SUMMARY OF MODELING OF WEST BAYOU LACASSINE TO DETERMINE A WASTELOAD ALLOCATION FOR LAKE CHARLES CANE – LACASSINE MILL

WEST BAYOU LACASSINE
IN BAYOU LACASSINE
SUBSEGMENT 050601

SURVEYED:
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Water Quality Modeling Section
Water Quality Assessment Division
Office of Environmental Assessment
Louisiana Department of Environmental Quality

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Executive Summary

The Louisiana Agricultural Finance Authority is building a sugar cane processing mill near the Village of Lacassine for the production of syrup which will be transported to other nearby mills for processing to raw sugar. The facility will be leased to and operated by Lake Charles Cane – Lacassine Mill, LLC, a company formed by the Lake Charles Cane Cooperative. The Lacassine Sugar Mill will discharge about 0.6 mgd of process wastewater to a tributary of West Bayou Lacassine between Interstate 10 and the Southern Pacific RR Line about 0.65 miles west of Highway 101. Attachment A is a digital map of the streams of the West Bayou Lacassine watershed and some of the roads. Water quality modeling of West Bayou Lacassine has been performed and wasteload allocations for the summer (March – November) and winter (December – February) seasons have been developed for the Lacassine Mill as follows:

Summer season	Winter season
CBOD5 (maximum) 5.0 mg/l	CBOD5 (maximum) 10.0 mg/l
Dissolved Oxygen (minimum) 5.0 mg/l	Dissolved Oxygen (minimum) 5.0 mg/l
22% reduction of nonpoint source load to West Bayou Lacassine	Monitor dissolved oxygen in the receiving waters
Monitor dissolved oxygen in the receiving waters	

These effluent limitations are contingent upon the 22% reduction of man-made nonpoint source loading. The model shows that the summer water quality criterion of 3.0 mg/l DO for dissolved oxygen will not be met without the reduction in the nonpoint source loading. The requirement that best management practices be implemented to achieve a 22% reduction of man-made nonpoint loading in the West Bayou Lacassine watershed will be incorporated in the Water Quality Management Plan and subsequently, into the discharge permit for the syrup mill. Compliance with the required nonpoint reduction will be verified by monitoring dissolved oxygen for compliance with the criteria in the tributary and West Bayou Lacassine at Abell Road and in West Bayou Lacassine at Ardoin Cove Road. A requirement to monitor the dissolved oxygen in the receiving stream year-round and report to LDEQ will also be incorporated in the discharge permit for the syrup mill.

The winter allocation for the mill has been made in compliance with the effluent standards cited by Title 33, Part IX of the Louisiana Regulatory Code, which allow effluent concentrations of 10 mg/l maximum CBOD5 and 4 mg/l minimum dissolved oxygen for discharge of treated wastewater from raw cane sugar processing. No nonpoint reduction is required for the winter season.

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Introduction

The Louisiana Agricultural Finance Authority is building a sugar cane processing mill near the Village of Lacassine for the production of syrup which will be transported to other nearby mills for processing to raw sugar. The facility will be leased to and operated by Lake Charles Cane – Lacassine Mill, LLC, a company formed by the Lake Charles Cane Cooperative. The mill will grind sugar cane 24 hours per day for 100-120 days per year during the sugar cane harvesting season. Power for the operation of the mill will be generated by burning bagasse, natural gas, and gas from the Jefferson Davis Parish Landfill. Excess electricity will be sold to the local power grid. It is estimated that bagasse supplies accumulated during the grinding of sugar cane will support the generation of electricity for approximately 200 days, or for about 100 days following the cessation of grinding. Process wastewater from the mill will be treated in two ponds and recycled to the mill. Make-up water for this operation will come from a municipal water supply, Jefferson Davis Water Commission No. 1. The Lacassine Sugar Mill will discharge about 0.6 mgd of process wastewater to a tributary of West Bayou Lacassine between Interstate 10 and the Southern Pacific RR Line about 0.65 miles west of Highway 101. A scale drawing of the streams of the West Bayou Lacassine watershed and some of the roads is attached as Figure 1. Summer and winter season wasteload allocations have been developed for this discharge, and are incorporated in the TMDL for West Bayou Lacassine.

Water Quality Criteria

Water quality criteria for West Bayou Lacassine, in Subsegment 050601 of the Mermentau River Basin, include:

Summer season (March through November) dissolved oxygen 3.0 mg/l minimum
Winter season (December through February) dissolved oxygen 5.0 mg/l minimum
Temperature 32 ^{o}C maximum
Chlorides 90 mg/l maximum
Sulfates 30 mg/l maximum
Total dissolved solids 400 mg/l maximum

Existing Dischargers

Present and proposed dischargers to West Bayou Lacassine are Lacassine High School (0.0092 mgd) to West Bayou Lacassine, and Lake Charles Cane – Lacassine Mill to an unnamed tributary of West Bayou Lacassine, as listed in Table 1.

Table 1

Facility	AI number	Permit number	Wastewater description	Receiving water	Treatment	Expected discharge	BOD5 limits	NH3-N limits	DO limits
Lacassine High School	3880	LAG540398	Sanitary wastewater	West Bayou Lacassine	Secondary extended aeration package plant	0.0092 mgd	30 mg/l	None	None
Lake Charles Cane – Lacassine Mill	84155	No permit on record	Blow-down from process wastewater recycle	Unnamed tributary of West Bayou Lacassine	None at present	0.60 mgd estimated	None	None	None

Previous Studies

Surveys in West Bayou Lacassine have been conducted in 1999 and 2004. The 1999 survey was conducted in August and September by FTN Associates of Little Rock, Arkansas as a part of a survey for a TMDL for Subsegment 050601, Bayou Lacassine. The 2004 survey was conducted in November by C-K Associates of Baton Rouge, LA, and covered West Bayou Lacassine and an unnamed tributary to West Lacassine to provide data for a wasteload allocation for the Lacassine Syrup Mill.

Summer Season Wasteload Allocation Development

Water quality modeling has been performed to develop a wasteload allocation for the Lacassine Syrup Mill. The model of the tributary is based on data collected during the 2004 survey conducted by C.K. Associates on November 10 and 12. The West Bayou Lacassine model was developed by FTN Associates of Little Rock, Arkansas, as a part of the Bayou Lacassine TMDL, September 2000 revision.

The model of the tributary was calibrated to the November 2004 data and projected at critical summer season conditions of 30.1 ^{o}C and a default minimum flow of 0.1 cfs. The summer season for these waters is defined by the Environmental Regulatory Code as the months of March through November. That projection was then combined with the FTN summer season projection for West bayou Lacassine to create a combined summer season model of the tributary and West Bayou Lacassine. This model was then run at a variety of mill discharge CBOD concentrations and nonpoint load reductions. Figures 1 and 2 depict the results of these runs. A wasteload allocation of a maximum of 5 mg/l five day carbonaceous biochemical oxygen demand (CBOD5) and a minimum of 5 mg/l dissolved oxygen (DO) combined with a 22% reduction of man-made nonpoint loading in the West Bayou Lacassine watershed will allow the summer season water quality criteria of 3.0 mg/l DO to be met. Compliance with the needed nonpoint reduction can be verified by monitoring dissolved oxygen for compliance with the criteria in the tributary and West Bayou Lacassine at Abell Road and in West Bayou Lacassine at Ardoin Cove Road. Figures 3 and 4 are the model dissolved oxygen projections for West Bayou Lacassine and for the tributary for 5/5 effluent limits and a 22% man-made nonpoint reduction. The minimum dissolved oxygen is projected to occur at the bottom of the tributary, just above it's junction with West Bayou Lacassine with another DO sag in West Bayou Lacassine just below the junction of the tributary.

In a departure from our normal procedure, the 20% margin of safety (MOS) for point sources was, in the case of the Lacassine Mill, added to the BOD concentration rather than the effluent discharge rate. The discharge rate from the mill is a rather uncertain estimate of the effluent recycle blowdown rate that may be needed in the operation of the mill.

No limits for nitrogenous oxygen demand were included, in accordance with the February 1975 EPA "Development Document for Interim Final Effluent Limitations Guidelines" for Raw Sugar Cane Processing, which states:

> "While various forms of nitrogenous compounds are present in waste waters resulting from the production of raw cane sugar, it has been determined that this potential pollutant is not present at a sufficient level to warrant treatment."

