BAYOU CHAUVIN WATERSHED TMDL
FOR BIOCHEMICAL OXYGEN-DEMANDING SUBSTANCES
AND NUTRIENTS

Subsegment 080102

SURVEYED 09/25/1994 – 10/05/1994 AND 5/31/2000 – 6/01/2000

TMDL REPORT

VOLUME 1

Engineering Group 2
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EXECUTIVE SUMMARY

This report presents the results of a watershed based, calibrated modeling analysis of Bayou Chauvin. The modeling was conducted to establish a TMDL for biochemical oxygen-demanding pollutants for the Bayou Chauvin watershed. The bayou is listed on the 2000 305(b) list as being impaired due to organic enrichment/low DO, requiring the development of a total maximum daily load (TMDL) for dissolved oxygen. It is also listed on the court-ordered 303(d) list as impaired due to nutrients, requiring the development of a total maximum daily load (TMDL) for nutrients. A map showing the bayou and the location of dischargers and a land use map may be found in Appendix A. There are no significant tributaries. The Bayou Chauvin watershed comprises the lower portion of Subsegment 080102 and is 94 square kilometers in area.. The area is heavily populated and land use is dominated by suburban communities and wetland. The upper portion of the subsegment is made up of the Lonewa Bayou and River Styx watersheds. This TMDL is for both DO and nutrients and is limited to the Bayou Chauvin watershed.

Bayou Chauvin is located in northeast Louisiana, just north of Monroe. The bayou originally drained Chauvin Swamp to the Ouachita River. Ouachita River overflow often flooded this area prior to completion of the east bank Ouachita River Levee in 1937. The levee includes floodgates in the natural drains of Bayou Chauvin, River Styx, and Lonewa Bayou. In the early 1950's the Louisiana Department of Public Works constructed the L-11 Canal cutting through the natural banks of Bayou De Siard to provide Chauvin Swamp an outlet to Little Bayou Boeuf thence to Bayou LaFourche. The watercourse that is herein referred to as Bayou Chauvin originates in a pooled reach of L-11 Canal just west of the junction of Caney Creek and east of Highway 139 and, at moderate to low flow conditions, flows in a westerly direction through Chauvin Swamp to the Ouachita River. The portion of Bayou Chauvin above Highway 165 has been channelized. West of Highway 165, Bayou Chauvin flows through a natural streambed to the Ouachita River Levee. The modeled reach extends from headwaters at Highway 139 to the Ouachita River Levee.

Bayou Chauvin cuts across the Bayou De Siard watershed just east of Joe White Road. Bayou De Siard is conveyed from the north to the south side of Bayou Chauvin by a siphon under Chauvin. Much of the flow in Bayou Chauvin comes from two Bayou De Siard overflow weirs located near either end of the siphon. The weirs are constructed of stacked timbers and a some flow leaks through these timbers even when there is no overflow. There is another overflow weir on Bayou De Siard at Hogg Bayou swamp that conveys some additional flow to Bayou Chauvin via the swamp.

Under low flow conditions, leakage through the weirs and sewage treatment facility discharges provide the flow in Bayou Chauvin. Headwater flow from the pooled reach at the junction of Caney Creek, although present, is minimal. The critical low flow for projection modeling was based on this condition. Input data for the calibration model was developed from data collected during a September, 1994 intensive survey. Modeling was limited to low flow scenarios for both the calibration and the projections since the constituent of concern was dissolved oxygen and the available data was limited to low flow conditions. The model used was LAQUAL, a windows version of QUAL-TX, modified to address some specific needs of Louisiana waters.

It is projected that the water quality standard for dissolved oxygen of 5.0 mg/l can be maintained during the summer critical season with an 80 to 100% reduction of man-made nonpoint loading plus limitations on point source dischargers. The extreme reduction of man-made loading required to meet criteria demonstrates that the summer season dissolved oxygen criteria of 5.0 mg/l is inappropriate for a man-made suburban drainage canal.

The winter model run projected that a reduction of nonpoint load of 60 percent would be required to meet the dissolved oxygen criterion. A reduction of 60 percent may possibly be achievable by improvements in the sewage treatment facilities and BMPs to reduce the impact of stormwater run-off. If necessary or desirable, the percent reduction of benthic load could be reduced further, accompanied by a tightening of the limitations on Oakwood Pond #2.

Table 1 is a summary of the percent reduction of man-made benthic load and the point source load allocations needed to meet stream dissolved oxygen criteria. Table 2 is a summary of the TMDLs.

Table 1. Benthic Load Reductions and Wasteload Allocations

Model reach	Percent summer reduction of man-made benthic load	Percent winter reduction of man-made benthic load	Facility name	WLA as CBOD5/NH3-N/DO	
				Summer	Winter
1	100	60			
2	100	60			
4	100	60			
5	80	60			
6	80	60	Leisure Village	16/8/5	Secondary
7	80	60	Oakwood Pond #2	8/4/5	20/10/5
8	80	60			
10	80	60			
11	80	60			
13	80	60	North Monroe SD #1	Secondary	Secondary
14	0	0			
16	0	0			
18	0	0			

Table 2. Total Maximum Daily Load (Sum of CBOD, NH3-N, and SOD)

Allocation	Summer (May-Oct)		Winter (Nov-Apr)	
	Kgm/day	Lbs/day	Kgm/day	Lbs/day
Point Source WLA	210	463	584	1288
Point Source Reserve MOS	53	117	146	322
Natural Nonpoint Source LA	97	214	67	148
Natural Nonpoint Source Reserve MOS	0	0	0	0
Manmade Nonpoint Source LA	53	117	100	221
Manmade Nonpoint Source Reserve MOS	15	33	25	55
TMDL	428	944	922	2034

LDEQ will work with other agencies such as local Soil Conservation Districts to implement agricultural 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 five-year cycle with two targeted basins sampled each year. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the five-year cycle. Sampling is conducted on a monthly basis or more frequently if necessary to yield at least 12 samples per site each year. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, targeted basins follow the TMDL priorities. In this manner, the first TMDLs will have been implemented by the time the first priority basins will be monitored again in the second five-year cycle. 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. The sampling schedule for the five year cycles is shown below.

Table 3 - Five Year Sampling Schedule Cycles

Basins	1st Cycle	2nd Cycle	3rd Cycle
Mermentau / Vermilion-Teche		2003	2008
Calcasieu / Ouachita		2004	2008
Barataria / Terrebonne		2005	2010
Mississippi / Pontchartrain / Pearl		2006	2011
Red / Sabine Atchafalaya	2002	2007	2012

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1 Introduction

Bayou Chauvin, Subsegment 080102 of the Ouachita Basin, is listed on the 2000 305(b) list as being impaired due to organic enrichment/low DO, requiring the development of a total maximum daily load (TMDL) for dissolved oxygen. A calibrated water quality model of Bayou Chauvin was developed and projections run to quantify the point source wasteload allocations and nonpoint source load allocations required to meet established dissolved oxygen criteria.

This waterbody is also listed on the court-ordered 303(d) list as impaired due to nutrients. This TMDL establishes load limitations for oxygen-demanding substances and goals for reduction of those pollutants. LDEQ's position, as supported by the declaratory ruling issued by Secretary Givens in response to the lawsuit regarding water quality criteria for nutrients (Sierra Club v. Givens, 710 So.2d 249 (La. App. 1st Cir. 1997), writ denied, 705 So.2d 1106 (La. 1998), is that when oxygen-demanding substances are controlled and limited in order to ensure that the dissolved oxygen criterion is supported, nutrients are also controlled and limited. The implementation of this TMDL through wastewater discharge permits and implementation of best management practices to control and reduce runoff of soil and oxygen-demanding pollutants from nonpoint sources in the watershed will also control and reduce the nutrient loading from those sources. For the TMDL in this report, the nutrient loading required to maintain the DO standards is the nutrient TMDL.

This report presents the development of the dissolved oxygen and nutrient model and the resulting load and wasteload allocations.

2 Study Area Description

2.1 Ouachita Basin

The Ouachita River's source is found in the Ouachita Mountains of west central Arkansas near the Oklahoma border. The Ouachita River flows south through northeastern Louisiana and joins with the Tensas River to form the Black river, which empties into the Red River. The Ouachita Basin covers over 10,000 square miles of drainage area. Most of the basin consists of rich, alluvial plains cultivated in cotton and soybeans. The northwest corner of the basin is forested in pine, which is commercially harvested. (LA DEQ, 1996).

2.2 Bayou Chauvin , Subsegment 080102

A map showing the bayou and the location of dischargers and a land use map may be found in Appendix A. The Bayou Chauvin watershed comprises the lower portion of Subsegment 080102. The upper portion of the subsegment is made up of the Lonewa Bayou and River Styx watersheds. This TMDL is limited to the Bayou Chauvin watershed.

Bayou Chauvin originally drained Chauvin Swamp to the Ouachita River. Ouachita River overflow often flooded this area prior to completion of the east bank Ouachita River Levee in 1937. The levee includes floodgates in the natural drains of Bayou Chauvin, River Styx, and Lonewa Bayou. In the early 1950's the Louisiana Department of Public Works constructed the L-11 Canal cutting through the natural banks of Bayou De Siard to provide Chauvin Swamp an outlet to Little Bayou Boeuf thence to Bayou LaFourche (Louisiana Department of Transportation and Development, Ouachita River Basin, Monroe and West Monroe, Interim Flood Protection Study, 1979) The watercourse that is herein referred to as Bayou Chauvin originates in a pooled reach of L-11 Canal just west of the junction of Caney Creek and east of Highway 139 and, at moderate to low flow conditions, flows in a westerly direction through Chauvin Swamp to the Ouachita River. The portion of Bayou Chauvin above Highway 165 has been channelized. West of Highway 165, Bayou Chauvin flows through a natural streambed to the Ouachita River Levee.

Bayou Chauvin cuts across the Bayou De Siard watershed just east of Joe White Road. Bayou De Siard is conveyed from the north to the south side of Bayou Chauvin by a siphon under Chauvin. Much of the flow in Bayou Chauvin comes from two Bayou De Siard overflow weirs located near either end of the siphon. The weirs are constructed of stacked timbers and a some flow leaks through these timbers even when there is no overflow. There is another overflow weir on Bayou De Siard at Hogg Bayou swamp that conveys some additional flow to Bayou Chauvin via the swamp.

Under low flow conditions, leakage through the weirs and sewage treatment facility discharges provide the flow in Bayou Chauvin. Headwater flow from the pooled reach at the junction of Caney Creek, although present, is minimal.

There is one very small intermittent tributary that joins Bayou Chauvin from the north just west of the Missouri Pacific Railroad. This tributary was not accounted for in the model.

Land uses in the Bayou Chauvin watershed are wetland, agriculture, and suburban development (See Table 4). The suburban development is, in many areas, not dense enough to show up and is recorded in the land use mapping as grassland and wetland. Most of the Bayou De Siard waterfront is suburban. There is also an area near the Ouachita River Levee and below Bayou Chauvin that is suburban and not wetland. The percentage of the Bayou Chauvin watershed that is actually suburban is unknown.

Table 4. Land uses in the Bayou Chauvin Watershed

LAND USE	ACRES	PERCENT
Agricultural and grassland	3500	43
Wetland	3200	40
Forest land	500	6
Suburban	500	6
Water	400	5
Total	8100	100

2.3 Water Quality Standards, Uses, and Support Issues.

Bayou Chauvin has been assessed as a waterbody not meeting the dissolved oxygen criteria based upon data collected from 1995 through 1999. Section 303(d) of the Clean Water Act requires the identification, listing, ranking and development of TMDLs for waters that do not meet applicable water quality standards after implementation of technology-based controls. Waterbodies are placed on the 303(d) list based on the comparison of data from ambient monthly samples and the criteria. The recent ambient water quality sampling period was during a drought, contributing to or exacerbating low-flow, low-dissolved oxygen conditions.

The Water Quality criteria, designated uses, and support of uses for the 080102 watershed are shown in Table 5. Bayou Chauvin being predominately a suburban drainage canal, a dissolved oxygen criteria of 5.0 mg/l is probably not justified.

Table 5 - Water Quality Numerical Criteria and Designated Uses

Subsegment	080102
Stream Description	Bayou Chauvin – headwaters to the Ouachita River
Designated Uses	A B C
Support of uses	Not supporting uses due to violations of dissolved oxygen and bacteria criteria
Criteria:	
Cl	160 mg/l
SO_4	35 mg/l
DO	5.0 mg/l
PH	6.0 – 8.5
BAC	1
TEMP	33 ^oC
TDS	350 mg/l

USES: A – primary contact recreation; B – secondary contact recreation; C – propagation of fish and wildlife; D – drinking water supply; E – oyster propagation; F – agriculture; G – outstanding natural resource water; L – limited aquatic life and wildlife use.

Note 1 – 200 colonies/100 ml maximum log mean and no more than 25% of samples exceeding 400 colonies/100 ml for the period May through October; 1,000 colonies/100mL maximum log mean and no more than 25% of samples exceeding 2,000 colonies/100mL for the period November through April.

2.4 Wastewater Discharges

Dischargers of oxygen demanding wastewater in the Bayou Chauvin watershed are listed in Table 6. There are fourteen known facilities, all of them treating sanitary wastewater. Four of these facilities are not modeled;

- Hide-A-Way SD #11 pond discharges to Chauvin Swamp and has no impact on Bayou Chauvin.
- Pecan Bayou & Treasure Island Subdivisions pond discharges to a large suburban canal system and is not judged to have an impact on Bayou Chauvin.
- Allied Building Stores, Inc. and the Monroe plant of Poly Processing discharge to an Arkansas Louisiana and Mississippi railroad ditch. There was no discharge from that ditch to Bayou Chauvin at the time of the 1994 survey.
- Two facilities, the pond serving Waterside & Lakeside Liner Subdivisions and the Bayou Oaks Subdivision pond, discharge via the Bayou Oaks ditch to Bayou Chauvin. The location of all known dischargers of oxygen demanding wastewater in the Bayou Chauvin watershed is shown on the map in Appendix A.

Table 6 - Discharger Inventory for Subsegment 080102

FACILITY	FILE_NUM	OUT-FALL NO.	FAC_TYPE	REC_WATER	EXPECTED FLOW, MGD	PERMIT BOD, MG/L	PERMIT TSS, MG/L	MODELING COMMENTS
Lakeview Estates STP	LAG560171	001	Sanitary wastewater extended aeration STP	Bayou Chauvin	0.0225	30 mo avg	30 mo avg	(1) (2
Waterside & Lakeside Liner Subdivision pond	GP4925	001	Oxidation pond treating sanitary wastewater only	Bayou Oaks Pond effluent ditch to Bayou Chauvin	0.120	30 mo avg	90 mo avg	(1) (2)
Bayou Oaks Subdivision pond	LA0090450	001	Oxidation pond treating sanitary wastewater only	Effluent ditch to Bayou Chauvin	0.160	10 mo avg	15 mo avg	(1) (2).
Leisure Village STP	LAG560170	001	Sanitary wastewater extended aeration STP	Bayou Chauvin	0.032	20 mo avg	20 mo avg	An independent discharge at the time of the survey and now.
Town & Country Subdivision - Oakwood Pond # 2	LA0052078	001	Oxidation pond treating sanitary wastewater only	Bayou Chauvin	0.810	10 mo avg	15 mo avg	(5)
West Elmwood Subdivision & Town & Country Estates – Elmwood Pond	LA0052086	001	Oxidation pond treating sanitary wastewater only	Effluent ditch to Bayou Chauvin	0.217	10 mo avg	15 mo avg	(3)
North Monroe SD #1	LA0039209	001	Aerated lagoon & rock filter & settling basin treating sanitary wastewater only	Effluent ditch to Bayou Chauvin	0.104	10 mo avg	15 mo avg	An independent discharge at the time of the survey and now.
Northgate Estates pond	LAG570130	001	Oxidation pond treating sanitary wastewater only	Effluent ditch to Bayou Chauvin	0.092	10 mo avg	15 mo avg	(3)
Northside Terrace pond	LA0052060	001	Oxidation pond treating sanitary wastewater only	Effluent ditch to Bayou Chauvin	0.220	10 mo avg	15 mo avg	(3)

Poly Processing – Monroe Plant	LA0090247	001	Sanitary wastewater extended aeration STP	ALM RR ditch to Bayou Chauvin	0.0014	30 mo avg	30 mo avg	Very small STP judged to have no impact on Bayou Chauvin.
Hide-A-Way SD #11	LAG570001	001	Oxidation pond treating sanitary wastewater only	Chauvin Swamp	0.088	10 mo avg	15 mo avg	Judged to have no impact on Bayou Chauvin.
Allied Building Stores, Inc.	LAG530032	001	Sanitary wastewater extended aeration STP	ALM RR ditch to Bayou Chauvin	0.00114	45 wk avg	45 wk avg	Very small STP judged to have no impact on Bayou Chauvin.
Pecan Bayou & Treasure Island Subdivisions – pond	LA0054992	001	Oxidation pond treating sanitary wastewater only	Town & Country Subdivision canal system then approx 2.6 Km to Bayou Chauvin	0.140	30 mo avg	90 mo avg	Judged to have no impact on Bayou Chauvin.
Belle Meade Subdivision – Timberwood Pond	LA0054941	001	Oxidation pond treating sanitary wastewater only	Bayou Oaks Pond effluent ditch to Bayou Chauvin	0.0172			(2) (4)

1) Located in Subsegment 080904, Bayou Lafourche, but actually in the Bayou Chauvin watershed.
2) Rerouted to Northeast Regional WWTP in Bayou Lafourche watershed subsequent to the 1994 intensive survey on which the allocations are based.
3) Rerouted to Oakwood Pond #2 subsequent to the 1994 intensive survey on which the allocations are based.
4) Discontinued discharge in 1990 or before. Effluent being treated by Bayou Oaks Oxidation Pond until Bayou Oaks rerouted to Northeast Regional WWTP.
5) Originally serving Town & Country Subdivision only, but now being converted to a regional WWTP incorporating West Elmwood, Northgate, and Northside Terrace.

2.5 Prior Studies

LDEQ has conducted surveys of the Bayou Chauvin watershed to provide data for modeling. These surveys include an August 17-19, 1992 Inventory and mapping survey, an October 17-20, 1993 reconnaissance survey, an August 14-19, 1994 hydrologic survey, a September 25 through October 5, 1994 water quality survey, and a May 31 through June 1, 2000 water quality survey. Reports of the October 1993 and the September 1994 surveys are available.

3 Documentation of Calibration Model

3.1 Overview

Data collected during surveys conducted in October, 1993, August, 1994, September, 1994, and May 2000, were used to establish the input for the model calibration and are presented in Appendices B through F. The October 17-20, 1993 reconnaissance survey and the August 14-19, 1994 hydrologic survey provided hydrologic information for the model, while the September 25 through October 5, 1994 intensive survey provided discharger and stream water quality information. The May 31 through June 1, 2000 water quality survey provided some water quality information for Bayou De Siard.

Bayou Chauvin is dominated by point source dischargers and algal production. The point sources are small sewage treatment plants of highly variable discharge rate. Attempts to calibrate using measured discharger flow rates, DMR flows for the facilities, and anticipated flow based on the State Sanitary Code all failed. Flow calibration was achieved using chloride concentrations measured in facility discharges and Bayou Chauvin, and the few good flow measurements of the bayou. Dissolved oxygen calibration could only be achieved by using measured chlorophyll a concentrations to simulate algal production.

Since the treatment facilities were not sampled during the May, 2000 survey, the results of that survey could not be used in the calibration. The September, 1994 survey provided both facility sampling and chlorophyll a measurements and was therefore suitable for calibration.

3.2 Program Description

"Simulation models are used extensively in water quality planning and pollution control. Models are applied to answer a variety of questions, support watershed planning and analysis and develop total maximum daily loads (TMDLs). . . . Receiving water models simulate the movement and transformation of pollutants through lakes, streams, rivers, estuaries, or near shore ocean areas. . . . Receiving water models are used to examine the interactions between loadings and response, evaluate loading capacities (LCs), and test various loading scenarios. . . . A fundamental concept for the analysis of receiving waterbody response to point and nonpoint source inputs is the principle of mass balance (or continuity). Receiving water models typically develop a mass balance for one or more constituents, taking into account three factors: transport through the system, reactions within the system, and inputs into the system." (EPA841-B-97-006, pp. 1-30)

The model used for this TMDL was LA-QUAL, a steady-state one-dimensional water quality model. LA-QUAL has the mechanisms for incorporating dams and weirs in the analysis and was particularly suitable for use in modeling Bayou Chauvin. LA-QUAL history dates back to the QUAL-I model developed by the Texas Water Development Board with Frank D. Masch & Associates in 1970 and 1971. William A. White wrote the original code.

In June, 1972, the United States Environmental Protection Agency awarded Water Resources Engineers, Inc. (now Camp Dresser & McKee) a contract to modify QUAL-I for application to the Chattahoochee-Flint River, the Upper Mississippi River, the Iowa-Cedar River, and the Santee River. The modified version of QUAL-I was known as QUAL-II.

Over the next three years, several versions of the model evolved in response to specific client needs. In March, 1976, the Southeast Michigan Council of Governments (SEMCOG) contracted with Water Resources Engineers, Inc. to make further modifications and to combine the best features of the existing versions of QUAL-II into a single model. That became known as the QUAL-II/SEMCOG version.

Between 1978 and 1984, Bruce L. Wiland with the Texas Department of Water Resources modified QUAL-II for application to the Houston Ship Channel estuarine system. Numerous modifications were made to enable modeling this very large and complex system including the addition of tidal dispersion, lower boundary conditions, nitrification inhibition, sensitivity analysis capability, branching tributaries, and various input/output changes. This model became known as QUAL-TX and was subsequently applied to streams throughout the State of Texas.

In 1999, the Louisiana Department of Environmental Quality and Wiland Consulting, Inc. developed LA-QUAL based on QUAL-TX Version 3.4. The program was converted from a DOS-based program to a Windows-based program with a graphical interface and enhanced graphic output. Other program modifications specific to the needs of Louisiana and the Louisiana DEQ were also made. LA-QUAL is a user-oriented model and is intended to provide the basis for evaluating total maximum daily loads in the State of Louisiana. (Wiland, Bruce L. *LA-QUAL for Windows User's Manual)*

The development of a TMDL for dissolved oxygen generally occurs in 3 stages. Stage 1 encompasses the data collection activities. These activities may include gathering such information as stream cross-sections, stream flow, stream water chemistry, stream temperature and dissolved oxygen at various locations on the stream, location of the stream centerline and the boundaries of the watershed which drains into the stream, and other physical and chemical factors which are associated with the stream. Additional data gathering activities include gathering all available information on each facility which discharges pollutants in to the stream, gathering all available stream water quality chemistry and flow data from other agencies and groups, gathering population statistics for the watershed to assist in developing projections of future loadings to the water body, land use and crop rotation data where available, and any other information which may have some bearing on the quality of the waters within the watershed. During Stage 1, any data available from reference or least impacted streams which can be used to gauge the relative health of the watershed is also collected.

Stage 2 involves organizing all of this data into one or more useable forms from which the input data required by the model can be obtained or derived. Water quality samples, field measurements, and historical data must be analyzed and statistically evaluated in order to determine a set of conditions which have actually been measured in the watershed. The findings are then input to the model. Best professional judgment is used to determine initial estimates for parameters which were not or could not be measured in the field. These estimated variables are adjusted in sequential runs of the model until the model reproduces the field conditions which were measured. In other words, the model produces a value of the flow, chlorides, biochemical oxygen demand, dissolved oxygen, or other parameter which matches the measured value within an acceptable margin of error at the locations along the stream where the measurements were actually made. When this happens, the model is said to be calibrated to the actual stream conditions. At this point, the model should confirm that there is an impairment and give some indications of the causes of the impairment. If a second set of measurements is available for slightly different conditions, the calibrated model is run with these conditions to see if the calibration holds for both sets of data. When this happens, the model is said to be verified.

Stage 3 covers the projection modeling which results in the TMDL. The critical conditions of flow and temperature are determined for the waterbody and the maximum pollutant discharge conditions from the point sources are determined. These conditions are then substituted into the model along with any related condition changes which are required to perform critical condition scenario predictions. At this point, the loadings from the point and nonpoint sources (increased by an acceptable margin of safety) are run at various levels and distributions until the model output shows that dissolved oxygen criteria are achieved. It is critical that a balanced distribution of the point and nonpoint source loads be made in order to predict any success in future achievement of water quality standards. At the end of Stage 3, a TMDL is produced which shows the point source permit limits and the amount of reduction in man-made nonpoint source loading which must be achieved to attain water quality standards. The man-made portion of the NPS pollution is estimated from the difference between the calibration loads and the loads observed on reference or least impacted streams.

3.3 Input Data Documentation

Flow measurements, cross-sections, and time-of-travel studies were used to develop the hydrology of the Bayou Chauvin channel. Reaches above Highway 165 are treated as constant depth and width reaches at conditions close to critical low flow. The geometry of reaches below Highway 165 is represented by equations for width and depth as a function of flow. The development of this hydrology may be found in Appendix B.

Water column BOD levels were developed from laboratory analysis of samples taken during the September, 1994 survey using the Louisiana GSBOD program. The development of BOD data is documented in Appendix D. The 1994 intensive survey did not include continuous monitoring data in Bayou Chauvin, but did include dawn, dusk, and midnight in-situ survey runs of all of the sites, providing a good description of diurnal dissolved oxygen variation in the bayou. That data and chlorophyll a analysis indicate substantial algal activity in the bayou.

3.3.1 Model Schematics and Maps

Model schematics and maps may be found in Appendix A. A vector diagram of the modeled area shows survey sites and inputs to the model. An ARCVIEW map of the watershed shows Bayou Chauvin, the location of dischargers, and selected streets and roads. The land use map is restricted to the Chauvin watershed and does not include the River Styx and Lonewa Bayou drainage.

3.3.2 Model Options, Data Type 2

Four constituents were modeled during the calibration process. These were chlorides, dissolved oxygen (DO), ultimate carbonaceous biochemical oxygen demand (UCBOD), and ultimate nitrogenous biochemical oxygen demand (UNBOD). Chlorophyll A was not modeled but was input as an initial condition to facilitate simulation of algal oxygen production. The impact of algae on measured values of water column UCBOD was also simulated.

3.3.3 Temperature Correction of Kinetics, Data Type 4

Stream temperature was not modeled, but was input as an initial condition. The temperature values are used to correct rate coefficients for BOD decay, settling, reaeration, and SOD. These coefficients are input at 20 ^{o}C and are then corrected to temperature using the following equation:

$$X_T = X_{20} * \text{Theta}^{(T-20)}$$

Where:

X_T = the value of the coefficient at the local temperature T in degrees Celsius
X_{20} = the value of the coefficient at the standard temperature at 20 degrees Celsius
Theta = an empirical constant for each reaction coefficient
(QUAL2E Documentation and User Model, 1987)

In the absence of specified values for data type 4, the model uses default values. A complete listing of these values can be found in the LA-QUAL for Windows User's Manual (Wiland, 2001).

3.3.4 Reach Identification Data, Data Type 8

The model was set up with 18 reaches, of which 5 were effluent ditches. The pool of water at Highway 139, river Km 10.9, was considered to be the headwater. The calibration includes nine point sources, eight sewage treatment facility discharges and overflow from Bayou De Siard at river Km 9.58. A small amount of inflow from the Hogg bayou swamp, river Km 3.06 to 0.0, was also included as an incremental input.

3.3.5 Advective Hydraulic Coefficients, Data Type 9

Rather than directly inputting the widths and depths of the stream, the model requires entry of the advective hydraulic characteristics as documented in the *Louisiana Total Maximum Daily Load Technical Procedures,* Waldon, M. G., R. K. Duerr, and Marian U. Aguillard (LTP). Reaches above Highway 165 are treated as constant depth and width reaches at conditions close to critical low flow. The geometry of reaches below Highway 165 is represented by modified Leopold equations for width and depth as a function of flow. Several measurements of flow in Chauvin at the Ouachita Levee and an October 1993 time-of-travel were used to estimate this relationship. The development of this hydrology may be found in Appendix B.

3.3.6 Dispersive Hydraulic Coefficients, Data Type 10

Dispersion rates were estimated by the method programmed into LaQual and by an equation that may be found on page 75 in "Principles of Surface Water Quality Modeling and Control" (1987) by Thomann and Mueller. The latter equation is taken from "Mixing in Inland and Coastal Waters" by Fischer, List, Koh, Imberger and Brooks, 1979.

The LaQual equation is;

$D_L = 18.53nuh^{5/6}$ in m^2/s
where n = Mannings roughness coefficient
u = stream velocity in mps
h = stream average depth in m

and the Fischer equation is;

$DL = 29.97u^2w^2/h^{1.5}g^{.5}s^{.5}$

Where u = stream velocity in fps
h = stream average depth in ft
w = stream width in ft
g = acceleration of gravity =32 ft/s^2
s = slope in ft per ft

Both of these equations predicted very low rates of dispersion. The maximum of the rates predicted by the two equations was used. Input data may be found in Appendix F.

3.3.7 Initial Conditions, Data Type 11

Initial conditions are used to input parameters that are not being modeled and to reduce the number of model iterations for those that are. Temperature and chlorophyll a were input in this manner and not modeled. The input data and sources are shown in Appendix F.

3.3.8 Reaeration Rates, Data Type 12

Bayou Chauvin is shallow and slow moving and is within the range of the Louisiana equation and/or the minimum $K_2 = 0.7/h$.

3.3.9 Sediment Oxygen Demand, Data Type 12

The SOD values were achieved through calibration and are high in reaches 1 through 6 and drop to zero in reaches 7 through 18. This behavior is not explained by the stream hydrology or by the location of dischargers.

3.3.10 Carbonaceous and Nitrogenous BOD Decay and Settling Rates, Data Types 12 and 15

Laboratory BOD decay rates may be found in Appendix D and were highly variable. The calibration was run at reasonable average decay rates of 0.2 1/d for CBOD and 0.1 1/d for NBOD. Lower decay rates would not be expected in a stream dominated by point source discharges. Higher decay rates would have depleted oxygen more rapidly, resulting in lower predicted dissolved oxygen. Since in the lower reaches the SOD could not be lowered any further, the model would not have calibrated at higher decay rates.

Settling rates were likewise set at reasonable values of 0.15 1/d for CBOD and 0.10 1/d for NBOD.

Since the levels of SOD in the bayou are due substantially to settling of point source CBOD and NBOD rather than natural background, settled BOD was converted to SOD in the model. It is assumed that as point source treatment is improved, reduced water column BOD and settling will result in reduced SOD.

Calibration input values may be found in Appendix F.

3.3.11 Incremental Conditions, Data Types 16, 17, and 18

It is not expected that there is any incremental inflow to Bayou Chauvin in any of the reaches except 18, where survey data suggests that the Hogg Bayou swamp is providing some inflow. The upper portion of the bayou is probably losing flow to evapotranspiration. An effort was made to estimate evaporative losses based on pan evaporation data for north Louisiana from the Louisiana Office of State Climatology (LOSC). The average pan evaporation for north Louisiana for September and October, the survey having been conducted in late September and early October, is 5.7" and 4.7" respectively or 3.83 and 3.06 cfs/sq mi. Assuming an average of 3.43 or 0.0377 cms/sq Km and an average stream width of 10 meters, evaporation is about 0.000377 cms/ Km. This rate of loss is noticeable but not really significant to the model. The estimate of inflow to reach 18 from the swamp is based on the difference in flow measurements between Highway 165 and the Ouachita levee during the October, 1993 survey when the flow at Highway 165 of 1.11 cfs was close to the September, 1994 survey measurement of 1.12 cfs. The gain of 0.3 cfs was used in the calibration model. The flow data may be found in appendix B.

3.3.12 Nonpoint Sources, Data Type 19

Nonpoint source loads which are not associated with a flow are input into this part of the model. CBOD and NBOD nonpoint loading is almost certainly due to resuspended load from the bottom sediments and is quantified by calibration. Values for the nonpoint and the sediment oxygen demand loading on a gm/m2-d basis may be found in the calibration load sheet in Appendix I.

3.3.13 Headwaters, Data Types 20, 21, and 22

The headwater for Bayou Chauvin is a pool of water extending west of the confluence of Caney Creek. Westward flow from the vicinity of Highway 139 was confirmed during the survey of August, 1994, and the time-of-travel data may be found in the TOT data sheet in Appendix B. The headwater flow was determined in an approximate fashion during chloride calibration. A significantly higher or lower headwater flow would not calibrate. Water quality was taken from the September, 1994 survey data, Appendix C.

A very small headwater flow was assigned to each of the effluent ditches in the model so that the ditches would not have zero flow in the no man-made load projection.

3.3.14 Wasteloads, Data Types 24, 25, and 26

Wasteloads consist of eight wastewater treatment facility discharges and the overflow from Bayou De Siard. Five of the dischargers were sampled during the September, 1994, survey, and that data was used in the calibration. An estimation of the water quality of the dischargers that were not sampled was made based on DMR data and measured data from similar measured discharges.

Bayou De Siard was not sampled during this survey The Bayou De Siard overflow rate was obtained by calibration. Normal background values of 5 UCBOD, 5 UNBOD were used for Bayou De Siard. Temperature was set at 1994 Bayou Chauvin survey values. DO, chlorides, sulfates, and chlorophyll a were taken from Bayou De Siard data from the 6/1/00 survey.

Wasteload data may be found in Appendix F, with the work-up of BOD data in Appendix E.

3.3.15 Boundary Conditions, Data Type 27

The lower boundary temperature and chlorophyll a were set at measured values for the Ouachita River Levee. The data may be found in Appendix C.

3.4 Model Discussion and Results

Bayou Chauvin is dominated by point source dischargers and algal production. The point sources are small sewage treatment plants of highly variable discharge rate. Attempts to calibrate using measured discharger flow rates, DMR flows for the facilities, and anticipated flow based on the State Sanitary Code all failed. Flow calibration was achieved using chloride concentrations measured in facility discharges and Bayou Chauvin, and the few good flow measurements of the bayou.

Since the treatment facilities were not sampled during the May, 2000 survey, the results of that survey could not be used in the calibration. The September, 1994 survey provided both facility sampling and chlorophyll a measurements and was therefore suitable for calibration.

The model was calibrated to UCBOD and UNBOD by varying nonpoint (benthic) loading and to observed dissolved oxygen measurements by varying sediment oxygen demand. Dissolved oxygen calibration could only be achieved by using measured chlorophyll a concentrations to simulate algal production. The minimum calibration dissolved oxygen was 1.6 mg/l and the maximum was 7.7 mg/l. Dissolved oxygen saturation at calibration temperature was 8.0 to 8.5. Considerable diurnal variation in dissolved oxygen was observed and chlorophyll a concentrations were quite high in most reaches.

The model calibrated at zero benthic load in the last 4 kilometers. Benthic loading in these reaches is undoubtedly greater than zero. The cause of this anomaly is unknown; possible causes are the extremely variable nature of the wastewater discharges that dominate Bayou Chauvin and the old laboratory BOD methodology which, in this case, produced highly variable bottle decay rates.

Calibration input and overlay data may be found in Appendix F. Calibration plots may be found in Appendix G. The calibration model output is presented in Appendix K.

4 Water Quality Projections

Since the calibrated model indicated that the DO criterion was not being met in Bayou Chauvin at numerous locations, a summer no load scenario was performed in addition to the usual summer and winter projections.

4.1 Critical Conditions, Seasonality and Margin of Safety

The Clean Water Act requires the consideration of seasonal variation of conditions affecting the constituent of concern, and the inclusion of a margin of safety (MOS) in the development of a TMDL.

Graphical and regression analysis techniques have been used by LDEQ historically to evaluate the temperature and dissolved oxygen data from the Ambient Monitoring Network and run-off determinations from the Louisiana Office of Climatology water budget. Since nonpoint loading is conveyed by run-off, this was a reasonable correlation to use. Temperature is strongly inversely proportional to dissolved oxygen and moderately inversely proportional to run-off. Dissolved oxygen and run-off are also moderately directly proportional. The analysis concluded that the critical conditions for stream dissolved oxygen concentrations were those of negligible nonpoint run-off and low stream flow combined with high stream temperature.

When the rainfall run-off (and non-point loading) and stream flow are high, turbulence is higher due to the higher flow and the temperature is lowered by the run-off. In addition, run-off coefficients are higher in cooler weather due to reduced evaporation and evapotranspiration, so that the high flow periods of the year tend to be the cooler periods. Reaeration rates and DO saturation are, of course, much higher when water temperatures are cooler, and BOD decay rates are much lower. For these reasons, periods of high loading are periods of higher reaeration and dissolved oxygen but not necessarily periods of high BOD decay.

This phenomenon is interpreted in TMDL modeling by assuming that nonpoint loading associated with flows into the stream are responsible for the benthic blanket which accumulates on the stream bottom and that the accumulated benthic blanket of the stream, expressed as SOD and/or resuspended BOD in the calibration model, has reached steady state or normal conditions over the long term and that short term additions to the blanket are off set by short term losses. This accumulated loading has its greatest impact on the stream during periods of higher temperature and lower flow. The manmade portion of the NPS loading is the difference between the calibration load and the reference stream load where the calibration load is higher. The only mechanism for changing this normal benthic blanket condition is to implement best management practices and reduce the amount of nonpoint source loading entering the stream and feeding the benthic blanket.

In reality, the highest temperatures occur in July-August, the lowest stream flows occur in October-November, and the maximum point source discharge occurs following a significant rainfall, i.e., high-flow conditions. The summer projection model is established as if all these conditions happened at the same time. The winter projection model accounts for the seasonal differences in flows, temperature, and BMP efficiencies. Other conservative assumptions regarding rates and loadings are also made during the modeling process. In addition to the conservative measures, an explicit MOS of 20% was used for all loads to account for future growth, safety, model uncertainty and data inadequacies. Point source design flows and man-made headwater, tributary, incremental, and benthic loading are increased to obtain the 20% MOS.

Critical conditions for temperature were determined for Bayou Chauvin using short term water quality data from Site 0771, "Bayou Chauvin at control structure on Ouachita River Levee north of Monroe, La." for 1999. Six summer season and six winter season data points yielded 90 percentile temperatures of 28.5 ^{o}C and 16.5 ^{o}C respectively. The ambient data is listed in Table 7.

Table 7 - Ambient Data for Bayou Chauvin

DATE	TIME	DEPTH (m)	FIELD PH	WATER TEMP (C)	D.O. (mg/l)	FIELD COND. (umhos)
12/14/99	0940	1.0	6.70	11.10	6.70	420.0
11/16/99	0935	1.0	7.10	14.00	9.00	485.0
10/19/99	0950	1.0	7.50	15.40	4.10	519.0
09/21/99	0945	1.0	8.40	22.80	4.20	496.0
08/17/99	1000	1.0	8.00	25.50	.30	397.0
07/20/99	0945	1.0	6.70	30.20	3.20	243.0
06/15/99	1135	1.0	6.70	26.70	3.70	200.0
05/18/99	1030	1.0	6.70	26.70	3.30	265.0
04/20/99	1025	1.0	6.60	18.90	3.10	91.0
03/16/99	1030	1.0	6.80	12.30	7.80	86.0
02/16/99	0910	1.0	6.80	13.80	3.90	78.0
01/19/99	1005	1.0	6.80	12.30	5.80	70.0

Almost all of the flow to Bayou Chauvin is man-made. The City of Monroe pumps water from Bayou Bartholomew to Lake Bartholomew and controls the flow from Lake Bartholomew to Bayou De Siard, by means of a gate, to control the water surface elevation in Bayou De Siard. The city potable water treatment plant takes water out of Bayou De Siard. Most of the flow in Bayou Chauvin is flow over and/or through the three weirs that release water from De Siard to Chauvin. After rainfall events, there is flow over the weirs, but between rainfall events the flow to Bayou Chauvin is that which leaks through the board weirs. This is true during the winter months as well as the summer months. Critical low flow in Bayou Chauvin therefore occurs when the water levels in Bayou De Siard are below the top of the overflow weirs, as they were during the surveys of August and September, 1994. At such a time the flow into Bayou Chauvin includes leakage through the board weirs plus discharges from sewage treatment facilities.

4.2 Input Data Documentation

The headwater flow obtained by calibration from the survey of September is probably also a critical low flow. Since the water from Caney Creek flows east toward Little Bayou Boeuf, there really is no headwater for Bayou Chauvin except for backwater from the L11 Canal east. The flow conditions of the calibration were, as discussed above, the critical flow conditions and were not changed for the summer projections. For the winter projection, the headwater flow was increased slightly to the default winter season headwater flow of 1 cfs or 0.0283 cms (Wiland, Bruce L. *LA-QUAL for Windows User's Manual).*

4.2.1 Model Options, Data Type 2

The constituents modeled for the calibration were modeled for the projection.

4.2.2 Temperature Correction of Kinetics, Data Type 4

The temperature correction factors specified in the LTP were entered in the model.

4.2.3 Reach Identification Data, Data Type 8

The reach-element design from the calibration was used in the projection modeling.

4.2.4 Advective Hydraulic Coefficients, Data Type 9

The stream cross-section was automatically adjusted for the projection flows by the model through the use of the modified Leopold coefficients and exponents established for the calibration.

4.2.5 Initial Conditions, Data Type 11

The initial conditions were set to the 90^{th} percentile critical season temperature in accordance with the LTP. The chlorophyll a concentrations were reduced to 10 ug/l for reaches of open water and 5 ug/l for reaches of shaded water.

4.2.6 Reaeration Rates, Carbonaceous BOD Decay and Settling Rates, Nitrogenous BOD Decay and Settling Rates, Data Types 12 and 15

The reaeration rate equations, and the fractions converting settled CBOD and settled NBOD to SOD were not changed from the calibration. BOD decay and settling rates were reduced somewhat from calibration values to reflect consolidation of treatment facilities and improved levels of treatment. The projections were run at decay rates of 0.15 1/d for CBOD and 0.1 1/d for NBOD. Settling rates were set at values of 0.10 1/d for CBOD and 0.05 1/d for NBOD.

4.2.7 Incremental Conditions, Data Types 16, 17, and 18

Incremental outflow in the upper reaches was used to simulate evaporation and was not changed for the projection. Incremental inflow in the bottom reach of the model was used to simulate a very low volume diversion from Bayou De Siard at Hogg Bayou via Hogg Bayou swamp, and was not changed for the projections.

4.2.8 Sediment Oxygen Demand, Nonpoint Sources, Headwaters, Wasteloads, Data Type 12, 19, 20, 21, 22, 24, 25, and 26

The three treatment facilities still discharging to Bayou Chauvin are North Monroe SD #1, Leisure Village, and Oakwood Pond #2. The Oakwood facility is now a regional treatment facility including wastewater from West Elmwood, Northgate, and Northside Terrace. These three facilities were input at anticipated flow plus a 20% margin of safety.

Headwater flow was not changed from the calibration for the summer projection, but was increased slightly to the default seasonal headwater flow of 1 cfs or 0.0283 cms for the winter projection.

Nonpoint loading and SOD were reduced from the calibration levels and facility treatment levels were tightened until dissolved oxygen criteria were projected to be met for both the summer and winter season.

The reduction of benthic and point source loads is documented in Appendix I.

4.2.9. Boundary Conditions, Data Type 27

The lower boundary conditions were set at the 90th percentile critical season temperature, and the chlorophyll a concentrations as per Section 4.2.5.

4.3 Model Discussion and Results

The projection model output data sets are presented in Appendices L, M, and N.

4.3.1 No Man-Made Load Scenario

Under this Scenario, man-made wasteloads were eliminated and sediment oxygen demand and nonpoint loading were reduced to levels considered representative of natural background stream values. In those several reaches in which calibration loading was less than natural background the no load scenario was run at the estimated natural background level. Although we have, from previous TMDLs, evidence that natural background benthic loading is in the vicinity of the values used, we really have no data on natural background loading in a man-altered, channelized, suburban drainage canal.

With no man-made loading, the dissolved oxygen was projected to be greater than the dissolved oxygen criterion of 5.0 mg/l in all reaches.

4.3.2 Summer Projection

The summer season projection required as much as 100 percent removal of man-made nonpoint loading and a reduction of loading from several sewage treatment facilities to meet the dissolved oxygen criterion. Table 8 is a summary of the percent reduction of man-made nonpoint load and the point source load allocations needed to meet stream dissolved oxygen criteria. A dissolved oxygen plot of the summer season projection may be found in Appendix H. The extreme reduction of man-made loading required to meet criteria demonstrates that the summer season dissolved oxygen criteria of 5.0 mg/l is inappropriate for a man-made suburban drainage canal.

Table 8 - Summer Season Load Allocations and Wasteload Allocations

Model Reach	% Reduction of man-made Benthic load	Facility name	Wasteload Allocation CBOD5/NH3-N/DO
1	100		
2	100		
4	100		
5	80		
6	80	Leisure Village STP	16/8/5
7	80	Oakwood Pond # 2	8/4/5
8	80		
10	80		
11	80		
13	80	North Monroe SD #1	Secondary
14	0		
16	0		
18	0		

4.3.3 Winter Projection

A reduction of nonpoint load of 60 percent was required by the winter run to meet the dissolved oxygen criterion. A reduction of 60 percent may possibly be achievable by improvements in the sewage treatment facilities and BMPs to reduce the impact of stormwater run-off. Table 9 is a summary of the percent reduction of man-made benthic load and the point source load allocations needed to meet stream dissolved oxygen criteria. A dissolved oxygen plot of the winter season projection may be found in Appendix H. If necessary or desirable, the percent reduction of benthic load could be reduced further, accompanied by a tightening of the limitations on Oakwood Pond #2.

Table 9 - Winter Season Load Allocations and Wasteload Allocations

Model Reach	% Reduction of man-made Benthic load	Facility name	Wasteload Allocation CBOD5/NH3-N/DO
1	60		
2	60		
4	60		
5	60		
6	60	Leisure Village STP	Secondary
7	60	Oakwood Pond # 2	20/10/5
8	60		
10	60		
11	60		

13	60	North Monroe SD #1	Secondary
14	60		
16	60		
18	60		

4.4 Calculated TMDL, WLAs, and Las

4.4.1 Outline of TMDL Calculations

An outline of the TMDL calculations is provided to assist in understanding the calculations in the Appendices. Slight variances may occur based on individual cases.

4.4.1.1 The natural background benthic loading was estimated from reference stream resuspension (nonpoint CBOD and NBOD), and SOD load data, and from previous TMDL work.

4.4.1.2 The calibration man-made benthic loading was determined as follows:

- Calibration resuspension and SOD loads were summed for each reach as gm O_2/m^2-day to get the calibration benthic loading.
- The natural background benthic loading was subtracted from the calibration benthic loading to obtain the man-made calibration benthic loading.

4.4.1.3 Projection benthic loads are determined by trial and error during the modeling process using a uniform percent reduction for resuspension and SOD. Point sources are reduced as necessary to more stringent levels of treatment, consistent with the size of the treatment facility as much as possible. Point source design flows and man-made headwater, tributary, incremental, and benthic loading are increased to obtain an explicit MOS of 20%. Headwater and tributary concentrations of CBOD, NBOD, and DO range from reference stream levels to calibration levels based on the character of the headwater. Where headwaters and tributaries exhibit man-made pollutant loads in excess of reference stream values, the loadings are reduced by the same uniform percent reduction as the benthic loads.

- The projection benthic loading at 20^{o}C is calculated as the sum of the projection resuspension and SOD components expressed as gm O_2/m^2-day.
- A reasonable, site-specific, estimate of the natural background benthic load (*Overview of the 1995 and 1996 Reference Streams,* Smythe, E. deEtte) is subtracted from the projection benthic load to obtain the man-made projection benthic load for each reach.
- The percent reduction of man-made loads for each reach is determined from the difference between the projected man-made non-point load and the man-made non-point load found during calibration.
- The projection loads are also computed in units of lb/d and kg/d for each reach.

4.4.1.4 The total stream loading capacity at critical water temperature is calculated as the sum of:

- Headwater and tributary CBOD and NBOD loading in lb/d and kg/d.
- The natural and man-made projection benthic loading for all reaches of the stream is converted to the loading at critical temperature and summed in lb/d and kg/d.
- Point source CBOD and NBOD loading in lb/d and kg/d.
- The margin of safety in lb/d and kg/d.

4.4.2 Bayou Chauvin TMDL

The TMDLs for the biochemical oxygen demanding constituents (CBOD, NH3N, and SOD), have been calculated for the summer and winter critical seasons. The TMDLs for the Bayou Chauvin watershed were set equal to the total stream loading capacity. TMDL development is presented in Appendix I. A summary of the loads is presented in Table 10. See Tables 8 and 9 for a summary of benthic load reduction by reach.

Table 10 - Total Maximum Daily Load (Sum of CBOD, NH3-N, and SOD)

Allocation	Summer (May-Oct)		Winter (Nov-Apr)	
	Kgm/day	Lbs/day	Kgm/day	Lbs/day
Point Source WLA	210	463	584	1288
Point Source Reserve MOS	53	117	146	322
Natural Nonpoint Source LA	97	214	67	148
Natural Nonpoint Source Reserve MOS	0	0	0	0
Manmade Nonpoint Source LA	53	117	100	221
Manmade Nonpoint Source Reserve MOS	15	33	25	55
TMDL	428	944	922	2034

5. Sensitivity Analyses

All modeling studies necessarily involve uncertainty and some degree of approximation. It is therefore of value to consider the sensitivity of the model output to changes in model coefficients, and in the hypothesized relationships among the parameters of the model. The LAQUAL model allows multiple parameters to be varied with a single run. The model adjusts each parameter up or down by the percentage given in the input set. The rest of the parameters listed in the sensitivity section are held at their original projection value. Thus the sensitivity of each parameter is reviewed separately. A sensitivity analysis was performed on the summer season projection. The sensitivity of the model's minimum DO projections to these parameters is presented in Appendix J. Parameters were varied by +/- 30%, except temperature, which was adjusted +/- 2 degrees Centigrade.

As shown in Table 11, DO is, as usual, most sensitive to stream reaeration, benthal demand, temperature, and depth. Immediately behind these parameters is wasteload (point source discharges) and chlorophyll a (algae).

Table 11 - Summary of Calibration Model Sensitivity Analysis

Parameter	%Param Chg	Min D.O.	%D.O. Chg	%Param Chg	Min D.O.	%D.O. Chg
Stream Reaeration	-30.	3.93	-21.6	30.	5.30	5.9
Benthal Demand	-30.	5.09	1.7	30.	4.39	-12.4
Initial Temperature	-2.	5.27	5.1	2.	4.57	-8.8
Stream Depth	-30.	5.15	2.8	30.	4.54	-9.4
Wasteload BOD	-30.	5.19	3.6	30.	4.62	-7.8
Initial Chlorophyll a	-30.	4.72	-5.8	30.	5.21	4.0
Wasteload Nonconservative	-30.	5.18	3.4	30.	4.75	-5.2
BOD Decay Rate	-30.	5.13	2.4	30.	4.82	-3.7
Nonconservative Decay	-30.	5.12	2.1	30.	4.88	-2.7
BOD Settling Rate	-30.	5.07	1.3	30.	4.94	-1.5
Incremental Outflow	-30.	5.04	0.7	30.	4.98	-0.7
Nonconservative Settling	-30.	5.05	0.7	30.	4.98	-0.7
Incremental Inflow	-30.	5.01	0.0	30.	5.01	0.0
Wasteload Flow	-30.	4.92	-1.7	30.	5.02	0.2
Stream Baseflow	-30.	4.95	-1.2	30.	5.06	1.1
Headwater Flow	-30.	4.95	-1.2	30.	5.06	1.1

6. Conclusions

Bayou Chauvin is a man-made suburban canal for most of it's length and is dominated by point source discharges and algae. It is projected that the water quality standard for dissolved oxygen of 5.0 mg/l can be maintained during the summer critical season with a 80 to 100% reduction of man-made nonpoint loading plus limitations on point source dischargers. The extreme reduction of man-made loading required to meet criteria demonstrates that the summer season dissolved oxygen criteria of 5.0 mg/l is inappropriate for a man-made suburban drainage canal. In the event that a more appropriate dissolved oxygen criterion is established in the future, the wasteload allocations will have to be recalculated and permit limitations adjusted.

This TMDL was developed in accordance with the Louisiana anti-degradation policy, Title 33:IX.1109. LDEQ will work with other agencies such as local Soil Conservation Districts to implement agricultural 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 five-year cycle with two targeted basins sampled each year. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the five-year cycle. Sampling is conducted on a monthly basis or more frequently if necessary to yield at least 12 samples per site each year. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, targeted basins follow the TMDL priorities. In this manner, the first TMDLs will have been implemented by the time the first priority basins will be monitored again in the second five-year cycle. 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. The sampling schedule for the five year cycles is shown below.

Table 12 - Five Year Sampling Schedule Cycles

Basins	1st Cycle	2nd Cycle	3rd Cycle
Mermentau / Vermilion-Teche		2003	2008
Calcasieu / Ouachita		2004	2008
Barataria / Terrebonne		2005	2010
Mississippi / Pontchartrain / Pearl		2006	2011
Red / Sabine Atchafalaya	2002	2007	2012

In addition to surface water monitoring, municipal and industrial point source dischargers are monitored to verify compliance with permitted effluent limitations and compliance schedules. Major dischargers are inspected annually (with sampling when necessary) to ensure compliance with applicable effluent limitations and state and federal permit requirements.

