rebuild while others will relocate. Observations and field data collection by LDEQ and other organizations have shown that the wildlife and fisheries in the Pearl River basin were significantly impacted by the hurricanes. The hurricanes expedited the loss of coastal land and modified the hydrology of some of the coastal water bodies. Several federal and state agencies including the Environmental Protection Agency (EPA) and LDEQ are engaged in collecting environmental data and assessing the recovery of the Gulf of Mexico waters. Most of the data used to develop the TMDLs in this report were collected prior to these hurricanes. Therefore, the post-hurricane conditions and other factors may require modifications of these TMDLs prior to their implementation. Any deviation from implementation of these TMDLs should be justified based on site-specific data and/or information.

6.0 PUBLIC PARTICIPATION

Federal regulations require EPA to notify the public and seek comment concerning TMDLs it prepares. The TMDLs in this report were developed under contract to EPA, and EPA held a public review period seeking comments, information, and data from the public and any other interested parties. The notice for the public review period was published in the Federal Register on February 1, 2008, and the review period closed on March 3, 2008.

General and specific comments were received from LDEQ during the public review period. Some of the specific comments addressed TMDLs in other reports. The specific comments addressing this report and all of the general comments are shown in Appendix H of this report. EPA's responses to the comments are also shown in Appendix H.

EPA will submit the final version of these TMDLs to LDEQ for implementation and incorporation into LDEQ's current water quality management plan.

7.0 REFERENCES

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APPENDIX A

Maps

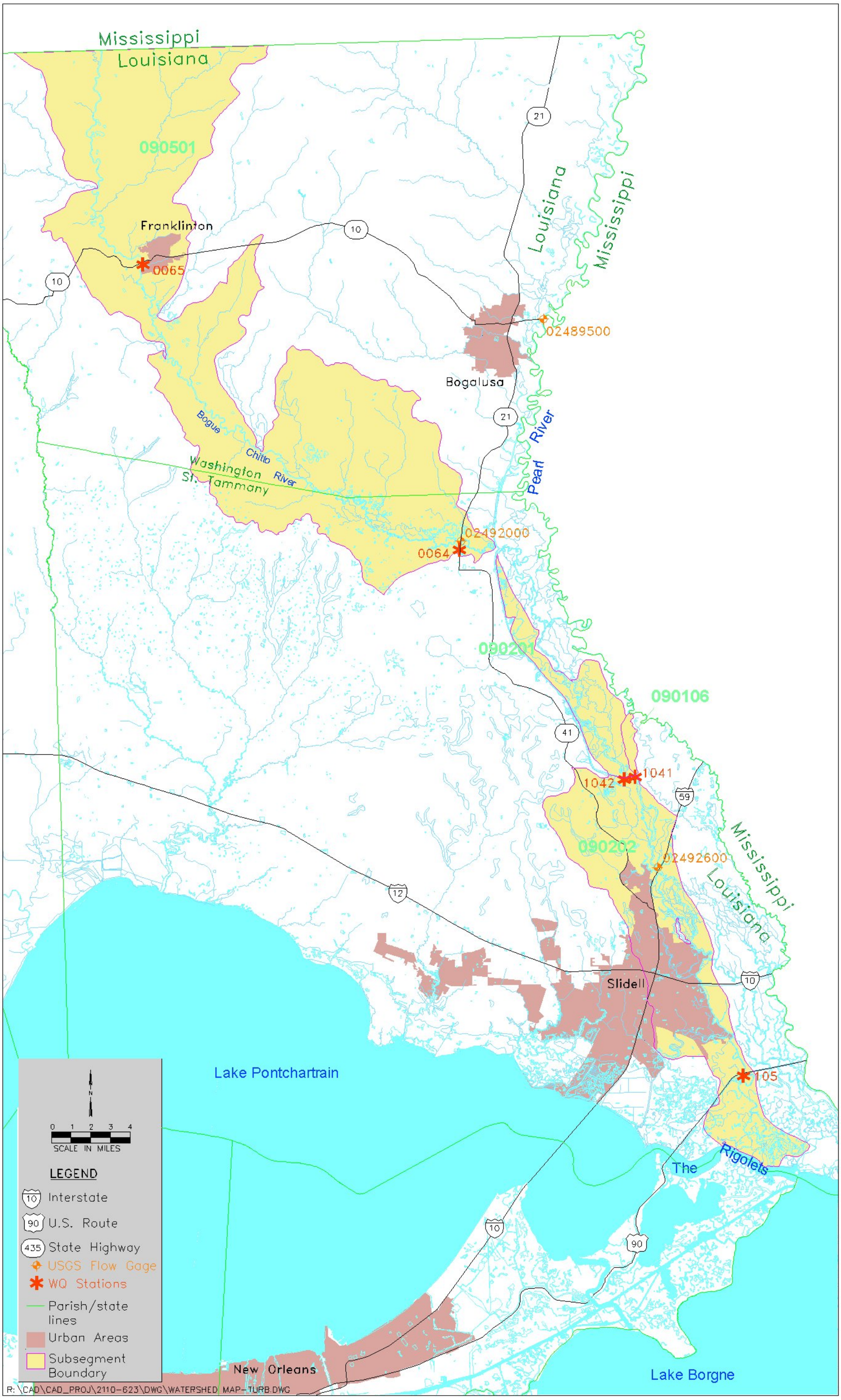


Figure A.1. General map for subsegments impaired for turbidity in the Pearl River basin.

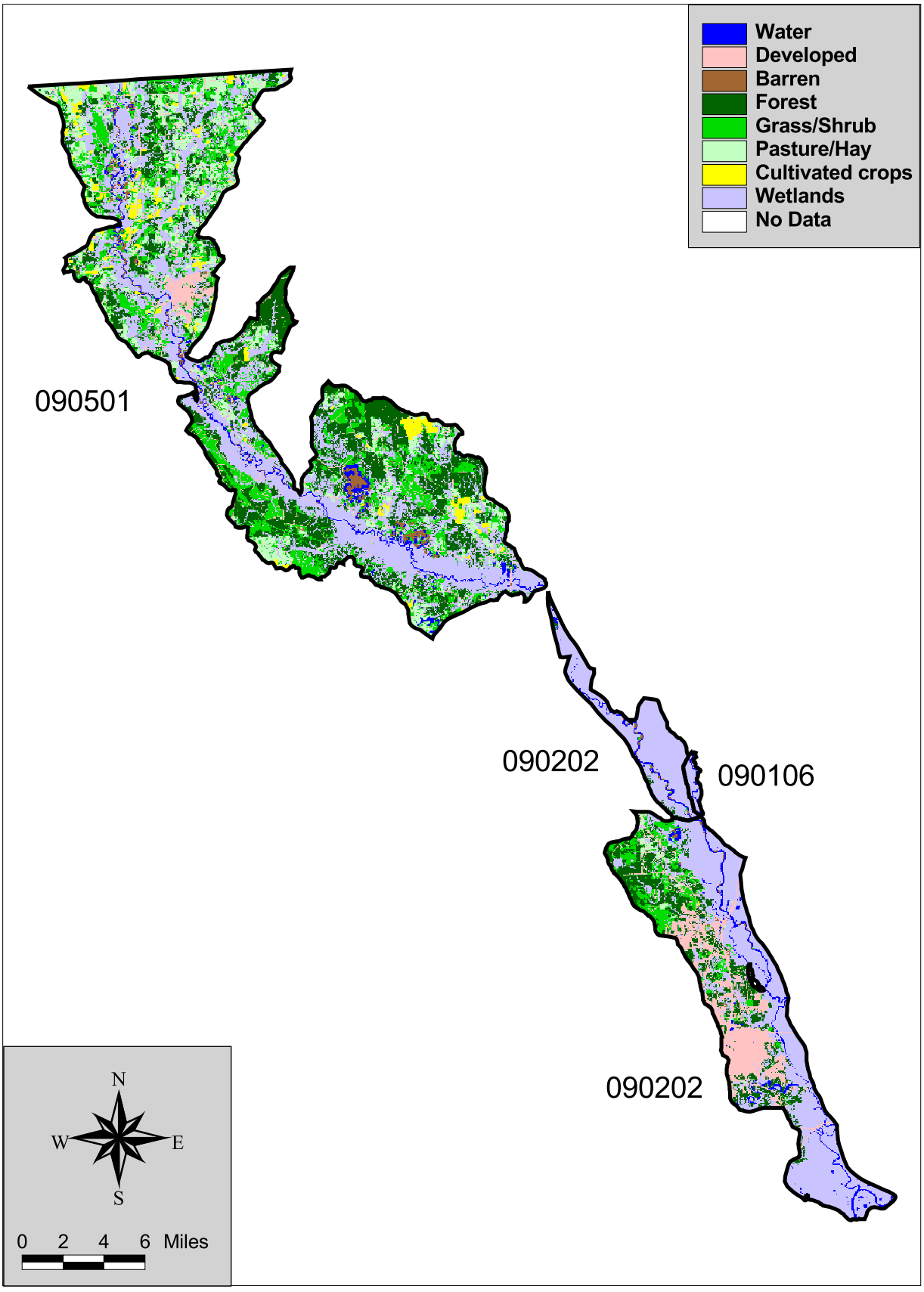


Figure A.2. Land use map for subsegments impaired for turbidity in the Pearl River basin.

APPENDIX B

Point Source Data

Table B.1. Point sources in turbidity impaired subsegments in the Pearl River basin.

Subsegment	Permit Number	AI Number	Facility Name	Receiving Stream	Outfall	Outfall type	Flowrate	Flow Type	TSS Permit Limit (mg/L)	TSS Permit Type	Included in TMDL?
90201	LAG531444	114015	AmSouth Bank-AmSouth Bank of Slidell LA Branch	Pearl River Basin	001	Treated Sanitary Wastewater	160	avg flow (GPD)	45	wkly avg	No
90202	LAR05N644	128705	Coastal Marine Contractors-Slidell Facility	Oyster Factory Canal	001	Stormwater Runoff	unknown				Yes
90202	LA0048941	19826	Cross Gates Utility Co.	West Pearl River	001	Treated Sanitary Wastewater	0.9	exp flow (MGD)	15, 23	mthly avg, wkly avg	No
					002	Treated Sanitary Wastewater	0.0325	exp flow (MGD)			No
					003	Treated Sanitary Wastewater	0.139	exp flow (MGD)			No
90202	LA0050351	19300	Resolve Systems Inc.-Whisperwood Northwood Sub	West Pearl River	001	Treated Sanitary Wastewater	0.54	exp flow (MGD)	23	wkly avg	No
90202	LA0051179	19472	Louisiana Water Service, Inc.-Magnolia Forest	West Pearl River	001	Treated Sanitary Wastewater	0.23	exp flow (MGD)	15, 23	mthly avg, wkly avg	No
90202	LA0065731	80577	Louisiana Water Service, Inc.-Qual Ridge Sub.	West Pearl River	001	Treated Sanitary Wastewater	0.254	exp flow (MGD)			No
90202	LA0065757	19473	LA Water Service-Lake Village Subdivision	West Pearl River	001	Treated Sanitary Wastewater	0.278	exp flow (MGD)	15, 23	mthly avg, wkly avg	No
90202	LA0075086	52399	Total Environmental Solutions	West Pearl River	001	Treated Sanitary Wastewater	0	avg flow (GPD)	15, 23	mthly avg, wkly avg	No
90202	LA0075329	19340	Pear River Town of -STP	West Pearl River	001A	Treated Sanitary Wastewater	0.338	exp flow (MGD)	15, 20	mthly avg	No
90202	LA0106372	24671	Durward Dunn Inc Slidell LA Yard	Local drainage then to West Pearl River	001	Treated Sanitary Wastewater	75	avg flow (GPD)	45	dly max	No
					002	Dry dock ballast	6250	exp flow (MGD)	no TSS limit		No
					003	Equipment Washwater	480	exp flow (MGD)	45	dly max	Yes
90202	LAG110079	43413	Standard Materials	French Branch	001	Process Wastewater & Stormwater (Concrete/Cement)	unknown		50	wkly avg	Yes
					002	Process Area Stormwater (Hot Mix Asphalt)	unknown		45	wkly avg	Yes
					003	Stormwater and Aggregate Spray from Sand & Unloading	unknown		no TSS limit		No
					004	Nonprocess Area Stormwater from Cement/Concrete	unknown		no TSS limit		No
					005	Treated Sanitary Wastewater	300	avg flow (GPD)	45	wkly avg	No
					006	Washrack Wastewater	500	avg flow (GPD)	45	wkly avg	Yes
90202	LAG470018	26048	Craig's Automotive Center	?	001	Treated Sanitary Wastewater	225	avg flow (GPD)			No
90202	LAG470208	40654	Automotive Center of Slidell	Ditch to Doubloon Bayou to Pearl River	005	Treated Sanitary Wastewater	5000	max flow (GPD)	45	wkly avg	No
90202	LAG480062	33846	Griffin Crane & Steel Service Inc.	Fritchie Marsh	001	Treated Sanitary Wastewater	500	avg flow (GPD)	45	wkly avg	No
					002	Equipment and exterior vehicle washwater	200	avg flow (GPD)	45	dly max	Yes
90202	LAG480526	81804	Kabco of LA LLC	West Pearl River	001	Treated Sanitary Wastewater	500	avg flow (GPD)	45	wkly avg	No
90202	LAG530233	41684	Eddie Reso's Gymnastics Plus Inc.	West Pearl River	001	Treated Sanitary Wastewater	560	avg flow (GPD)	45	dly max	No
90202	LAG530259	41892	Indian Village Garden Homes	West Pearl River	001	Treated Sanitary Wastewater	3000	avg flow (GPD)	45	dly max	No
90202	LAG530410	42787	Pearl Plantation Townhomes	West Pearl River	001	Treated Sanitary Wastewater	4500	avg flow (GPD)	45	dly max	No
90202	LAG530660	43249	Slidell Welding Service Inc.	?	001	Treated Sanitary Wastewater	5000	max flow (GPD)	45	wkly avg	No
90202	LAG530692	41245	Pearl Acres Pediatrics LLC	French Branch	001	Treated Sanitary Wastewater	2500	avg flow (GPD)	45	wkly avg	No
90202	LAG530698	40599	Military Road Chevron	Pearl River	001	Treated Sanitary Wastewater	2540	avg flow (GPD)	45	wkly avg	No
90202	LAG530768	41367	Retail Office Development	French Branch	001	Treated Sanitary Wastewater	120	avg flow (GPD)	45	wkly avg	No
90202	LAG530867	35353	Faust Veterinary Hospital	Pearl River Basin	001	Treated Sanitary Wastewater	200	avg flow (GPD)	45	wkly avg	No
90202	LAG530891	42336	Lowe Eddifice	French Branch	001	Treated Sanitary Wastewater	5000	max flow (GPD)	45	wkly avg	No
90202	LAG530913	41721	Han's Repair Service, Inc.	Rigolets	001	Treated Sanitary Wastewater	160	avg flow (GPD)	45	wkly avg	No
90202	LAG530957	40425	Abundant Life UPC	Pearl River	001	Treated Sanitary Wastewater	500	avg flow (GPD)	45	wkly avg	No
90202	LAG530976	41586	Two Sisters Billiards	French Branch	001	Treated Sanitary Wastewater	665	avg flow (GPD)	45	wkly avg	No
90202	LAG531050	83632	Amber Associates LLC	?	001	Treated Sanitary Wastewater	5000	max flow (GPD)	45	wkly avg	No
90202	LAG531103	86482	Bennett Christian Inc.	Pearl River Basin	001	Treated Sanitary Wastewater	240	avg flow (GPD)	45	wkly avg	No
90202	LAG531151	36291	Family Dentistry	Pearl River Basin	001	Treated Sanitary Wastewater	580	avg flow (GPD)	45	wkly avg	No
90202	LAG531250	93653	Bus Group Inc.	West Pearl River	002	Treated Sanitary Wastewater	60	avg flow (GPD)	45	wkly avg	No
90202	LAG531256	94718	Eagle Sanctuary LLC & Pearl River Eco Tours	Pearl River Basin	001	Treated Sanitary Wastewater	40	avg flow (GPD)	45	wkly avg	No
90202	LAG531279	52283	Jim's Feed Seed & Hardware	Pearl River Basin	001	Treated Sanitary Wastewater	100	avg flow (GPD)	45	wkly avg	No
90202	LAG531295	94288	Graham Cabinets Inc.	Pearl River Basin	001	Treated Sanitary Wastewater	5000	Flow cap (GPD)	45	wkly avg	No
				Pearl River Basin	002	Treated Sanitary Wastewater	5000	Flow cap (GPD)	45	wkly avg	No
90202	LAG531343	98464	St. Tammany Federal Credit Union	Pearl River Basin	001	Treated Sanitary Wastewater	100	avg flow (GPD)	45	wkly avg	No
90202	LAG531351	87117	Heartwood Lumber Co Inc.	Pearl River	001	Treated Sanitary Wastewater	300	avg flow (GPD)	45	wkly avg	No
90202	LAG531418	103368	GLBJ LLC Dunaway Office-Retail Center-Chinese	Pearl River Basin	001	Treated Sanitary Wastewater	300	avg flow (GPD)	45	wkly avg	No
90202	LAG531506	116570	Daiquiri's Now	Pearl River Basin	001	Treated Sanitary Wastewater	800	avg flow (GPD)	45	wkly avg	No
90202	LAG531559	52385	Uniservice American LLC	West Pearl River	001	Treated Sanitary Wastewater	140	avg flow (GPD)	45	wkly avg	No
90202	LAG531563	102053	St Tammany Fire Protection District #1-Fire St	Pearl River Basin	001	Treated Sanitary Wastewater	500	avg flow (GPD)	45	wkly avg	No
90202	LAG531575	120303	Cajun Encounters Swamp Tours	West Pearl River	001	Treated Sanitary Wastewater	100	avg flow (GPD)	45	wkly avg	No
90202	LAG531681	123009	Parr Prosthetics Labs	West Pearl River	001	Treated Sanitary Wastewater	180	avg flow (GPD)	23	wkly avg	No
90202	LAG531874	24626	Military Road Commercial Property LLC-Auto Exc	Pearl River Basin	001	Treated Sanitary Wastewater	40	exp flow (GPD)	45	wkly avg	No

Subsegment	Permit Number	AI Number	Facility Name	Receiving Stream	Outfall	Outfall type	Flowrate	Flow Type	TSS Permit Limit (mg/L)	TSS Permit Type	Included in TMDL?
90202	LAG531887	121566	Don Wolsefer Office Warehouse	West Pearl River	001	Treated Sanitary Wastewater	140	avg flow (GPD)	45	wkly avg	No
90202	LAG531940	121481	The Lion's Den Karate Academy	Pearl River Basin	001	Treated Sanitary Wastewater	900	avg flow (GPD)	45	wkly avg	No
90202	LAG541284	122729	Cross Gates Utility Co.-Taylor Trace	West Pearl River	001	Treated Sanitary Wastewater	24000	avg flow (GPD)	45	wkly avg	No
90202	LAG541323	121011	Lazy Wheels Trailer Park	Pearl River Basin	001	Treated Sanitary Wastewater	7500	avg flow (GPD)	45	wkly avg	No
90202	LAG570014	41146	Country Club Mobile Home Park	West Pearl River	001	Treated Sanitary Wastewater	28000	avg flow (GPD)	15, 23	mthly avg, wkly avg	No
90202	LAG570015	41184	St. Tammany Parish Government-Meadow Lake Sewa	Pearl River	001	Treated Sanitary Wastewater	50000	avg flow (GPD)	15, 23	mthly avg, wkly avg	No
					002	Treated Sanitary Wastewater	50000	avg flow (GPD)	15, 23	mthly avg, wkly avg	No
90202	LAG570028	19495	LADOTD-Slidell Rest Area	Pearl River	001	Treated Sanitary Wastewater	15000	avg flow (GPD)	45	dly max	No
90202	LAG570033	19468	LA Water Service Inc.-Village Acadian Subdivsi	Pearl River	001	Treated Sanitary Wastewater	17075	exp flow (GPD)	15, 23	mthly avg, wkly avg	No
90202	LAG570037	22161	Lee Lou Enterprises Inc.	?	001	Treated Sanitary Wastewater (Mobile Home Park)	unknown		15, 23	mthly avg, wkly avg	No
90202	LAG570053	19256	Southern Manor Mobile Home Park	Ditch to Gum Bayou	001	Treated Sanitary Wastewater	24600	avg flow (GPD)	15, 23	mthly avg, wkly avg	No
90202	LAG570059	43405	Boyet Junior High School	Pearl River Basin	001	Treated Sanitary Wastewater	37000	avg flow (GPD)	15, 23	mthly avg, wkly avg	No
90202	LAG570067	43466	Tammany Mobile Home Park	Pearl River Basin	001	Treated Sanitary Wastewater	45600	avg flow (GPD)	15, 23	mthly avg, wkly avg	No
90202	LAG570203	87879	Northlake Environmenal Engineering Services, I	West Pearl River	001	Treated Sanitary Wastewater	60000	exp flow (GPD)	15, 23	mthly avg, wkly avg	No
90202	LAG570238	115892	Southeastern LA Water & Sewer Co LLC-St Joe ST	Lake Borgne	001	Treated Sanitary Wastewater	26500	exp flow (GPD)	15, 23	mthly avg, wkly avg	No
90202	LAG750020	43393	St. Tammany Parish Police Jury-Fritchie Mainte	West Pearl River	001	Treated Sanitary Wastewater	unknown		45	dly max	No
90202	LAG750516	128426	LCW Properties LLC	Fritchie Marsh	001	Exterior Vehicle and Equipment Wash Wastewater	140	avg flow (GPD)	45	dly max	Yes
90202	LAG480526	81804	KABCO of Louisiana LLC	?	001	Treated Sanitary Wastewater (from trucking co. site)	500	exp flow (GPD)	45	wkly avg	No
90202	GP7499	86943	COOPERS SEPTIC TANK SERVICE	WEST PEARL		Ponds that receive and contain septic tank waste	unknown				No
90202	LAG531252	43393	ST TAMMANY PARISH GOVERNMENT	?	003	Treated Sanitary Wastewater	240	avg flow (GPD)	45	wkly avg	No
90202	LAG570032	80577	LA WATER SERVICE INC	DITCH-W P	001	Treated Sanitary Wastewater	unknown		15, 23	mthly avg, wkly avg	No
90202	LAG750414	5855	EXXONMOBIL CORP	French Branch	001	Exterior Vehicle and Equipment Wash Wastewater	4240	avg flow (GPD)	45	dly max	Yes
90202	LAG530501	26554	Bellsouth Communications Inc J2831	Pearl River	001	Treated Sanitary Wastewater	100	exp flow (GPD)	45	wkly avg	No
90202	LAG530695	43968	Outland Technology	Salt Bayou	001	Treated Sanitary Wastewater	120	exp flow (GPD)	45	wkly avg	No
90202	LAG530797	41349	Ed's Electrical Service	French Branch	001	Treated Sanitary Wastewater	140	avg flow (GPD)	45	wkly avg	No
90202	LAG531196	92109	Dufour's Kitchen	Pearl River Basin	001	Treated Sanitary Wastewater	100	avg flow (GPD)	45	wkly avg	No
90202	LAG531257	96544	Rendon Mobile Home Park	Pearl River Basin	001	Treated Sanitary Wastewater	2000	avg flow (GPD)	45	wkly avg	No
90202	LAG531310	101111	Prisma Enterprises LLC-Children's International	West Pearl River	001	Treated Sanitary Wastewater	100	exp flow (GPD)	45	wkly avg	No
90202	LAG531881	124927	Discount Tire	French Branch	001	Treated Sanitary Wastewater	20	exp flow (GPD)	45	wkly avg	No
90202	LAG540404	42070	Kteri Apts	West Pearl River	001	Treated Sanitary Wastewater	2160	avg flow (GPD)	30, 45	mthly avg, wkly avg	No
90501	LAG110160	132663	Covington Paving Co.	Bogue Chitto River	002B	Stormwater Discharges from Process Area	unknown		45	dly max	Yes
				Bogue Chitto River	002C	Stormwater Discharges from Process Area	unknown		45	dly max	Yes
				Bogue Chitto River	002D	Stormwater Discharges from Process Area	unknown		45	dly max	Yes
				Bogue Chitto River	002E	Stormwater Discharges from Process Area	unknown		45	dly max	Yes
				Bogue Chitto River	006	Washrack and Shopfloor Washdown Wastewater	unknown		45	dly max	Yes
90501	LAG110089	26176	Covington Paving Co.	Bogue Chitto River	001	Process Area Stormwater Discharges	unknown		45	dly max	Yes
				Bogue Chitto River	002	NonProcess Area Stormwater from Hotmix asphalt/con	unknown		no TSS limit		No
90501	LAG480093	85773	STATE OF LA MILITARY DEPT (Co. B 205th Engr. Batta	Ditch to Bogue Chitto	001	Exterior Vehicle Washwater	45600	exp flow (GPD)	45	dly max	Yes
90501	LAG490027	84204	TXI-Isbel Sand & Gravel	Talleys Creek	001	Wastewater and Process Area Stormwater	unknown		50	dly max	Yes
90501	LAR05M698	86897	BARRIERE CONSTRUCTION CO LLC	?		Stormwater Runoff	unknown				No
90501	LA0007889	2185	Dairy Farmers of America	?	001	Dairy Processing Waters	0.307	avg flow (MGD)	88.4 lbs/day, 205 lbs/day	mthly avg, dly max	No
					002	Continuous Discharge of Non-Contact Cooling Water	0.062	avg flow (MGD)	no TSS limit		No
90501	LA0038831	19627	Franklinton Town of - Wastewater Treatment Facility	?	001	Treated Sanitary Wastewater	0.74	avg flow (MGD)	15, 23	mthly avg, wkly avg	No
90501	LAG110055	9481	Thigpen Concrete Materials Inc.	?	001	Process Wastewater and Process Area Stormwater	unknown		50	dly max	Yes
					002	Stormwater and Aggregate Spray from Sand & Unloading	unknown		45	dly max	Yes
90501	LAG531039	2555	Southern Natural Gas-Franklinton Station	Bogue Chitto River	001	Treated Sanitary Wastewater	700	avg flow (GPD)	45	wkly avg	No
90501	LAG531498	115945	Dollar General Store	Bogue Chitto River	001	Treated Sanitary Wastewater	120	avg flow (GPD)	45	wkly avg	No
90501	LAG570062	43402	Fifth Ward Junior High School	Bogue Chitto River	001	Treated Sanitary Wastewater	12300	exp flow (GPD)	15, 23	mthly avg, wkly avg	No
90501	LAR05N050	90370	A-1 Sand & Gravel LLC	?	001	Stormwater Runoff	May 2001 NOI says that no stormwater is discharged.				No
90501	LAG490019	19488	Sun Minerals, LLC (located near Sun, LA)	Local drainage then to Bogue Chitto River	001	Process Wastewater and Process Area Stormwater	unknown		25, 45	mthly avg, dly max	Yes
					004	Treated Sanitary Wastewater	5000	max flow (GPD)	45	dly max	No

FILE: R:\PROJECTS\2110-623\TECH\NPDES\FINAL PEARL TSS FAC REVISED APR2008.XLS

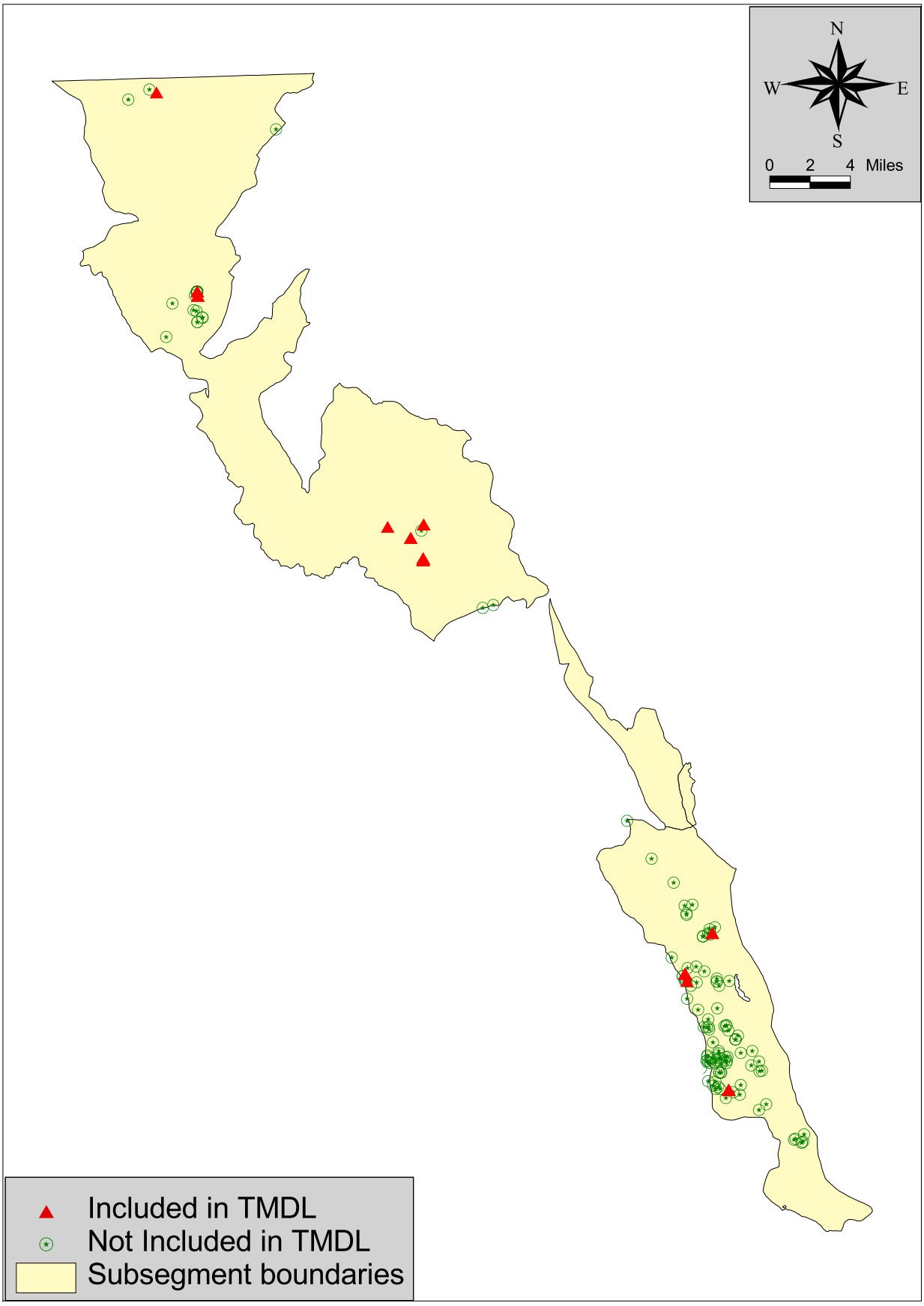


Figure B.1. Point sources in subsegments impaired for turbidity in the Pearl River basin.