Figure 1

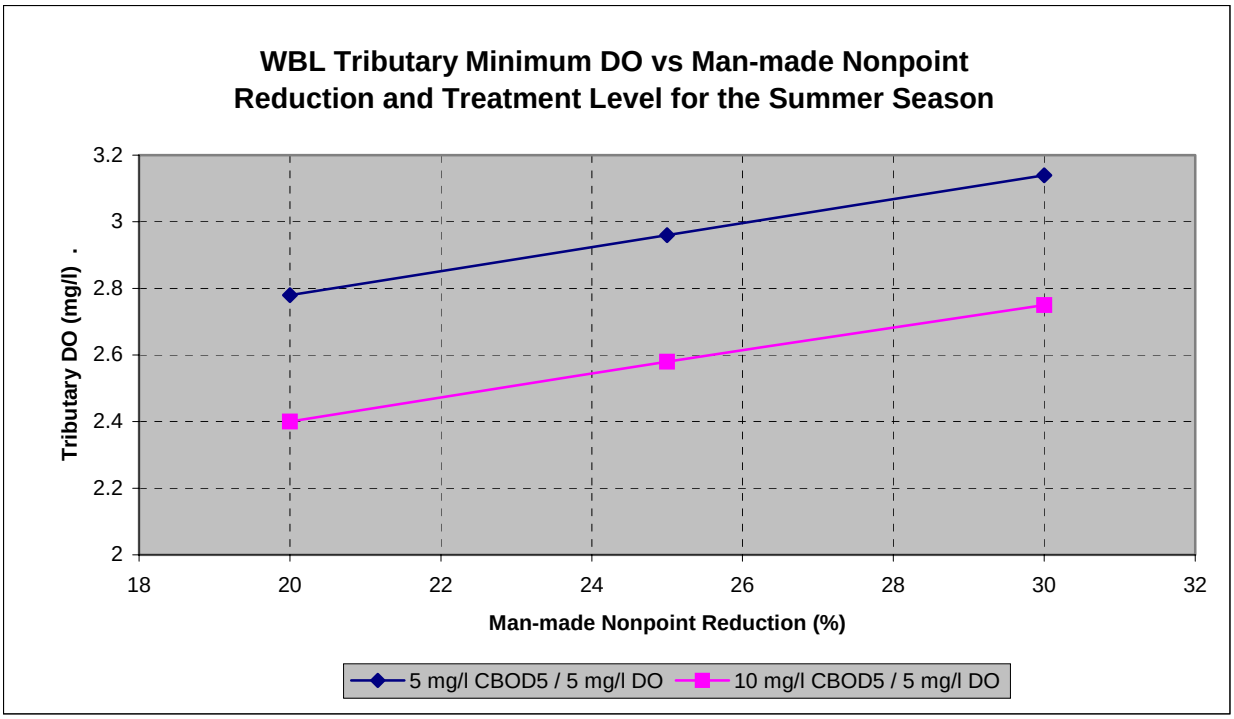


Figure 2

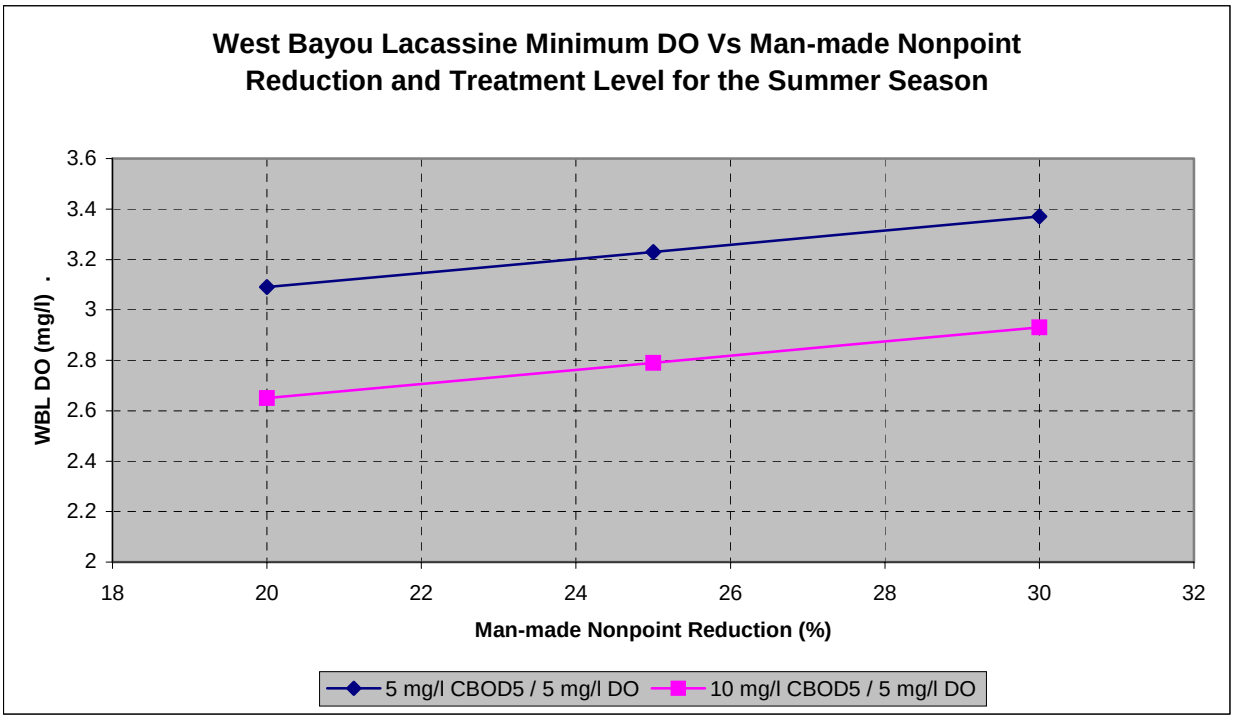
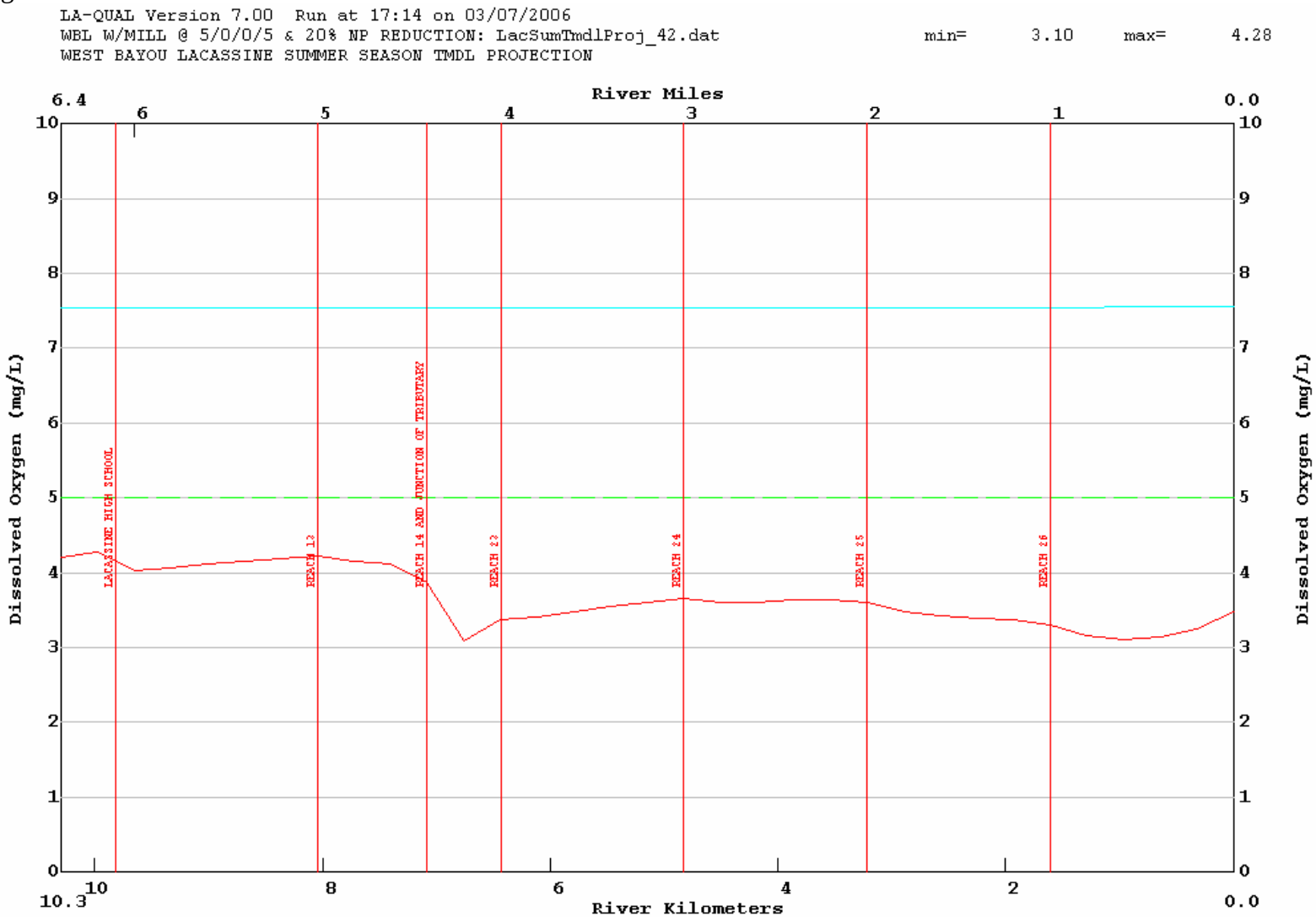