7. References

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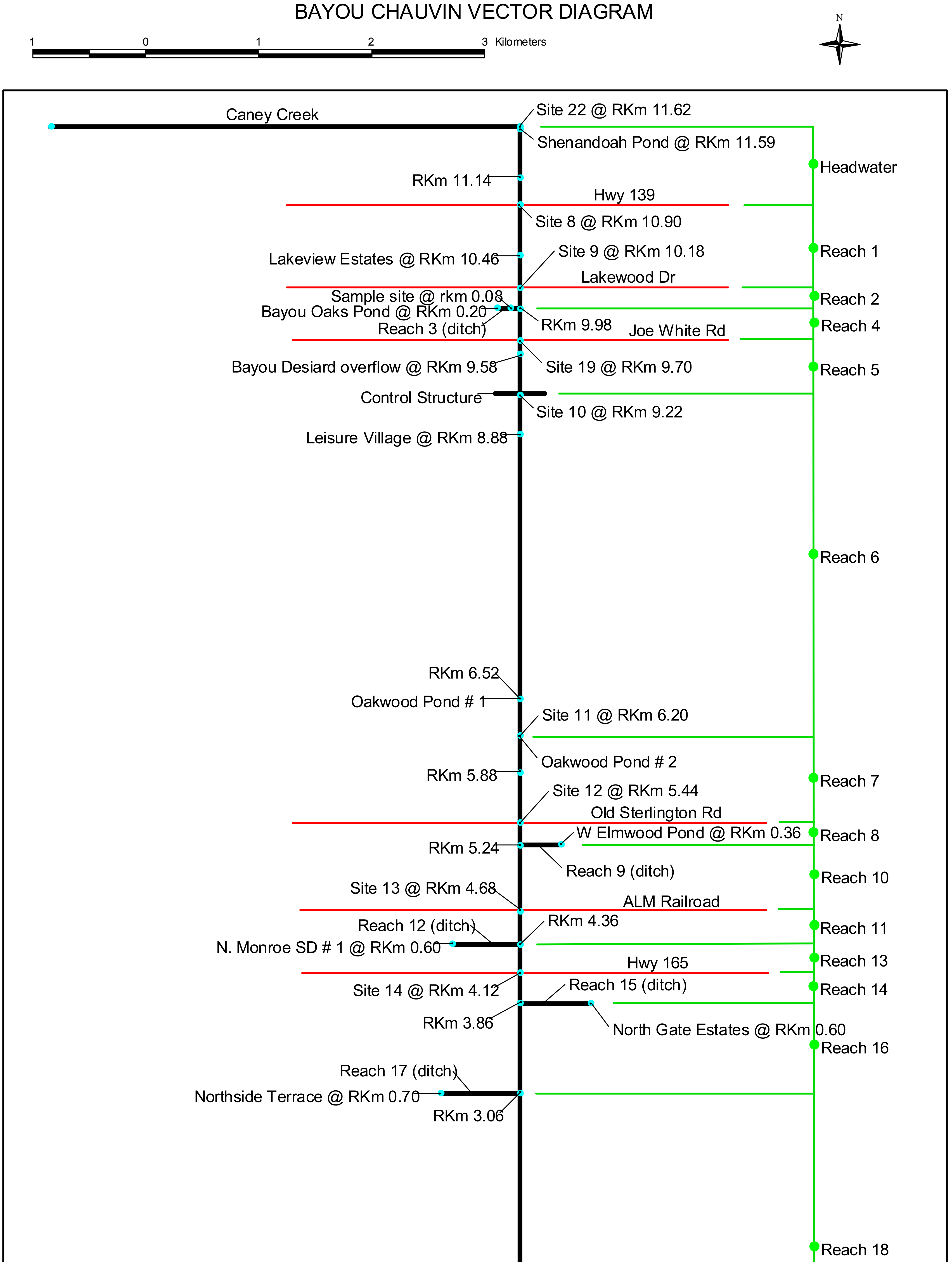
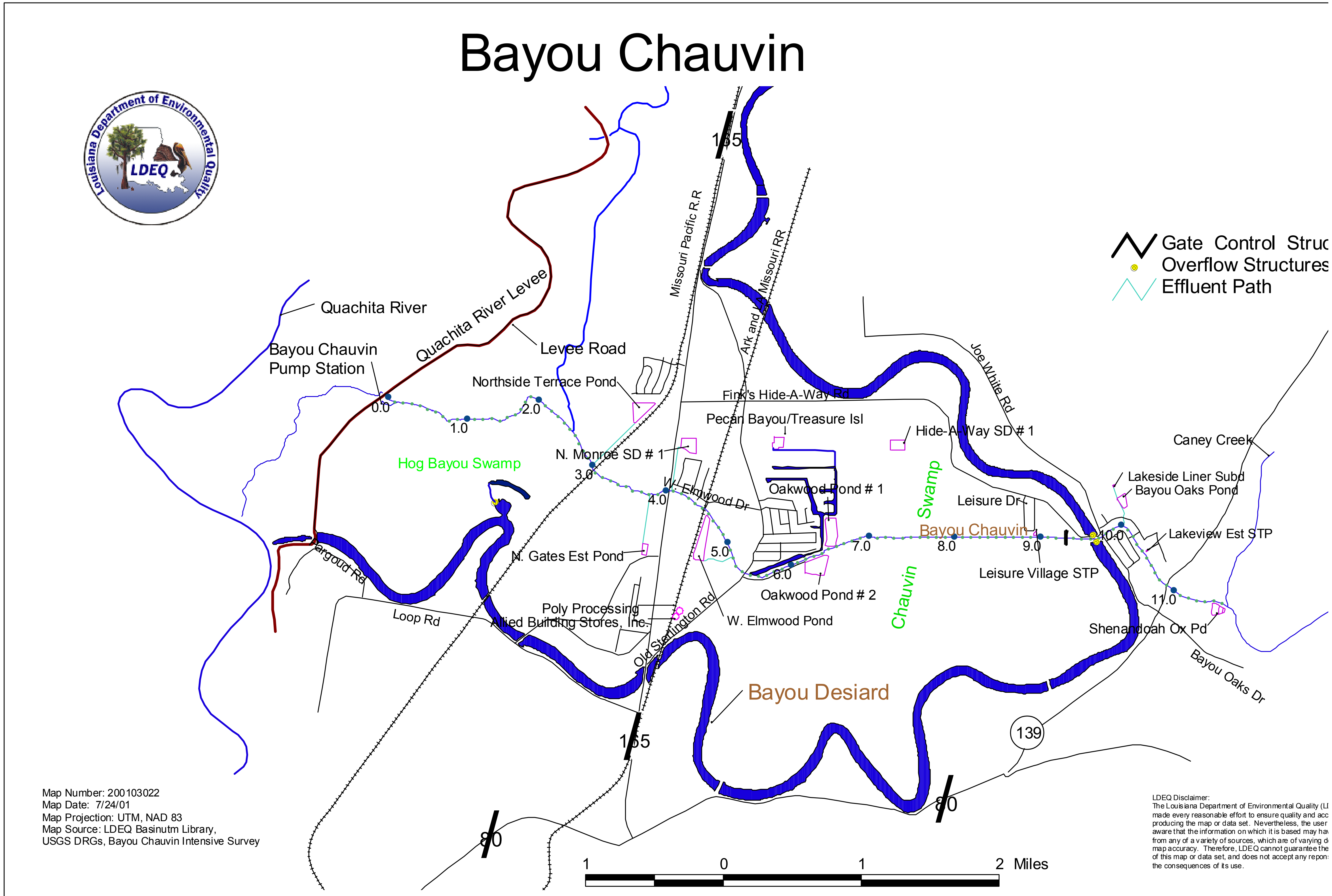
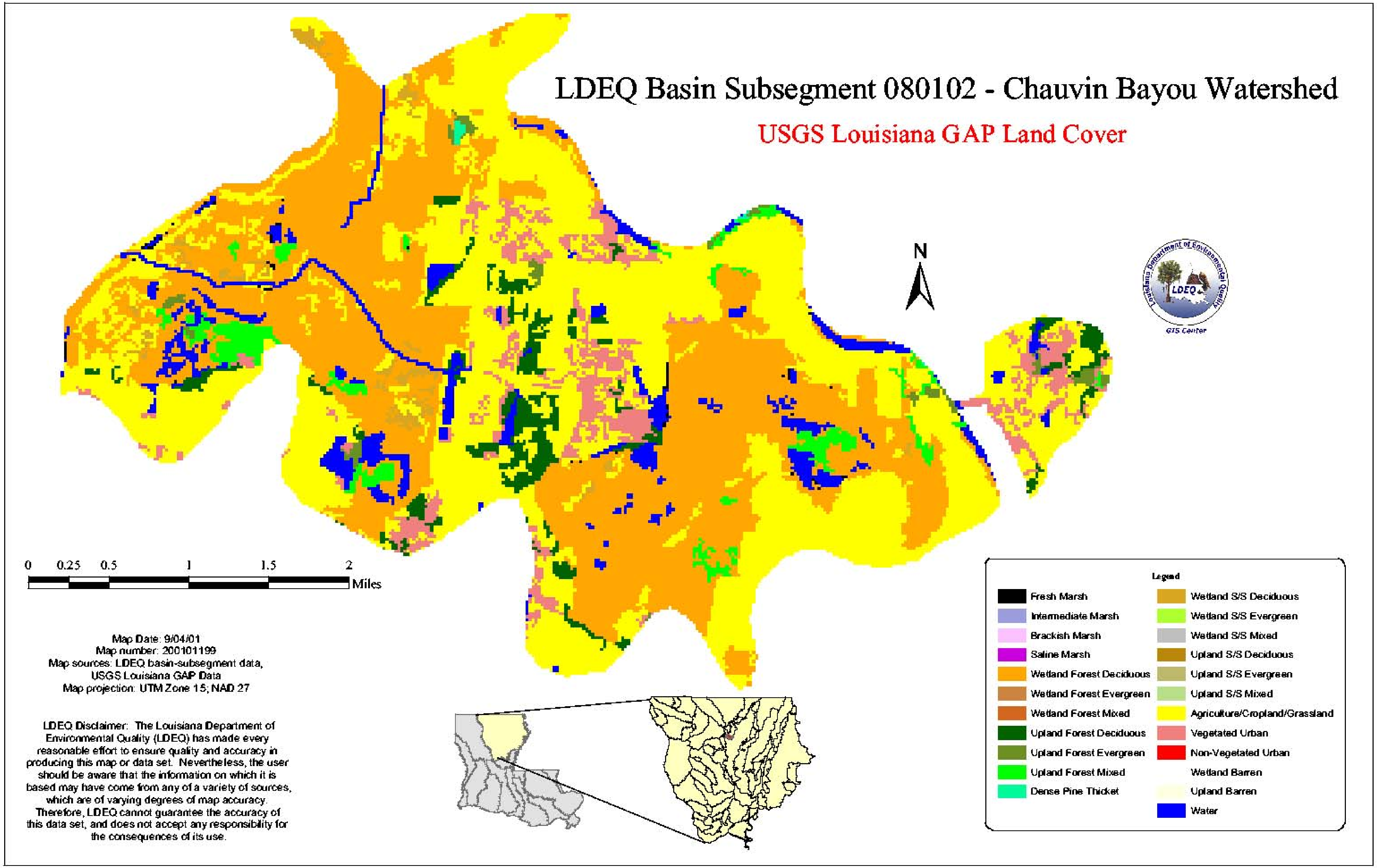
APPENDIX A – VECTOR DIAGRAM AND MAPS


BAYOU CHAUVIN VECTOR DIAGRAM
1 0 1 2 3 Kilometers
N
Caney Creek
Site 22 @ RKm 11.62
Shenandoah Pond @ RKm 11.59
Headwater
RKm 11.14
Hwy 139
Site 8 @ RKm 10.90
Lakeview Estates @ RKm 10.46
Site 9 @ RKm 10.18
Reach 1
Lakewood Dr
Sample site @ rkm 0.08
Bayou Oaks Pond @ RKm 0.20
Reach 3 (ditch)
Reach 2
RKm 9.98
Joe White Rd
Reach 4
Bayou Desiard overflow @ RKm 9.58
Site 19 @ RKm 9.70
Reach 5
Control Structure
Site 10 @ RKm 9.22
Leisure Village @ RKm 8.88
Reach 6
RKm 6.52
Oakwood Pond # 1
Site 11 @ RKm 6.20
Oakwood Pond # 2
RKm 5.88
Reach 7
Site 12 @ RKm 5.44
Old Sterlington Rd
W Elmwood Pond @ RKm 0.36
Reach 8
RKm 5.24
Reach 9 (ditch)
Reach 10
Site 13 @ RKm 4.68
ALM Railroad
Reach 12 (ditch)
RKm 4.36
Reach 11
N. Monroe SD # 1 @ RKm 0.60
Hwy 165
Reach 13
Site 14 @ RKm 4.12
Reach 15 (ditch)
Reach 14
RKm 3.86
North Gate Estates @ RKm 0.60
Reach 16
Reach 17 (ditch)
Northside Terrace @ RKm 0.70
RKm 3.06
Reach 18


Bayou Chauvin
Gate Control Struc
Overflow Structures
Effluent Path
Quachita River
Quachita River Levee
Levee Road
Bayou Chauvin Pump Station
Northside Terrace Pond
Missouri Pacific R.R
Ark and LA Missouri RR
Fink's Hide-A-Way Rd
Pecan Bayou/Treasure Isl
Hide-A-Way SD # 1
Joe White Rd
Caney Creek
Lakeside Liner Subd
Bayou Oaks Pond
Lakeview Est STP
Hog Bayou Swamp
N. Monroe SD # 1
W. Elmwood Dr
Oakwood Pond # 1
Leisure Dr
Bayou Chauvin
Swamp
Chauvin
Leisure Village STP
N. Gates Est Pond
Oakwood Pond # 2
W. Elmwood Pond
Poly Processing
Allied Building Stores, Inc.
Old Sterlington Rd
Loop Rd
Shenandoah Ox Pd
Bayou Oaks Dr
Bayou Desiard
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
165
80
139
1 0 1 2 Miles
Map Number: 200103022
Map Date: 7/24/01
Map Projection: UTM, NAD 83
Map Source: LDEQ Basinutm Library,
USGS DRGs, Bayou Chauvin Intensive Survey
LDEQ Disclaimer:


LDEQ Basin Subsegment 080102 - Chauvin Bayou Watershed
USGS Louisiana GAP Land Cover
N
0 0.25 0.5 1 1.5 2
Miles
Map Date: 9/04/01
Map number: 200101199
Map sources: LDEQ basin-subsegment data,
USGS Louisiana GAP Data
Map projection: UTM Zone 15; NAD 27
LDEQ Disclaimer: The Louisiana Department of Environmental Quality (LDEQ) has made every reasonable effort to ensure quality and accuracy in producing this map or data set. Nevertheless, the user should be aware that the information on which it is based may have come from any of a variety of sources, which are of varying degrees of map accuracy. Therefore, LDEQ cannot guarantee the accuracy of this data set, and does not accept any responsibility for the consequences of its use.
Legend
Fresh Marsh
Intermediate Marsh
Brackish Marsh
Saline Marsh
Wetland Forest Deciduous
Wetland Forest Evergreen
Wetland Forest Mixed
Upland Forest Deciduous
Upland Forest Evergreen
Upland Forest Mixed
Dense Pine Thicket
Wetland S/S Deciduous
Wetland S/S Evergreen
Wetland S/S Mixed
Upland S/S Deciduous
Upland S/S Evergreen
Upland S/S Mixed
Agriculture/Cropland/Grassland
Vegetated Urban
Non-Vegetated Urban
Wetland Barren
Upland Barren
Water
GIS Center

APPENDIX B – STREAM GEOMETRY

Stream Geometry

The upper reaches of Bayou Chauvin, reach numbers 1 & 2, 4 – 8, 10 & 11, 13 & 14, 16 & 18, are pooled behind the ALM Railroad bridge and the Highway 165 culvert, and are of fairly constant width and depth. The various effluent ditches were not measured and are given constant dimensions for modeling. All of the measurements are shown in Tables 13, 14, and 15.

Unlike the upper reaches of Bayou Chauvin the hydrology for reaches 14, 16, and 18 varies with flow. The hydrologic constants for these reaches were developed based upon discharge measurements just upstream of the Ouachita River Levee on 10/19/93 and 6/1/00 as shown in Table 14 and Figures 12 and 13.

Table 13 - Discharge Measurements in Bayou Chauvin at the Ouachita River Levee

Date	Discharge	Width	Avg. depth
10/19/93	0.0399	3.109	0.1128
6/1/00	0.1764	6.584	0.5578

The hydrologic relations used were:

$$W = 34.77851Q^{1.22601} + 2.4383811 \quad \text{and} \quad D = 9.7429314Q^{1.733359} + 0.0761947$$

Figure 1 - Depth vs Flow in Bayou Chauvin at the Ouachita River Levee

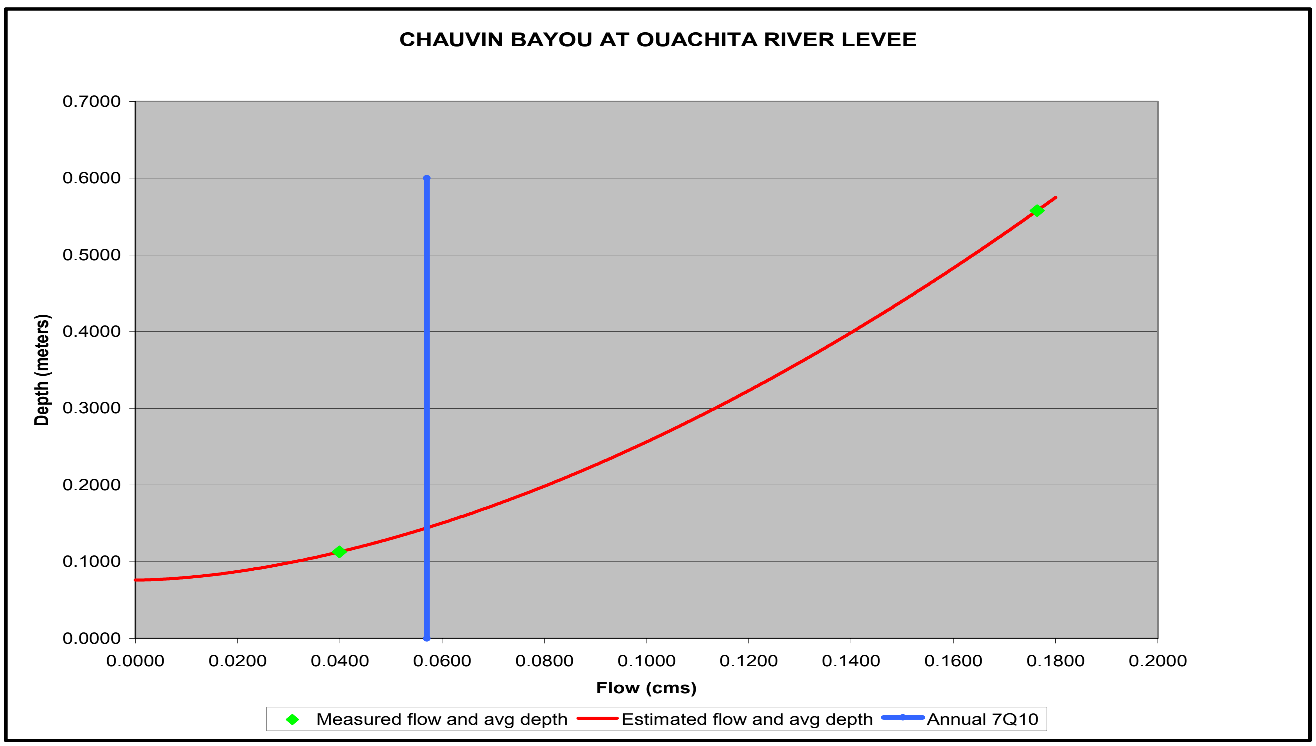
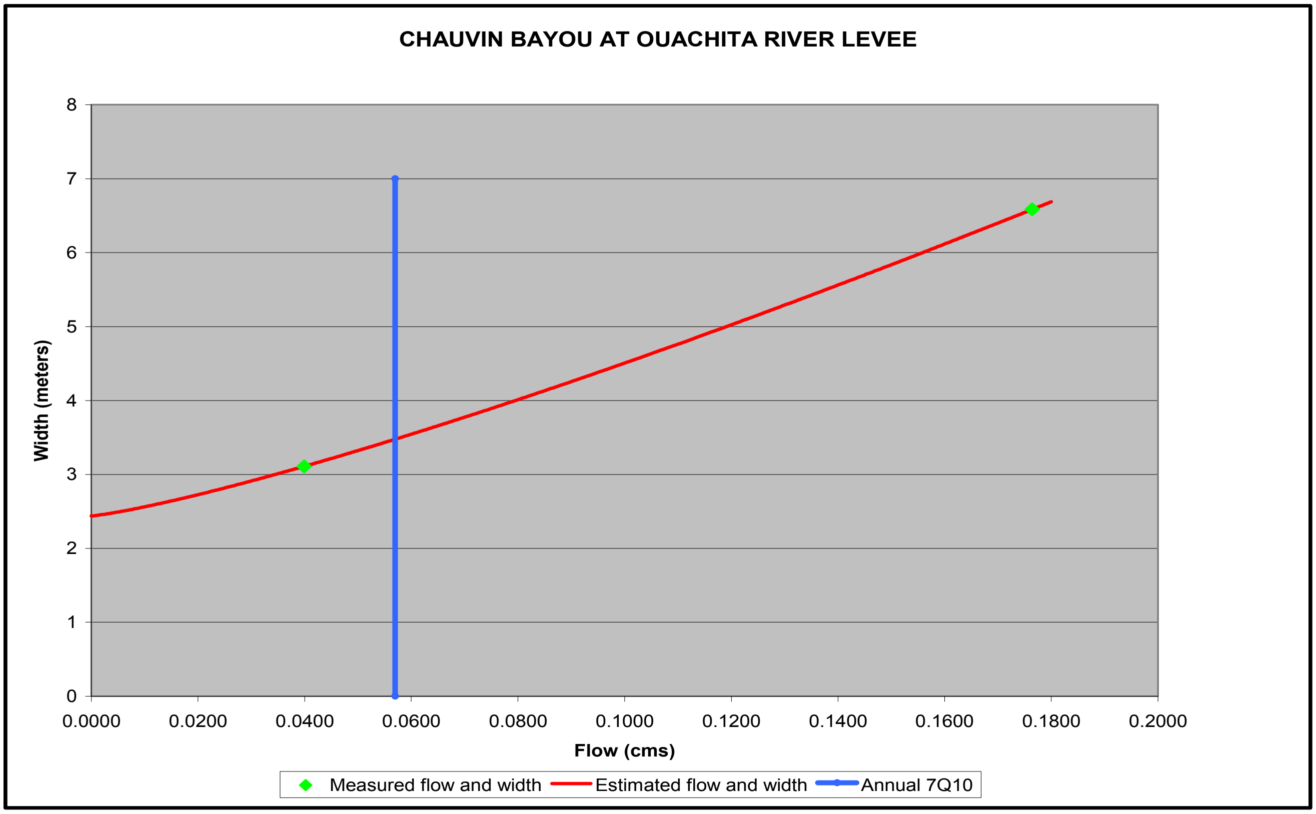


Figure 2 - Width vs Flow in Bayou Chauvin at the Ouachita River Levee



The coefficients and exponents for the hydrologic equations represented by Figures 1 and 2 were used in the calibration and projections, but the constant was adjusted upward to better represent the 27 hour time-of-travel from Highway 165 to the levee measured in October 1993 at a similar flow. The resulting relations of width and depth with flow are;

$$W = 34.77851Q^{1.22601} + 4.5 \quad \text{and} \quad D = 9.7429314Q^{1.733359} + 0.15$$

as shown in Figures 3 and 4.

Figure 3 - Depth vs Flow for Bayou Chauvin Reaches 14, 16, and 18

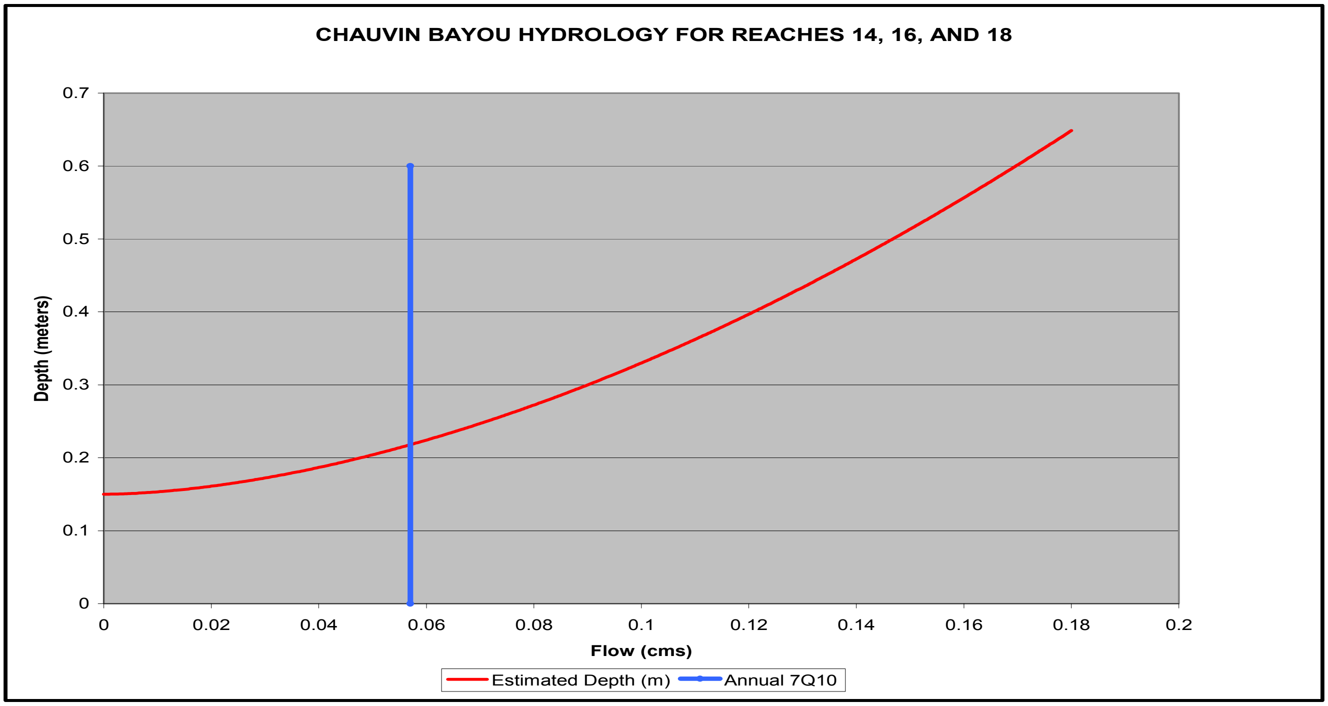


Figure 4 - Width vs Flow for Bayou Chauvin Reaches 14, 16, and 18

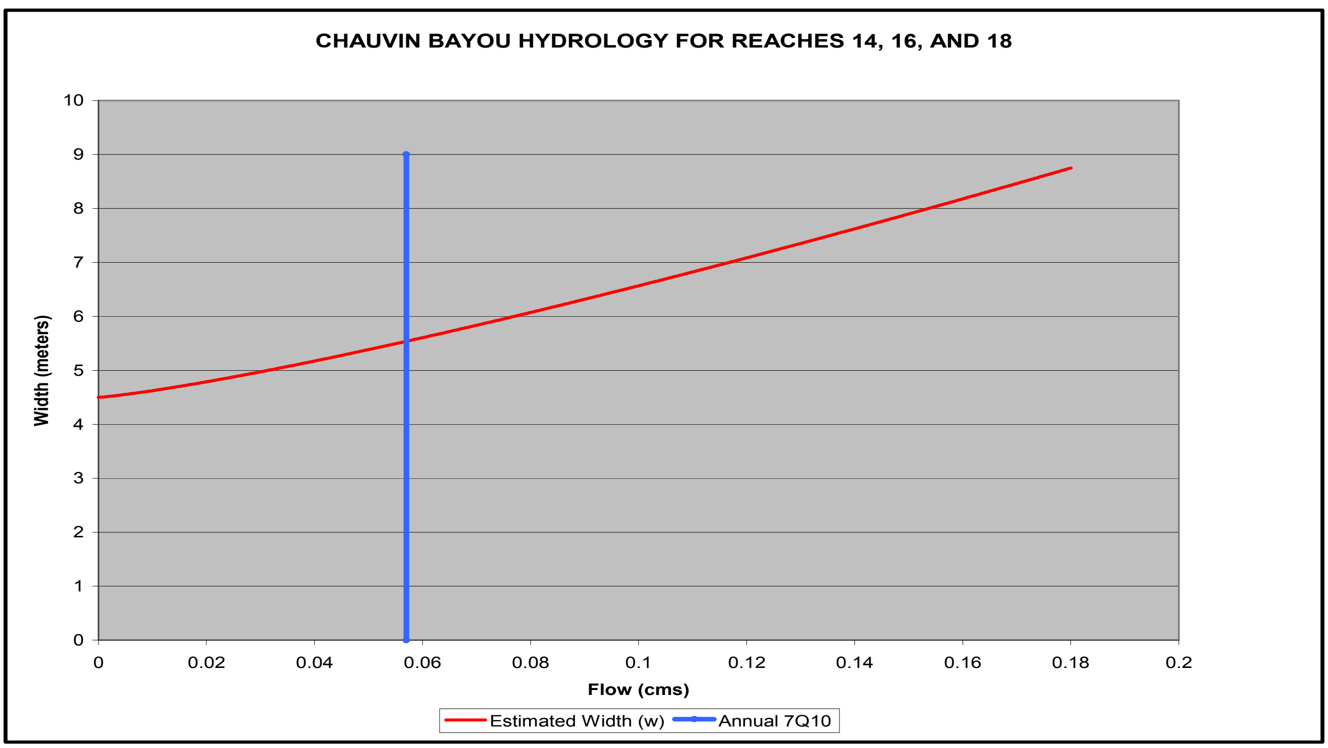


Table 14 – Bayou Chauvin Stream Distance, Flow Merasurements, and Width Estimates

BAYOU CHAUVIN STREAM DISTANCE, FLOW MEASUREMENTS, AND WIDTH ESTIMATES											
			10/17-20/1993			8/14-19/94			9/25/94 - 10/5/94		
River miles	RKm	Description	Width (ft)	Depth (ft)	Flow (cfs)	Width (ft)	Depth (ft)	Flow (cfs)	Width (ft)	Depth (ft)	Flow (cfs)
5.28	11.62	Junction of Caney Creek									
5.30	11.59	Shenandoah oxidation pond									
5.73	10.90	Hwy 139									NM
6.00	10.46	Lakeview estates (by pipe to bayou)									NM
6.30	9.98	Timberwood/Lakeside Liner/Bayou Oaks (by ditch)									
6.18	10.17	Lakewood Drive									
6.47	9.70	Joe White Rd									
6.55	9.58	Bayou de Siard overflow structure									
6.77	9.22	Control structure									
6.99	8.87	Leisure Village (by pipe to bayou)									NM
6.99	8.87	Bayou Chauvin at Leisure Village				22.00	1.19	0.95			
8.00	7.24	Hide-a-way SD#1 (disch to swamps - not impacting Chauvin)									
8.45	6.52	Oakwood pond # 1									
8.65	6.20	Oakwood pond # 2									
8.60	6.28	Bayou Chauvin at Oakwood # 2									
8.96	5.70	Pecan Bayou/Treasure Island OP (by ditch to canal system - no impact on Chauvin)									
9.12	5.44	Old Sterlington Rd	4.80	0.65	0.87	5.00	0.49	0.94	5.60	0.47	1.24
9.12	5.44	Old Sterlington Rd							5.50	0.54	1.21
9.25	5.23	West Elmwood/Town & Country Estates									
9.60	4.67	ArkLa&Mo RR: Geneva's Plaza/Poly Processing/Allied Building Stores - no disch to Chauvin in evidence during any of surveys - assume no impact.									
9.80	4.35	North Monroe SD#1									
9.94	4.12	Hwy 165	8.20	0.13	1.11	6.80	0.19	0.81	10.00	0.47	1.10
9.94	4.12	Hwy 165							8.00	0.31	1.13
10.10	3.86	North Gate Estates (by ditch to bayou)									
10.60	3.06	Northside Terrace (by RR ditch to bayou)									
12.46	0.06	Ouachita Levee site	10.20	0.37	1.41						
12.50	0.00	Ouachita River Levee culvert									

Table 15 - Bayou Chauvin Stream Distance, Flow Measurements, and Width Estimates

BAYOU CHAUVIN STREAM DISTANCE, FLOW MEASUREMENTS, AND WIDTH ESTIMATES							
			5/31/2000 - 6/1/2000			August, 1994 Width Run	
River miles	RKm	Description	Width (ft)	Depth (ft)	Flow (cfs)	Avg upstream	Avg downstream
5.28	11.62	Junction of Caney Creek				16	16
5.30	11.59	Shenandoah oxidation pond					
5.73	10.90	Hwy 139				22	20
6.00	10.46	Lakeview estates (by pipe to bayou)					
6.30	9.98	Timberwood/Lakeside Liner/Bayou Oaks (by ditch)					
6.18	10.17	Lakewood Drive				32	30
6.47	9.70	Joe White Rd				46	46
6.55	9.58	Bayou de Siard overflow structure			2.30	40	40
6.77	9.22	Control structure				25	25
6.99	8.87	Leisure Village (by pipe to bayou)					
6.99	8.87	Bayou Chauvin at Leisure Village					
8.00	7.24	Hide-a-way SD#1 (disch to swamps - not impacting Chauvin)					
8.45	6.52	Oakwood pond # 1					
8.65	6.20	Oakwood pond # 2				37	37
8.60	6.28	Bayou Chauvin at Oakwood # 2					
8.96	5.70	Pecan Bayou/Treasure Island OP (by ditch to canal system - no impact on Chauvin)					
9.12	5.44	Old Sterlington Rd				35	32
9.12	5.44	Old Sterlington Rd					
9.25	5.23	West Elmwood/Town & Country Estates					
9.60	4.67	ArkLa&Mo RR: Geneva's Plaza/Poly Processing/Allied Building Stores - no disch to Chauvin in evidence during any of surveys - assume no impact.	11.80	0.80	3.28	32	32
9.80	4.35	North Monroe SD#1					
9.94	4.12	Hwy 165				50	12
9.94	4.12	Hwy 165					
10.10	3.86	North Gate Estates (by ditch to bayou)					
10.60	3.06	Northside Terrace (by RR ditch to bayou)					
12.46	0.06	Ouachita Levee site	21.60	1.83	6.23	12	12
12.50	0.00	Ouachita River Levee culvert					

Table 16 - Bayou Chauvin Time-of-Travel Data and 1979 DOTD Stream Channel Estimates

BAYOU CHAUVIN TIME-OF-TRAVEL DATA

Reach No.	Reach	Meas. TOT (hrs)	Calc. TOT (hrs)	Meas. Q (cfs)	Calc. Q (cfs)	Length L (mi)	Est. width W (ft)	Est. depth D (ft)	Calc. avg. depth D (ft)	Source
	Caney Creek confluence to Hwy 139	*					19	0.75		8/94 W estimates, DOTD avg. D
1	Hwy 139 to Lakewood Dr.	44.20		*	0.29	0.45	26	0.75		8/94 TOT & W, DOTD avg. D, 8/94 TOT
2,4,5	Lakewood Dr. to Bayou Desiard						38	0.75		8/94 W estimates, DOTD avg. D
2,4	Lakewood Dr to Joe White Rd	84.02			0.14	0.29	38	0.75		8/94 W estimates, DOTD avg. D, 9/94 TOT; 9/94 Q calculated from L, W, D, & TOT
5	Joe White Rd to Bayou Desiard		23.89		0.14	0.08	38	0.75		8/94 W estimates, DOTD avg. D; 9/94 Q assumed same as Lakewood to Joe White; 9/94 TOT calculated from L, W, D, Q
5	Joe White Rd to Control Structure	42.60				0.30	28	0.75		8/94 W estimates, DOTD avg. D, 9/94 TOT
5	Bayou Desiard to Control Structure		18.71		0.36	0.22	28	0.75		8/94 W estimates, DOTD avg. D; 9/94 TOT is "Joe White to Control Structure" TOT minus "reach 2b" TOT; 9/94 Q calc from L, W, D, & calc 9/94 TOT
5	Bayou Desiard to Control Structure	**					28	0.75		8/94 W estimates, DOTD avg. D
6	Control Structure to Oakwood # 2	109.75		0.95		1.88	28		1.34	8/94 TOT, Q, & W; D calc from TOT, Q, W
7	Oakwood # 2 to Old Sterlington Rd.	30.92		0.94		0.47	36		1.18	8/94 TOT, Q, & W; D calc from TOT, Q, W
8,10	Old Sterlington Rd. to ALM Railroad	41.67		0.87		0.48	32		1.61	10/93 TOT, Q, & 8/94 W; D calc from TOT, Q, & W
11,13	ALM Railroad to Hwy 165	17.83		0.81		0.34	32		0.90	8/94 TOT, Q, & W; D calc from TOT, Q, W
14,16,18	Hwy 165 to Ouachita Levee site	27.09		1.41		2.52	20		0.52	10/93 TOT, Q, & 8/94 W; D calc from TOT, Q, & W***

* Not enough flow to measure   ** Not measured   *** Used as basis for modified Leopold coefficients for reach 8

1979 DOTD ESTIMATES OF TRAPEZOIDAL STREAM CHANNEL SIZE AT LOW FLOW

Reach No.	Approximate reach	Disch (cfs)	Bottom width (ft)	Side slope	Trap. Depth (ft)	X-sect area (ft2)	Surface width (ft)	Avg. depth (ft)	Reach length (ft)	Reach length (mi)	From - To (RKm)
1,2,4,5,6,7	Lakeview Est. to Old Sterlington Rd	2.23	30.00	3.50	0.71	22.72	30.41	0.75	12700	2.41	10.46 - 5.44
8,10	Old Sterlington Rd to ALM RR	2.56	25.00	3.00	0.75	20.44	25.50	0.80	6100	1.16	5.44 - 4.68
11	ALM RR To N. Monroe SD # 1	2.63	25.00	3.00	0.75	20.44	25.50	0.80	1600	0.30	4.68 - 4.36
13,14	N. Monroe SD # 1 to North Gate Est.	2.71	20.00	3.00	0.50	10.52	20.33	0.52	1100	0.21	4.36 - 3.86
16	North Gate Est. to Northside Terrace	2.75	30.00	3.00	0.40	12.16	30.27	0.40	2200	0.42	3.86 - 3.06
18	Northside Terrace to Ouachita River Levee	2.85	20.00	2.50	0.51	10.85	20.41	0.53	18600	3.52	3.06 - 0.00

APPENDIX C – 1994 SURVEY DATA

Table 17 - Bayou Chauvin Daytime Sampling Data

BAYOU CHAUVIN RAW DAYTIME SAMPLING DATA (9/25/94 - 10/05/94)

Site	Date	Time	Sample depth	pH	Temp (oC)	DO (mg/l)	Cond (umhos/cm)	TSS (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO2+NO3 (mg/l)	TP (mg/l)	TKN (mg/l)	NH3-N (mg/l)	UCBOD (mg/l)	UNBOD (mg/l)	Kd (1/d)	Kn (1/d)
Caney Cr confluence	9/28/94	13:45	mid-depth	7.03	23.8	1.53	471	57	50.0	19.0	<0.02	1.70	10.70	4.15	24.5	51.7	0.17	0.10
Hwy 139	9/28/94	8:40	mid-depth	6.98	21.2	3.01	257	62	34.0	6.0	0.03	0.30	1.66	0.25	5.8	10.8	0.11	0.43
Lakewood Dr	9/28/94	13:05	mid-depth	6.84	23.2	3.33	460	10	39.5	23.2	0.47	1.17	4.50	3.10	4.5	18.7	0.13	0.33
Joe White Rd	9/28/94	12:50	mid-depth	6.89	22.4	2.71	610	44	46.7	32.8	0.06	3.01	11.20	6.10	28.9	62.0	0.11	0.12
Control structure	9/28/94	11:40	mid-depth	6.85	23.4	4.92	254	51	17.6	9.4	0.46	0.37	3.10	1.10	4.4	12.2	0.21	0.10
Oakwood pond # 2	9/28/94	14:35	mid-depth	6.99	25.3	4.99	283	82	19.5	10.4	1.43	0.26	1.64	0.27	2.5	13.8	0.47	0.05
Old Sterlington Rd	9/28/94	9:38	mid-depth	7.50	22.3	5.19	356	184	25.5	18.1	1.24	0.70	4.20	0.80	12.9	25.7	0.13	0.04
ALM RR	9/28/94	9:13	mid-depth	7.25	21.8	3.65	363	234	26.5	17.2	10.70	0.70	3.51	0.70	10.3	21.2	0.13	0.21
Hwy 165	9/28/94	8:54	mid-depth	7.27	21.1	3.05	371	178	27.4	17.8	1.00	0.65	4.14	0.60	12.9	32.0	0.13	0.05
Ouachita levee	9/28/94	8:10	mid-depth	7.38	18.4	4.65	443	46	33.2	18.2	1.15	0.64	2.44	0.50	10.3	11.0	0.06	0.43

Site	Date	Time	Sample depth	pH	Temp (oC)	DO (mg/l)	Cond (umhos/cm)	TSS (mg/l)	Cl (mg/l)	SO4 (mg/l)	NO2+NO3 (mg/l)	TP (mg/l)	TKN (mg/l)	NH3-N (mg/l)	UCBOD (mg/l)	UNBOD (mg/l)	Kd (1/d)	Kn (1/d)
Caney Cr confluence	9/28/94	13:50	mid-depth	7.03	23.8	1.53	471	52	50.0	18.9	<0.02	1.70	9.10	4.17	24.6	42.2	0.17	0.08
Hwy 139	9/28/94	8:45	mid-depth	6.98	21.2	3.01	257	36	34.0	6.0	0.02	0.28	2.04	0.21	4.6	11.9	0.21	0.60
Lakewood Dr	9/28/94	13:10	mid-depth	6.84	23.2	3.33	460	6	39.5	23.1	0.54	1.28	4.80	3.10	3.9	17.6	0.11	0.18
Joe White Rd	9/28/94	12:55	mid-depth	6.89	22.4	2.71	610	49	46.5	32.9	0.09	3.00	10.80	6.14	25.2	56.1	0.10	0.25
Control structure	9/28/94	11:45	mid-depth	6.85	23.4	4.92	254	53	17.5	9.3	0.34	0.33	2.66	1.10	5.7	11.7	0.18	0.21
Oakwood pond # 2	9/28/94	14:40	mid-depth	6.99	25.3	4.99	283	60	19.3	10.4	1.46	0.28	2.04	0.26	4.8	9.7	0.14	0.59
Old Sterlington Rd	9/28/94	9:47	mid-depth	7.50	22.3	5.19	356	152	25.6	18.1	1.34	0.61	3.84	0.79	11.1	26.6	0.12	0.03
ALM RR	9/28/94	9:21	mid-depth	7.25	21.8	3.65	363	218	26.6	17.7	1.14	0.65	3.78	0.69	11.4	24.0	0.13	0.10
Hwy 165	9/28/94	9:02	mid-depth	7.27	21.1	3.05	371	215	27.3	17.5	1.09	0.70	4.29	0.56	13.0	24.1	0.14	0.21
Ouachita levee	9/28/94	8:27	mid-depth	7.38	18.4	4.65	443	35	33.1	18.2	0.97	0.64	3.06	0.47	5.5	10.7	0.14	0.09

Table 18 - Bayou Chauvin Day/Night Data and Summary of Daytime Data

	Dawn-dusk-midnight (D-D-M) in-situ sampling runs										
	Temp (^oC)				Dissolved oxygen (mg/l)			pH			
Site	Dawn	Dusk	Midnight	Avg of dawn & dusk	Dawn	Dusk	Midnight	Dawn	Dusk	Midnight	
Hwy 139	22.33	27.80	23.37	25.07	1.55	6.80	3.04	6.71	7.37	6.90	
Lakewood Dr	22.17	24.53	23.23	23.35	1.66	1.79	1.03	6.85	6.92	6.81	
Joe White Rd	22.50	26.34	24.40	24.42	0.83	3.68	0.82	6.85	7.08	6.89	
Control structure	23.54	26.35	24.35	24.95	3.78	9.30	6.08	6.81	7.30	6.08	
Oakwood pond # 2	23.89	25.13	22.73	24.51	3.15	5.05	3.58	7.44	7.31	7.05	
Old Sterlington Rd	21.64	28.48	25.87	25.06	6.02	13.60	9.31	6.94	8.94	8.40	
ALM RR	23.55	27.65	23.96	25.60	3.68	12.00	5.15	7.25	8.85	7.00	
Hwy 165	23.26	30.20	25.79	26.73	2.75	12.40	5.65	7.17	8.83	7.41	
Ouachita levee	20.15	28.19	--	24.17	4.45	11.37	--	7.28	8.75	7.54	

	D-D-M in-situ sampling runs			Average values from daytime water quality sampling								
	Conductivity (umhos/cm)											
Site	Dawn	Dusk	Midnight	Date	Times	NO_2+NO_3 (mg/l)	TP (mg/l)	TKN (mg/l)	NH_3-N (mg/l)	Chloro-phyll *a*	TSS (mg/l)	Cl (mg/l)
Caney Cr confluence				9/28/94	1345-1350	<0.020	1.700	9.90	4.16	236	55.0	50.0
Hwy 139	277	91	276	9/28/94	0840-0845	0.025	0.290	1.85	0.23	90.00	49.0	34.0
Lakewood Dr	447	451	449	9/28/94	1305-1310	0.505	1.225	4.65	3.10	8.00	8.0	39.5
Joe White Rd	550	566	574	9/28/94	1250-1255	0.075	3.005	11.00	6.12	109.00	47.0	46.6
Control structure	297	281	293	9/28/94	1140-1145	0.400	0.350	2.88	1.10	53.00	52.0	17.6
Oakwood pond # 2	350	288	292	9/28/94	1435-1440	1.445	0.270	1.84	0.27	21.00	71	19.4
Old Sterlington Rd	281	340	348	9/28/94	0938-0947	1.290	0.655	4.02	0.80	65.00	168	25.6
ALM RR	390	347	365	9/28/94	0913-0921	1.105	0.675	3.65	0.70	61.00	226	26.6
Hwy 165	368	351	356	9/28/94	0854-0902	1.045	0.675	4.22	0.58	75.00	197	27.4
Ouachita levee	402	385	--	9/28/94	0810-0827	1.060	0.640	2.75	0.49	17.00	41	33.2

	Avg values from daytime WQ sampling											
Site	SO4 (mg/l)	Temp (oC)	pH	Cond (umhos/cm)	DO (mg/l)	UCBOD (mg/l)	UNBOD (mg/l)	Kd (1/d)	Kn (1/d)	TKNx4.3 (mg/l)	BPJ* UNBOD	BPJ* UCBOD
Caney Cr confluence	19.00	23.8	7.0	471.00	1.53	24.55	46.95	0.17	0.09	42.57	42.57	28.93
Hwy 139	6.00	21.2	7.0	257.00	3.01	5.20	11.35	0.16	0.515	7.96	7.96	8.59
Lakewood Dr	23.20	23.2	6.8	460.00	3.33	4.20	18.15	0.12	0.255	20.00	18.15	4.20
Joe White Rd	32.90	22.4	6.9	610.00	2.71	27.05	59.05	0.105	0.185	47.30	47.30	38.80
Control structure	9.40	23.4	6.9	254.00	4.92	5.05	11.95	0.195	0.155	12.38	11.95	5.05
Oakwood pond # 2	10.4	25.33	6.99	283	4.99	3.65	11.75	0.305	0.32	7.91	7.91	7.49
Old Sterlington Rd	18.1	22.31	7.5	356	5.19	12	26.15	0.125	0.035	17.29	17.29	20.86
ALM RR	17.5	21.81	7.25	363	3.65	10.85	22.6	0.13	0.155	15.70	15.70	17.75
Hwy 165	17.7	21.1	7.27	371	3.05	12.95	28.05	0.135	0.13	18.15	18.15	22.85
Ouachita levee	18.2	18.36	7.38	443	4.65	7.9	10.85	0.1	0.26	11.83	10.85	7.90

* Where TKNx4.3 is less than UNBOD, the BPJ UNBOD is TKNx4.3 and the UCBOD is UBOD-UNBOD.

Table 19 - Bayou Chauvin Measured Facility Data

MEASURED FACILITY DATA 2 (9/25/94 - 10/05/94)									
Facility	Date	Time	Avg flow (cms)	UCBOD (mg/l)	UNBOD (mg/l)	Kd (1/d)	Kn (1/d)	TKNx4.3 (mg/l)	BOD-4.3xTKN (mg/l)
Northside Terrace	9/27/94	9:30	0.00156	116.5	69.9	0.09	0.60	56.33	130.06
		9:42		127.4	81.0	0.17	0.12	82.13	126.24
Northgate Estates	9/24/94	14:00	0.00119	78.5	36.7	0.05	0.35	80.84	34.3
		14:10		84.6	34.7	0.06	0.40	67.94	51.43
Leisure Village	9/27/94	15:15	0.000396	11.4	10.3	0.07	0.03	7.955	13.725
		15:20		5.1	12.2	0.14	0.14	8.256	9.004
Lakeside Liner & Bayou Oaks	9/27/94	15:40	0.00692	71.4	56.9	0.04	0.42	79.55	48.75
		15:45		72.9	63.1	0.04	0.60	77.4	58.62
Shenandoah Subdivision	9/26/94		0.00147					0	0
Lakeview Estates	9/26/94		0.000708					0	0
Oakwood # 2	9/27/94	14:40	0.00663	12.7	38.3	0.14	0.44	34.83	16.16
		14:45		13.9	43.0	0.12	0.35	40.764	16.146
North Monroe SD # 1	9/26/94		No flow					0	0
West Elmwood Pond	9/26/94		No flow					0	0

FACILITY DMR DATA SUMMARY									
	Sep-94			Oct-94					
Facility	Flow (mgd)	BOD5 (mg/l)	NH3-N (mg/l)	Flow (mgd)	BOD5 (mg/l)	NH3-N (mg/l)	Avg flow (cms)	Avg UCBOD (mg/l) as BOD5*2.3	Comments
Bayou Oaks OP	0.0740	46.85		0.1410	29.43		0.004709	88	1994 data
Lakeside Liner OP	0.0000	0.00		0.0000	0.00		0.000000	0	1994 data
West Elmwood OP	0.1350	17.80		0.0160	17.80		0.003307	41	1996 data
Northside Terrace OP	0.1550	40.30		0.0260	30.10		0.003964	81	1996 data
North Monroe SD #1 OP	0.0958	2.02	1.58	0.1210	2.95	1.18	0.004749	6	1994 data
Oakwood #2 OP	0.3120	27.30		0.0300	11.95		0.007491	45	1996 data
North Gate Estates OP	0.0140	18.40		0.0150	24.05		0.000635	49	1996 data
Leisure Village STP	0.0227	40.20		0.0286	27.70		0.001124	78	1994 data
Lakeview Estates STP	0.0160	29.40		0.0160	26.00		0.000701	64	1994 data

Table 20 – Bayou Chauvin Measured Facility and Facility DMR Data

MEASURED FACILITY DATA 1 (9/25/94 - 10/05/94)

Facility	Date	Time	Flow (cfs)	Date	Time	Flow (cfs)	Comments
Northside Terrace	9/26/94	NR	**0.057**	9/27/94	NR	**0.052**	12.5 gal bucket in an average of 7.3 sec (9/26) & 8.01 sec (9/27)
Northgate Estates	9/26/94	NR	**0.039**	9/27/94	NR	**0.045**	12.5 gal bucket in an average of 10.75 sec (9/26). Two streams: 12.5 gal/11.45 sec & 12.5 gal/47.59 sec (9/27). Will use measurement of 9/27.
Leisure Village	9/26/94	NR	**0.018**	9/27/94	NR	**0.010**	12.5 gal bucket in an average of 22.87 sec (9/26) & 43.39 sec (9/27)
Lakeside Liner & Bayou Oaks	9/26/94	16:35	**0.147**	9/27/94	NR	**0.342**	Conventional discharge measurement and culvert measurement both give about the same result (9/26) & Culvert measurement: .42 ft depth in 4 ft culvert @ v = .54 ft/sec (9/27)
Shenandoah Subdivision	9/26/94	NR	0.052	---	---	---	Cannot find field notes, value is from survey report.
Lakeview Estates	9/26/94	NR	**0.025**	---	---	---	Estimated from a channel .5 ft wide, approximately .05 ft deep and flowing with a velocity of approximately 1 foot per second.
Oakwood # 2	9/26/94	NR	**0.234**	9/27/94	---	---	Flowing from an 8 in vertical pipe with a head of 1.25 in. Calculated by rectantular weir formula without end contractions.
North Monroe SD # 1	9/26/94	NR	no disch				
West Elmwood Pond	9/26/94	NR	no disch				

Facility	Date	Time	pH	Temp	DO	Cond	TSS	CL	SO4	NO_2+ NO_3	TP	TKN	NH_3-N	Chloro-phyll a
Northside Terrace	9/27/94	9:30	9.70	22.42	17.60	431	168	40.0	15.9	< 0.02	4.92	13.10	0.48	892.87
		9:42					174	39.9	16.2	< 0.02	5.41	19.10	0.47	
Northgate Estates	9/24/94	14:00	7.48	21.97	0.42	392	88	33.1	21.8	< 0.02	3.81	18.80	3.83	
		14:10					95	33.0	21.7	< 0.02	4.06	15.80	3.07	198.68
Leisure Village	9/27/94	15:15	7.84	25.17	5.91	700	33	153.0	72.6	30.60	4.75	1.85	0.15	0.00
		15:20					27	148.0	66.2	25.40	4.80	1.92	0.12	
Lakeside Liner & Bayou Oaks	9/27/94	15:40	7.51	26.46	4.76	486	50	39.7	30.4	0.33	3.71	18.50	7.09	371.48
		15:45					52	39.4	30.6	0.36	3.88	18.00	7.20	
Shenandoah Subdivision	No data													
Lakeview Estates	No data													
Oakwood # 2	9/27/94	14:40	8.19	22.98	5.94	475	198	39.9	30.2	1.43	1.36	8.10	4.03	
		14:45					184	39.8	30.4	1.23	1.49	9.48	4.06	105.53
North Monroe SD # 1	No data													
West Elmwood Pond	No data													

APPENDIX D – 1994 BOD DATA

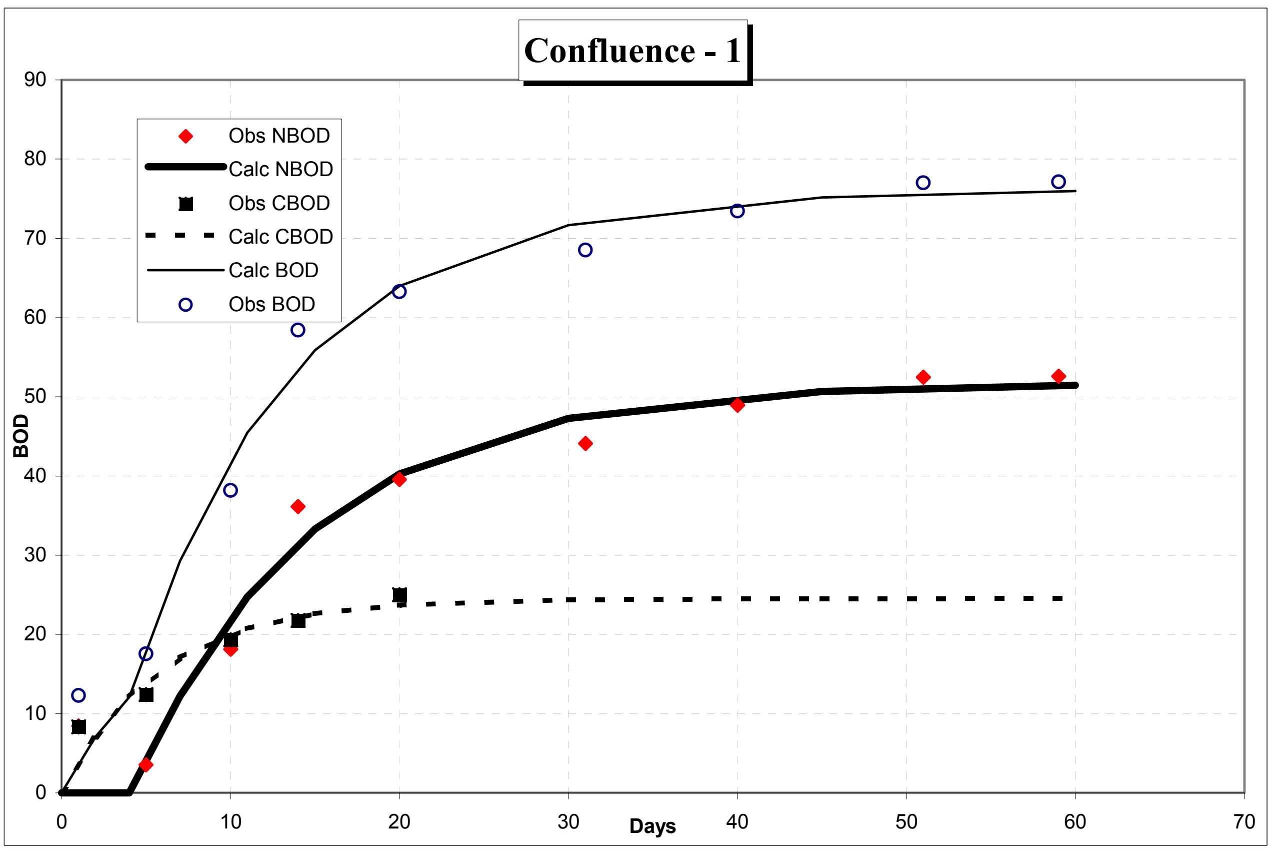
BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Confluence - 1