APPENDIX C

Plots of Turbidity and TSS

Figure C.1. Time series plot of TSS for Bogue Chitto River near Bush, LA (LDEQ 64)

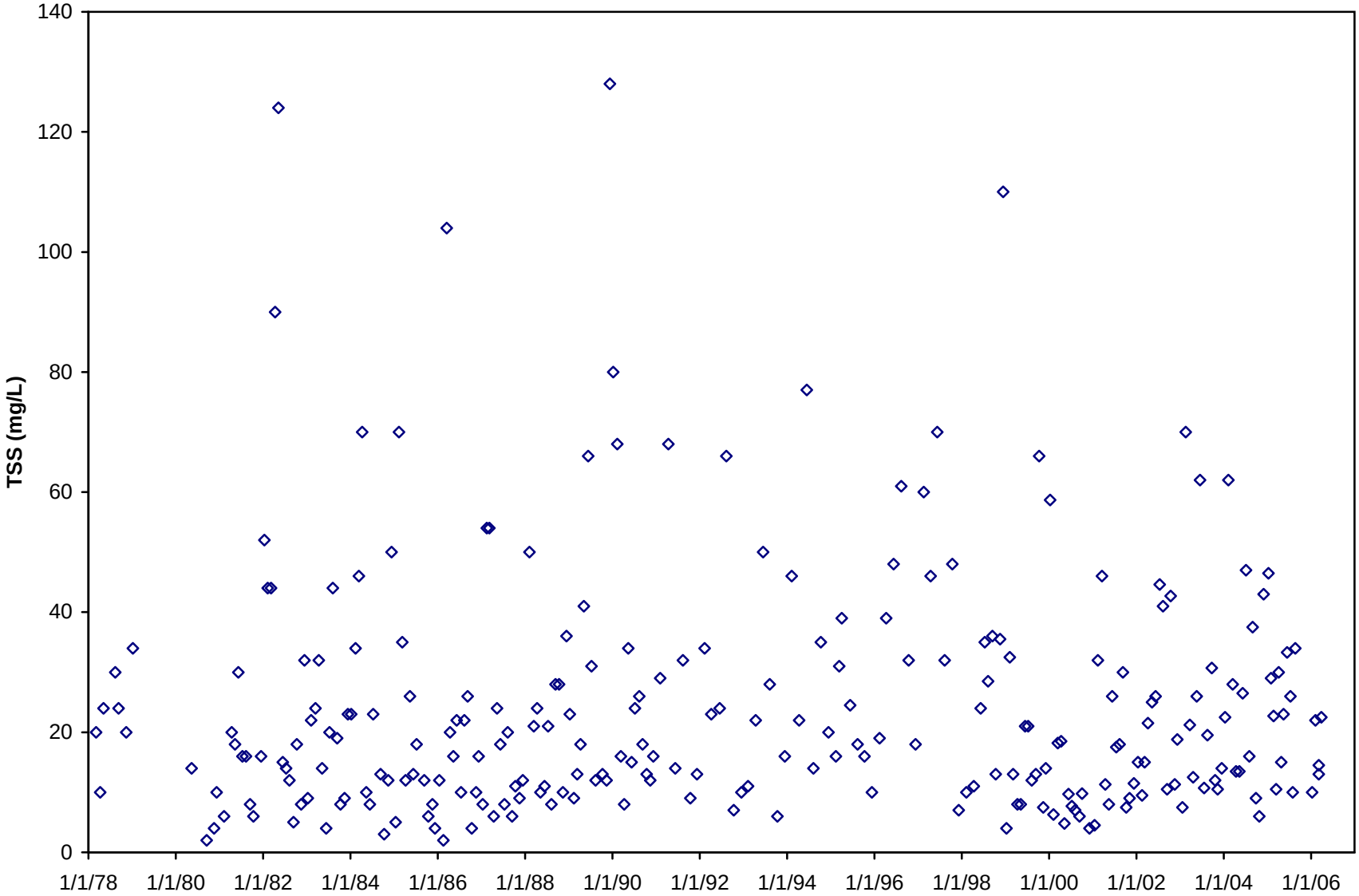


Figure C.2. Time series plot of TSS for Bogue Chitto River near Franklinton, LA (LDEQ 65)

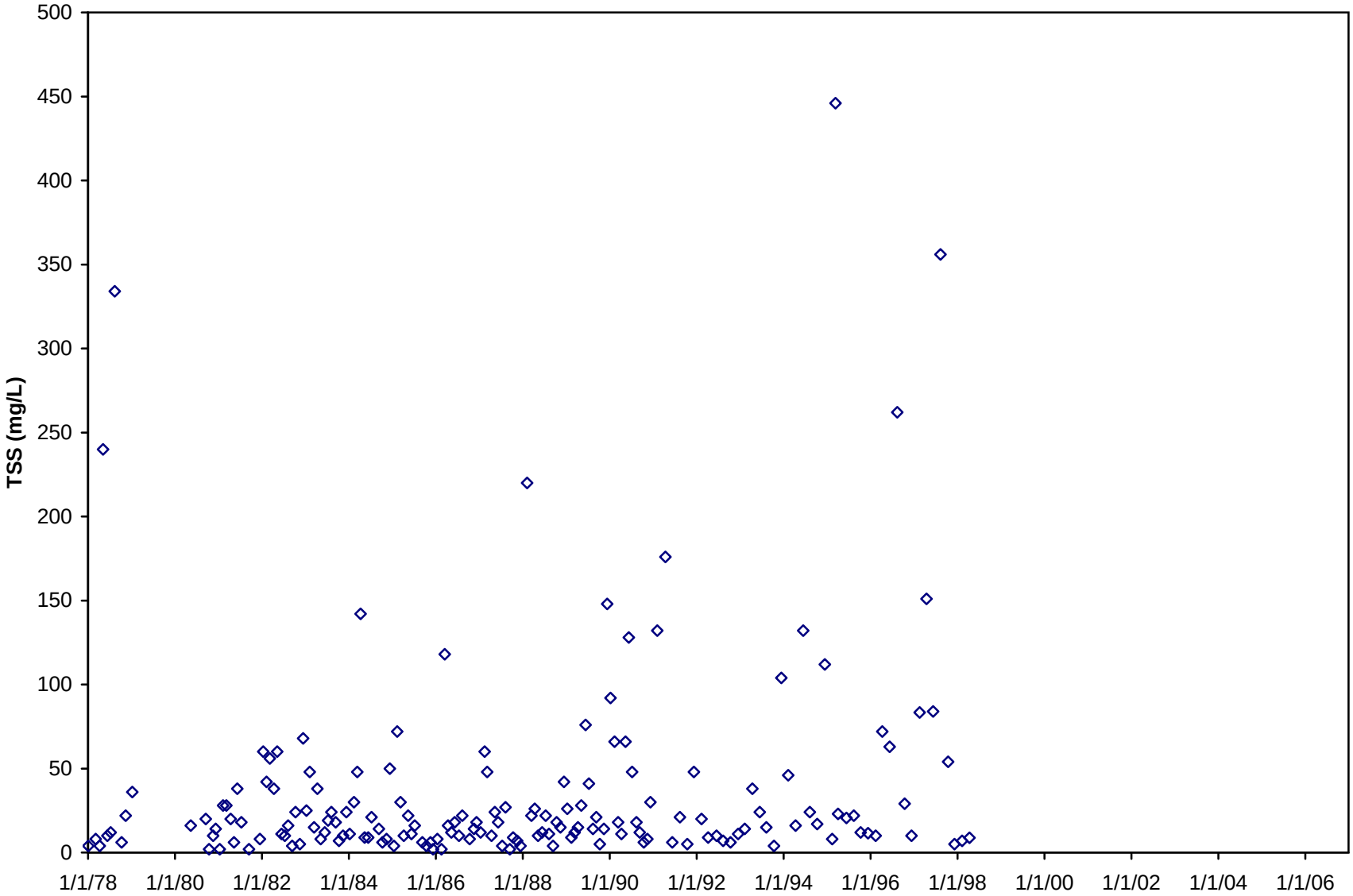


Figure C.3. Time series plot of TSS for West Pearl River SE of Slidell, LA (LDEQ 105)

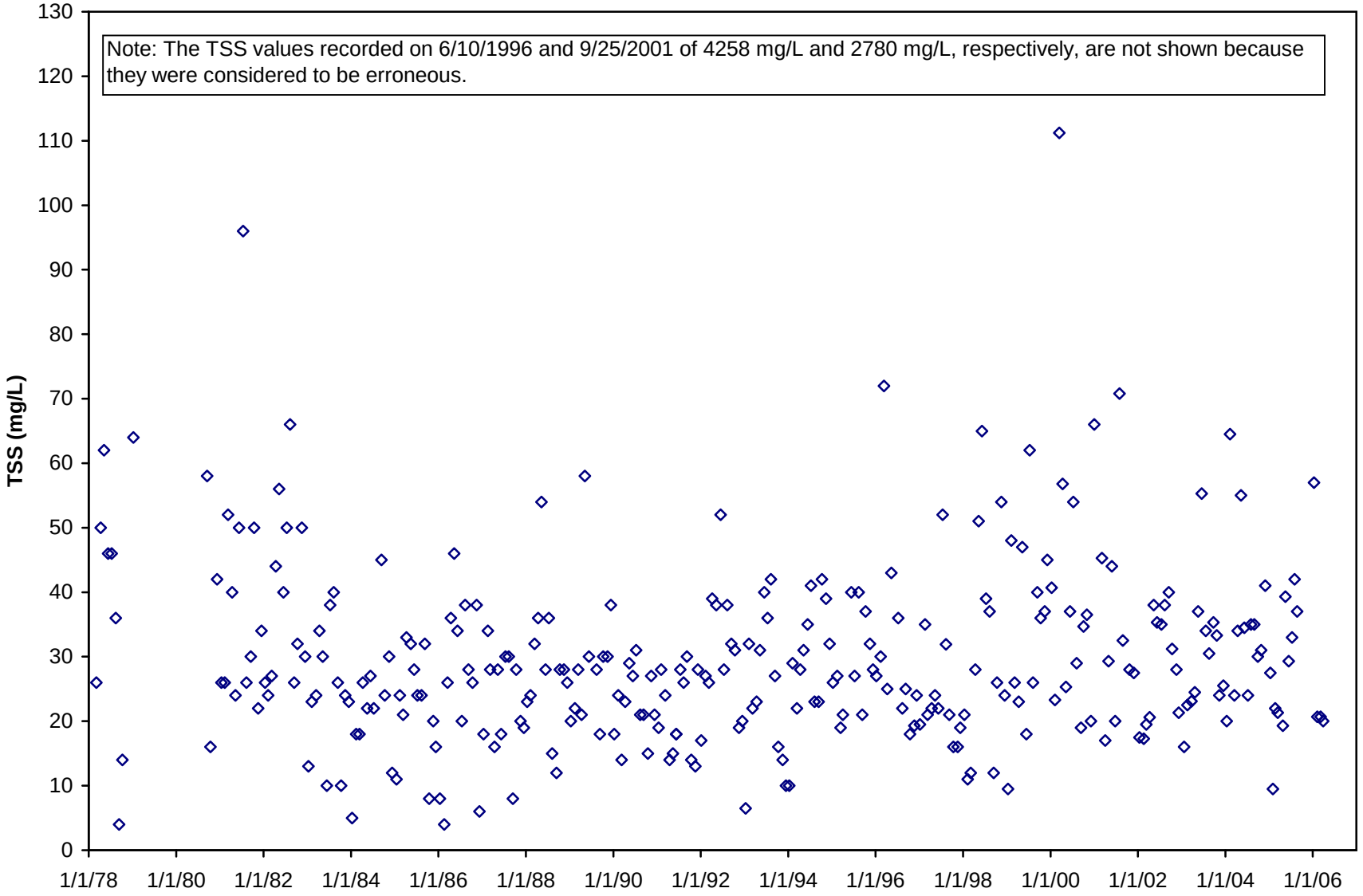


Figure C.4. Time series plot of TSS for Holmes Bayou (LDEQ 1041)

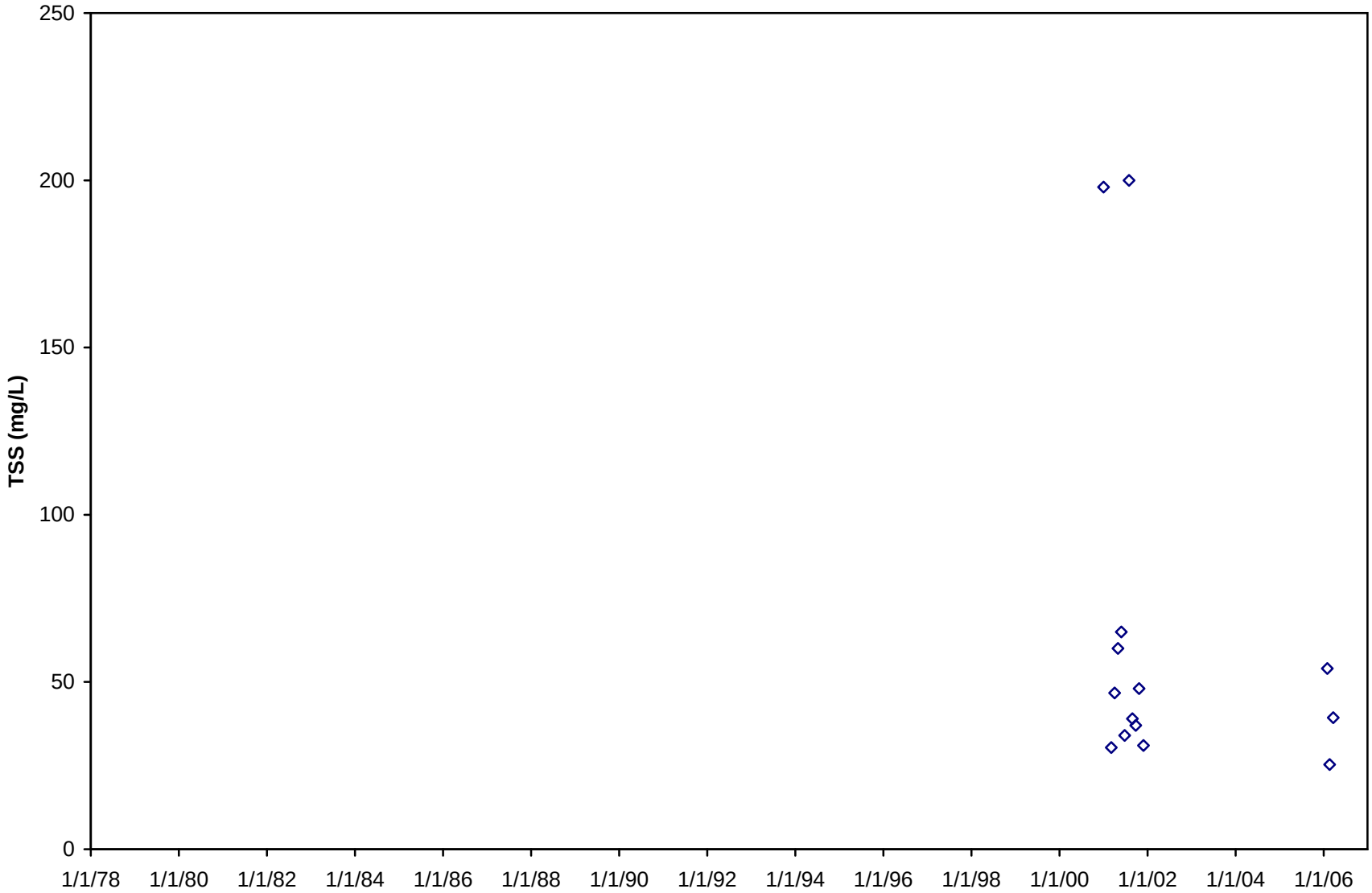


Figure C.5. Time series plot of TSS for West Pearl River upstream of Pearl River Barge Canal (LDEQ 1042)

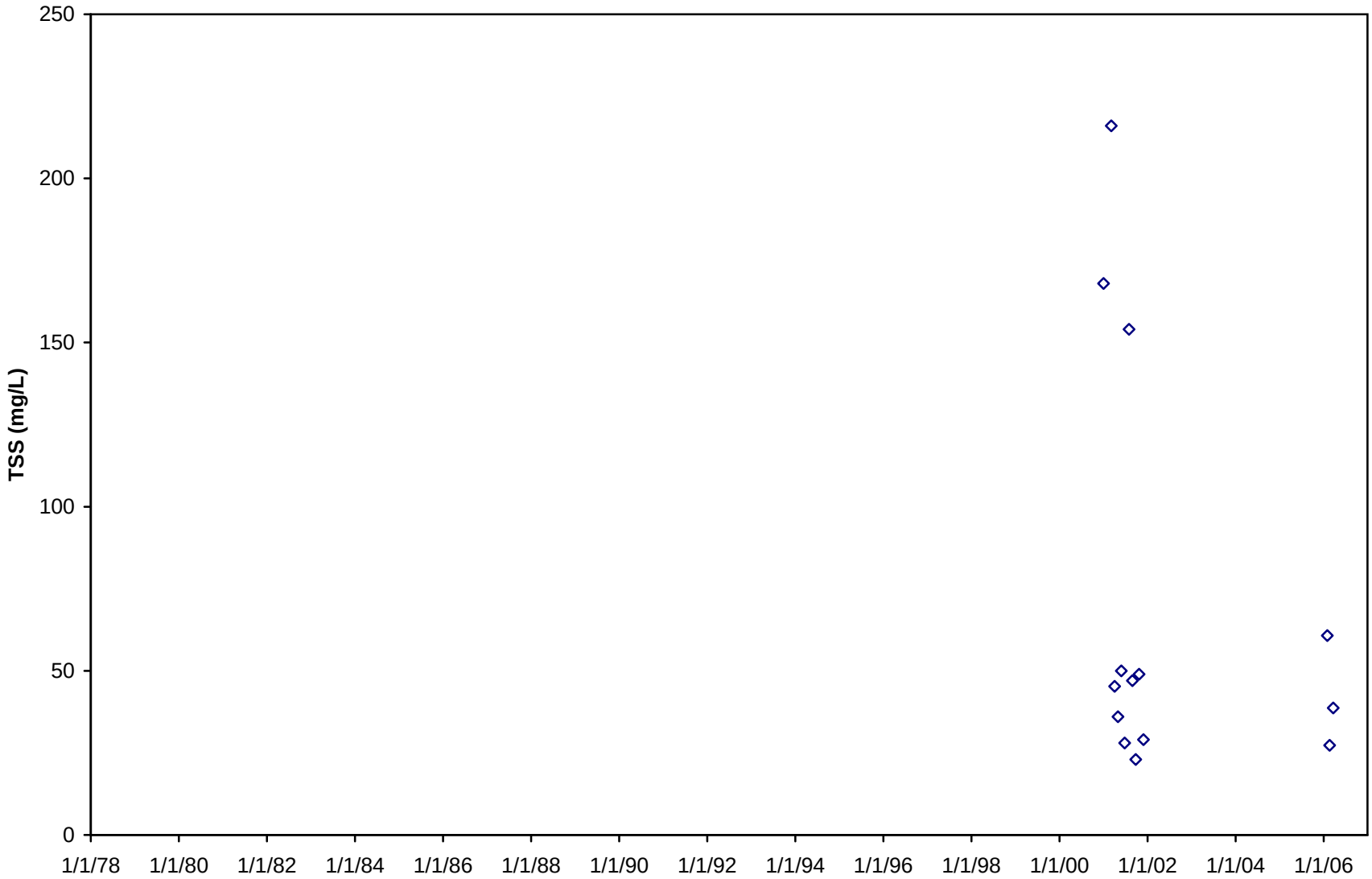


Figure C.6. Time series plot of Turbidity for Bogue Chitto River near Bush, LA (LDEQ 64)

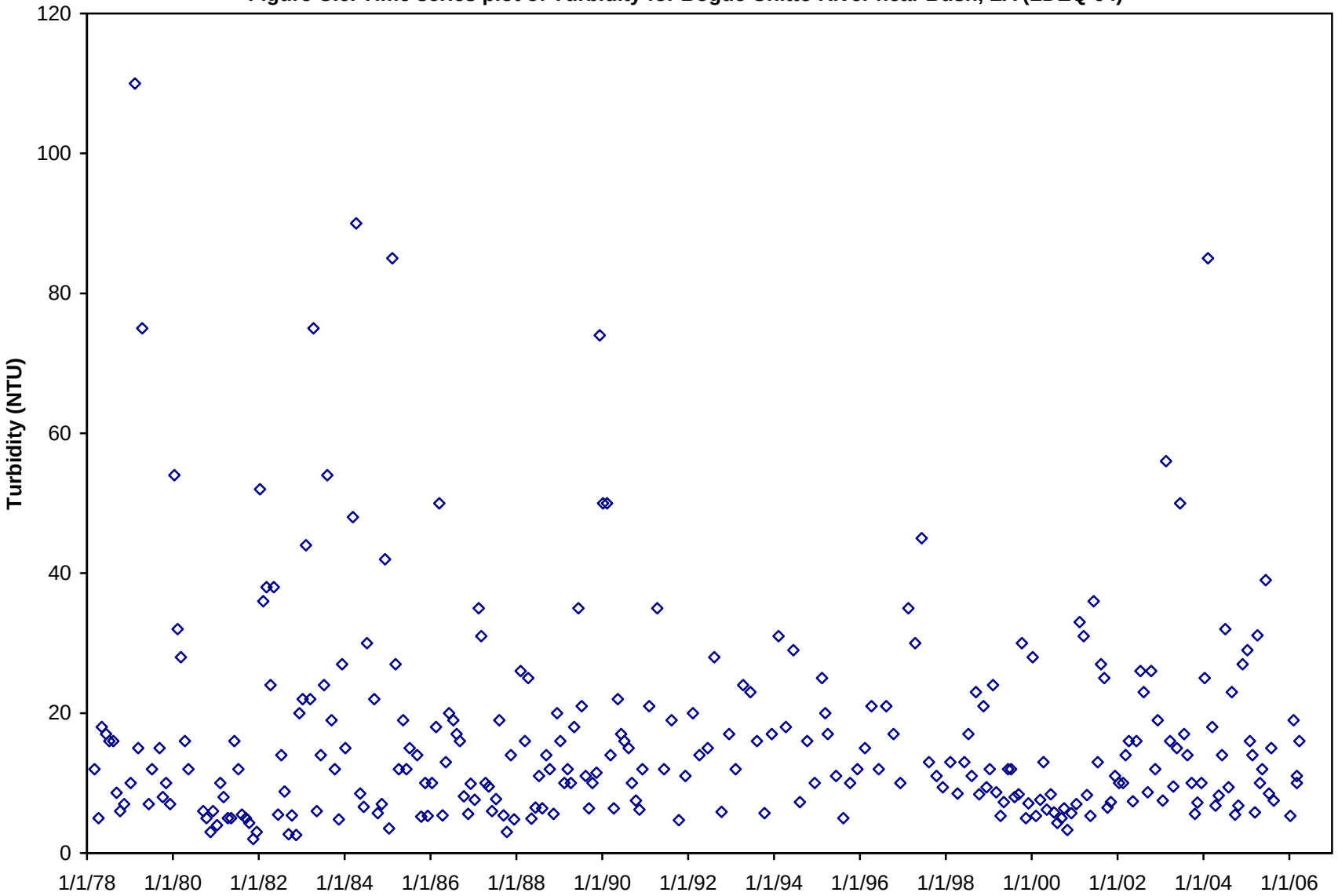


Figure C.7. Time series plot of Turbidity for Bogue Chitto River near Franklinton, LA (LDEQ 65)

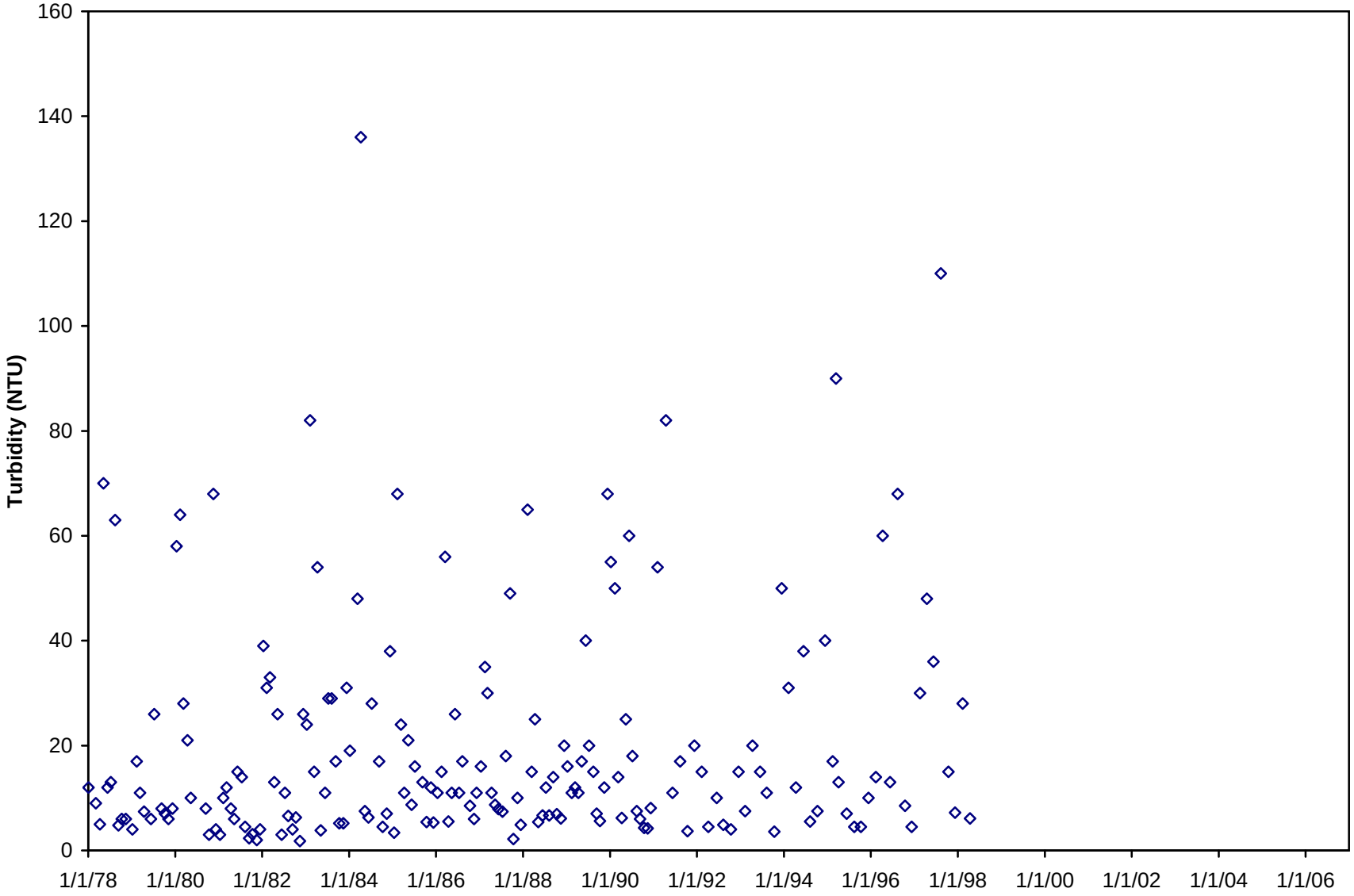


Figure C.8. Time series plot of Turbidity for West Pearl River SE of Slidell, LA (LDEQ 105)

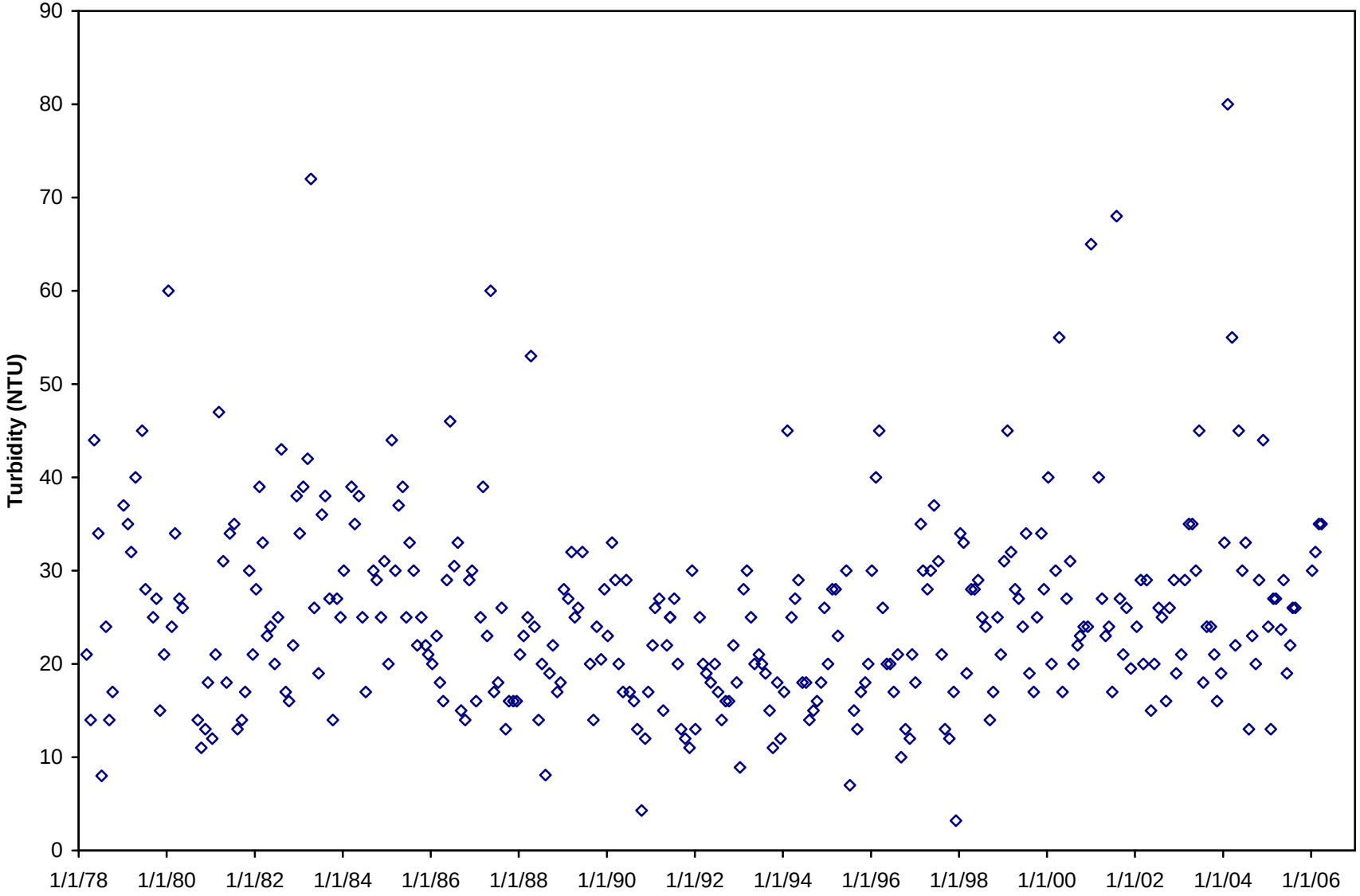


Figure C.9. Time series plot of Turbidity for Holmes Bayou (LDEQ 1041)

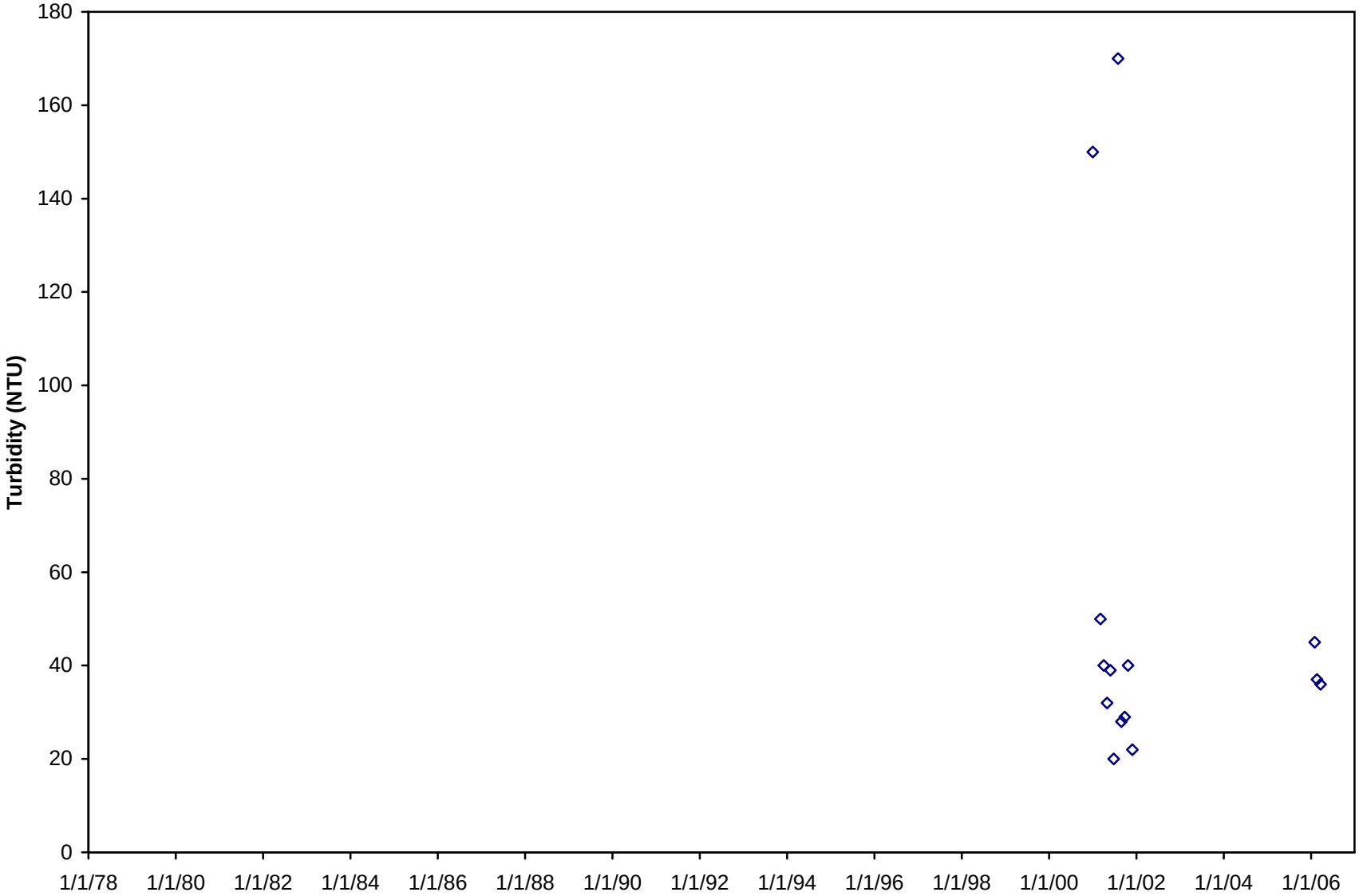


Figure C.10. Time series plot of Turbidity for West Pearl River upstream of Pearl River Barge Canal (LDEQ 1042)