Figure 3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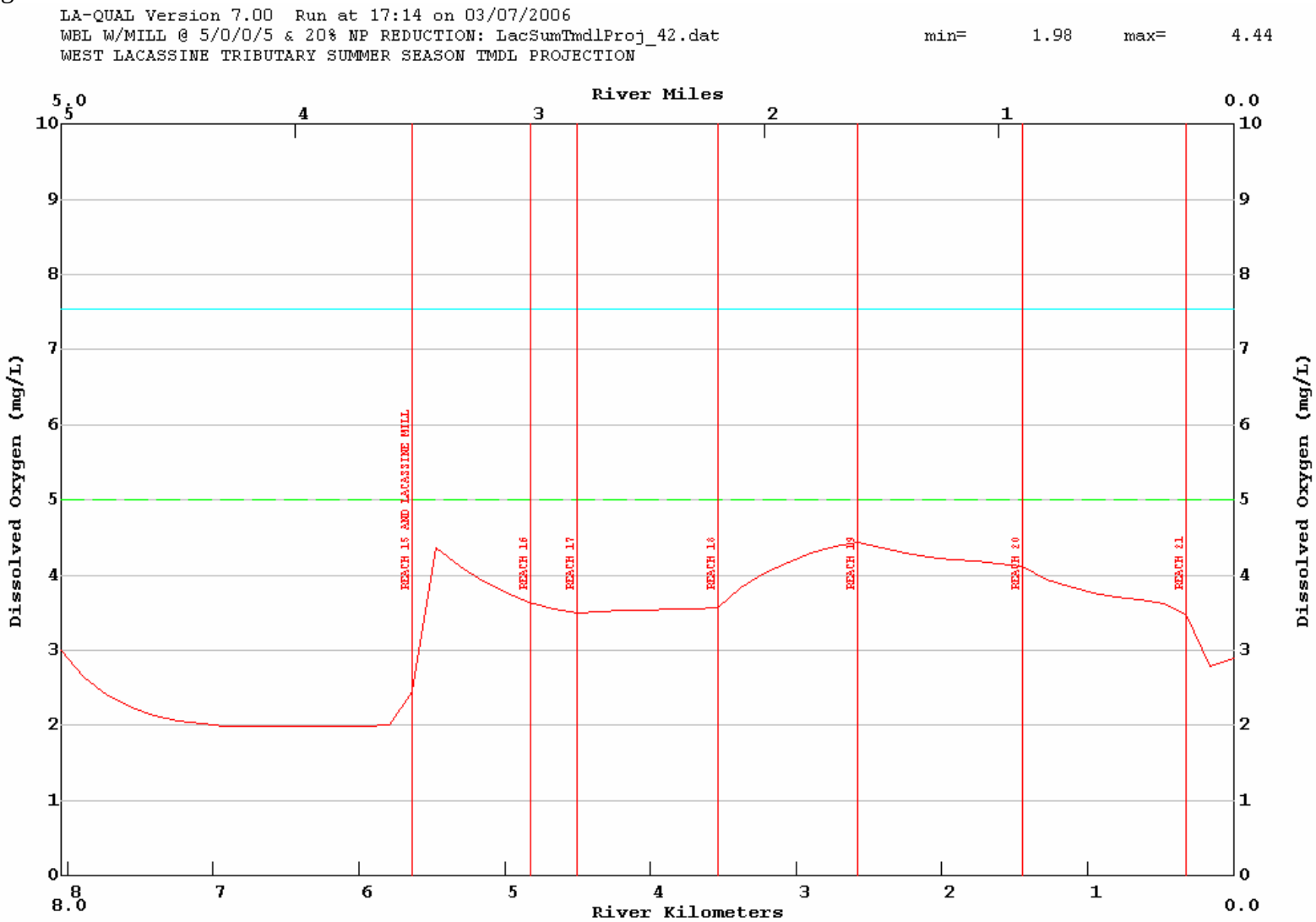
WEST BAYOU LACASSINE SUMMER SEASON TMDL PROJECTION
River Miles
6.4
0.0
6
5
4
3
2
1
Dissolved Oxygen (mg/L)
LACASSINE HIGH SCHOOL
REACH 13
REACH 14 AND JUNCTION OF TRIBUTARY
REACH 23
REACH 24
REACH 25
REACH 26
10.3
10
8
6
4
2
0.0
River Kilometers

Figure 4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WEST LACASSINE TRIBUTARY SUMMER SEASON TMDL PROJECTION
River Miles
River Kilometers
Dissolved Oxygen (mg/L)
REACH 15 AND LACASSINE MILL
REACH 16
REACH 17
REACH 18
REACH 19
REACH 20
REACH 21

Winter Season Wasteload Allocation Development

Similar to the development of summer season allocations, the model was projected at critical winter season conditions of 15.1 ^{o}C and a default minimum flow of 1.0 cfs. The winter season for these waters is defined as the months of December through February. A wasteload allocation of a maximum of 10 mg/l five day carbonaceous biochemical oxygen demand (CBOD5) and a minimum of 5 mg/l dissolved oxygen (DO) will allow the winter season water quality criteria of 5.0 mg/l DO to be met. The winter allocation for the mill has been made in compliance with the effluent standards cited by Title 33, Part IX of the Louisiana Regulatory Code, which allow effluent concentrations of 10 mg/l maximum CBOD5 and 4 mg/l minimum dissolved oxygen for discharge of treated wastewater from raw cane sugar processing. No reduction of man-made nonpoint loading in the West Bayou Lacassine watershed is needed during the winter season. Figures 5 and 6 depict the results of these runs. Figures 7 and 8 are the model dissolved oxygen projections for West Bayou Lacassine and for the tributary for 10/5 effluent limits and with no man-made nonpoint reduction.