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	12.3	8.47	8.32
5	17.56	3.52	12.40
10	38.18	18.13	19.31
14	58.41	36.15	21.78
20	63.27	39.56	25.02
31	68.51	44.11	
40	73.43	48.93	
51	77	52.48	
59	77.12	52.59	

Calculated: BOD_t=UBOD[1-e$^{-(k(t-lag))}$]

Total BOD (NBOD+CBOD)	NBOD	CBOD
3.83	0.00	3.83
17.97	3.92	14.04
42.09	22.04	20.05
53.71	31.45	22.26
63.98	40.27	23.71
72.10	47.70	24.40
74.51	50.01	24.50
75.64	51.12	24.52
75.96	51.43	24.53
UBOD	51.71	24.53
K	0.10	0.17
Lag	4.17	0.00
RMSE/UBOD (note 2)	18.39%	20.51%



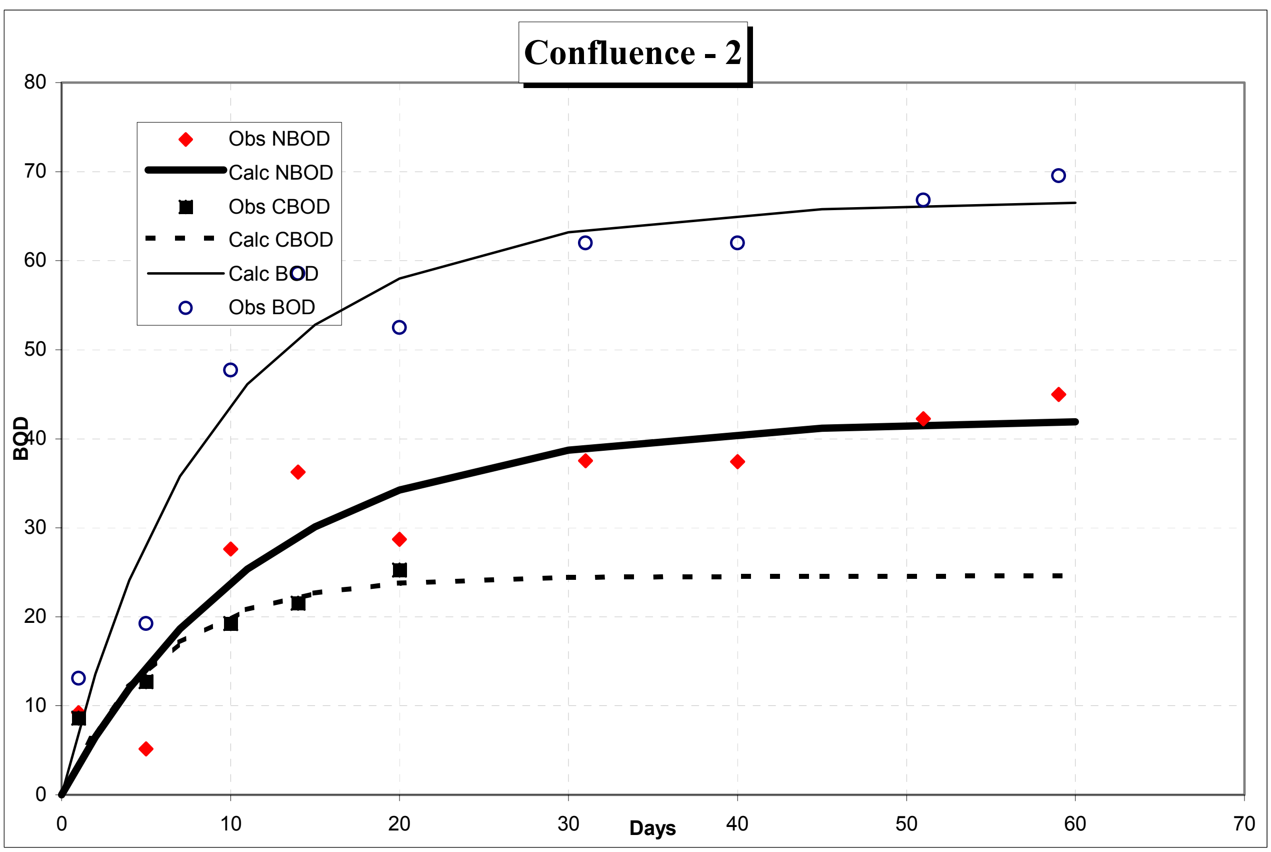
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Confluence - 2

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	13.08	9.24	8.62
5	19.24	5.16	12.70
10	47.72	27.62	19.25
14	58.59	36.27	21.54
20	52.49	28.72	25.26
31	62	37.53	
40	62	37.43	
51	66.81	42.22	
59	69.56	44.97	

Calculated: BOD_t=UBOD[1-e$^{-(k(t-lag))}$]		
Total BOD (NBOD+CBOD)	NBOD	CBOD
7.22	3.38	3.84
28.47	14.39	14.08
43.97	23.87	20.10
51.39	29.07	22.32
58.01	34.23	23.77
63.47	39.01	24.47
65.25	40.68	24.57
66.17	41.58	24.59
66.46	41.87	24.59
UBOD	42.18	24.59
K	0.08	0.17
Lag	0.00	0.00
RMSE/UBOD (note 2)	36.95%	21.61%



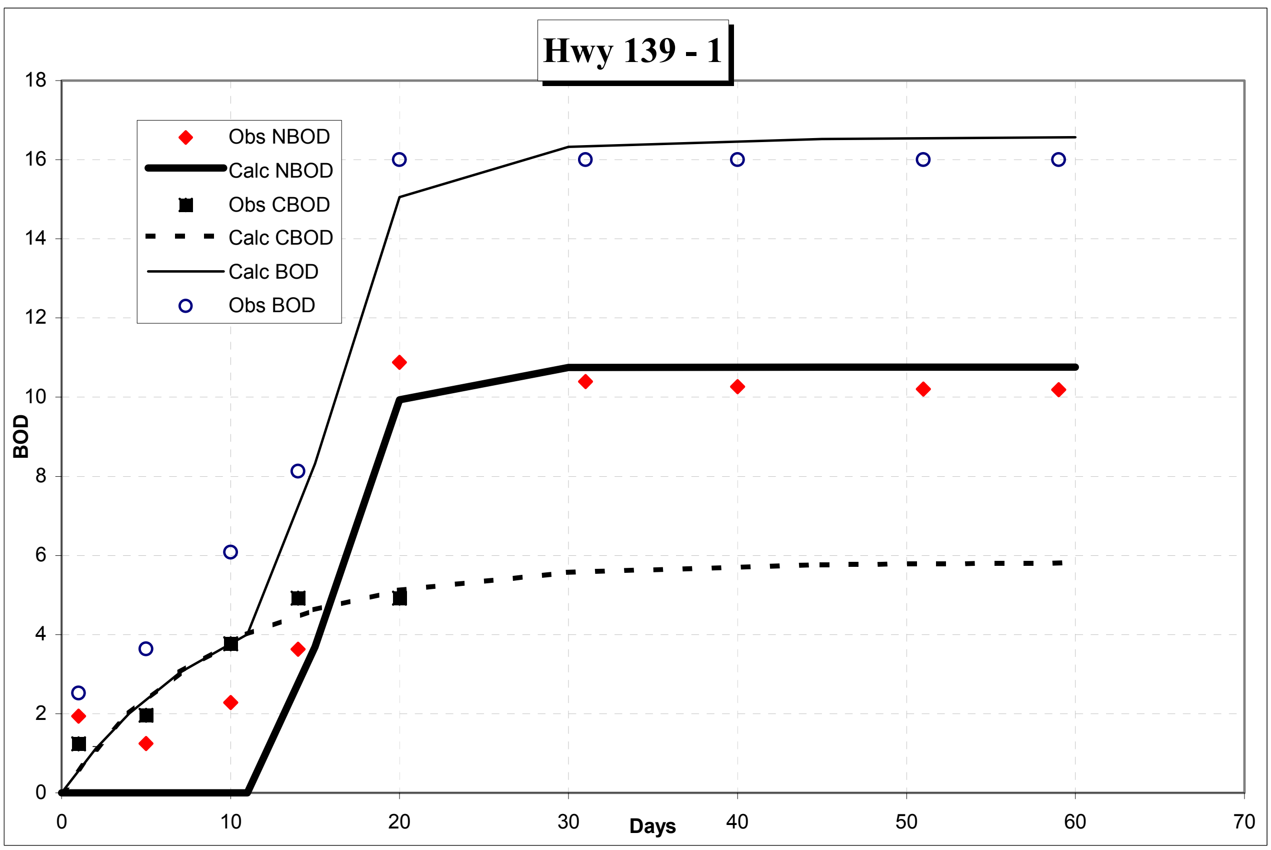
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Hwy 139 - 1

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	2.52	1.94	1.24
5	3.64	1.25	1.96
10	6.08	2.28	3.77
14	8.13	3.63	4.92
20	16	10.88	4.92
31	16	10.40	
40	16	10.26	
51	16	10.21	
59	16	10.19	

Calculated: BOD_t=UBOD[1-$e^{-(k(t-lag))}$]		
Total BOD (NBOD+CBOD)	NBOD	CBOD
0.58	0.00	0.58
2.39	0.00	2.39
3.80	0.00	3.80
4.50	0.00	4.50
15.06	9.94	5.12
16.35	10.75	5.60
16.49	10.76	5.74
16.55	10.76	5.79
16.57	10.76	5.81
UBOD	10.76	5.82
K	0.43	0.11
Lag	14.02	0.00
RMSE/UBOD (note 2)	33.26%	15.70%



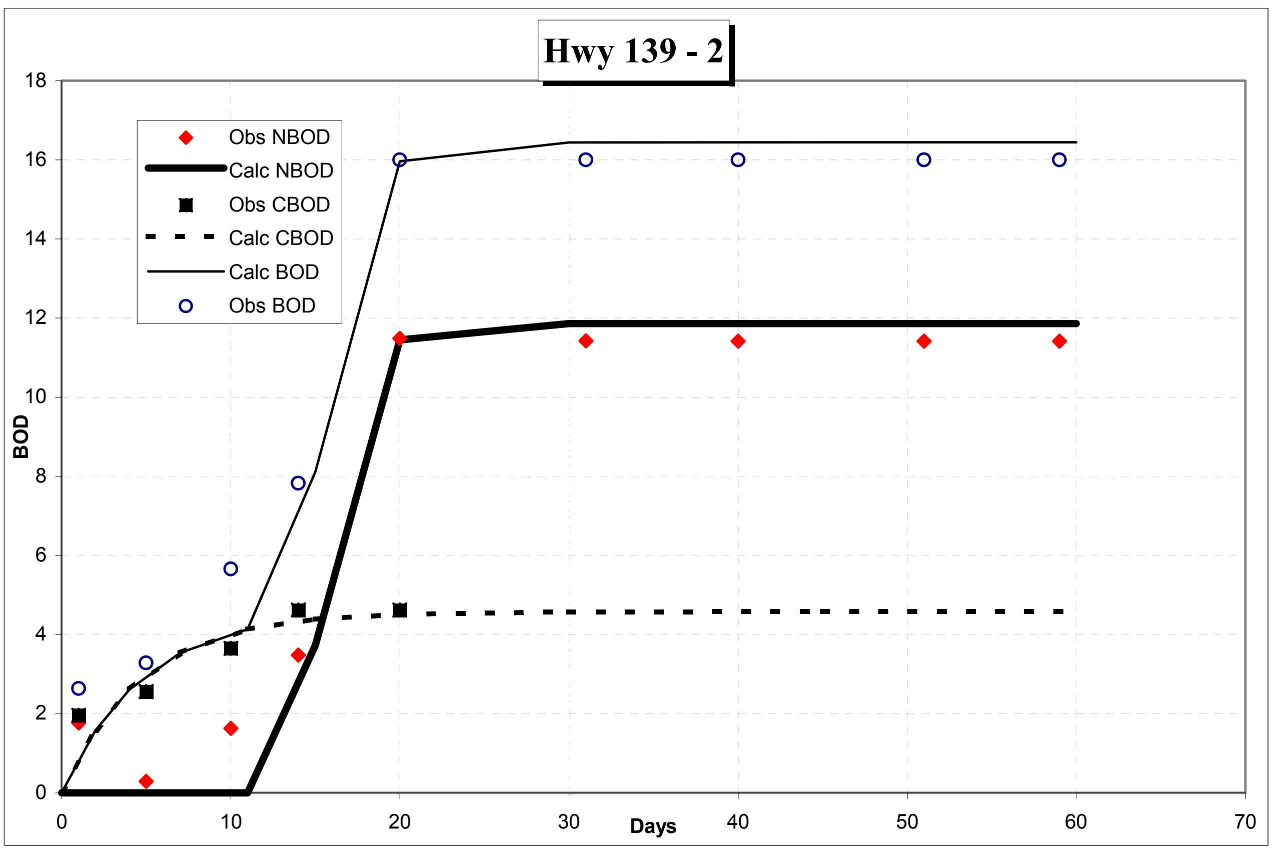
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Hwy 139 - 2

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	2.64	1.77	1.96
5	3.28	0.29	2.56
10	5.66	1.63	3.65
14	7.83	3.49	4.62
20	16	11.48	4.62
31	16	11.42	
40	16	11.42	
51	16	11.42	
59	16	11.42	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
0.87	0.00	0.87
2.99	0.00	2.99
4.03	0.00	4.03
4.34	0.00	4.34
15.97	11.45	4.52
16.44	11.86	4.58
16.45	11.86	4.58
16.45	11.86	4.58
16.45	11.86	4.58
UBOD	11.86	4.58
K	0.60	0.21
Lag	14.37	0.00
RMSE/UBOD (note 2)	20.01%	27.57%



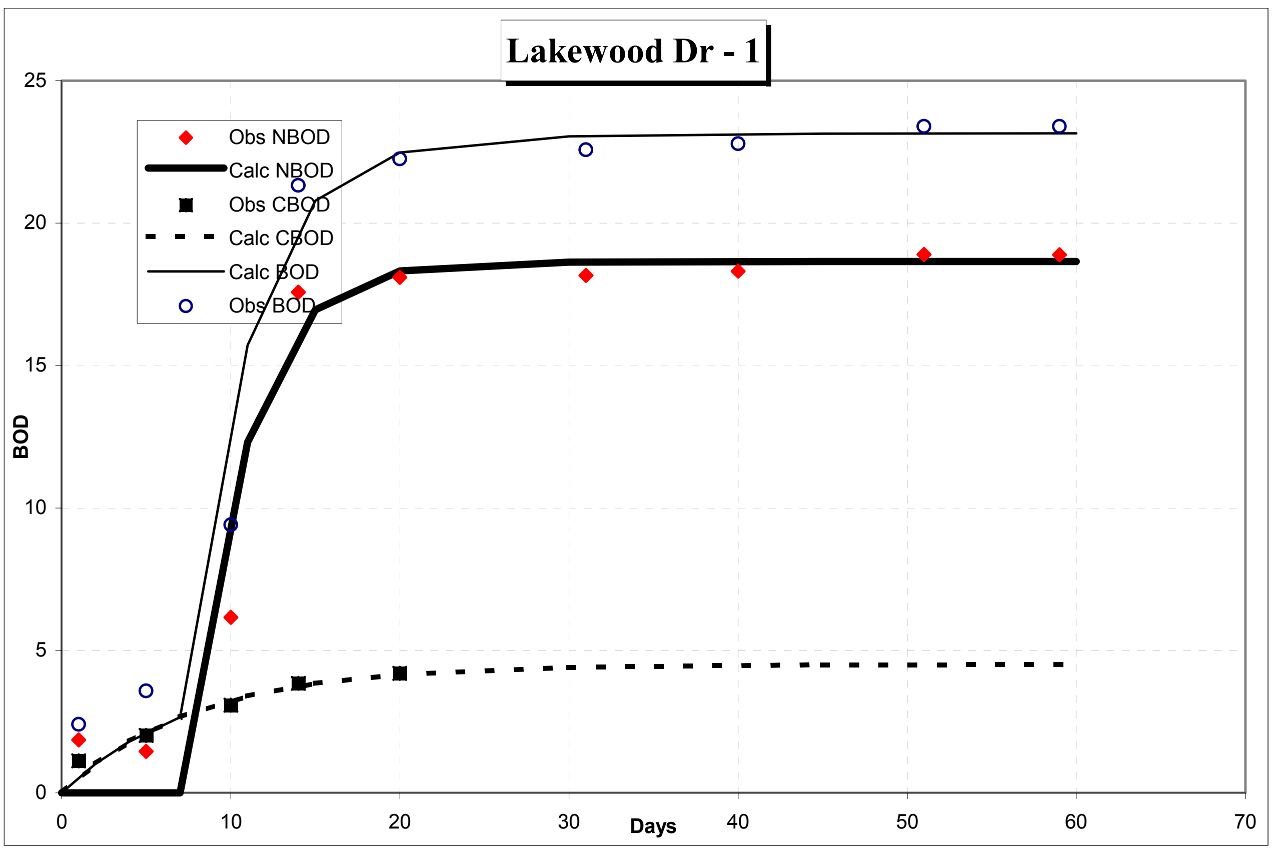
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Lakewood Dr - 1

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	2.4	1.86	1.12
5	3.58	1.45	2.02
10	9.41	6.16	3.08
14	21.33	17.58	3.84
20	22.26	18.10	4.20
31	22.58	18.16	
40	22.79	18.31	
51	23.4	18.90	
59	23.4	18.90	

Calculated: $BOD_t = UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
0.54	0.00	0.54
2.13	0.00	2.13
13.09	9.84	3.25
20.04	16.29	3.75
22.48	18.32	4.16
23.06	18.64	4.42
23.13	18.65	4.48
23.15	18.65	4.50
23.16	18.65	4.50
UBOD	18.65	4.51
K	0.33	0.13
Lag	7.72	0.00
RMSE/UBOD (note 2)	13.52%	13.79%



Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

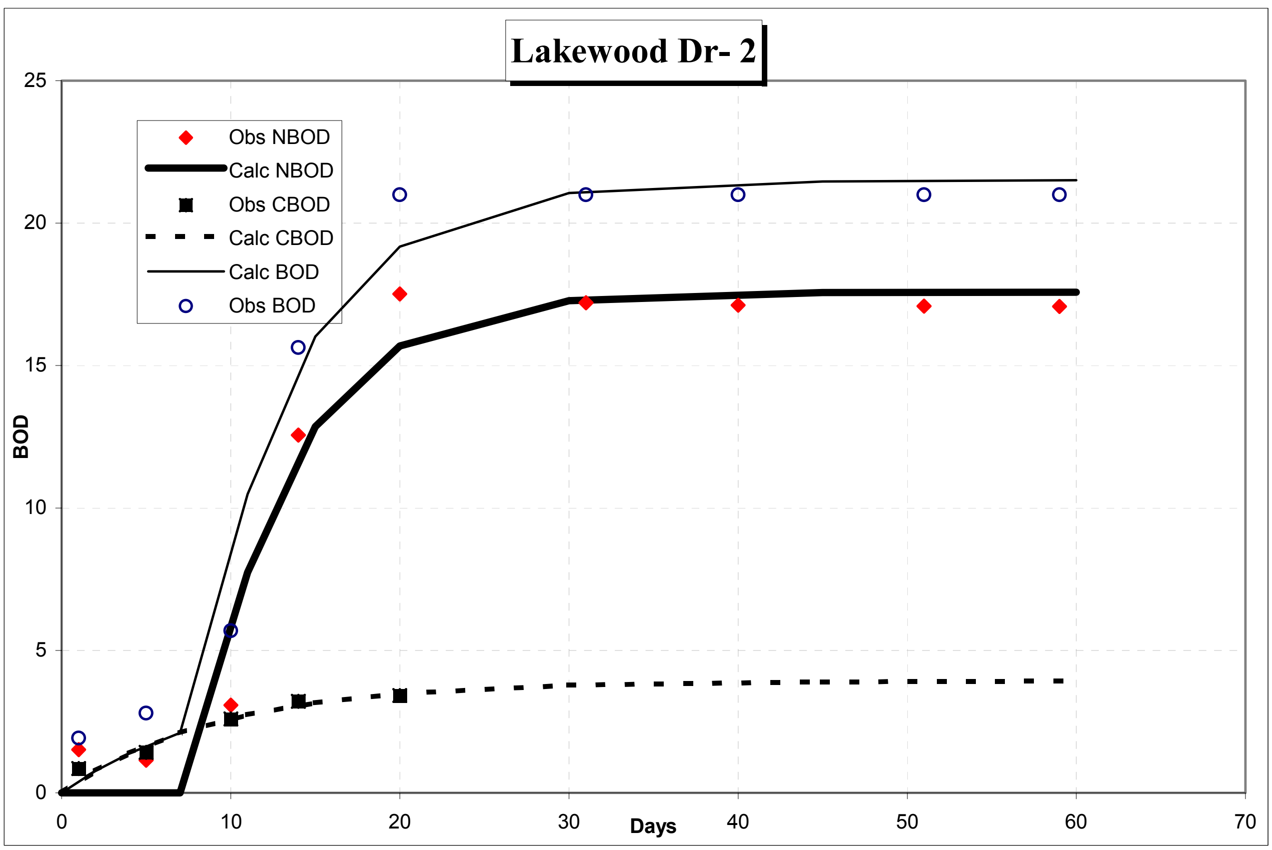
BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Lakewood Dr- 2

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	1.92	1.51	0.85
5	2.8	1.15	1.42
10	5.69	3.08	2.60
14	15.63	12.55	3.21
20	21	17.51	3.42
31	21	17.21	
40	21	17.12	
51	21	17.09	
59	21	17.08	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$

Total BOD (NBOD+CBOD)	NBOD	CBOD
0.41	0.00	0.41
1.65	0.00	1.65
8.37	5.76	2.61
14.98	11.90	3.08
19.18	15.69	3.49
21.12	17.33	3.79
21.41	17.53	3.88
21.49	17.58	3.91
21.50	17.58	3.92
UBOD	17.58	3.93
K	0.18	0.11
Lag	7.83	0.00
RMSE/UBOD (note 2)	15.85%	13.31%



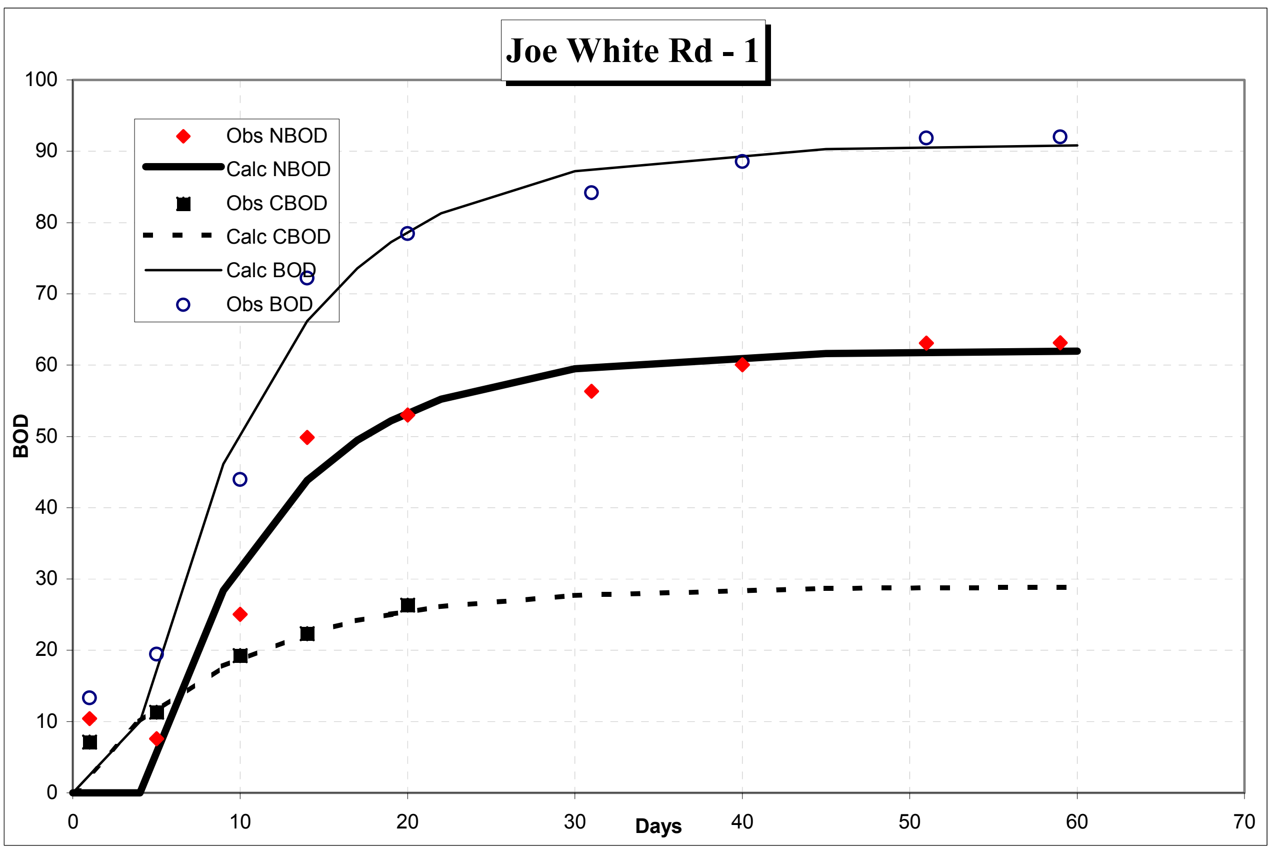
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = **Joe White Rd - 1**

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	13.32	10.42	7.12
5	19.48	7.60	11.32
10	43.94	25.06	19.25
14	72.21	49.86	22.32
20	78.45	53.01	26.34
31	84.17	56.34	
40	88.55	60.05	
51	91.86	63.07	
59	92	63.14	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
2.90	0.00	2.90
18.89	7.01	11.88
51.17	32.28	18.88
66.19	43.84	22.35
78.77	53.33	25.44
87.61	59.77	27.83
89.78	61.28	28.50
90.62	61.83	28.79
90.81	61.95	28.86
UBOD	62.02	28.92
K	0.12	0.11
Lag	4.03	0.00
RMSE/UBOD (note 2)	18.77%	15.38%



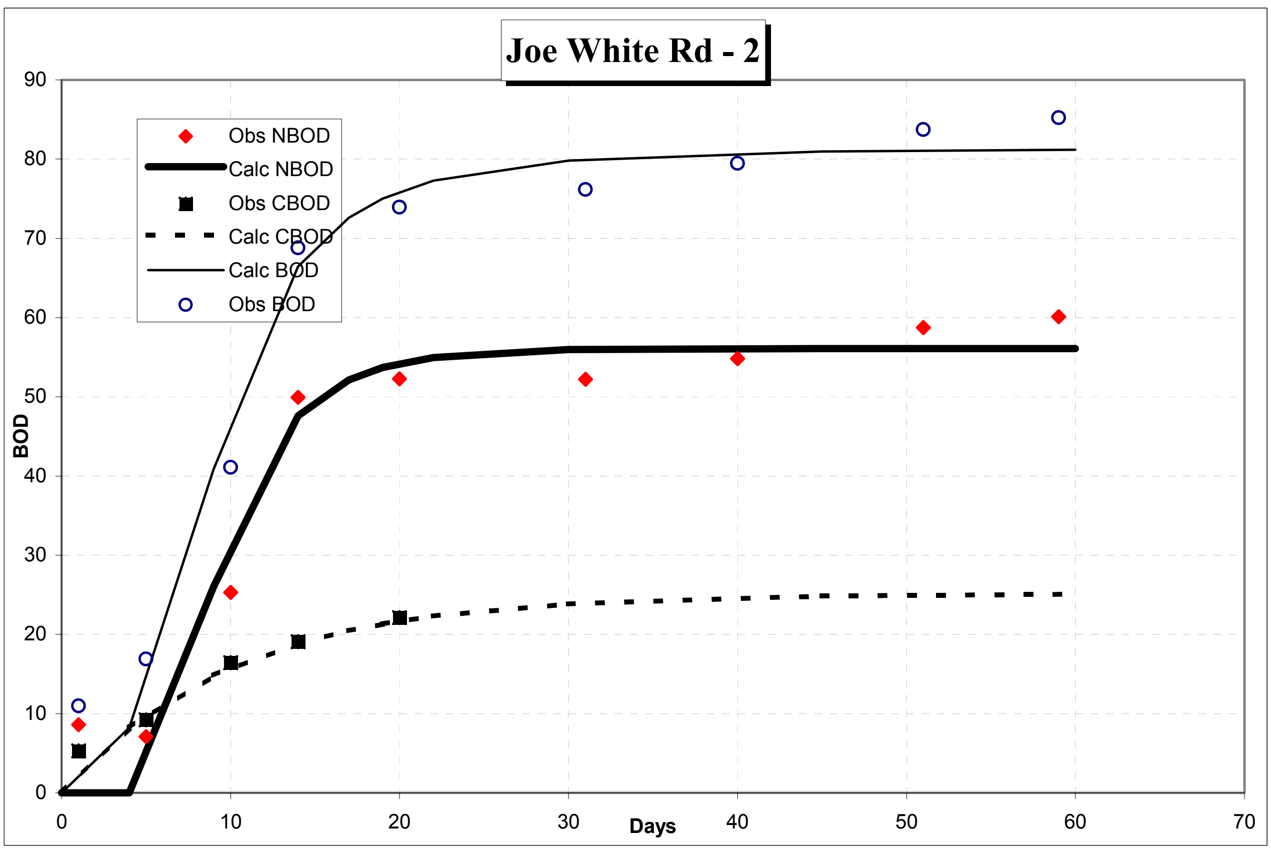
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Joe White Rd - 2

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	10.98	8.61	5.32
5	16.9	7.09	9.22
10	41.12	25.33	16.43
14	68.79	49.94	19.08
20	73.95	52.28	22.14
31	76.19	52.20	
40	79.49	54.81	
51	83.73	58.73	
59	85.22	60.13	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
2.37	0.00	2.37
9.81	0.00	9.81
48.58	32.79	15.79
66.46	47.61	18.85
75.91	54.23	21.67
79.97	55.98	23.99
80.77	56.09	24.68
81.10	56.10	25.00
81.19	56.10	25.09
UBOD	56.10	25.16
K	0.25	0.10
Lag	6.52	0.00
RMSE/UBOD (note 2)	22.91%	12.23%



Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

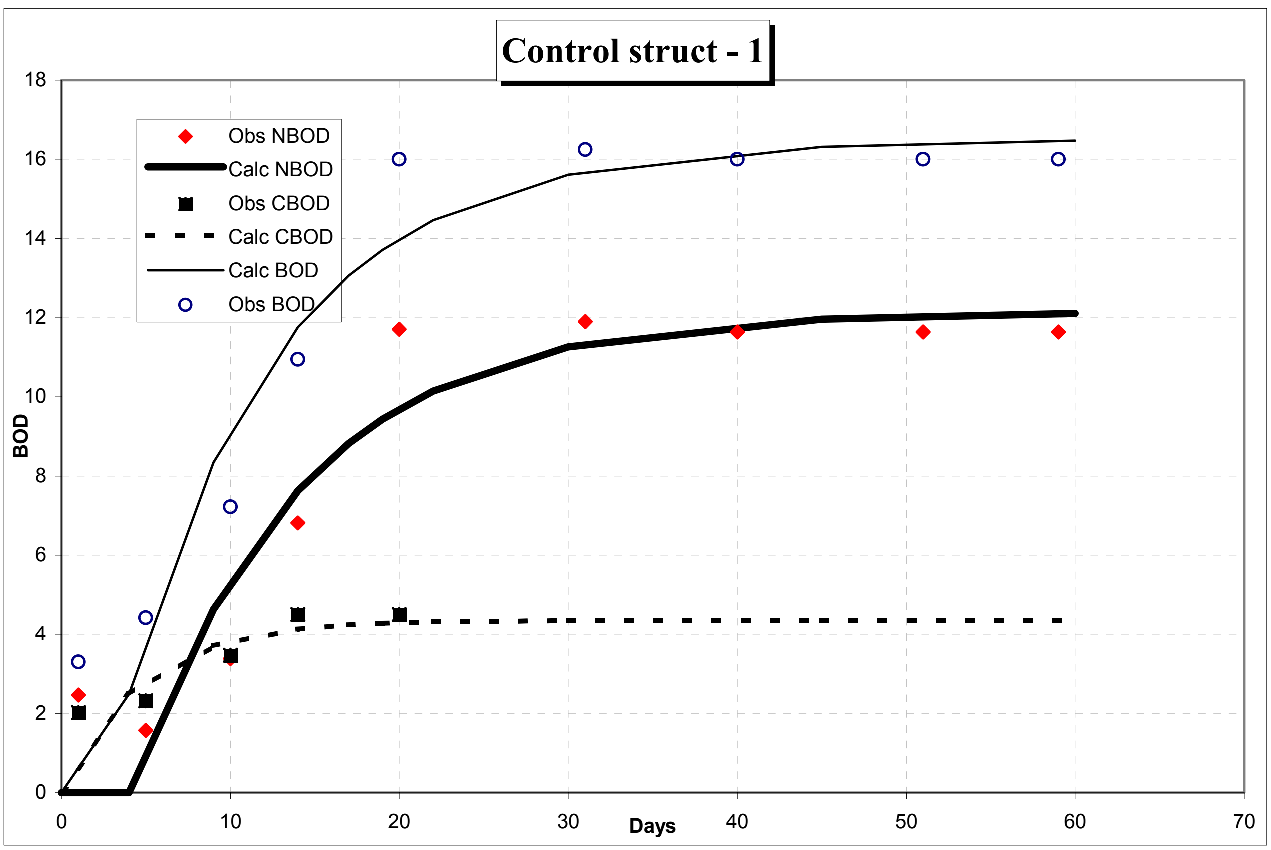
BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Control struct - 1

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	3.3	2.47	2.02
5	4.42	1.58	2.32
10	7.22	3.39	3.47
14	10.95	6.82	4.50
20	16	11.70	4.50
31	16.25	11.90	
40	16	11.64	
51	16	11.64	
59	16	11.64	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$

Total BOD (NBOD+CBOD)	NBOD	CBOD
0.83	0.00	0.83
3.70	0.86	2.84
9.19	5.36	3.83
11.76	7.63	4.13
13.99	9.69	4.30
15.70	11.35	4.35
16.19	11.83	4.36
16.41	12.05	4.36
16.47	12.11	4.36
UBOD	12.15	4.36
K	0.10	0.21
Lag	4.28	0.00
RMSE/UBOD (note 2)	31.37%	32.85%



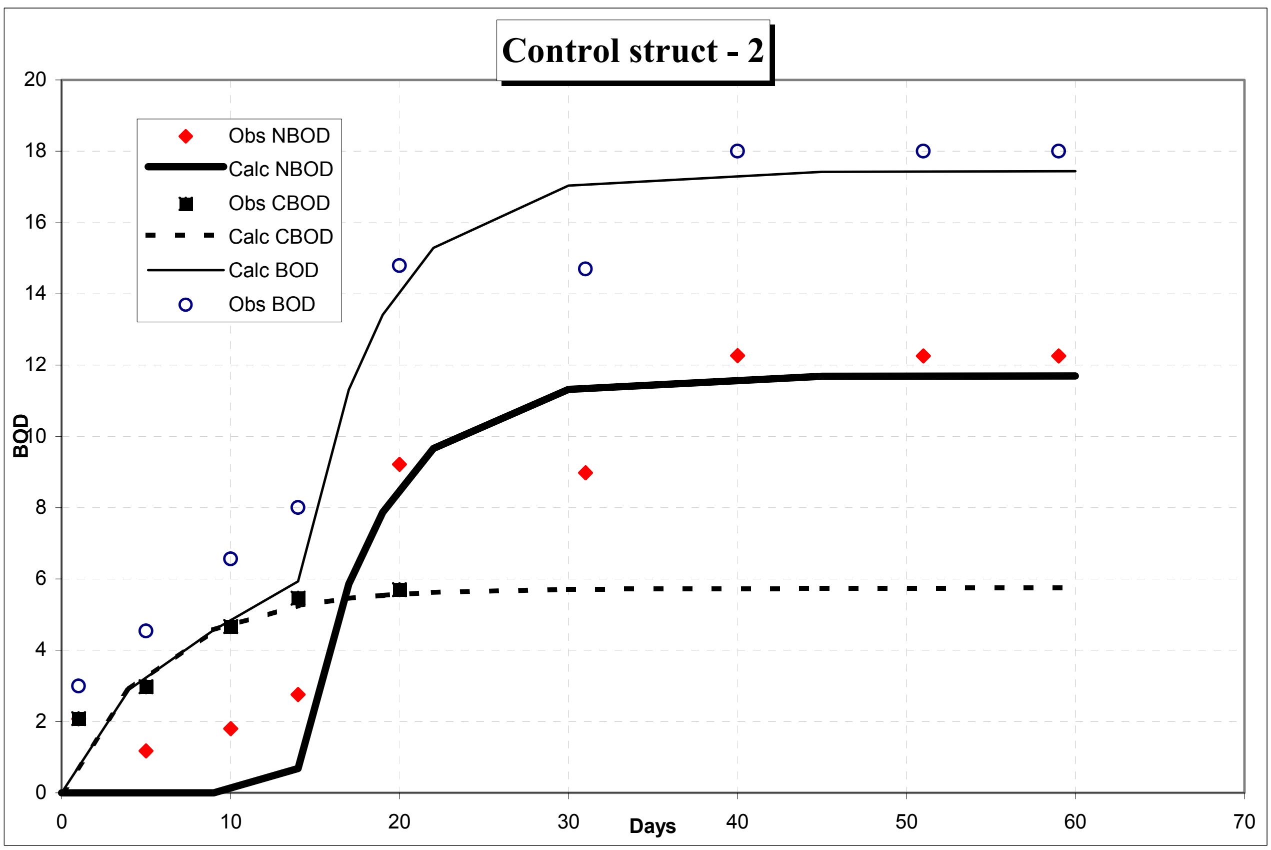
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Control struct - 2

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	3	2.07	2.08
5	4.54	1.18	2.98
10	6.56	1.80	4.67
14	8.01	2.76	5.46
20	14.79	9.22	5.70
31	14.7	8.98	
40	18	12.26	
51	18	12.26	
59	18	12.26	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$ Total BOD (NBOD+CBOD)	NBOD	CBOD
0.93	0.00	0.93
3.36	0.00	3.36
4.76	0.00	4.76
5.93	0.68	5.25
14.17	8.60	5.57
17.11	11.39	5.72
17.39	11.65	5.74
17.43	11.69	5.74
17.44	11.70	5.74
UBOD	11.70	5.74
K	0.21	0.18
Lag	13.72	0.00
RMSE/UBOD (note 2)	34.29%	21.80%



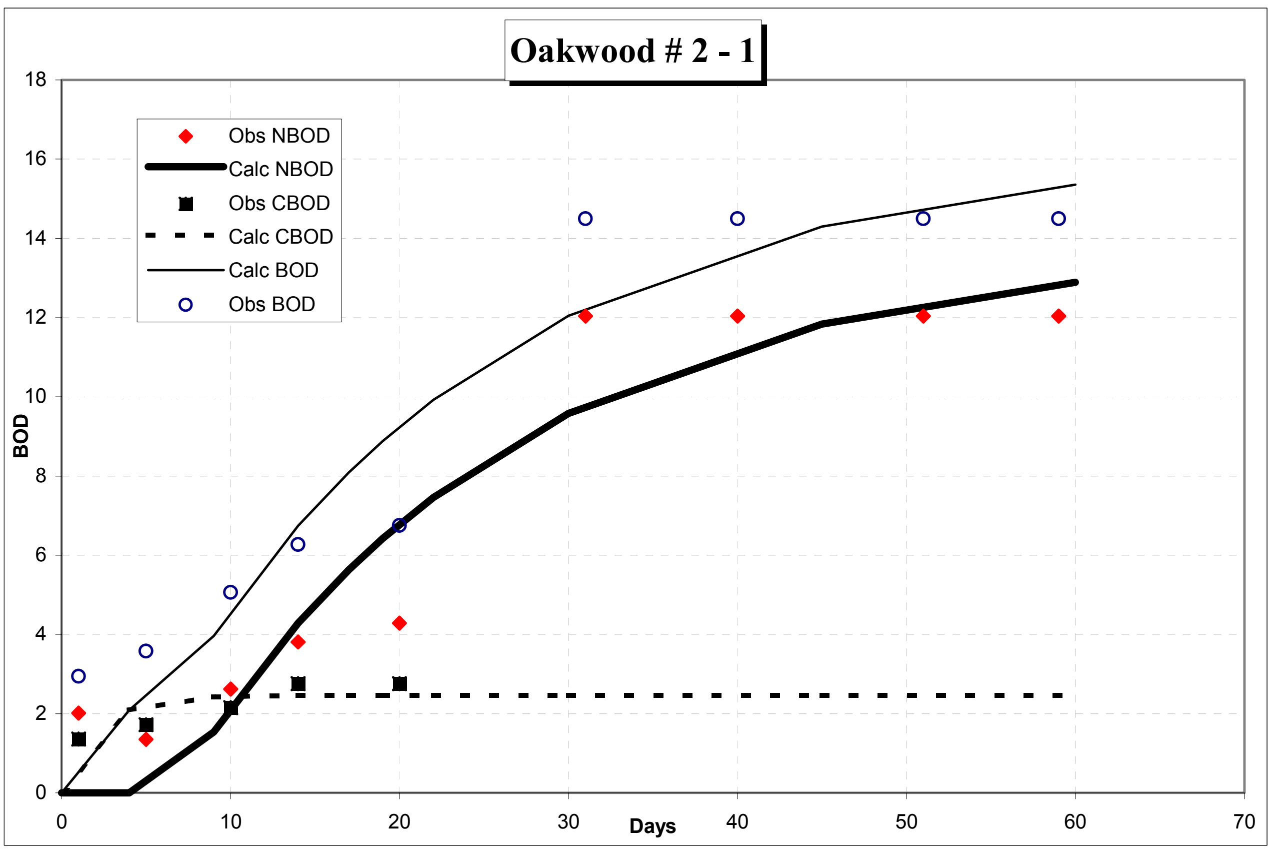
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
<u>Bayou Chauvin, September 25 - October 5, 1994</u>

Sample/Site # = Oakwood # 2 - 1

	Measured		
Days	Total BOD	NBOD (note1)	CBOD
1	2.94	2.01	1.36
5	3.58	1.35	1.72
10	5.06	2.62	2.15
14	6.27	3.81	2.76
20	6.75	4.29	2.76
31	14.5	12.04	
40	14.5	12.04	
51	14.5	12.04	
59	14.5	12.04	

Calculated: $BOD_t = UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
0.93	0.00	0.93
2.23	0.00	2.23
4.59	2.15	2.44
6.75	4.29	2.46
9.25	6.78	2.46
12.25	9.79	2.46
13.73	11.27	2.46
14.82	12.36	2.46
15.31	12.84	2.46
UBOD	13.82	2.46
K	0.05	0.47
Lag	6.67	0.00
RMSE/UBOD (note 2)	34.52%	34.35%



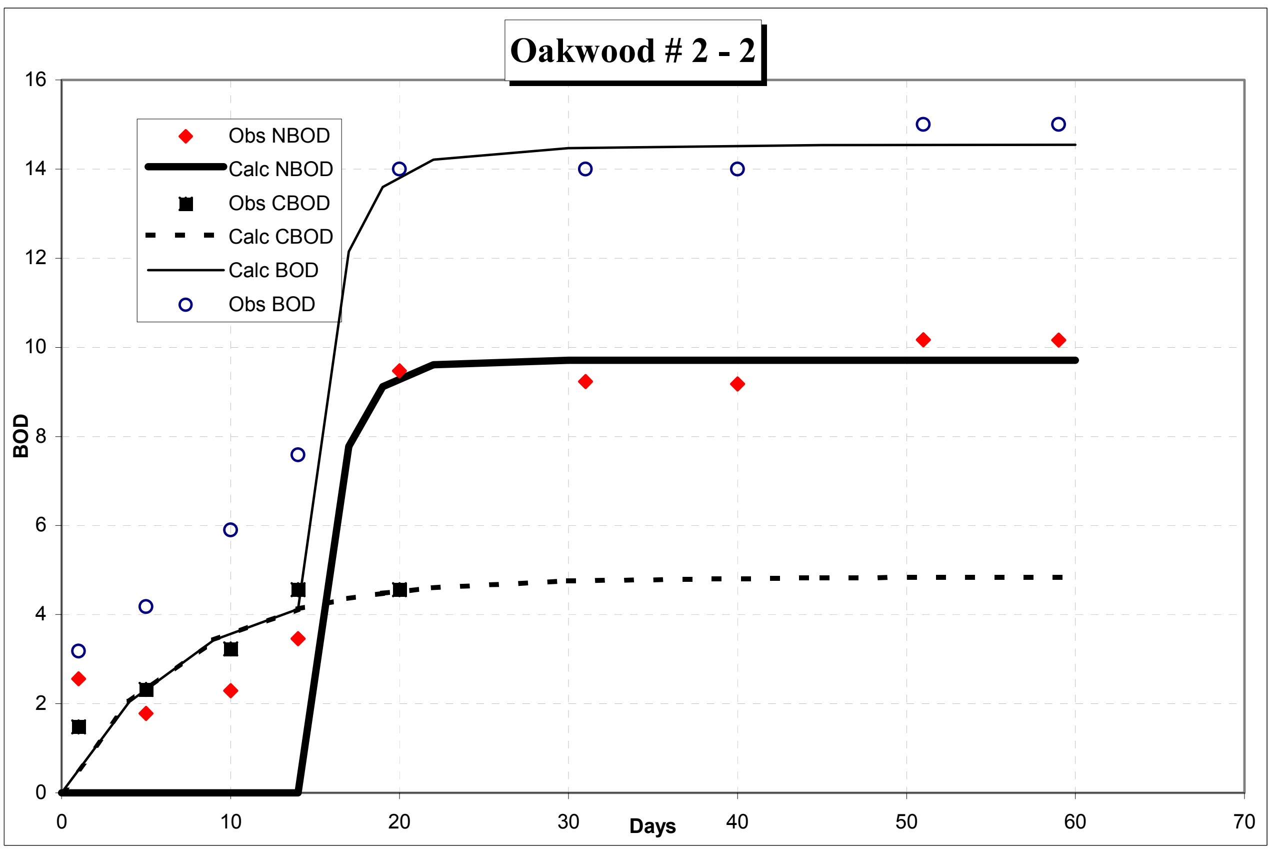
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Oakwood # 2 - 2

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	3.18	2.56	1.48
5	4.18	1.78	2.32
10	5.9	2.29	3.23
14	7.59	3.46	4.56
20	14	9.47	4.56
31	14	9.23	
40	14	9.18	
51	15	10.16	
59	15	10.16	

Calculated: $BOD_t = UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
0.62	0.00	0.62
2.40	0.00	2.40
3.61	0.00	3.61
4.13	0.00	4.13
13.91	9.38	4.53
14.48	9.71	4.77
14.53	9.71	4.82
14.55	9.71	4.84
14.55	9.71	4.84
UBOD	9.71	4.84
K	0.59	0.14
Lag	14.27	0.00
RMSE/UBOD (note 2)	42.17%	22.18%



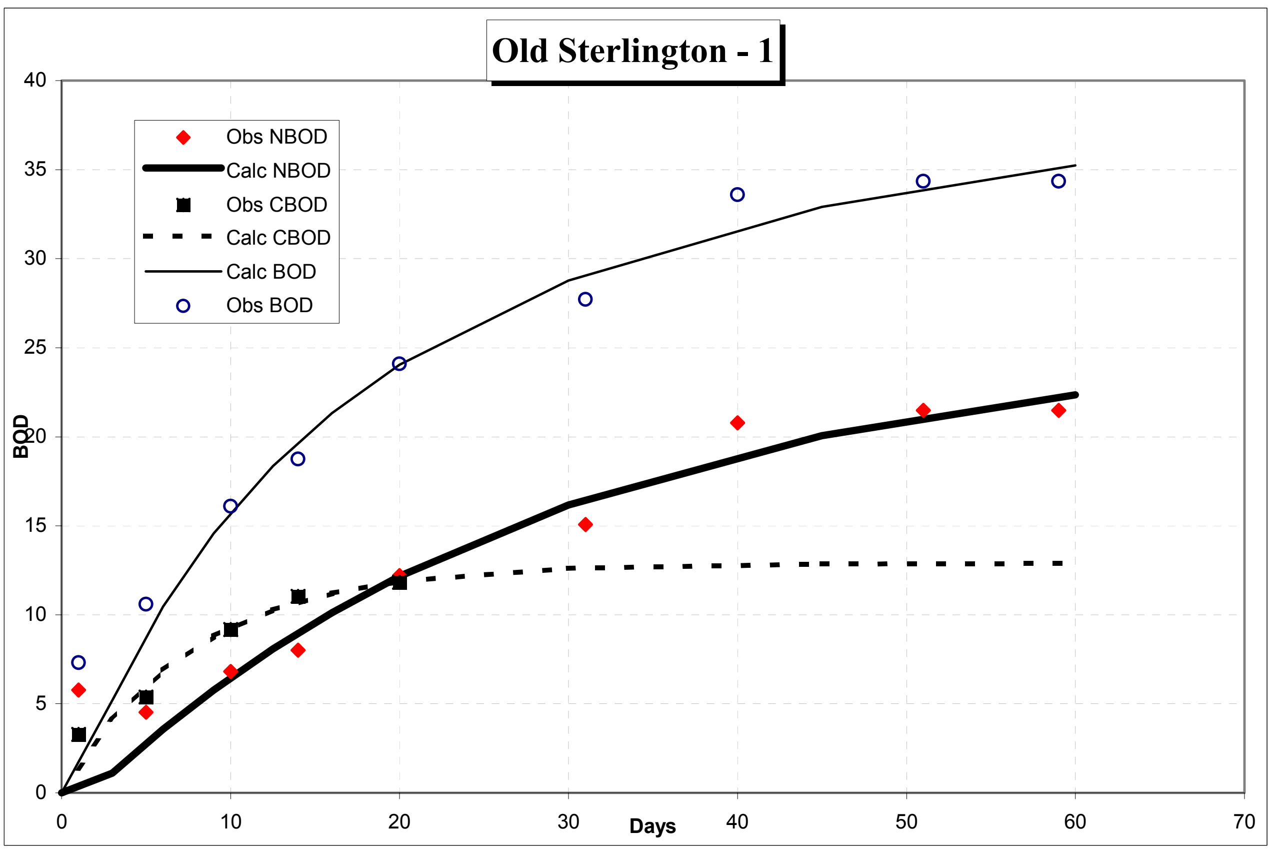
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Old Sterlington - 1

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	7.32	5.78	3.28
5	10.6	4.52	5.38
10	16.1	6.81	9.17
14	18.75	8.02	11.04
20	24.09	12.21	11.82
31	27.71	15.07	
40	33.59	20.78	
51	34.35	21.48	
59	34.35	21.47	

Calculated: BOD_t=UBOD[1-e$^{-(k(t-lag))}$]		
Total BOD (NBOD+CBOD)	NBOD	CBOD
1.54	0.00	1.54
8.85	2.77	6.08
15.75	6.46	9.29
19.71	8.98	10.73
24.04	12.16	11.88
29.13	16.49	12.64
31.79	18.98	12.81
33.99	21.13	12.87
35.12	22.24	12.88
UBOD	25.67	12.89
K	0.04	0.13
Lag	1.75	0.00
RMSE/UBOD (note 2)	25.68%	14.76%



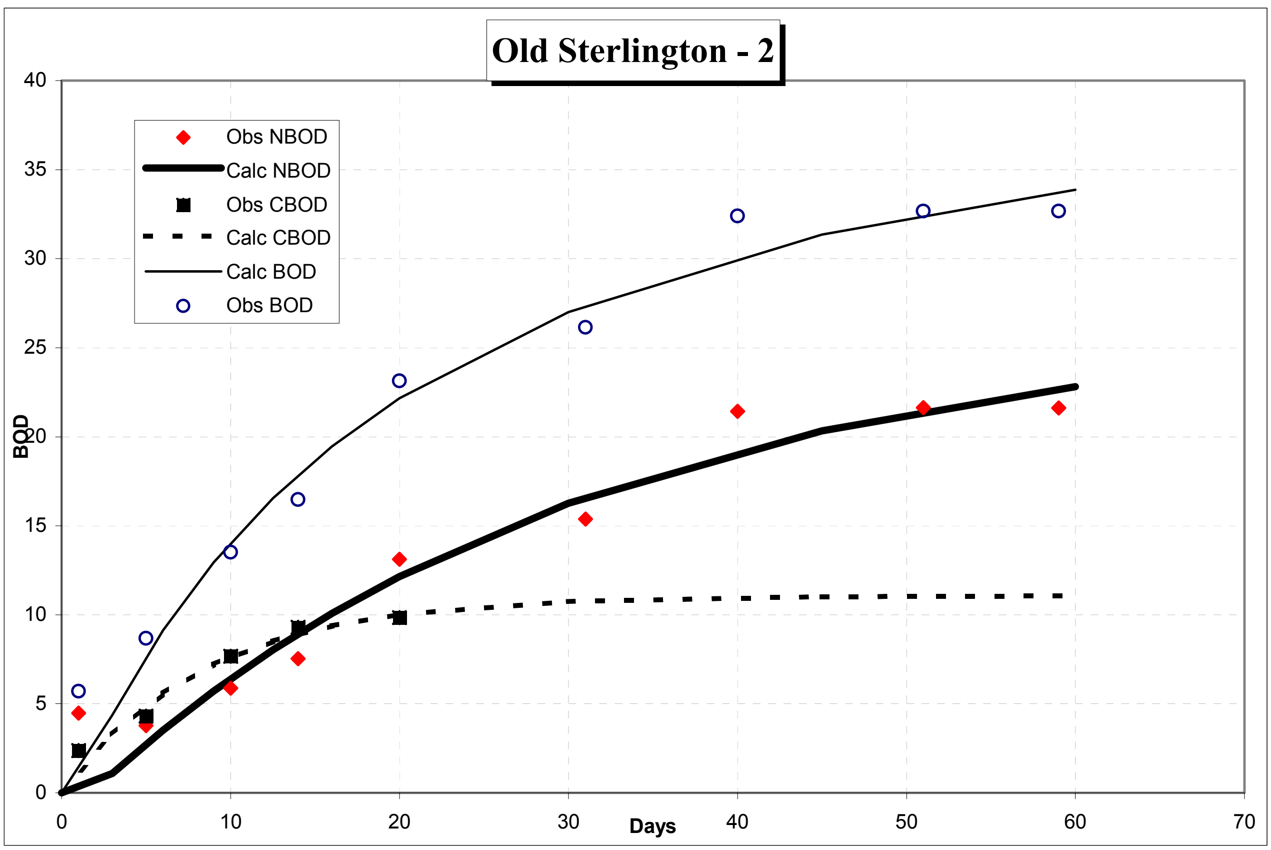
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Old Sterlington - 2