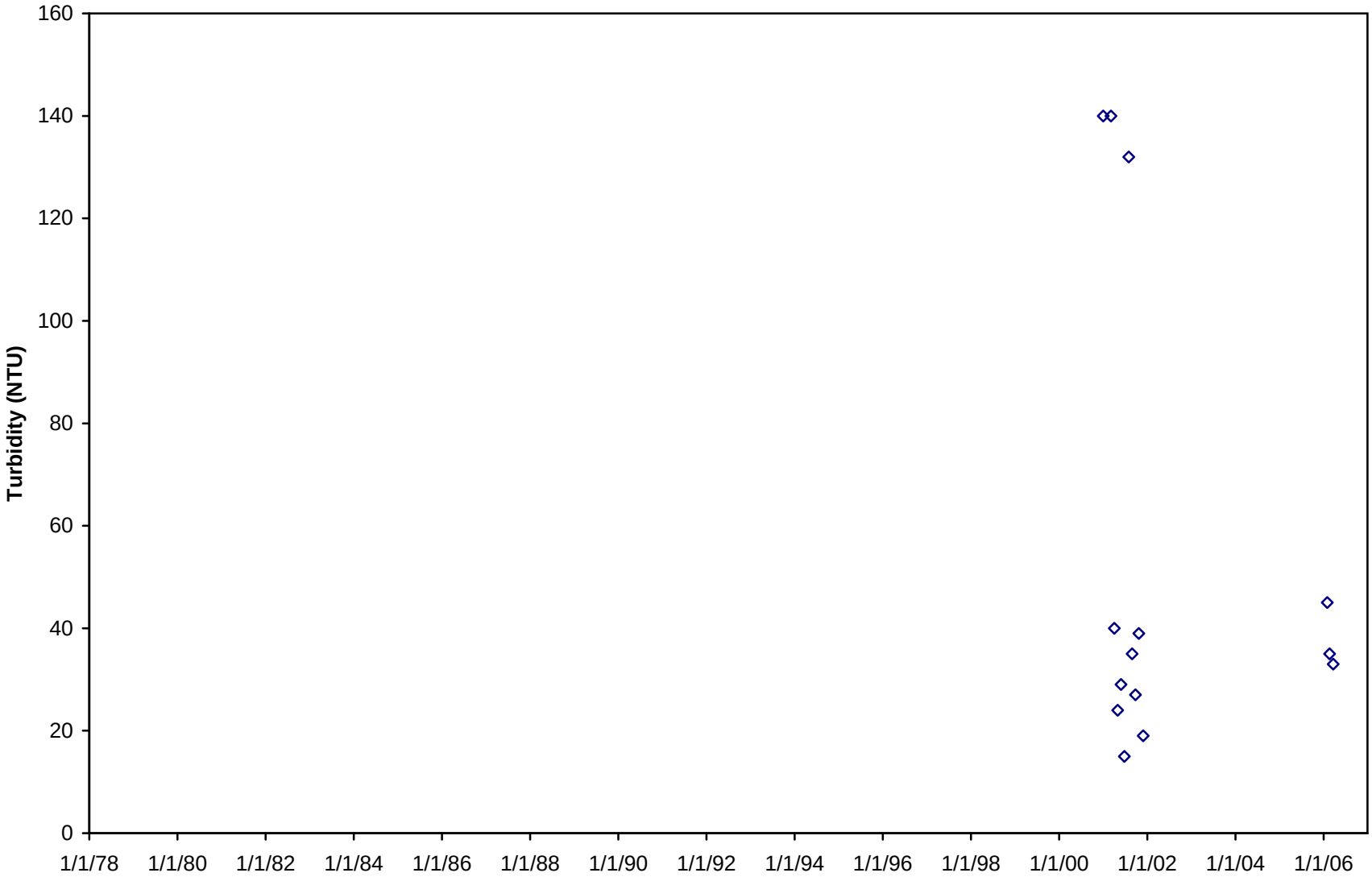


Figure C.11. Seasonal plot of TSS for Bogue Chitto River near Bush, LA (LDEQ 64)

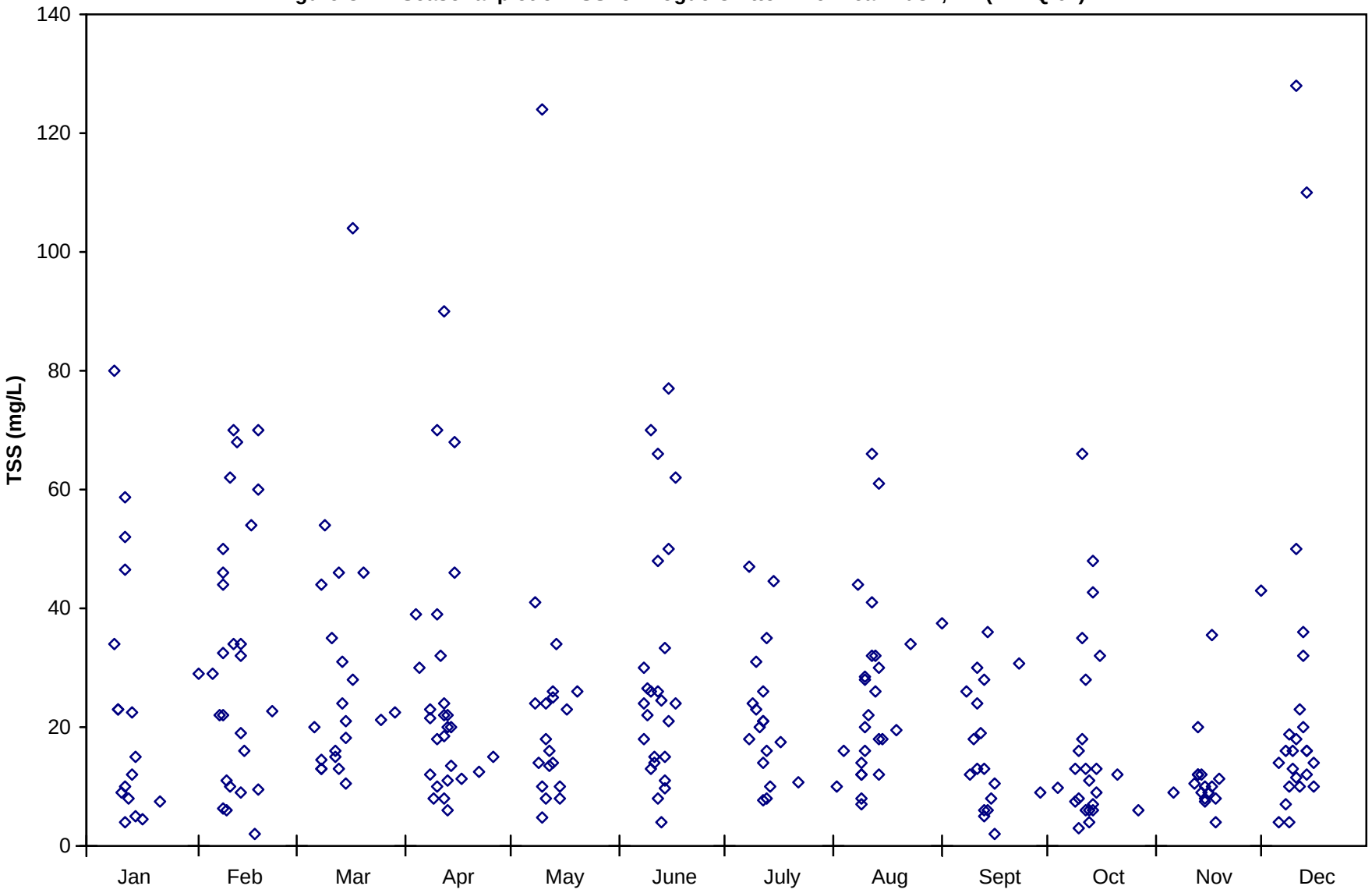


Figure C.12. Seasonal plot of TSS for Bogue Chitto River near Franklinton, LA (LDEQ 65)

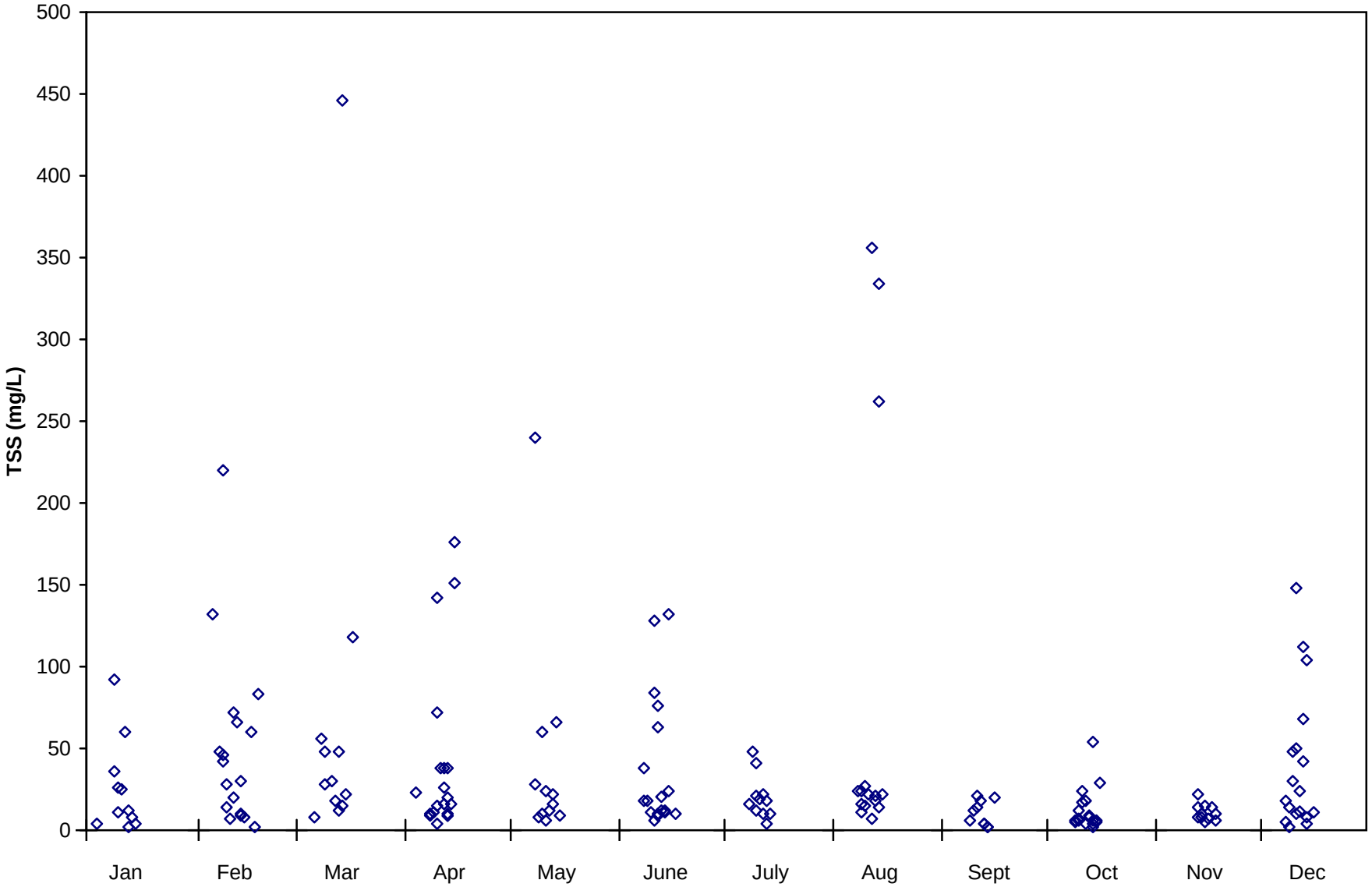


Figure C.13. Seasonal plot of TSS for West Pearl River SE of Slidell, LA (LDEQ 105)

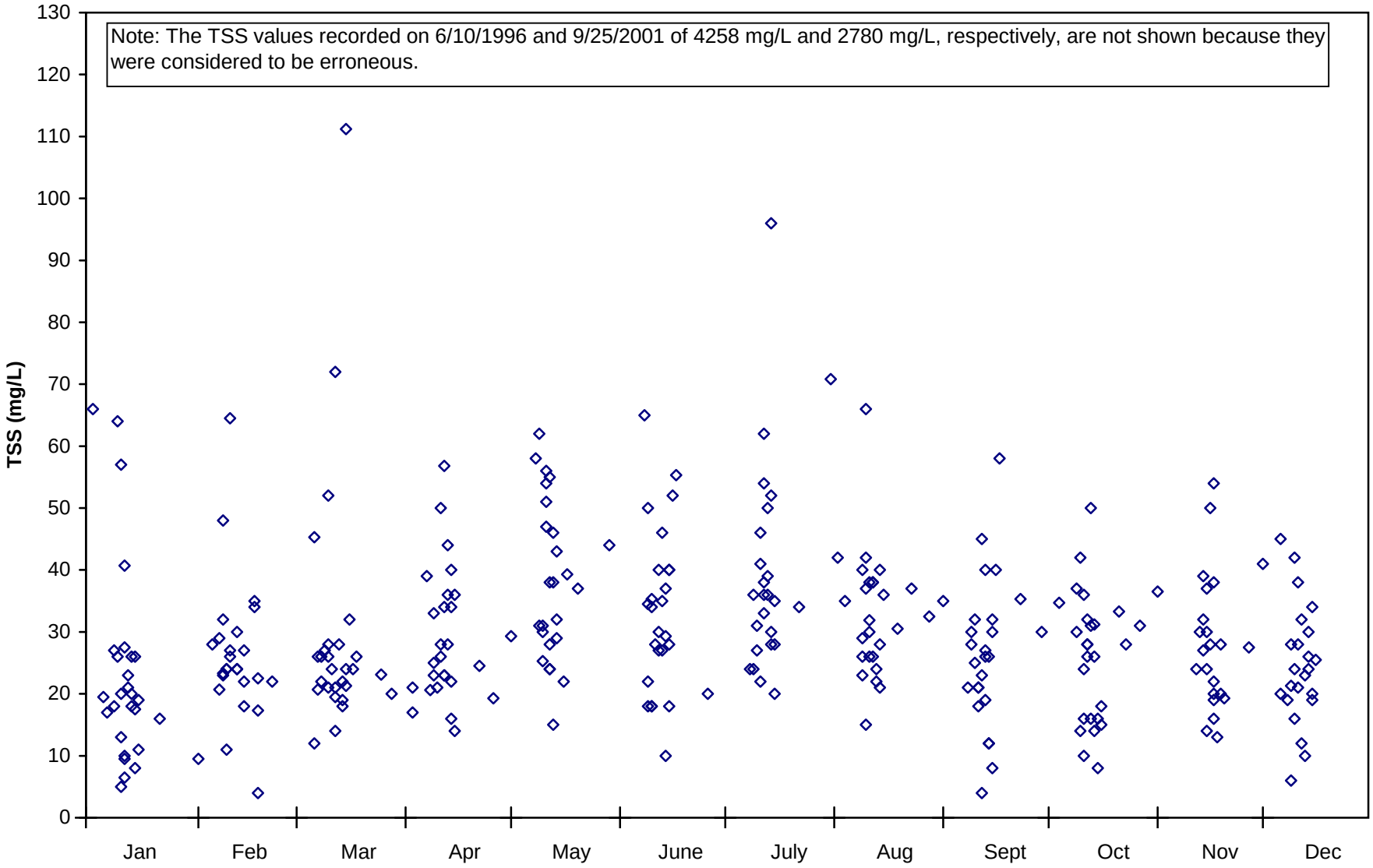


Figure C.14. Seasonal plot of TSS for Holmes Bayou (LDEQ 1041)

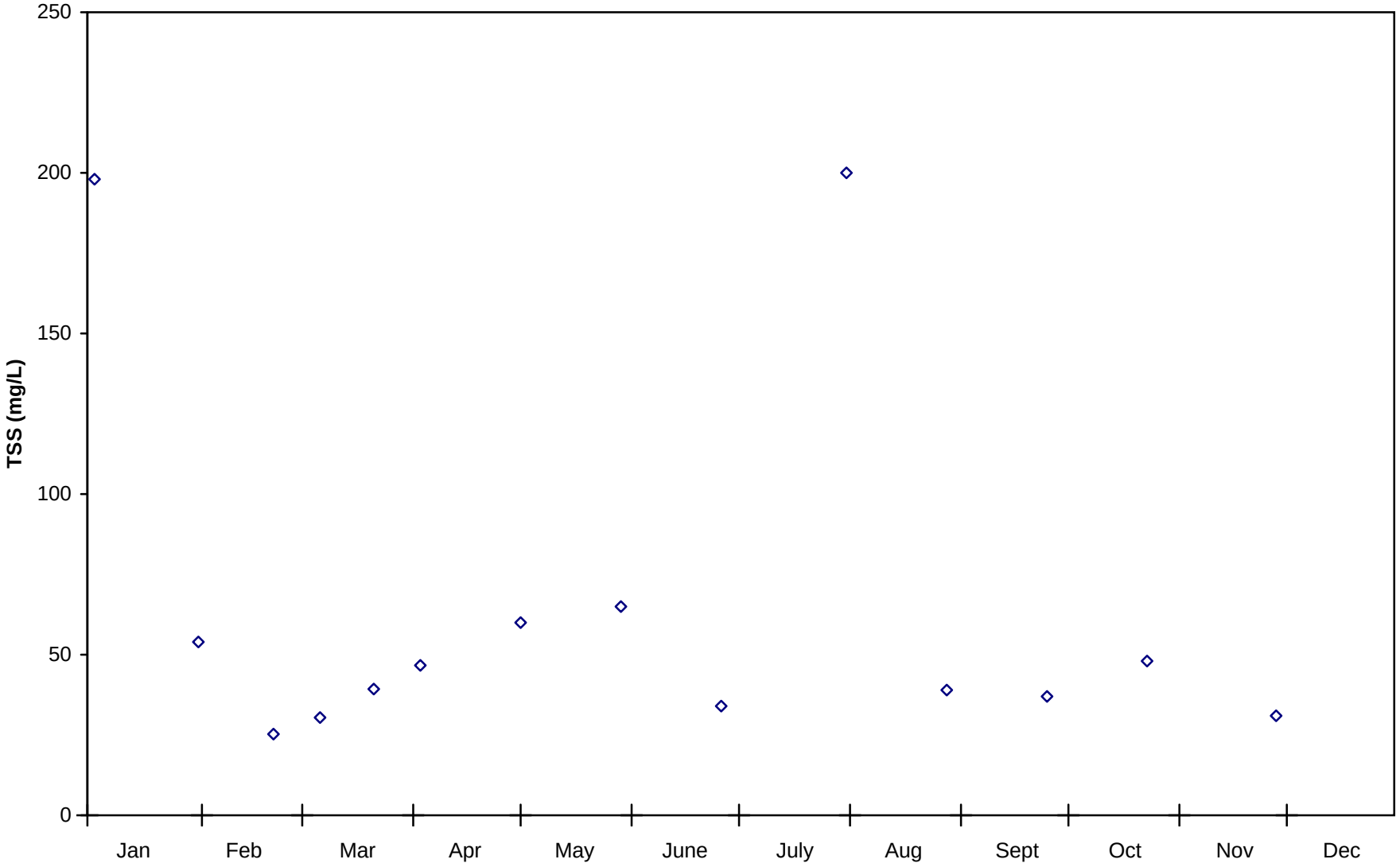


Figure C.15. Seasonal plot of TSS for West Pearl River upstream of Pearl River Barge Canal (LDEQ 1042)

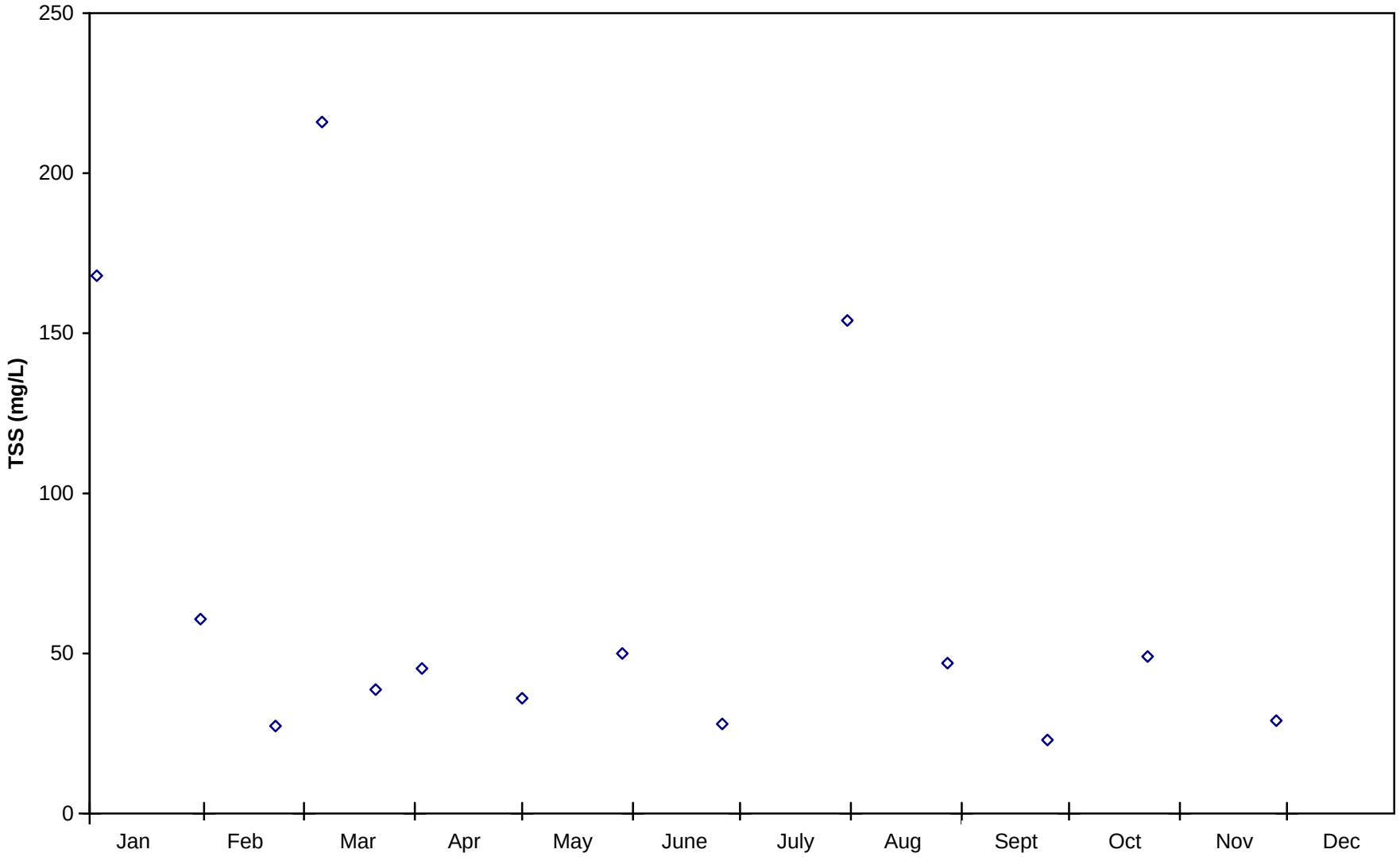


Figure C.16. Seasonal plot of Turbidity for Bogue Chitto River near Bush, LA (LDEQ 64)

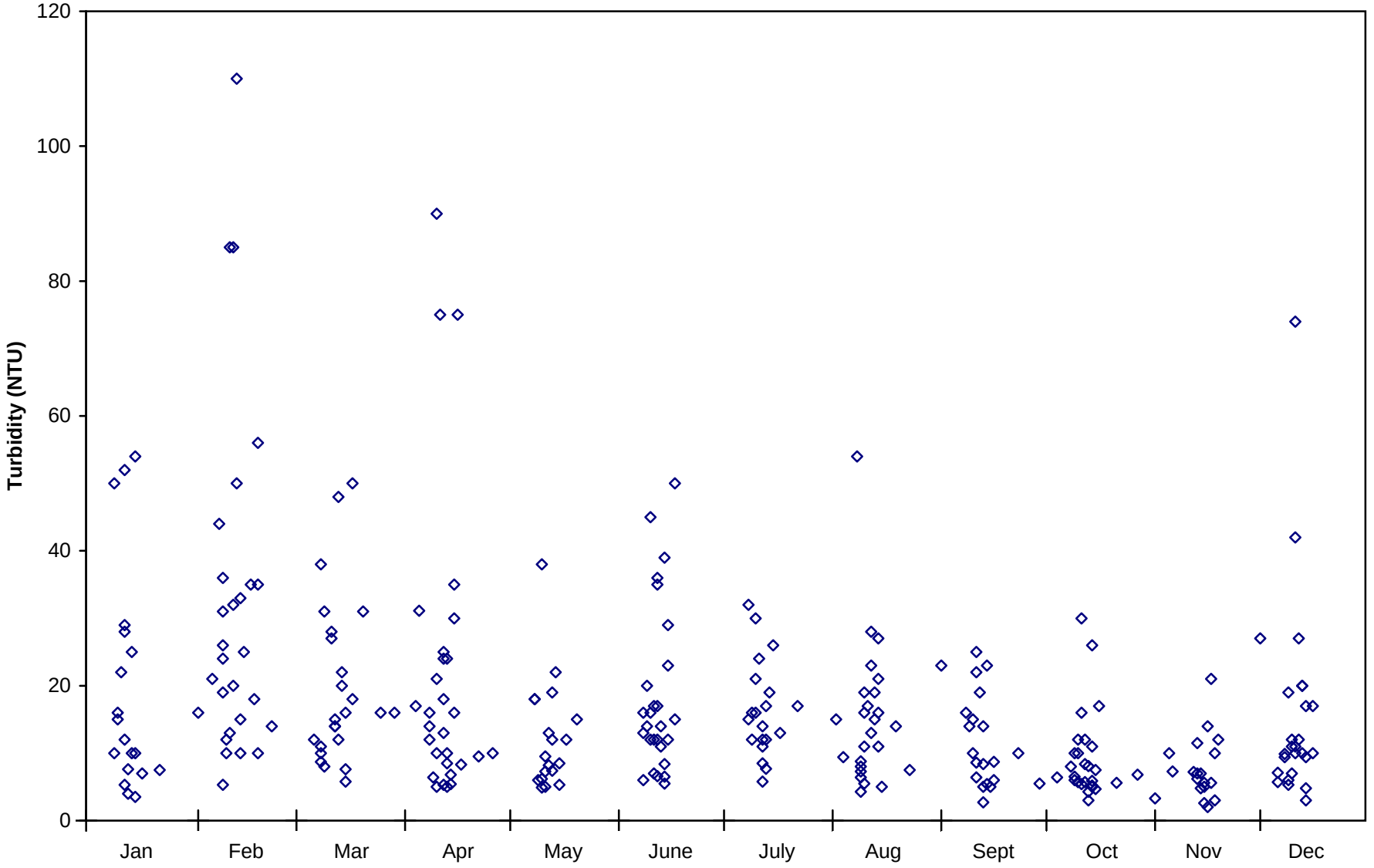


Figure C.17. Seasonal plot of Turbidity for Bogue Chitto River near Franklinton (LDEQ 0065)

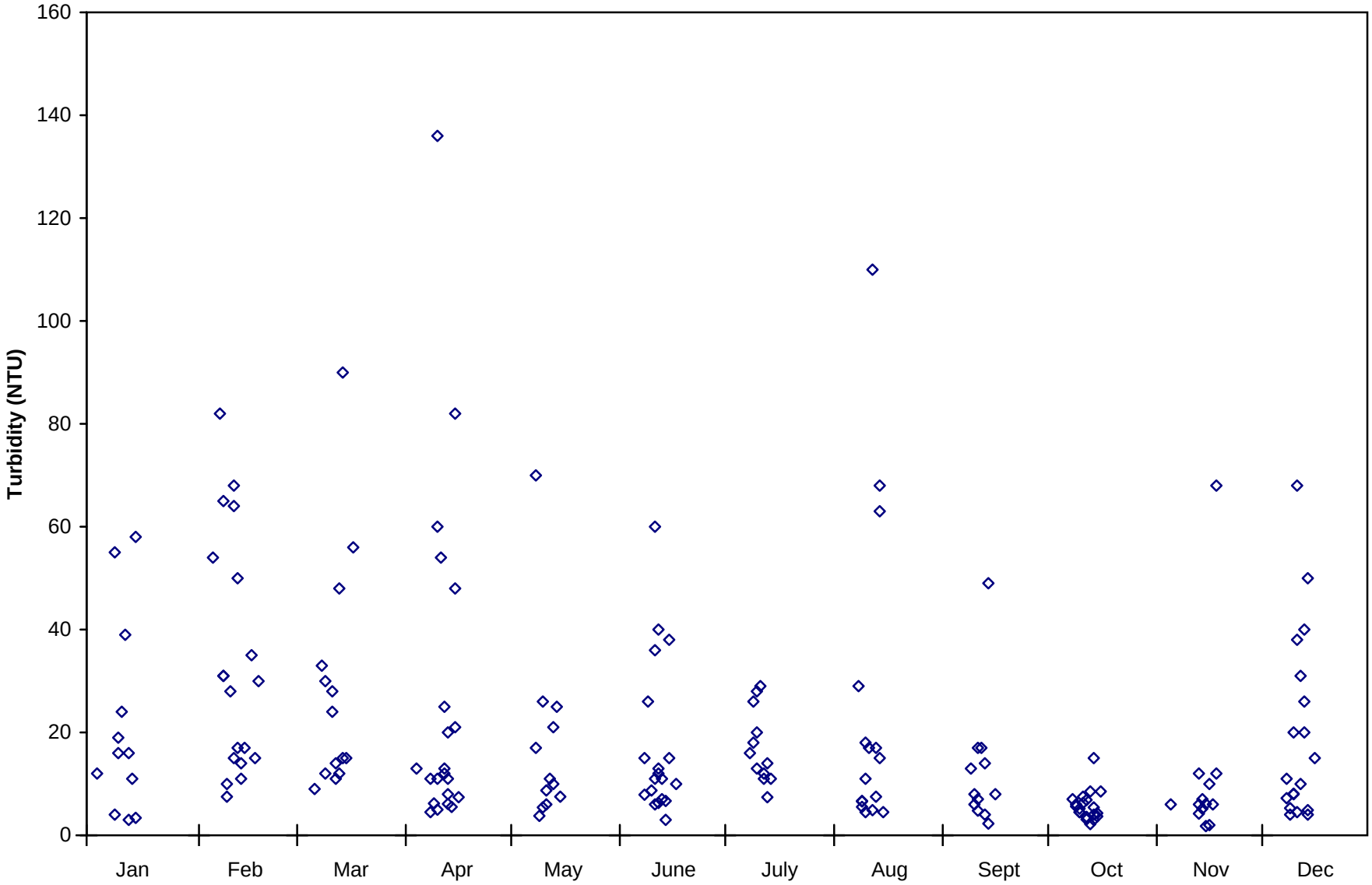


Figure C.18. Seasonal plot of Turbidity for West Pearl River SE of Slidell, LA (LDEQ 105)

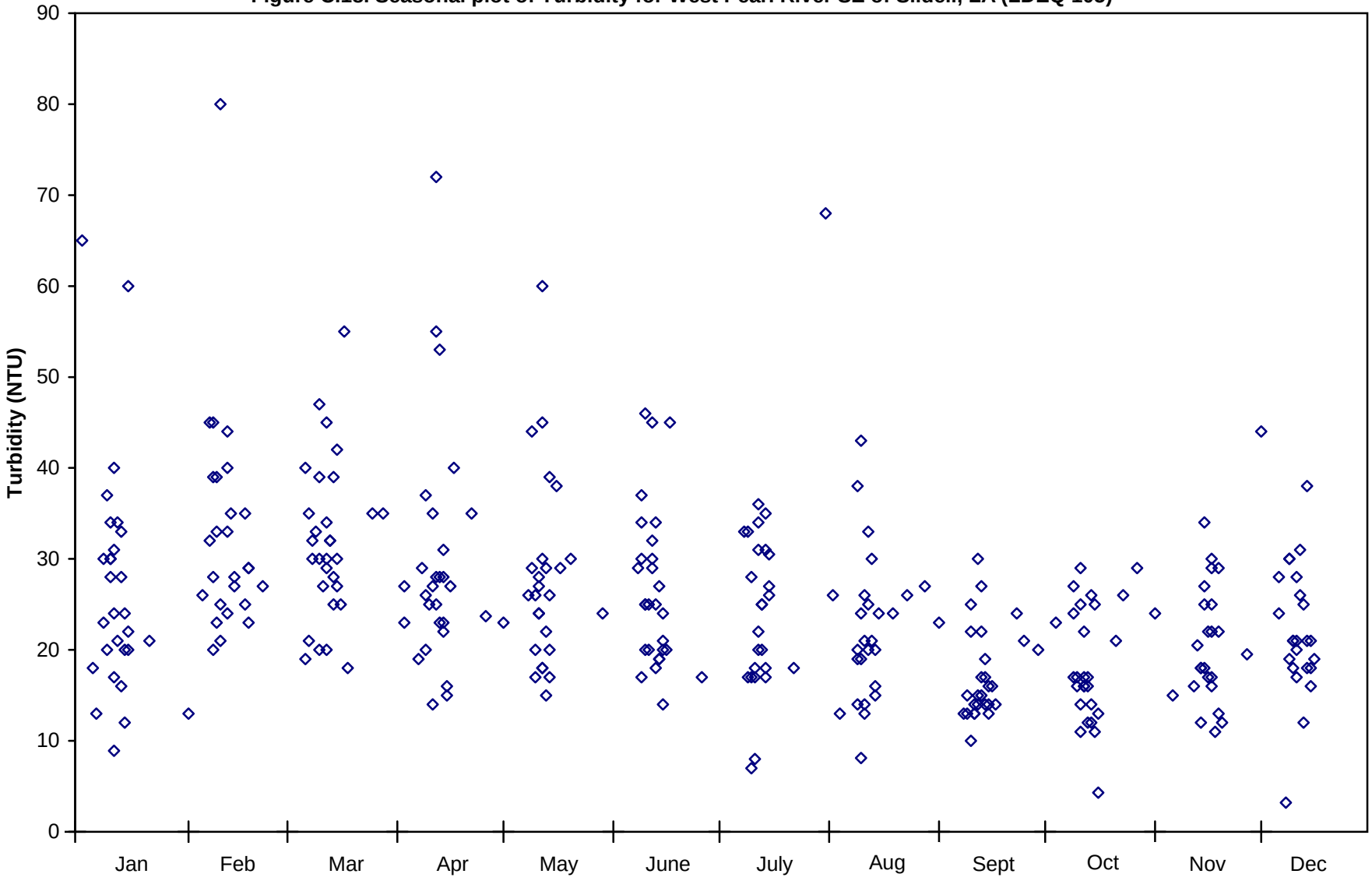


Figure C.19. Seaonal plot of Turbidity for Holmes Bayou (LDEQ 1041)