Figure 5

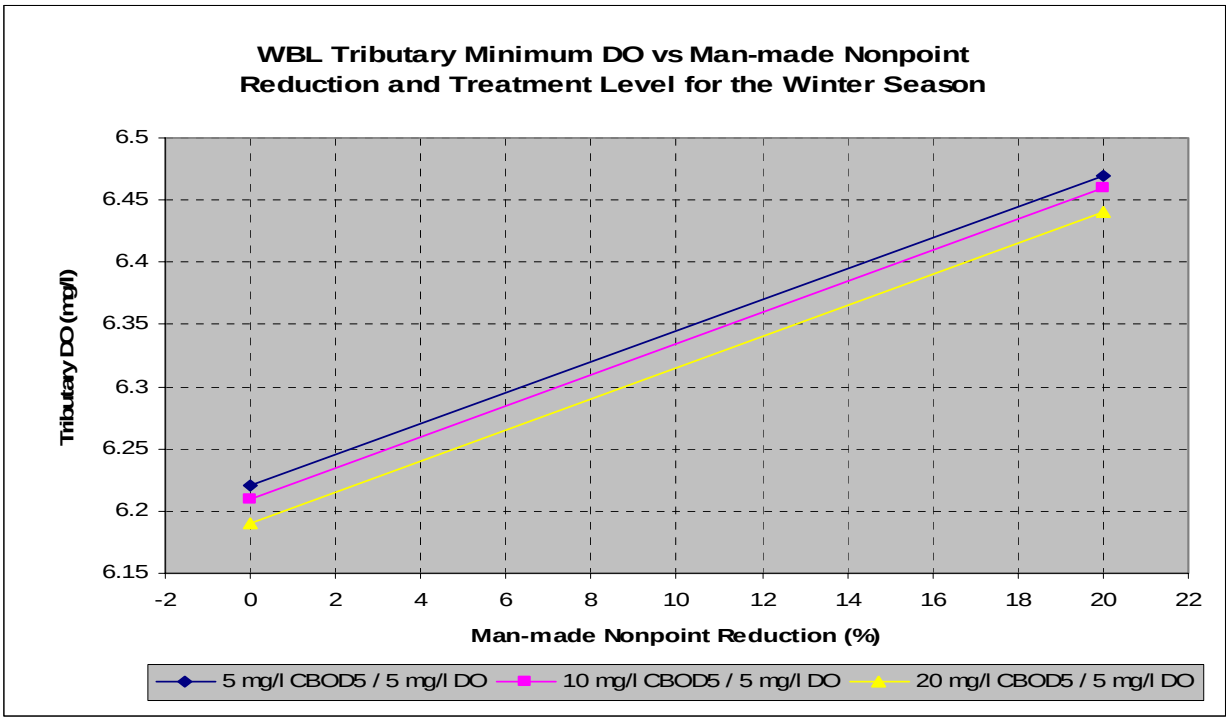


Figure 6

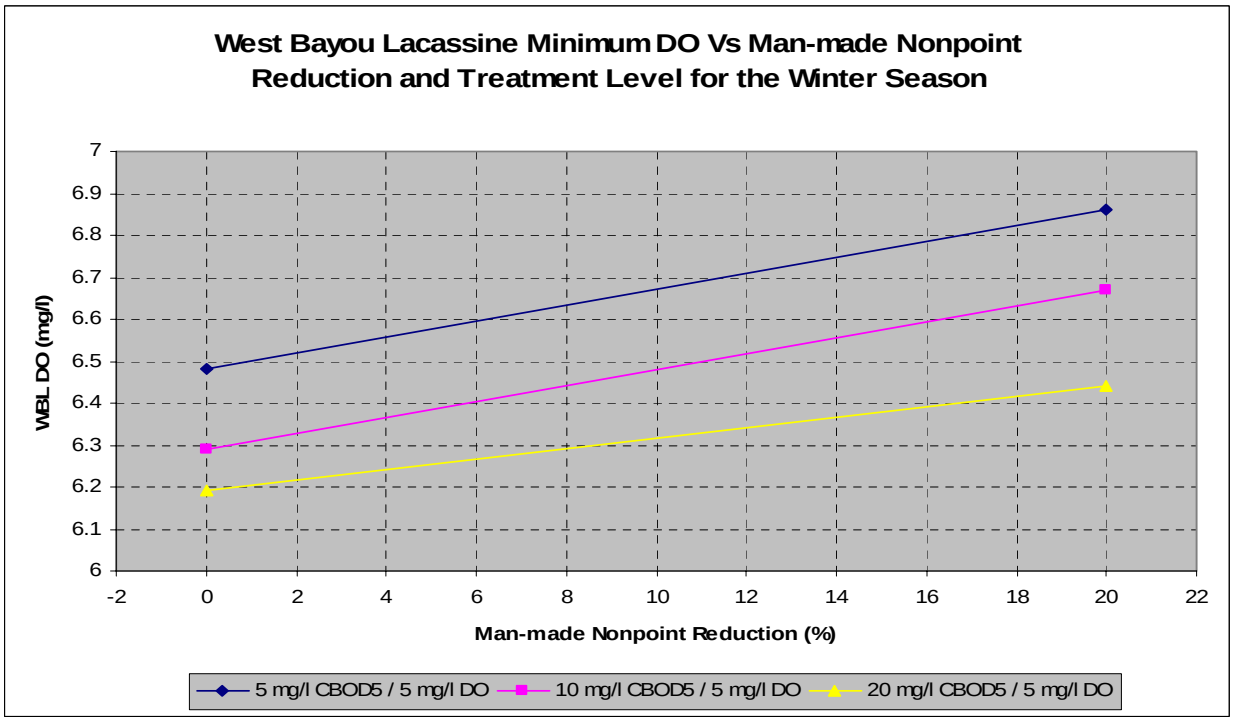
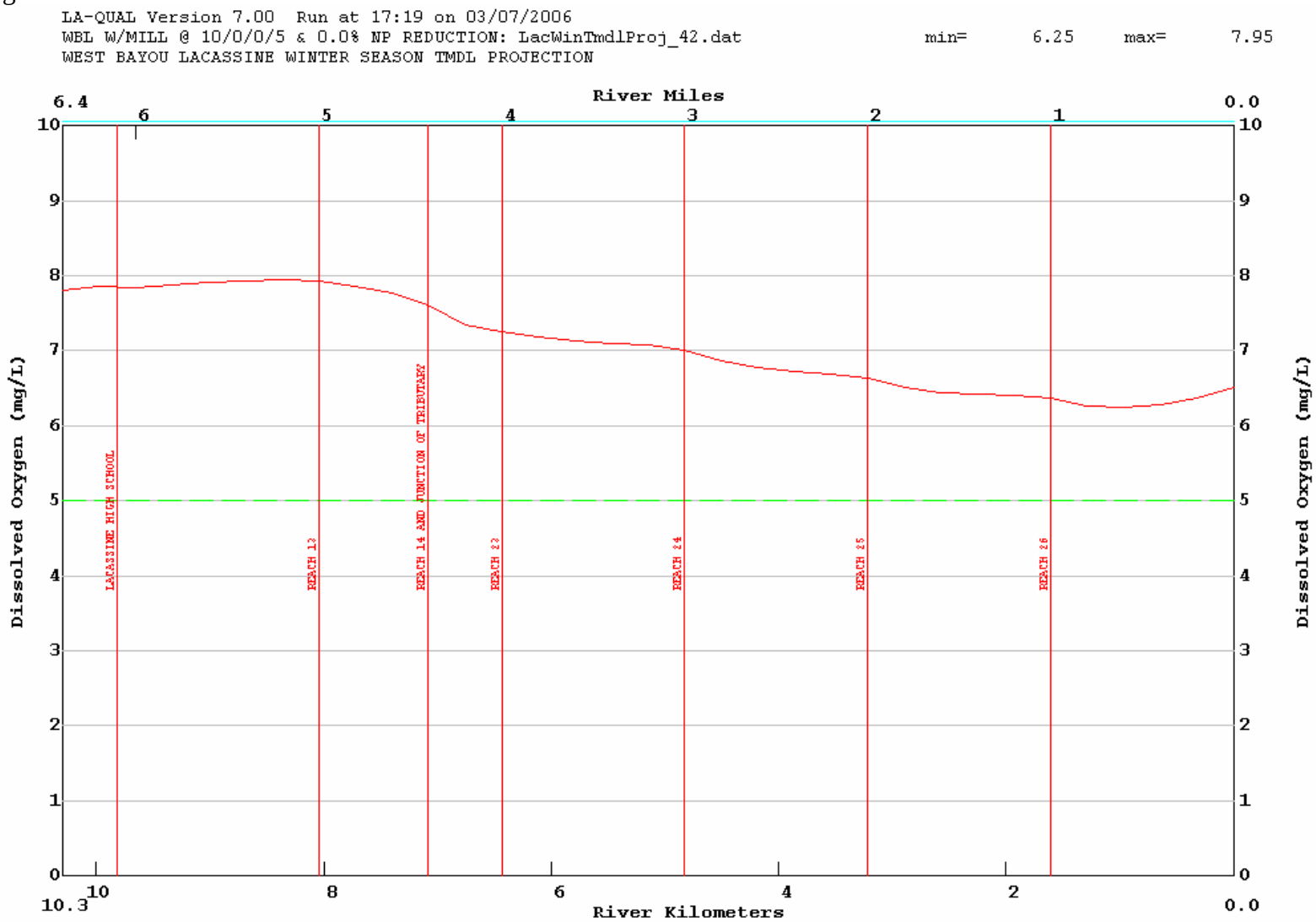


Figure 7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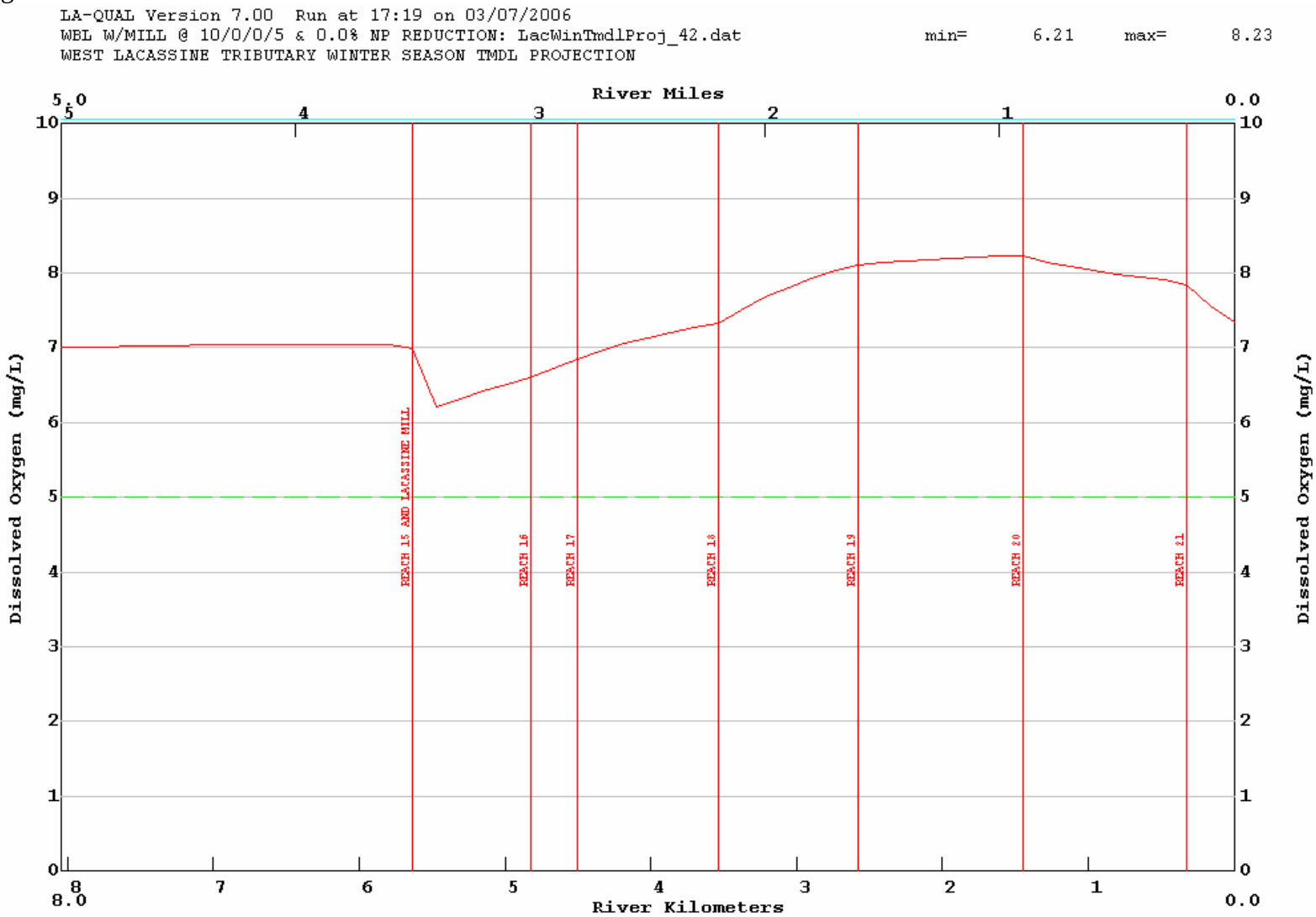
WEST BAYOU LACASSINE WINTER SEASON TMDL PROJECTION
River Miles
6.4
0.0
6
5
4
3
2
1
Dissolved Oxygen (mg/L)
LACASSINE HIGH SCHOOL
REACH 12
REACH 14 AND JUNCTION OF TRIBUTARY
REACH 22
REACH 24
REACH 25
REACH 26
10.3
10
8
6
4
2
0.0
River Kilometers