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	5.7	4.47	2.38
5	8.68	3.77	4.30
10	13.52	5.88	7.67
14	16.47	7.54	9.30
20	23.13	13.12	9.84
31	26.15	15.37	
40	32.39	21.42	
51	32.67	21.63	
59	32.67	21.61	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
1.23	0.00	1.23
7.65	2.74	4.91
14.06	6.41	7.64
17.87	8.94	8.93
22.16	12.15	10.01
27.38	16.60	10.78
30.17	19.20	10.97
32.52	21.48	11.04
33.74	22.68	11.06
UBOD	26.59	11.07
K	0.03	0.12
Lag	1.75	0.00
RMSE/UBOD (note 2)	21.23%	12.37%



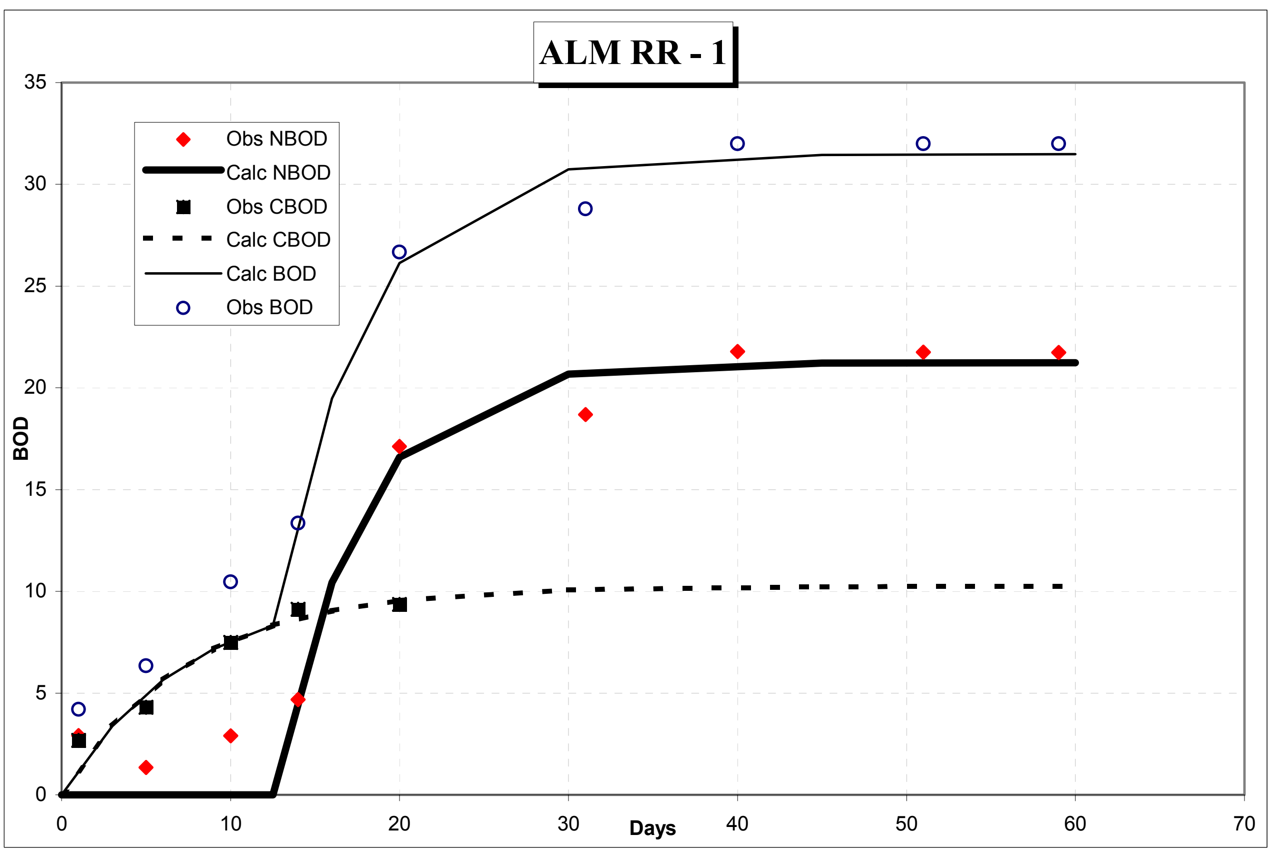
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = ALM RR - 1

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	4.2	2.92	2.68
5	6.34	1.35	4.30
10	10.46	2.91	7.49
14	13.35	4.68	9.12
20	26.67	17.12	9.36
31	28.79	18.70	
40	32	21.79	
51	32	21.75	
59	32	21.74	

Calculated: BOD_t=UBOD[1-e$^{-(k(t-lag))}$]		
Total BOD (NBOD+CBOD)	NBOD	CBOD
1.28	0.00	1.28
4.99	0.00	4.99
7.55	0.00	7.55
13.45	4.78	8.67
26.14	16.59	9.55
30.87	20.78	10.09
31.37	21.16	10.21
31.47	21.23	10.25
31.49	21.23	10.26
UBOD	21.23	10.26
K	0.21	0.13
Lag	12.79	0.00
RMSE/UBOD (note 2)	23.23%	15.95%



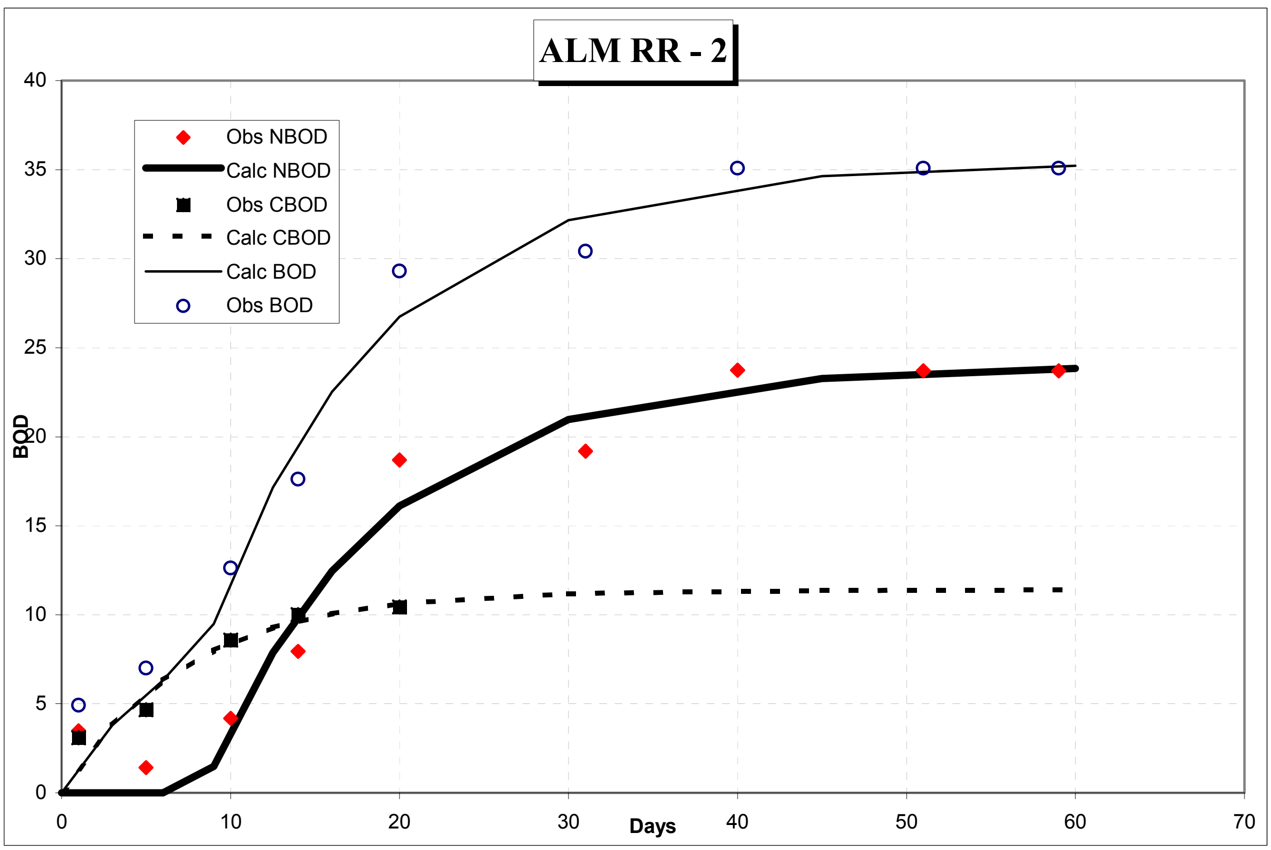
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = ALM RR - 2

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	4.92	3.48	3.10
5	7	1.42	4.66
10	12.62	4.19	8.57
14	17.61	7.95	10.02
20	29.31	18.69	10.44
31	30.41	19.19	
40	35.08	23.74	
51	35.08	23.70	
59	35.08	23.69	

Calculated: $BOD_t = UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
1.44	0.00	1.44
5.58	0.00	5.58
11.96	3.54	8.43
19.69	10.02	9.66
26.73	16.11	10.62
32.46	21.24	11.22
34.17	22.83	11.34
34.97	23.59	11.38
35.20	23.81	11.39
UBOD	24.00	11.39
K	0.10	0.13
Lag	8.33	0.00
RMSE/UBOD (note 2)	23.03%	17.11%



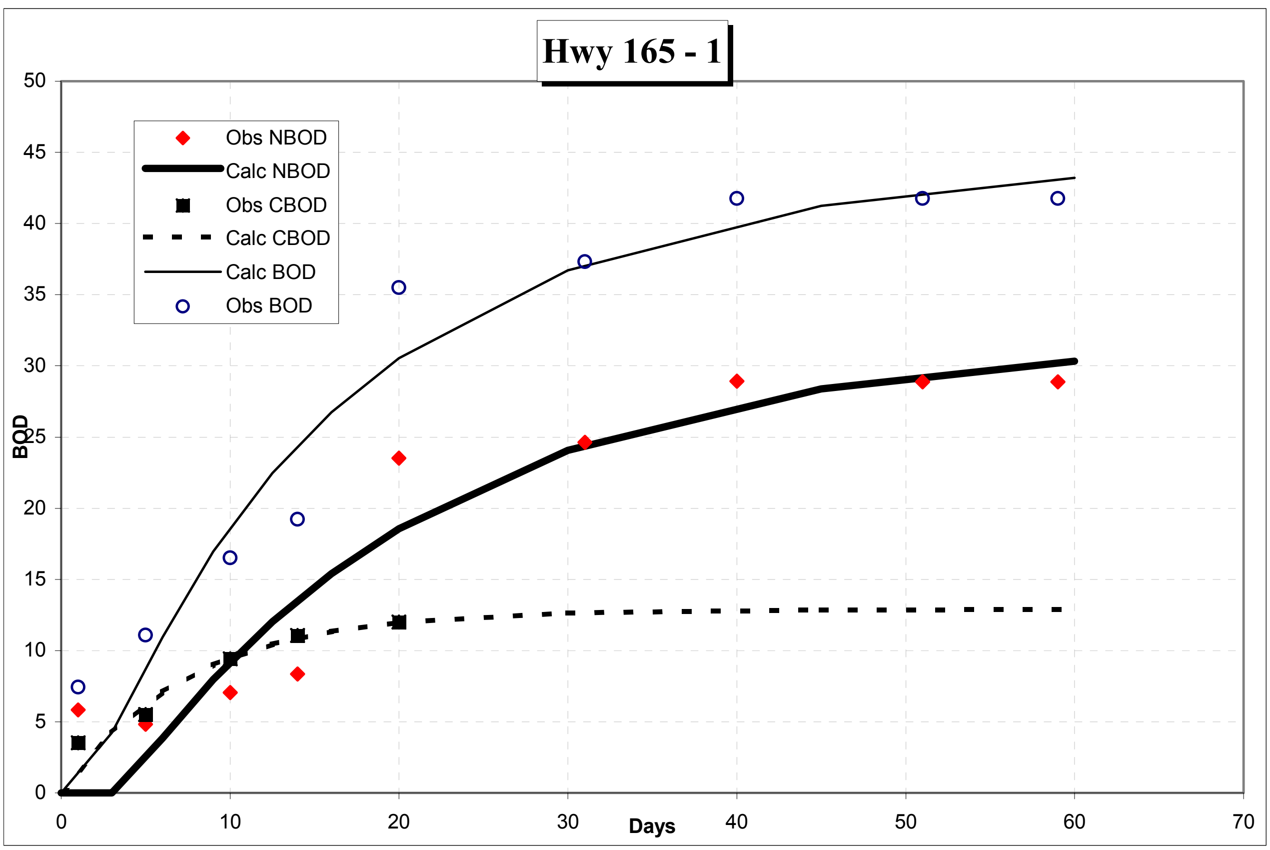
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Hwy 165 - 1

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	7.44	5.84	3.52
5	11.08	4.82	5.50
10	16.52	7.04	9.41
14	19.23	8.35	11.07
20	35.49	23.51	12.00
31	37.31	24.63	
40	41.75	28.93	
51	41.75	28.88	
59	41.75	28.87	

Calculated: $BOD_t = UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
1.60	0.00	1.60
8.58	2.32	6.26
18.69	9.21	9.48
24.43	13.55	10.88
30.54	18.56	11.98
37.15	24.47	12.68
40.13	27.30	12.82
42.22	29.35	12.87
43.13	30.25	12.88
UBOD	31.95	12.89
K	0.05	0.13
Lag	3.57	0.00
RMSE/UBOD (note 2)	31.51%	16.06%



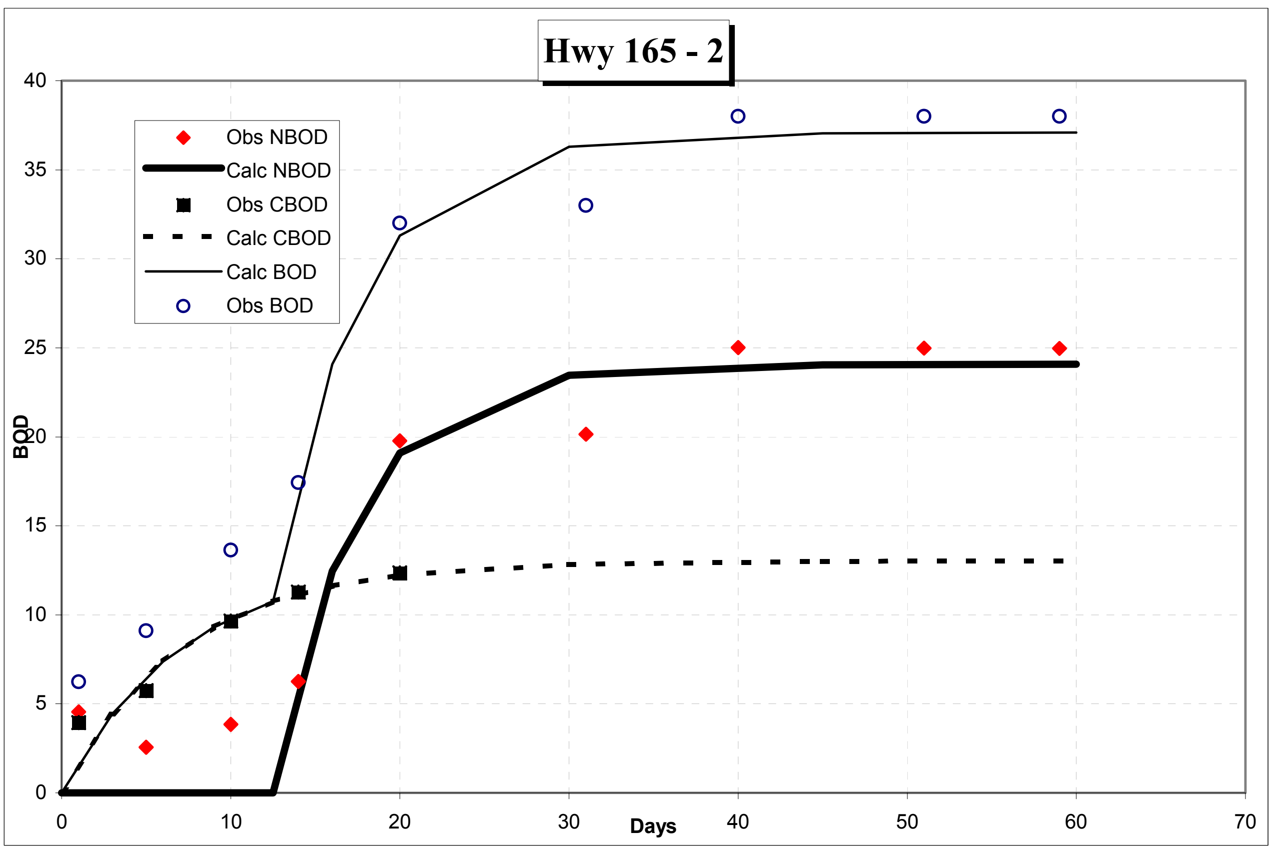
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Hwy 165 - 2

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	6.24	4.55	3.94
5	9.1	2.57	5.74
10	13.64	3.85	9.65
14	17.43	6.26	11.28
20	32	19.77	12.36
31	33	20.14	
40	38	25.02	
51	38	24.98	
59	38	24.97	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
1.69	0.00	1.69
6.53	0.00	6.53
9.79	0.00	9.79
17.53	6.35	11.17
31.31	19.08	12.23
36.44	23.58	12.86
36.98	24.00	12.98
37.08	24.06	13.02
37.10	24.07	13.03
UBOD	24.07	13.03
K	0.21	0.14
Lag	12.55	0.00
RMSE/UBOD (note 2)	31.40%	18.36%



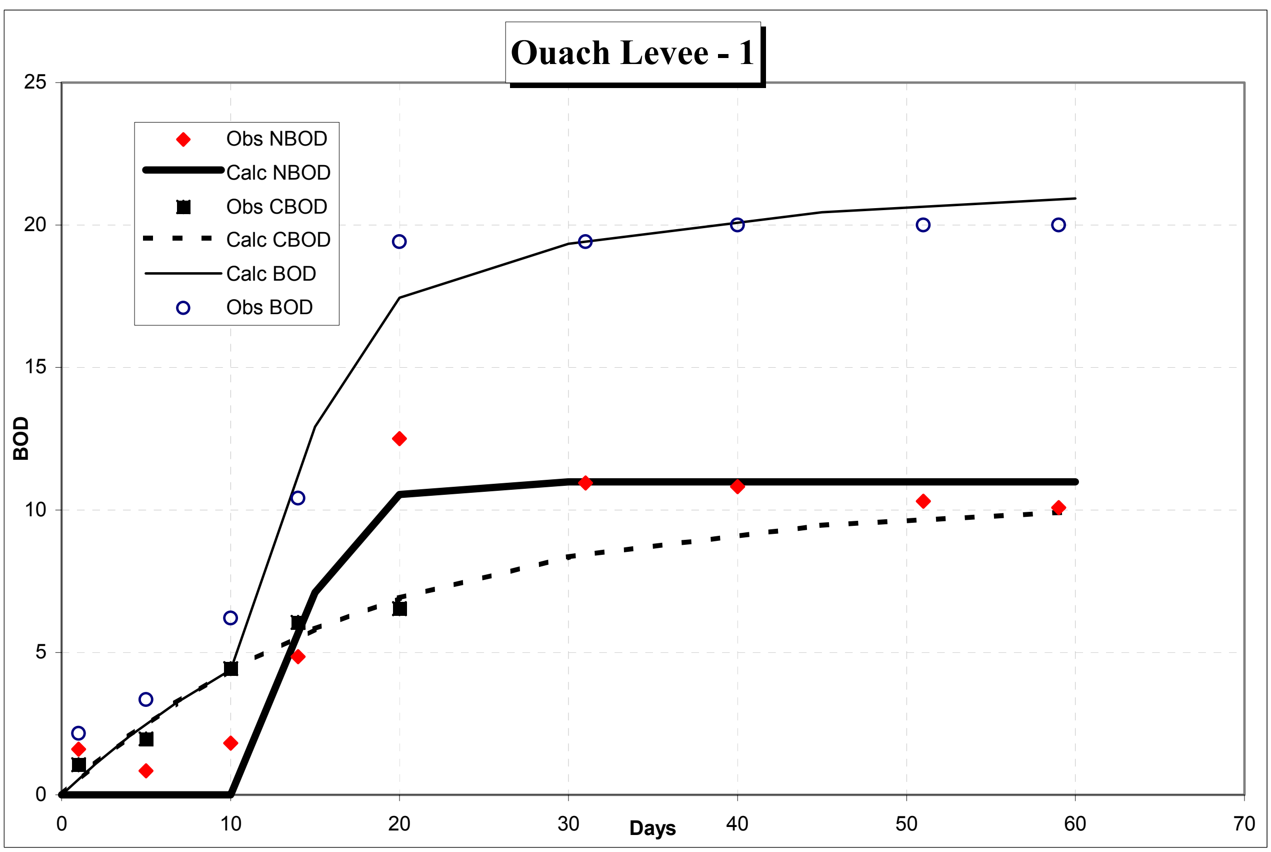
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Ouach Levee - 1

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	2.16	1.60	1.06
5	3.34	0.84	1.96
10	6.2	1.81	4.43
14	10.41	4.85	6.06
20	19.41	12.50	6.54
31	19.41	10.95	
40	20	10.81	
51	20	10.30	
59	20	10.08	

Calculated: BOD_t=UBOD[1-e$^{-(k(t-lag))}$]		
Total BOD (NBOD+CBOD)	NBOD	CBOD
0.56	0.00	0.56
2.50	0.00	2.50
4.39	0.00	4.39
10.57	5.00	5.56
17.45	10.54	6.91
19.45	10.99	8.46
20.18	10.99	9.19
20.69	10.99	9.70
20.91	10.99	9.92
UBOD	10.99	10.31
K	0.43	0.06
Lag	12.59	0.00
RMSE/UBOD (note 2)	31.25%	9.32%



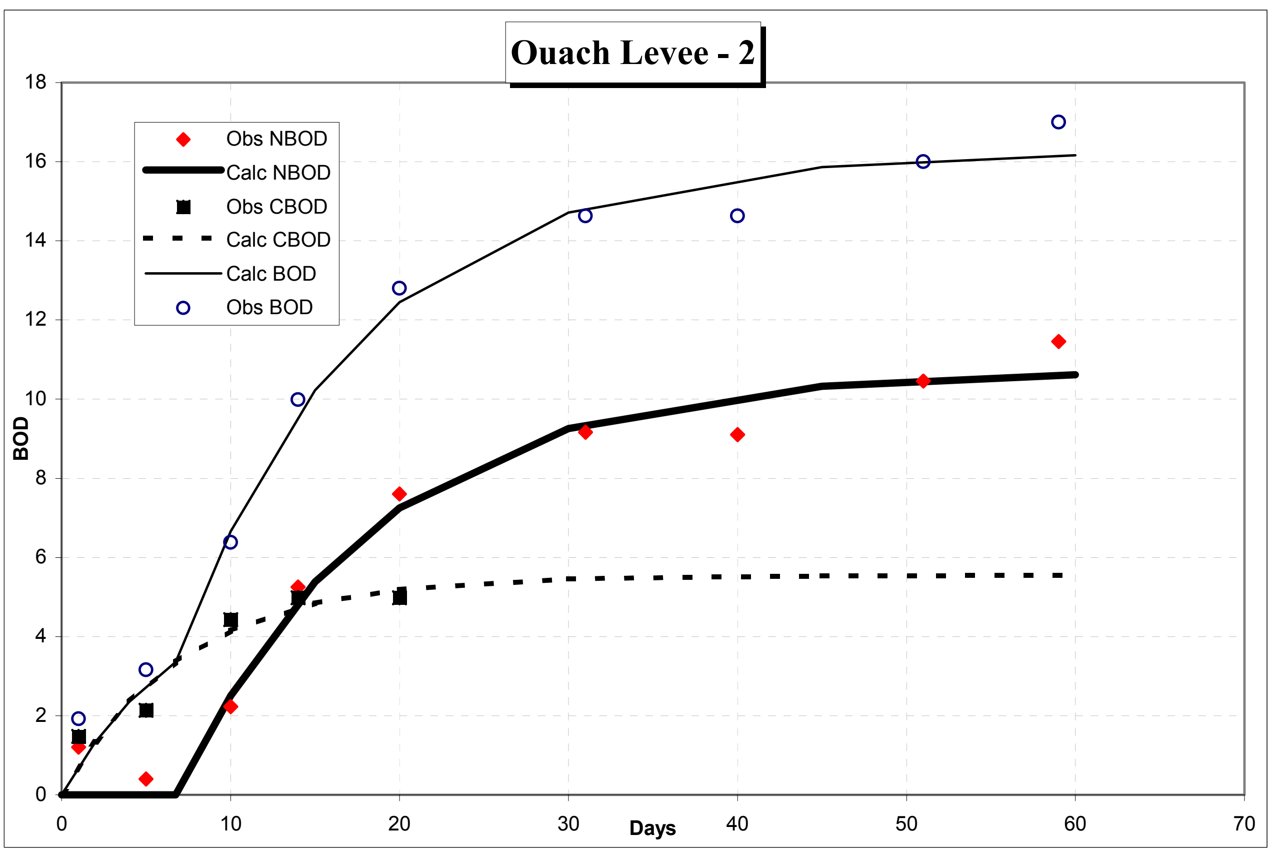
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Ouach Levee - 2

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	1.92	1.21	1.48
5	3.16	0.40	2.14
10	6.38	2.23	4.43
14	9.99	5.25	4.98
20	12.8	7.61	4.98
31	14.63	9.16	
40	14.63	9.11	
51	16	10.46	
59	17	11.46	

Calculated: BOD_t=UBOD[1-$e^{-(k(t-lag))}$]		
Total BOD (NBOD+CBOD)	NBOD	CBOD
0.71	0.00	0.71
2.76	0.00	2.76
6.66	2.51	4.15
9.64	4.90	4.74
12.45	7.25	5.19
14.85	9.38	5.47
15.63	10.11	5.52
16.03	10.49	5.54
16.16	10.61	5.54
UBOD	10.73	5.54
K	0.09	0.14
Lag	6.90	0.00
RMSE/UBOD (note 2)	17.93%	19.39%



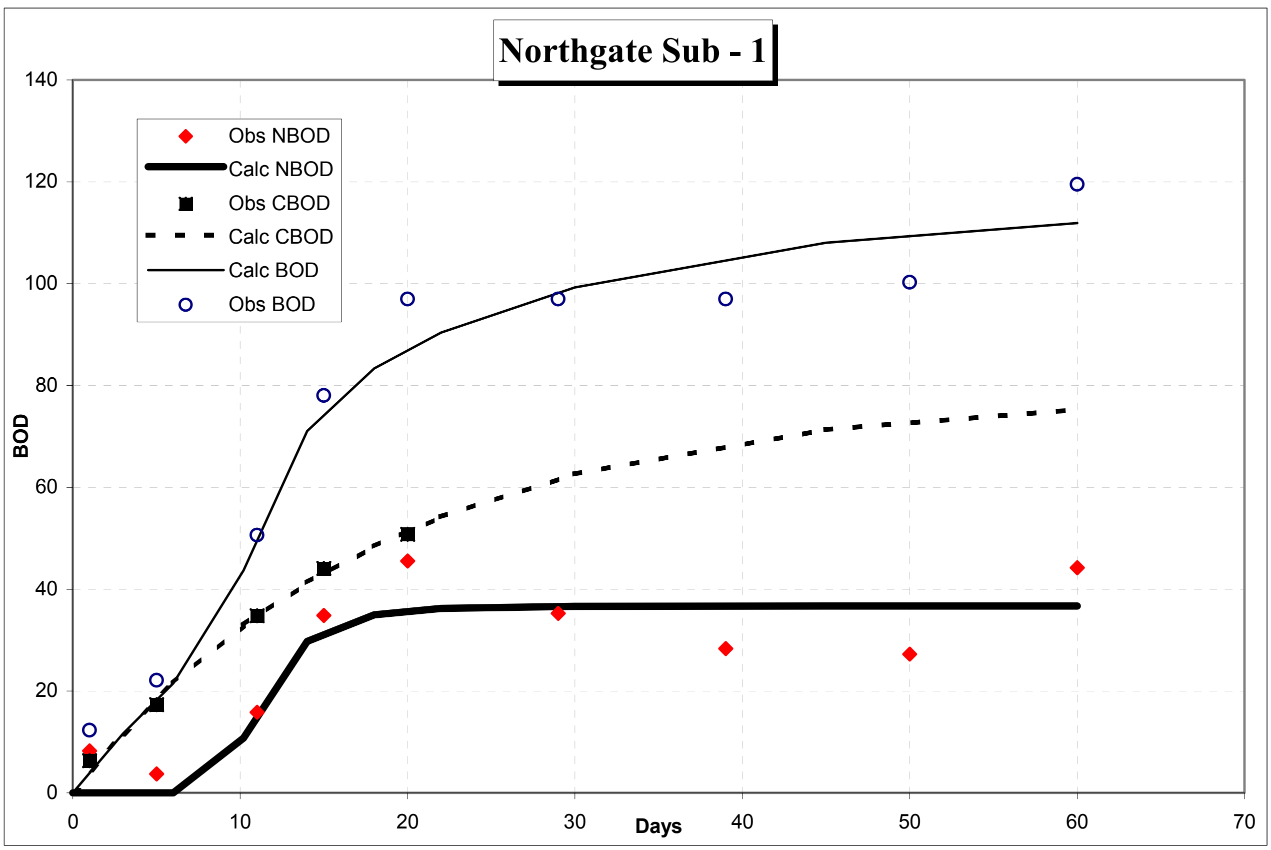
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Northgate Sub - 1

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	12.3	8.23	6.32
5	22.09	3.73	17.35
11	50.63	15.81	34.78
15	78.05	34.84	44.09
20	97	45.54	50.81
29	97	35.24	
39	97	28.33	
50	100.29	27.27	
60	119.48	44.20	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
4.07	0.00	4.07
18.36	0.00	18.36
51.87	17.05	34.82
75.00	31.79	43.21
87.27	35.81	51.46
98.38	36.62	61.76
105.33	36.66	68.67
109.68	36.66	73.02
111.94	36.66	75.28
UBOD	36.66	78.48
K	0.35	0.05
Lag	9.20	0.00
RMSE/UBOD (note 2)	54.79%	3.44%



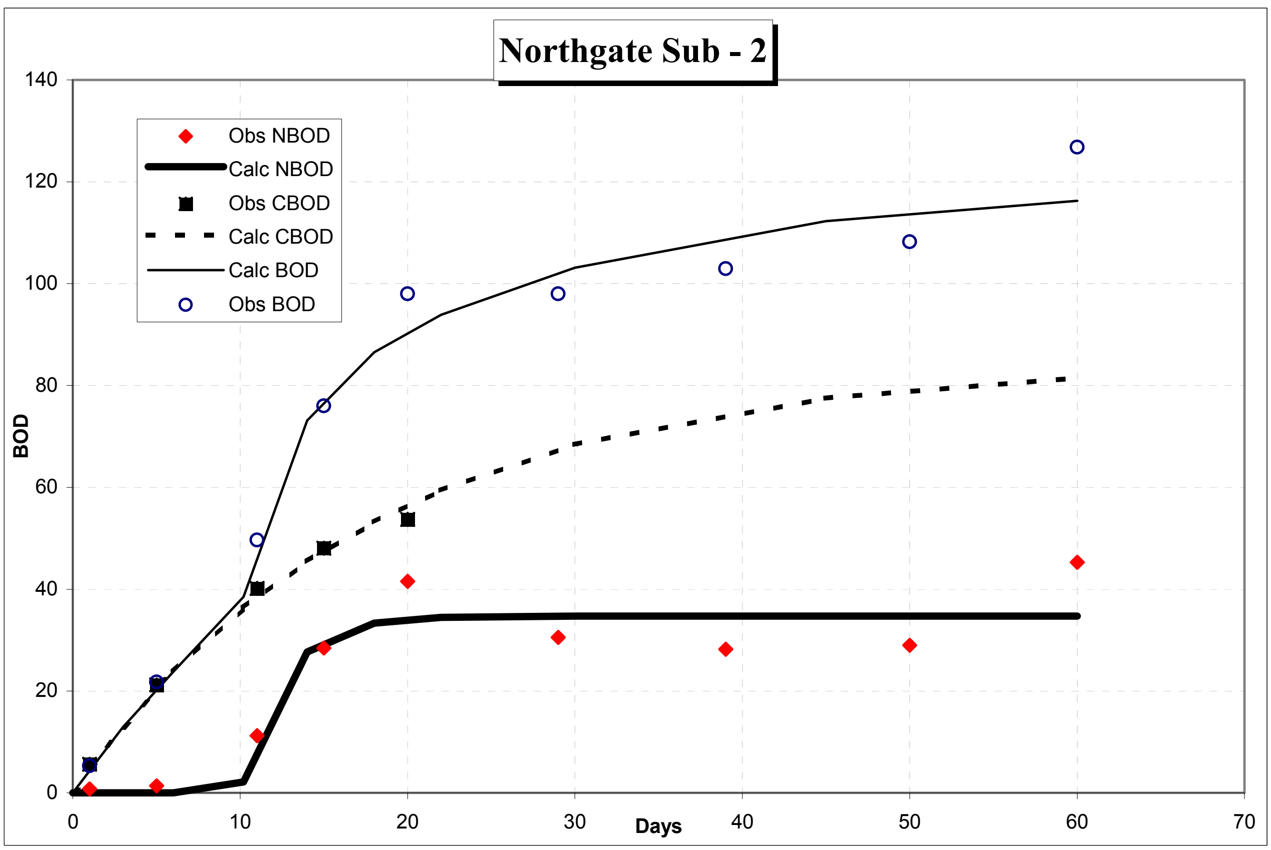
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Northgate Sub - 2

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	5.3	0.77	5.60
5	21.73	1.37	21.19
11	49.67	11.23	40.18
15	76.01	28.44	48.05
20	98	41.52	53.69
29	98	30.52	
39	102.93	28.19	
50	108.21	28.97	
60	126.8	45.28	

Calculated: $BOD_t = UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
4.53	0.00	4.53
20.36	0.00	20.36
49.55	11.11	38.44
77.59	30.02	47.57
90.59	34.10	56.48
102.19	34.71	67.48
109.47	34.73	74.74
113.96	34.73	79.24
116.25	34.73	81.52
UBOD	34.73	84.64
K	0.40	0.06
Lag	10.04	0.00
RMSE/UBOD (note 2)	46.85%	4.24%



Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

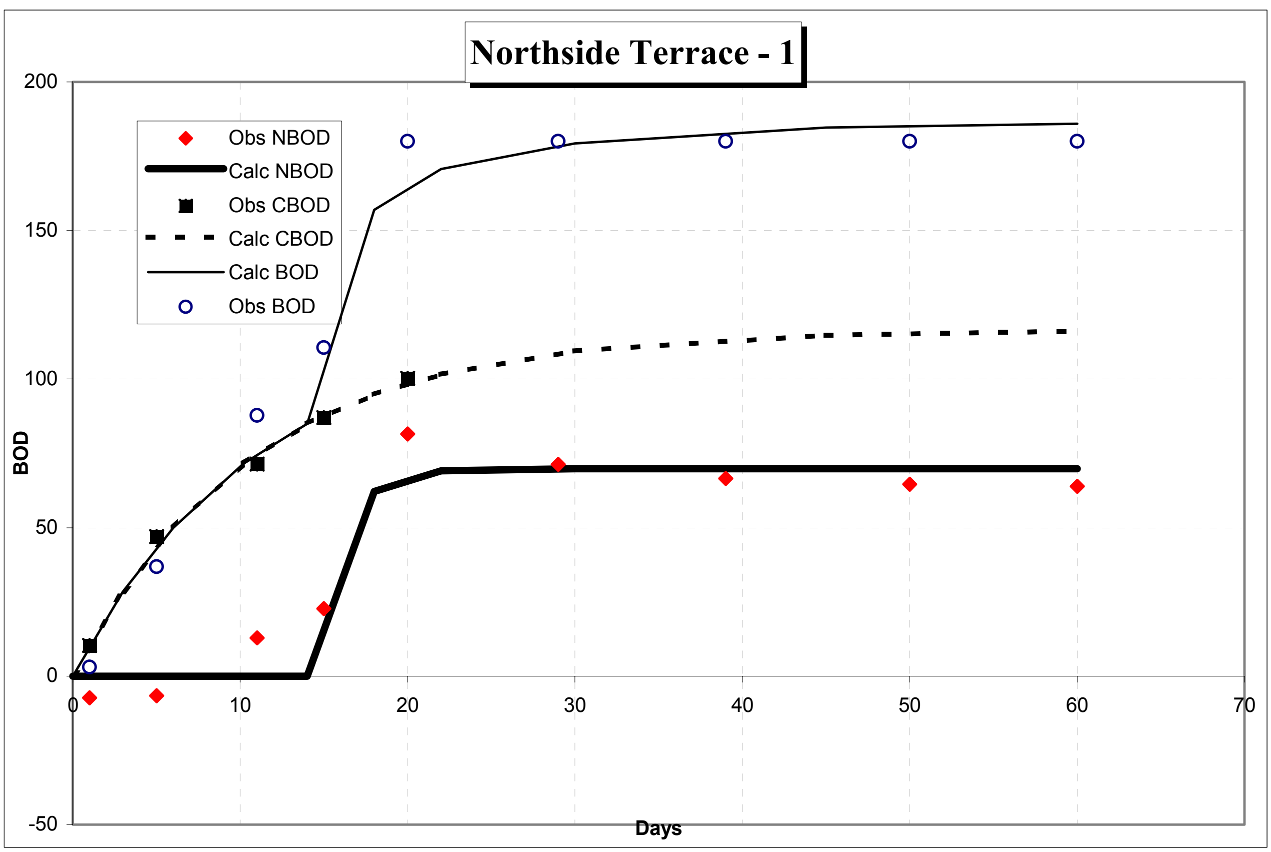
BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Northside Terrace - 1

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	3.1	-7.29	10.28
5	36.85	-6.62	46.99
11	87.71	12.90	71.38
15	110.57	22.76	87.05
20	180	81.48	100.25
29	180	71.25	
39	180	66.53	
50	180	64.57	
60	180	63.91	

Calculated: BOD_t=UBOD[1-$e^{-(k(t-lag))}$]

Total BOD (NBOD+CBOD)	NBOD	CBOD
10.39	0.00	10.39
43.47	0.00	43.47
74.81	0.00	74.81
111.56	23.75	87.81
166.04	67.52	98.52
178.62	69.86	108.75
183.34	69.87	113.47
185.30	69.87	115.43
185.96	69.87	116.09
UBOD	69.87	116.52
K	0.60	0.09
Lag	14.30	0.00
RMSE/UBOD (note 2)	33.13%	4.52%



Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

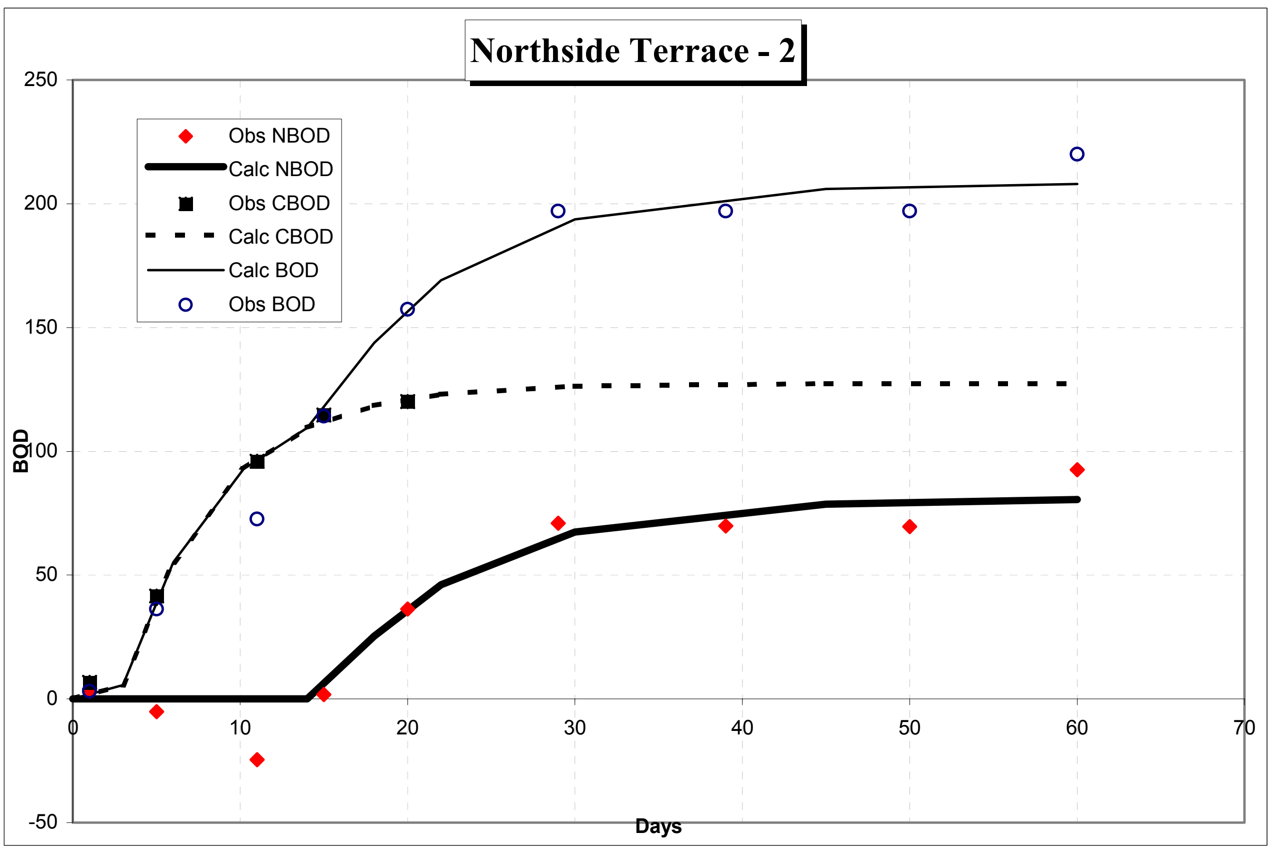
BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Northside Terrace - 2

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	3.1	3.10	6.68
5	36.25	-5.20	41.59
11	72.71	-24.57	95.98
15	114.17	1.75	114.65
20	157.39	36.24	120.05
29	197	70.90	
39	197	69.83	
50	197	69.64	
60	220	92.61	

Calculated: BOD_t=UBOD[1-e$^{-(k(t-lag))}$]

Total BOD (NBOD+CBOD)	NBOD	CBOD
0.00	0.00	0.00
41.45	0.00	41.45
97.28	0.00	97.28
114.29	1.87	112.42
158.11	36.96	121.15
191.76	65.66	126.10
203.40	76.24	127.17
207.03	79.67	127.36
207.96	80.57	127.39
UBOD	80.98	127.39
K	0.12	0.17
Lag	14.80	2.75
RMSE/UBOD (note 2)	38.16%	5.69%



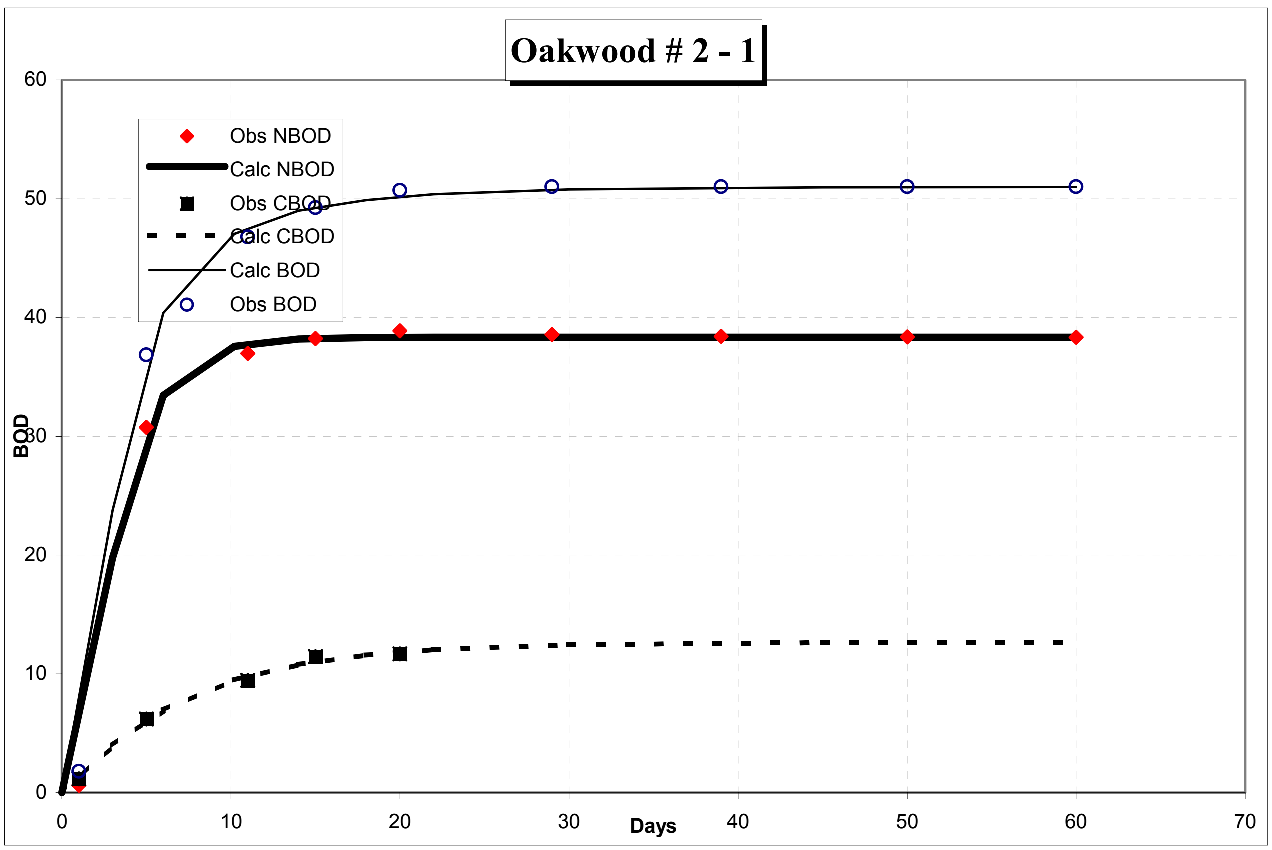
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Oakwood # 2 - 1

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	1.8	0.62	1.16
5	36.85	30.76	6.19
11	46.79	36.98	9.46
15	49.25	38.22	11.45
20	50.71	38.87	11.69
29	51	38.58	
39	51	38.40	
50	51	38.36	
60	51	38.35	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
1.18	0.00	1.18
36.80	30.71	6.09
47.62	37.81	9.81
49.27	38.24	11.03
50.17	38.32	11.84
50.76	38.33	12.42
50.93	38.33	12.60
50.98	38.33	12.64
50.99	38.33	12.65
UBOD	38.33	12.66
K	0.44	0.14
Lag	1.37	0.30
RMSE/UBOD (note 2)	3.11%	4.59%



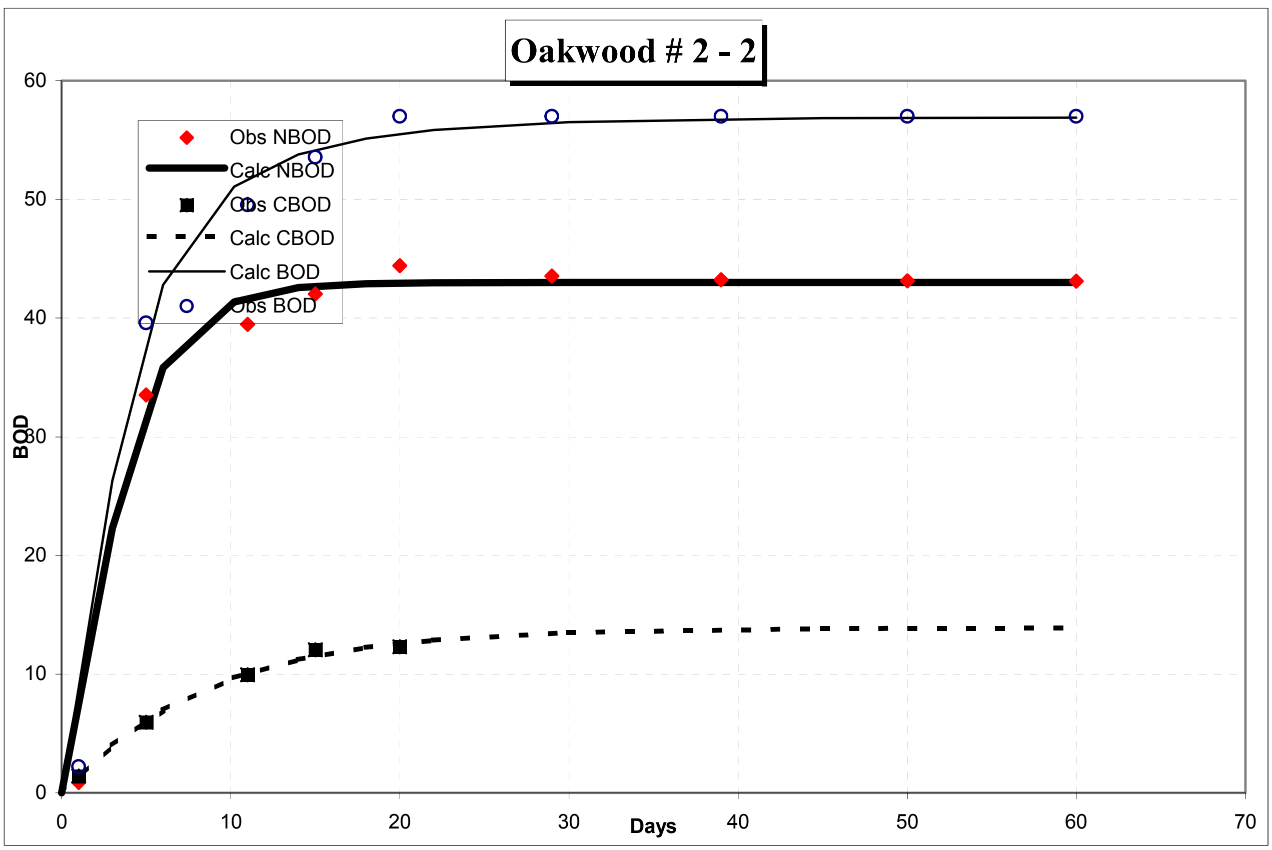
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Oakwood # 2 - 2

Days	Measured		
	Total BOD	NBOD (note1)	CBOD
1	2.2	0.86	1.40
5	39.61	33.52	5.95
11	49.55	39.47	9.94
15	53.57	42.04	12.05
20	57	44.41	12.29
29	57	43.54	
39	57	43.23	
50	57	43.13	
60	57	43.10	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
2.36	1.03	1.34
38.88	32.79	6.09
51.85	41.78	10.08
54.23	42.70	11.53
55.55	42.95	12.59
56.46	43.00	13.46
56.77	43.00	13.77
56.87	43.00	13.87
56.90	43.00	13.90
UBOD	43.00	13.91
K	0.35	0.12
Lag	0.93	0.15
RMSE/UBOD (note 2)	6.89%	4.60%



Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

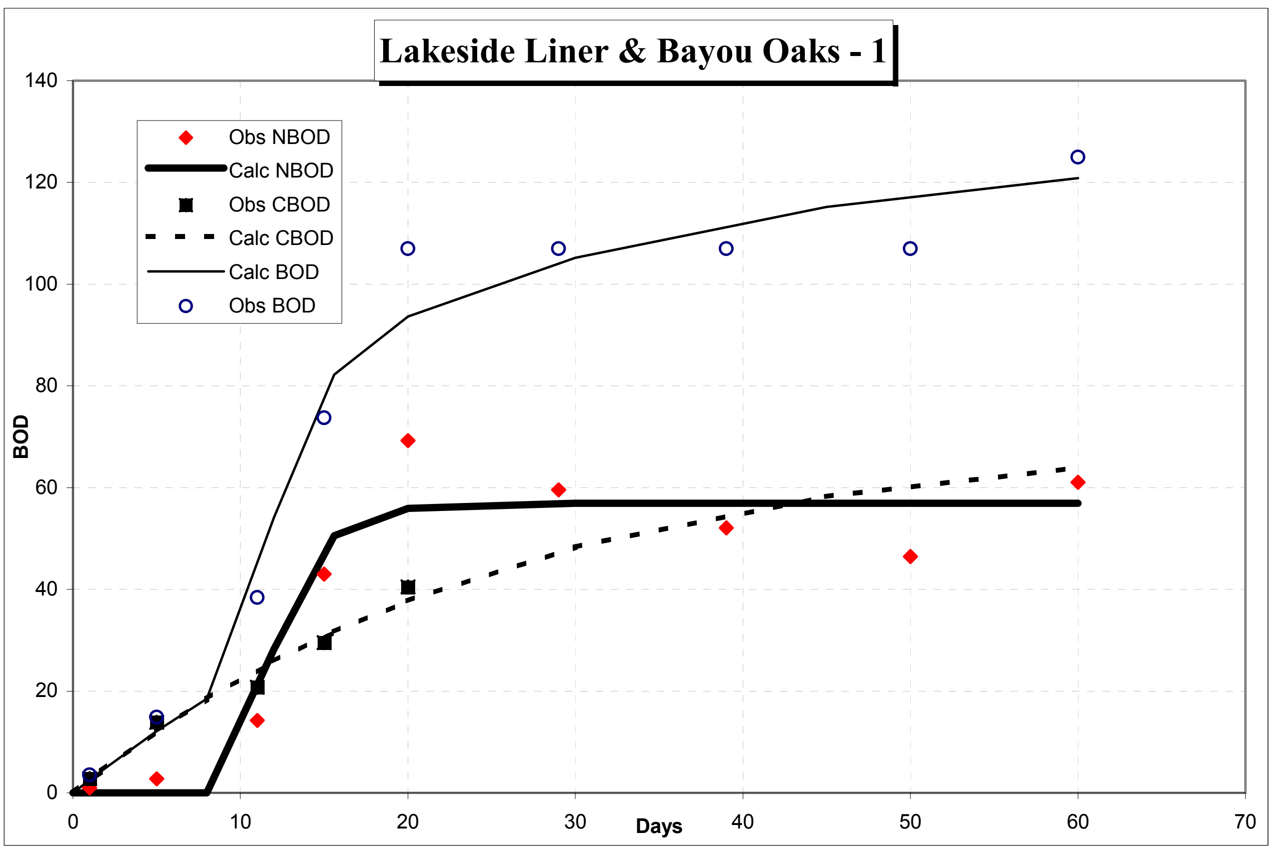
BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Lakeside Liner & Bayou Oaks - 1

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	3.5	0.99	2.84
5	14.89	2.74	13.87
11	38.39	14.25	20.74
15	73.73	42.98	29.57
20	107	69.27	40.49
29	107	59.59	
39	107	52.06	
50	107	46.48	
60	125	61.07	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$

Total BOD (NBOD+CBOD)	NBOD	CBOD
2.51	0.00	2.51
12.15	0.00	12.15
37.59	13.45	24.14
79.49	48.74	30.75
93.64	55.91	37.73
104.31	56.90	47.41
111.86	56.92	54.94
117.44	56.92	60.52
120.85	56.92	63.93
UBOD	56.92	71.38
K	0.42	0.04
Lag	10.35	0.05
RMSE/UBOD (note 2)	34.15%	6.81%