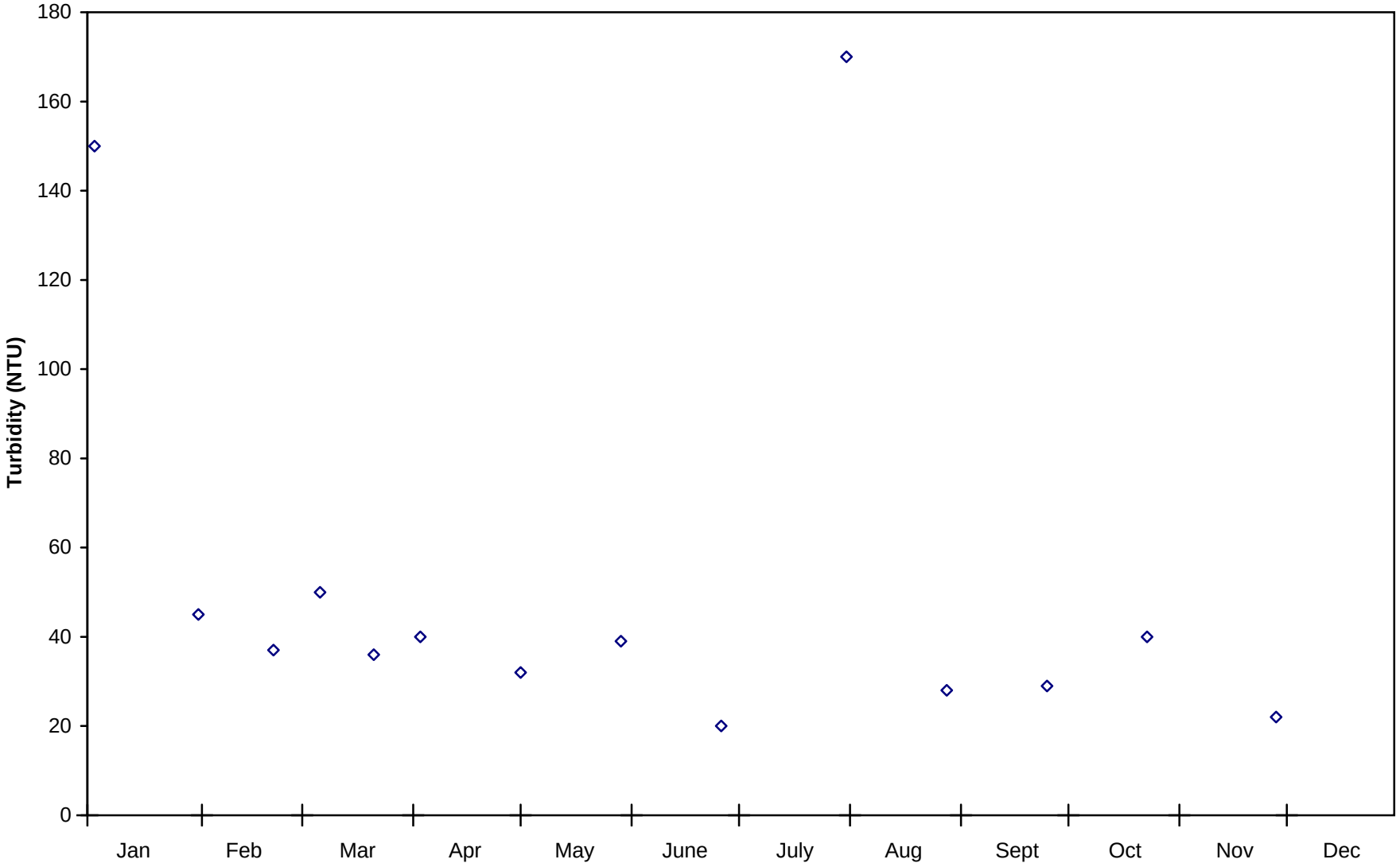


Figure C.20. Seasonal plot of Turbidity for West Pearl River upstream Pearl River Barge Canal (LDEQ 1042)

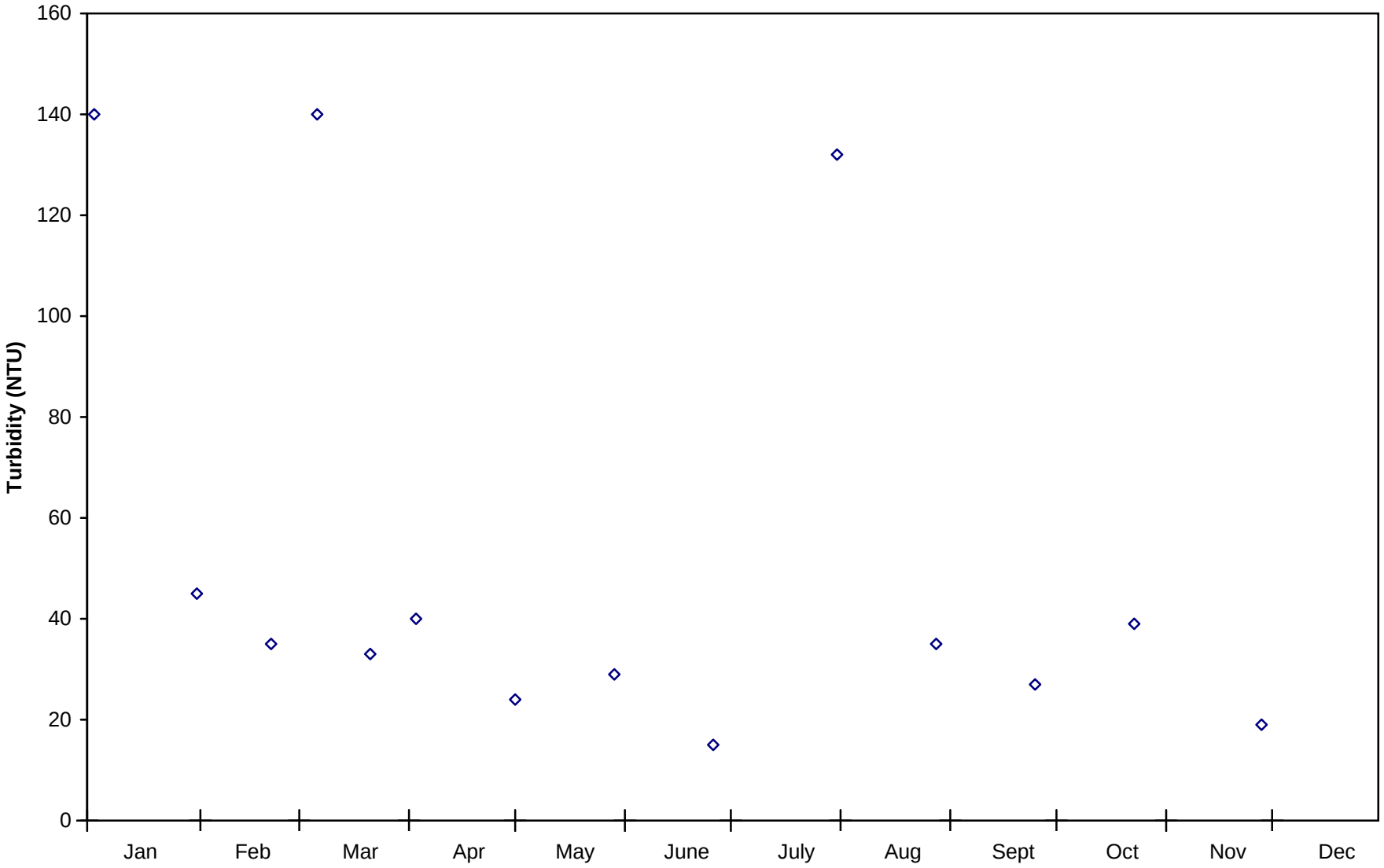


Figure C.21. TSS versus Flow for Bogue Chitto River near Bush, LA (LDEQ 64)

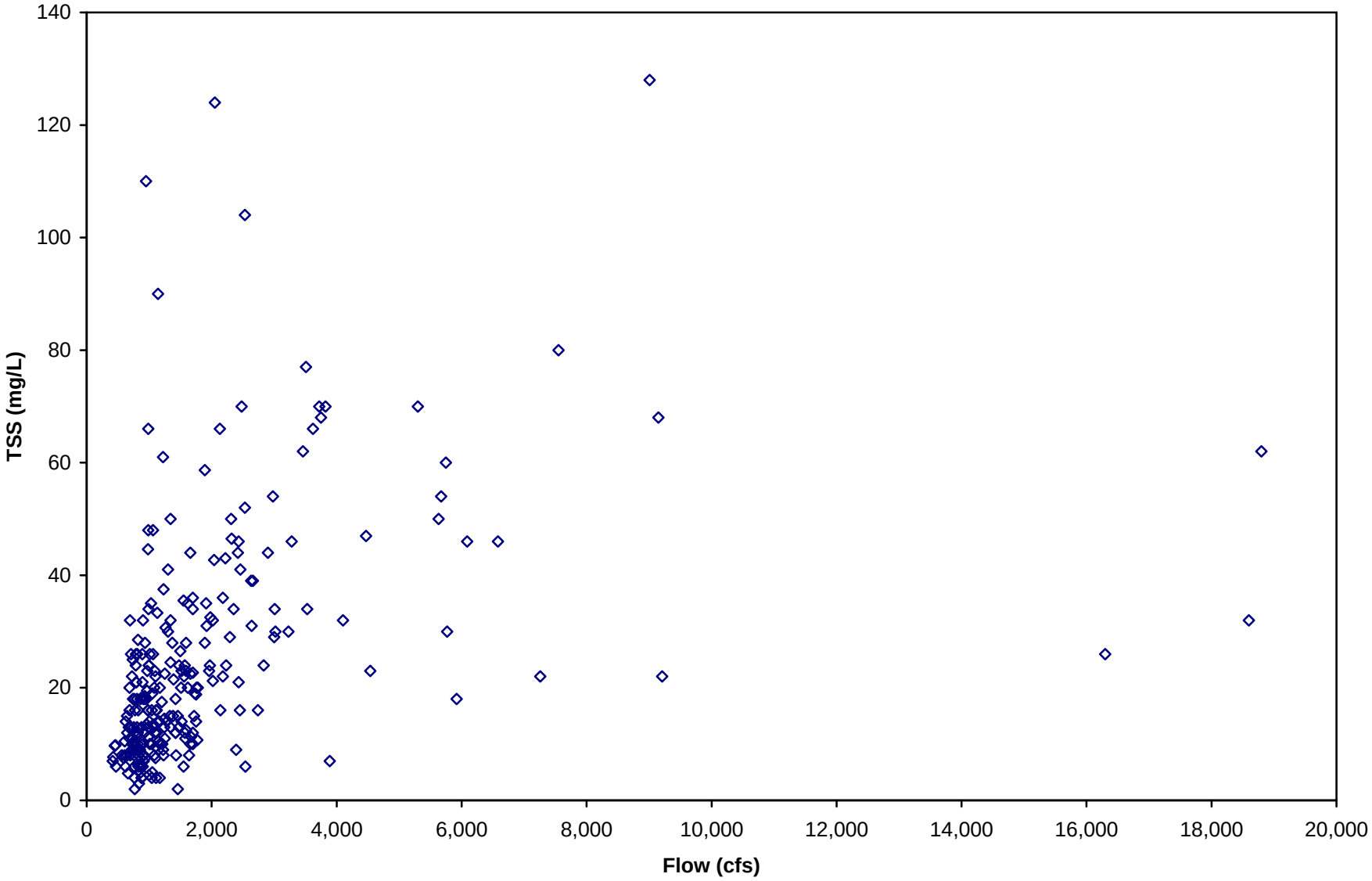


Figure C.22. TSS versus Flow for Bogue Chitto River near Franklinton, LA (LDEQ 65)

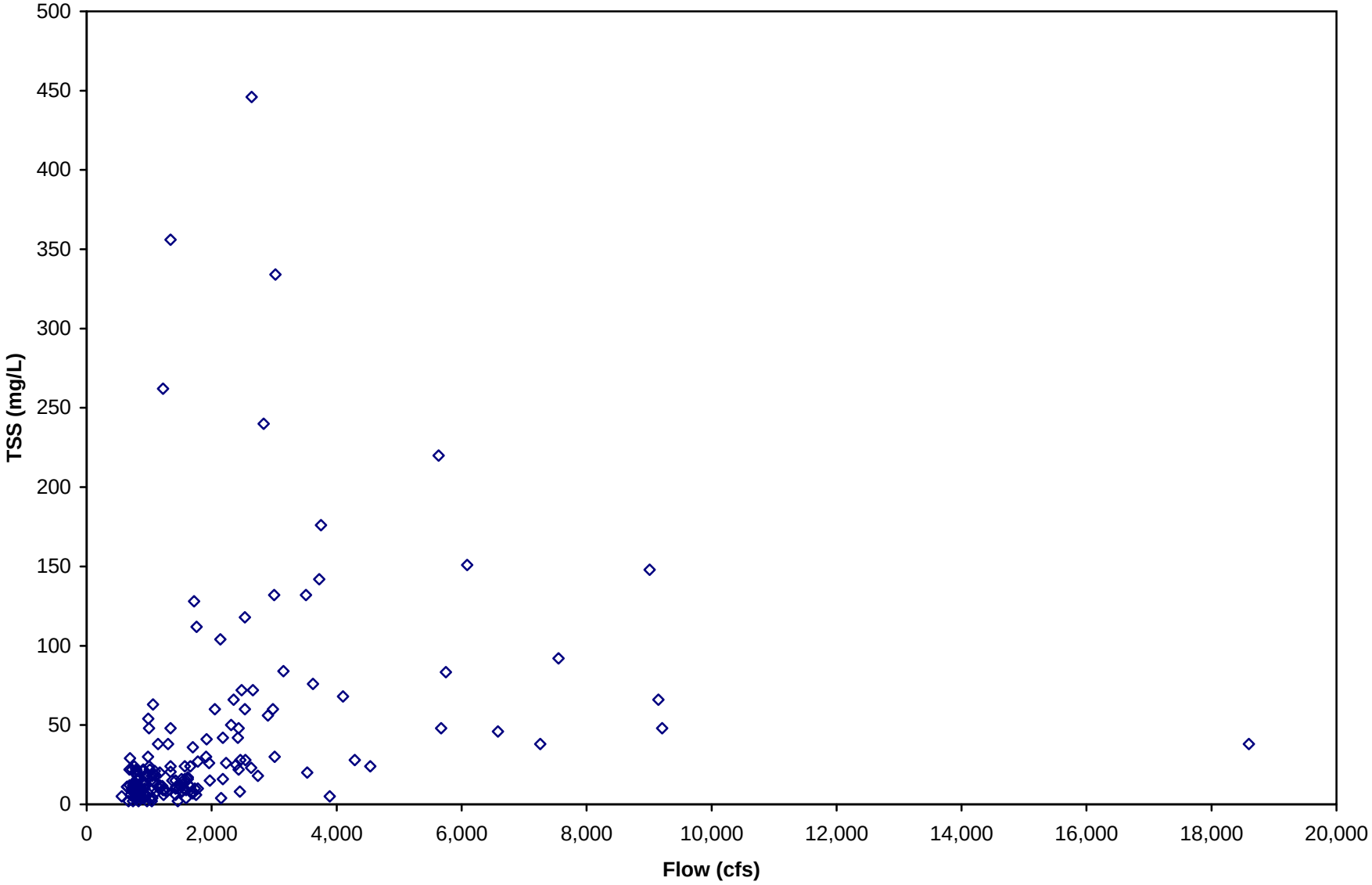


Figure C.23. TSS versus flow for West Pearl River SE of Slidell, LA (LDEQ 105)

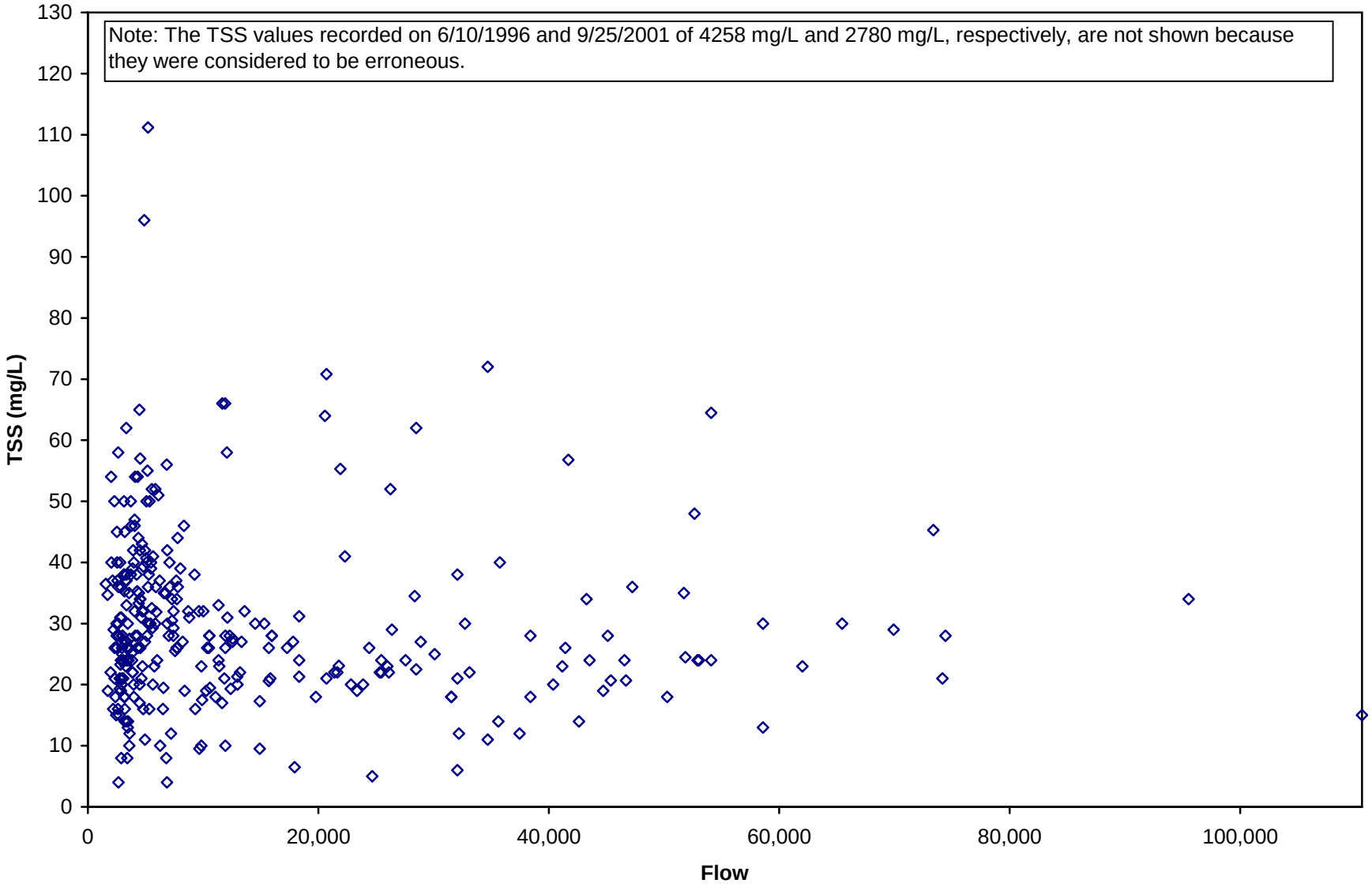


Figure C.24. TSS versus flow for Holmes Bayou (LDEQ 1041)

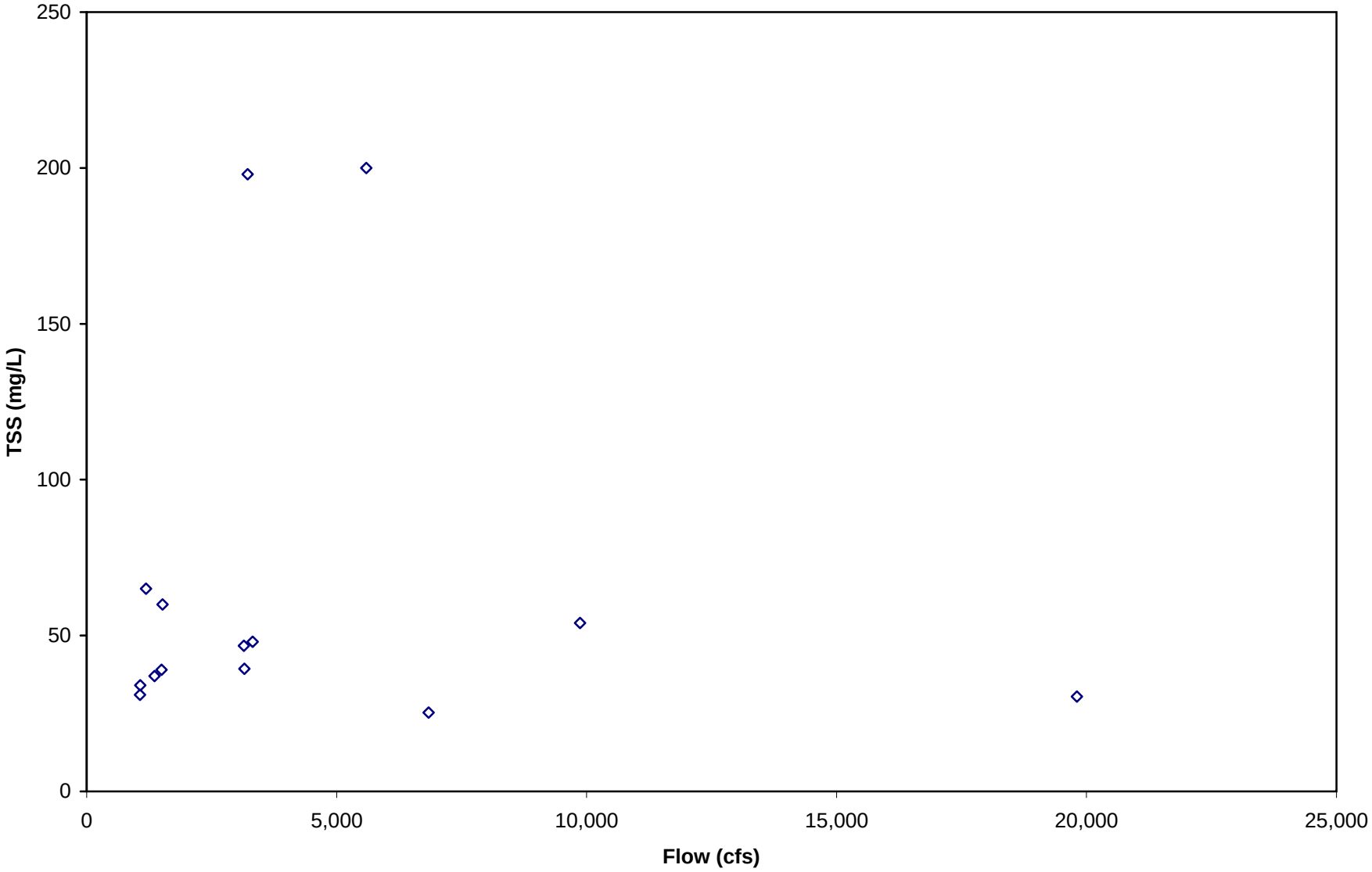


Figure C.25. TSS versus flow for West Pearl River upstream of Pearl River Barge Canal (LDEQ 1042)

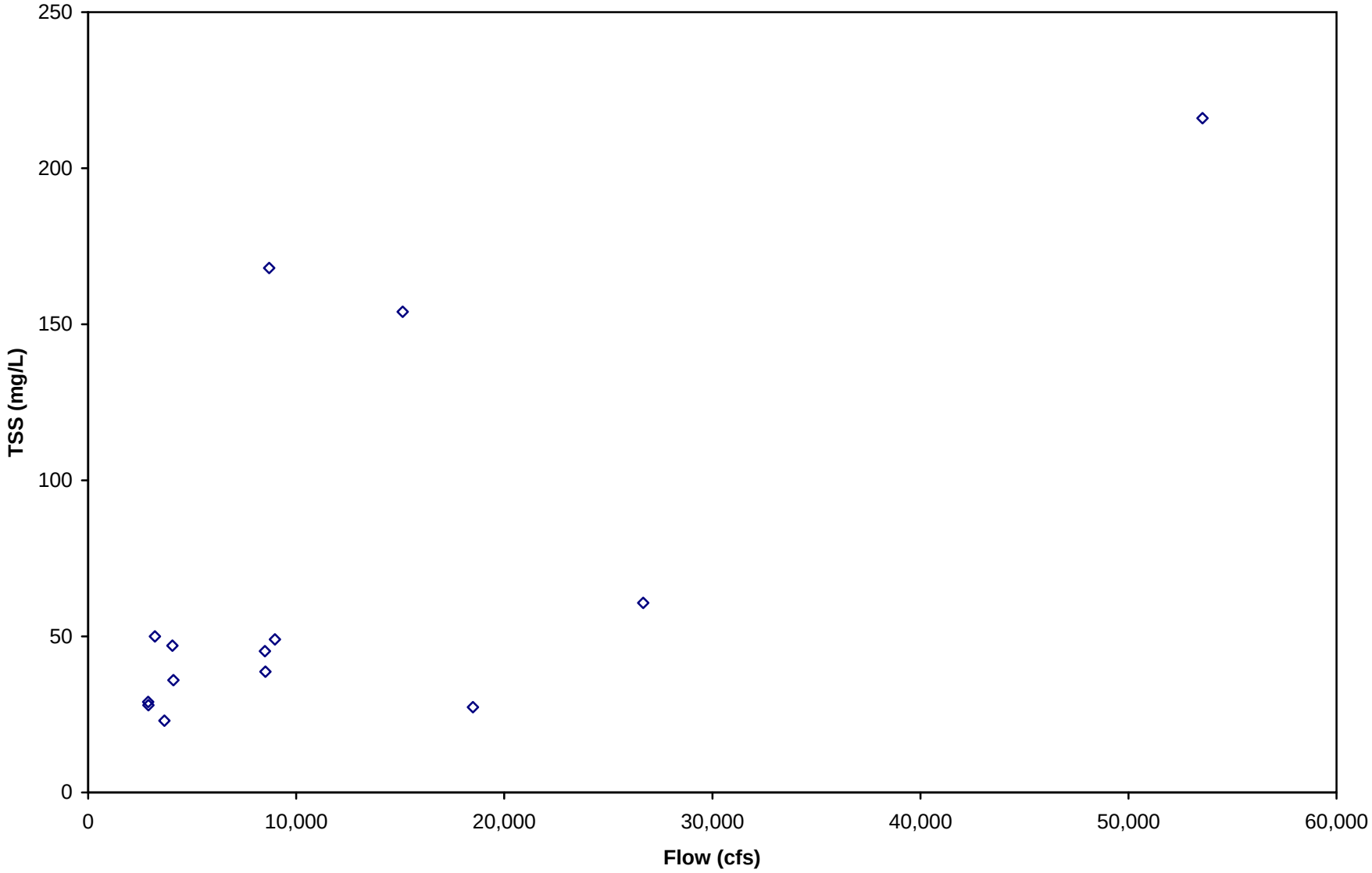


Figure C.26. Turbidity versus Flow for Bogue Chitto River near Bush, LA (LDEQ 64)

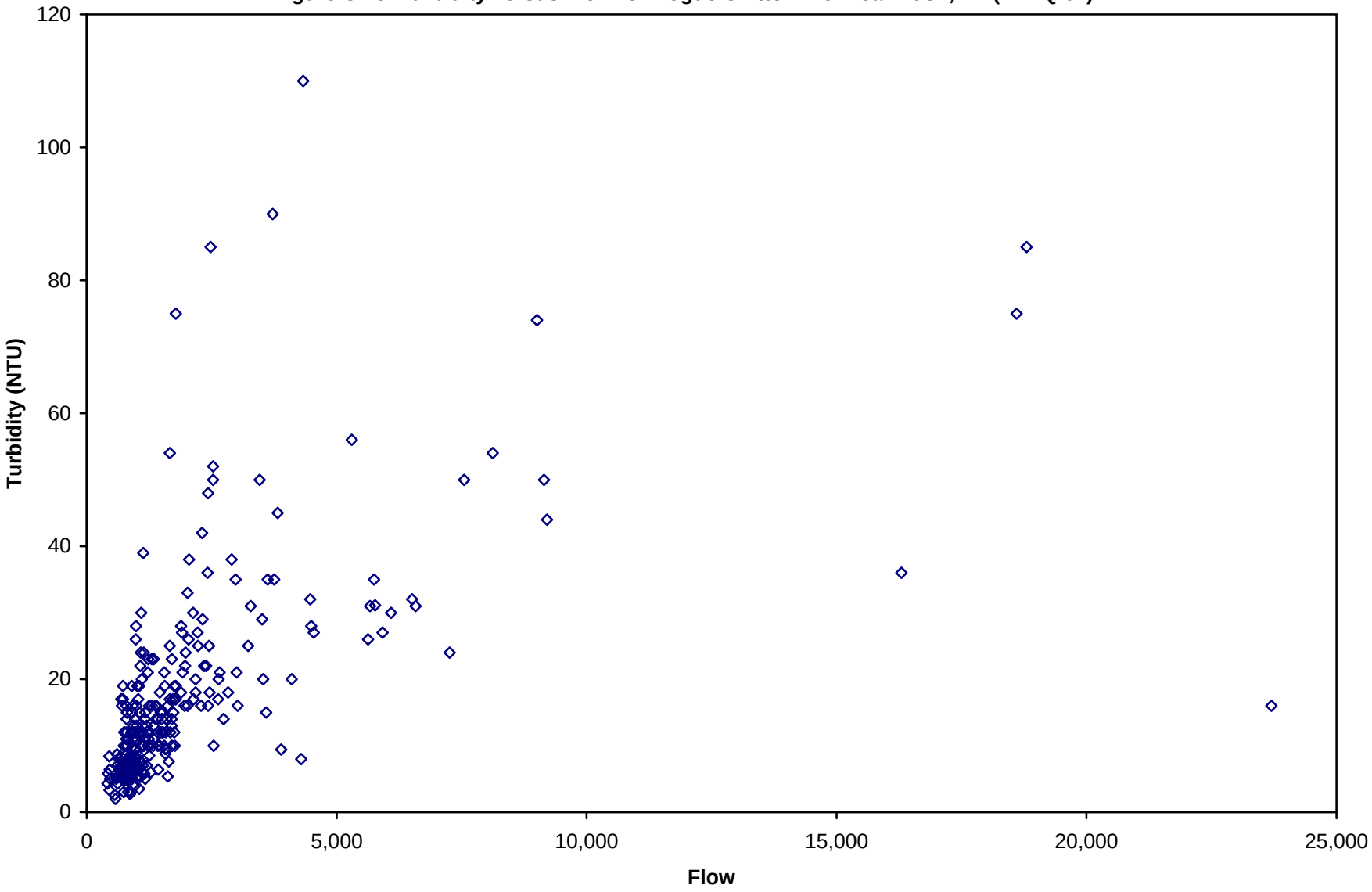


Figure C.27. Turbidity versus Flow for Bogue Chitto River near Franklinton, LA (LDEQ 65)