Figure 8


LA-QUAL Version 7.00 Run at 17:19 on 03/07/2006
WBL W/MILL @ 10/0/0/5 & 0.0% NP REDUCTION: LacWinTmdlProj_42.dat
min= 6.21 max= 8.23
WEST LACASSINE TRIBUTARY WINTER SEASON TMDL PROJECTION
River Miles
River Kilometers
Dissolved Oxygen (mg/L)
REACH 15 AND LACASSINE MILL
REACH 16
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Calculated Allocations and TMDLs

TMDLs for the oxygen demanding constituents have been calculated for the summer and winter season TMDL projections, and are presented in Tables 2 and 3.

Table 2

West Bayou Lacassine Summer Projection TMDL

PARAMETER	WLA (lb/day)	LA (lb/day)	MOS (lb/day)	TMDL (lb/day)
UCBOD	62.8	569.5	27.9	660.2
ORG-N	1.8	137.8	5.2	144.7
NH_3-N	3.5	70.0	5.2	78.7
SOD	--	5381.1	597.9	5979.0
TOTAL	68.1	6158.5	636.2	6862.7

Table 3

West Bayou Lacassine Winter Projection TMDL

PARAMETER	WLA (lb/day)	LA (lb/day)	MOS (lb/day)	TMDL (lb/day)
UCBOD	120.4	3601.1	34.4	3755.9
ORG-N	1.8	1009.1	6.8	1017.7
NH_3-N	3.5	329.2	2.7	335.4
SOD	--	2629.8	292.2	2922.0
TOTAL	125.6	7569.3	336.1	8031.0

Summer and winter season point source allocations and nonpoint reductions for West Bayou Lacassine are presented in Table 4.

Table 4

	Summer Season			Winter Season		
Facility	CBOD5	NH3-N	DO	CBOD5	NH3-N	DO
Lacassine High School	30 mg/l	---	---	30 mg/l	---	---
Lacassine Syrup Mill	5 mg/l	---	5 mg/l	10 mg/l	---	5 mg/l
Man-made nonpoint reductions	22 %			0%		

Conclusions

Wasteload allocations for the summer (March – November) and winter (December – February) seasons have been developed for Lake Charles Cane – Lacassine Mill, and are incorporated in the West Bayou Lacassine TMDL as follows:

Summer season	Winter season
CBOD5 (maximum) 5.0 mg/l	CBOD5 (maximum) 10.0 mg/l
Dissolved Oxygen (minimum) 5.0 mg/l	Dissolved Oxygen (minimum) 5.0 mg/l
22% reduction of nonpoint source load	Monitor dissolved oxygen in receiving stream
Monitor dissolved oxygen in receiving stream	

These effluent limitations are contingent upon a 22% reduction of man-made nonpoint source loading in the West Bayou Lacassine watershed. The model shows that the summer water quality criterion of 3.0 mg/l DO for dissolved oxygen will not be met without the reduction in the nonpoint source loading. The requirement that best management practices be implemented to achieve a 22% reduction of man-made nonpoint loading will be incorporated in the Water Quality Management Plan and subsequently, in the discharge permit for the syrup mill. Compliance with the required nonpoint reduction will be verified by monitoring dissolved oxygen for compliance with the criteria in the tributary and West Bayou Lacassine at Abell Road and in West Bayou Lacassine at Ardoin Cove Road. A requirement to monitor the dissolved oxygen in-stream year-round and report to LDEQ will also be incorporated in the discharge permit for the syrup mill.

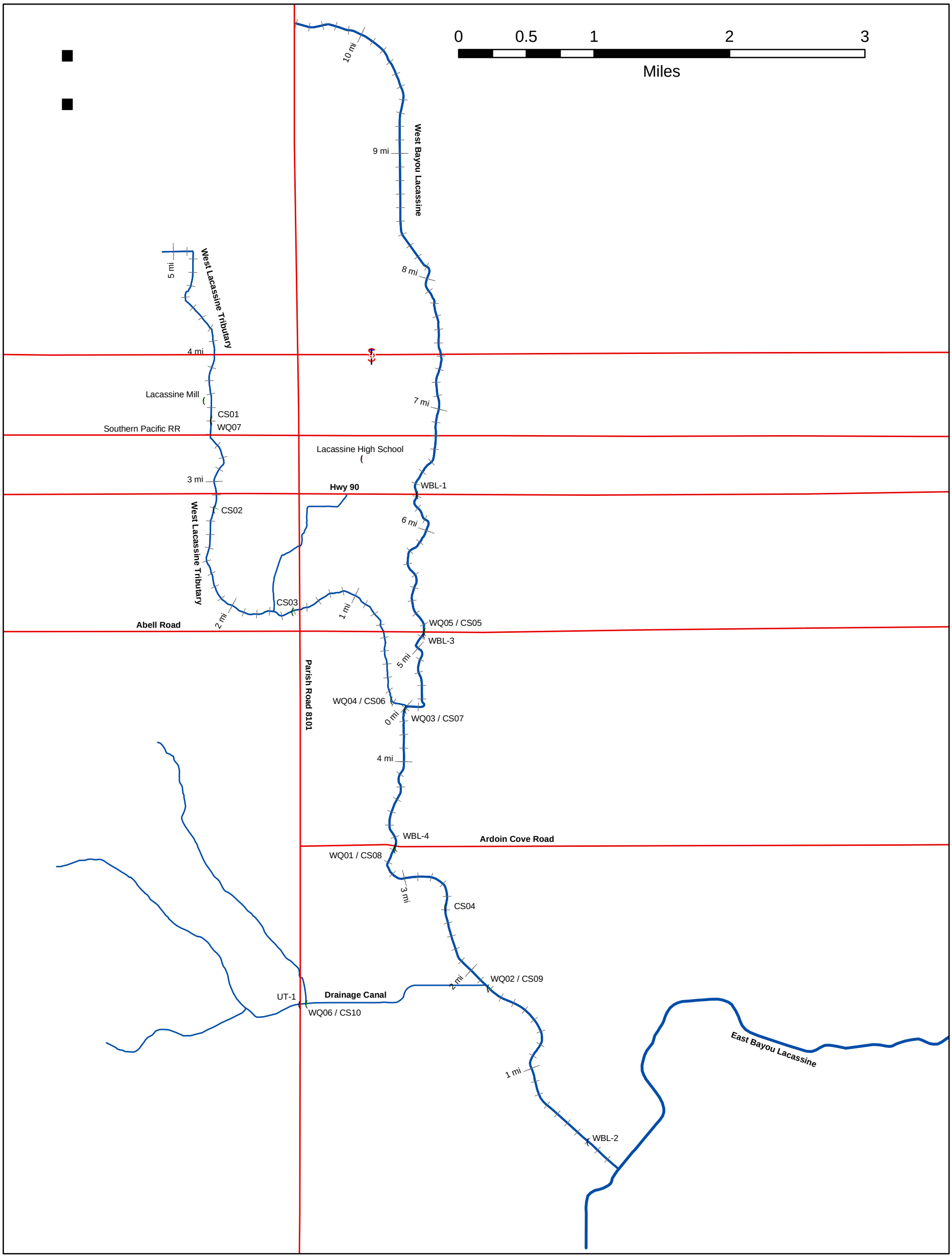
The winter allocation for the mill has been made in compliance with the effluent standards cited by Title 33, Part IX of the Louisiana Regulatory Code, which allow effluent concentrations of 10 mg/l maximum CBOD5 and 4 mg/l minimum dissolved oxygen for discharge of treated wastewater from raw cane sugar processing. No nonpoint reduction is required for the winter season.