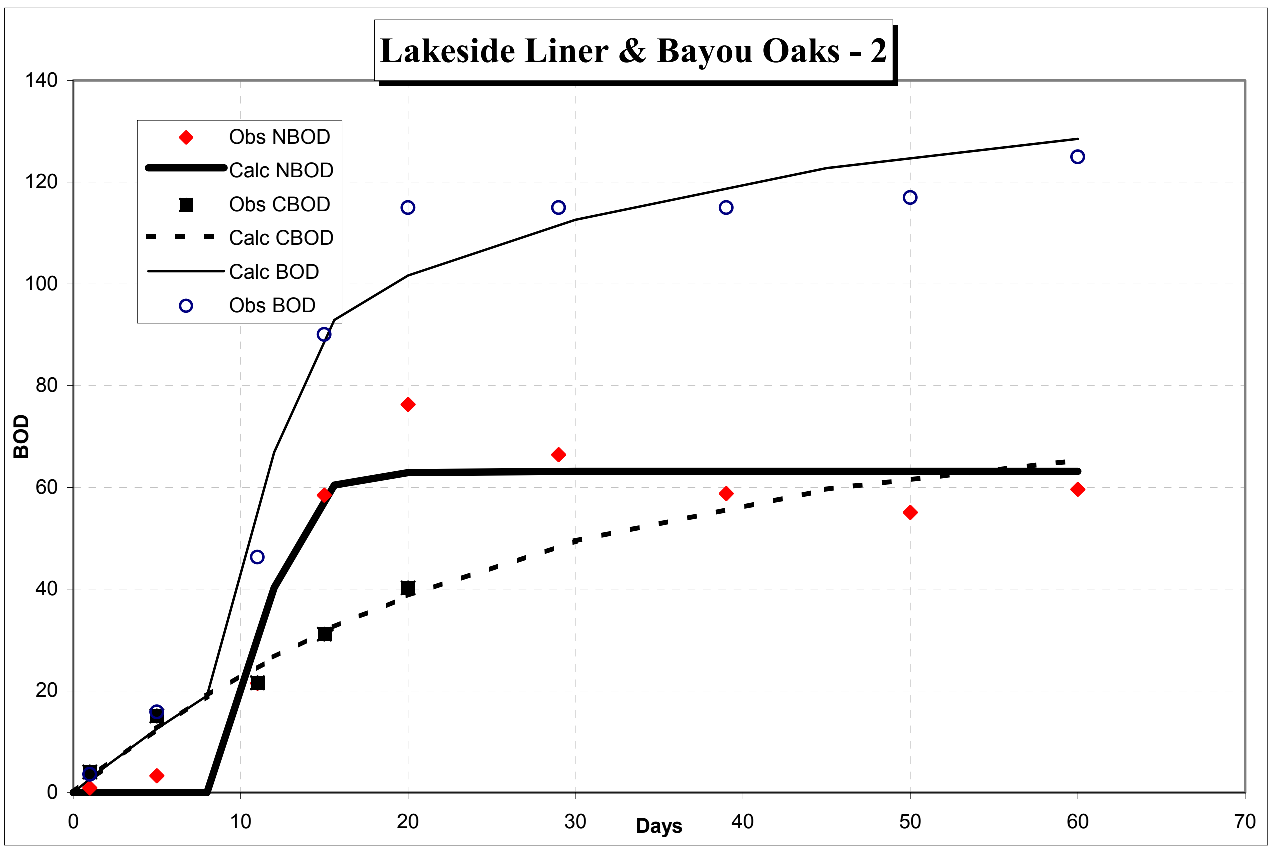
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Lakeside Liner & Bayou Oaks - 2

	Measured		
Days	Total BOD	NBOD (note1)	CBOD
1	3.6	0.89	4.04
5	15.85	3.28	15.07
11	46.31	21.49	21.58
15	90.05	58.47	31.13
20	115	76.30	40.25
29	115	66.43	
39	115	58.76	
50	117	55.09	
60	125	59.63	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
2.71	0.00	2.71
12.57	0.00	12.57
46.54	21.72	24.82
90.88	59.30	31.58
101.64	62.94	38.70
111.70	63.13	48.57
119.37	63.13	56.24
125.04	63.13	61.91
128.50	63.13	65.37
UBOD	63.13	72.89
K	0.60	0.04
Lag	10.29	0.00
RMSE/UBOD (note 2)	27.33%	6.31%



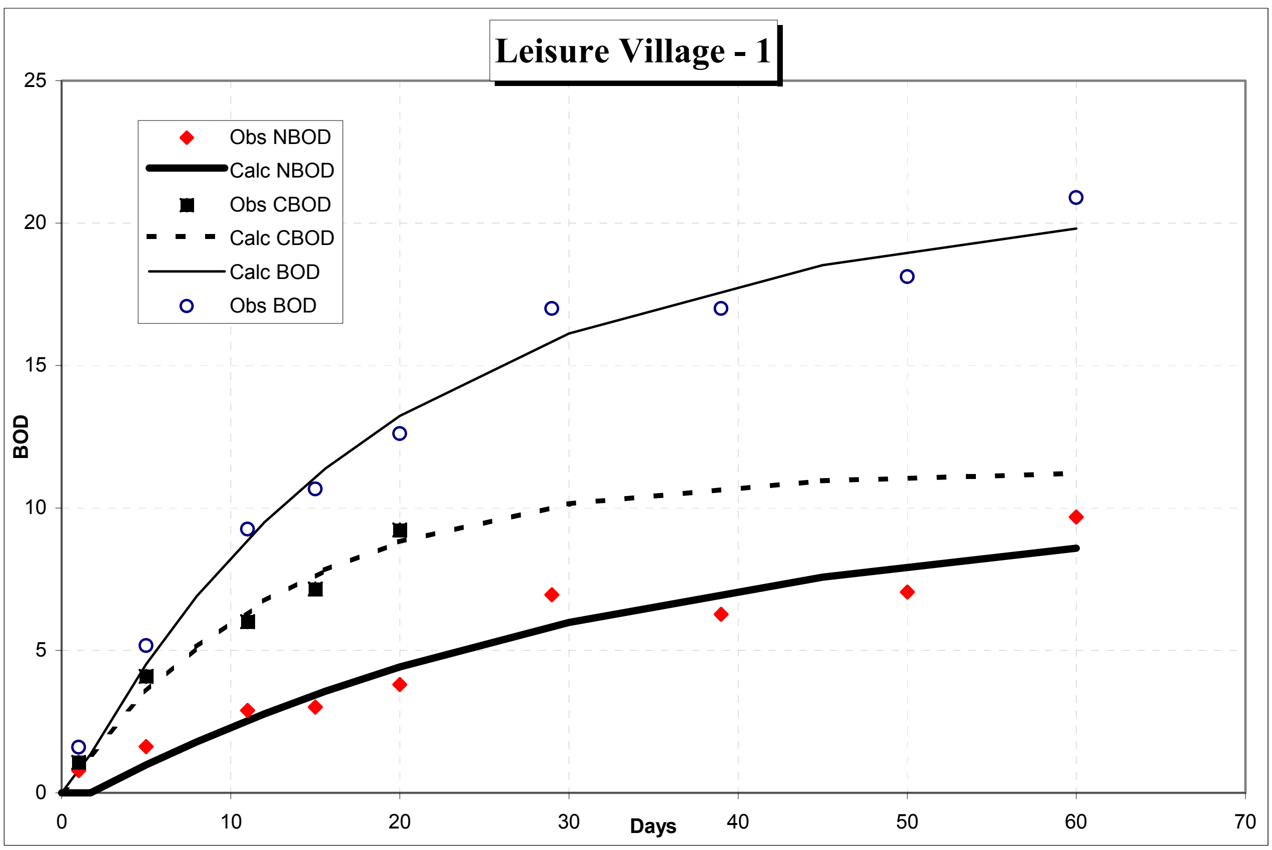
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
Bayou Chauvin, September 25 - October 5, 1994

Sample/Site # = Leisure Village - 1

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	1.6	0.78	1.07
5	5.17	1.63	4.09
11	9.26	2.89	6.01
15	10.67	3.01	7.16
20	12.61	3.80	9.23
29	17	6.95	
39	17	6.27	
50	18.12	7.04	
60	20.9	9.68	

Calculated: BOD_t=UBOD$[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
0.82	0.00	0.82
4.52	0.98	3.54
8.91	2.55	6.37
11.10	3.44	7.66
13.23	4.42	8.81
15.89	5.84	10.05
17.76	7.02	10.73
19.04	7.97	11.08
19.81	8.59	11.22
UBOD	10.33	11.35
K	0.03	0.07
Lag	1.75	0.00
RMSE/UBOD (note 2)	22.84%	8.42%



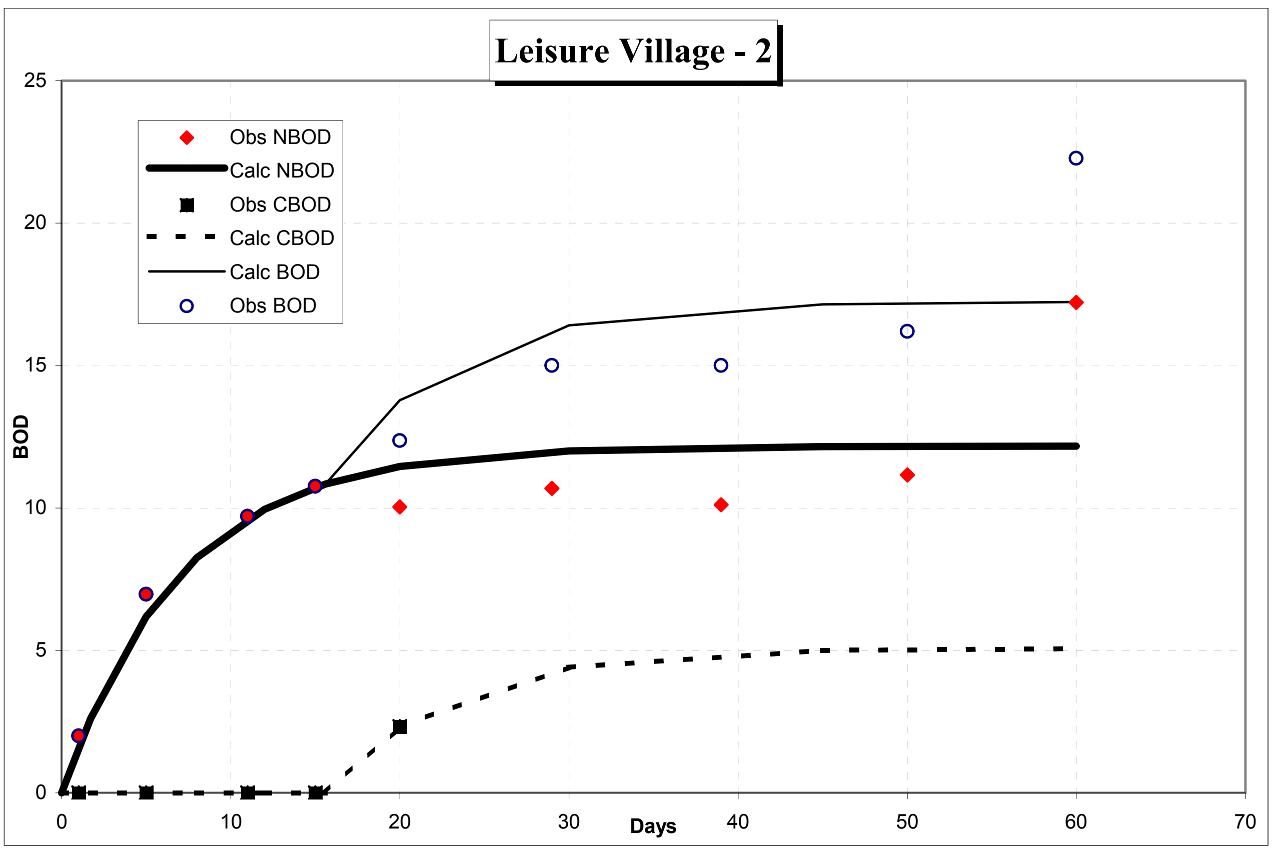
Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

BOD Analysis of the for:
<u>Bayou Chauvin, September 25 - October 5, 1994</u>

Sample/Site # = Leisure Village - 2

Days	Measured Total BOD	Measured NBOD (note1)	Measured CBOD
1	2	2.00	0.00
5	6.97	6.97	0.00
11	9.71	9.71	0.00
15	10.76	10.76	0.00
20	12.37	10.04	2.33
29	15	10.69	
39	15	10.11	
50	16.2	11.16	
60	22.28	17.21	

Calculated: $BOD_t=UBOD[1-e^{-(k(t-lag))}]$		
Total BOD (NBOD+CBOD)	NBOD	CBOD
1.61	1.61	0.00
6.18	6.18	0.00
9.62	9.62	0.00
10.72	10.72	0.00
13.79	11.46	2.33
16.28	11.98	4.31
17.02	12.13	4.89
17.20	12.17	5.04
17.24	12.17	5.07
UBOD	12.18	5.08
K	0.14	0.14
Lag	0.00	15.65
RMSE/UBOD (note 2)	48.53%	0.00%



Note 1 - Measured NBOD is calculated by subtracting the calc.CBOD from the Measured Total BOD.
Note 2 - Square Root of the sum of the Standard Errors squared divided by the UBOD.

APPENDIX E – 2000 SURVEY AND BOD DATA

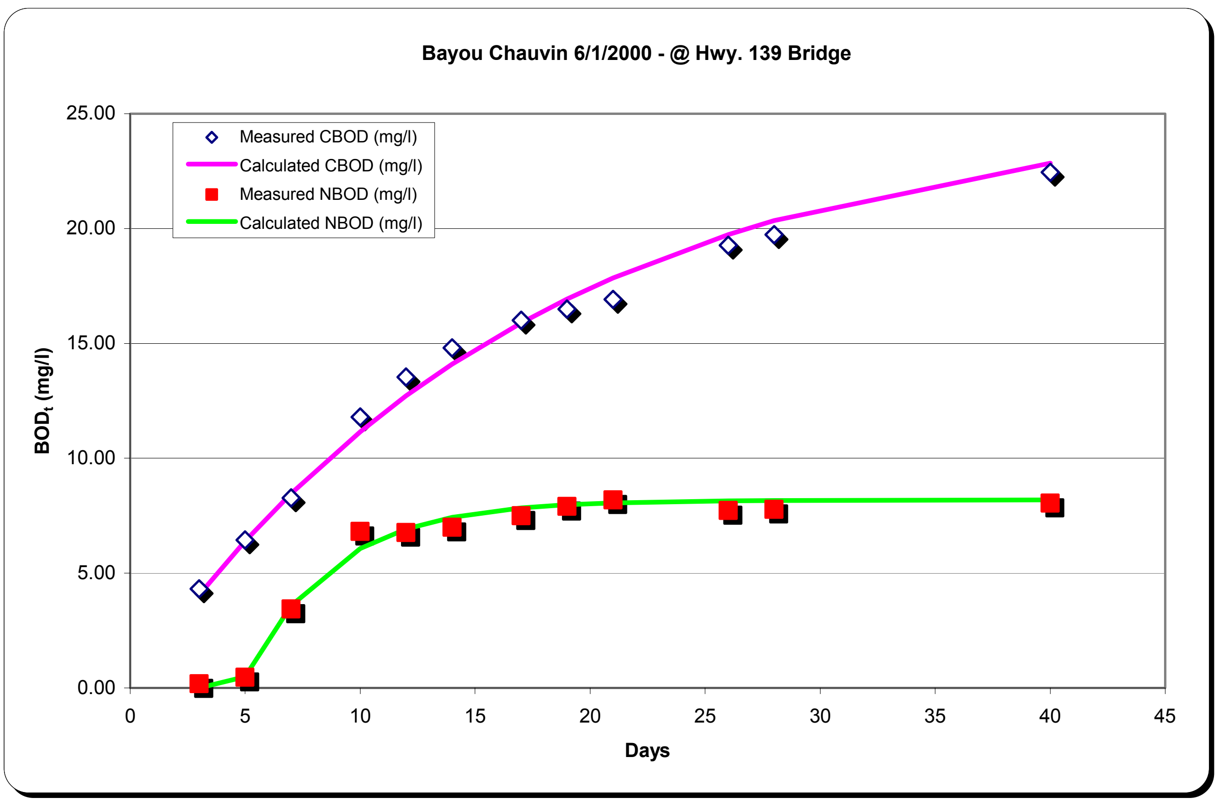
Table 21 - Bayou Chauvin Daytime sampling Data (5/31/00 - 6/01/00)

BAYOU CHAUVIN RAW DAYTIME SAMPLING DATA (5/31/00 - 6/01/00)

Site	Date	Time	Sample depth	pH	Temp (oC)	DO (mg/l)	Cond (umhos/cm)	TSS (mg/l)	Color (PCU)	Cl (mg/l)	SO4 (mg/l)	NO2+NO3 (mg/l)	TP (mg/l)	TKN (mg/l)	NH3-N (mg/l)	UCBOD (mg/l)	UNBOD (mg/l)	Kd (1/d)	Kn (1/d)
B. Chauvin @ Hwy 139	6/1/00	8:15	mid-depth	6.62	24.9	2.22	204	27	110	26.2	6.0	0.05	0.83	3.24	0.98	25.3	8.2	0.06	0.26
Bayou Desiard Overflow	6/1/00	8:45	mid-depth	6.69	28.3	4.90	88	8	50	7.1	2.4	0.05	0.10	1.13	0.00	10.3	2.4	0.08	0.13
B. Chauvin @ Leisure Village	6/1/00	9:25	mid-depth	6.38	27.9	1.86	110	24	50	8.6	4.4	0.16	0.21	1.19	0.39	10.0	2.9	0.07	0.20
B. Chauvin @ Leisure Village	6/1/00	9:25	mid-depth	6.38	27.9	1.86	110	26	50	8.6	4.3	0.16	0.21	1.24	0.32	10.1	2.8	0.06	0.24
B. Chauvin @ Old Sterlington	6/1/00	10:20	mid-depth	7.17	28.7	4.89	140	96	60	10.9	6.1	0.13	0.47	2.00	0.48	16.9	4.4	0.08	0.18
B. Chauvin @ ALM RR	6/1/00	8:45	mid-depth	7.02	27.9	2.57	145	106	60	12.4	6.5	0.19	0.60	2.10	0.50	17.1	4.9	0.07	0.18
B. Chauvin @ Ouachita Levee	6/1/00	13:00	mid-depth	7.26	30.1	4.30	174	54	60	16.0	9.1	0.25	0.50	1.83	0.15	21.3	7.0	0.10	0.10

BOD Analysis of the for: **Bayou Chauvin 6/1/2000 - @ Hwy. 139 Bridge**

Measured Data					Calculated Data		
Days	***Total BOD (mg/l)***	***NOx as N (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	
Note 1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7	
0		0.02					
3	4.5	0.06	0.18	4.32	0.00	4.05	
5	6.9	0.12	0.46	6.44	0.48	6.39	
7	11.70	0.77	3.43	8.27	3.59	8.46	
10	18.60	1.51	6.81	11.79	6.07	11.16	
12	20.30	1.5	6.76	13.54	6.92	12.72	
14	21.80	1.55	6.99	14.81	7.43	14.10	
17	23.50	1.66	7.49	16.01	7.83	15.90	
19	24.40	1.75	7.91	16.49	7.97	16.93	
21	25.10	1.81	8.18	16.92	8.06	17.85	
26	27.00	1.71	7.72	19.28	8.15	19.74	
28	27.50	1.72	7.77	19.73	8.16	20.35	
40	30.50	1.78	8.04	22.46	8.18	22.85	
49	32.50	1.81	8.18	24.32	8.18	23.86	
60	34.40	2.05	9.28	25.12	8.18	24.56	
					8.18	25.33	**UBOD (mg/l)**
					0.26	0.06	**k rate (1/day)**
					4.76	0.00	**Lag time (days)**



Note 1 - Days from the BOD test start date.

Note 2 - Measured total BOD at time in "Days" column.

Note 3 - Measured (NO_2 + NO_3 as nitrogen) at time in "Days" column.

Note 4 - Calculated by multipling the measured (NO_2 +NO_3 as nitrogen) minus the day zero (NO_2 +NO_3 as nitrogen) by 4.57.

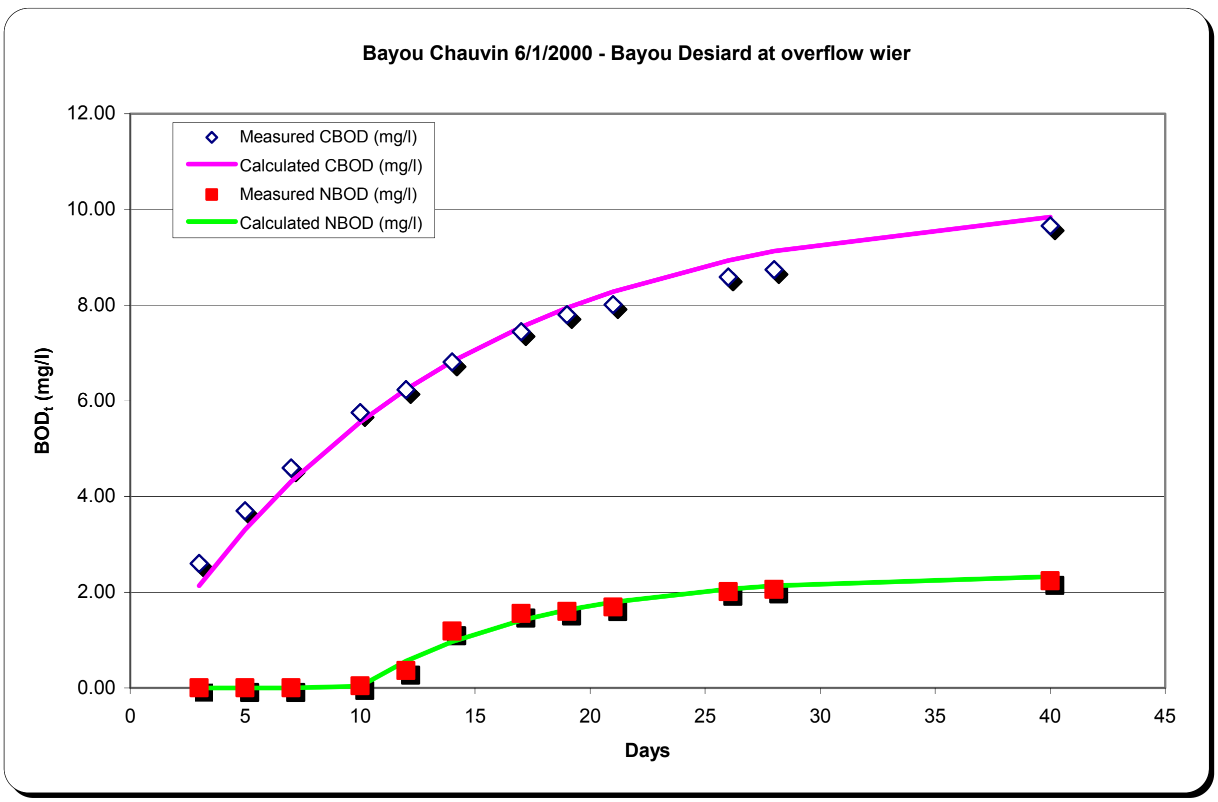
Note 5 - Determined by subtracting the calculated NBOD from the measured total BOD.

Note 6 - Calculated from the formula {NBODt=UNBOD[1-e-(k(t-lag))]} using the listed values of UNBOD, k decay rate and lag time.

Note 7 - Calculated from the formula {CBODt=UCBOD[1-e-(k(t-lag))]} using the listed values of UCBOD, k decay rate and lag time.

BOD Analysis of the for: **Bayou Chauvin 6/1/2000 - Bayou Desiard at overflow wier**

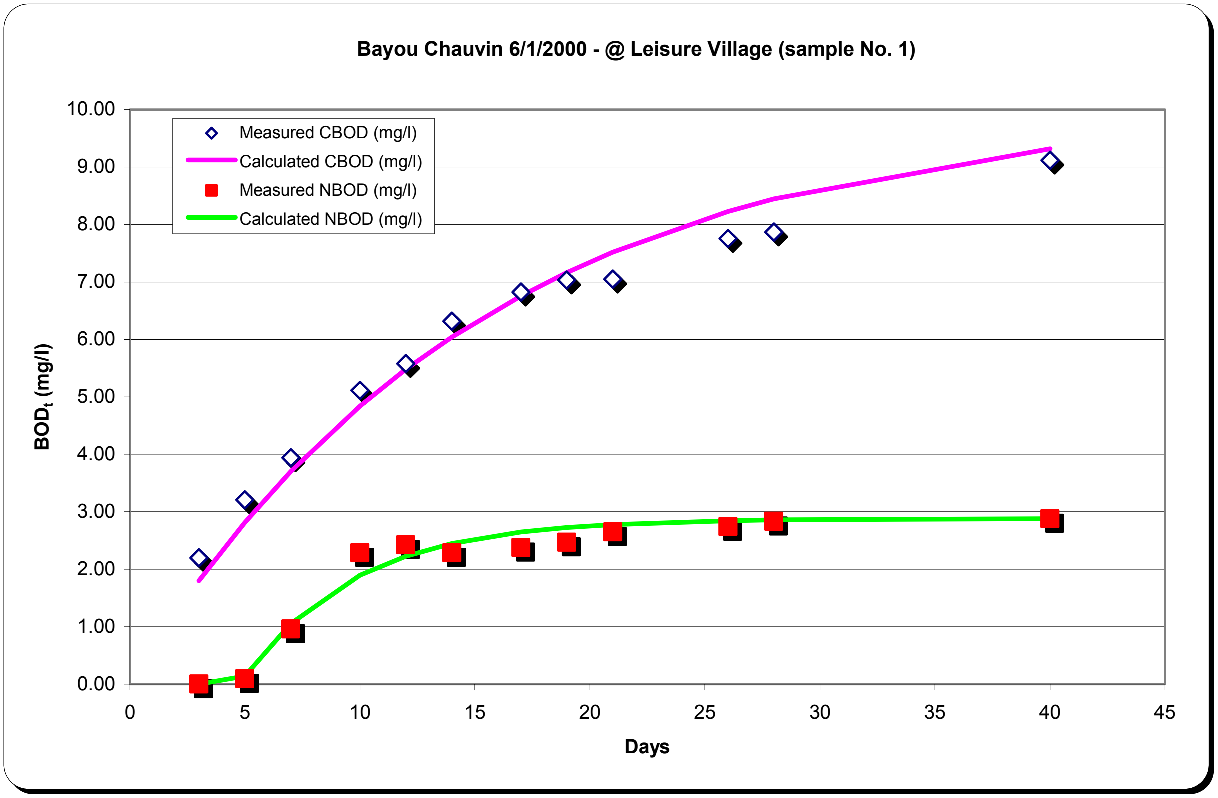
Measured Data					Calculated Data		
Days	***Total BOD (mg/l)***	***NOx as N (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	
Note 1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7	
0		0.05					
3	2.6	0.04	0.00	2.60	0.00	2.14	
5	3.7	0.05	0.00	3.70	0.00	3.31	
7	4.6	0.05	0.00	4.60	0.00	4.31	
10	5.8	0.06	0.05	5.75	0.04	5.56	
12	6.6	0.13	0.37	6.23	0.56	6.24	
14	8	0.31	1.19	6.81	0.97	6.82	
17	9	0.39	1.55	7.45	1.41	7.54	
19	9.4	0.4	1.60	7.80	1.63	7.94	
21	9.7	0.42	1.69	8.01	1.79	8.28	
26	10.6	0.49	2.01	8.59	2.07	8.93	
28	10.8	0.5	2.06	8.74	2.14	9.13	
40	11.9	0.54	2.24	9.66	2.32	9.85	
49	12.7	0.56	2.33	10.37	2.36	10.08	
60	13.3	0.61	2.56	10.74	2.37	10.21	
					2.38	10.31	**UBOD (mg/l)**
					0.13	0.08	**k rate (1/day)**
					9.87	0.00	**Lag time (days)**



Note 1 - Days from the BOD test start date.
Note 2 - Measured total BOD at time in "Days" column.
Note 3 - Measured (NO_2 + NO_3 as nitrogen) at time in "Days" column.
Note 4 - Calculated by multipling the measured (NO_2 +NO_3 as nitrogen) minus the day zero (NO_2 +NO_3 as nitrogen) by 4.57.
Note 5 - Determined by subtracting the calculated NBOD from the measured total BOD.
Note 6 - Calculated from the formula {NBODt=UNBOD[1-e-(k(t-lag))]} using the listed values of UNBOD, k decay rate and lag time.
Note 7 - Calculated from the formula {CBODt=UCBOD[1-e-(k(t-lag))]} using the listed values of UCBOD, k decay rate and lag time.

BOD Analysis of the for: **Bayou Chauvin 6/1/2000 - @ Leisure Village (sample No. 1)**

Measured Data					Calculated Data		
Days	***Total BOD (mg/l)***	***NOx as N (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	
Note 1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7	
0		0.16					
3	2.2	0.16	0.00	2.20	0.00	1.80	
5	3.3	0.18	0.09	3.21	0.14	2.81	
7	4.9	0.37	0.96	3.94	1.06	3.70	
10	7.4	0.66	2.29	5.12	1.89	4.84	
12	8	0.69	2.42	5.58	2.23	5.48	
14	8.6	0.66	2.29	6.32	2.45	6.04	
17	9.2	0.68	2.38	6.82	2.65	6.76	
19	9.5	0.7	2.47	7.03	2.73	7.16	
21	9.7	0.74	2.65	7.05	2.78	7.52	
26	10.5	0.76	2.74	7.76	2.85	8.23	
28	10.7	0.78	2.83	7.87	2.86	8.45	
40	12	0.79	2.88	9.12	2.88	9.32	
49	12.9	0.81	2.97	9.93	2.88	9.64	
60	13.7	0.88	3.29	10.41	2.88	9.85	
					2.88	10.04	**UBOD (mg/l)**
					0.20	0.07	**k rate (1/day)**
					4.76	0.00	**Lag time (days)**



Note 1 - Days from the BOD test start date.

Note 2 - Measured total BOD at time in "Days" column.

Note 3 - Measured (NO_2 + NO_3 as nitrogen) at time in "Days" column.

Note 4 - Calculated by multipling the measured (NO_2 +NO_3 as nitrogen) minus the day zero (NO_2 +NO_3 as nitrogen) by 4.57.

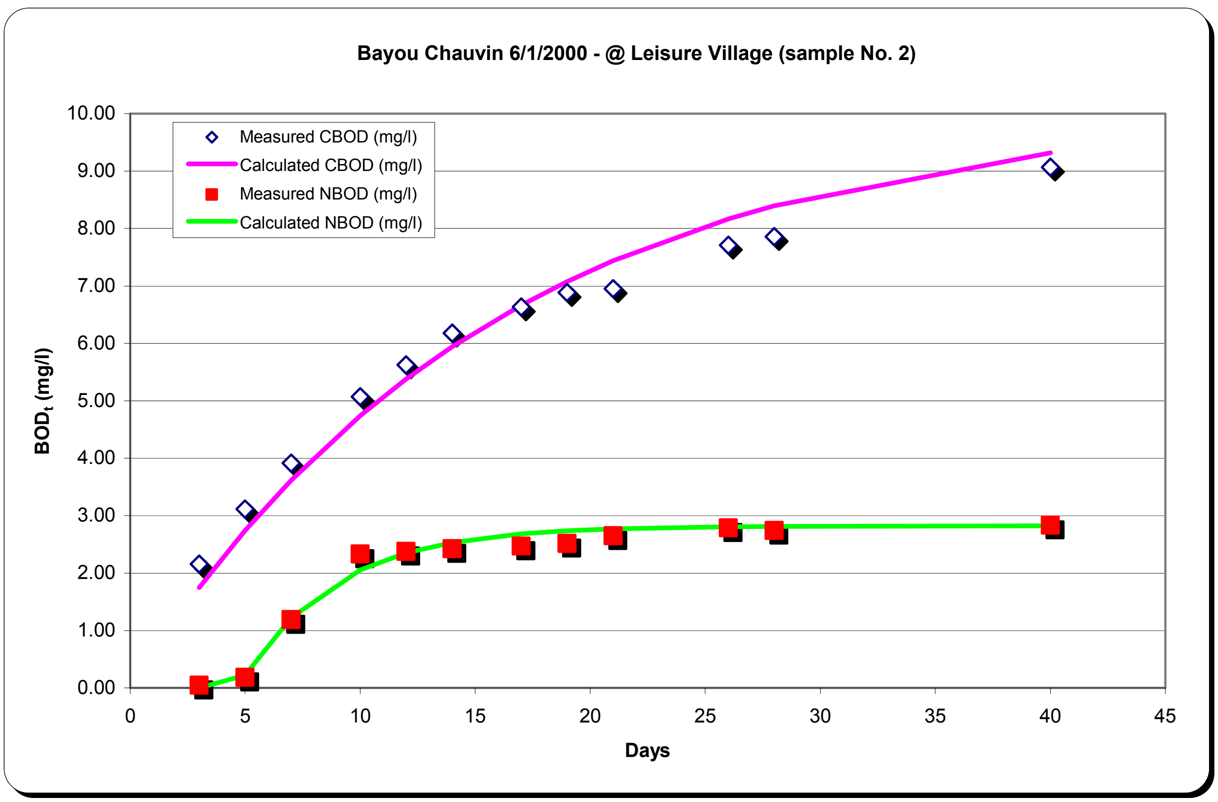
Note 5 - Determined by subtracting the calculated NBOD from the measured total BOD.

Note 6 - Calculated from the formula {NBODt=UNBOD[1-e-(k(t-lag))]} using the listed values of UNBOD, k decay rate and lag time.

Note 7 - Calculated from the formula {CBODt=UCBOD[1-e-(k(t-lag))]} using the listed values of UCBOD, k decay rate and lag time.

BOD Analysis of the for: **Bayou Chauvin 6/1/2000 - @ Leisure Village (sample No. 2)**

Measured Data					Calculated Data		
Days	***Total BOD (mg/l)***	***NOx as N (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	
Note 1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7	
0		0.15					
3	2.20	0.16	0.05	2.15	0.00	1.75	
5	3.30	0.19	0.18	3.12	0.22	2.74	
7	5.10	0.41	1.19	3.91	1.23	3.62	
10	7.40	0.66	2.33	5.07	2.06	4.74	
12	8.00	0.67	2.38	5.62	2.35	5.38	
14	8.60	0.68	2.42	6.18	2.53	5.94	
17	9.10	0.69	2.47	6.63	2.68	6.66	
19	9.40	0.70	2.51	6.89	2.74	7.07	
21	9.60	0.73	2.65	6.95	2.77	7.44	
26	10.50	0.76	2.79	7.71	2.81	8.17	
28	10.60	0.75	2.74	7.86	2.81	8.40	
40	11.90	0.77	2.83	9.07	2.82	9.32	
49	12.90	0.79	2.92	9.98	2.82	9.67	
60	13.70	0.85	3.20	10.50	2.82	9.90	
					2.82	10.13	**UBOD (mg/l)**
					0.24	0.06	**k rate (1/day)**
					4.67	0.00	**Lag time (days)**



Note 1 - Days from the BOD test start date.

Note 2 - Measured total BOD at time in "Days" column.

Note 3 - Measured (NO_2 + NO_3 as nitrogen) at time in "Days" column.

Note 4 - Calculated by multipling the measured (NO_2 +NO_3 as nitrogen) minus the day zero (NO_2 +NO_3 as nitrogen) by 4.57.

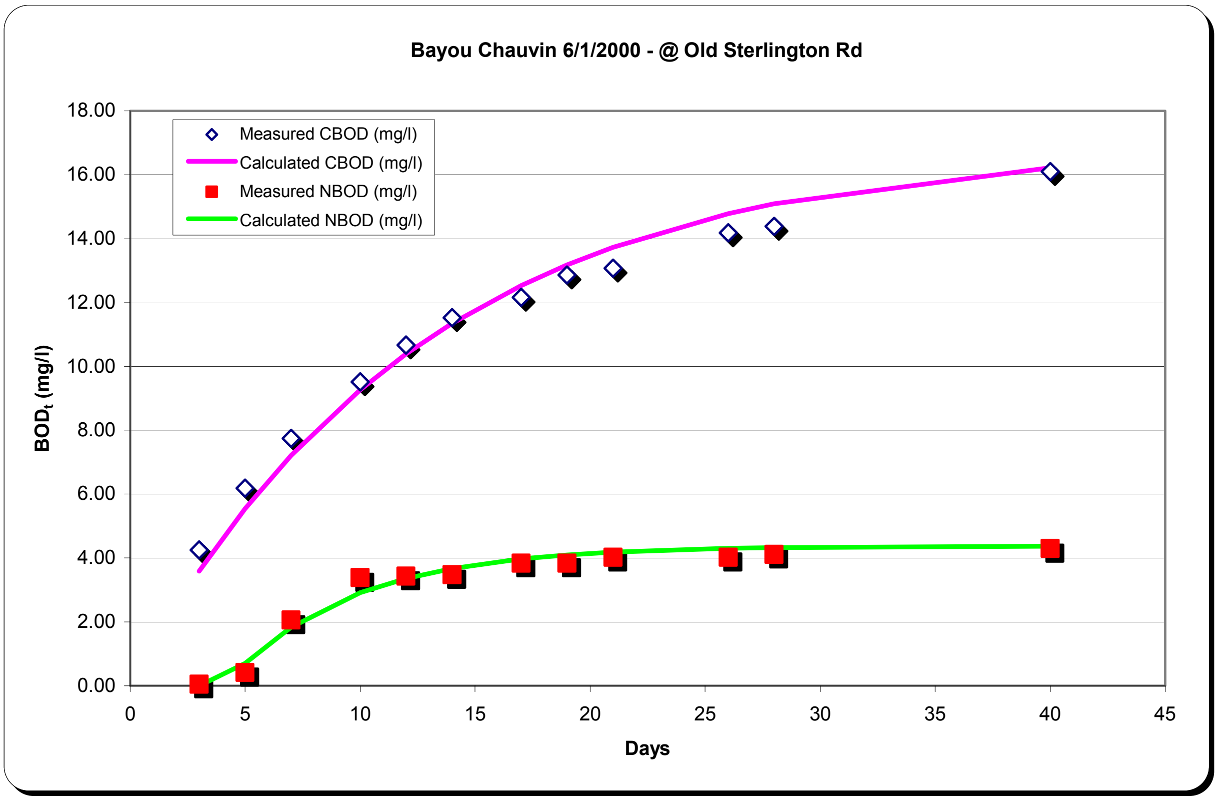
Note 5 - Determined by subtracting the calculated NBOD from the measured total BOD.

Note 6 - Calculated from the formula {NBODt=UNBOD[1-e-(k(t-lag))]} using the listed values of UNBOD, k decay rate and lag time.

Note 7 - Calculated from the formula {CBODt=UCBOD[1-e-(k(t-lag))]} using the listed values of UCBOD, k decay rate and lag time.

BOD Analysis of the for: **Bayou Chauvin 6/1/2000 - @ Old Sterlington Rd**

Measured Data					Calculated Data		
Days	*Total BOD (mg/l)*	*NOx as N (mg/l)*	*NBOD (mg/l)*	*CBOD (mg/l)*	*NBOD (mg/l)*	*CBOD (mg/l)*	
Note 1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7	
0		0.12					
3	4.3	0.13	0.05	4.25	0.00	3.58	
5	6.6	0.21	0.41	6.19	0.70	5.54	
7	9.8	0.57	2.06	7.74	1.83	7.21	
10	12.9	0.86	3.38	9.52	2.91	9.27	
12	14.1	0.87	3.43	10.67	3.36	10.39	
14	15	0.88	3.47	11.53	3.67	11.35	
17	16	0.96	3.84	12.16	3.97	12.53	
19	16.7	0.96	3.84	12.86	4.10	13.18	
21	17.1	1	4.02	13.08	4.18	13.73	
26	18.2	1	4.02	14.18	4.30	14.78	
28	18.5	1.02	4.11	14.39	4.33	15.09	
40	20.4	1.06	4.30	16.10	4.37	16.22	
49	21.6	1.11	4.52	17.08	4.38	16.59	
60	22.7	1.22	5.03	17.67	4.38	16.79	
					4.38	16.93	**UBOD (mg/l)**
					0.18	0.08	**k rate (1/day)**
					4.04	0.00	**Lag time (days)**



Note 1 - Days from the BOD test start date.

Note 2 - Measured total BOD at time in "Days" column.

Note 3 - Measured (NO_2 + NO_3 as nitrogen) at time in "Days" column.

Note 4 - Calculated by multipling the measured (NO_2 +NO_3 as nitrogen) minus the day zero (NO_2 +NO_3 as nitrogen) by 4.57.

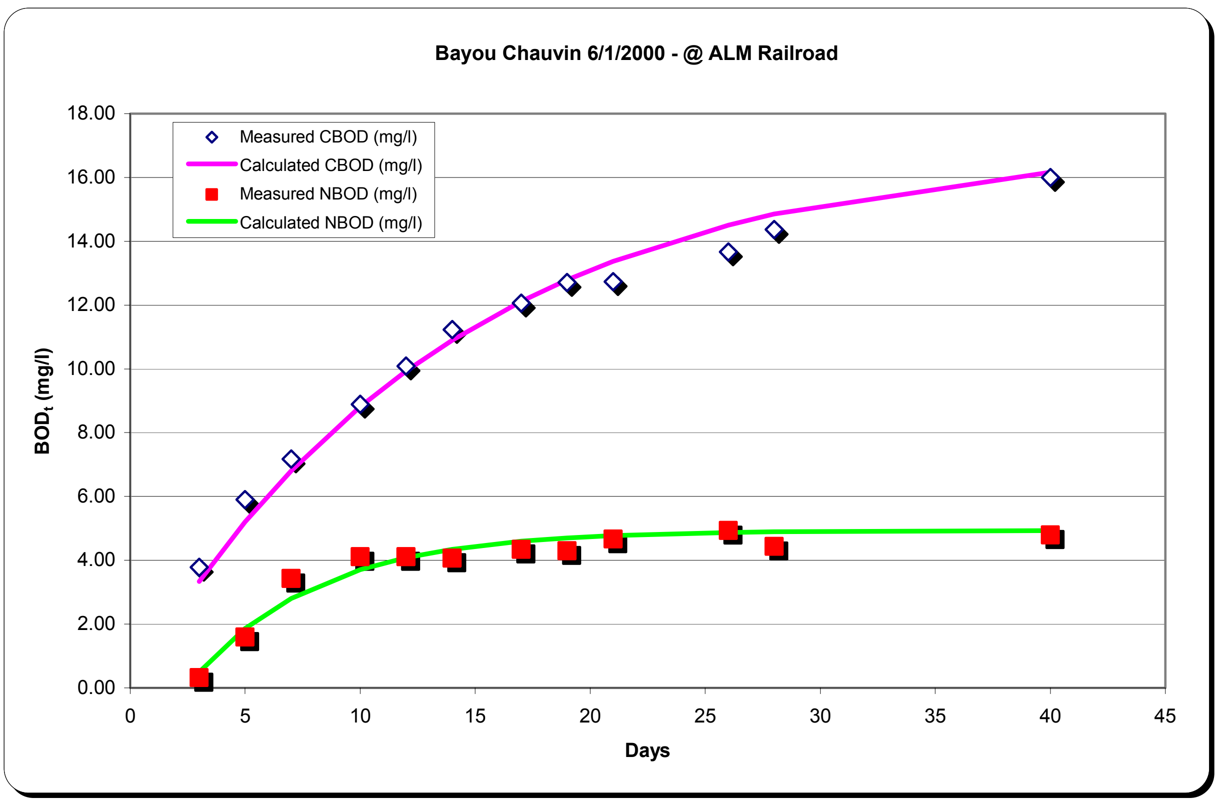
Note 5 - Determined by subtracting the calculated NBOD from the measured total BOD.

Note 6 - Calculated from the formula {NBODt=UNBOD[1-e-(k(t-lag))]} using the listed values of UNBOD, k decay rate and lag time.

Note 7 - Calculated from the formula {CBODt=UCBOD[1-e-(k(t-lag))]} using the listed values of UCBOD, k decay rate and lag time.

BOD Analysis of the for: **Bayou Chauvin 6/1/2000 - @ ALM Railroad**

Measured Data					Calculated Data		
Days	***Total BOD (mg/l)***	***NOx as N (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	
Note 1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7	
0		0.17					
3	4.1	0.24	0.32	3.78	0.50	3.34	
5	7.5	0.52	1.60	5.90	1.86	5.20	
7	10.6	0.92	3.43	7.17	2.80	6.80	
10	13	1.07	4.11	8.89	3.71	8.82	
12	14.2	1.07	4.11	10.09	4.08	9.93	
14	15.3	1.06	4.07	11.23	4.35	10.90	
17	16.4	1.12	4.34	12.06	4.60	12.11	
19	17	1.11	4.30	12.70	4.70	12.79	
21	17.4	1.19	4.66	12.74	4.77	13.37	
26	18.6	1.25	4.94	13.66	4.87	14.51	
28	18.8	1.14	4.43	14.37	4.89	14.86	
40	20.8	1.22	4.80	16.00	4.93	16.16	
49	22.2	1.28	5.07	17.13	4.94	16.62	
60	23.2	1.42	5.71	17.49	4.94	16.89	
					4.94	17.11	**UBOD (mg/l)**
					0.18	0.07	**k rate (1/day)**
					2.42	0.00	**Lag time (days)**



Note 1 - Days from the BOD test start date.

Note 2 - Measured total BOD at time in "Days" column.

Note 3 - Measured (NO_2 + NO_3 as nitrogen) at time in "Days" column.

Note 4 - Calculated by multipling the measured (NO_2 +NO_3 as nitrogen) minus the day zero (NO_2 +NO_3 as nitrogen) by 4.57.

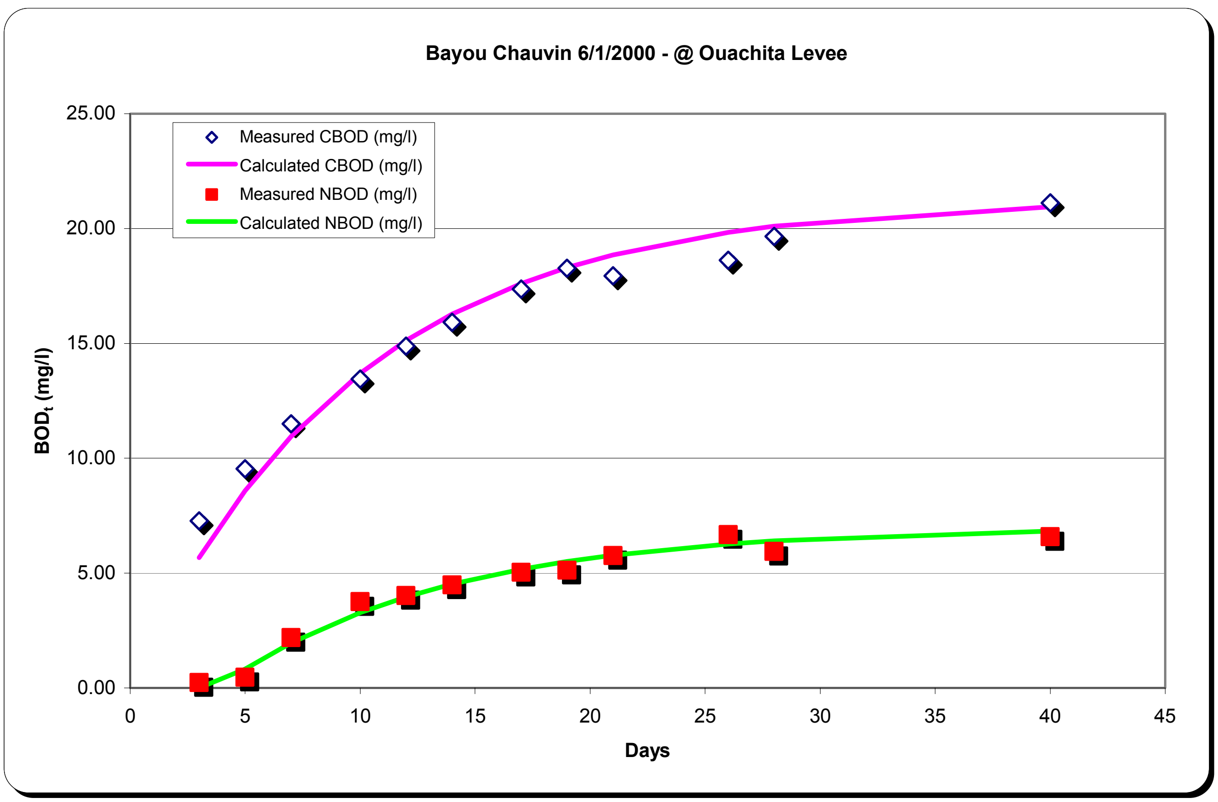
Note 5 - Determined by subtracting the calculated NBOD from the measured total BOD.

Note 6 - Calculated from the formula {NBODt=UNBOD[1-e-(k(t-lag))]} using the listed values of UNBOD, k decay rate and lag time.

Note 7 - Calculated from the formula {CBODt=UCBOD[1-e-(k(t-lag))]} using the listed values of UCBOD, k decay rate and lag time.

BOD Analysis of the for: **Bayou Chauvin 6/1/2000 - @ Ouachita Levee**

Measured Data					Calculated Data		
Days	***Total BOD (mg/l)***	***NOx as N (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	***NBOD (mg/l)***	***CBOD (mg/l)***	
Note 1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7	
0		0.24					
3	7.50	0.29	0.23	7.27	0.00	5.67	
5	10.00	0.34	0.46	9.54	0.82	8.58	
7	13.70	0.72	2.19	11.51	1.95	10.95	
10	17.20	1.06	3.75	13.45	3.28	13.71	
12	18.90	1.12	4.02	14.88	3.96	15.12	
14	20.40	1.22	4.48	15.92	4.52	16.27	
17	22.40	1.34	5.03	17.37	5.17	17.61	
19	23.40	1.36	5.12	18.28	5.50	18.30	
21	23.70	1.5	5.76	17.94	5.78	18.86	
26	25.30	1.7	6.67	18.63	6.26	19.84	
28	25.60	1.54	5.94	19.66	6.40	20.11	
40	27.70	1.68	6.58	21.12	6.82	20.95	
49	28.90	1.73	6.81	22.09	6.93	21.16	
60	29.70	1.87	7.45	22.25	6.98	21.25	
					7.00	21.30	**UBOD (mg/l)**
					0.10	0.10	**k rate (1/day)**
					3.77	0.00	**Lag time (days)**



Note 1 - Days from the BOD test start date.
Note 2 - Measured total BOD at time in "Days" column.
Note 3 - Measured (NO_2 + NO_3 as nitrogen) at time in "Days" column.
Note 4 - Calculated by multipling the measured (NO_2 +NO_3 as nitrogen) minus the day zero (NO_2 +NO_3 as nitrogen) by 4.57.
Note 5 - Determined by subtracting the calculated NBOD from the measured total BOD.
Note 6 - Calculated from the formula {NBODt=UNBOD[1-e-(k(t-lag))]} using the listed values of UNBOD, k decay rate and lag time.
Note 7 - Calculated from the formula {CBODt=UCBOD[1-e-(k(t-lag))]} using the listed values of UCBOD, k decay rate and lag time.

APPENDIX F – 1994 CALIBRATION DATA

Table 22 - Bayou Chauvin Stream Geometry and Water Quality

BAYOU CHAUVIN STREAM GEOMETRY INPUT														
Reach	Description	River Km from	River Km to	Width (ft)	Depth (ft)	Width (m)	Depth (m)	Modified Leopold Constants a	b	c	d	e	f
	Caney Creek to Hwy 139	11.62	10.90	19.0	0.75	5.791	0.2286	0.000	0.00	5.791	0.000	0.00	0.22860
1	Hwy 139 to Lakewood Dr	10.90	10.17	26.0	0.75	7.925	0.2286	0.000	0.00	7.925	0.000	0.00	0.22860
2	Lakewood Dr to Bayou Oaks Ditch	10.17	9.98	34.0	0.75	10.363	0.2286	0.000	0.00	10.363	0.000	0.00	0.22860
3	Bayou Oaks Pond to Bayou Chauvin	0.08	0.00	2.0	0.33	0.610	0.1006	0.000	0.00	0.610	0.000	0.00	0.10058
4	Bayou Oaks Ditch to Joe White Rd	9.98	9.70	42.0	0.75	12.802	0.2286	0.000	0.00	12.802	0.000	0.00	0.22860
5	Joe White Rd to Control Structure	9.70	9.22	36.0	0.75	10.973	0.2286	0.000	0.00	10.973	0.000	0.00	0.22860
6	Control Structure to Oakwood Pond #2	9.22	6.20	31.0	1.34	9.449	0.4084	0.000	0.00	9.449	0.000	0.00	0.40843
7	Oakwood Pond #2 to Old Sterlington Rd	6.20	5.44	36.0	1.18	10.973	0.3597	0.000	0.00	10.973	0.000	0.00	0.35966
8	Old Sterlington Rd to West Elmwood Ditch	5.44	5.24	32.0	1.61	9.754	0.4907	0.000	0.00	9.754	0.000	0.00	0.49073
9	West Elmwood Pond to Bayou Chauvin	0.36	0.00	2.0	0.33	0.610	0.1006	0.000	0.00	0.610	0.000	0.00	0.10058
10	West Elmwood Ditch to ALM RR	5.24	4.67	32.0	1.61	9.754	0.4907	0.000	0.00	9.754	0.000	0.00	0.49073
11	ALM RR to North Monroe SD #1 Ditch	4.67	4.36	40.0	0.90	12.192	0.2743	0.000	0.00	12.192	0.000	0.00	0.27432
12	North Monroe SD #1 Pond to Bayou Chauvin	0.60	0.00	2.0	0.33	0.610	0.1006	0.000	0.00	0.610	0.000	0.00	0.10058
13	N. Monroe SD # 1 Ditch to Hwy. 165	4.36	4.12	50.0	0.90	15.240	0.2743	0.000	0.00	15.240	0.000	0.00	0.27432
14	Hwy 165 to North Gate Estates Ditch	4.12	3.86	15.0	0.69	4.572	0.2103	60.907	1.40	2.438	3.322	1.40	0.07620
15	North Gate Pond to Bayou Chauvin	0.60	0.00	2.0	0.33	0.610	0.1006	0.000	0.00	0.610	0.000	0.00	0.10058
16	North Gate Estates Ditch to Northside Terrace Ditch	3.86	3.06	15.0	0.69	4.572	0.2103	60.907	1.40	2.438	3.322	1.40	0.07620
17	Northside Terrace Pond to Bayou Chauvin	0.70	0.00	2.0	0.33	0.610	0.1006	0.000	0.00	0.610	0.000	0.00	0.10058
18	Northside Terrace Ditch to Ouachita River Levee	3.06	0.00	15.0	0.69	4.572	0.2103	60.907	1.40	2.438	3.322	1.40	0.07620

BAYOU CHAUVIN CALIBRATION WATER QUALITY INPUT											
Reach	Description	Temp (°C)	Chlor a (ug/l)	Kd (1/d)	Kn (1/d)	Reach	Description	Temp (oC)	Chlor a (ug/l)	Kd (1/d)	Kn (1/d)
	Caney Creek to Hwy 139	23.8	236	0.200	0.100	9	West Elmwood Pond to Bayou Chauvin	25.3	200	0.200	0.100
1	Hwy 139 to Lakewood Dr	25.1	90	0.200	0.100	10	West Elmwood Ditch to ALM RR	25.3	80	0.200	0.100
2	Lakewood Dr to Bayou Oaks Ditch	23.4	8	0.200	0.100	11	ALM RR to North Monroe SD #1 Ditch	25.6	61	0.200	0.100
3	Bayou Oaks Pond to Bayou Chauvin	23.9	371	0.200	0.100	12	North Monroe SD #1 Pond to Bayou Chauvin	26.2	200	0.200	0.100
4	Bayou Oaks Ditch to Joe White Rd	24.4	80	0.200	0.100	13	N. Monroe SD # 1 Ditch to Hwy. 165	26.2	80	0.200	0.100
5	Joe White Rd to Control Structure	24.4	109	0.200	0.100	14	Hwy 165 to North Gate Estates Ditch	26.7	75	0.200	0.100
6	Control Structure to Oakwood Pond #2	25.0	53	0.200	0.100	15	North Gate Pond to Bayou Chauvin	25.5	199	0.200	0.100
7	Oakwood Pond #2 to Old Sterlington Rd	24.5	21	0.200	0.100	16	North Gate Estates Ditch to Northside Terrace Ditch	25.5	80	0.200	0.100
8	Old Sterlington Rd to West Elmwood Ditch	25.1	65	0.200	0.100	17	Northside Terrace Pond to Bayou Chauvin	24.2	893	0.200	0.100
						18	Northside Terrace Ditch to Ouachita River Levee	24.2	80	0.200	0.100

Temperature and chlorophyll a are entered as initial conditions at the head of each reach. The carbonaceous and nitrogeneous laboratory decay rates were highly variable. The values used in the model were reasonable values that allowed the model to calibrate.