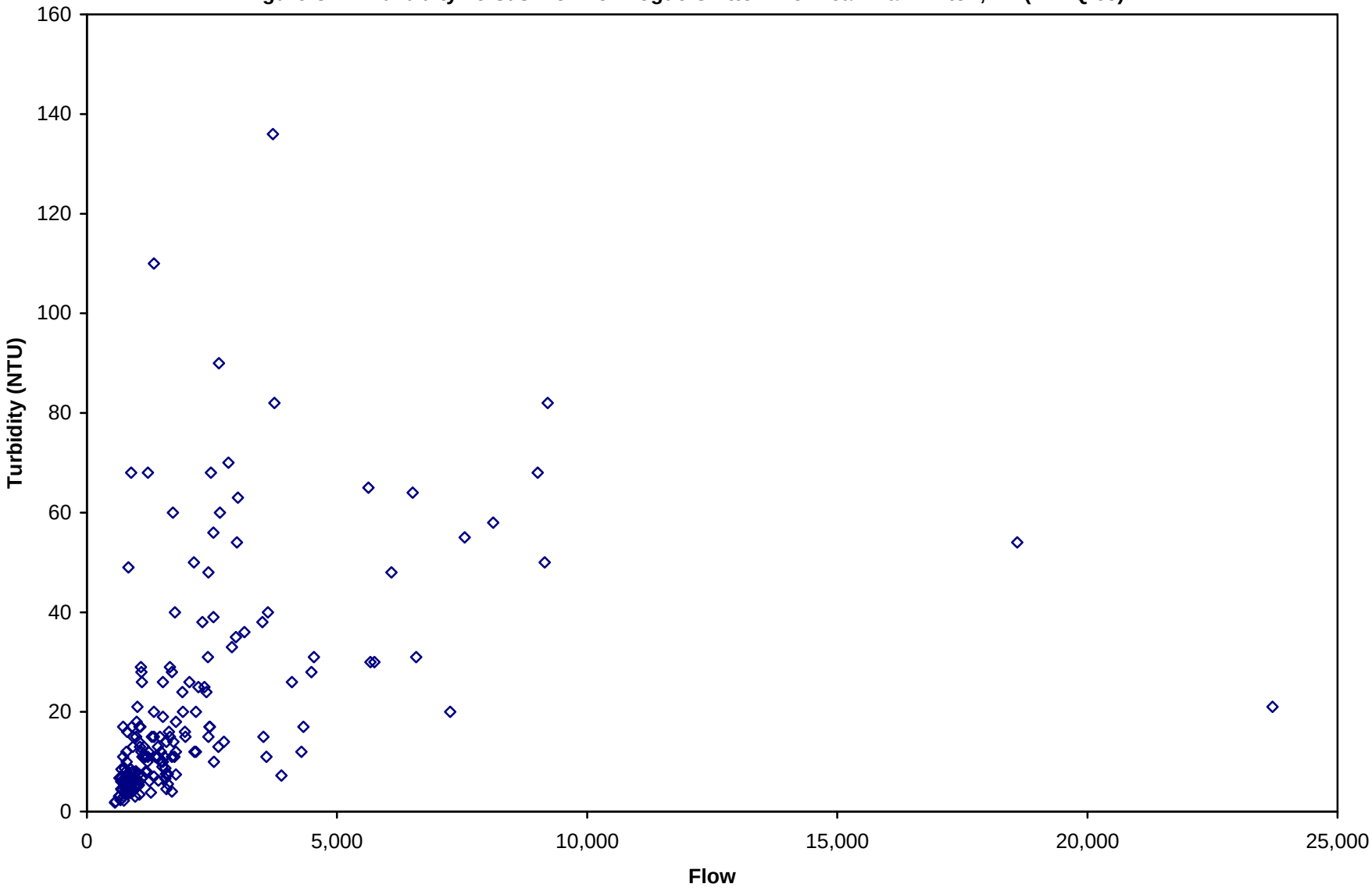


Figure C.28. Turbidity versus flow for West Pearl River SE of Slidell, LA (LDEQ 105)

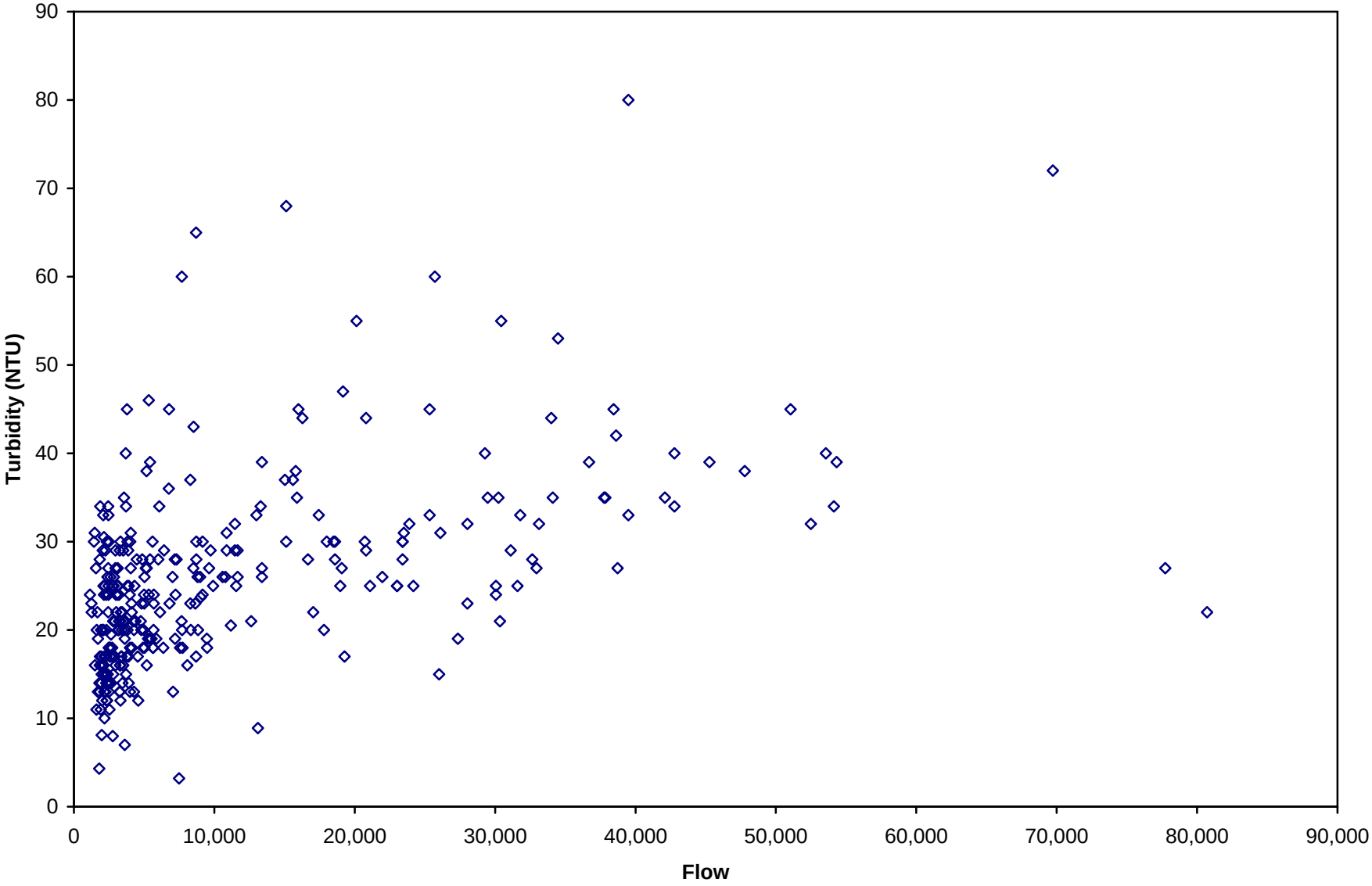


Figure C.29. Turbidity versus flow for Holmes Bayou (LDEQ 1041)

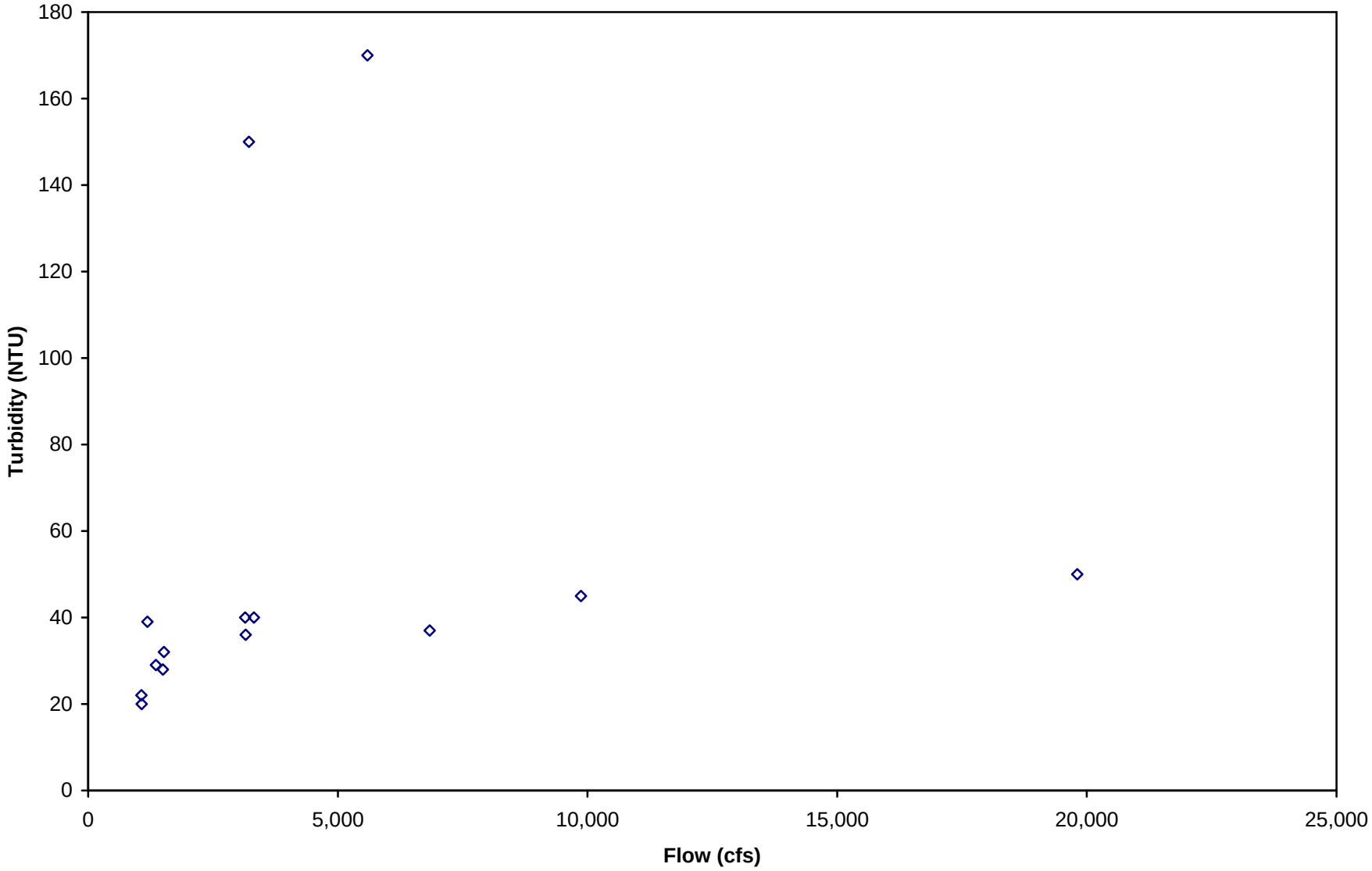


Figure C.30. Turbidity versus flow for West Pearl River upstream ofPearl River Barge Canal (LDEQ 1042)

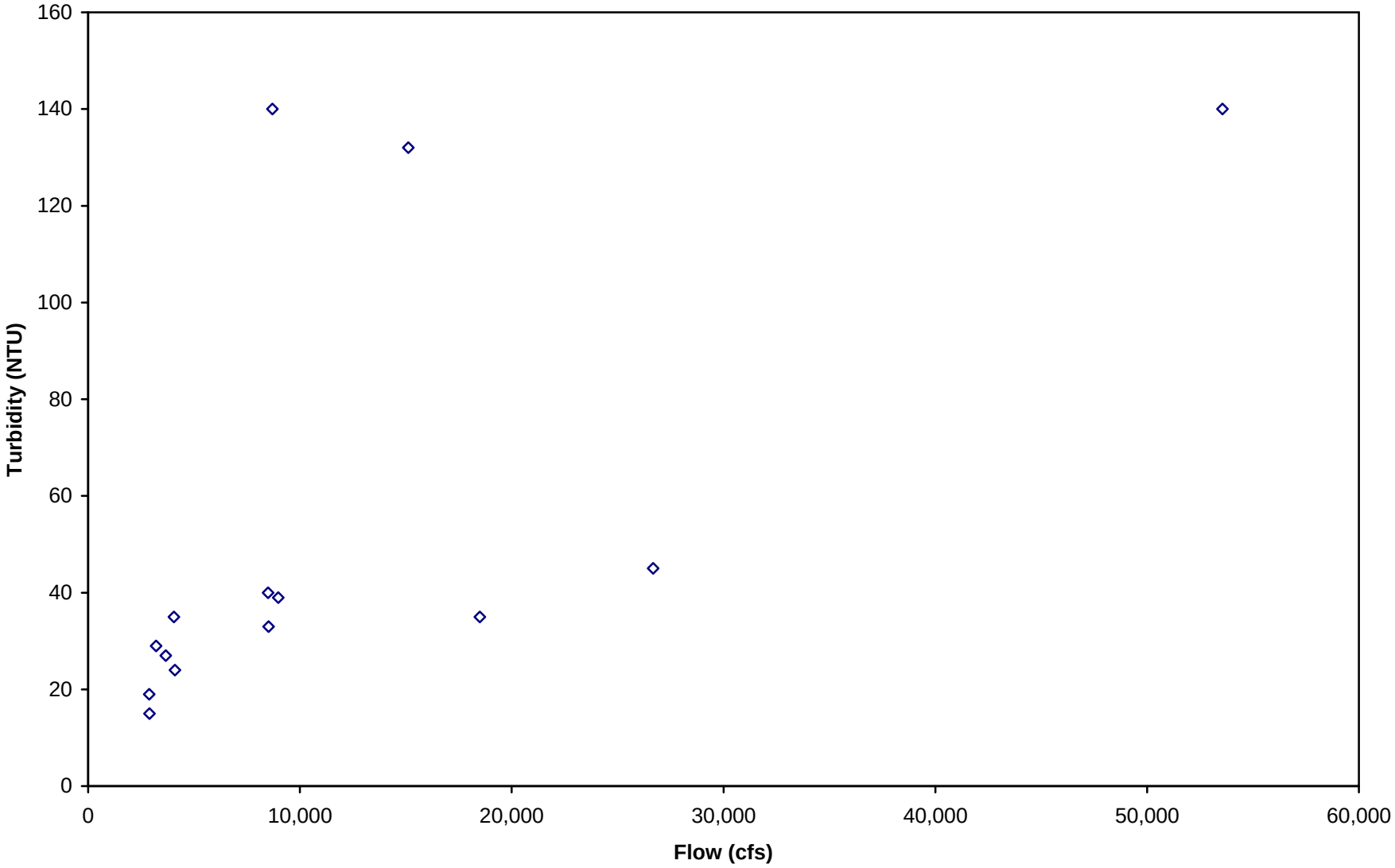


Figure C.31. Turbidity vs TSS for Bogue Chitto River near Bush, LA (LDEQ 64)

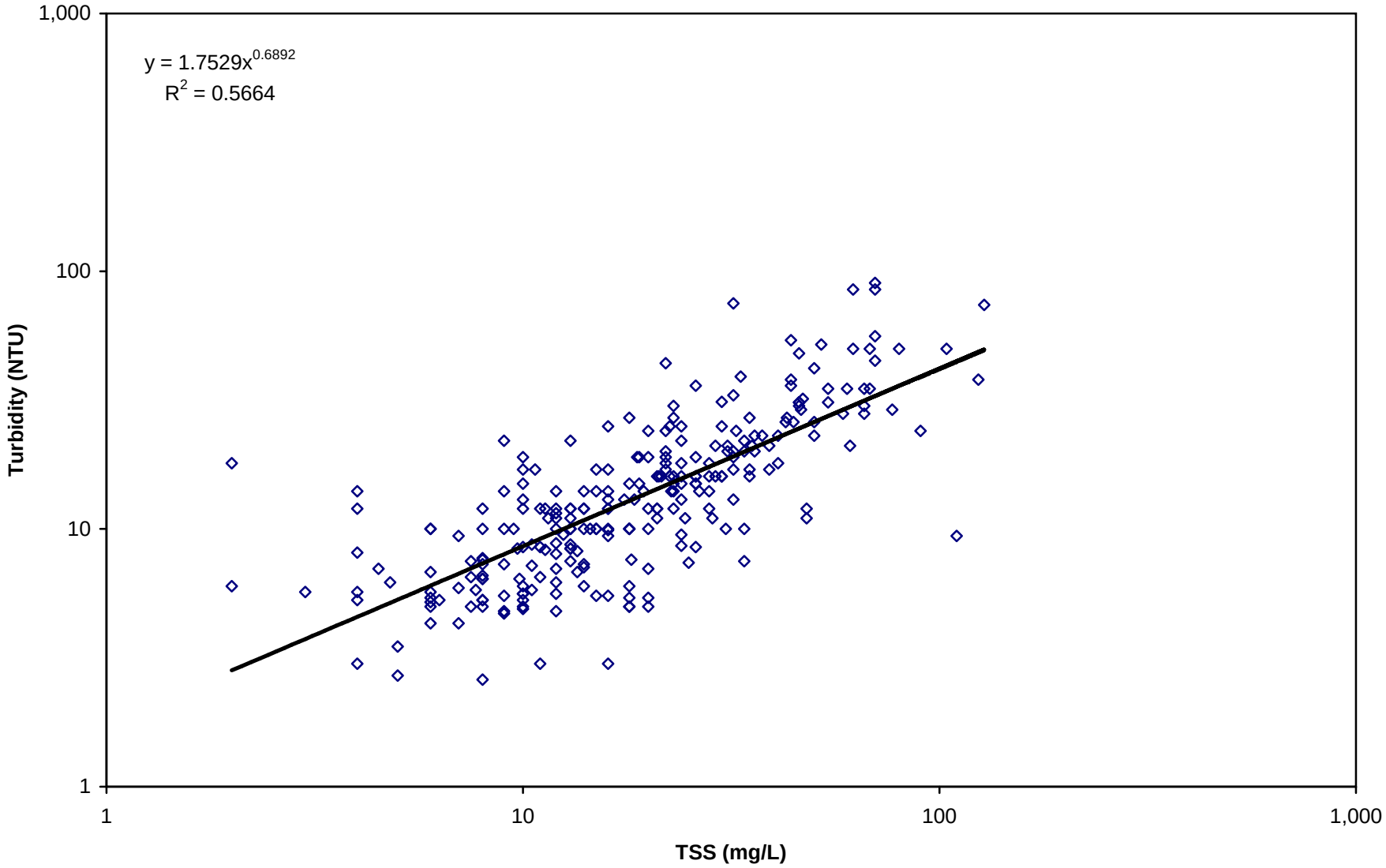


Figure C.32. Turbidity vs TSS for Bogue Chitto River near Franklinton, LA (LDEQ 65)

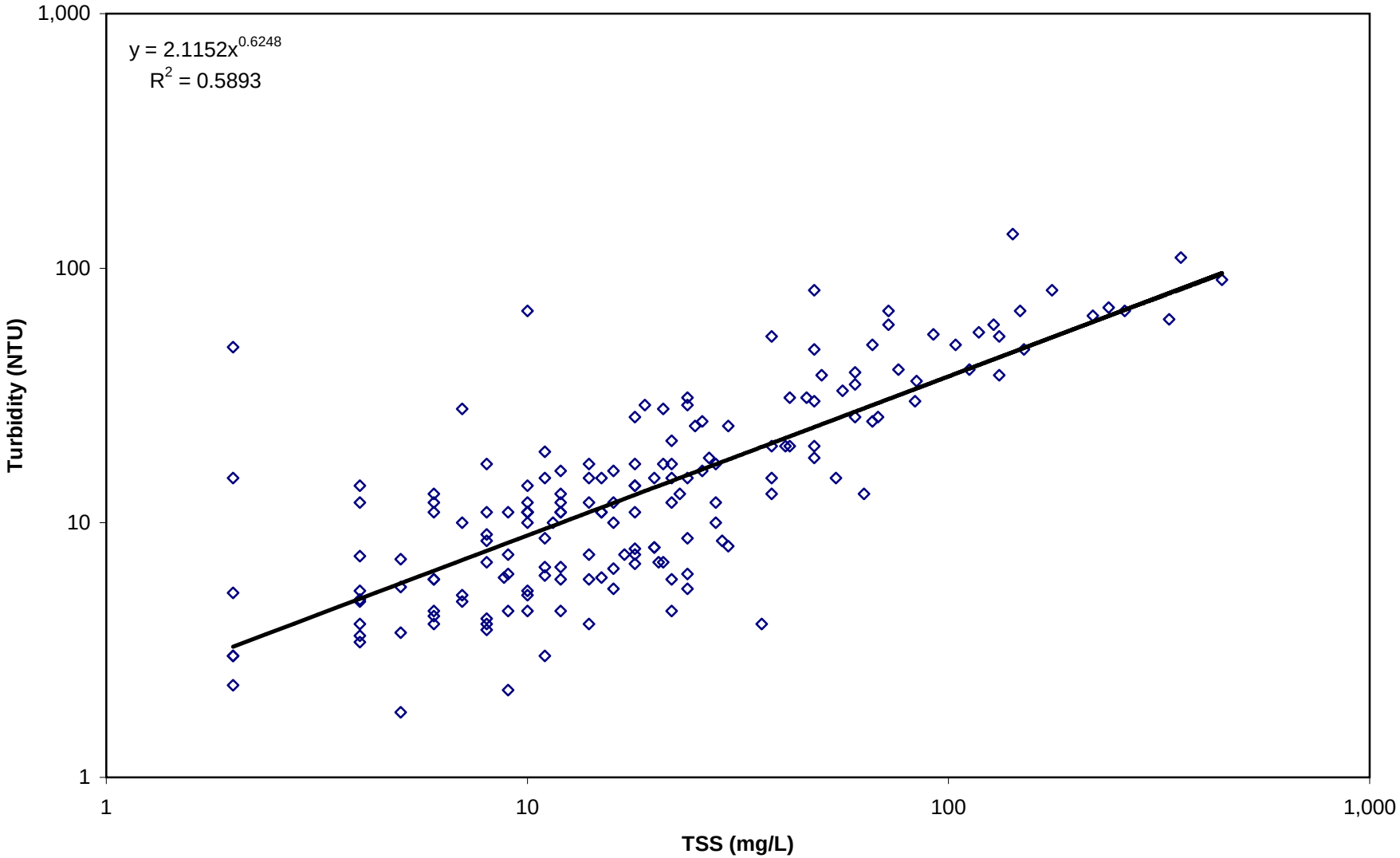


Figure C.33. Turbidity vs TSS for West Pearl River SE of Slidell, LA (LDEQ 105)

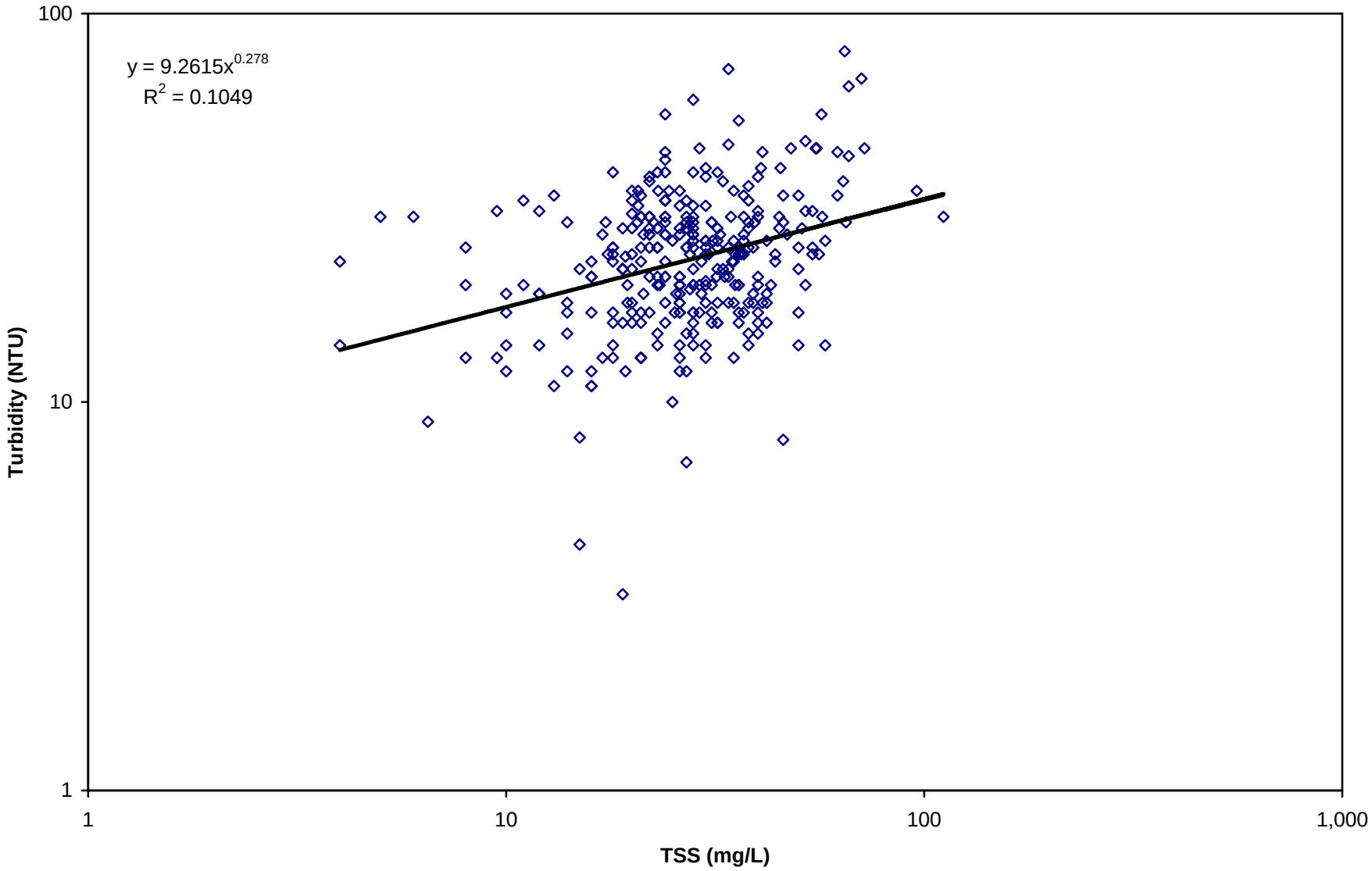


Figure C.34. Turbidity vs TSS for Holmes Bayou (LDEQ 1041)

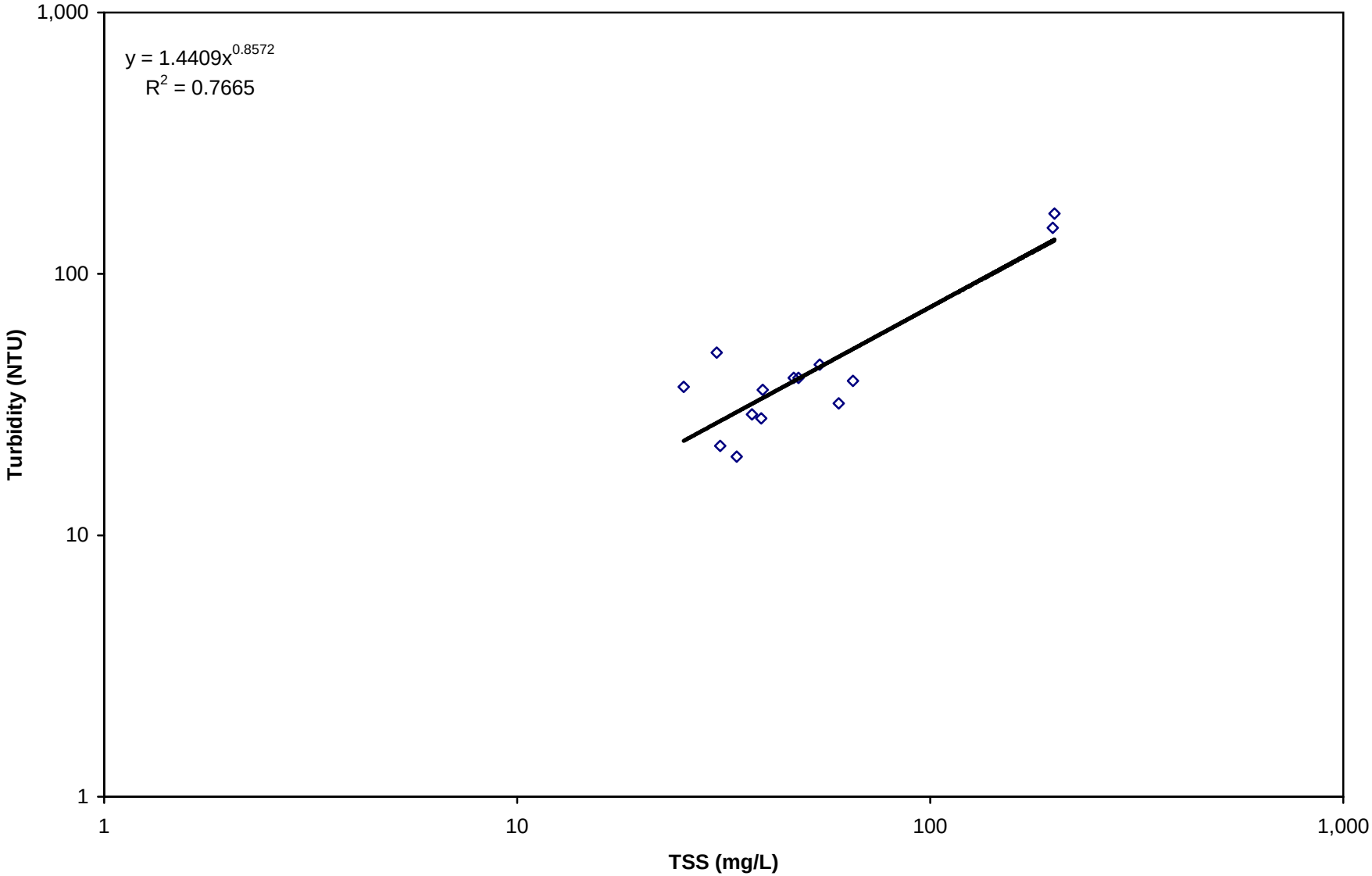
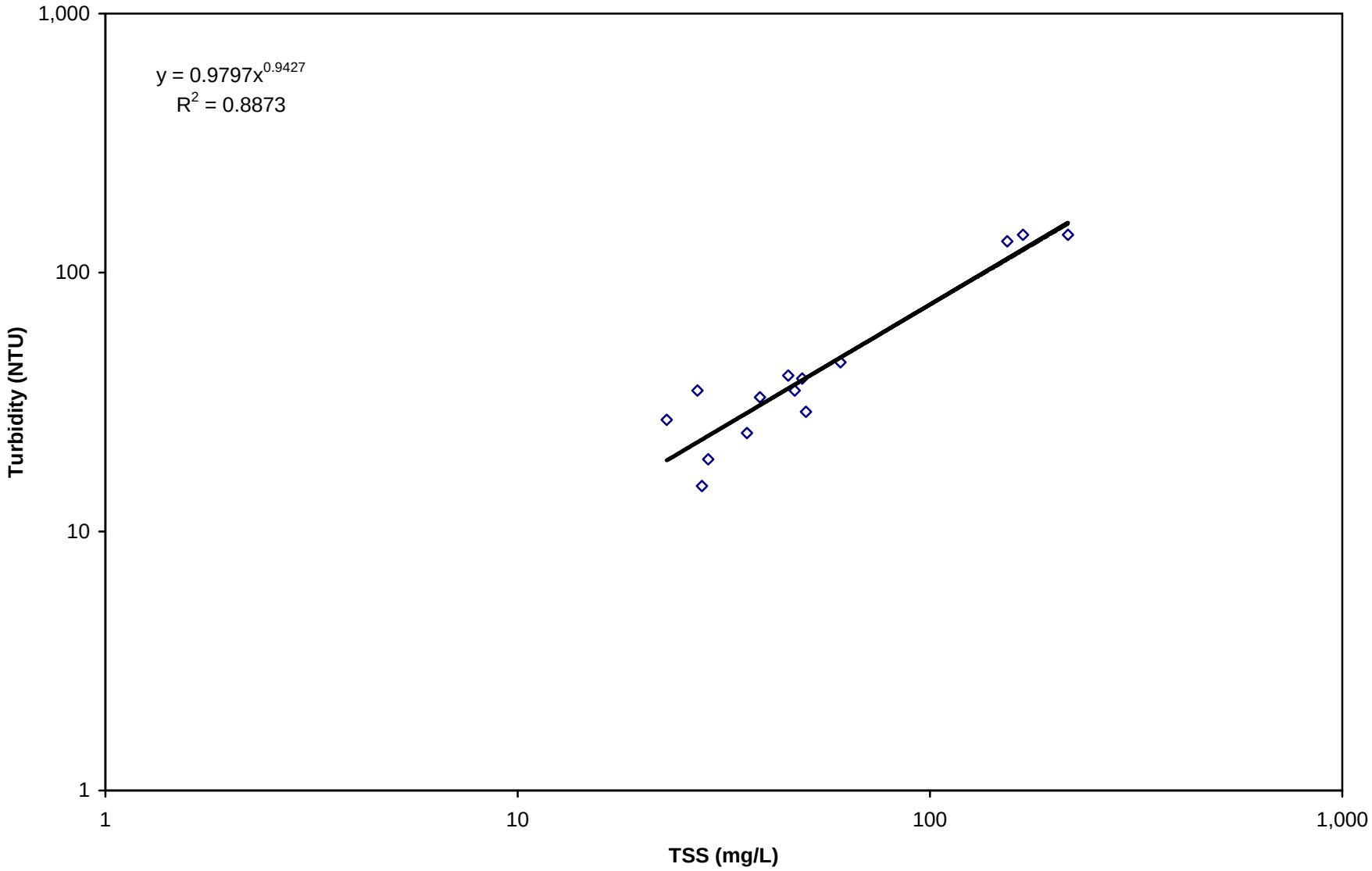


Figure C.35. Turbidity vs TSS for West Pearl River upstream of Pearl River Barge Canal (LDEQ 1042)



APPENDIX D

TMDL Calculations for 090501

TABLE D.1. ALLOWABLE TSS LOAD CALCULATIONS FOR BOGUE CHITTO RIVER NEAR BUSH (LDEQ (

TSS target[A] = 47 mg/L

Target load = 5.09E+05 lbs/day

Flow for Bogue Chitto River nr Bush (02492000), (cfs)	Percent exceedance	Width on plot between data points (percent)	TSS TMDL load (lbs/day)[B]	TSS TMDL - FG - MOS load (lbs/day)[C]	Area under TMDL Curve (TMDL width times TMDL load) (lbs/day)[D]
369	100.00%	0.003	9.35E+04	7.48E+04	2.79E+00
371	99.99%	0.004	9.41E+04	7.52E+04	3.74E+00
372	99.99%	0.004	9.43E+04	7.54E+04	3.75E+00
375	99.99%	0.005	9.51E+04	7.61E+04	4.73E+00
380	99.98%	0.008	9.63E+04	7.71E+04	7.67E+00
382	99.97%	0.013	9.68E+04	7.75E+04	1.25E+01
383	99.95%	0.014	9.71E+04	7.77E+04	1.35E+01
385	99.94%	0.009	9.76E+04	7.81E+04	8.74E+00
386	99.94%	0.006	9.79E+04	7.83E+04	5.84E+00
387	99.93%	0.006	9.81E+04	7.85E+04	5.86E+00
388	99.92%	0.007	9.84E+04	7.87E+04	6.85E+00
389	99.92%	0.009	9.86E+04	7.89E+04	8.83E+00
390	99.91%	0.010	9.89E+04	7.91E+04	9.84E+00
391	99.90%	0.009	9.91E+04	7.93E+04	8.88E+00
392	99.89%	0.012	9.94E+04	7.95E+04	1.19E+01
394	99.87%	0.015	9.99E+04	7.99E+04	1.49E+01
397	99.86%	0.009	1.01E+05	8.05E+04	9.01E+00
398	99.85%	0.006	1.01E+05	8.07E+04	6.02E+00
400	99.85%	0.008	1.01E+05	8.11E+04	8.07E+00
401	99.84%	0.006	1.02E+05	8.13E+04	6.07E+00

For brevity most of the rows have been hidden (between the 99.84% and 0.08% percent exceedances).