ATTACHMENT A
Digital Map of West Bayou Lacassine

WEST BAYOU LACASSINE IN SUBSEGMENT 050601

Map date: 10/13/2004
Map number: 200503005
Map sources (cont): DOQQ raster maps
Map projection: UTM Zone 15
Map datum: NAD83
LDEQ/OEA/WQAD/ENG

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.



ATTACHMENT B

Data summary and critical temperature calculations

WEST BAYOU LACASSINE DATA SUMMARY

CROSS SECTIONS

CK Assoc

Site	Location	RM	Wetted Cross Sections Width (ft)	Depth (ft)	CK Flow (cfs)	Flow (cfs)
CS01	Trib - 20 yds upstream of proposed mill disch	3.52	4.00	0.66		
WQ07	Trib - at proposed mill disch	3.51	2.67	0.29	0.49	0.30
CS02*	Trib - 200 yds downstream of Hwy 90	2.80	6.0	0.45		
CS03	Trib - 100 yds upstream of Hwy 101	1.51	8.5	0.26		
WQ04/CS06*	Trib - 225 yds upstream of junction of WBL	0.13	20.0	1.25	0.00	0.00
WQ05/CS05*	WBL - 16 yds upstream of Abel Road Bridge		29.0	2.71	1.58	1.68
WQ03/CS07*	WBL - 36 yds downstream of junction of Trib		42.0	3.54	5.52	3.41
WQ01/CS08*	WBL - 24 yds downstream of Ardoin Cove Rd		56.0	3.91	4.65	2.55
CS04	WBL - midway Ardoin Cove Rd & Drainage Canal		72.0	4.86		
WQ02/CS09*	WBL - 50 yds downstream of Drainage Canal		80.0	7.64	16.83	16.63
WQ06/CS10*	Drainage Canal - 75 yds downstream of Hwy 101		63.0	3.32	5.71	4.91

* Significantly different from descriptions of site locations but agrees with CK map.

Trib geometry from full bank cross sections:

a	b	c	d	e	f
5.9545	0.4562	1.0000	0.6225	0.3812	0.1000
6.7707	0.2959	1.0000	0.5005	0.4738	0.1000
0.3881	0.7931	7.8920	0.5249	0.4076	0.1000

Calculated slope from cross sections (CS06 - CS02):

Avg. D	Max. D
0.000057	0.000057

FTN Asoc

WBL-1	WBL - at Hwy 90 Bridge	6.0	0.7
WBL-3	WBL - at Abell Rd Bridge	27.2	1.3
WBL-4	WBL - at Ardoin Cove Rd Bridge	55.8	4.6
WBL-2	WBL - 0.3 mile upstream of junction with EBL	105.0	8.9

WATER QUALITY

CK Assoc		Date	Time	Temp (oC)	pH	NO2-NO3 (mg/l)	NH3-N (mg/l)	TKN (mg/l)	Chloride (mg/l)	Time	DO (mg/l)	Time	DO (mg/l)	Org-N
WQ07	Trib - at proposed mill disch	11/10/04	9:00	N/A	N/A	0.28	0.59	2.24	33.70	8:40	6.0	N/A	N/A	1.65
WQ04	Trib - 225 yds upstream of junction of WBL	11/10/04	15:31	20.3	6.86	0.21	0.13	2.24	12.40	7:30	6.4	15:35	0.8	2.11
WQ05	WBL - 16 yds upstream of Abel Road Bridge	11/10/04	13:30	N/A	N/A	0.12	0.12	2.66	12.40	7:47	6.0	17:00	5.9	2.54
WQ03	WBL - 36 yds downstream of junction of Trib	11/10/04	16:40	22.9	6.62	0.07	0.19	2.94	14.20	7:17	5.4	16:40	5.8	2.75
WQ01	WBL - 24 yds downstream of Ardoin Cove Rd	11/10/04	15:00	20.0	6.53	0.08	0.23	2.38	14.20	6:44	4.8	17:15	4.8	2.15
WQ06	Drainage Canal - 75 yds downstream of Hwy 101	11/10/04	13:45	22.3	6.30	0.07	0.20	3.50	10.60	8:12	1.8	17:35	1.8	3.3
WQ02	WBL - 50 yds downstream of Drainage Canal	11/10/04	12:40	22.3	6.13	0.09	0.14	1.96	14.20	6:58	2.4	17:30	3.1	1.82
WQ07	Trib - at proposed mill disch	11/12/04	7:55	18.5	6.77					7:55	5.5			
WQ04	Trib - 225 yds upstream of junction of WBL	11/12/04		N/A	N/A									
WQ05	WBL - 16 yds upstream of Abel Road Bridge	11/12/04	13:30	18.7	6.83	0.12	0.13	1.54	12.40	13:30	5.0			1.41
WQ03	WBL - 36 yds downstream of junction of Trib	11/12/04		N/A	N/A									
WQ01	WBL - 24 yds downstream of Ardoin Cove Rd	11/12/04	12:20	17.7	6.65					12:20	4.0			
WQ06	Drainage Canal - 75 yds downstream of Hwy 101	11/12/04	10:21	17.1	6.63					10:21	2.3			
WQ02	WBL - 50 yds downstream of Drainage Canal	11/12/04	11:45	17.8	6.41					11:45	2.4			

Critical Temperature and DO Determinations:

Site Description:	Bayou Lacassine Site 98

Input values into shaded area

Raw Data				
Date			DO	Temperature
Mo	D	Yr	(mg/l)	(C^o)
12	2	2003	3.9	12.94
11	5	2003	5.24	23.09
10	7	2003	2.05	22.52
9	9	2003	3.83	27.7
8	19	2003	4.49	30.17
7	8	2003	1.92	27.97
6	3	2003	5.54	28.76
5	6	2003	4.56	26.53
4	8	2003	1.32	19.61
3	11	2003	2.03	14.3
2	4	2003	5.78	11.93
1	13	2003	6.21	10.29
12	2	1998	4.84	20.92
11	5	1998	1.29	20.21
10	7	1998		24.9
9	2	1998	2.05	28.87
8	5	1998	4.7	31.83
7	8	1998	6.34	31.72
6	17	1998	5.3	30.4
5	12	1998	3.5	26.3
4	14	1998	4.9	20.9
3	10	1998	4.2	14.4
2	10	1998	4.6	14.2
1	13	1998	6.3	15
12	9	1997	2.7	14.4
11	18	1997	4.5	13.4
10	14	1997	2.2	23.9
9	9	1997	7.1	29.6
8	12	1997	2.8	29.3
7	15	1997	1.6	28.2
6	10	1997	1.3	25.5
5	13	1997	1.1	21.2
4	15	1997	2.7	15.8
3	11	1997	4.3	20.9
2	18	1997	7.2	11.72
1	7	1997	2.8	16.4
12	10	1996	3.2	14.7
11	19	1996	3	19.4
10	15	1996	5.2	21.9
9	10	1996	1.4	26.5
8	13	1996	1.4	27.2
7	9	1996	7.4	30.6
6	11	1996	5.3	27.9
5	14	1996	4.7	26.63
4	9	1996	2.2	17.7
3	12	1996	7.3	12.4
2	13	1996	7.3	12.1
1	9	1996	7.3	8.9
12	12	1995	7.1	12.2
11	14	1995	2.8	16.4
10	10	1995	4.9	22.5
9	12	1995	2.6	27.9
8	15	1995	1.1	28.7
7	11	1995	2.6	29.2
6	13	1995	2.6	26.9
5	9	1995	2.2	22.6
4	4	1995	3.6	17
3	14	1995	5.2	14.8
2	14	1995	5.6	11.4
1	10	1995	5.2	12.2
12	13	1994	3	15.3
11	15	1994	5.4	20.9
10	11	1994	3.6	22
9	13	1994	1.1	26.2
8	9	1994	2.1	26.9
7	12	1994	3.6	25.8
6	14	1994	1.7	26.7
5	10	1994	1.1	24.8
4	12	1994	4.6	21.1
3	15	1994	5.2	15.8
2	8	1994	5.8	13.9
1	11	1994	7.6	10.5

Summer Season 90th Percentile, Temperature(^{o}C):	**30.1**
Winter Season 90th Percentile, Temperature(^{o}C):	**15.1**