Table 23 – Bayou Chauvin Facility and Other Data

SUMMARY OF FACILITY AND OTHER DATA FROM DMRs AND MEASUREMENTS

Facility	DMR Year	Measured Flow (cms)	DMR Flow (cms)	Measured Temp (°C)	Measured DO (mg/l)	Measured CL (mg/l)	Measured SO4 (mg/l)	Measured UCBOD (mg/l)	Measured UBOD-TKNx4.3 (mg/l)	DMR UCBOD (mg/l)	Measured UNBOD (mg/l)	Measured TKNx4.3 (mg/l)
Northside Terrace pond	1996	0.00156	0.00396	22.40	17.60	40.00	16.10	122	128	81	75	69
Northgate Estates pond	1996	0.00119	0.00064	22.00	0.42	33.10	21.80	82	43	49	36	74
Leisure Village plant	1994	0.00040	0.00112	25.20	5.91	151.00	69.40	8	11	78	11	8
Lakeside Liner & Bayou Oaks ponds	1994	0.00692	0.00471	26.50	4.76	39.60	30.50	72	54	88	60	78
Shenandoah Subdivision pond												
Lakeview Estates plant	1994	0.00071	0.00070							64		
Oakwood # 1 pond												
Oakwood # 2 pond	1996	0.00663	0.00749	23.00	5.94	39.90	30.30	13	16	45	41	38
North Monroe SD # 1 pond	1994	0.00000	0.00475							6		
West Elmwood Pond	1996	0.00000	0.00331							41		
Bayou Desiard Overflow				24.40	4.90	7.10	2.40					

FACILITY AND OTHER DATA FOR INPUT TO CALIBRATION

Facility	Flow (cms)	Temp (°C)	DO (mg/l)	CL (mg/l)	SO4 (mg/l)	UCBOD (mg/l)	UNBOD (mg/l)	Comments
Northside Terrace pond	0.0016	22.40	17.60	40.00	16.10	128.00	69.00	
Northgate Estates pond	0.0012	22.00	0.42	33.10	21.80	82.00	36.00	
Leisure Village plant	0.0011	25.20	5.91	151.00	69.40	11.00	8.00	
Lakeside Liner & Bayou Oaks ponds	0.0047	26.50	4.76	39.60	30.50	72.00	60.00	
Shenandoah Subdivision pond								
Lakeview Estates plant	0.0007	25.20	5.00	150.00	70.00	64	64	Temp, DO, Cl, & SO4 taken from data for the other extended aeration plant, Leisure Village.
Oakwood # 1 pond								
Oakwood # 2 pond	0.0066	23.00	5.94	39.90	30.30	16.00	38.00	
North Monroe SD # 1 pond	0.0000	23.00	5.00	38.00	25.00	6	6	Temp, DO, Cl, & SO4 taken from data for the other ponds.
West Elmwood Pond	0.0000	23.00	5.00	38.00	25.00	41	41	Temp, DO, Cl, & SO4 taken from data for the other ponds.
Bayou Desiard Overflow	0.0140	24.40	4.90	7.10	2.40	5.00	5.00	

The North Monroe SD#1 and West Elmwood pond discharges were checked at the wrong points during the survey and there is therefore is no discharge data for these facilities. Lakeview Estates water quality data was lost. For these three facilities Temp, DO, Cl, and SO4 data were taken from data typical of other facilities and BOD data taken from DMRs. The Bayou Desiard flow and water quality were not measured - it was not known at the time that this flow was to Bayou Chauvin. The Bayou Desiard overflow rate was obtained by calibration. Normal background values of 5 UCBOD, 5 UNBOD were used for Bayou Desiard. Temperature was set at 1994 Chauvin Bayou survey values. DO, chlorides, sulfates, and chlorophyll a were taken from Bayou Desiard data from the 6/1/00 survey. Temperature, DO, Chlorides, and sulfates for most facilities were taken from data measured during the survey. The Shenandoah Subdivision Pond has been determined to discharge to the east flowing portion of Bayou Chauvin/Bayou Patrick/Sawyer Ditch. Oakwood Pond # 1 is used only as emergency overflow for Town & Country Subdivision and had no flow at the time of the survey.

Table 24 - Bayou Chauvin Incremental input/output data

BAYOU CHAUVIN INCREMENTAL OUTFLOW / INFLOW						
		River Km			Incremental outflow	
Description	Reach	from	to	Reach length (Km)	cms per Km	cms per reach
Hwy 139 to Lakewood Dr	1	10.90	10.17	0.73	-0.0004	-0.000292
Lakewood Dr to Bayou Oaks Ditch	2	10.17	9.98	0.19	-0.0004	-0.000076
Bayou Oaks Pond to Bayou Chauvin	3	0.08	0.00	0.08	0	0
Bayou Oaks Ditch to Joe White Rd	4	9.98	9.70	0.28	-0.0004	-0.000112
Joe White Rd to Control Structure	5	9.70	9.22	0.48	-0.0004	-0.000192
Control Structure to Oakwood Pond #2	6	9.22	6.20	3.02	-0.0004	-0.001208
Oakwood Pond #2 to Old Sterlington Rd	7	6.20	5.44	0.76	-0.0004	-0.000304
Old Sterlington Rd to West Elmwood Ditch	8	5.44	5.24	0.2	-0.0004	-0.000080
West Elmwood Pond to Bayou Chauvin	9	0.36	0.00	0.36	0	0
West Elmwood Ditch to ALM RR	10	5.24	4.67	0.57	-0.0004	-0.000228
ALM RR to North Monroe SD #1 Ditch	11	4.67	4.36	0.31	-0.0004	-0.000124
North Monroe SD #1 Pond to Bayou Chauvin	12	0.60	0.00	0.6	0	0
N. Monroe SD # 1 Ditch to Hwy. 165	13	4.36	4.12	0.24	-0.0004	-0.000096
Hwy 165 to North Gate Estates Ditch	14	4.12	3.86	0.26	0.01	0.0026
North Gate Pond to Bayou Chauvin	15	0.60	0.00	0.6	0.01	0.0060
North Gate Estates Ditch to Northside Terrace Ditch	16	3.86	3.06	0.8	0.01	0.0080
Northside Terrace Pond to Bayou Chauvin	17	0.70	0.00	0.7	0.01	0.0070
Northside Terrace Ditch to Ouachita River Levee	18	3.06	0.00	3.06	0.01	0.0306

Table 25 – Estimation of Dispersion Rates in Bayou Chauvin

Estimation of River Longitudinal Dispersion Coefficients:

Reach No.	Calculations based on Principles of Surface Water Quality Modeling and Control (1987)											LaQual estimation	
	Velocity (m/s)	Width (m)	Depth (m)	U-Velocity (fps)	B-Width (ft)	H-Mean Depth (ft)	g (ft/sec^2)	S-River slope (ft/ft)	E_x-Long. Disp. Coef. (mi^2/day) (1)	Ex-Long. Disp. Coef. (ft^2/sec)	Ex-Long. Disp. Coef. (m^2/sec)	Mannings n	D_L (m^2/s)
1	0.001350	7.92	0.229	0.004429	26.0	0.750	32	0.00018939	0.00000892	0.002877	**0.000267**	0.07	**0.000512**
2	0.000840	10.36	0.229	0.002756	34.0	0.750	32	0.00018939	0.00000590	0.001905	**0.000177**	0.07	**0.000319**
4	0.000700	12.80	0.229	0.002297	42.0	0.750	32	0.00018939	0.00000626	0.002019	**0.000188**	0.07	**0.000265**
5	0.002170	10.97	0.229	0.007119	36.0	0.750	32	0.00018939	0.00004417	0.014252	**0.001324**	0.07	**0.000823**
6	0.004000	9.45	0.408	0.013123	31.0	1.340	32	0.00018939	0.00004660	0.015036	**0.001397**	0.07	**0.002460**
7	0.014740	10.97	0.360	0.048359	36.0	1.180	32	0.00018939	0.00103268	0.333212	**0.030953**	0.07	**0.008154**
8	0.012050	9.75	0.491	0.039534	32.0	1.610	32	0.00018939	0.00034216	0.110402	**0.010256**	0.07	**0.008636**
10	0.012030	9.75	0.491	0.039468	32.0	1.610	32	0.00018939	0.00034102	0.110036	**0.010222**	0.07	**0.008622**
11	0.017090	12.19	0.274	0.056069	40.0	0.900	32	0.00018939	0.00257294	0.830202	**0.077121**	0.07	**0.007544**
13	0.015030	15.24	0.274	0.049311	50.0	0.900	32	0.00018939	0.00310945	1.003315	**0.093202**	0.07	**0.006635**
14	0.048080	5.67	0.230	0.157742	18.6	0.755	32	0.00094697	0.00256566	0.827854	**0.076903**	0.07	**0.018325**
16	0.048170	5.69	0.230	0.158038	18.7	0.755	32	0.00094697	0.00259348	0.836828	**0.077736**	0.07	**0.018359**
18	0.048350	5.74	0.240	0.158628	18.8	0.787	32	0.00094697	0.00249457	0.804915	**0.074772**	0.07	**0.019093**
14													
15													
16													
17													
18													
19													
20													

Note (1) - Ex = Longitudinal dispersion coefficient = 3.4x10-5 [(U2*B2)/(H*(g*H*S)0.5)] = (miles2/day)

Equation used is Equation 2.44 on page 75 in Principles fo Surface Water Quality Modeling and Control (1987) written by Thomann and Mueller. The equation was taken from "Mixing in Inland and Coastal Waters" by Fischer, List, Koh, Imberger and Brooks, 1979.

Table 26 - Bayou Chauvin Element Number Calculations

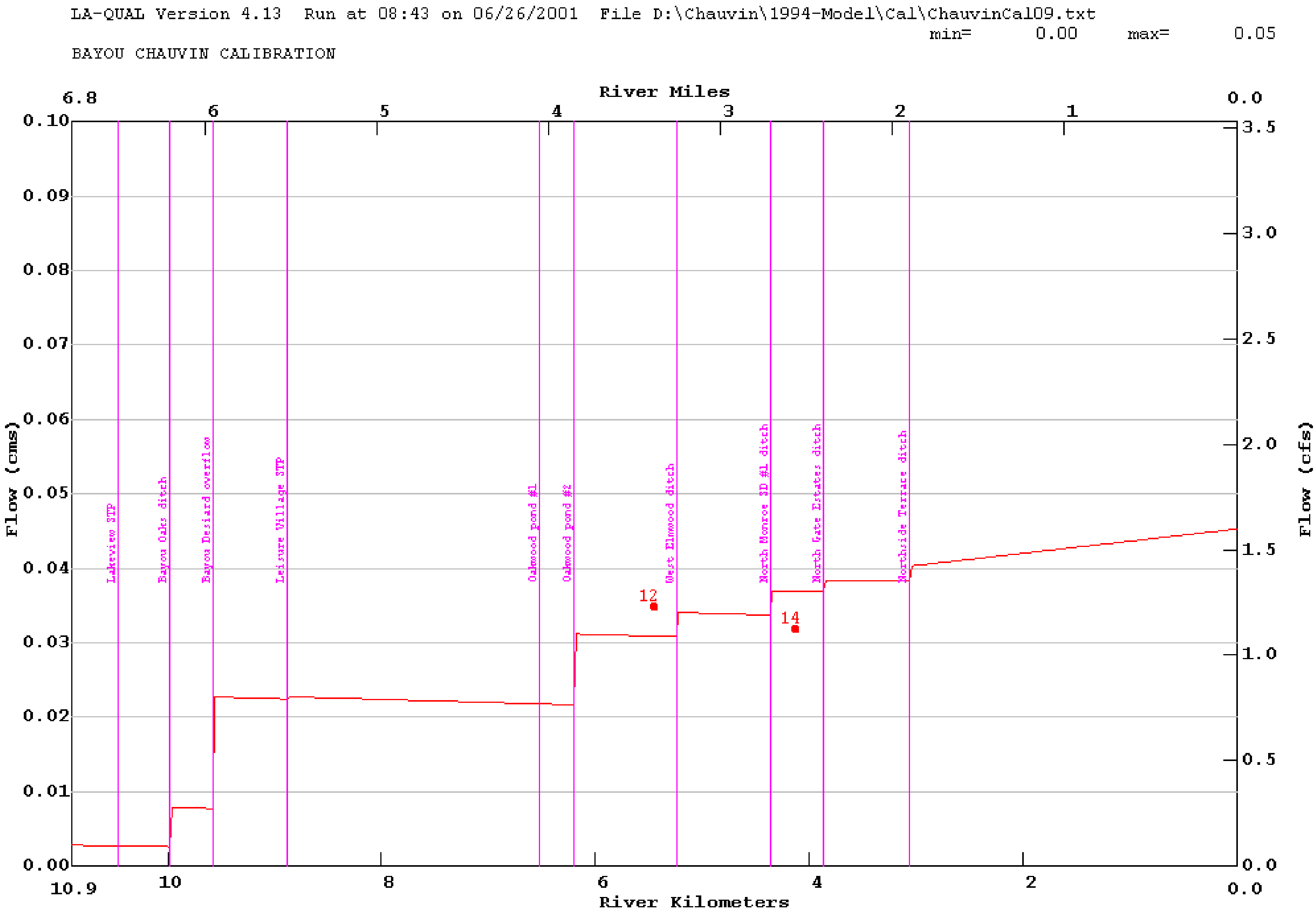
MODEL ELEMENT NUMBER CALCULATIONS									
	Reach No.		Name	Top RKm	Bottom RKm	Element length (Km)	No. elements	Top element no.	Bottom element no.
REACH ID	1	BC	HWY 139 TO LAKEWOOD DR	10.90	10.17	0.02	37	1	37
REACH ID	2	BC	LAKEWOOD DR TO BAYOU OAKS DITCH	10.17	9.98	0.02	9	38	46
REACH ID	3	BO	BAYOU OAKS POND TO BAYOU CHAUVIN	0.08	0.00	0.01	8	47	54
REACH ID	4	BC	BAYOU OAKS DITCH TO JOE WHITE RD	9.98	9.70	0.02	14	55	68
REACH ID	5	BC	J WHITE RD TO CONTROL STRUCTURE	9.70	9.22	0.02	24	69	92
REACH ID	6	BC	CONT STRUCT TO OAKWOOD POND #2	9.22	6.20	0.02	151	93	243
REACH ID	7	BC	OAKWOOD #2 TO OLD STERLINGTON RD	6.20	5.44	0.02	38	244	281
REACH ID	8	BC	OLD ST RD TO WEST ELMWOOD DITCH	5.44	5.24	0.02	10	282	291
REACH ID	9	WE	W ELMWOOD POND TO BAYOU CHAUVIN	0.36	0.00	0.01	36	292	327
REACH ID	10	BC	W ELMWOOD DITCH TO ALM RR	5.24	4.67	0.02	29	328	356
REACH ID	11	WE	ALM RR TO NORTH MONROE DITCH	4.67	4.36	0.02	16	357	371
REACH ID	12	NM	N MONROE SD #1 POND TO B CHAUVIN	0.60	0.00	0.01	60	372	431
REACH ID	13	BC	N MONROE DITCH TO HWY 165	4.36	4.12	0.02	12	432	443
REACH ID	14	BC	HWY 165 TO NORTH GATE DITCH	4.12	3.86	0.02	13	444	456
REACH ID	15	NG	N GATE ESTATES POND TO B CHAUVIN	0.60	0.00	0.01	60	457	516
REACH ID	16	BC	N GATE DITCH TO NORTHSIDE DITCH	3.86	3.06	0.02	40	517	556
REACH ID	17	NS	N SIDE ESTATES POND TO B CHAUVIN	0.70	0.00	0.01	70	557	626
REACH ID	18	BC	N SIDE DITCH TO OUACHITA R LEVEE	3.06	0.00	0.02	153	627	779

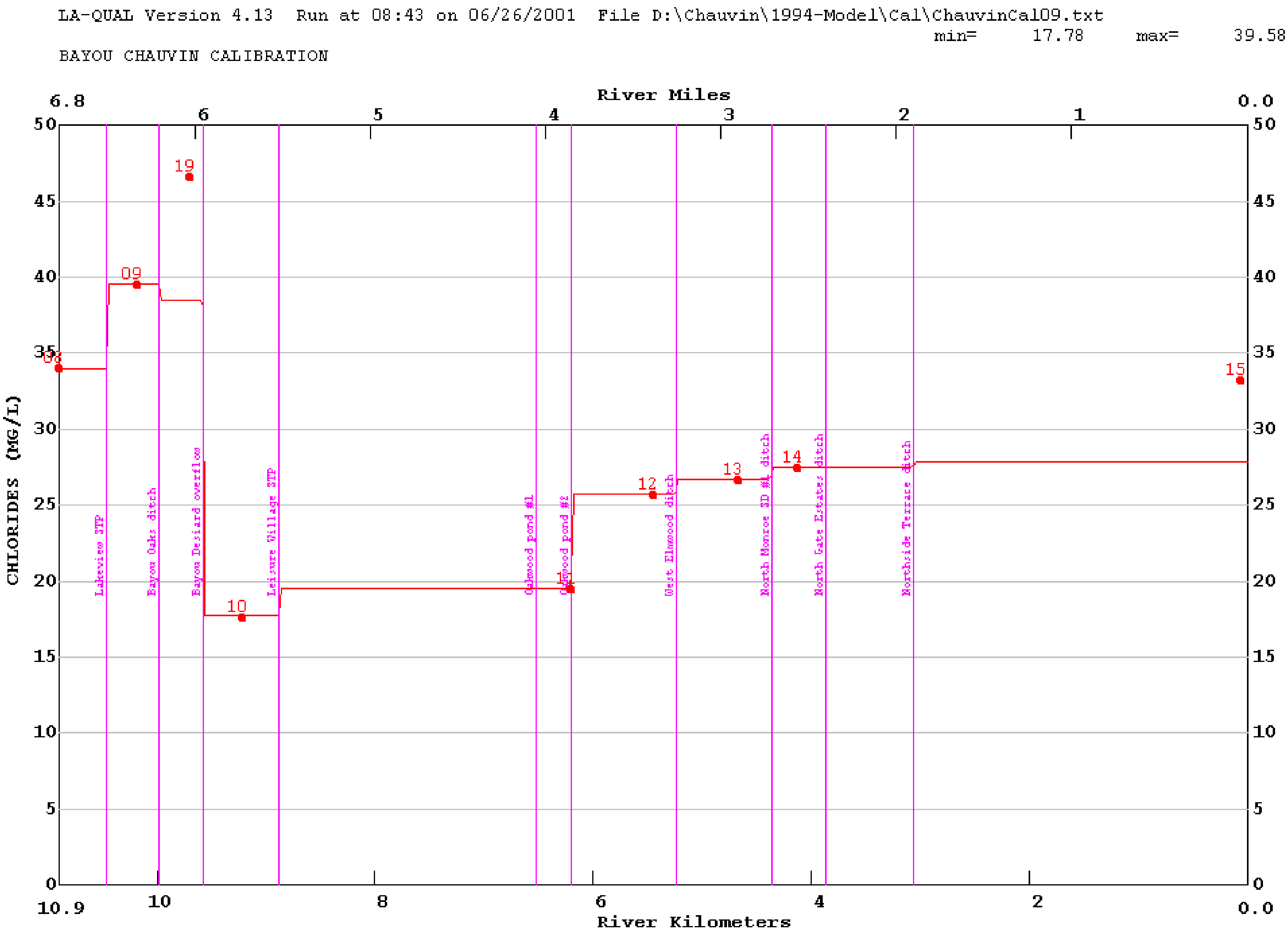
FACILITY ELEMENT CALCULATIONS			
Facility Name	Reach No.	RKm	Element No.
Oakwood Pond # 1	6	6.52	228
Oakwood Pond # 2	7	6.20	244
Lakeview Estates	1	10.46	23
Bayou Desiard	5	9.58	75
Leisure Village	6	8.88	110

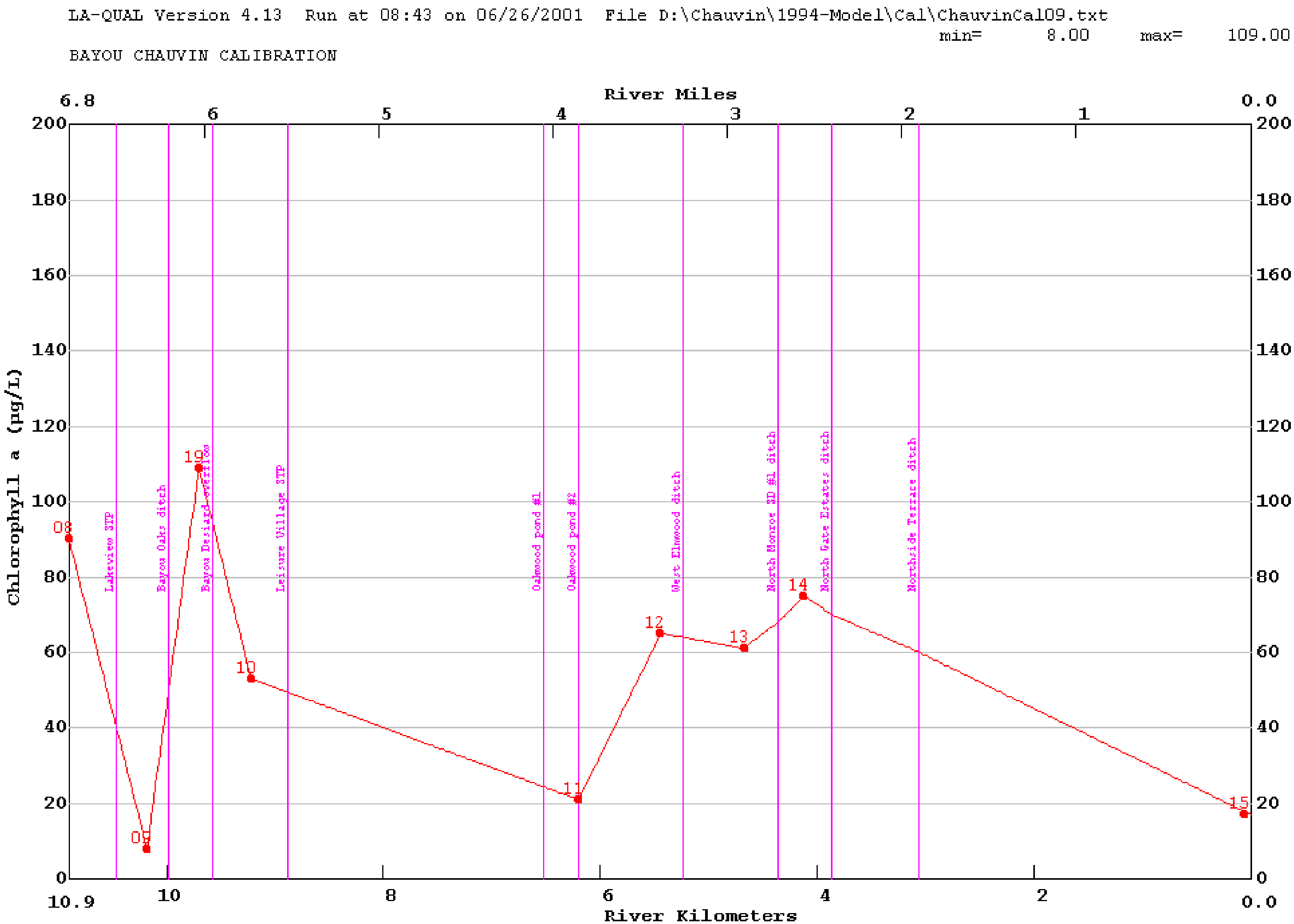
Table 27 - Bayou Chauvin Calibration Overlay Data

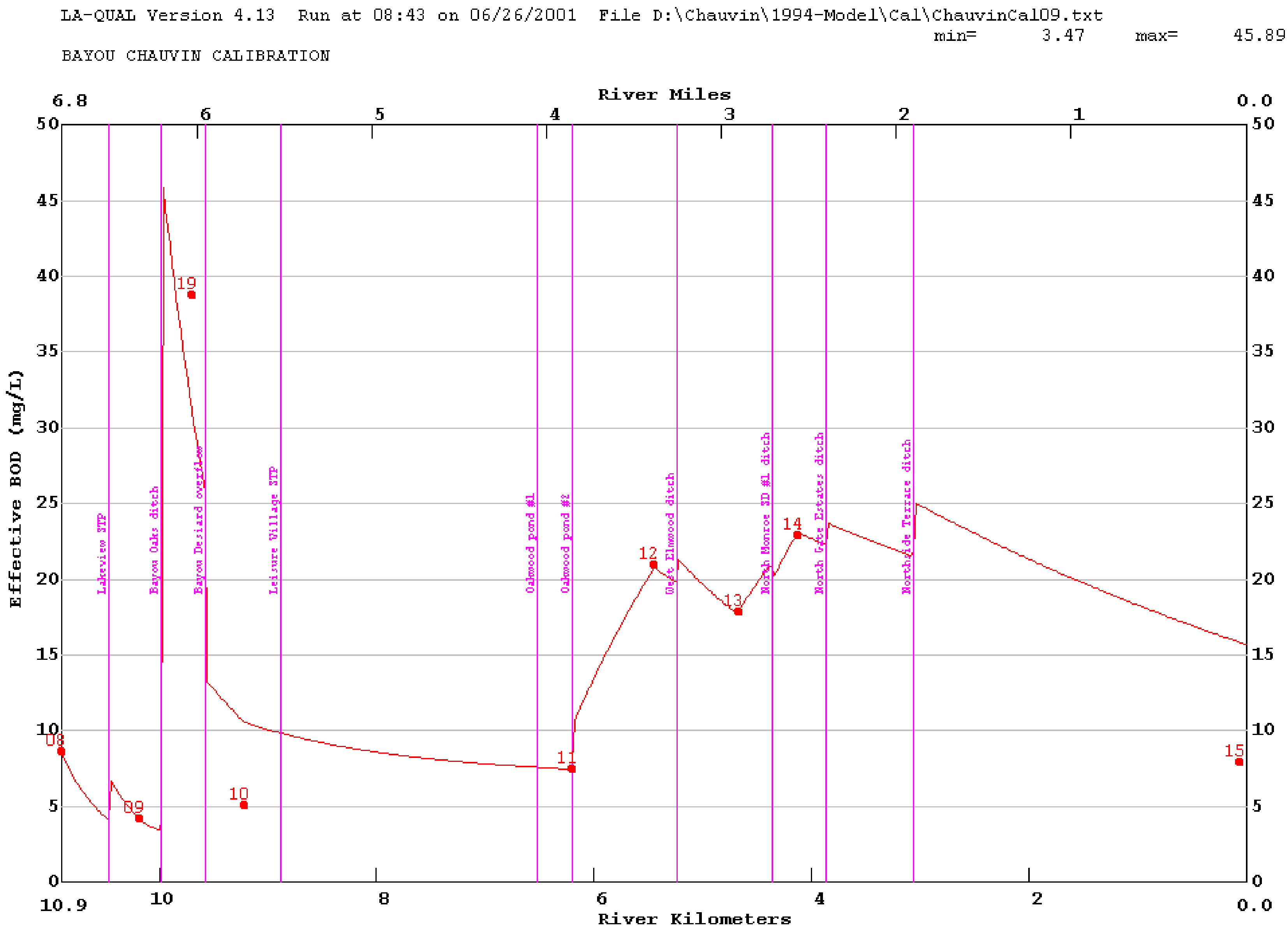
BAYOU CHAUVIN CALIBRATION OVERLAY DATA (9/25/94 - 10/05/94)											
		DO (mg/l)				Avg values from daytime WQ sampling					Avg of dawn & dusk temp (°C)
Site	Site No.	Dawn	Dusk	Measured flow (cfs)	Measured flow (cms)	Cl (mg/l)	SO4 (mg/l)	UCBOD (mg/l)	UNBOD (mg/l)	Chloro-phyll a (ug/l)	
Caney Cr confluence	22					50.0	19.0	28.9	42.6	236	23.8
Hwy 139	8	1.55	6.80			34.0	6.0	8.6	8.0	90	25.1
Lakewood Dr	9	1.66	1.79			39.5	23.2	4.2	18.2	8	23.4
Joe White Rd	19	0.83	3.68			46.6	32.9	38.8	47.3	109	24.4
Control structure	10	3.78	9.30			17.6	9.4	5.1	12.0	53	24.9
Oakwood pond # 2	11	3.15	5.05			19.4	10.4	7.5	7.9	21	24.5
Old Sterlington Rd	12	6.02	13.60	1.23	0.0348	25.6	18.1	20.9	17.3	65	25.1
ALM RR	13	3.68	12.00			26.6	17.5	17.8	15.7	61	25.6
Hwy 165	14	2.75	12.40	1.12	0.0317	27.4	17.7	22.9	18.2	75	26.7
Ouachita levee	15	4.45	11.37			33.2	18.2	7.9	10.9	17	24.2

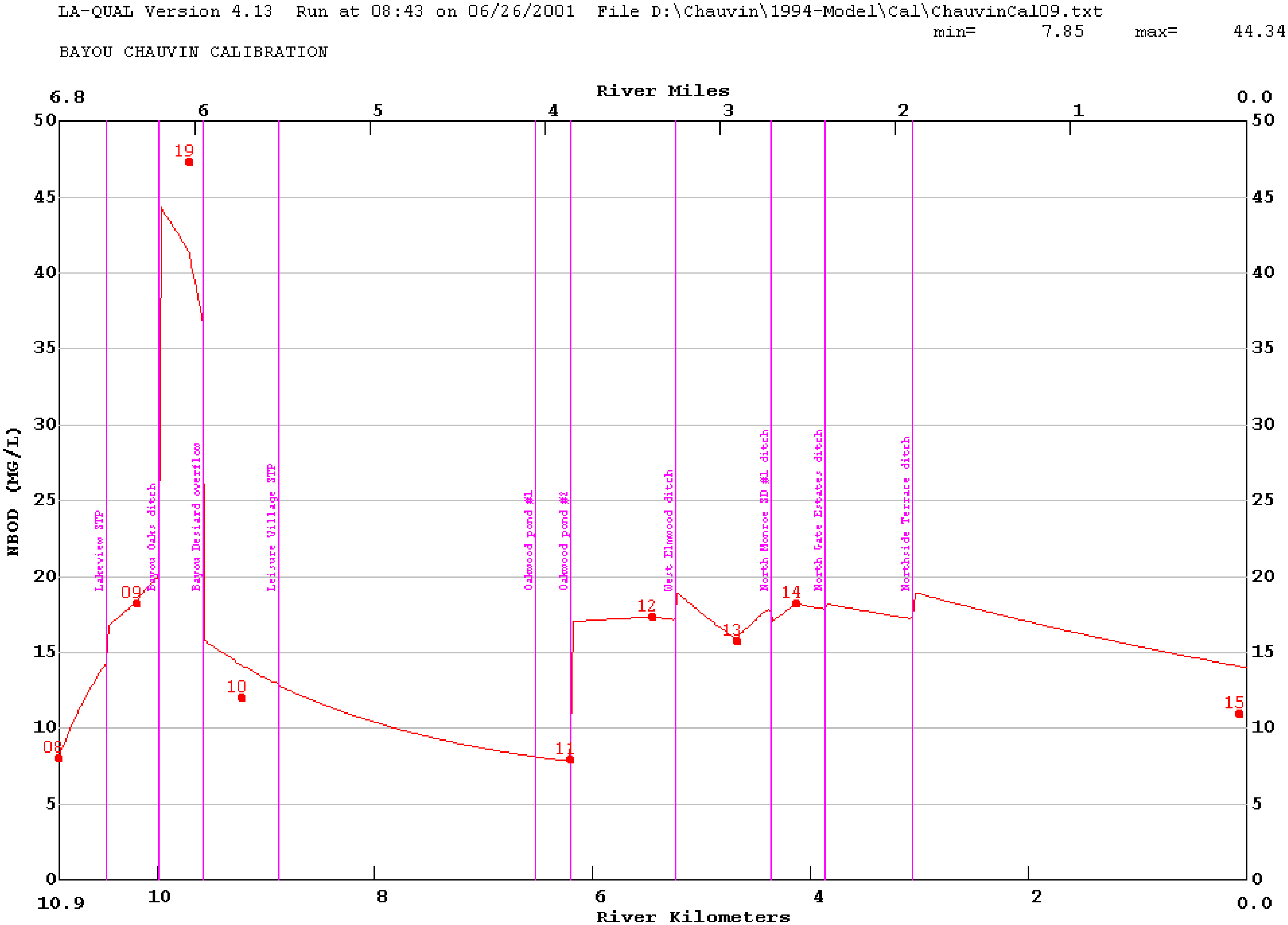
APPENDIX G – CALIBRATION PLOTS

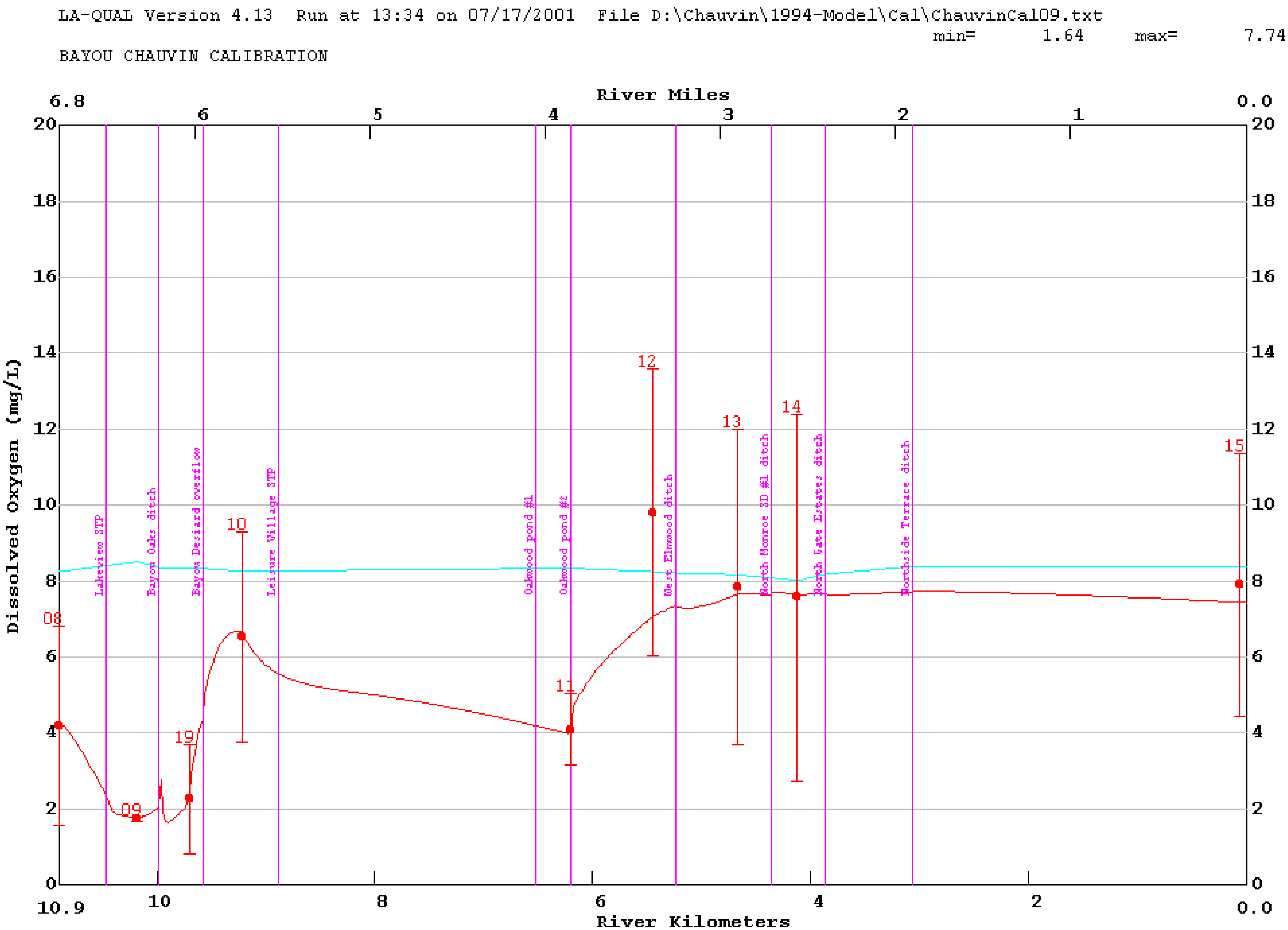

LA-QUAL Version 4.13 Run at 08:43 on 06/26/2001 File D:\Chauvin\1994-Model\Cal\ChauvinCal09.txt
min= 0.00 max= 0.05
BAYOU CHAUVIN CALIBRATION
River Miles
River Kilometers
Flow (cms)
Flow (cfs)
Lakeview STP
Bayou Oaks ditch
Bayou Desiard overflow
Leisure Village STP
Oakwood pond #1
Oakwood pond #2
West Elmwood ditch
North Monroe SD #1 ditch
North Gate Estates ditch
Northside Terrace ditch
12
14


LA-QUAL Version 4.13 Run at 08:43 on 06/26/2001 File D:\Chauvin\1994-Model\Cal\ChauvinCal09.txt
min= 17.78 max= 39.58
BAYOU CHAUVIN CALIBRATION
River Miles
River Kilometers
CHLORIDES (MG/L)
Lakeview STP
Bayou Oaks ditch
Bayou Desiard overflow
Leisure Village STP
Oakwood pond #1
Oakwood pond #2
West Elmwood ditch
North Monroe SD #1 ditch
North Gate Estates ditch
Northside Terrace ditch
08
09
19
10
11
12
13
14
15

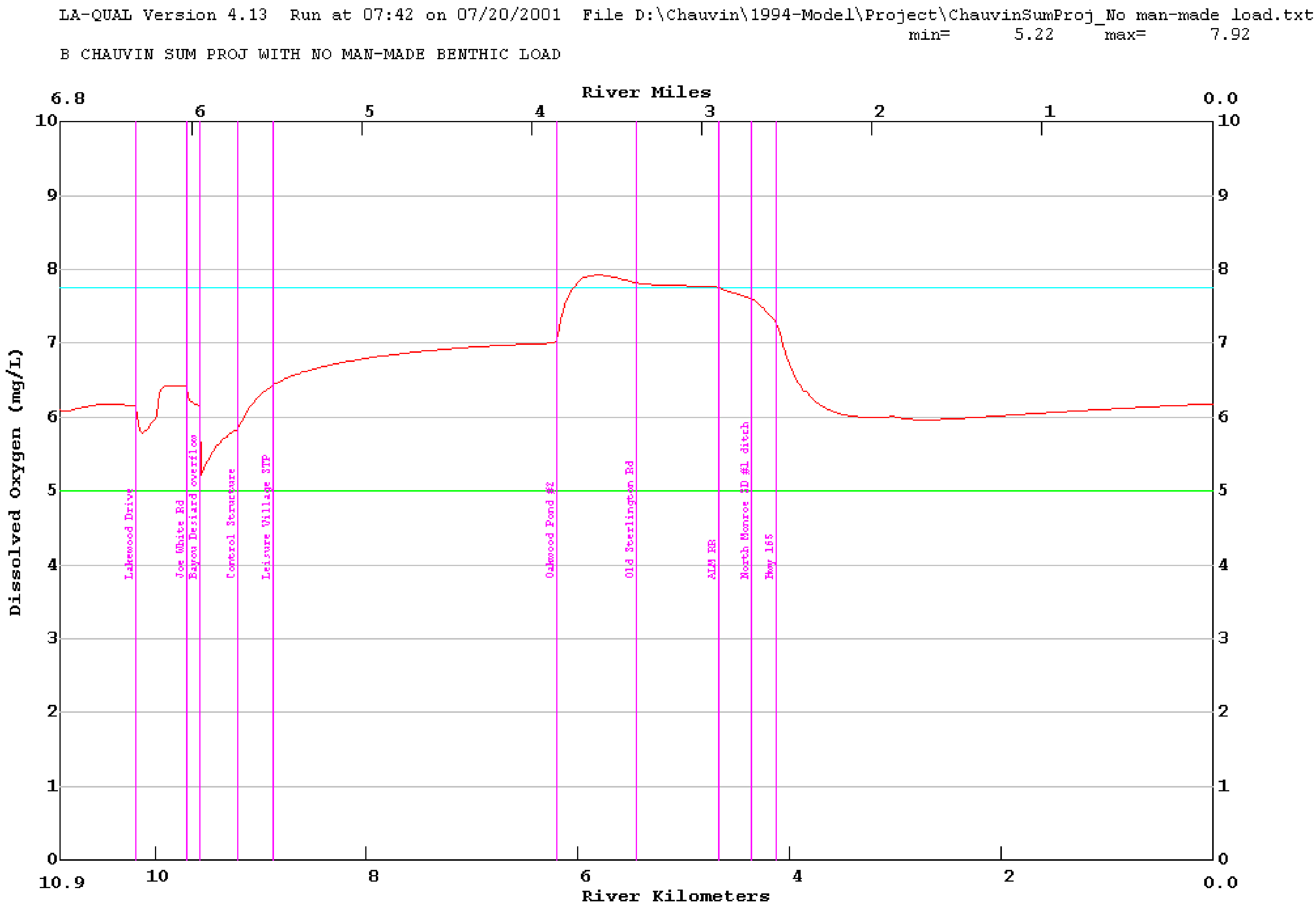

LA-QUAL Version 4.13 Run at 08:43 on 06/26/2001 File D:\Chauvin\1994-Model\Cal\ChauvinCal09.txt
min= 8.00 max= 109.00
BAYOU CHAUVIN CALIBRATION
River Miles
6.8
6
5
4
3
2
1
0.0
Chlorophyll a (µg/L)
0
20
40
60
80
100
120
140
160
180
200
Lakeview STP
Bayou Oaks ditch
Bayou Desiard overflow
Leisure Village STP
Oakwood pond #1
Oakwood pond #2
West Elmwood ditch
North Monroe SD #1 ditch
North Gate Estates ditch
Northside Terrace ditch
08
09
19
10
11
12
13
14
15
10.9
10
8
6
4
2
0.0
River Kilometers

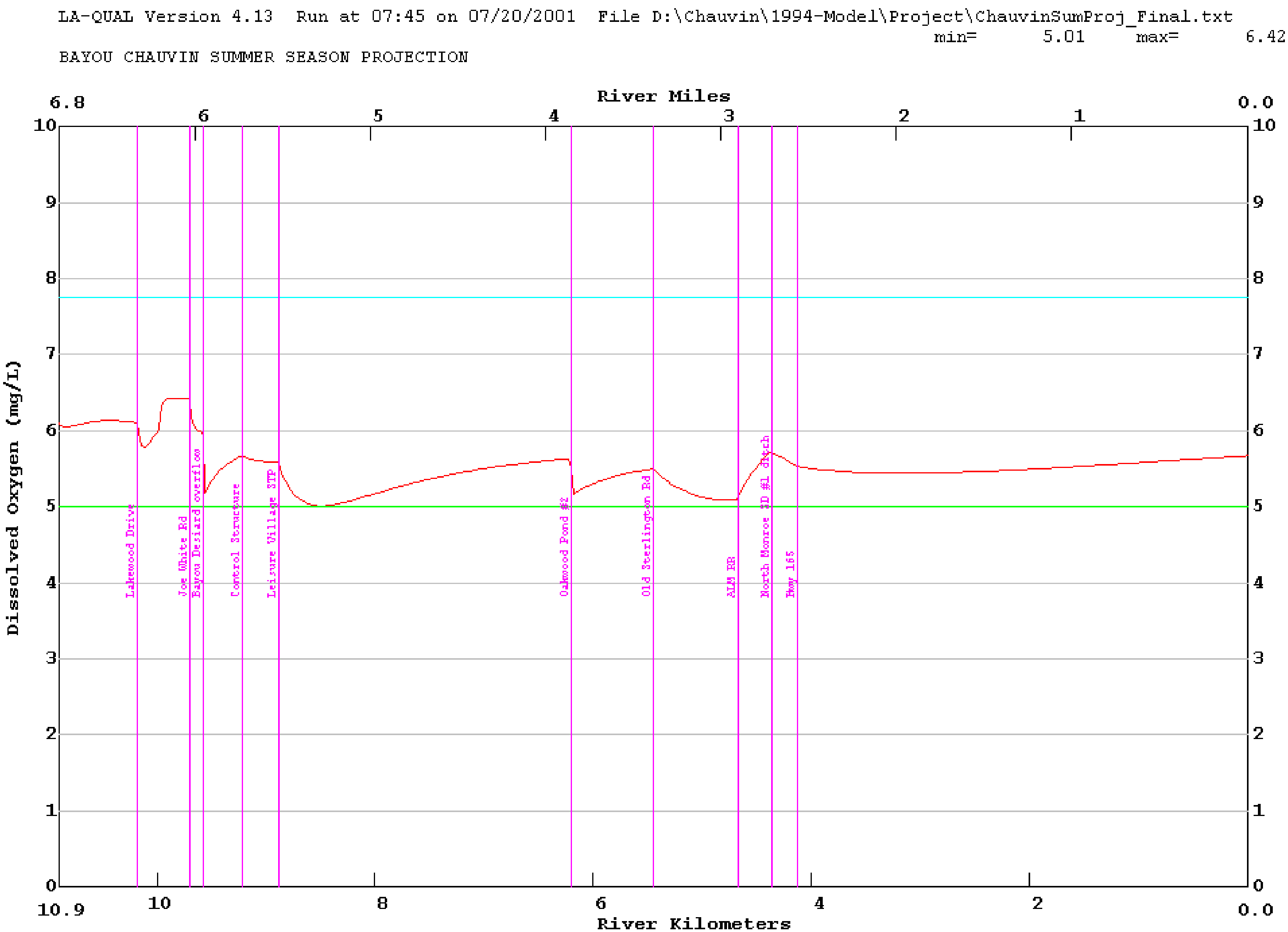

LA-QUAL Version 4.13 Run at 08:43 on 06/26/2001 File D:\Chauvin\1994-Model\Cal\ChauvinCal09.txt
min= 3.47 max= 45.89
BAYOU CHAUVIN CALIBRATION
River Miles
River Kilometers
Effective BOD (mg/L)
Lakeview STP
Bayou Oaks ditch
Bayou Desiard overflow
Leisure Village STP
Oakwood pond #1
Oakwood pond #2
West Elmwood ditch
North Monroe SD #1 ditch
North Gate Estates ditch
Northside Terrace ditch

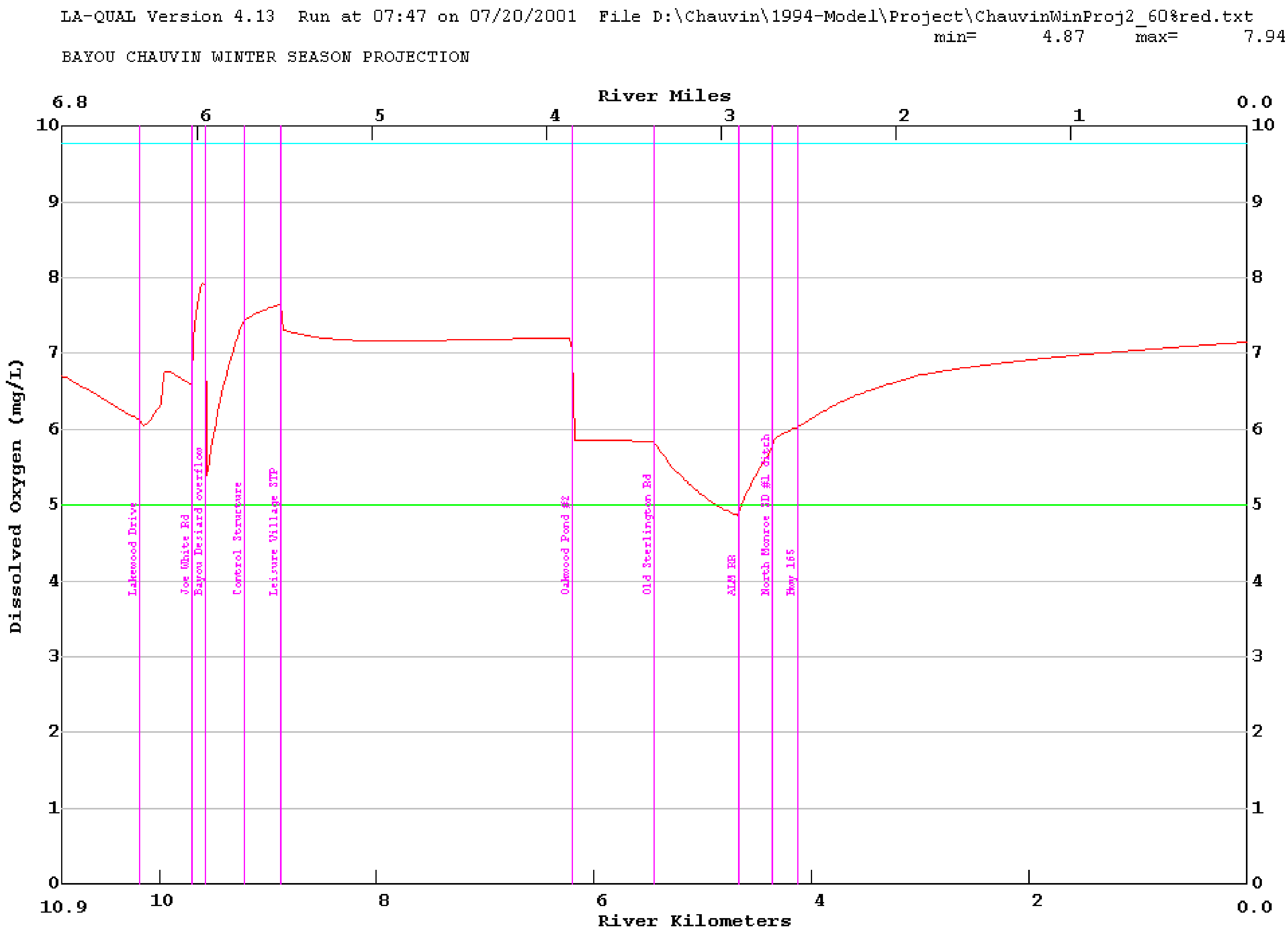

LA-QUAL Version 4.13 Run at 08:43 on 06/26/2001 File D:\Chauvin\1994-Model\Cal\ChauvinCal09.txt
min= 7.85 max= 44.34
BAYOU CHAUVIN CALIBRATION
River Miles
River Kilometers
NBOD (MG/L)
Lakeview STP
Bayou Oaks ditch
Bayou Desiard overflow
Leisure Village STP
Oakwood pond #1
Oakwood pond #2
West Elmwood ditch
North Monroe SD #1 ditch
North Gate Estates ditch
Northside Terrace ditch


LA-QUAL Version 4.13 Run at 13:34 on 07/17/2001 File D:\Chauvin\1994-Model\Cal\ChauvinCal09.txt
min= 1.64 max= 7.74
BAYOU CHAUVIN CALIBRATION
River Miles
Dissolved Oxygen (mg/L)
River Kilometers
Lakeview STP
Bayou Oaks ditch
Bayou Desiard overflow
Leisure Village STP
Oakwood pond #1
Oakwood pond #2
West Elmwood ditch
North Monroe SD #1 ditch
North Gate Estates ditch
Northside Terrace ditch
08
09
19
10
11
12
13
14
15

APPENDIX H – PROJECTION PLOTS


LA-QUAL Version 4.13 Run at 07:42 on 07/20/2001 File D:\Chauvin\1994-Model\Project\ChauvinSumProj_No man-made load.txt
min= 5.22 max= 7.92
B CHAUVIN SUM PROJ WITH NO MAN-MADE BENTHIC LOAD
River Miles
Dissolved Oxygen (mg/L)
River Kilometers
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165


LA-QUAL Version 4.13 Run at 07:45 on 07/20/2001 File D:\Chauvin\1994-Model\Project\ChauvinSumProj_Final.txt
min= 5.01 max= 6.42
BAYOU CHAUVIN SUMMER SEASON PROJECTION
River Miles
6.8
6
5
4
3
2
1
0.0
Dissolved Oxygen (mg/L)
10
9
8
7
6
5
4
3
2
1
0
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165
10.9
10
8
6
4
2
0.0
River Kilometers


LA-QUAL Version 4.13 Run at 07:47 on 07/20/2001 File D:\Chauvin\1994-Model\Project\ChauvinWinProj2_60%red.txt
min= 4.87 max= 7.94
BAYOU CHAUVIN WINTER SEASON PROJECTION
River Miles
River Kilometers
Dissolved Oxygen (mg/L)
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165

APPENDIX I – TMDL CALCULATIONS

Calibration Model Non-Point Load Equivalent Calculations:

Chauvin Bayou in Ouachita Basin - 080102

REACH NUMBER & DESCRIPTION	Calibration Model Reach Length (km)	Calibration Model Average Reach Width (meters)	Calibration Model UCBOD Nonpoint loading (kg/day)	Calibration Model UNBOD Nonpoint loading (kg/day)	Calibration Model UCBOD Nonpoint loading (gmO_2/m^2day)	Calibration Model UNBOD Nonpoint loading (gmO_2/m^2day)	Calibration Model SOD (gmO_2/m^2day)	Calibration Model TOTAL Benthic Load (gmO_2/m^2day)
	A	**B**	**C**	**D**	**E = C / (A x B)**	**F = D / (A x B)**	**G**	**H = E + F + G**
1 - Hwy 139 to Lakewood Dr	0.73	7.92	0.600	8.400	0.104	1.452	4.00	**5.56**
2 - Lakewood Dr to Bayou Oaks Ditch	0.19	10.36	0.200	0.000	0.102	0.000	4.00	**4.10**
3 - Bayou Oaks Pond to Bayou Chauvin	0.08	0.61	0.000	0.000	0.000	0.000	0.00	**0.00**
4 - Bayou Oaks Ditch to Joe White Rd	0.28	12.80	3.800	0.000	1.060	0.000	3.50	**4.56**
5 - Joe White Rd to Control Structure	0.48	10.97	0.600	0.000	0.114	0.000	1.30	**1.41**
6 - Control Structure to Oakwood Pond #2	3.02	9.45	30.000	16.600	1.051	0.582	2.40	**4.03**
7 - Oakwood Pond #2 to Old Sterlington Rd	0.76	10.97	50.000	22.600	5.996	2.710	0.00	**8.71**
8 - Old Sterlington Rd to West Elmwood Ditch	0.20	9.75	5.000	3.400	2.563	1.743	0.00	**4.31**
9 - West Elmwood Pond to Bayou Chauvin	0.36	0.61	0.000	0.000	0.000	0.000	0.00	**0.00**
10 - West Elmwood Ditch to ALM RR	0.57	9.75	15.000	7.000	2.699	1.260	0.00	**3.96**
11 - ALM RR to North Monroe SD #1 Ditch	0.31	12.19	18.000	10.000	4.762	2.646	0.20	**7.61**
12 - North Monroe SD #1 Pond to Bayou Chauvin	0.60	0.61	0.000	0.000	0.000	0.000	0.00	**0.00**
13 - N. Monroe SD # 1 Ditch to Hwy. 165	0.24	15.24	14.000	7.800	3.828	2.133	0.20	**6.16**
14 - Hwy 165 to North Gate Estates Ditch	0.26	5.03	0.000	0.000	0.000	0.000	0.30	**0.30**
15 - North Gate Pond to Bayou Chauvin	0.60	0.61	0.000	0.000	0.000	0.000	0.00	**0.00**
16 - North Gate Estates Ditch to Northside Terrace Ditch	0.80	5.07	0.000	0.000	0.000	0.000	0.30	**0.30**
17 - Northside Terrace Pond to Bayou Chauvin	0.70	0.61	0.000	0.000	0.000	0.000	0.00	**0.00**
18 - Northside Terrace Ditch to Ouachita River Levee	3.06	5.15	0.000	0.000	0.000	0.000	0.00	**0.00**

Summer Projection, Non-Point Benthic Load Input and TMDL Calculations:

Chauvin Bayou in Ouachita Basin - 080102

	Calibration Model Values												Projection Model Equivalents				Projected Model Loads			
Reach Number and Description	Non-Point UCBOD	Non-Point UNBOD	SOD @ 20°C	Total Calb. Benthic Load (TCBL)	Reach Length	Back-ground Benthic Load	Back-ground percentage reduction	Back-ground Benthic Load adjusted for % reduction	Proj. Model Avg. Reach Width	Proj. Temp.	Percentage Reduction of man-made sources	TCBL adjusted for % reduction (Reduced TCBL)	Reduced TCBL adjusted for MOS	Non-Point UCBOD	Non-Point UNBOD	SOD @ 20°C	Non-Point UCBOD INPUTS	Non-Point UNBOD INPUTS	SOD load @ Proj. temp.	Total Projection Benthic Load **(LA+MOS)**
	gmO_2/m^2day	$gmO_2/m^2 day$	$gmO_2/m^2 day$	gmO_2/m^2day	Kilo-meters	gmO_2/m^2day	%	gmO_2/m^2day	Meters	degrees Celcius	%	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	(kg/day)	(kg/day)	(kg/day)	(kg/day)
	A, (note 1)	B, (note 1)	C, (note 1)	D, (note 1)	E, (note 1)	F1	F2	F = F1*(1-F2)	G	I	H	J, (note 2)	K, (note 3)	L = (K)(A / D)	M = (K)(B / D)	N = (K)(C / D)	O = (E)(G)(L)	P = (E)(G)(M)	Q, (note 4)	O + P + Q
1 - Hwy 139 to Lakewood Dr	0.104	1.452	4.00	5.556	0.73	1.00	0%	1.00	7.92	28.50	100.0%	1.00	1.00	0.019	0.261	0.72	0.11	1.51	7.11	8.73
2 - Lakewood Dr to Bayou Oaks Ditch	0.102	0.000	4.00	4.102	0.19	1.00	0%	1.00	10.36	28.50	100.0%	1.00	1.00	0.025	0.000	0.98	0.05	0.00	3.28	3.33
3 - Bayou Oaks Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.08	0.00	0%	0.00	0.61	28.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
4 - Bayou Oaks Ditch to Joe White Rd	1.060	0.000	3.50	4.560	0.28	1.00	0%	1.00	12.80	28.50	100.0%	1.00	1.00	0.232	0.000	0.77	0.83	0.00	4.70	5.53
5 - Joe White Rd to Control Structure	0.114	0.000	1.30	1.414	0.48	1.00	0%	1.00	10.97	28.50	80.0%	1.08	1.10	0.089	0.000	1.01	0.47	0.00	9.13	9.59
6 - Control Structure to Oakwood Pond #2	1.051	0.582	2.40	4.033	3.02	1.00	0%	1.00	9.45	28.50	80.0%	1.61	1.76	0.458	0.254	1.05	13.08	7.24	50.99	71.31
7 - Oakwood Pond #2 to Old Sterlington Rd	5.996	2.710	0.00	8.706	0.76	1.00	0%	1.00	10.97	28.50	80.0%	2.54	2.93	2.015	0.911	0.00	16.81	7.60	0.00	24.40
8 - Old Sterlington Rd to West Elmwood Ditch	2.563	1.743	0.00	4.306	0.20	1.00	0%	1.00	9.75	28.50	80.0%	1.66	1.83	1.087	0.739	0.00	2.12	1.44	0.00	3.56
9 - West Elmwood Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.36	0.00	0%	0.00	0.61	28.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
10 - West Elmwood Ditch to ALM RR	2.699	1.260	0.00	3.959	0.57	1.00	0%	1.00	9.75	28.50	80.0%	1.59	1.74	1.186	0.554	0.00	6.59	3.08	0.00	9.67
11 - ALM RR to North Monroe SD #1 Ditch	4.762	2.646	0.20	7.608	0.31	1.00	0%	1.00	12.19	28.50	80.0%	2.32	2.65	1.660	0.922	0.07	6.27	3.49	0.45	10.21
12 - North Monroe SD #1 Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.60	0.00	0%	0.00	0.61	28.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
13 - N. Monroe SD # 1 Ditch to Hwy. 165	3.828	2.133	0.20	6.160	0.24	1.00	0%	1.00	15.24	28.50	80.0%	2.03	2.29	1.423	0.793	0.07	5.20	2.90	0.46	8.57
14 - Hwy 165 to North Gate Estates Ditch	0.000	0.000	0.30	0.300	0.26	2.00	0%	2.00	5.03	28.50	0.0%	0.30	0.30	0.000	0.000	0.30	0.00	0.00	0.67	0.67
15 - North Gate Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.60	0.00	0%	0.00	0.61	28.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
16 - North Gate Estates Ditch to Northside Terrace Ditch	0.000	0.000	0.30	0.300	0.80	2.00	0%	2.00	5.07	28.50	0.0%	0.30	0.30	0.000	0.000	0.30	0.00	0.00	2.08	2.08
17 - Northside Terrace Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.70	0.00	0%	0.00	0.61	28.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
18 - Northside Terrace Ditch to Ouachita River Levee	0.000	0.000	0.00	0.000	3.06	2.00	0%	2.00	5.15	28.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
Sub-Total												16.44					52	27	78.88	**157.67**

EXPLICIT MARGIN OF SAFETY = 20%

Notes:
Note 1, Data was calculated in and brought from the Calibration worksheet dataset.
Note 2, J = [(1 - H) x (D - F) + F]
Note 3, K = [(J - F) / (1 - MOS) + F]
Note 4, Q = E x G x N x 1.065 (I-20)
Note 5, V = S x 1.065 (I-20)
Note 6, AC = E x G x Z x 1.065 (I-20)

Summer Projection, Non-Point Benthic Load Input and TMDL Calculations:

Chauvin Bayou in Ouachita Basin - 080102

	Margin of Safety Loads						Man-made Model equivalents				Man-made Model loads				Background Model loads			
Reach Number and Description	MOS Total Benthic Load @ 20°C	MOS SOD @ 20°C	Non-Point UCBOD MOS Loads	Non-Point UNBOD MOS Loads	Adjusted SOD MOS @ Proj. temp	Adjusted Total MOS @ Proj. temp	Manmade portion of TCBL	Non-Point UCBOD	Non-Point UNBOD	SOD @ 20°C	Non-Point UCBOD INPUTS	Non-Point UNBOD INPUTS	SOD load @ Proj. temp.	Man-made Total Projection Benthic Load	Non-Point UCBOD INPUTS	Non-Point UNBOD INPUTS	SOD load @ Proj. temp.	Man-made Total Projection Benthic Load
	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	gmO2/m2day	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)
	R = (K-J)(E)(G)	**S = (R)(C/D)**	**T = (R)(A/D)**	**U = (R)(B/D)**	**V, (note 5)**	**T + U + V**	**W = K - F**	**X = (W)(A / D)**	**Y = (W)(B / D)**	**Z = (W)(C / D)**	**AA = (E)(G)(X)**	**AB = (E)(G)(Y)**	**AC, (note 6)**	**AA + AB + AC**	**AD = O - AA**	**AE = P - AB**	**AF = Q - AC**	**AD + AE + AF**
1 - Hwy 139 to Lakewood Dr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	1.51	7.11	8.73
2 - Lakewood Dr to Bayou Oaks Ditch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	3.28	3.33
3 - Bayou Oaks Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 - Bayou Oaks Ditch to Joe White Rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.00	4.70	5.53
5 - Joe White Rd to Control Structure	0.11	0.10	0.01	0.00	0.17	0.18	0.10	0.01	0.00	0.10	0.04	0.00	0.86	0.90	0.42	0.00	8.27	8.70
6 - Control Structure to Oakwood Pond #2	4.33	2.58	1.13	0.62	4.40	6.15	0.76	0.20	0.11	0.45	5.64	3.12	21.99	30.75	7.44	4.12	29.00	40.56
7 - Oakwood Pond #2 to Old Sterlington Rd	3.21	0.00	2.21	1.00	0.00	3.21	1.93	1.33	0.60	0.00	11.06	5.00	0.00	16.07	5.74	2.60	0.00	8.34
8 - Old Sterlington Rd to West Elmwood Ditch	0.32	0.00	0.19	0.13	0.00	0.32	0.83	0.49	0.33	0.00	0.96	0.65	0.00	1.61	1.16	0.79	0.00	1.95
9 - West Elmwood Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 - West Elmwood Ditch to ALM RR	0.82	0.00	0.56	0.26	0.00	0.82	0.74	0.50	0.24	0.00	2.80	1.31	0.00	4.11	3.79	1.77	0.00	5.56
11 - ALM RR to North Monroe SD #1 Ditch	1.25	0.03	0.78	0.43	0.06	1.27	1.65	1.03	0.57	0.04	3.91	2.17	0.28	6.36	2.37	1.31	0.17	3.85
12 - North Monroe SD #1 Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 - N. Monroe SD # 1 Ditch to Hwy. 165	0.94	0.03	0.59	0.33	0.05	0.97	1.29	0.80	0.45	0.04	2.93	1.63	0.26	4.83	2.27	1.27	0.20	3.74
14 - Hwy 165 to North Gate Estates Ditch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.67
15 - North Gate Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 - North Gate Estates Ditch to Northside Terrace Ditch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.08	2.08
17 - Northside Terrace Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18 - Northside Terrace Ditch to Ouachita River Levee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	10.99		5.47	2.78	4.68	**12.93**					27.35	13.89	23.39	**64.63**	24.19	13.36	55.49	**93.04**

Summer TMDL Calculations for Point Source loads:

Chauvin Bayou in Ouachita Basin - 080102

Point Source Loading Calculations

Pt. Source / Facility Description and Reach #	Receiving Stream	Included in the Projection Model (Yes/No)	Anticipated/ design flow (cms)	Flow (cms)	Proposed Permit Limits			UCBOD				UNBOD				Sub-total of Point Source Loads		
					$CBOD_5$ (mg/l)	NH_3N (mg/l)	MOS (%)	Ultimate Conc. (mg/l) (2)	Loads (kg/day) (1)	WLA (kg/day)	Reserve/ MOS Load (kg/day)	Ultimate Conc. (mg/l) (2)	Loads (kg/day) (1)	WLA (kg/day)	Reserve/ MOS Load (kg/day)	**Loads (kg/day)**	**WLA (kg/day)**	**Reserve/ MOS (kg/day)**
			A	A1 = A/(1-D)	B	C	D	E = 2.3 x B	F = (86.4)(A1)(E)	G = (1-D) x F	H = (D)(F)	I = 4.3 x B	J = (86.4)(A1)(I)	K = (1-D) x J	L = (D)(J)	F + J	G + K	H + L
Leisure Village STP - LAG560170	ditch approximately 50 meters to Chauvin Bayou	Yes	0.001402	0.001752702	16.0	8.0	20%	36.80	5.57	4.46	1.11	34.40	5.21	4.17	1.04	**10.78**	**8.63**	**2.16**
Oakwood Pond # 2 - LA0052078	ditch approximately 30 meters to Chauvin Bayou	Yes	0.035492	0.044365273	8.0	4.0	20%	18.40	70.53	56.42	14.11	17.20	65.93	52.74	13.19	**136.46**	**109.17**	**27.29**
North Monroe SD #1 - LA0039209	Effluent ditch to Highway 165 east drainage ditch to Chauvin Bayou	Yes	0.004557	0.005696282	30.0	15.0	20%	69.00	33.96	27.17	6.79	64.50	31.74	25.40	6.35	**65.70**	**52.56**	**13.14**
Poly Processing Company - Monroe Plant - small sanitary facility - LA0090247	ALM Railroad ditch approximately 1.5 Km to Chauvin Bayou	No	0.000061	0.000077	30.0	15.0	20%	69.00	0.46	0.37	0.09	64.50	0.43	0.34	0.09	**0.88**	**0.71**	**0.18**
Hide-a-Way SD #11 - LAG570001	A large swampy area draining to Chauvin Bayou	No	0.003856	0.004820	10.0	10.0	20%	23.00	9.58	7.66	1.92	43.00	17.91	14.33	3.58	**27.49**	**21.99**	**5.50**
Allied Building Stores - small sanitary facility - LAG530032	ALM Railroad ditch approximately 1.5 Km to Chauvin Bayou	No	0.000050	0.000062	45.0	15.0	20%	103.50	0.56	0.45	0.11	64.50	0.35	0.28	0.07	**0.91**	**0.73**	**0.18**
Greater Ouachita Water Company - Pecan Bayou & Treasure Island Subdivision Pond - LA0054992	A series of large canals extending approximately 3 Km to Chauvin Bayou	No	0.002927	0.003659	10.0	10.0	20%	23.00	7.27	5.82	1.45	43.00	13.59	10.87	2.72	**20.86**	**16.69**	**4.17**
SUB-TOTAL Loads									**127.93**	**102.34**	**25.59**		**135.16**	**108.13**	**27.03**	**263.09**	**210.47**	**52.62**

(1) - Load(kg/day) = 86.4 x Ultimate Conc.(mg/l) x Modeled Flow(cms)

(2) - [UCBOD conc. = CBOD5(mg/l) x 2.3] and [UNBOD conc. = NH3N(mg/l) x 4.3]

Summer TMDL calculations and Projection model calculations for Headwater / Tributary loads:

Chauvin Bayou in Ouachita Basin - 080102

Headwater / Tributary load determinations																			
Headwater / Tributary Description and Reach #	Seasonal Critical flow (cms)	UCBOD (mg/l)	UNBOD (mg/l)	UCBOD (kg/day)	UNBOD (kg/day)	Background UCBOD conc. (mg/l)	Background UNBOD conc. (mg/l)	Background % Reduction	Background UCBOD Load (kg/day)	Background UNBOD Load (kg/day)	Percent reduction of Man-Made loads	UCBOD load adjusted for % Reduction (kg/day)	UNBOD load adjusted for % Reduction (kg/day)	Reduced UCBOD load adjusted for MOS (kg/day)	Reduced UNBOD load adjusted for MOS (kg/day)	Projection UCBOD input conc. (mg/l)	Projection UNBOD input conc. (mg/l)	**Total MOS (kg/day)**	**Total LA (kg/day)**
	A	**B**	**C**	**D =** (86.4)(A)(B)	**E =** (86.4)(A)(C)	**F**	**G**	**H1**	**H =** (1-H1) (86.4)(A)(F)	**I =** (1-H1) (86.4)(A)(G)	**J**	**K =** (D-H)(1-J) + H	**L =** (D-I)(1-J) + I	**M = (K - H) / (1 - MOS) + H**	**N = (L - I) / (1 - MOS) + I**	(M)/[(A)(86.4)]	(N)/[(A)(86.4)]	(M+N) - (K+L)	K + L
Chauvin Bayou headwater	0.0028	4.18	8.05	1.01	1.95	4.00	4.00	0%	0.97	0.97	0%	1.01	1.95	1.02	2.19	4.23	9.06	**0.26**	**2.96**
SUB-TOTAL TMDL LOADING				**1.01**	**1.95**				**0.97**	**0.97**		**1.01**	**1.95**	**1.02**	**2.19**			**0.26**	**2.96**

EXPLICIT MARGINS:

MARGIN OF SAFETY (MOS) (%) =	**20%**

Summer TMDL calculations and Projection model calculations for Incremental loads:

Chauvin Bayou in Ouachita Basin - 080102

Incremental Load Determinations:																					
	Calibration Load determinations:										Percentage Reduction calculations:			Projection Model Input determinations:				Projection Model Input determinations:			
Reach Description and #	Projection Flow (cms)	Calb. UCBOD conc. (mg/l)	Unadjusted UCBOD (kg/day)	Calb. UNBOD conc. (mg/l)	Unadjusted UNBOD (kg/day)	Background Conc. UCBOD (mg/l)	Background Conc. UNBOD (mg/l)	Background % Reduction	Background Load UCBOD (kg/day)	Background Load UNBOD (kg/day)	Actual % Reduction of Man-Made Loads	Increm. UCBOD Load Adjusted For % Reduction **(LA load)**	Increm. UNBOD Load Adjusted For % Reduction **(LA load)**	Increm. UCBOD Adjusted for MOS (kg/day) (1)	Increm. UNBOD Adjusted for MOS (kg/day) (1)	Projection UCBOD conc. (mg/l)	Projection UNBOD conc. (mg/l)	Proj. UCBOD MOS load (kg/day)	Proj. UNBOD MOS load (kg/day)	**Sub-total MOS load (kg/day)**	**Sub-total LA load (kg/day)**
	A	**B**	**C =** (86.4)(A)(B)	**D**	**E =** (86.4)(A)(D)	**F**	**G**	**H1**	**H = (1-H1)** (86.4)(A)(F)	**I = (1-H1)** (86.4)(A)(G)	**J,** Note 1	**K =** (C-H)(1-J) + H	**L =** (E-I)(1-J) + I	**M = (K-H) / (1-MOS) + H**	**N = (L-I) / (1-MOS) + I**	**M / [(A)(86.4)]**	**N / [(A)(86.4)]**	**O =** M - K	**P =** N - L	**O + P**	**K + L**
1 - Hwy 139 to Lakewood Dr								0%			100%										
2 - Lakewood Dr to Bayou Oaks Ditch								0%			100%										
3 - Bayou Oaks Pond to Bayou Chauvin								0%			0%										
4 - Bayou Oaks Ditch to Joe White Rd								0%			100%										
5 - Joe White Rd to Control Structure								0%			80%										
6 - Control Structure to Oakwood Pond #2								0%			80%										
7 - Oakwood Pond #2 to Old Sterlington Rd								0%			80%										
8 - Old Sterlington Rd to West Elmwood Ditch								0%			80%										
9 - West Elmwood Pond to Bayou Chauvin								0%			0%										
10 - West Elmwood Ditch to ALM RR								0%			80%										
11 - ALM RR to North Monroe SD #1 Ditch								0%			80%										
12 - North Monroe SD #1 Pond to Bayou Chauvin								0%			0%										
13 - N. Monroe SD # 1 Ditch to Hwy. 165								0%			80%										
14 - Hwy 165 to North Gate Estates Ditch								0%			0%										
15 - North Gate Pond to Bayou Chauvin								0%			0%										
16 - North Gate Estates Ditch to Northside Terrace Ditch								0%			0%										
17 - Northside Terrace Pond to Bayou Chauvin								0%			0%										
18 - Northside Terrace Ditch to Ouachita River Levee	0.0050	2.00	0.86	2.00	0.86	2.00	2.00	0%	0.86	0.86	0%	0.86	0.86	0.86	0.86	2.00	2.00	2.00	0.00	2.00	1.73
Sub-Total benthic loading									**0.86**	**0.86**		**0.86**	**0.86**	**0.86**	**0.86**			**2.00**	**0.00**	**2.00**	**1.73**

Note 1: The percentage reduction values are taken from the "Non-Point Benthic Load Input and TMDL Calculations" worksheet.

EXPLICIT MARGINS:

MARGIN OF SAFETY (MOS) (%) =	**20%**

Summer TMDL Summary:

Chauvin Bayou in Ouachita Basin - 080102

Calculation of the TMDL - Kilograms per day			
Load description	WLA (kg/day)	LA (kg/day)	MOS Load (kg/day)
Point Source loads	210		53
Headwater / Tributatary loads		3	0
Benthic loads		145	13
Incremental Loads		2	2
SUB-TOTAL	**210**	**150**	**68**
TMDL = WLA + LA + MOS		***428 kg/day***	

Calculation of the TMDL - Pounds per day			
Load description	WLA (lbs/day) (1)	LA (lbs/day) (1)	MOS Load (lbs/day) (1)
Point Source loads	463		117
Headwater / Tributatary loads		7	0
Benthic loads		320	29
Incremental Loads		4	4
SUB-TOTAL	**463**	**331**	**150**
TMDL = WLA + LA + MOS		***944 lbs/day***	

Notes:

(1) - Load(lbs/day) = Load(kg/day) x 2.205

Calculation of the TMDL - Kilograms per day			
Load description	WLA (kg/day)	LA (kg/day)	MOS Load (kg/day)
Point Source loads	210		53
Natural Nonpoint Loads		97	
Manmade Nonpoint Loads		53	15
SUB-TOTAL	**210**	**150**	**68**
TMDL = WLA + LA + MOS		***428 Kg/day***	

Calculation of the TMDL - Pounds per day			
Load description	WLA (lbs/day)	LA (lbs/day)	MOS Load (lbs/day)
Point Source loads	463		117
Natural Nonpoint Loads		214	
Manmade Nonpoint Loads		117	33
SUB-TOTAL	**463**	**331**	**150**
TMDL = WLA + LA + MOS		***944 lbs/day***	

Winter Projection, Non-Point Benthic Load Input and TMDL Calculations:

Chauvin Bayou in Ouachita Basin - 080102

	Calibration Model Values												Projection Model Equivalents				Projected Model Loads			
Reach Number and Description	Non-Point UCBOD	Non-Point UNBOD	SOD @ 20°C	Total Calb. Benthic Load (TCBL)	Reach Length	Back-ground Benthic Load	Back-ground percentage reduction	Back-ground Benthic Load adjusted for % reduction	Proj. Model Avg. Reach Width	Proj. Temp.	Percentage Reduction of man-made sources	TCBL adjusted for % reduction (Reduced TCBL)	Reduced TCBL adjusted for MOS	Non-Point UCBOD	Non-Point UNBOD	SOD @ 20°C	Non-Point UCBOD INPUTS	Non-Point UNBOD INPUTS	SOD load @ Proj. temp.	Total Projection Benthic Load **(LA+MOS)**
	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	Kilo-meters	gmO_2/m^2day	%	gmO_2/m^2day	Meters	(degrees Celcius)	%	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	(kg/day)	(kg/day)	(kg/day)	(kg/day)
	A, (note 1)	B, (note 1)	C, (note 1)	D, (note 1)	E, (note 1)	F1	F2	F = F1*(1-F2)	G	I	H	J, (note 2)	K, (note 3)	L = (K)(A / D)	M = (K)(B / D)	N = (K)(C / D)	O = (E)(G)(L)	P = (E)(G)(M)	Q, (note 4)	O + P + Q
1 - Hwy 139 to Lakewood Dr	0.104	1.452	4.00	5.556	0.73	1.00	0%	1.00	7.92	16.50	60.0%	2.82	3.28	0.061	0.857	2.36	0.35	4.96	10.95	16.26
2 - Lakewood Dr to Bayou Oaks Ditch	0.102	0.000	4.00	4.102	0.19	1.00	0%	1.00	10.36	16.50	60.0%	2.24	2.55	0.063	0.000	2.49	0.12	0.00	3.93	4.05
3 - Bayou Oaks Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.08	0.00	0%	0.00	0.61	16.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
4 - Bayou Oaks Ditch to Joe White Rd	1.060	0.000	3.50	4.560	0.28	1.00	0%	1.00	12.80	16.50	60.0%	2.42	2.78	0.646	0.000	2.13	2.32	0.00	6.14	8.45
5 - Joe White Rd to Control Structure	0.114	0.000	1.30	1.414	0.48	1.00	0%	1.00	10.97	16.50	60.0%	1.17	1.21	0.097	0.000	1.11	0.51	0.00	4.69	5.20
6 - Control Structure to Oakwood Pond #2	1.051	0.582	2.40	4.033	3.02	1.00	0%	1.00	9.45	16.50	60.0%	2.21	2.52	0.656	0.363	1.50	18.72	10.36	34.28	63.36
7 - Oakwood Pond #2 to Old Sterlington Rd	5.996	2.710	0.00	8.706	0.76	1.00	0%	1.00	10.97	16.50	60.0%	4.08	4.85	3.342	1.511	0.00	27.87	12.60	0.00	40.47
8 - Old Sterlington Rd to West Elmwood Ditch	2.563	1.743	0.00	4.306	0.20	1.00	0%	1.00	9.75	16.50	60.0%	2.32	2.65	1.579	1.074	0.00	3.08	2.09	0.00	5.18
9 - West Elmwood Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.36	0.00	0%	0.00	0.61	16.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
10 - West Elmwood Ditch to ALM RR	2.699	1.260	0.00	3.959	0.57	1.00	0%	1.00	9.75	16.50	60.0%	2.18	2.48	1.690	0.789	0.00	9.39	4.38	0.00	13.78
11 - ALM RR to North Monroe SD #1 Ditch	4.762	2.646	0.20	7.608	0.31	1.00	0%	1.00	12.19	16.50	60.0%	3.64	4.30	2.694	1.497	0.11	10.18	5.66	0.34	16.18
12 - North Monroe SD #1 Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.60	0.00	0%	0.00	0.61	16.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
13 - N. Monroe SD # 1 Ditch to Hwy. 165	3.828	2.133	0.20	6.160	0.24	1.00	0%	1.00	15.24	16.50	60.0%	3.06	3.58	2.224	1.239	0.12	8.14	4.53	0.34	13.01
14 - Hwy 165 to North Gate Estates Ditch	0.000	0.000	0.30	0.300	0.26	2.00	0%	2.00	5.69	16.50	0.0%	0.30	0.30	0.000	0.000	0.30	0.00	0.00	0.36	0.36
15 - North Gate Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.60	0.00	0%	0.00	0.61	16.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
16 - North Gate Estates Ditch to Northside Terrace Ditch	0.000	0.000	0.30	0.300	0.80	2.00	0%	2.00	5.70	16.50	0.0%	0.30	0.30	0.000	0.000	0.30	0.00	0.00	1.10	1.10
17 - Northside Terrace Pond to Bayou Chauvin	0.000	0.000	0.00	0.000	0.70	0.00	0%	0.00	0.61	16.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
18 - Northside Terrace Ditch to Ouachita River Levee	0.000	0.000	0.00	0.000	3.06	2.00	0%	2.00	5.76	16.50	0.0%	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00
Sub-Total												26.76					80.69	44.58	62.12	**187.00**

EXPLICIT MARGIN OF SAFETY = **20%**

Notes:
Note 1, Data was calculated in and brought from the Calibration worksheet dataset.
Note 2, J = [(1 - H) x (D - F) + F]
Note 3, K = [(J - F) / (1 - MOS) + F]
Note 4, Q = E x G x N x 1.065 (I-20)
Note 5, V = S x 1.065 (I-20)
Note 6, AC = E x G x Z x 1.065 (I-20)

Winter Projection, Non-Point Benthic Load Input and TMDL Calculations:

Chauvin Bayou in Ouachita Basin - 080102

	Margin of Safety Loads						Man-made Model equivalents				Man-made Model loads				Background Model loads			
Reach Number and Description	MOS Total Benthic Load @ 20°C	MOS SOD @ 20°C	Non-Point UCBOD MOS Loads	Non-Point UNBOD MOS Loads	Adjusted SOD MOS @ Proj. temp	Adjusted Total MOS @ Proj. temp	Manmade portion of TCBL	Non-Point UCBOD	Non-Point UNBOD	SOD @ 20°C	Non-Point UCBOD INPUTS	Non-Point UNBOD INPUTS	SOD load @ Proj. temp.	Man-made Total Projection Benthic Load	Non-Point UCBOD INPUTS	Non-Point UNBOD INPUTS	SOD load @ Proj. temp.	Man-made Total Projection Benthic Load
	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	gmO_2/m^2day	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)	(kg/day)
	R = (K-J)(E)(G)	S = (R)(C/D)	T = (R)(A/D)	U = (R)(B/D)	V, (note 5)	T + U + V	W = K - F	X = (W)(A / D)	Y = (W)(B / D)	Z = (W)(C / D)	AA = (E)(G)(X)	AB = (E)(G)(Y)	AC, (note 6)	AA + AB + AC	AD = O - AA	AE = P - AB	AF = Q - AC	AD + AE + AF
1 - Hwy 139 to Lakewood Dr	2.64	1.90	0.05	0.69	1.52	2.26	2.28	0.043	0.595	1.64	0.25	3.44	7.61	11.30	0.11	1.51	3.34	4.96
2 - Lakewood Dr to Bayou Oaks Ditch	0.61	0.60	0.02	0.00	0.48	0.49	1.55	0.038	0.000	1.51	0.08	0.00	2.39	2.46	0.05	0.00	1.54	1.59
3 - Bayou Oaks Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 - Bayou Oaks Ditch to Joe White Rd	1.28	0.98	0.30	0.00	0.79	1.08	1.78	0.414	0.000	1.37	1.48	0.00	3.93	5.41	0.83	0.00	2.21	3.04
5 - Joe White Rd to Control Structure	0.22	0.20	0.02	0.00	0.16	0.18	0.21	0.017	0.000	0.19	0.09	0.00	0.80	0.89	0.42	0.00	3.88	4.31
6 - Control Structure to Oakwood Pond #2	8.65	5.15	2.26	1.25	4.13	7.64	1.52	0.395	0.219	0.90	11.28	6.24	20.66	38.18	7.44	4.12	13.62	25.18
7 - Oakwood Pond #2 to Old Sterlington Rd	6.43	0.00	4.43	2.00	0.00	6.43	3.85	2.653	1.199	0.00	22.13	10.00	0.00	32.13	5.74	2.60	0.00	8.34
8 - Old Sterlington Rd to West Elmwood Ditch	0.64	0.00	0.38	0.26	0.00	0.64	1.65	0.984	0.669	0.00	1.92	1.31	0.00	3.22	1.16	0.79	0.00	1.95
9 - West Elmwood Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 - West Elmwood Ditch to ALM RR	1.64	0.00	1.12	0.52	0.00	1.64	1.48	1.009	0.471	0.00	5.61	2.62	0.00	8.22	3.79	1.77	0.00	5.56
11 - ALM RR to North Monroe SD #1 Ditch	2.50	0.07	1.56	0.87	0.05	2.48	3.30	2.068	1.149	0.09	7.82	4.34	0.26	12.42	2.37	1.31	0.08	3.76
12 - North Monroe SD #1 Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 - N. Monroe SD # 1 Ditch to Hwy. 165	1.89	0.06	1.17	0.65	0.05	1.88	2.58	1.603	0.893	0.08	5.86	3.27	0.25	9.38	2.27	1.27	0.10	3.63
14 - Hwy 165 to North Gate Estates Ditch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.36
15 - North Gate Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 - North Gate Estates Ditch to Northside Terrace Ditch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	1.10
17 - Northside Terrace Pond to Bayou Chauvin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18 - Northside Terrace Ditch to Ouachita River Levee	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	26.50		11.30	6.24	7.18	**25.00**					56.51	31.22	35.90	**123.63**	24.19	13.36	26.23	**63.77**

Winter TMDL Calculations for Point Source loads:

Chauvin Bayou in Ouachita Basin - 080102

Point Source Loading Calculations																		
					Proposed Permit Limits			UCBOD				UNBOD				Sub-total of Point Source Loads		
Pt. Source / Facility Description and Reach #	Receiving Stream	Included in the Projection Model (Yes/No)	Anticipated/ design flow (cms)	Flow (cms)	$CBOD_5$ (mg/l)	NH_3N (mg/l)	MOS (%)	Ultimate Conc. (mg/l) (2)	Loads (kg/day) (1)	WLA (kg/day)	Reserve/ MOS Load (kg/day)	Ultimate Conc. (mg/l) (2)	Loads (kg/day) (1)	WLA (kg/day)	Reserve/ MOS Load (kg/day)	**Loads (kg/day)**	**WLA (kg/day)**	**Reserve/ MOS (kg/day)**
			A	**A1 = A/(1-D)**	**B**	**C**	**D**	**E = 2.3 x B**	**F = (86.4)(A1)(E)**	**G = (1-D) x F**	**H = (D)(F)**	**I = 4.3 x B**	**J = (86.4)(A1)(I)**	**K = (1-D) x J**	**L = (D)(J)**	**F + J**	**G + K**	**H + L**
Leisure Village STP - LAG560170	ditch approximately 50 meters to Chauvin Bayou	Yes	0.001402	0.001753	10.0	10.0	20%	23.00	3.48	2.79	0.70	43.00	6.51	5.21	1.30	**9.99**	**8.00**	**2.00**
Oakwood Pond # 2 - LA0052078	ditch approximately 30 meters to Chauvin Bayou	Yes	0.035492	0.044365	30.0	15.0	20%	69.00	264.49	211.59	52.90	64.50	247.24	197.79	49.45	**511.73**	**409.38**	**102.35**
North Monroe SD #1 - LA0039209	Effluent ditch to Highway 165 east drainage ditch to Chauvin Bayou	Yes	0.004557	0.005696	45.0	15.0	20%	103.50	50.94	40.75	10.19	64.50	31.74	25.40	6.35	**82.68**	**66.15**	**16.54**
					15.0	10.0	20%											
Poly Processing Company - Monroe Plant - small sanitary facility - LA0090247	ALM Railroad ditch approximately 1.5 Km to Chauvin Bayou	No	0.000061	0.000077	45.0	15.0	20%	103.50	0.69	0.55	0.14	64.50	0.43	0.34	0.09	**1.11**	**0.89**	**0.22**
Hide-a-Way SD #11 - LAG570001	A large swampy area draining to Chauvin Bayou	No	0.003856	0.004820	45.0	15.0	20%	103.50	43.10	34.48	8.62	64.50	26.86	21.49	5.37	**69.96**	**55.97**	**13.99**
Allied Building Stores - small sanitary facility - LAG530032	ALM Railroad ditch approximately 1.5 Km to Chauvin Bayou	No	0.000050	0.000062	45.0	15.0	20%	103.50	0.56	0.45	0.11	64.50	0.35	0.28	0.07	**0.91**	**0.73**	**0.18**
Greater Ouachita Water Company - Pecan Bayou & Treasure Island Subdivision Pond - LA0054992	A series of large canals extending approximately 3 Km to Chauvin Bayou	No	0.002927	0.003659	45.0	15.0	20%	103.50	32.72	26.17	6.54	64.50	20.39	16.31	4.08	**53.11**	**42.49**	**10.62**
SUB-TOTAL Loads									**395.97**	**316.78**	**79.19**		**333.52**	**266.82**	**66.70**	**729.49**	**583.59**	**145.90**

Winter TMDL calculations and Projection model calculations for Headwater / Tributary loads:

Chauvin Bayou in Ouachita Basin - 080102

Headwater / Tributary load determinations																			
Headwater / Tributary Description and Reach #	Seasonal Critical flow (cms)	UCBOD (mg/l)	UNBOD (mg/l)	UCBOD (kg/day)	UNBOD (kg/day)	Background UCBOD conc. (mg/l)	Background UNBOD conc. (mg/l)	Background % Reduction	Background UCBOD Load (kg/day)	Background UNBOD Load (kg/day)	Percent reduction of Man-Made loads	UCBOD load adjusted for % Reduction (kg/day)	UNBOD load adjusted for % Reduction (kg/day)	Reduced UCBOD load adjusted for MOS (kg/day)	Reduced UNBOD load adjusted for MOS (kg/day)	Projection UCBOD input conc. (mg/l)	Projection UNBOD input conc. (mg/l)	**Total MOS (kg/day)**	**Total LA (kg/day)**
	A	**B**	**C**	**D =** (86.4)(A)(B)	**E =** (86.4)(A)(C)	**F**	**G**	**H1**	**H = (1-H1)** (86.4)(A)(F)	**I = (1-H1)** (86.4)(A)(G)	**J**	**K = (D-H)(1-J) + H**	**L = (D-I)(1-J) + I**	**M = (K - H) / (1 - MOS) + H**	**N = (L - I) / (1 - MOS) + I**	(M)/[(A)(86.4)]	(N)/[(A)(86.4)]	**(M+N) - (K+L)**	**K + L**
Chauvin Bayou headwater	0.0028	4.18	8.05	1.01	1.95	4.00	4.00	0%	0.97	0.97	0%	1.01	1.95	1.02	2.19	4.23	9.06	**0.26**	**2.96**
SUB-TOTAL TMDL LOADING				**1.01**	**1.95**				**0.97**	**0.97**		**1.00**	**2.00**	**1.02**	**2.19**			**0.26**	**2.96**

EXPLICIT MARGIN OF SAFETY = **20%**

Winter TMDL calculations and Projection model calculations for Incremental loads:

Chauvin Bayou in Ouachita Basin - 080102

Incremental Load Determinations:

Reach Description and #	Calibration Load determinations:										Percentage Reduction calculations:			Projection Model Input determinations:				Projection Model Input determinations:			
	Projection Flow (cms)	Calb. UCBOD conc. (mg/l)	Unadjusted UCBOD (kg/day)	Calb. UNBOD conc. (mg/l)	Unadjusted UNBOD (kg/day)	Background Conc. UCBOD (mg/l)	Background Conc. UNBOD (mg/l)	Background % Reduction	Background Load UCBOD (kg/day)	Background Load UNBOD (kg/day)	Actual % Reduction of Man-Made Loads	Increm. UCBOD Load Adjusted For % Reduction **(LA load)**	Increm. UNBOD Load Adjusted For % Reduction **(LA load)**	Increm. UCBOD Adjusted for MOS (kg/day) (1)	Increm. UNBOD Adjusted for MOS (kg/day) (1)	Projection UCBOD conc. (mg/l)	Projection UNBOD conc. (mg/l)	Proj. UCBOD MOS load (kg/day)	Proj. UNBOD MOS load (kg/day)	**Sub-total MOS load (kg/day)**	**Sub-total LA load (kg/day)**
	A	**B**	**C =** (86.4)(A)(B)	**D**	**E =** (86.4)(A)(D)	**F**	**G**	**H1**	**H** = (1-**H1**) (86.4)(A)(F)	**I** = (1-**H1**) (86.4)(A)(G)	**J,** Note 1	**K =** (**C-H**)(1-**J**) + **H**	**L =** (**E-I**)(1-**J**) + **I**	**M = (K-H) / (1-MOS)** + H	**N = (L-I) / (1-MOS)** + I	**M / [(A)(86.4)]**	**N / [(A)(86.4)]**	**O =** **M - K**	**P =** **N - L**	**O + P**	**K + L**
1 - Hwy 139 to Lakewood Dr								0%			60%										
2 - Lakewood Dr to Bayou Oaks Ditch								0%			60%										
3 - Bayou Oaks Pond to Bayou Chauvin								0%			0%										
4 - Bayou Oaks Ditch to Joe White Rd								0%			60%										
5 - Joe White Rd to Control Structure								0%			60%										
6 - Control Structure to Oakwood Pond #2								0%			60%										
7 - Oakwood Pond #2 to Old Sterlington Rd								0%			60%										
8 - Old Sterlington Rd to West Elmwood Ditch								0%			60%										
9 - West Elmwood Pond to Bayou Chauvin								0%			0%										
10 - West Elmwood Ditch to ALM RR								0%			60%										
11 - ALM RR to North Monroe SD #1 Ditch								0%			60%										
12 - North Monroe SD #1 Pond to Bayou Chauvin								0%			0%										
13 - N. Monroe SD # 1 Ditch to Hwy. 165								0%			60%										
14 - Hwy 165 to North Gate Estates Ditch								0%			0%										
15 - North Gate Pond to Bayou Chauvin								0%			0%										
16 - North Gate Estates Ditch to Northside Terrace Ditch								0%			0%										
17 - Northside Terrace Pond to Bayou Chauvin								0%			0%										
18 - Northside Terrace Ditch to Ouachita River Levee	0.0050	2.00	0.86	2.00	0.86	2.00	2.00	0%	0.86	0.86	0%	0.86	0.86	0.86	0.86	2.00	2.00	0.00	0.00	0.00	1.73
								Notes:													
Sub-Total benthic loading									**0.86**	**0.86**		**0.86**	**0.86**	**0.86**	**0.86**			**0.00**	**0.00**	**0.00**	**1.73**

Note 1: The percentage reduction values are taken from the "Non-Point Benthic Load Input and TMDL Calculations" worksheet.

EXPLICIT MARGIN OF SAFETY = 20%

Winter TMDL Summary:

Chauvin Bayou in Ouachita Basin - 080102

Calculation of the TMDL - Kilograms per day			
Load description	WLA (kg/day)	LA (kg/day)	MOS Load (kg/day)
Point Source loads	584		146
Headwater / Tributatary loads		3	0
Benthic loads		162	25
Incremental Loads		2	0
SUB-TOTAL	**584**	**167**	**171**
TMDL = WLA + LA + MOS	***922 kg/day***		

Calculation of the TMDL - Pounds per day			
Load description	WLA (lbs/day) (1)	LA (lbs/day) (1)	MOS Load (lbs/day) (1)
Point Source loads	1,288		322
Headwater / Tributatary loads		7	0
Benthic loads		357	55
Incremental Loads		4	0
SUB-TOTAL	**1,288**	**368**	**377**
TMDL = WLA + LA + MOS	***2,033 lbs/day***		

Notes:

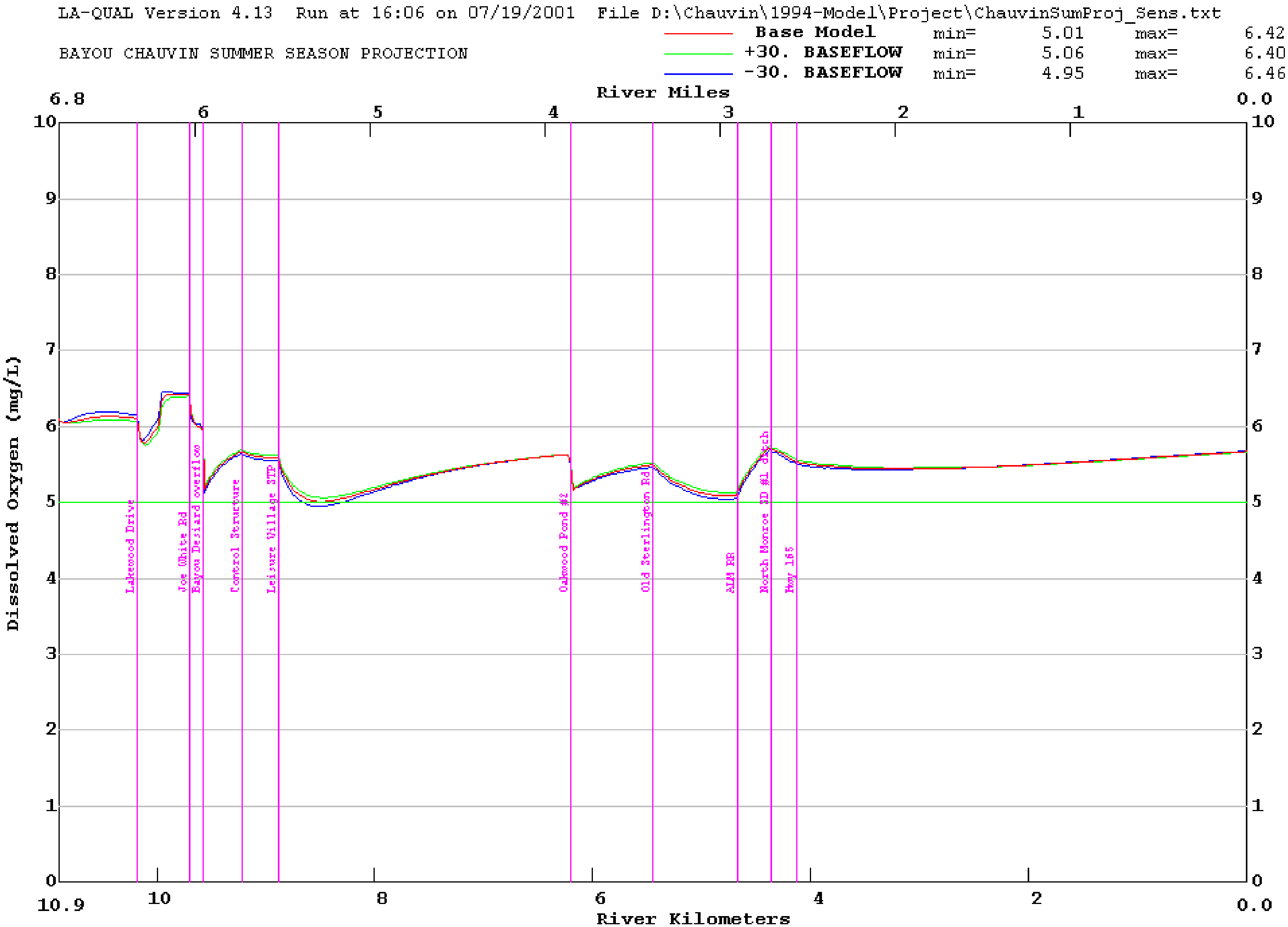
(1) - Load(lbs/day) = Load(kg/day) x 2.205

Calculation of the TMDL - Kilograms per day			
Load description	WLA (kg/day)	LA (kg/day)	MOS Load (kg/day)
Point Source loads	584		146
Natural Nonpoint Loads		67	
Manmade Nonpoint Loads		100	25
SUB-TOTAL	**584**	**167**	**171**
TMDL = WLA + LA + MOS	***922 Kg/day***		

Calculation of the TMDL - Pounds per day			
Load description	WLA (lbs/day)	LA (lbs/day)	MOS Load (lbs/day)
Point Source loads	1,288		322
Natural Nonpoint Loads		148	
Manmade Nonpoint Loads		221	55
SUB-TOTAL	**1,288**	**369**	**377**
TMDL = WLA + LA + MOS	***2,034 lbs/day***		