38,600	0.08%	0.004	9.79E+06	7.83E+06	3.90E+02
39,200	0.08%	0.005	9.94E+06	7.95E+06	4.94E+02
39,300	0.07%	0.006	9.96E+06	7.97E+06	5.95E+02
39,500	0.07%	0.005	1.00E+07	8.01E+06	4.98E+02
39,900	0.06%	0.004	1.01E+07	8.09E+06	4.03E+02
41,100	0.06%	0.004	1.04E+07	8.34E+06	4.15E+02
41,200	0.05%	0.004	1.04E+07	8.36E+06	4.16E+02
41,400	0.05%	0.004	1.05E+07	8.40E+06	4.18E+02
43,300	0.05%	0.004	1.10E+07	8.78E+06	4.37E+02
44,000	0.04%	0.004	1.12E+07	8.92E+06	4.44E+02
44,200	0.04%	0.004	1.12E+07	8.96E+06	4.46E+02
45,600	0.03%	0.004	1.16E+07	9.25E+06	4.60E+02
46,900	0.03%	0.004	1.19E+07	9.51E+06	4.73E+02
48,800	0.03%	0.004	1.24E+07	9.90E+06	4.92E+02
49,600	0.02%	0.004	1.26E+07	1.01E+07	5.01E+02
54,000	0.02%	0.004	1.37E+07	1.10E+07	5.45E+02
57,200	0.01%	0.004	1.45E+07	1.16E+07	5.77E+02
57,300	0.01%	0.004	1.45E+07	1.16E+07	5.78E+02
84,600	0.01%	0.004	2.14E+07	1.72E+07	8.54E+02
126,000	0.00%	0.003	3.19E+07	2.56E+07	9.54E+02
				Sum = Target load =	5.09E+05

NOTES: A. This target is based on the whole period of record for LDEQ station 0064.
B. This is the target for TSS (47.0 mg/L), times the flow per unit area to yield a “load“.
C. This is the load calculated as described in note A and reduced by 20% due to a FG of 10% and a M
D. This is the instantaneous load described in note A times a width to get an area that will be summed determine a total load.

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TABLE D.2. PERCENT REDUCTION CALCULATIONS FOR TSS FOR BOGUE CHITTO RIVER NEAR BUSH (LDEQ 0064)

Percent Red. = 66 %

Error check for reduction is/is not needed: OK

Error check more reduction needed/not needed: OK

Date[A]	Observed TSS at Station 64 (mg/L)	Flow per unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Observed TSS load (lbs/day)[B]	Reduced TSS load (lbs/day)[C]	Allowable TSS load (lbs/day)[D]	Reduced load less than or equal to allow load
2/10/1998	10.0	1700	29.99	9.17E+04	3.12E+04	3.45E+05	Yes
4/13/1998	11.0	1250	44.60	7.42E+04	2.52E+04	2.54E+05	Yes
6/8/1998	24.0	995	58.89	1.29E+05	4.38E+04	2.02E+05	Yes
7/13/1998	35.0	1030	56.36	1.94E+05	6.61E+04	2.09E+05	Yes
8/10/1998	28.5	821	73.44	1.26E+05	4.29E+04	1.67E+05	Yes
9/14/1998	36.0	1700	29.99	3.30E+05	1.12E+05	3.45E+05	Yes
10/12/1998	13.0	984	59.48	6.90E+04	2.35E+04	2.00E+05	Yes
11/17/1998	35.5	1550	33.87	2.97E+05	1.01E+05	3.14E+05	Yes
12/14/1998	110.0	948	62.29	5.62E+05	1.91E+05	1.92E+05	Yes
1/11/1999	4.0	1110	51.42	2.39E+04	8.14E+03	2.25E+05	Yes
2/8/1999	32.5	1980	24.43	3.47E+05	1.18E+05	4.02E+05	Yes
3/8/1999	13.0	879	68.22	6.16E+04	2.10E+04	1.78E+05	Yes
4/12/1999	8.0	1080	53.12	4.66E+04	1.58E+04	2.19E+05	Yes
5/11/1999	8.0	830	72.78	3.58E+04	1.22E+04	1.68E+05	Yes
6/15/1999	21.0	892	67.04	1.01E+05	3.44E+04	1.81E+05	Yes
7/12/1999	21.0	795	76.15	9.00E+04	3.06E+04	1.61E+05	Yes
8/9/1999	12.0	650	89.65	4.21E+04	1.43E+04	1.32E+05	Yes
9/13/1999	13.0	674	87.92	4.73E+04	1.61E+04	1.37E+05	Yes
10/11/1999	66.0	2130	22.19	7.58E+05	2.58E+05	4.32E+05	Yes
11/15/1999	7.5	592	93.89	2.39E+04	8.14E+03	1.20E+05	Yes
12/6/1999	14.0	625	91.55	4.72E+04	1.60E+04	1.27E+05	Yes
1/11/2000	58.7	1890	26.06	5.98E+05	2.03E+05	3.83E+05	Yes
2/8/2000	6.3	823	73.29	2.80E+04	9.51E+03	1.67E+05	Yes
3/14/2000	18.2	872	68.86	8.56E+04	2.91E+04	1.77E+05	Yes
4/11/2000	18.5	930	63.66	9.28E+04	3.16E+04	1.89E+05	Yes
5/9/2000	4.8	662	88.51	1.71E+04	5.83E+03	1.34E+05	Yes
6/13/2000	9.7	450	99.32	2.35E+04	8.00E+03	9.13E+04	Yes
7/11/2000	7.7	426	99.64	1.77E+04	6.02E+03	8.64E+04	Yes
8/8/2000	7.0	415	99.74	1.57E+04	5.33E+03	8.42E+04	Yes
9/12/2000	6.0	468	98.95	1.51E+04	5.15E+03	9.49E+04	Yes
10/3/2000	9.8	460	99.09	2.43E+04	8.27E+03	9.33E+04	Yes
12/5/2000	4.0	766	79.31	1.65E+04	5.62E+03	1.55E+05	Yes
1/16/2001	4.5	997	58.78	2.42E+04	8.23E+03	2.02E+05	Yes
2/13/2001	32.0	2020	23.75	3.49E+05	1.19E+05	4.10E+05	Yes
3/20/2001	46.0	3280	12.30	8.14E+05	2.77E+05	6.65E+05	Yes
4/17/2001	11.3	985	59.38	6.00E+04	2.04E+04	2.00E+05	Yes

Date[A]	Observed TSS at Station 64 (mg/L)	Flow per unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Observed TSS load (lbs/day)[B]	Reduced TSS load (lbs/day)[C]	Allowable TSS load (lbs/day)[D]	Reduced load less than or equal to allow load
5/15/2001	8.0	606	93.06	2.61E+04	8.89E+03	1.23E+05	Yes
6/12/2001	26.0	16300	0.89	2.29E+06	7.77E+05	3.31E+06	Yes
7/17/2001	17.5	1200	46.83	1.13E+05	3.85E+04	2.43E+05	Yes
8/14/2001	18.0	5920	5.23	5.75E+05	1.95E+05	1.20E+06	Yes
9/11/2001	30.0	3230	12.51	5.23E+05	1.78E+05	6.55E+05	Yes
10/9/2001	7.5	936	63.33	3.79E+04	1.29E+04	1.90E+05	Yes
11/6/2001	9.0	740	81.82	3.59E+04	1.22E+04	1.50E+05	Yes
12/11/2001	11.5	816	74.18	5.06E+04	1.72E+04	1.65E+05	Yes
1/14/2002	15.0	1460	36.68	1.18E+05	4.02E+04	2.96E+05	Yes
2/18/2002	9.5	1100	51.96	5.64E+04	1.92E+04	2.23E+05	Yes
3/12/2002	15.0	1380	39.34	1.12E+05	3.80E+04	2.80E+05	Yes
4/8/2002	21.5	1390	38.94	1.61E+05	5.48E+04	2.82E+05	Yes
5/13/2002	25.0	737	82.04	9.94E+04	3.38E+04	1.49E+05	Yes
6/10/2002	26.0	791	76.67	1.11E+05	3.77E+04	1.60E+05	Yes
7/15/2002	44.6	982	59.69	2.36E+05	8.03E+04	1.99E+05	Yes
8/12/2002	41.0	1300	42.29	2.87E+05	9.77E+04	2.64E+05	Yes
9/16/2002	10.5	607	92.99	3.44E+04	1.17E+04	1.23E+05	Yes
10/14/2002	42.7	2040	23.44	4.70E+05	1.60E+05	4.14E+05	Yes
11/19/2002	11.3	1670	30.77	1.02E+05	3.46E+04	3.39E+05	Yes
12/9/2002	18.8	1750	28.75	1.77E+05	6.03E+04	3.55E+05	Yes
1/21/2003	7.5	1100	51.96	4.45E+04	1.51E+04	2.23E+05	Yes
2/18/2003	70.0	5300	6.18	2.00E+06	6.80E+05	1.07E+06	Yes
3/25/2003	21.2	2020	23.75	2.31E+05	7.85E+04	4.10E+05	Yes
4/22/2003	12.5	1590	32.90	1.07E+05	3.64E+04	3.22E+05	Yes
5/20/2003	26.0	1060	54.28	1.49E+05	5.05E+04	2.15E+05	Yes
6/17/2003	62.0	3460	11.43	1.16E+06	3.93E+05	7.02E+05	Yes
7/22/2003	10.7	1770	28.31	1.02E+05	3.47E+04	3.59E+05	Yes
8/19/2003	19.5	965	60.88	1.01E+05	3.45E+04	1.96E+05	Yes
9/23/2003	30.7	1260	44.18	2.09E+05	7.09E+04	2.56E+05	Yes
10/21/2003	12.0	760	79.75	4.92E+04	1.67E+04	1.54E+05	Yes
11/12/2003	10.5	754	80.45	4.27E+04	1.45E+04	1.53E+05	Yes
12/16/2003	14.0	1140	49.71	8.61E+04	2.93E+04	2.31E+05	Yes
1/13/2004	22.5	1660	31.04	2.01E+05	6.85E+04	3.37E+05	Yes
2/10/2004	62.0	18800	0.61	6.29E+06	2.14E+06	3.81E+06	Yes
3/16/2004	28.0	1890	26.06	2.85E+05	9.70E+04	3.83E+05	Yes
4/13/2004	13.5	1070	53.63	7.79E+04	2.65E+04	2.17E+05	Yes
5/11/2004	13.5	960	61.16	6.99E+04	2.38E+04	1.95E+05	Yes
6/8/2004	26.5	1500	35.34	2.14E+05	7.29E+04	3.04E+05	Yes
7/7/2004	47.0	4470	8.00	1.13E+06	3.85E+05	9.07E+05	Yes
8/3/2004	16.0	976	60.13	8.42E+04	2.86E+04	1.98E+05	Yes

Table D.2 Percent Reductions for LDEQ 0064

Date[A]	Observed TSS at Station 64 (mg/L)	Flow per unit area on sampling day (cfs)	Percent exceedance for flow on sampling day	Observed TSS load (lbs/day)[B]	Reduced TSS load (lbs/day)[C]	Allowable TSS load (lbs/day)[D]	Reduced load less than or equal to allow load
8/31/2004	37.5	1230	45.48	2.49E+05	8.46E+04	2.49E+05	Yes
9/28/2004	9.0	723	83.38	3.51E+04	1.19E+04	1.47E+05	Yes
10/26/2004	6.0	864	69.61	2.80E+04	9.51E+03	1.75E+05	Yes
11/30/2004	43.0	2220	21.04	5.15E+05	1.75E+05	4.50E+05	Yes
1/11/2005	46.5	2320	19.86	5.82E+05	1.98E+05	4.71E+05	Yes
2/1/2005	29.0	2290	20.22	3.58E+05	1.22E+05	4.64E+05	Yes
2/22/2005	22.7	1700	29.99	2.08E+05	7.08E+04	3.45E+05	Yes
3/15/2005	10.5	1150	49.21	6.51E+04	2.21E+04	2.33E+05	Yes
4/5/2005	30.0	5770	5.47	9.34E+05	3.17E+05	1.17E+06	Yes
4/26/2005	15.0	1330	41.25	1.08E+05	3.66E+04	2.70E+05	Yes
5/17/2005	23.0	971	60.45	1.20E+05	4.10E+04	1.97E+05	Yes
6/14/2005	33.3	1130	50.19	2.03E+05	6.90E+04	2.29E+05	Yes
7/12/2005	26.0	890	67.20	1.25E+05	4.24E+04	1.80E+05	Yes
8/2/2005	10.0	1170	48.22	6.31E+04	2.15E+04	2.37E+05	Yes
8/23/2005	34.0	988	59.19	1.81E+05	6.16E+04	2.00E+05	Yes

Allowable Percent of Exceedances = 0.0%
Percent of Exceedances before Reductions = 6.6%
Percent of Exceedances after Reductions = 0.0%

Total allowable loading in subsegment 090501 to meet stds (from Table D.1) = 254.34 tons/day

Explicit MOS for TSS for Subsegment 090501 (10% * 2.54E+02) = 25.43 tons/day
Explicit FG for TSS for Subsegment 090501 (10% * 2.54E+02) = 25.43 tons/day

Exist. point source TSS load for Subseg. 090501 (from Table D.3) = 239.16 lbs/day = 0.12 tons/day

WLA for TSS for Subsegment 090501 (same as existing load) = 239.16 lbs/day = 0.12 tons/day

LA for TSS for Subsegment 090501 = TMDL - MOS - WLA - FG = 203.36 tons/day

NOTES: A. Only the data from the assessment period (Jan. 1, 1998 - Aug 23, 2005) is included.
B. This is the observed TSS concentration (mg/L) times the flow per unit area to yield a "load".
C. This is the load calculated as described in note B and reduced by 66% to allow none of the points above the “TMDL - MOS - FG“ line found in Figure D.2.
D. This is the criterion (47 mg/L) times the flow per unit area minus the 10% MOS and the 10% FG.

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Table D.2 Percent Reductions for LDEQ 0064

TABLE D.3. POINT SOURCE LOADS FOR SUBSEGMENT 090501.

Permit	Company	Outfall	Flow rate (GPD)	TSS conc (mg/L)	TSS load (lbs/day)
LAG110160 and LAG110089 (same facility)	Covington Paving Co.		13,148	45	4.94
LAG480093	State of LA Military Dept.	001	45,600	45	17.12
LAG490027	TXI - Isbel Sand & Gravel	001	10,000	50	4.17
LA0007889	Dairy Farmers of America	001	307,000	80	205.00
LAG110055	Thigpen Concrete Materials Inc.	001	10,000	50	4.17
LAG490019	Sun Minerals, LLC (near Sun, LA)	001	10,000	45	3.76
		TOTALS =	395,748	--	239.16

Notes:
1. Flow rate for Covington Paving Co. is average flow from LAG110089 DMRs for July 2005 through Sept. 2006.
2. For Dairy Farmers of America, TSS load was taken from permit and TSS concentration was back-calculated.
3. Flow rate of 10,000 gpd was assumed for permits with no flow information.

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Figure D.1. Flow duration curve for Bogue Chitto near Bush, LA (USGS 02492000)

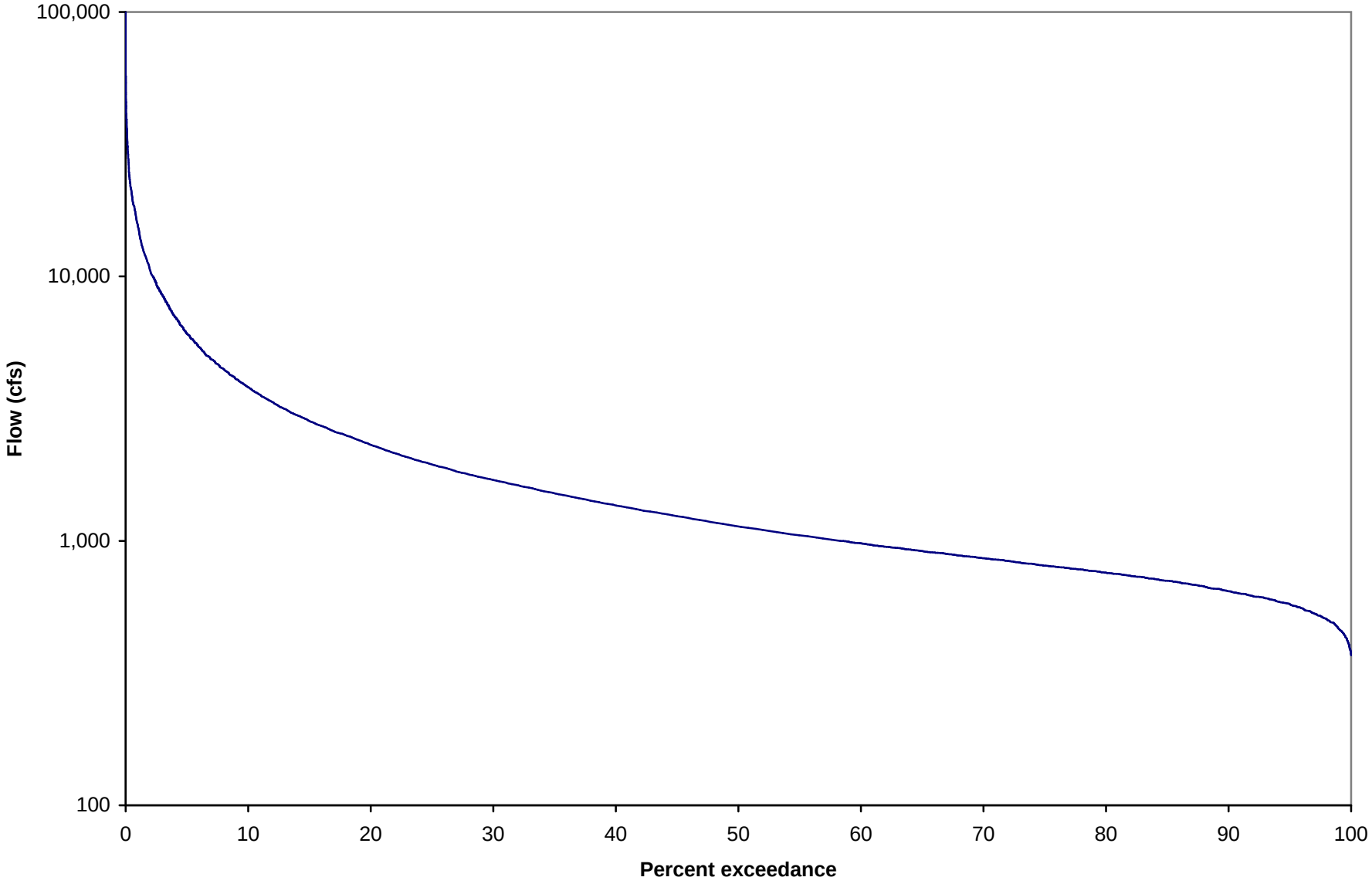
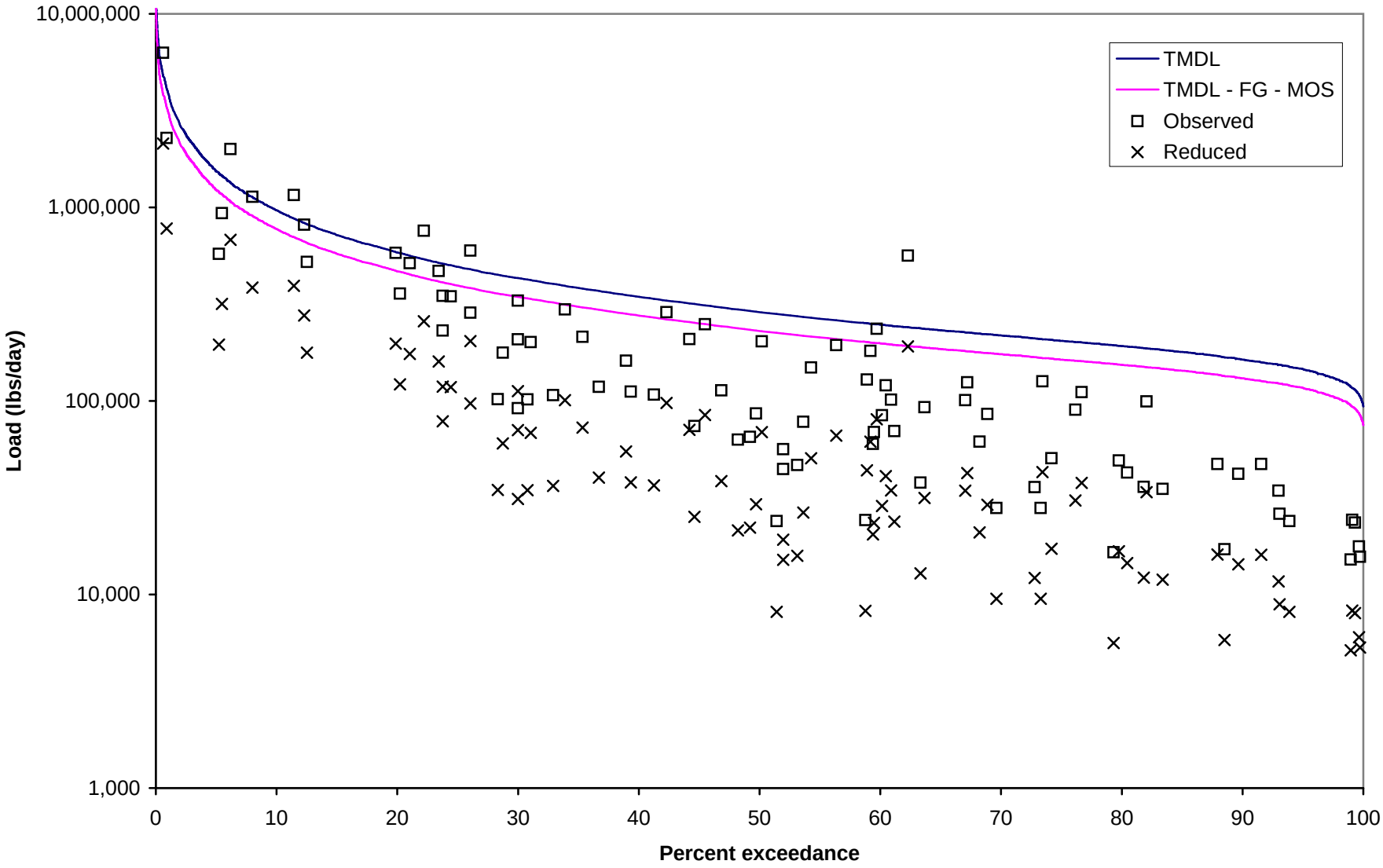


Figure D.2. Load duration curve for Bogue Chitto River (LDEQ 0064)



APPENDIX E

TMDL Calculations for 090201

TABLE E.1. ALLOWABLE TSS LOAD CALCULATIONS FOR WEST PEARL RIVER UPSTREAM FROM PEARL RIVER BARGE CANAL LOCK LOCK NO.1 (LDEQ (1042)

TSS target = 31 mg/L
Percent of flow at USGS 02492600 from West Peaarl River = 73%

Target load = 1,734,548.2 lbs/day

Flow at Pearl River near Pearl, LA (02492600), (cfs)	Flow in West Pearl River at DS end of subsegment, (cfs)	Percent exceedance	Width on plot between data points (percent)	TSS TMDL load (lbs/day)[A]	TSS TMDL - FG - MOS load (lbs/day)[B]	Area under TMDL Curve (TMDL width times TMDL load) (lbs/day)[C]
1,504	1,098	100.00%	0.006	1.84E+05	1.47E+05	1.18E+01
1,544	1,127	99.99%	0.010	1.88E+05	1.51E+05	1.81E+01
1,557	1,137	99.98%	0.021	1.90E+05	1.52E+05	3.95E+01
1,570	1,146	99.95%	0.027	1.92E+05	1.53E+05	5.21E+01
1,580	1,153	99.92%	0.026	1.93E+05	1.54E+05	4.94E+01
1,583	1,156	99.90%	0.030	1.93E+05	1.55E+05	5.88E+01
1,597	1,165	99.86%	0.034	1.95E+05	1.56E+05	6.55E+01
1,610	1,175	99.83%	0.026	1.96E+05	1.57E+05	5.03E+01
1,610	1,175	99.81%	0.024	1.97E+05	1.57E+05	4.72E+01
1,623	1,185	99.78%	0.030	1.98E+05	1.58E+05	6.02E+01
1,630	1,190	99.75%	0.021	1.99E+05	1.59E+05	4.14E+01
1,636	1,194	99.74%	0.016	2.00E+05	1.60E+05	3.20E+01
1,649	1,204	99.72%	0.026	2.01E+05	1.61E+05	5.15E+01
1,650	1,205	99.69%	0.021	2.01E+05	1.61E+05	4.19E+01
1,663	1,214	99.68%	0.010	2.03E+05	1.62E+05	1.95E+01
1,670	1,219	99.67%	0.006	2.04E+05	1.63E+05	1.30E+01
1,676	1,223	99.66%	0.008	2.05E+05	1.64E+05	1.64E+01
1,689	1,233	99.65%	0.010	2.06E+05	1.65E+05	1.98E+01
1,690	1,234	99.64%	0.008	2.06E+05	1.65E+05	1.65E+01
1,700	1,241	99.64%	0.008	2.08E+05	1.66E+05	1.66E+01

For brevity most of the rows have been hidden (between the 99.64% and 0.13% percent exceedances).

117,302	85,630	0.13%	0.006	1.43E+07	1.15E+07	9.16E+02
117,698	85,919	0.12%	0.006	1.44E+07	1.15E+07	9.19E+02
118,358	86,401	0.12%	0.006	1.44E+07	1.16E+07	9.25E+02
119,545	87,268	0.11%	0.006	1.46E+07	1.17E+07	9.34E+02
121,656	88,809	0.11%	0.006	1.48E+07	1.19E+07	9.50E+02
123,899	90,447	0.10%	0.006	1.51E+07	1.21E+07	9.68E+02
124,031	90,543	0.09%	0.006	1.51E+07	1.21E+07	9.69E+02
124,559	90,928	0.09%	0.006	1.52E+07	1.22E+07	9.73E+02
125,219	91,410	0.08%	0.006	1.53E+07	1.22E+07	9.78E+02
125,615	91,699	0.07%	0.006	1.53E+07	1.23E+07	9.81E+02
125,879	91,891	0.07%	0.008	1.54E+07	1.23E+07	1.23E+03
126,275	92,180	0.06%	0.010	1.54E+07	1.23E+07	1.48E+03
126,802	92,566	0.05%	0.008	1.55E+07	1.24E+07	1.24E+03
128,518	93,818	0.04%	0.006	1.57E+07	1.25E+07	1.00E+03
130,629	95,359	0.04%	0.006	1.59E+07	1.28E+07	1.02E+03
137,226	100,175	0.03%	0.006	1.67E+07	1.34E+07	1.07E+03
143,824	104,991	0.02%	0.006	1.76E+07	1.40E+07	1.12E+03
151,741	110,771	0.02%	0.006	1.85E+07	1.48E+07	1.19E+03
160,977	117,513	0.01%	0.006	1.96E+07	1.57E+07	1.26E+03
167,574	122,329	0.00%	0.006	2.05E+07	1.64E+07	1.31E+03
					Sum = Target load =	1.73E+06

NOTES: A. This is the target for TSS (31.0 mg/L), times the flow per unit area to yield a “load“.
B. This is the load calculated as described in note A and reduced by 20% due to a FG of 10% and a MOS of 10%.
C. This is the instantaneous load described in note A times a width to get an area that will be summed to determine a total load.

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TABLE E.2. PERCENT REDUCTION CALCULATIONS FOR TSS FOR WEST PEARL RIVER UPSTREAM FROM PEARL RIVER BARGE CANAL LOCK LOCK NO.1 (LDEQ (1042)

Percent Red. = 89 %

Error check for reduction is/is not needed: OK
Error check more reduction needed/not needed: OK

Date[A]	Observed TSS at Station 1042 (mg/L)	Flow in West Pearl River, (cfs)	Percent exceedance for flow on sampling day	Observed TSS load (lbs/day)[B]	Reduced TSS load (lbs/day)[C]	Allowable TSS load (lbs/day)[D]	Reduced load less than or equal to allow load
1/2/2001	168.0	8,698	33.40%	7.88E+06	8.67E+05	1.16E+06	Yes
3/6/2001	216.0	53,555	1.22%	6.24E+07	6.86E+06	7.16E+06	Yes
4/3/2001	45.3	8,496	34.07%	2.08E+06	2.28E+05	1.14E+06	Yes
5/1/2001	36.0	4,103	55.00%	7.97E+05	8.76E+04	5.49E+05	Yes
5/29/2001	50.0	3,208	64.59%	8.65E+05	9.52E+04	4.29E+05	Yes
6/26/2001	28.0	2,899	69.18%	4.38E+05	4.82E+04	3.88E+05	Yes
7/31/2001	154.0	15,123	21.22%	1.26E+07	1.38E+06	2.02E+06	Yes
8/28/2001	47.0	4,046	55.41%	1.03E+06	1.13E+05	5.41E+05	Yes
9/25/2001	23.0	3,670	58.98%	4.55E+05	5.01E+04	4.91E+05	Yes
10/23/2001	49.0	8,977	32.63%	2.37E+06	2.61E+05	1.20E+06	Yes
11/28/2001	29.0	2,880	69.59%	4.50E+05	4.96E+04	3.85E+05	Yes
						Allowable Percent of Exceedances =	0.0%
						Percent of Exceedances before Reductions =	72.7%
						Percent of Exceedances after Reductions =	0.0%

Total allowable loading in subsegment 090201 to meet stds (from Table E.1) = 8.7E+02 tons/day

Explicit MOS for TSS for Subsegment 090201 (10% * 8.67E+02) = 8.7E+01 tons/day
Explicit FG for TSS for Subsegment 090201 (10% * 8.67E+02) = 8.7E+01 tons/day

Existing point source TSS load for Subsegment 090201 = 0.0E+00 tons/day

WLA for TSS for Subsegment 090201 (same as existing point source load) = 0.0E+00 tons/day

LA for TSS for Subsegment 090201 = TMDL - MOS - WLA - FG = 6.9E+02 tons/day

NOTES: A. Only the data from the assessment period (Jan. 1, 1998 - Aug 23, 2005) is included.
B. This is the observed TSS concentration (mg/L) times the flow per unit area to yield a "load".
C. This is the load calculated as described in note B and reduced by 89% to allow none of the points above the “TMDL - MOS - FG“ line found in Figure E.2.
D. This is the criterion (mg/L) times the flow per unit area minus the 10% MOS and the 10% FG.