Summer Season Median, DO(mg/l):	**3.60**
Winter Season Median, DO(mg/l):	**5.40**
Annual Median, DO(mg/l):	**3.90**
Annual 10th Percentile, DO(mg/l):	**1.45**

Summer Seasonal Months
3
4
5
6
7
8
9
10
11

Winter Seasonal Months
12
1
2

Summer season DO data count:	**88**
Winter season DO data count:	**28**
Summer season Temperature data count:	**85**
Winter season Temperature data count:	**28**

12	14	1993	3.5	14.5
11	16	1993	4.6	18.2
10	12	1993	5.7	23.6
9	14	1993	4.6	28.9
8	10	1993	4.6	30
7	13	1993	4.1	29.6
6	15	1993	3	28.9
5	11	1993	1.4	22.8
4	13	1993	4	19.3
3	9	1993	4.8	16.2
2	9	1993	5	12.7
1	12	1993	9.2	11.3
12	15	1992		
11	17	1992	3.4	14.7
10	13	1992	6.1	22.2
9	15	1992	2.1	26.58
8	11	1992	3.9	29.23
7	14	1992	4.9	30.7
6	16	1992	1.5	27.9
5	12	1992	4.4	22.7
4	7	1992	3	17.6
3	10	1992	3.1	20.1
2	11	1992	5.9	10.83
1	7	1992	4.6	13.4
12	10	1991	2.8	14.04
11	19	1991	3.2	
10	15	1991	6.4	19.25
9	10	1991	0.28	26.92
8	13	1991	3.2	29.84
7	16	1991		30.35
6	11	1991	2.6	24.4
5	14	1991	0.7	28.52
4	16	1991	3.9	20.1
3	12	1991	3.9	16.51
2	5	1991	3.9	12.18
1	15	1991	6	9.89
12	11	1990	3.06	12.33
11	14	1990	3.45	16.31
10	16	1990	5.9	23.55
9	11	1990	3.2	29.34
8	14	1990	5.3	30.29
7	10	1990	4.91	30.39
6	12	1990	3.8	
5	14	1990	3.6	
4	10	1990	2.8	
3	12	1990	4.6	
2	12	1990		
1	8	1990	5.6	13.1

ATTACHMENT C

Summer season projection input and TMDL calculations

BAYOU LACASSINE SUMMER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: BENTHIC SOURCES
Input to blue shaded areas

		Calibration Benthic Source Loads and Rates									Split to Background and Man-made Calibration Benthic Load				Adjustment of Calibration Benthic Load				Projection Input Source Rates					
Reach No.	Reach Length (mi)	Cal Width (ft)	Benthic NH_3-N (mg/ft^2-d)	Theta for NH3 Decay	Nonpoint CBOD (lb/d)	Nonpoint CBOD (mg/ft^2d)	Nonpoint Org-N (lb/d)	Nonpoint Org-N (mg/ft^2d)	SOD (mg/ft^2d)	Theta for SOD	Tot Cal Benthic Load (mgO/ft^2d)	Bkgrnd Cal Benthic Load (gmO/m^2d)	Bkgrnd Cal Benthic Load (mgO/ft^2d)	Man-made Cal Benthic Load (mgO/ft^2d)	MOS for man made load (%)	Reduct-ion of man-made Load (%)	Reduct-ion of Bkgrnd Load (%)	Reduced Total Cal Benthic Load (mgO/ft^2d)	Benthic NH_3-N (mg/ft^2-d)	Nonpoint CBOD (mg/ft^2d)	Nonpoint CBOD (lb/d)	Nonpoint Org-N (mg/ft^2d)	Nonpoint Org-N (lb/d)	SOD (mg/ft2-d)
1	1.40	18.80	0.00	1.083	2.600	8.494	0.10	0.33	140.00	1.065	149.987	1.000	92.903	57.084	10.000	20.000	0.000	143.644	0.00	8.13	2.00	0.31	0.08	134.0797
2	0.60	35.30	0.00	1.083	4.884	19.828	0.20	0.80	140.00	1.065	163.501	1.000	92.903	70.598	10.000	20.000	0.000	155.657	0.00	18.88	3.73	0.77	0.15	133.2833
3	1.50	4.00	0.00	1.083	0.700	10.032	0.24	3.44	480.00	1.065	505.750	1.000	92.903	412.847	10.000	20.000	0.000	459.878	0.00	9.12	0.28	3.13	0.09	436.4637
4	0.50	3.31	0.00	1.083	0.100	5.195	0.12	6.23	470.00	1.065	503.687	1.000	92.903	410.784	10.000	20.000	0.000	458.045	0.00	4.72	0.16	5.67	0.19	427.4100
5	0.20	5.72	0.00	1.083	0.100	7.516	0.04	3.01	350.00	1.065	371.256	1.000	92.903	278.353	10.000	20.000	0.000	340.328	0.00	6.89	0.19	2.76	0.08	320.8427
6	0.60	6.12	0.00	1.083	0.150	3.512	0.16	3.75	330.00	1.065	350.634	1.000	92.903	257.731	10.000	20.000	0.000	321.998	0.00	3.23	0.27	3.44	0.29	303.0484
7	0.60	7.94	0.00	1.083	0.300	5.415	0.22	3.97	180.00	1.065	203.561	1.000	92.903	110.658	10.000	20.000	0.000	191.266	0.00	5.09	0.46	3.73	0.34	169.1278
8	0.70	8.60	0.00	1.083	0.400	5.713	0.26	3.71	220.00	1.065	242.685	1.000	92.903	149.782	10.000	20.000	0.000	226.042	0.00	5.32	0.56	3.46	0.36	204.9132
9	0.70	20.01	0.00	1.083	2.400	14.733	1.05	6.45	200.00	1.065	244.189	1.000	92.903	151.286	10.000	20.000	0.000	227.380	0.00	13.72	2.23	6.00	0.98	186.2323
10	0.20	20.01	0.00	1.083	0.100	2.149	0.40	8.59	390.00	1.065	431.424	1.000	92.903	338.521	10.000	20.000	0.000	393.811	0.00	1.96	0.09	7.84	0.37	355.9981
11	0.40	35.30	0.00	1.083	3.256	19.828	0.13	0.80	140.00	1.065	163.501	1.000	92.903	70.598	10.000	20.000	0.000	155.657	0.00	18.88	3.27	0.77	0.13	133.2833
12	1.00	40.00	0.00	1.083	15.510	33.341	0.69	1.48	140.00	1.065	180.119	1.000	92.903	87.216	10.000	20.000	0.000	170.428	0.00	31.55	14.68	1.40	0.65	132.4678
13	1.00	57.48	1.00	1.083	27.530	41.182	1.41	2.11	140.00	1.065	195.392	1.000	92.903	102.489	10.000	20.000	0.000	184.004	0.94	38.78	25.93	1.99	1.33	131.8407
14	1.00	77.44	1.00	1.083	43.230	48.000	2.29	2.54	155.00	1.065	219.190	1.000	92.903	126.287	10.000	20.000	0.000	205.158	0.94	44.93	40.46	2.38	2.14	145.0774
15	1.00	99.99	2.50	1.083	63.990	55.027	3.45	2.97	170.00	1.065	250.010	1.000	92.903	157.107	10.000	20.000	0.000	232.554	2.33	51.19	59.52	2.76	3.21	158.1302

West Bayou Lacassine West Bayou Lacassine Tributary

BAYOU LACASSINE SUMMER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: BENTHIC SOURCES

Input to blue shaded areas

Reach No.	Projection Stream Temp (^oC)	Projection Stream Width (ft)	Projection Oxygen Demanding Load Allocation				Projection MOS			
			NH_3-N (lb O_2/d)	**CBOD (lb O_2/d)**	**Org-N (lb O_2/d)**	**SOD (lb O_2/d)**	**NH_3-N (lb O_2/d)**	**CBOD (lb O_2/d)**	**Org-N (lb O_2/d)**	**SOD (lb O_2/d)**
1	30.1	15.09	0.0	7.3	0.3	255.9	0.0	0.8	0.0	28.4
2	30.1	28.35	0.0	17.0	0.7	204.9	0.0	1.9	0.1	22.8
3	30.1	1.74	0.0	8.2	2.8	102.9	0.0	0.9	0.3	11.4
4	30.1	5.90	0.0	4.3	5.1	113.9	0.0	0.5	0.6	12.7
5	30.1	11.95	0.0	6.2	2.5	69.3	0.0	0.7	0.3	7.7
6	30.1	11.95	0.0	2.9	3.1	196.3	0.0	0.3	0.3	21.8
7	30.1	12.95	0.0	4.6	3.4	118.7	0.0	0.5	0.4	13.2
8	30.1	12.95	0.0	4.8	3.1	167.8	0.0	0.5	0.3	18.6
9	30.1	20.01	0.0	12.3	5.4	235.7	0.0	1.4	0.6	26.2
10	30.1	20.01	0.0	1.8	7.1	128.7	0.0	0.2	0.8	14.3
11	30.1	37.25	0.0	17.0	0.7	179.4	0.0	1.9	0.1	19.9
12	30.1	40.00	0.0	28.4	1.3	478.8	0.0	3.2	0.1	53.2
13	30.1	57.48	5.8	34.9	1.8	684.8	0.6	3.9	0.2	76.1
14	30.1	77.44	7.8	40.4	2.1	1015.2	0.9	4.5	0.2	112.8
15	30.1	99.99	24.9	46.1	2.5	1428.7	2.8	5.1	0.3	158.7
		Total	38.4	236.1	41.8	5381.1	4.3	26.2	4.6	597.9