APPENDIX J – SENSITIVITY PLOTS

BASEFLOW - stream flow
HDW FLOW – headwater flow
WSL FLOW – wasteload flow
INC INFL – incremental inflow
INC OUTF – incremental outflow
WSL BOD – wasteload CBOD
WSL NCM – wasteload NBOD
TEMPERAT – stream temperature
DEPTH – stream depth
REAERATI – reaeration rate
BOD DECA – CBOD decay rate
BOD SETT – CBOD settling rate
NCM DECA – NBOD decay rate
NCM SETT – NBOD settling rate
BENTHAL – sediment oxygen demand
CHLOR A - Chlorophyll a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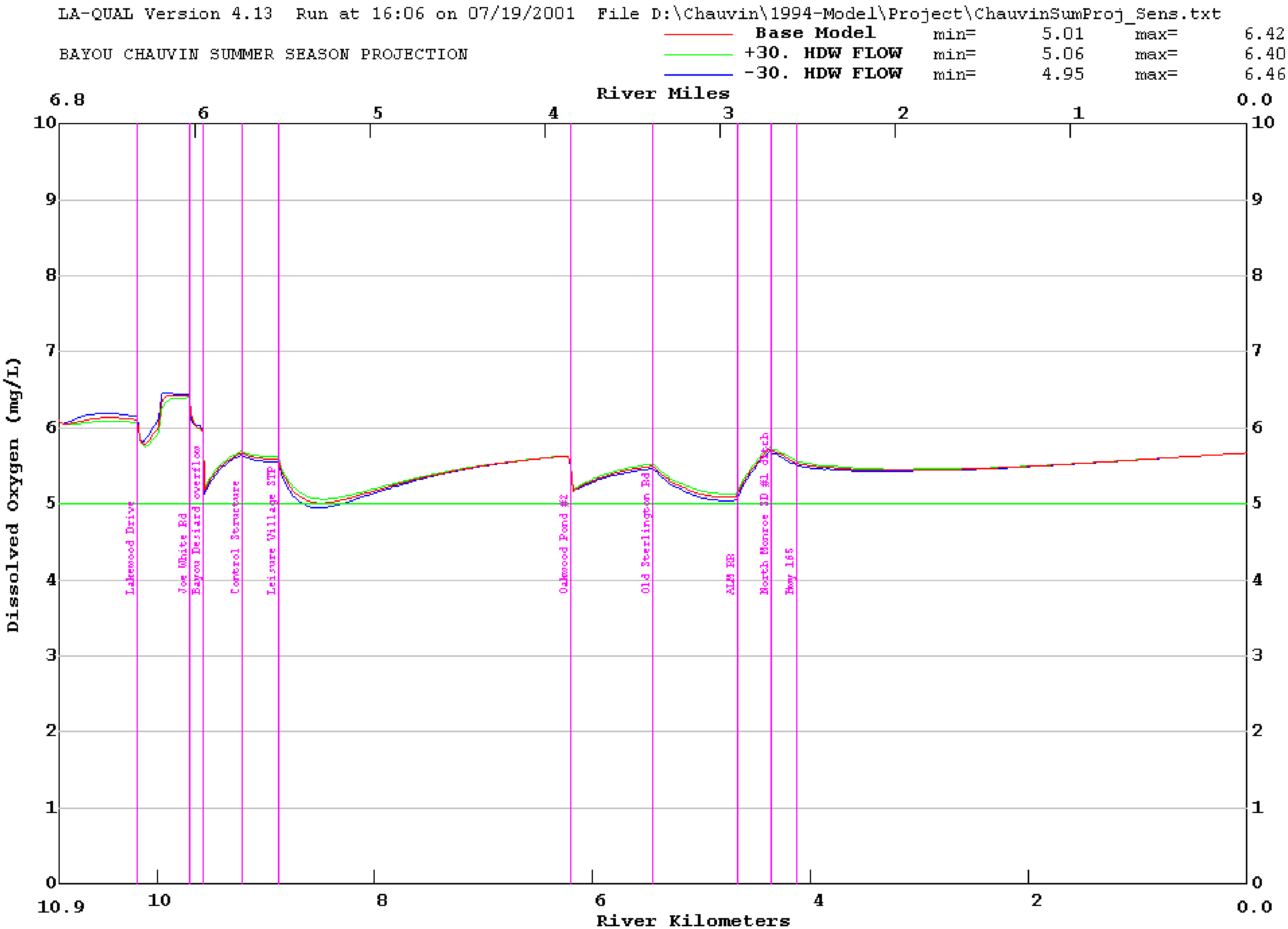
+30. BASEFLOW min= 5.06 max= 6.40
-30. BASEFLOW min= 4.95 max= 6.46
River Miles
6.8
6
5
4
3
2
1
0.0
Dissolved Oxygen (mg/L)
0
1
2
3
4
5
6
7
8
9
10
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165
10.9
10
8
6
4
2
0.0
River Kilometers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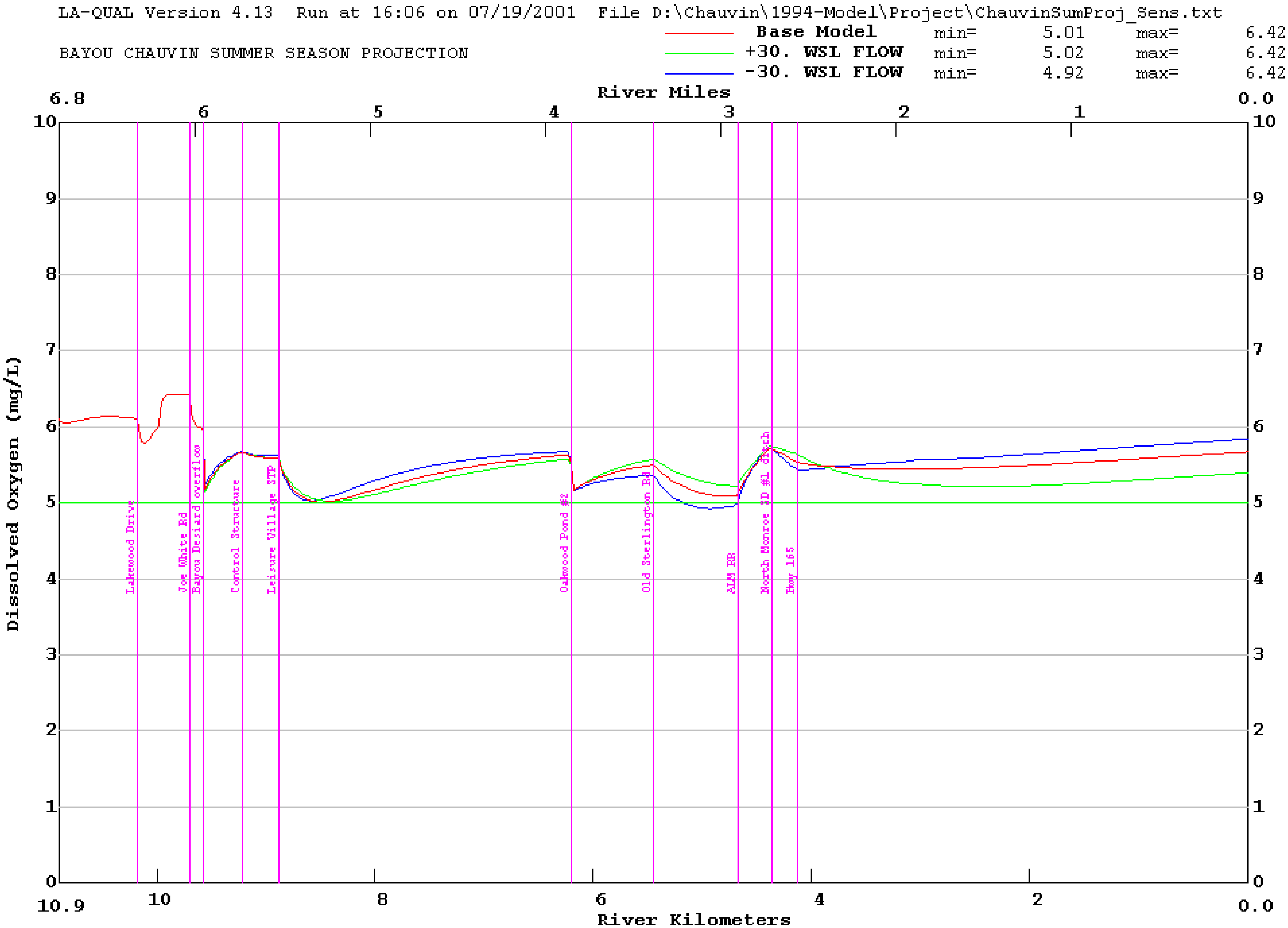
Base Model min= 5.01 max= 6.42
+30. HDW FLOW min= 5.06 max= 6.40
-30. HDW FLOW min= 4.95 max= 6.46
River Miles
6.8
6
5
4
3
2
1
0.0
Dissolved Oxygen (mg/L)
10
9
8
7
6
5
4
3
2
1
0
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165
10.9
10
8
6
4
2
0.0
River Kilometers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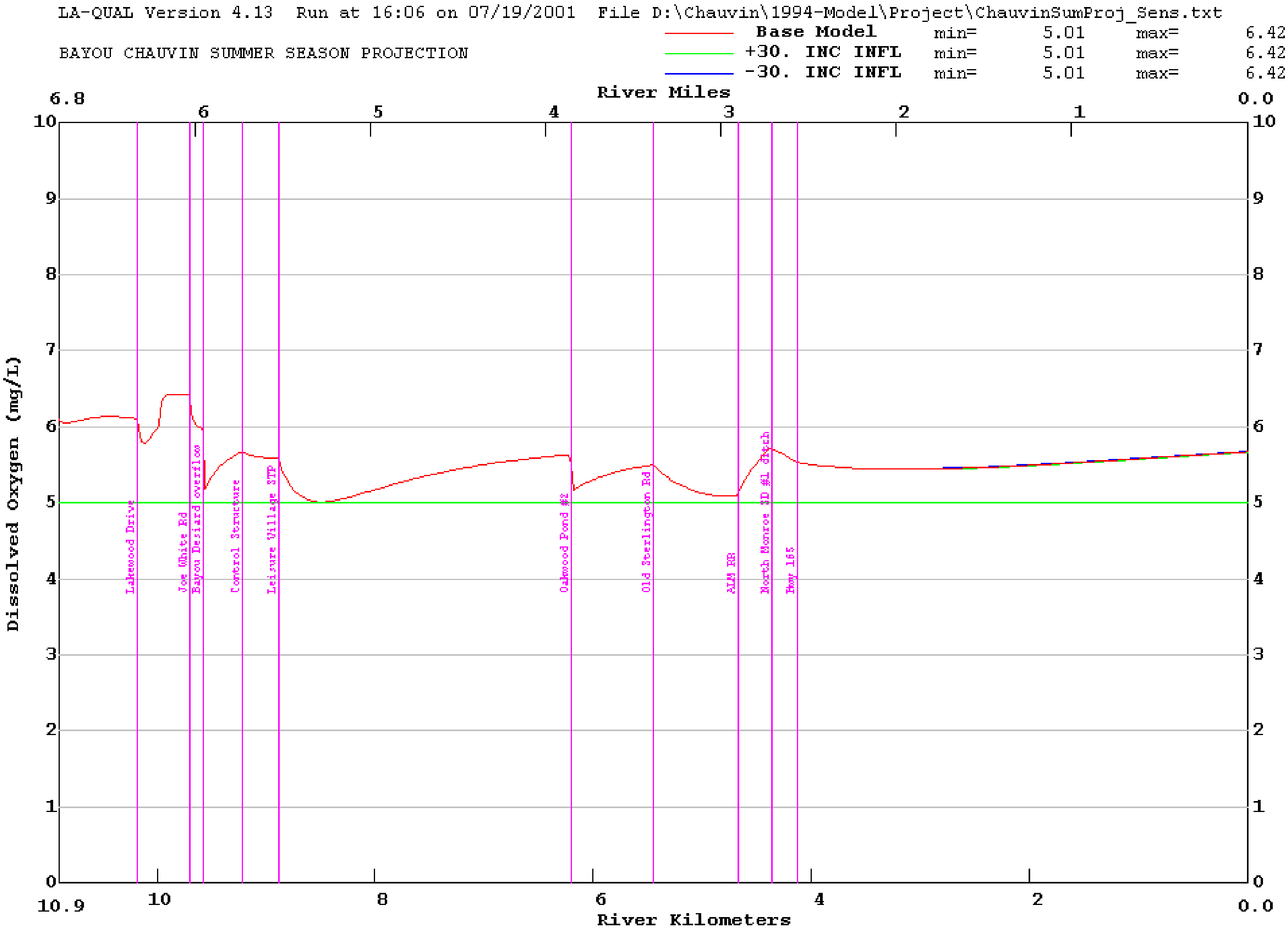
+30. WSL FLOW min= 5.02 max= 6.42
-30. WSL FLOW min= 4.92 max= 6.42
River Miles
6.8
6
5
4
3
2
1
0.0
Dissolved Oxygen (mg/L)
10
9
8
7
6
5
4
3
2
1
0
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165
10.9
10
8
6
4
2
0.0
River Kilometers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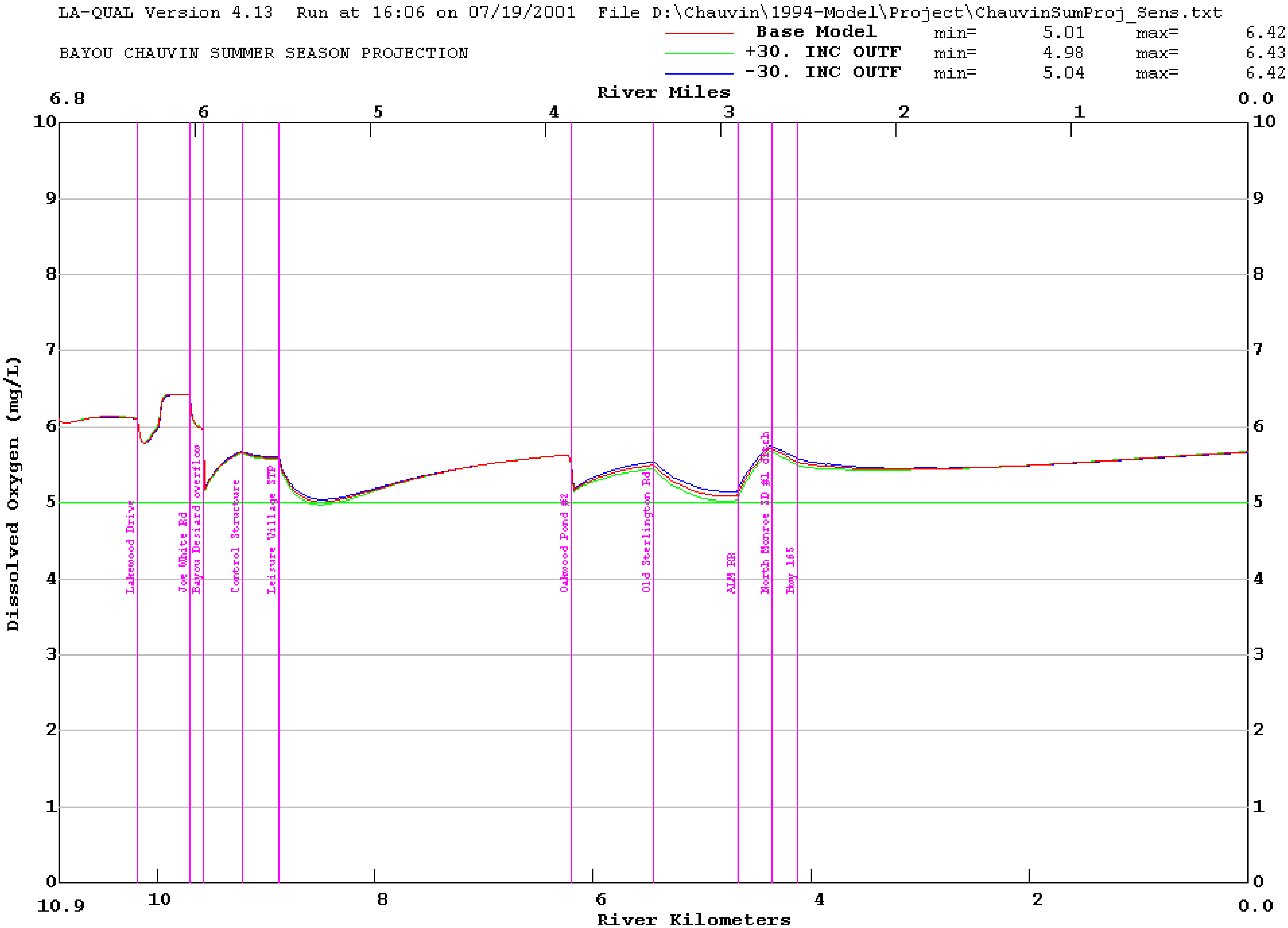
+30. INC INFL min= 5.01 max= 6.42
-30. INC INFL min= 5.01 max= 6.42
River Miles
Dissolved Oxygen (mg/L)
River Kilometers
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165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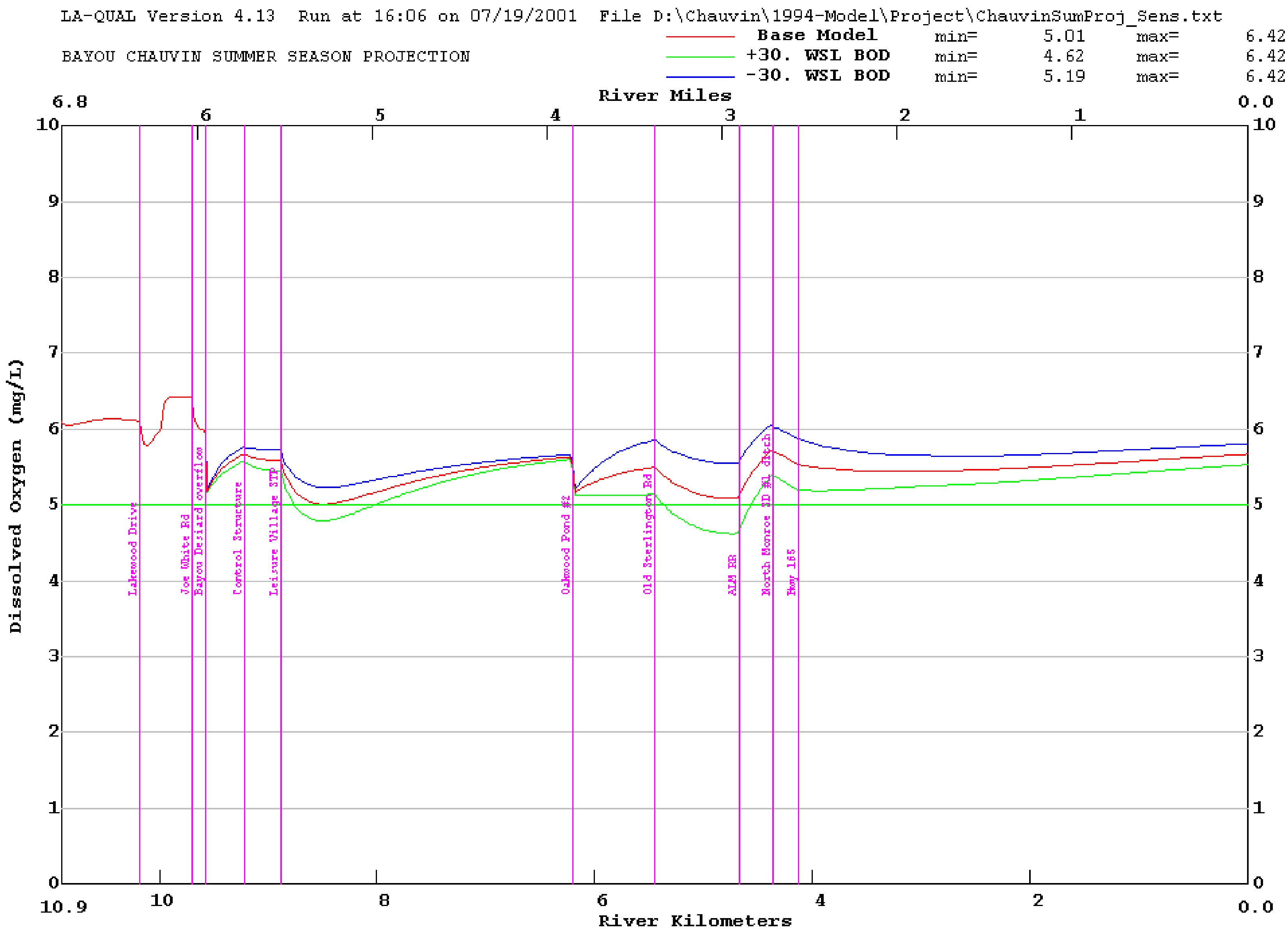
+30. INC OUTF min= 4.98 max= 6.43
-30. INC OUTF min= 5.04 max= 6.42
River Miles
6.8
6
5
4
3
2
1
0.0
Dissolved Oxygen (mg/L)
0
1
2
3
4
5
6
7
8
9
10
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165
10.9
10
8
6
4
2
0.0
River Kilometers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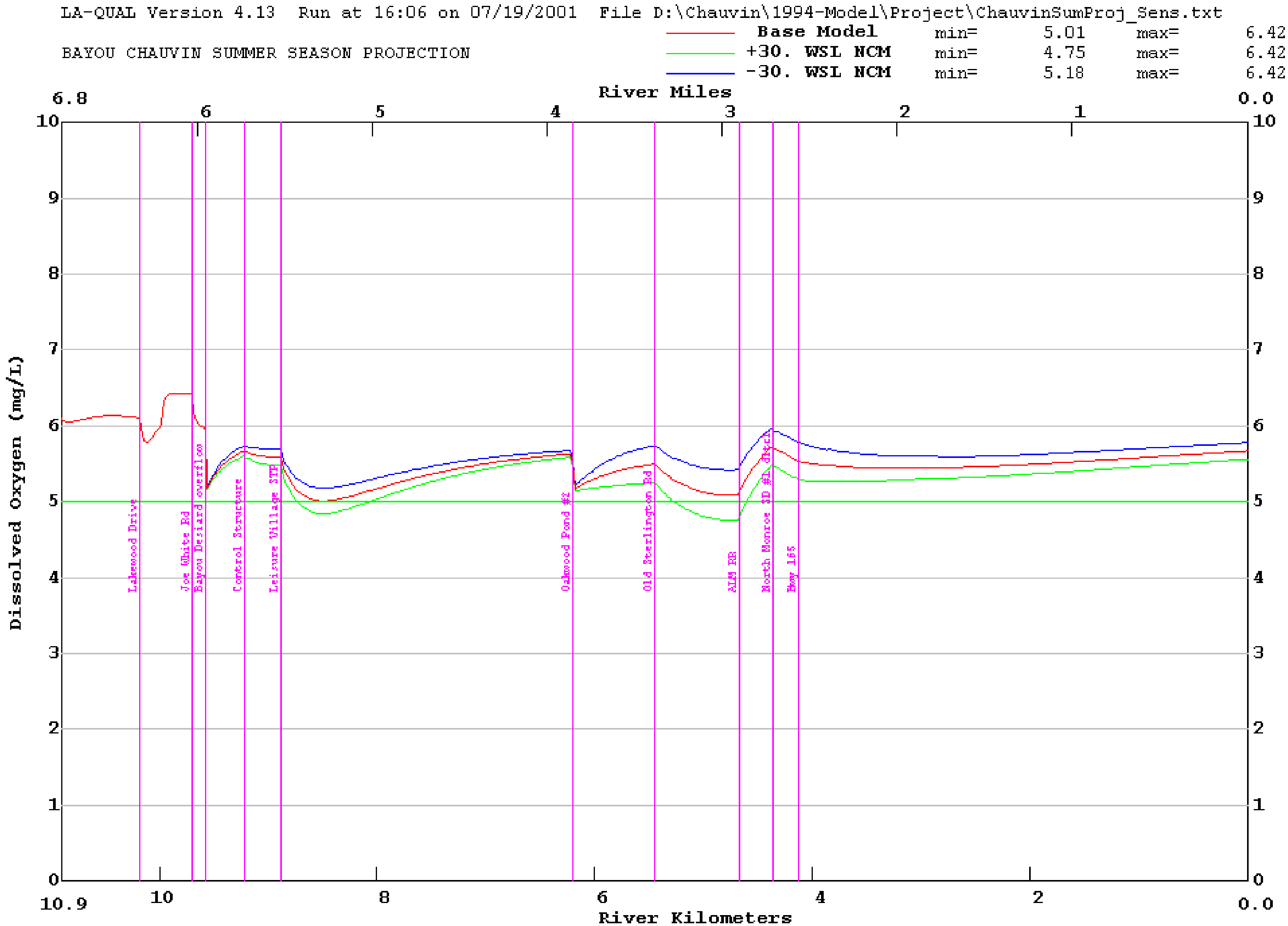
+30. WSL BOD min= 4.62 max= 6.42
-30. WSL BOD min= 5.19 max= 6.42
River Miles
6.8
6
5
4
3
2
1
0.0
Dissolved Oxygen (mg/L)
10
9
8
7
6
5
4
3
2
1
0
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165
10.9
10
8
6
4
2
0.0
River Kilometers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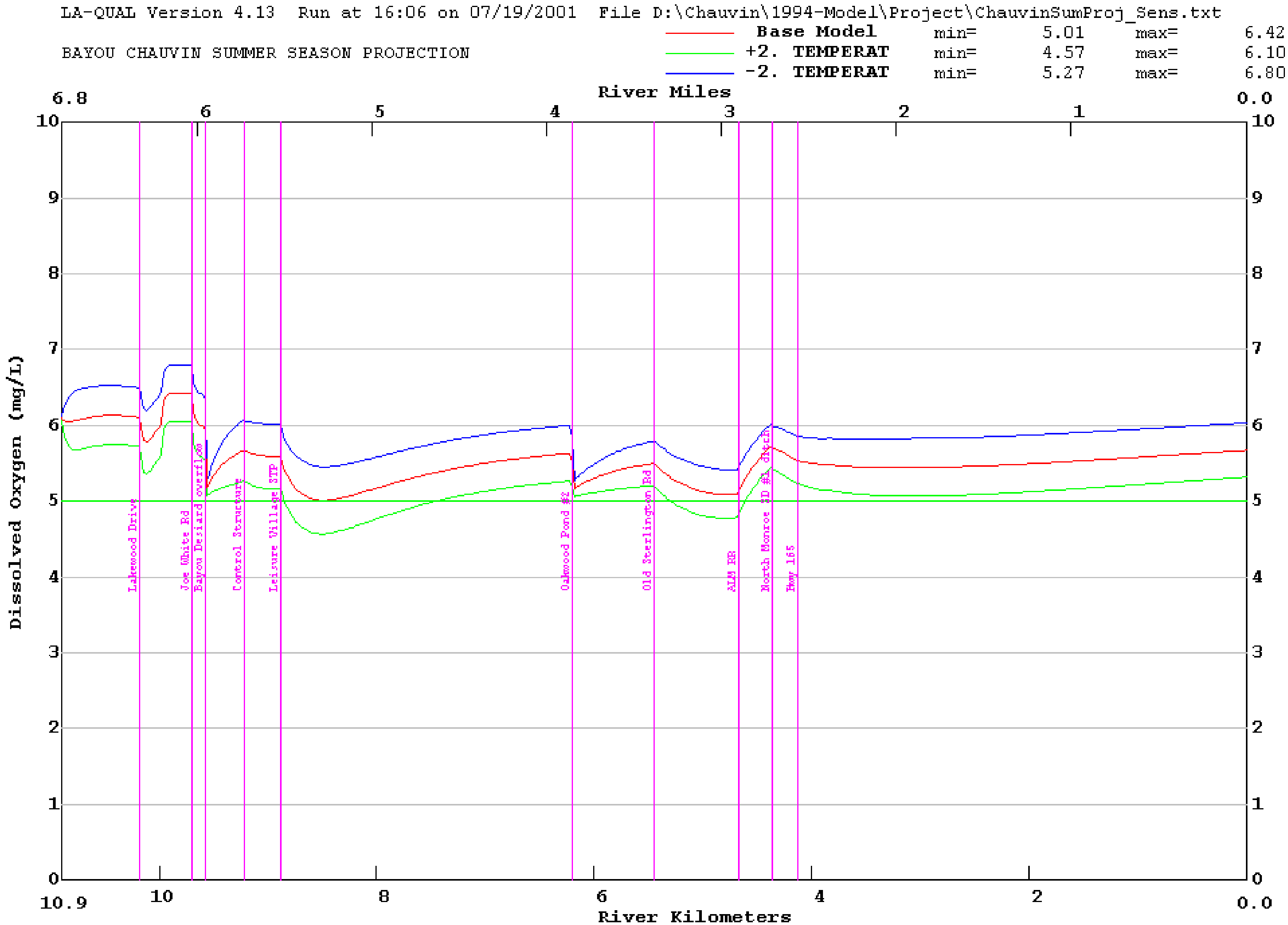
+30. WSL NCM min= 4.75 max= 6.42
-30. WSL NCM min= 5.18 max= 6.42
River Miles
River Kilometers
Dissolved Oxygen (mg/L)
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 discharge
Hwy 165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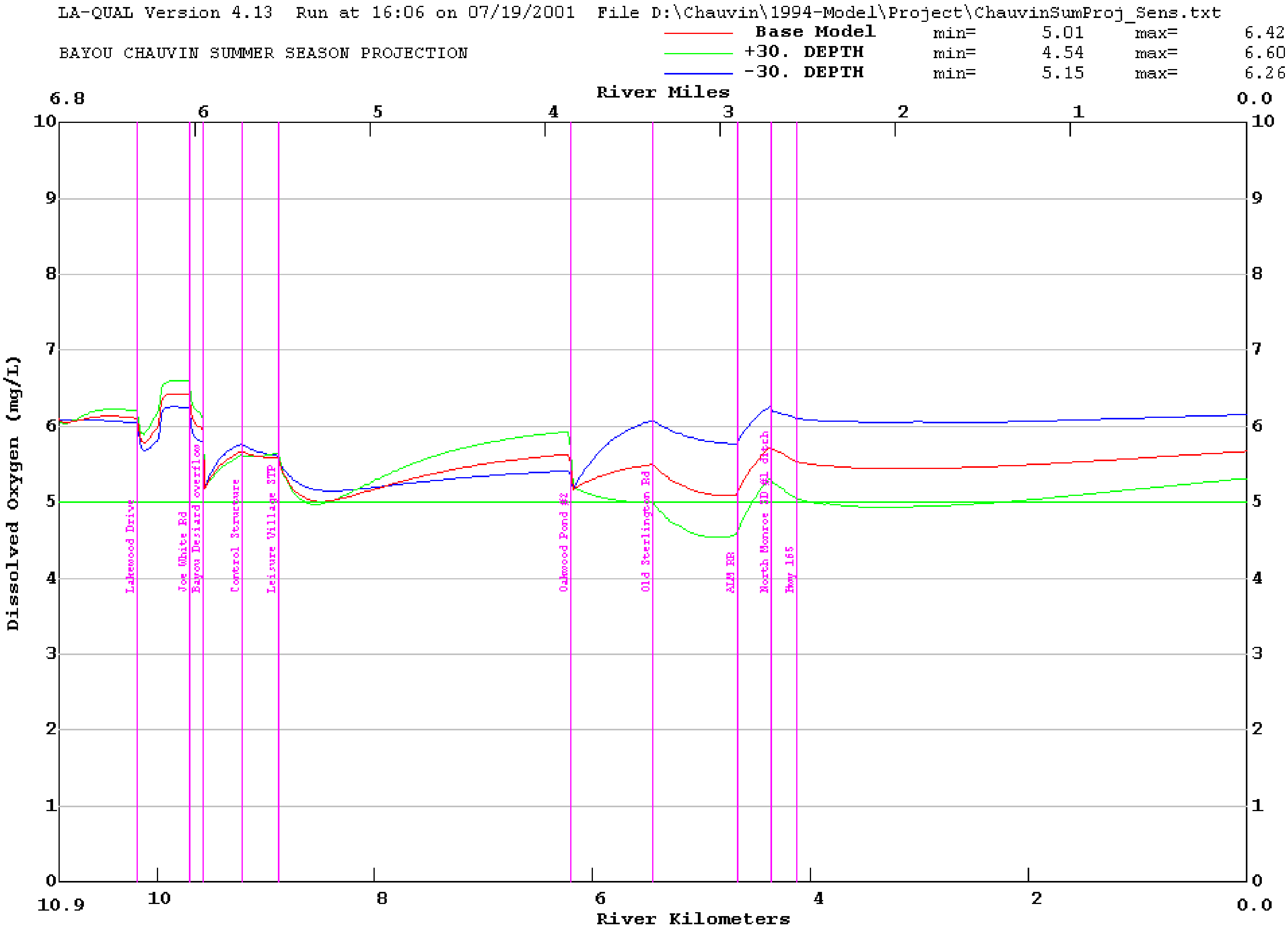
+2. TEMPERAT min= 4.57 max= 6.10
-2. TEMPERAT min= 5.27 max= 6.80
River Miles
6.8
0.0
Dissolved Oxygen (mg/L)
River Kilometers
10.9
0.0
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165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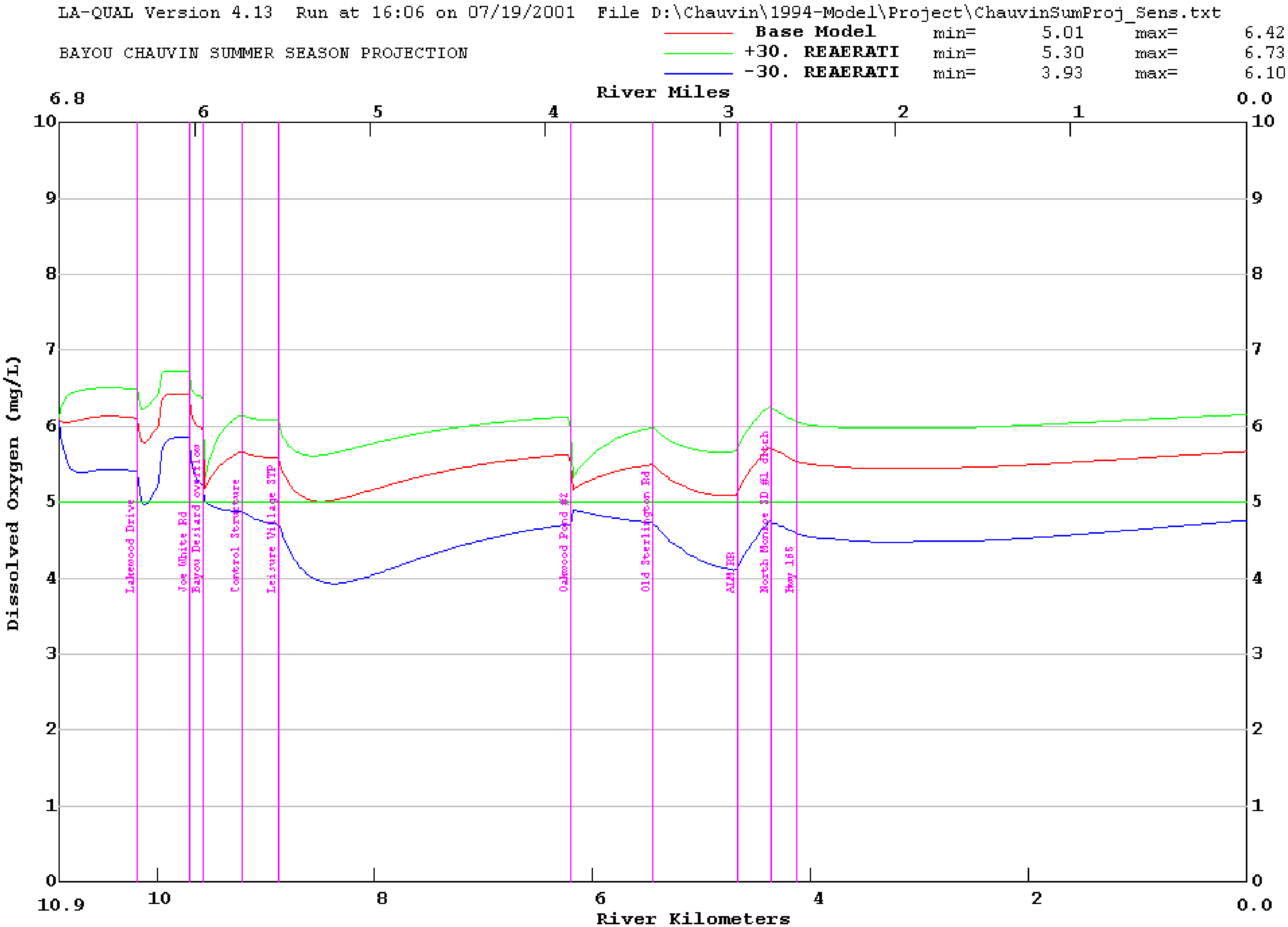
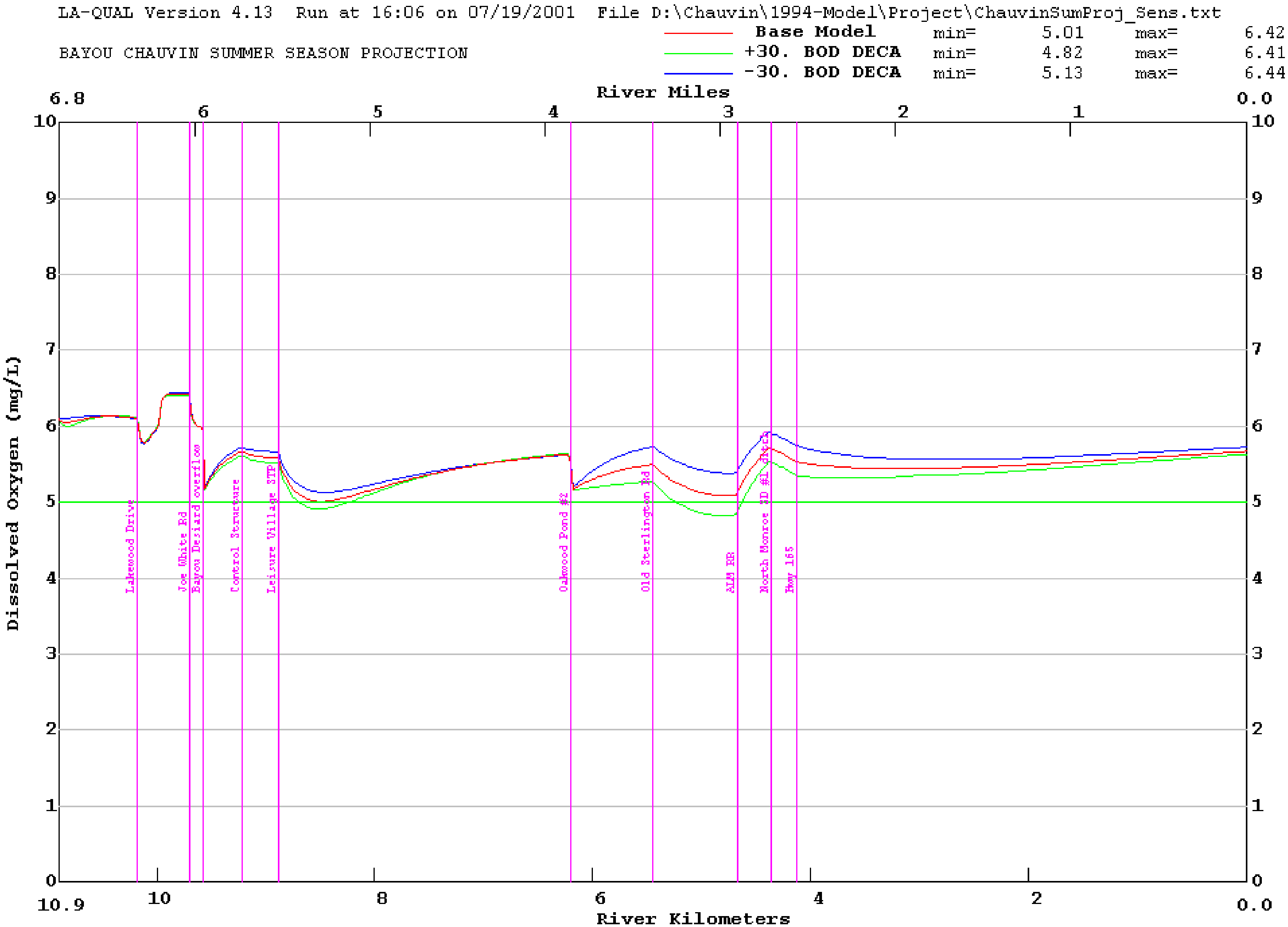
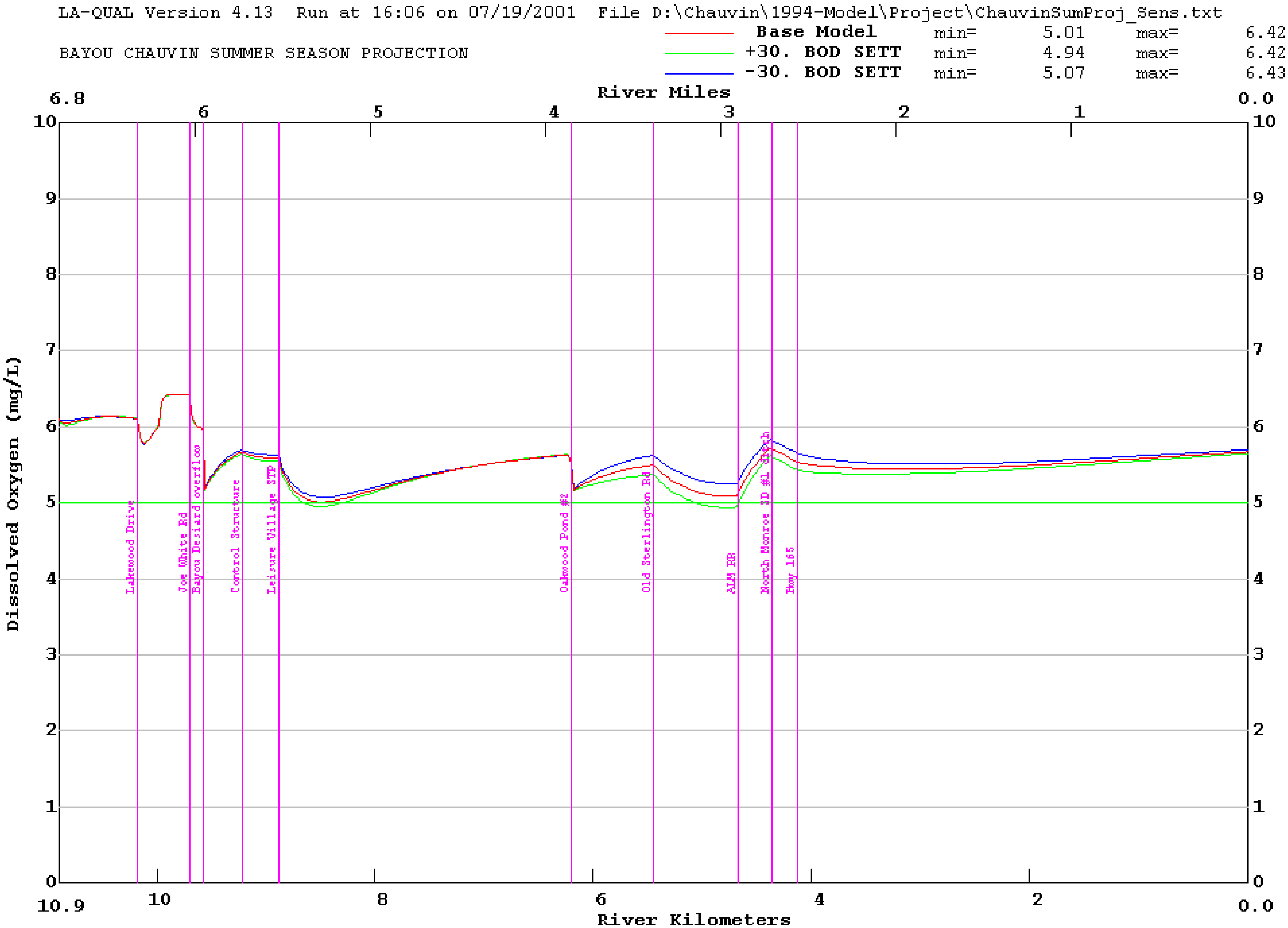
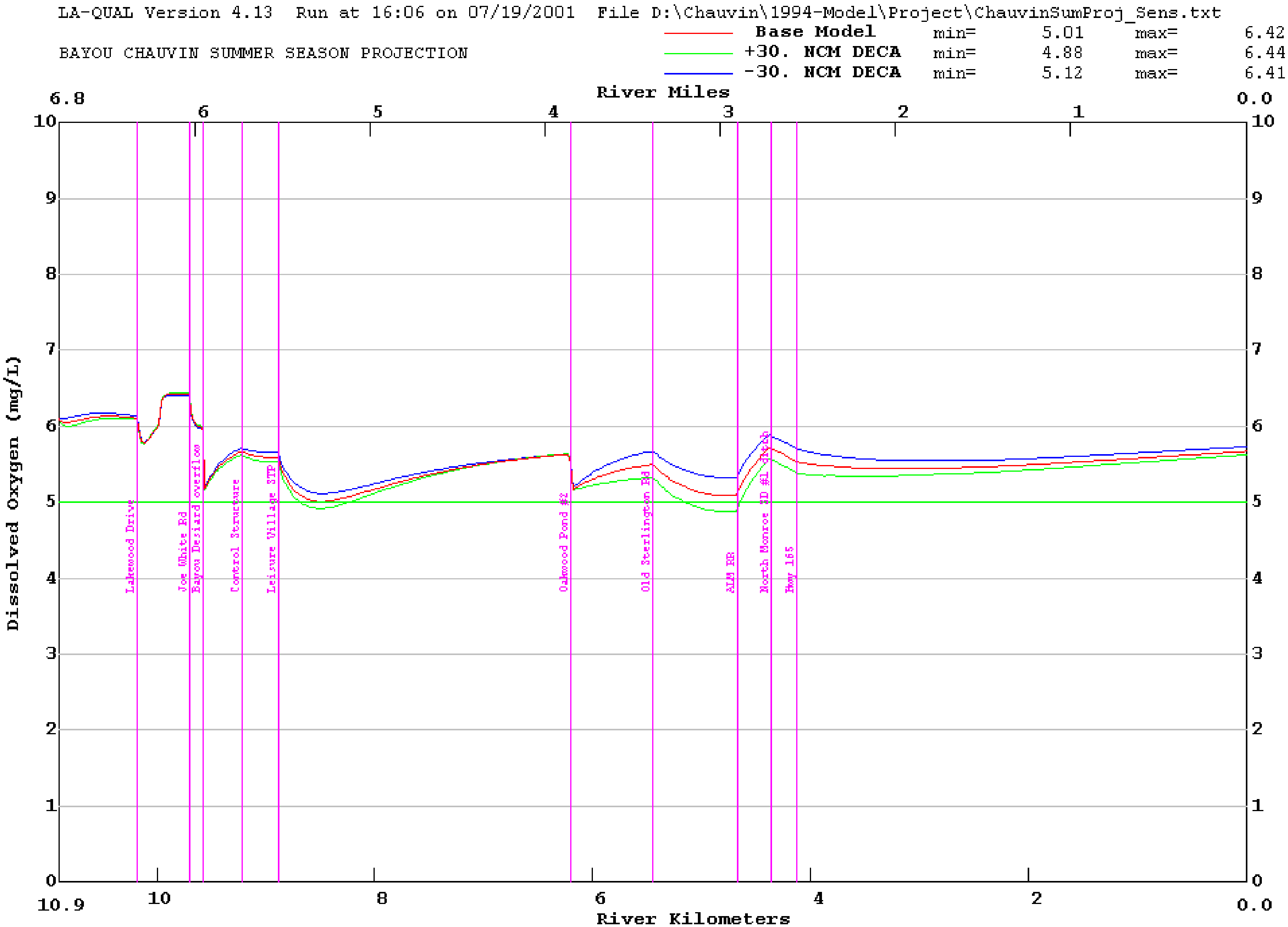
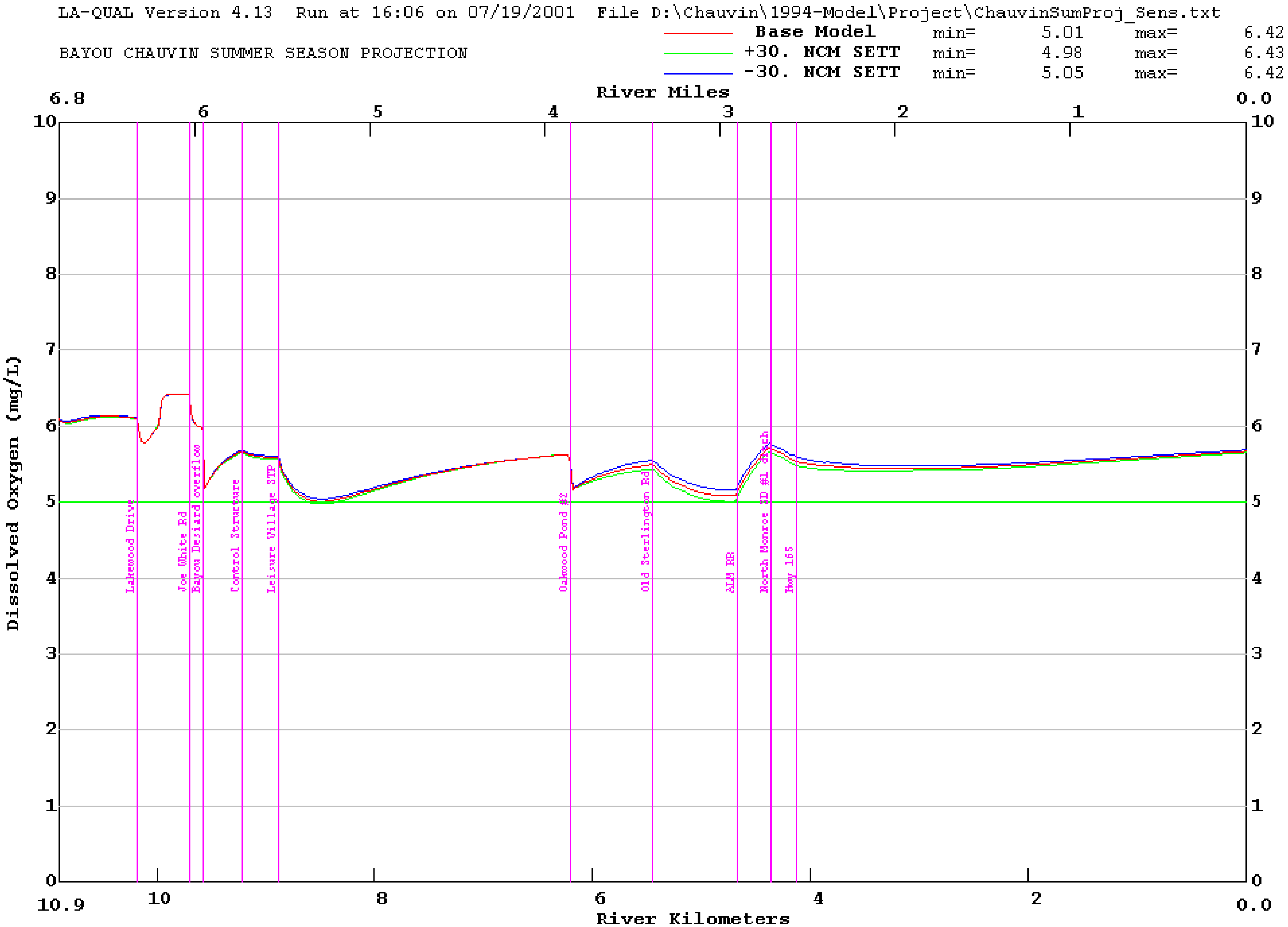
+30. DEPTH min= 4.54 max= 6.60
-30. DEPTH min= 5.15 max= 6.26
River Miles
River Kilometers
Dissolved Oxygen (mg/L)
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165

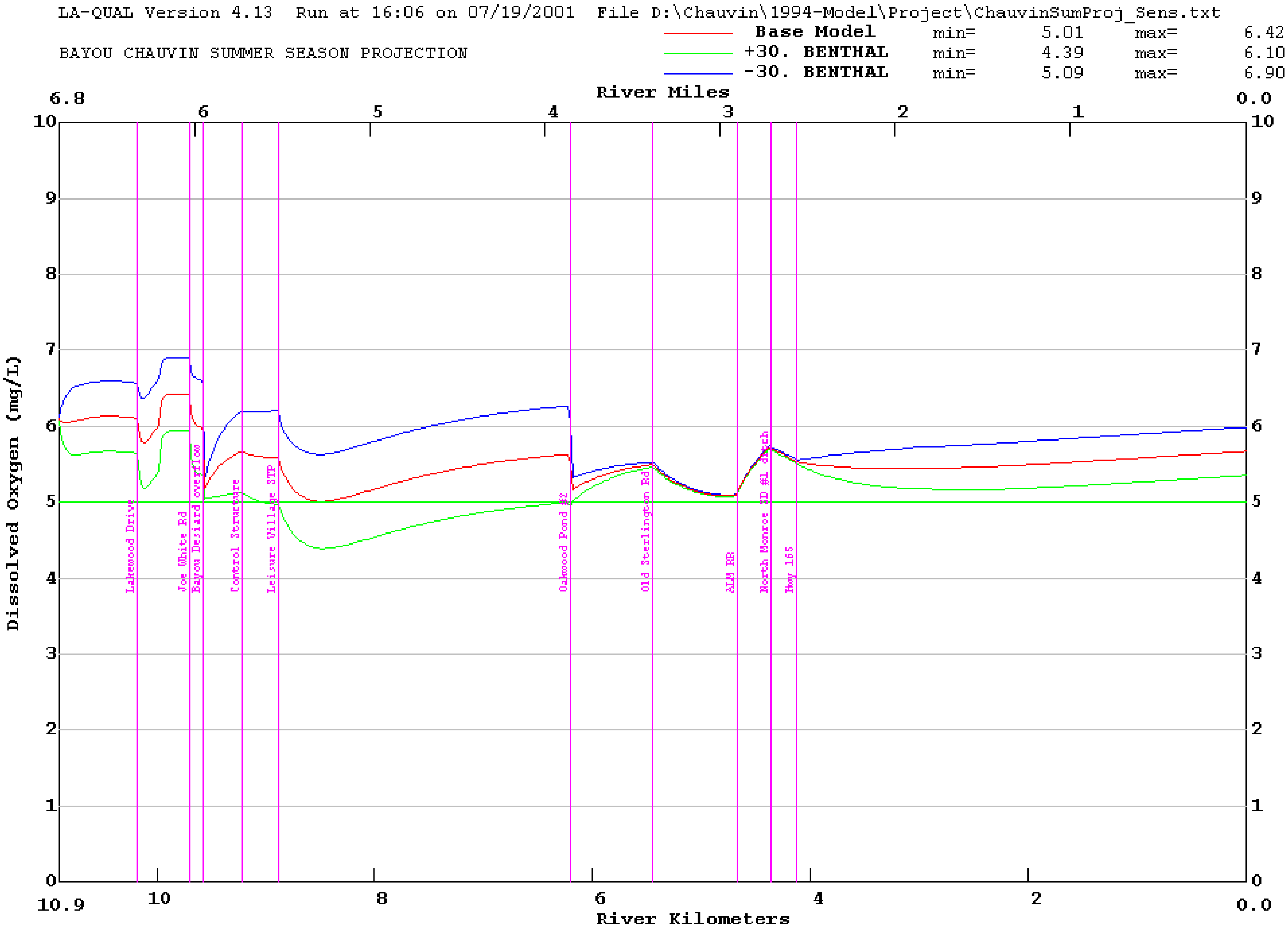

LA-QUAL Version 4.13 Run at 16:06 on 07/19/2001 File D:\Chauvin\1994-Model\Project\ChauvinSumProj_Sens.txt
BAYOU CHAUVIN SUMMER SEASON PROJECTION
Base Model min= 5.01 max= 6.42
+30. REAERATI min= 5.30 max= 6.73
-30. REAERATI min= 3.93 max= 6.10
River Miles
6.8
6
5
4
3
2
1
0.0
Dissolved Oxygen (mg/L)
10
9
8
7
6
5
4
3
2
1
0
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165
10.9
10
8
6
4
2
0.0
River Kilometers

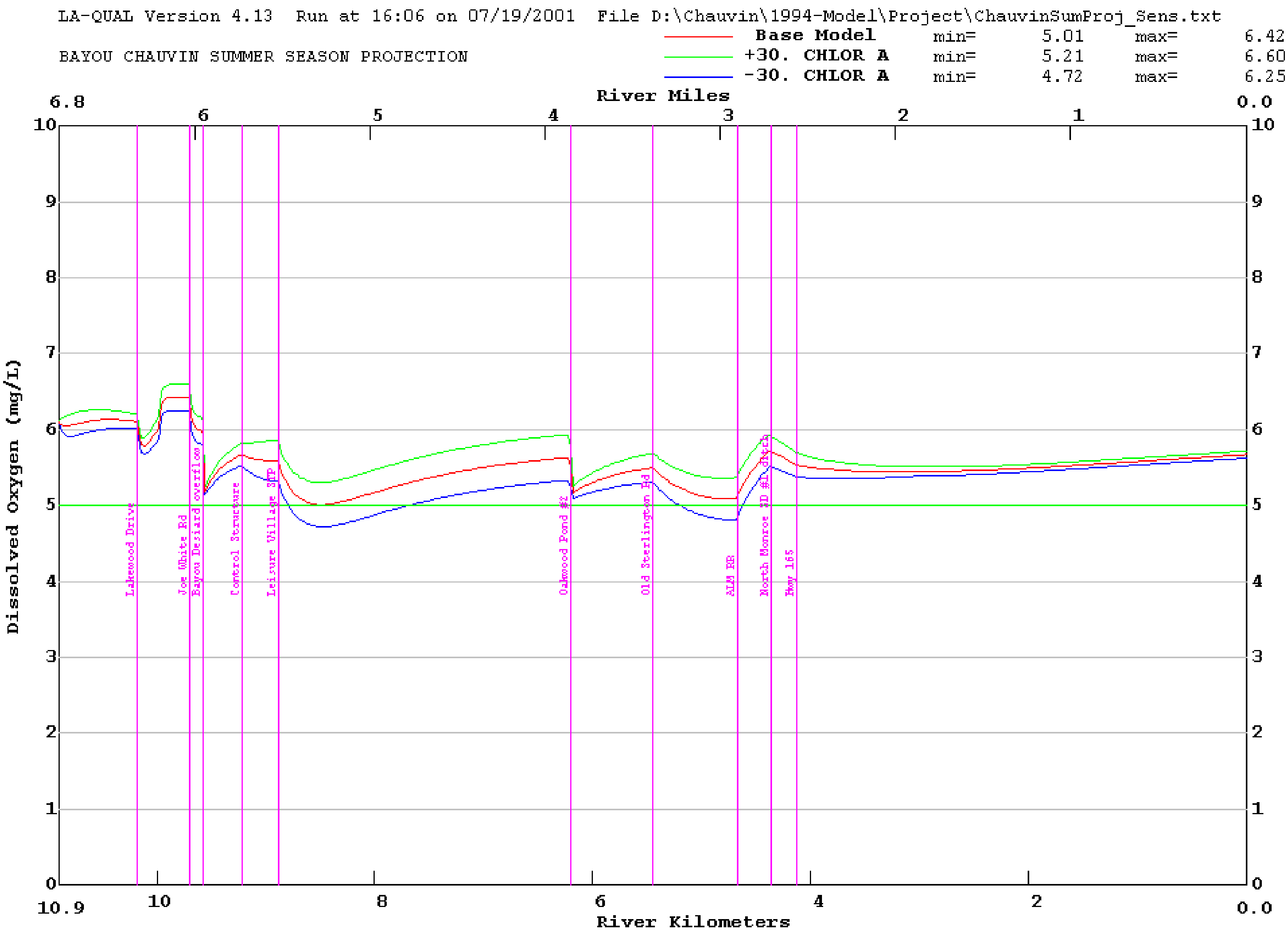

LA-QUAL Version 4.13 Run at 16:06 on 07/19/2001 File D:\Chauvin\1994-Model\Project\ChauvinSumProj_Sens.txt
BAYOU CHAUVIN SUMMER SEASON PROJECTION
Base Model min= 5.01 max= 6.42
+30. BOD DECA min= 4.82 max= 6.41
-30. BOD DECA min= 5.13 max= 6.44
River Miles
River Kilometers
Dissolved Oxygen (mg/L)
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 discharge
Hwy 165


LA-QUAL Version 4.13 Run at 16:06 on 07/19/2001 File D:\Chauvin\1994-Model\Project\ChauvinSumProj_Sens.txt
BAYOU CHAUVIN SUMMER SEASON PROJECTION
Base Model min= 5.01 max= 6.42
+30. BOD SETT min= 4.94 max= 6.42
-30. BOD SETT min= 5.07 max= 6.43
River Miles
6.8
6
5
4
3
2
1
0.0
Dissolved Oxygen (mg/L)
10
9
8
7
6
5
4
3
2
1
0
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165
10.9
10
8
6
4
2
0.0
River Kilometers


LA-QUAL Version 4.13 Run at 16:06 on 07/19/2001 File D:\Chauvin\1994-Model\Project\ChauvinSumProj_Sens.txt
BAYOU CHAUVIN SUMMER SEASON PROJECTION
Base Model min= 5.01 max= 6.42
+30. NCM DECA min= 4.88 max= 6.44
-30. NCM DECA min= 5.12 max= 6.41
River Miles
6.8
6
5
4
3
2
1
0.0
Dissolved Oxygen (mg/L)
0
1
2
3
4
5
6
7
8
9
10
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165
10.9
10
8
6
4
2
0.0
River Kilometers


LA-QUAL Version 4.13 Run at 16:06 on 07/19/2001 File D:\Chauvin\1994-Model\Project\ChauvinSumProj_Sens.txt
BAYOU CHAUVIN SUMMER SEASON PROJECTION
Base Model min= 5.01 max= 6.42
+30. NCM SETT min= 4.98 max= 6.43
-30. NCM SETT min= 5.05 max= 6.42
River Miles
River Kilometers
Dissolved Oxygen (mg/L)
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165


LA-QUAL Version 4.13 Run at 16:06 on 07/19/2001 File D:\Chauvin\1994-Model\Project\ChauvinSumProj_Sens.txt
BAYOU CHAUVIN SUMMER SEASON PROJECTION
Base Model min= 5.01 max= 6.42
+30. BENTHAL min= 4.39 max= 6.10
-30. BENTHAL min= 5.09 max= 6.90
River Miles
River Kilometers
Dissolved Oxygen (mg/L)
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165


LA-QUAL Version 4.13 Run at 16:06 on 07/19/2001 File D:\Chauvin\1994-Model\Project\ChauvinSumProj_Sens.txt
BAYOU CHAUVIN SUMMER SEASON PROJECTION
Base Model min= 5.01 max= 6.42
+30. CHLOR A min= 5.21 max= 6.60
-30. CHLOR A min= 4.72 max= 6.25
River Miles
River Kilometers
Dissolved Oxygen (mg/L)
Lakewood Drive
Joe White Rd
Bayou Desiard overflow
Control Structure
Leisure Village STP
Oakwood Pond #2
Old Sterlington Rd
ALM RR
North Monroe SD #1 ditch
Hwy 165