FILE: R:\PROJECTS\2110-623\TECH\TMDL\PEARL\TSS\LDEQ 1042 WEST OF PEARL RIVER TMDL.XLS

Figure E.1. Flow duration curve for West Pearl River

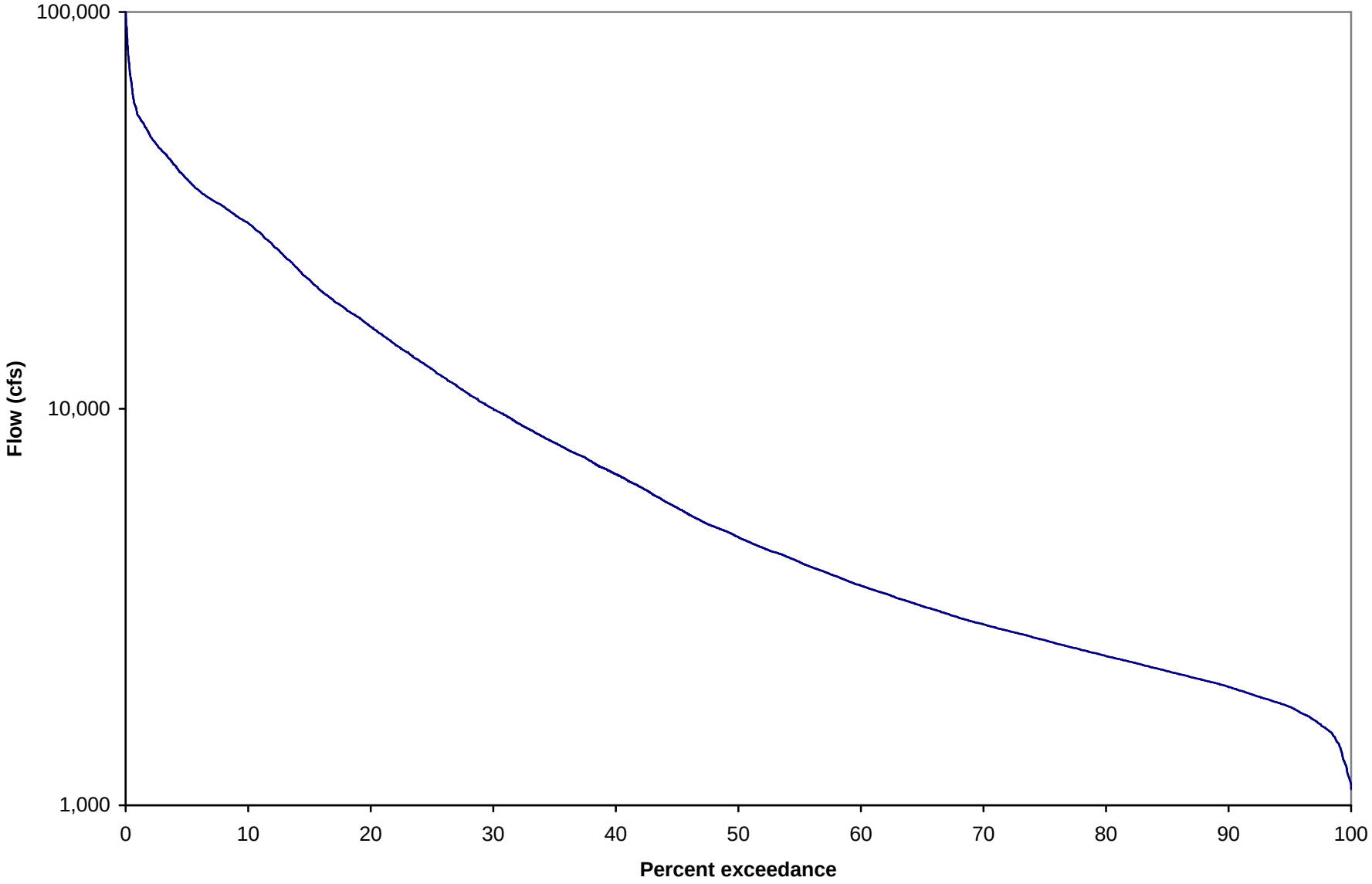
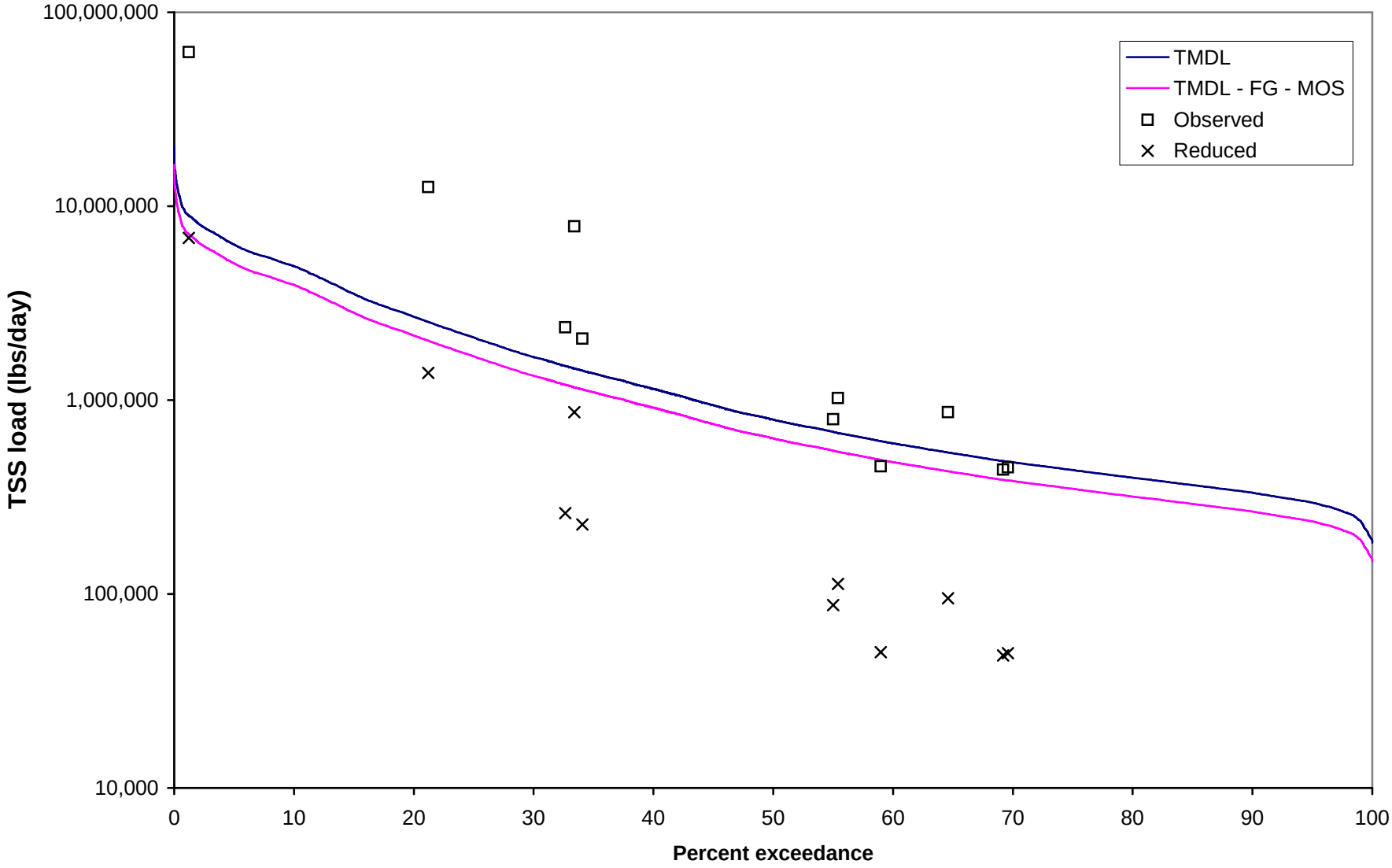


Figure E.2. Load duration curve for West Pearl River (LDEQ 1042)



APPENDIX F

TMDL Calculations for 090106

TABLE F.1. ALLOWABLE TSS LOAD CALCULATIONS FOR HOLMES BAYOU AT WEST PEARL RIVER (LDEQ 1041)

TSS target = 28 mg/L
Percent of flow at USGS 02492600 from Holmes Bayou = 27%

Target load = 579,460.2 lbs/day

Flow at Pearl River near Pearl, LA (02492600), (cfs)	Est flow at DS end of Holmes Bayou, (cfs)	Percent exceedance	Width on plot between data points (percent)	TSS TMDL load (lbs/day)[A]	TSS TMDL - FG - MOS load (lbs/day)[B]	Area under TMDL Curve (TMDL width times TMDL load) (lbs/day/)[C]
1,504	406	100.00%	0.006	6.13E+04	4.91E+04	3.93E+00
1,544	417	99.99%	0.010	6.30E+04	5.04E+04	6.04E+00
1,557	420	99.98%	0.021	6.35E+04	5.08E+04	1.32E+01
1,570	424	99.95%	0.027	6.40E+04	5.12E+04	1.74E+01
1,580	427	99.92%	0.026	6.44E+04	5.15E+04	1.65E+01
1,583	428	99.90%	0.030	6.46E+04	5.17E+04	1.96E+01
1,597	431	99.86%	0.034	6.51E+04	5.21E+04	2.19E+01
1,610	435	99.83%	0.026	6.56E+04	5.25E+04	1.68E+01
1,610	435	99.81%	0.024	6.57E+04	5.25E+04	1.58E+01
1,623	438	99.78%	0.030	6.62E+04	5.29E+04	2.01E+01
1,630	440	99.75%	0.021	6.65E+04	5.32E+04	1.38E+01
1,636	442	99.74%	0.016	6.67E+04	5.34E+04	1.07E+01
1,649	445	99.72%	0.026	6.73E+04	5.38E+04	1.72E+01
1,650	446	99.69%	0.021	6.73E+04	5.38E+04	1.40E+01
1,663	449	99.68%	0.010	6.78E+04	5.42E+04	6.51E+00
1,670	451	99.67%	0.006	6.81E+04	5.45E+04	4.36E+00
1,676	452	99.66%	0.008	6.83E+04	5.47E+04	5.47E+00
1,689	456	99.65%	0.010	6.89E+04	5.51E+04	6.61E+00
1,690	456	99.64%	0.008	6.89E+04	5.51E+04	5.51E+00

For brevity most of the rows have been hidden (between the 99.64% and 0.13% percent exceedances).

117,302	31,672	0.13%	0.006	4.78E+06	3.83E+06	3.06E+02
117,698	31,778	0.12%	0.006	4.80E+06	3.84E+06	3.07E+02
118,358	31,957	0.12%	0.006	4.83E+06	3.86E+06	3.09E+02
119,545	32,277	0.11%	0.006	4.87E+06	3.90E+06	3.12E+02
121,656	32,847	0.11%	0.006	4.96E+06	3.97E+06	3.17E+02
123,899	33,453	0.10%	0.006	5.05E+06	4.04E+06	3.23E+02
124,031	33,488	0.09%	0.006	5.06E+06	4.05E+06	3.24E+02
124,559	33,631	0.09%	0.006	5.08E+06	4.06E+06	3.25E+02
125,219	33,809	0.08%	0.006	5.11E+06	4.08E+06	3.27E+02
125,615	33,916	0.07%	0.006	5.12E+06	4.10E+06	3.28E+02
125,879	33,987	0.07%	0.008	5.13E+06	4.11E+06	4.11E+02
126,275	34,094	0.06%	0.010	5.15E+06	4.12E+06	4.94E+02
126,802	34,237	0.05%	0.008	5.17E+06	4.14E+06	4.14E+02
128,518	34,700	0.04%	0.006	5.24E+06	4.19E+06	3.35E+02
130,629	35,270	0.04%	0.006	5.33E+06	4.26E+06	3.41E+02
137,226	37,051	0.03%	0.006	5.60E+06	4.48E+06	3.58E+02
143,824	38,832	0.02%	0.006	5.86E+06	4.69E+06	3.75E+02
151,741	40,970	0.02%	0.006	6.19E+06	4.95E+06	3.96E+02
160,977	43,464	0.01%	0.006	6.56E+06	5.25E+06	4.20E+02
167,574	45,245	0.00%	0.006	6.83E+06	5.47E+06	4.37E+02
					Sum = Target load =	5.79E+05

NOTES: A. This is the target for TSS (28.0 mg/L), times the flow per unit area to yield a “load“.
B. This is the load calculated as described in note A and reduced by 20% due to a FG of 10% and a MOS of 10%.
C. This is the instantaneous load described in note A times a width to get an area that will be summed to determine a total load.

FILE: R:\PROJECTS\2110-623\TECH\TMDL\PEARL\TSS\LDEQ 1041 HOLMES BAYOU TMDL.XLS

TABLE F.2. PERCENT REDUCTION CALCULATIONS FOR TSS FOR HOLMES BAYOU AT WEST PEARL RIVER (LDEQ 1041)

Percent Red. = 89 %

Error check for reduction is/is not needed: OK
Error check more reduction needed/not needed: OK

Date[A]	Observed TSS at Station 1041 (mg/L)	Est flow in Holmes Bayou, (cfs)	Percent exceedance for flow on sampling day	Observed TSS load (lbs/day)[B]	Reduced TSS load (lbs/day)[C]	Allowable TSS load (lbs/day)[D]	Reduced load less than or equal to allow load
1/2/2001	198	3,217	33.40%	3.44E+06	3.78E+05	3.89E+05	Yes
3/6/2001	30	19,808	1.22%	3.25E+06	3.57E+05	2.39E+06	Yes
4/3/2001	47	3,142	34.07%	7.91E+05	8.71E+04	3.80E+05	Yes
5/1/2001	60	1,518	55.00%	4.91E+05	5.40E+04	1.83E+05	Yes
5/29/2001	65	1,186	64.59%	4.16E+05	4.58E+04	1.43E+05	Yes
6/26/2001	34	1,072	69.18%	1.97E+05	2.16E+04	1.30E+05	Yes
7/31/2001	200	5,593	21.22%	6.03E+06	6.64E+05	6.76E+05	Yes
8/28/2001	39	1,496	55.41%	3.15E+05	3.46E+04	1.81E+05	Yes
9/25/2001	37	1,357	58.98%	2.71E+05	2.98E+04	1.64E+05	Yes
10/23/2001	48	3,320	32.63%	8.60E+05	9.46E+04	4.01E+05	Yes
11/28/2001	31	1,065	69.59%	1.78E+05	1.96E+04	1.29E+05	Yes
					Allowable Percent of Exceedances =		0.0%
					Percent of Exceedances before Reductions =		100.0%
					Percent of Exceedances after Reductions =		0.0%

Total allowable loading in subsegment 090106 to meet stds (from Table F.1) = 2.9E+02 tons/day

Explicit MOS for TSS for Subsegment 090106 (10% * 2.90E+02) = 2.9E+01 tons/day
Explicit FG for TSS for Subsegment 090106 (10% * 2.90E+02) = 2.9E+01 tons/day

Existing point source TSS load for Subsegment 090106 = 0.0E+00 tons/day

WLA for TSS for Subsegment 090106 (same as existing point source load) = 0.0E+00 tons/day

LA for TSS for Subsegment 090106 = TMDL - MOS - WLA - FG = 2.3E+02 tons/day

NOTES: A. Only the data from the assessment period (Jan. 1, 1998 - Aug 23, 2005) is included.
B. This is the observed TSS concentration (mg/L) times the flow per unit area to yield a "load".
C. This is the load calculated as described in note B and reduced by 89% to allow none of the points above the “TMDL - MOS - FG“ line found in Figure F.2.
D. This is the criterion (28 mg/L) times the flow per unit area minus the 10% MOS and the 10% FG.

FILE: R:\PROJECTS\2110-623\TECH\TMDL\PEARL\TSS\LDEQ 1041 HOLMES BAYOU TMDL.XLS

Figure F.1. Flow duration curve for Holmes Bayou

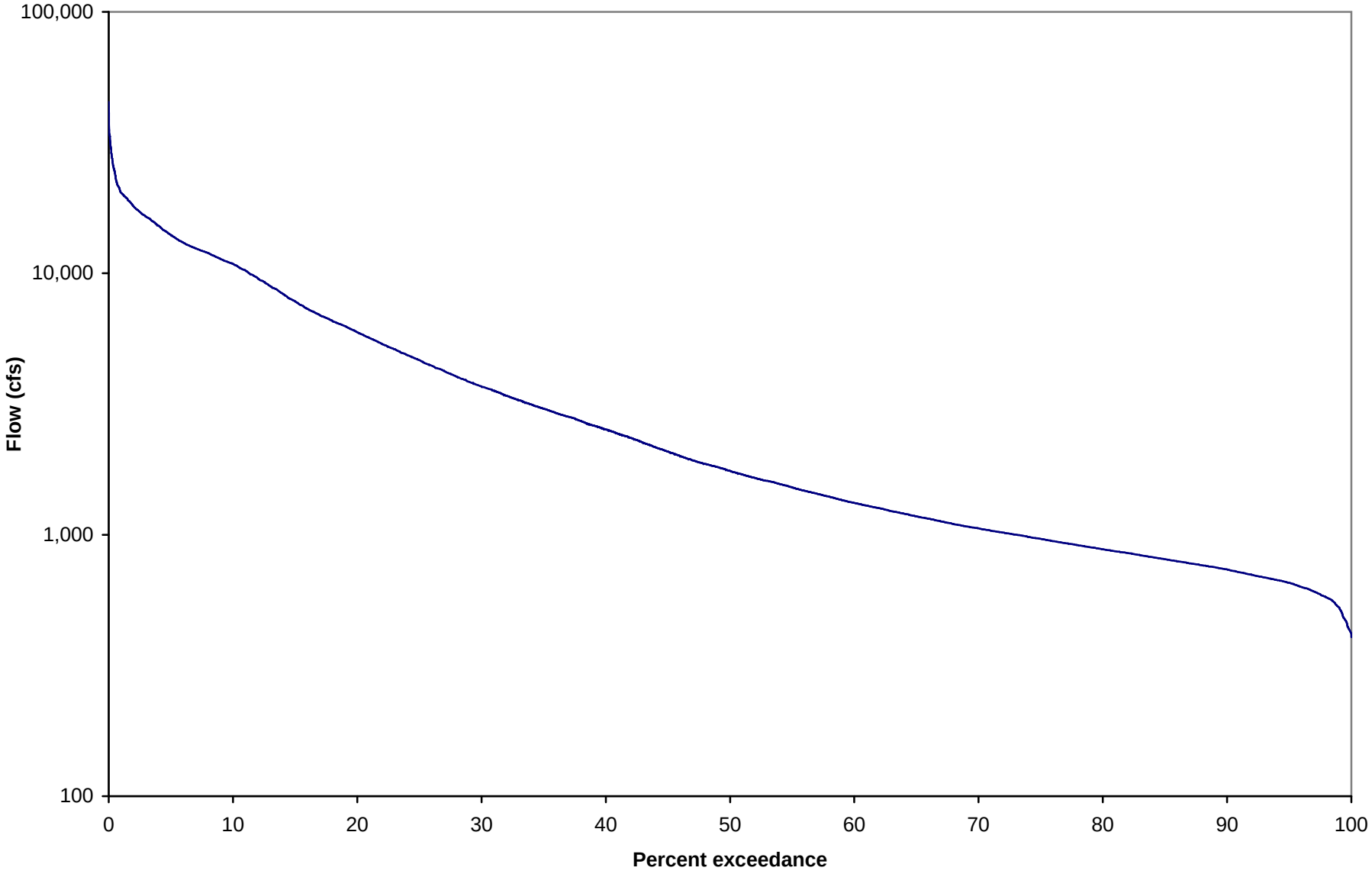
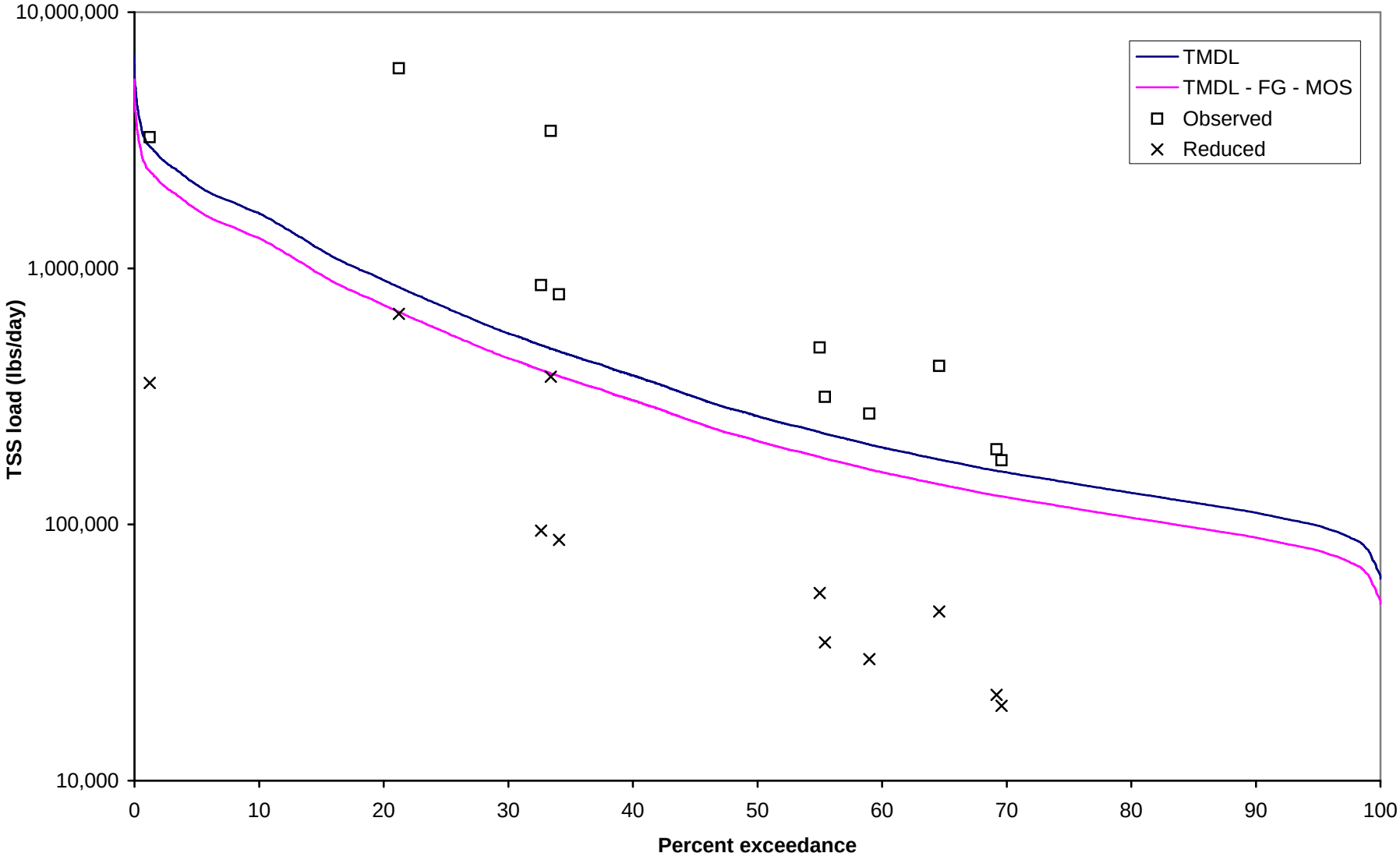


Figure F.2. Load duration curve for Homes Bayou (LDEQ 1041)



APPENDIX G

TMDL Calculations for 090202

TABLE G.1. ALLOWABLE TSS LOAD CALCULATIONS FOR PEARL RIVER (WEST) SE OF SLIDELL (LDEQ 0105)

TSS target[A] = 31 mg/L
Drainage area of flow gage = 8557 mi^2
Drainage area at DS end of sub = 8494 mi^2

Target load = 2.39E+06 lbs/day

Flow at Pearl River near Pearl, LA (02492600), (cfs)	Flow at DS end of Subsegment, (cfs)	Percent exceedance	Width on plot between data points (percent)	TSS TMDL load (lbs/day)[B]	TSS TMDL - FG - MOS load (lbs/day)[C]	Area under TMDL Curve (TMDL width times TMDL load) (lbs/day)[D]
1,504	1,515	100.00%	0.005	2.53E+05	2.03E+05	1.22E+01
1,544	1,555	99.99%	0.010	2.60E+05	2.08E+05	2.50E+01
1,557	1,569	99.98%	0.021	2.62E+05	2.10E+05	5.46E+01
1,570	1,582	99.95%	0.027	2.64E+05	2.12E+05	7.19E+01
1,580	1,592	99.92%	0.026	2.66E+05	2.13E+05	6.81E+01
1,583	1,595	99.90%	0.030	2.67E+05	2.13E+05	8.11E+01
1,597	1,608	99.86%	0.034	2.69E+05	2.15E+05	9.04E+01
1,610	1,622	99.83%	0.026	2.71E+05	2.17E+05	6.94E+01
1,610	1,622	99.81%	0.024	2.71E+05	2.17E+05	6.51E+01
1,623	1,635	99.78%	0.030	2.73E+05	2.19E+05	8.31E+01
1,630	1,642	99.75%	0.021	2.75E+05	2.20E+05	5.71E+01
1,636	1,648	99.74%	0.016	2.76E+05	2.20E+05	4.41E+01
1,649	1,662	99.72%	0.026	2.78E+05	2.22E+05	7.11E+01
1,650	1,662	99.69%	0.021	2.78E+05	2.22E+05	5.78E+01
1,663	1,675	99.68%	0.010	2.80E+05	2.24E+05	2.69E+01
1,670	1,682	99.67%	0.006	2.81E+05	2.25E+05	1.80E+01
1,676	1,688	99.66%	0.008	2.82E+05	2.26E+05	2.26E+01
1,689	1,701	99.65%	0.010	2.84E+05	2.28E+05	2.73E+01
1,690	1,703	99.64%	0.008	2.85E+05	2.28E+05	2.28E+01
1,700	1,713	99.64%	0.008	2.86E+05	2.29E+05	2.29E+01

For brevity most of the rows have been hidden (between the 99.64% and 0.13% percent exceedances).

117,302	118,172	0.13%	0.006	1.98E+07	1.58E+07	1.26E+03
117,698	118,571	0.12%	0.006	1.98E+07	1.59E+07	1.27E+03
118,358	119,235	0.12%	0.006	1.99E+07	1.59E+07	1.28E+03
119,545	120,432	0.11%	0.006	2.01E+07	1.61E+07	1.29E+03
121,656	122,559	0.11%	0.006	2.05E+07	1.64E+07	1.31E+03
123,899	124,818	0.10%	0.006	2.09E+07	1.67E+07	1.34E+03
124,031	124,951	0.09%	0.006	2.09E+07	1.67E+07	1.34E+03
124,559	125,483	0.09%	0.006	2.10E+07	1.68E+07	1.34E+03
125,219	126,148	0.08%	0.006	2.11E+07	1.69E+07	1.35E+03
125,615	126,546	0.07%	0.006	2.12E+07	1.69E+07	1.35E+03
125,879	126,812	0.07%	0.008	2.12E+07	1.70E+07	1.70E+03
126,275	127,211	0.06%	0.010	2.13E+07	1.70E+07	2.04E+03
126,802	127,743	0.05%	0.008	2.14E+07	1.71E+07	1.71E+03
128,518	129,471	0.04%	0.006	2.16E+07	1.73E+07	1.39E+03
130,629	131,598	0.04%	0.006	2.20E+07	1.76E+07	1.41E+03
137,226	138,244	0.03%	0.006	2.31E+07	1.85E+07	1.48E+03
143,824	144,890	0.02%	0.006	2.42E+07	1.94E+07	1.55E+03
151,741	152,866	0.02%	0.006	2.56E+07	2.04E+07	1.64E+03
160,977	162,171	0.01%	0.007	2.71E+07	2.17E+07	1.90E+03
167,574	168,817	0.00%	0.006	2.82E+07	2.26E+07	1.64E+03

Sum = Target load = 2.39E+06

NOTES: A. This target is based on the whole period of record for LDEQ station 0064.
B. This is the target for TSS (31.0 mg/L), times the flow per unit area to yield a “load“.
C. This is the load calculated as described in note A and reduced by 20% due to a FG of 10% and a MOS of 10%.
D. This is the instantaneous load described in note A times a width to get an area that will be summed to determine a total load.

FILE: R:\PROJECTS\2110-623\TECH\TMDL\PEARL\TSS\LDEQ 105 PEARL RIVER TMDL.XLS

TABLE G.2. PERCENT REDUCTION CALCULATIONS FOR TSS FOR PEARL RIVER (LDEQ 0105)

Percent Red. = 78 %

Error check for reduction is/is not needed: OK

Error check more reduction needed/not needed: OK

Date[A]	Observed TSS at Station 105 (mg/L)	Flow on sampling day (cfs)	Percent exceedance for flow on sampling day	Observed TSS load (lbs/day)[B]	Reduced TSS load (lbs/day)[C]	Allowable TSS load (lbs/day)[D]	Reduced load less than or equal to allow load
1/12/1998	21.0	74,705	1.14	8.46E+06	1.86E+06	9.99E+06	Yes
2/9/1998	11.0	34,960	12.32	2.07E+06	4.56E+05	4.68E+06	Yes
3/6/1998	12.0	37,751	11.18	2.44E+06	5.38E+05	5.05E+06	Yes
4/13/1998	28.0	7,470	45.97	1.13E+06	2.48E+05	9.99E+05	Yes
5/11/1998	51.0	6,168	51.92	1.70E+06	3.73E+05	8.25E+05	Yes
6/8/1998	65.0	4,506	63.87	1.58E+06	3.48E+05	6.03E+05	Yes
7/13/1998	39.0	3,921	70.28	8.25E+05	1.81E+05	5.25E+05	Yes
8/10/1998	37.0	3,390	78.19	6.76E+05	1.49E+05	4.53E+05	Yes
9/14/1998	12.0	3,655	74.10	2.37E+05	5.21E+04	4.89E+05	Yes
10/12/1998	26.0	3,629	74.48	5.09E+05	1.12E+05	4.85E+05	Yes
11/17/1998	54.0	4,347	65.40	1.27E+06	2.79E+05	5.81E+05	Yes
12/14/1998	24.0	3,868	71.02	5.01E+05	1.10E+05	5.17E+05	Yes
1/11/1999	9.5	15,021	27.97	7.70E+05	1.69E+05	2.01E+06	Yes
2/8/1999	48.0	53,038	4.81	1.37E+07	3.02E+06	7.09E+06	Yes
3/8/1999	26.0	15,818	26.92	2.22E+06	4.88E+05	2.12E+06	Yes
4/12/1999	23.0	9,916	38.57	1.23E+06	2.71E+05	1.33E+06	Yes
5/11/1999	47.0	4,081	68.18	1.03E+06	2.28E+05	5.46E+05	Yes
6/15/1999	18.0	3,164	82.19	3.07E+05	6.76E+04	4.23E+05	Yes
7/12/1999	62.0	3,363	78.67	1.12E+06	2.47E+05	4.50E+05	Yes
8/9/1999	26.0	2,353	96.00	3.30E+05	7.26E+04	3.15E+05	Yes
9/13/1999	40.0	2,565	92.95	5.54E+05	1.22E+05	3.43E+05	Yes
10/11/1999	36.0	5,955	53.29	1.16E+06	2.54E+05	7.97E+05	Yes
11/15/1999	37.0	2,579	92.73	5.15E+05	1.13E+05	3.45E+05	Yes
12/6/1999	45.0	2,539	93.39	6.16E+05	1.36E+05	3.40E+05	Yes
1/11/2000	40.7	5,104	58.72	1.12E+06	2.47E+05	6.83E+05	Yes
2/8/2000	23.3	2,845	88.12	3.57E+05	7.86E+04	3.81E+05	Yes
3/14/2000	111.2	5,264	57.62	3.16E+06	6.95E+05	7.04E+05	Yes
4/11/2000	56.8	42,005	9.17	1.29E+07	2.83E+06	5.62E+06	Yes
5/9/2000	25.3	3,908	70.46	5.33E+05	1.17E+05	5.23E+05	Yes
6/13/2000	37.0	2,167	97.82	4.32E+05	9.51E+04	2.90E+05	Yes
7/11/2000	54.0	2,034	98.71	5.92E+05	1.30E+05	2.72E+05	Yes
8/8/2000	29.0	2,246	97.18	3.51E+05	7.73E+04	3.00E+05	Yes
9/12/2000	19.0	1,755	99.52	1.80E+05	3.96E+04	2.35E+05	Yes
10/3/2000	34.7	1,728	99.61	3.23E+05	7.12E+04	2.31E+05	Yes
10/31/2000	36.5	1,569	99.98	3.09E+05	6.79E+04	2.10E+05	Yes
12/5/2000	20.0	2,964	85.81	3.20E+05	7.03E+04	3.97E+05	Yes

Date[A]	Observed TSS at Station 105 (mg/L)	Flow on sampling day (cfs)	Percent exceedance for flow on sampling day	Observed TSS load (lbs/day)[B]	Reduced TSS load (lbs/day)[C]	Allowable TSS load (lbs/day)[D]	Reduced load less than or equal to allow load
1/2/2001	66.0	12,003	33.40	4.27E+06	9.40E+05	1.61E+06	Yes
3/6/2001	45.3	73,907	1.22	1.81E+07	3.97E+06	9.89E+06	Yes
4/3/2001	17.0	11,724	34.07	1.08E+06	2.37E+05	1.57E+06	Yes
5/1/2001	29.3	5,663	55.00	8.95E+05	1.97E+05	7.57E+05	Yes
5/29/2001	44.0	4,426	64.59	1.05E+06	2.31E+05	5.92E+05	Yes
6/26/2001	20.0	4,001	69.18	4.32E+05	9.50E+04	5.35E+05	Yes
7/31/2001	70.8	20,870	21.22	7.97E+06	1.75E+06	2.79E+06	Yes
8/28/2001	32.5	5,583	55.41	9.79E+05	2.15E+05	7.47E+05	Yes
10/23/2001	28.0	12,389	32.63	1.87E+06	4.12E+05	1.66E+06	Yes
11/27/2001	27.5	3,642	74.27	5.40E+05	1.19E+05	4.87E+05	Yes
1/14/2002	17.5	9,996	38.36	9.44E+05	2.08E+05	1.34E+06	Yes
2/18/2002	17.3	15,021	27.97	1.40E+06	3.08E+05	2.01E+06	Yes
3/12/2002	19.5	6,606	49.72	6.95E+05	1.53E+05	8.84E+05	Yes
4/8/2002	20.6	15,818	26.92	1.76E+06	3.87E+05	2.12E+06	Yes
5/13/2002	38.0	3,150	82.42	6.46E+05	1.42E+05	4.21E+05	Yes
6/10/2002	35.3	3,204	81.53	6.10E+05	1.34E+05	4.29E+05	Yes
7/15/2002	35.0	3,602	74.95	6.80E+05	1.50E+05	4.82E+05	Yes
8/12/2002	38.0	4,267	66.33	8.75E+05	1.92E+05	5.71E+05	Yes
9/16/2002	40.0	2,060	98.60	4.45E+05	9.78E+04	2.76E+05	Yes
10/14/2002	31.2	18,477	23.64	3.11E+06	6.84E+05	2.47E+06	Yes
11/19/2002	28.0	16,084	26.59	2.43E+06	5.34E+05	2.15E+06	Yes
12/9/2002	21.3	13,067	31.39	1.50E+06	3.30E+05	1.75E+06	Yes
1/21/2003	16.0	6,567	49.90	5.67E+05	1.25E+05	8.78E+05	Yes
2/18/2003	22.5	28,712	15.21	3.48E+06	7.67E+05	3.84E+06	Yes
3/25/2003	23.1	21,933	20.24	2.73E+06	6.01E+05	2.93E+06	Yes
4/22/2003	24.5	52,240	5.03	6.90E+06	1.52E+06	6.99E+06	Yes
5/20/2003	37.0	7,723	45.12	1.54E+06	3.39E+05	1.03E+06	Yes
6/17/2003	55.3	22,066	20.11	6.58E+06	1.45E+06	2.95E+06	Yes
7/22/2003	34.0	7,776	44.95	1.43E+06	3.14E+05	1.04E+06	Yes
8/19/2003	30.5	7,364	46.32	1.21E+06	2.67E+05	9.85E+05	Yes
9/23/2003	35.3	4,307	65.87	8.20E+05	1.80E+05	5.76E+05	Yes
10/21/2003	33.3	4,440	64.48	7.97E+05	1.75E+05	5.94E+05	Yes
11/12/2003	24.0	2,911	86.86	3.77E+05	8.29E+04	3.89E+05	Yes
12/16/2003	25.5	7,630	45.45	1.05E+06	2.31E+05	1.02E+06	Yes
1/13/2004	20.0	24,060	18.41	2.60E+06	5.71E+05	3.22E+06	Yes
2/10/2004	64.5	54,500	4.43	1.90E+07	4.17E+06	7.29E+06	Yes
3/16/2004	24.0	27,782	15.71	3.60E+06	7.91E+05	3.72E+06	Yes
4/13/2004	34.0	4,599	62.92	8.43E+05	1.86E+05	6.15E+05	Yes
5/11/2004	55.0	5,211	58.03	1.55E+06	3.40E+05	6.97E+05	Yes
6/8/2004	34.5	28,579	15.27	5.32E+06	1.17E+06	3.82E+06	Yes

Table G.2 Percent Reductions for LDEQ 0105

Date[A]	Observed TSS at Station 105 (mg/L)	Flow on sampling day (cfs)	Percent exceedance for flow on sampling day	Observed TSS load (lbs/day)[B]	Reduced TSS load (lbs/day)[C]	Allowable TSS load (lbs/day)[D]	Reduced load less than or equal to allow load
7/7/2004	24.0	43,866	8.28	5.68E+06	1.25E+06	5.87E+06	Yes
8/3/2004	35.0	4,466	64.25	8.43E+05	1.85E+05	5.97E+05	Yes
8/31/2004	35.0	6,646	49.59	1.25E+06	2.76E+05	8.89E+05	Yes
9/28/2004	30.0	2,645	91.60	4.28E+05	9.42E+04	3.54E+05	Yes
10/26/2004	31.0	2,818	88.68	4.71E+05	1.04E+05	3.77E+05	Yes
11/30/2004	41.0	22,465	19.82	4.97E+06	1.09E+06	3.00E+06	Yes
1/11/2005	27.5	12,655	32.08	1.88E+06	4.13E+05	1.69E+06	Yes
2/1/2005	9.5	9,744	39.08	4.99E+05	1.10E+05	1.30E+06	Yes
2/22/2005	22.0	26,320	16.64	3.12E+06	6.87E+05	3.52E+06	Yes
3/15/2005	21.3	18,477	23.64	2.12E+06	4.67E+05	2.47E+06	Yes
4/26/2005	19.3	12,482	32.42	1.30E+06	2.86E+05	1.67E+06	Yes
5/17/2005	39.3	4,852	60.70	1.03E+06	2.26E+05	6.49E+05	Yes
6/14/2005	29.3	7,484	45.93	1.18E+06	2.60E+05	1.00E+06	Yes
7/12/2005	33.0	3,376	78.43	6.01E+05	1.32E+05	4.52E+05	Yes
8/2/2005	42.0	3,948	69.98	8.94E+05	1.97E+05	5.28E+05	Yes
8/23/2005	37.0	3,297	79.76	6.58E+05	1.45E+05	4.41E+05	Yes
						Allowable Percent of Exceedances =	0.0%
						Percent of Exceedances before Reductions =	67.4%
						Percent of Exceedances after Reductions =	0.0%

Total allowable loading per unit area to meet stds (from Table G.1) = 1196.9 tons/day

Explicit MOS for TSS for Subsegment 090202 (10% * 1.20E+03) = 119.7 tons/day
Explicit FG for TSS for Subsegment 090202 (10% * 1.20E+03) = 119.7 tons/day

Allowable point source TSS load from facilities in 090202 (from Table G.3) = 9.41 lbs/day = 0.005 tons/day
Allowable TSS load from Slidell MS4 (shown on same page as Table G.3) = 311.2 tons/day

Total WLA for subsegment 090202 = 0.005 + 311.2 = 311.205 tons/day

LA for TSS for Subsegment 090202 = TMDL - MOS - WLA - FG = 646.3 tons/day

NOTES: A. Only the data from the assessment period (Jan. 1, 1998 - Aug 23, 2005) is included.
B. This is the observed TSS concentration (mg/L) times the flow per unit area to yield a "load".
C. This is the load calculated as described in note B and reduced by 78% to allow none of the points above the “TMDL - MOS - FG“ line found in Figure G.2.
D. This is the criterion (31 mg/L) times the flow per unit area minus the 10% MOS and the 10% FG.

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TABLE G.3. POINT SOURCE LOADS FOR SUBSEGMENT 090202.

Permit	Company	Outfall	Flow rate (GPD)	TSS conc (mg/L)	TSS (lbs/day)
LAR05N644	Coastal Marine Contractors - Slidell	001	10,000	45	3.76
LA0106372	Durward Dunn Inc Slidell LA Yard	003	480	45	0.18
LAG110079	Standard Materials	001, 002, 006	10,000	45	3.76
LAG480062	Griffin Crane & Steel Service Inc.	002	200	45	0.08
LAG750516	LCW Properties LLC	001	140	45	0.05
LAG750414	ExxonMobil Corporation	001	4,240	45	1.59
		TOTALS FROM FACILITIES =	25,060		9.41

Notes:
1. Flow rate of 10,000 gpd was assumed for permits with no flow information.
2. TSS concentration of 45 mg/L was assumed for permits with no TSS limits.
3. Flows for LCW Properties and ExxonMobil were averages of values from 4 quarterly DMRs.

CALCULATION OF ALLOWABLE TSS LOAD FROM SLIDELL MS4:

Total allowable load for Subsegment 090202 (from Table G.2) =	1196.9	tons/day
Percent of Subsegment 090202 land area regulated by MS4 =	26%	
Allowable load for MS4 = 26% × 1196.9 tons/day =	311.2	tons/day
Allowable load from facilities (shown above) = 9.41 lbs/day =	0.005	tons/day
Total WLA for subsegment 090202 = 311.2 + 0.005 =	311.205	tons/day

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Figure G.1. Flow duration curve for Pearl River (USGS 02492000)

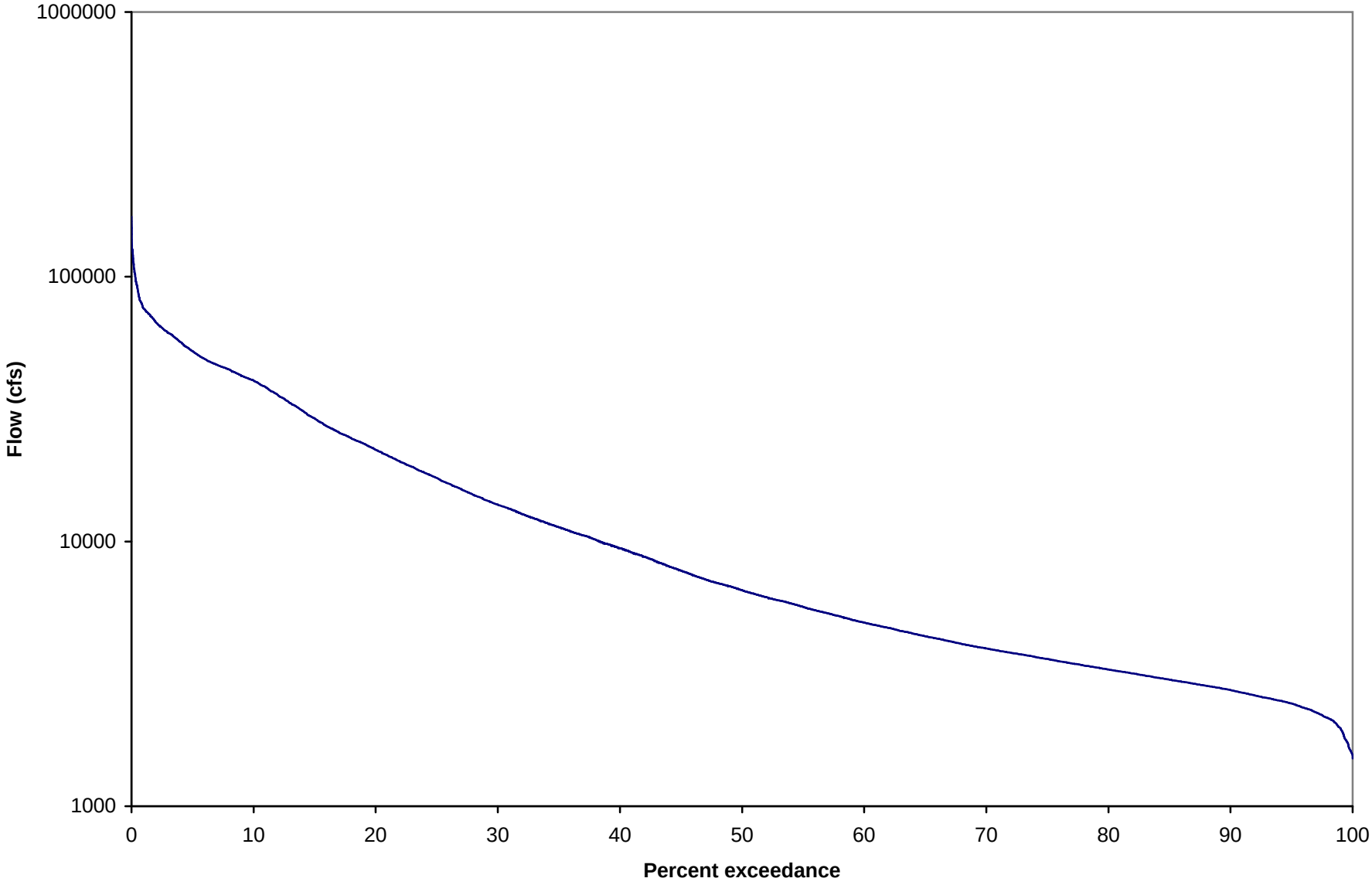
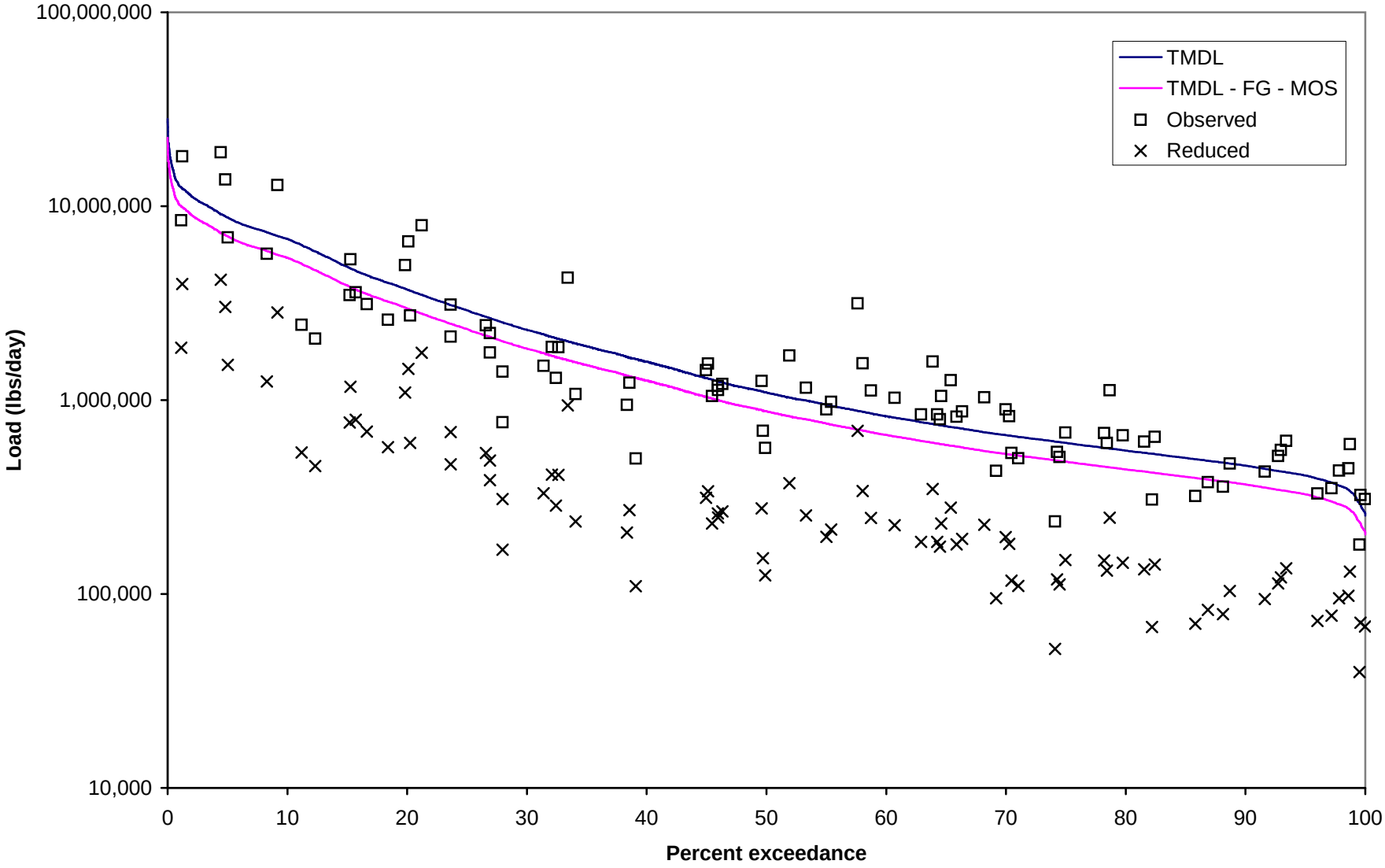


Figure G.2. Load duration curve for Pearl River (LDEQ 0105)



APPENDIX H

Public Comments and EPA Responses

LDEQ Comments 3/3/2008

March 3, 2008

Diane Smith, Environmental Protection Specialist
Mail Code: 6WQNP
Water Quality Protection Division
U.S. Environmental Protection Agency
Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

RE:Comments on Federal Register: February 1, 2008 (Volume 73, Number 22)
[FRL-8523-6] Clean Water Act Section 303(d): Availability of 16 Total Maximum Daily Loads (TMDLs) in Louisiana

Dear Ms. Smith:

The Louisiana Department of Environmental Quality appreciates the opportunity to review the above referenced Notice and hereby submits the enclosed comments on the TMDLs prepared by EPA Region 6 for waters listed in the Pearl River and the Terrebonne Basins in Louisiana.

If you have any questions, please contact me at 225-219-3554.

Sincerely,

David M. Hughes
Environmental Scientist
Water Quality Assessment Division

Enclosure(s)
c: (w/enclosure)
Linda Levy, LDEQ
Barbara Romanowsky, LDEQ

General Comments

1. If any unresolved LDEQ comments to these TMDLs become the basis for an EPA Region 6 objection of an LDEQ drafted permit or permittee objection/appeal of an LDEQ drafted permit, LDEQ shall relinquish permitting authority to EPA Region 6.

EPA Response: In accordance with Section 1.C of the NPDES MOA (Revision 1, April 28, 2004) between LDEQ and EPA, EPA has the responsibility of providing technical and other assistance on a continuing basis, including interpretation and implementation of Federal regulations, policies, and guidelines on permitting and enforcement matters. The MOA further states that LDEQ has primary responsibilities for implementing the LPDES program in Louisiana, including applicable sections of the Federal Clean Water Act, applicable state legal authority, the applicable requirements of 40 CFR Parts 122-125 and any other applicable federal regulations, establishing LPDES program priorities with consideration of EPA Region 6 and national NPDES goals and objectives.

In developing the TMDLs, EPA strives to use the most accurate available information for the point sources. Also, during the public comment period if any entity including LDEQ, permittee, or public has provided any significant data or information that is relevant to the calculations of the TMDLs, EPA has reviewed those data or information and revised the TMDLs as appropriate.

Specific Comments[1]

<u>TMDLs for Turbidity for Subsegments 090106, 090201, 090202 and 090501 in the Pearl River Basin, Louisiana</u>

1. Table D.3 WLA for Subsegment 090501
    a. GP15963, GP19019, GP7602 are not active facilities and should be removed from the TMDL.
    b. GP19020 was inspected in 1999. At the time they were told to apply for a permit, which they never did. It is unknown if the facility is in operation or has shut down. Contact should be attempted to make this determination.
    c. LAG490019, Sun Minerals LLC is not on this list of dischargers for subsegment 090501.

[1] The March 3, 2008 letter and TMDL responses from LDEQ address three TMDL reports, including this document. Specific comments to other TMDL reports have been omitted from this document and are addressed in their respective documents.

EPA Response: GP15963, GP19019, GP7602, and GP19020 have now been removed from the WLA calculations in Table D.3. These four permits had already been removed from Table B.1 in the draft version of this report but they were inadvertently kept in the WLA in Table D.3. LAG490019 has now been added to Table B.1 (the table listing all point sources) and it has been added to the WLA calculations in Table D.3.

2. Table G.3 WLA for Subsegment 090202
    a. LAG530926 was terminated 1/4/05. Facility now operates under LAG470208.
    b. LA0057339 was terminated 4/7/05.

EPA Response: LAG530926 and LA0057339 have been removed from Table B.1 and from the WLA calculations in Table G.3. LAG470208 has been added to Table B.1 and the WLA calculations in Table G.3.

LDEQ Summary of Persistent Problems with TMDLs Developed by EPA Region 6 for Louisiana Waters

For Parameters Other Than Dissolved Oxygen and Nutrients

1. Inadequate or erroneous science

    a. Application of in-stream criteria at "end-of-pipe" without allowing for mixing with upstream flow (resulting in unnecessarily stringent wasteload allocations).

EPA Response: Allowable point source loads in these turbidity TMDLs were not based on "end-of-pipe" permit limits.

    b. The use of inappropriate sites for flow data when more appropriate sites are available and/or faulty calculations of flow from available data (resulting in inaccurate TMDL calculations).

EPA Response: Flows for the Bogue Chitto River were appropriate because they were published data from the USGS gage near the downstream end of that subsegment. Flows for Holmes Bayou and the West Pearl River were the best estimates that could be made with the resources available. EPA believes that these flows are acceptable for developing TMDLs. No point source permits will be affected by the estimation of stream flows in these TMDLs. If more accurate stream flow data for Holmes Bayou and the West Pearl River become available in the future, then these TMDLs can be revised.

    c. The use of monthly water yield for flow data instead of measured flows is inappropriate and can result in inaccurate TMDL calculations.

EPA Response: No monthly water yields were used in this TMDL report.

    d. Water quality data supposedly copied from our web site often does not agree with the web site data (resulting in errors in the statistical analysis and causing inaccurate TMDL calculations).

EPA Response: During the development of these TMDLs, ambient water quality data were not available on LDEQ's web site. All ambient water quality data were obtained directly from LDEQ staff.

    e. The EPA uses average flow for TMDLs of chlorides, sulfates, and TDS rather than harmonic mean flow as called for by our regulations (resulting in inaccurate TMDL calculations).

EPA Response: This comment applies only to dissolved minerals TMDLs, not the turbidity TMDLs in this report.

f. The EPA has treated non-conservative parameters such as temperature and TSS as conservatives (resulting in unnecessarily stringent wasteload allocations and nonpoint percentage reductions).

EPA Response: TSS was treated as a conservative parameter in this report because resources and information were not available to estimate settling and resuspension in waterbodies. This is a common assumption for turbidity TMDLs across the United States that use TSS as a surrogate.

g. In a TMDL for temperature, the EPA calculated the heat content of a lake from 0^{o}C rather than 0^{o}K and failed to address evaporation from the lake.

EPA Response: This comment applies only to temperature TMDLs, not the turbidity TMDLs in this report.

2. A significant portion of the flow/watershed was not taken into consideration while calculating the TMDL (resulting in inaccurate TMDL calculations).

EPA Response: These TMDLs were calculated to include contributions from all parts of each watershed.

3. Combined point source wasteload allocations for an entire basin/segment/ subsegment that do not accommodate all existing dischargers and do not include a margin of safety/growth for existing facilities or addition of new facilities (possibly resulting in unnecessarily stringent wasteload allocations which could cause major restrictions to the number and size of future permit renewals and new permits).

   LDEQ TMDLs give facilities within the watershed, that are not a part of the model, allocations based on state policy. Thus all of the facilities that we are aware of within a subsegment are accounted for in the TMDL. LDEQ wasteload allocations contain a margin of growth to allow for facility expansions and new facilities. In those cases where the wasteload is increased or the discharge point is relocated, the Louisiana Technical Procedures provide that an increase in the total wasteload of 10 percent or more or a change in discharge location of 15 percent or more (of the wasteload) will trigger a recalculation of the TMDL and allocations.

EPA Response: Tables D.3 and G.3 in this report show allowable loads for each individual point source that discharges suspended solids that are primarily inorganic. The TMDLs also include an explicit margin of safety.

4. The EPA used weak correlations between TSS and turbidity to develop linear regression equations. From turbidity's numeric criteria, these equations were used to determine numeric criteria for TSS (resulting in EPA assigning numeric criteria for TSS to Louisiana streams, which conflicts with LDEQ's regulatory intentions). LDEQ takes exception to EPA's continued use of a TMDL "endpoint" in the absence of promulgated water quality criteria. TMDL's seriously impact both point and nonpoint sources and as such should not be capriciously developed for substances for which no numerical water quality criteria exists. While the methodology used for developing the endpoint is the methodology LDEQ uses for establishing water quality criteria, use of this number as the basis for a TMDL without promulgation is unacceptable.

EPA Response: The TSS targets for the TMDLs in this report were based on regressions for LDEQ stations 64, 1041, and 1042. The correlation coefficients (R squared) for each regression ranged from 0.566 to 0.887 (see Table 3.3 in the report). Regressions for the two stations with lower correlation coefficients (stations 65 and 105) were not used for developing TSS target concentrations. The correlation coefficients for stations 64, 1041, and 1042 were considered acceptable for this type of analysis; they indicate that the majority of the variation in TSS is accounted for by the variation in turbidity. EPA does not consider the use of TSS endpoints to constitute assignment of numeric criteria. See response to comment #11 concerning the use of endpoints for which there are no numeric criteria in the Water Quality Standards.

5. By definition, load-duration curves describe the contribution of each constituent as a function of overland flow. Most of the data trend shows an inverse relationship between flows and constituent concentrations (i.e., constituent concentrations decrease with increasing flow). This trend indicates that impairments are contributed by a constant background source. Because of these factors, the proposed BMPs, which seek to reduce constituent concentrations by mitigating overland inflows, could fail to yield even the slightest reduction in the targeted impairments.

EPA Response: The load duration approach includes flow and pollutant loadings from all sources (e.g., overland flow, subsurface seepage, pumped inflows, etc.). The portion of the comment about most of the data showing an inverse relationship between flows and constituent concentrations is not true for this report (as shown on Figures C.11 – C.15 and Figures C.26 – C.30 in Appendix C). No BMPs have been proposed in this report; selection of BMPs would be done during the implementation process.

6. Many of the load-duration curves are based on the relationship between flow and drainage area. This relationship is not valid for most of the targeted waterbodies. Most of these waterbodies are tidally influenced or they are controlled by man-made control structures.

EPA Response: Although several assumptions were used to estimate flows in Holmes Bayou and the West Pearl River, no flows were calculated based on drainage area.

7. The landuse data used in many of these reports appears to be 10-15 years old. Much of the landuse has changed within that time due to new agricultural practices/and crop-type changes, subsidence, and urban expansion.

EPA Response: The land use data in this report are from the USGS National Land Cover Dataset, which is based on aerial imagery during 2001. These are the most recent land use data that are available for the study area.

8. The EPA has, in several cases, added small point source dischargers to a LDEQ TMDL and subtracted that loading from the non-point "load allocation". We do not agree with this practice. The LDEQ TMDLs are specific to the 303(d) listed stream and are not calculated to apply to the entire watershed.

   To the extent that these small/distant dischargers impact the 303(d) stream, they were already accounted for in the LDEQ TMDL as part of the distributed non-point loading, and the EPA is therefore accounting for them twice. The LDEQ has recently started listing the known small/distant dischargers separately and giving them state policy limitations. EPA needs to do that as well in their TMDLs developed for Louisiana.

EPA Response: This comment does not apply to this TMDL report.

9. Discharges were estimated for the facilities with no justification as to how the estimates were calculated (which could result in inaccurately calculated WLA loads).

EPA Response: The point source information in this TMDL report was obtained from permits, applications, DMRs, and other documents on LDEQ's Electronic Document Management System (EDMS). Assumptions used to estimate point source loads were documented in Tables D.3 and G.3 in the report.

10. TMDL Load Calculations - Louisiana regulations state: "For chlorides, sulfates and total dissolved solids, criteria are to be met below the point of discharge after complete mixing. Because criteria are developed over a long-term period, harmonic mean flow will be applied for mixing." (33:IX.1115.C.8) The flow which should have been used to calculate both the current and TMDL loadings should have been the harmonic mean flow.

EPA Response: This comment applies only to dissolved minerals TMDLs, not the turbidity TMDLs in this report.

11. LDEQ strongly objects to establishing a TMDL for a constituent which does not have a numerical water quality criteria especially when a valid constituent which does have a criteria is available for use in protecting the water from the same type of pollution. The sources of input data for this TMDL are not adequately documented. An adequate

margin of safety was not used in the establishment of the TMDL. Numerous point source and nonpoint sources were not identified and received no allocations in the TMDL. LDEQ expects the same high standard of data documentation, presentation and justification from EPA which is required in the TMDLs prepared by LDEQ. EPA has not met this standard.

EPA Response: In cases where the water quality impairment is based on a parameter for which there is a numeric criterion but for which allocations do not make sense (e.g. dissolved oxygen and turbidity), TMDLs are expressed using parameters that are causing the impairment but have no numeric criterion. For cases where TSS is truly the primary cause for turbidity, EPA believes that this is conceptually similar to DO TMDLs developed by LDEQ and others. LDEQ takes waterbodies that are impaired due to DO (for which there is a numeric criterion) and expresses the TMDLs in terms of CBOD, NBOD, and SOD. These three parameters are the primary cause of DO violations but there are no numeric criteria for any of the three parameters. In both cases, the subsegment is considered impaired due to the parameter that has a numeric criterion (turbidity or DO), and the TMDLs are being expressed as allowable loads of other parameters for which there is no numeric criterion (TSS or BOD).

EPA strives to provide good documentation of input data and other information in TMDL reports and will continue to do so.

For these TMDLs, the explicit margin of safety and the future growth combined were 20% of the allowable loading. This is consistent with guidance in the *Standard Operating Procedure for Louisiana Maximum Daily Load Technical Procedures* document (LTP).

EPA believes that the comment about numerous point sources not being identified is incorrect. Initial point source information was obtained from LDEQ using their internal databases. Documents in EDMS were then reviewed for pertinent information.

12. The EPA has developed TMDLs for parameters that are not on the court ordered list or that should, by their own stated justification, have been delisted (resulting in unnecessary load restrictions as well as increased workload for EPA and LDEQ staff).

EPA Response: All of the TMDLs in this report addressed impairments on the 2004 approved 303(d) list. These impairments were put on the 303(d) list by LDEQ.

13. Cocodrie Lake is not on the court ordered list for these parameters. EPA claims that it is mentioned in a consent order, but the LDEQ has no documentation of that order.

EPA Response: This comment does not apply to this TMDL report.

For Dissolved Oxygen and Nutrients

EPA Response: The remaining comments below do not apply to this TMDL report.

1. Inadequate or erroneous science
    a. The use of inappropriate sites for flow data when more appropriate sites are available and/or faulty calculations of flow from available data (resulting in inaccurate TMDL calculations).
    b. Incorrect calculations/determinations of critical flows.
    c. Inappropriate use of LDEQ's defaults for calibration and projection modeling.
    d. Omission of hydrologic data which was used as the basis for the TMDL is unacceptable.
    e. Omission of field notes, measurements, and lab reports which were used as the basis for the TMDL is unacceptable.
    f. The amount of data actually collected is inadequate to support the TMDL model and conclusions.
    g. The calibration is not calibrated acceptably or adequately.
    h. Inappropriate interpretation and use of Chlorophyll a data.
    i. Inadequate data to appropriately analyze the tributaries.
    j. Omission of key tributaries.

2. Incomplete and/or inaccurate discharger inventory
    a. Some known facilities are missing.
    b. Apparently the DMRs were not reviewed.
    c. Discharges were estimated for the facilities with no justification as to how the estimates were calculated (which could result in inaccurately calculated WLA loads).
    d. Loads were estimated for the facilities with no justification as to how the estimates were calculated.
    e. Overly conservative handling of dischargers:

        The EPA has, in several cases, added small point source dischargers to a LDEQ TMDL and subtracted that loading from the non-point "load allocation". We do not agree with this practice. The LDEQ TMDLs are specific to the 303(d) listed stream and are not calculated to apply to the entire watershed.

        To the extent that these small/distant dischargers impact the 303(d) stream, they were already accounted for in the LDEQ TMDL as part of the distributed non-point loading, and the EPA is therefore accounting for them twice. The LDEQ has recently started listing the known small/distant dischargers separately and giving them state policy limitations. EPA needs to do that as well in their TMDLs developed for Louisiana.

3. Water quality data supposedly copied/downloaded from our web site often does not agree with the web site data (resulting in errors in the statistical analysis and causing inaccurate TMDL calculations).

4. The presence of a year-round criterion for DO does not relieve EPA of the responsibility to perform winter season projection modeling.

5. Inconsistencies between the Tabular information presented in the report and the same information presented in the Appendices. Inadequacies in the information presented (missing overlay files for example).

6. Inappropriate determinations/use of the MOS.

7. The Consultants confuse information from one TMDL with information from another. Remnant tables and sentences from some previous TMDL appear in the report. Before delivering reports to Region 6, EPA's paid consultants should be responsible for carefully proofing final submittals and checking for errors made when cutting and pasting language among multiple TMDL reports.

8. The poor quality of all EPA TMDLs is a direct result of inadequate funding. The Consultants do not gather enough field data, measurements or samples to support the development of technically sound and complete TMDLs.

9. The EPA has developed TMDLs for parameters that are not on the court ordered list or that should, by their own stated justification, have been delisted (resulting in unnecessary load restrictions assigned to sources as well as increased workload for EPA and LDEQ staff).