BAYOU LACASSINE SUMMER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: HEADWATER AND TRIBUTARIES

Input to blue shaded areas

	Calibration Concentrations								MOS & Reduction						Projection Input Concentrations			
Name	Chl-a (ug/l)	UCBOD (mg/l)	Org-N (mg/l)	NH_3-N (mg/l)	NOx-N (mg/l)	Org-P (mg/l)	Dis-P (mg/l)	Equiv-alent Cal UBOD (mg/l)	Bkgrnd cal UBOD (mg/l)	Man-made Cal UBOD (mg/l)	MOS (%)	Reduction of Cal Bkgrnd Load (%)	Reduction of Cal Man-made Load (%)	Reduced Cal UBOD Load (%)	Chl-a (ug/l)	UCBOD (mg/l)	Org-N (mg/l)	NH_3-N (mg/l)
WBL Headwater	2.00	3.62	0.29	0.05	0.05	0.00	0.00	5.17	3.00	2.17	10	0	20	4.93	1.91	3.45	0.28	0.05
Tributary Headwater	0.00	3.00	1.65	0.59	0.28	0.00	0.00	13.24	3.00	10.24	10	0	20	12.10	0.00	2.74	1.51	0.54

BAYOU LACASSINE SUMMER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: HEADWATER AND TRIBUTARIES

Input to blue shaded areas

Projection Input Concentrations				**Projection Oxygen Demanding Load Allocations**			**Projection MOS**		
NOx-N (mg/l)	Org-P (mg/l)	Dis-P (mg/l)	Projection Critical Flow (cfs)	**UCBOD (lb O_2/d)**	**Org-N (lb O_2/d)**	**NH_3-N (lb O_2/d)**	**UCBOD (lb O_2/d)**	**Org-N (lb O_2/d)**	**NH_3-N (lb O_2/d)**
0.05	0.00	0.00	0.10	185.74	14.88	2.57	0.19	0.01	0.00
0.26	0.00	0.00	0.10	147.59	81.18	29.03	0.15	0.08	0.03
			Total	333.33	96.06	31.59	0.33	0.10	0.03

BAYOU LACASSINE SUMMER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: POINT SOURCES

Input to blue shaded areas

Name	$CBOD_5$ (mg/l)	UCBOD (mg/l)	MOS (%)	Projection UCBOD (mg/l)	Org-N (mg/l)	NH_3-N (mg/l)	NO_3-N (mg/l)	Projection Flows: Design Flows (mgd)	Projection Flows: MOS (%)	Projection Flows: Projection Flows (mgd)	Projection Flows: Projection Flows (cfs)	**Projection Oxygen Demanding Waste Load Allocations: UCBOD (lb O_2/d)**	**Projection Oxygen Demanding Waste Load Allocations: Org-N (lb O_2/d)**	**Projection Oxygen Demanding Waste Load Allocations: NH3-N (lb O_2/d)**	**Projection MOS: UCBOD (lb O_2/d)**	**Projection MOS: Org-N (lb O_2/d)**	**Projection MOS: NH3-N (lb O_2/d)**
Lacassine High School	30.0	69.0	0.0	69.000	5.00	10.00	0.05	0.0092	20	0.0115	0.0178	5.3	1.8	3.5	1.3	0.4	0.9
Lacassine Syrup Mill	5.0	11.5	20.0	14.375	0.00	0.00	0.00	0.6000	0	0.6000	0.9282	57.5	0.0	0.0	0.0	0.0	0.0
											Total	62.8	1.8	3.5	1.3	0.4	0.9

BAYOU LACASSINE SUMMER PROJECTION AND TMDL WORKSHEET
TMDL CALCULATIONS

PARAMETER	WLA (lb/day)	LA (lb/day)	MOS (lb/day)	TMDL (lb/day)
UCBOD	62.8	569.5	27.9	660.2
ORG-N	1.8	137.8	5.2	144.7
NH_3-N	3.5	70.0	5.2	78.7
SOD	--	5381.1	597.9	5979.0
TOTAL	68.1	6158.5	636.2	6862.7

ATTACHMENT D

Summer season TMDL projection input file

```
CNTROL01     Bayou West Lacassine including West Lacassine Tributary
CNTROL02     WBL W/MILL @ 5/0/0/5 & 20% NP REDUCTION: LacSumTmdlProj_42.dat
CNTROL12  NO METR
ENDATA01
MODOPT01  NO TEMP
MODOPT02  NO SALI
MODOPT03  NO CONS                                                    CHLORIDE
MODOPT04  NO CONS                                                    CONDUCTIVITY
MODOPT05 YES DISS
MODOPT06 YES BIOC
MODOPT07 YES NITR
MODOPT08  NO PHOS
MODOPT09  NO CHLO
MODOPT10  NO MACR
MODOPT11  NO COLI
MODOPT12  NO NONC
ENDATA02
PROGRAM  MAXIMUM ITERATION LIMIT                  1000.0
PROGRAM  N INHIBITION                                1.0
PROGRAM  KL MINIMUM                                  0.7
ENDATA03
CORRCT01 NH3 DECAY    1.07
CORRCT02 BENTHAL     1.065
CORRCT03 REAERATI    1.024
ENDATA04
ENDATA05
ENDATA06
ENDATA07
REACH ID   1   WL Begin West Bayou Lacassine             6.4         5       0.2
REACH ID   2   WL West Bayou Lacassine                     5       4.4       0.2
REACH ID   3   TR West Lacassine Trib Headwater            5       3.5       0.1
REACH ID   4   TR West Lacassine Trib                    3.5       3.0       0.1
REACH ID   5   TR West Lacassine Trib                    3.0       2.8       0.1
REACH ID   6   TR West Lacassine Trib                    2.8       2.2       0.1
REACH ID   7   TR West Lacassine Trib                    2.2       1.6       0.1
REACH ID   8   TR West Lacassine Trib                    1.6       0.9       0.1
REACH ID   9   TR West Lacassine Trib                    0.9       0.2       0.1
REACH ID   10  TR West Lacassine Trib                    0.2       0.0       0.1
REACH ID   11  WL West Bayou Lacassine                   4.4         4       0.2
REACH ID   12  WL West Bayou Lacassine                     4         3       0.2
REACH ID   13  WL West Bayou Lacassine                     3         2       0.2
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REACH ID   14  WL West Bayou Lacassine                    2         1       0.2
REACH ID   15  WL West Bayou Lacassine at confl           1         0       0.2
ENDATA08
HYDR-1     1   3.68E-02  0.43      1.39      0.45      0.00      0.00
HYDR-1     2   1.03E-02  0.43      2.65      0.45      0.00      0.00
HYDR-1     3   0.215     0.190     0.800     0.285     0.000     0.060
HYDR-1     4   0.215     0.190     0.800     0.285     0.000     0.060
HYDR-1     5   0.1387    0.2910    0.180     1.059     0.43      0.060
HYDR-1     6   0.1387    0.2910    0.180     1.05      0.43      0.060
HYDR-1     7   0.245     0.350     0.098     1.05      0.22      0.060
HYDR-1     8   0.245     0.350     0.098     1.05      0.22      0.060
HYDR-1     9   0.040     1.000     0.000     0.000     1.25      0.060
HYDR-1     10  0.040     1.000     0.000     0.000     1.25      0.060
HYDR-1     11  1.03E-02  0.43      2.65      0.45      0.00      0.00
HYDR-1     12  6.10E-03  1.0       4.10      0.00      0.00      0.00
HYDR-1     13  2.98E-03  1.0       5.84      0.00      0.00      0.00
HYDR-1     14  1.84E-03  1.0       7.02      0.00      0.00      0.00
HYDR-1     15  1.22E-03  1.0       8.20      0.00      0.00      0.00
ENDATA09
HYDR-2     1     1.0       8.0       0.0       0.0       0.0
HYDR-2     2     1.0       8.0       0.0       0.0       0.0
HYDR-2     3     0.0       8.0       0.0       0.0       0.0
HYDR-2     4     0.0       8.0       0.0       0.0       0.0
HYDR-2     5     0.0       8.0       0.0       0.0       0.0
HYDR-2     6     0.0       8.0       0.0       0.0       0.0
HYDR-2     7     0.0       8.0       0.0       0.0       0.0
HYDR-2     8     0.0       8.0       0.0       0.0       0.0
HYDR-2     9     1.0       8.0       0.0       0.0       0.0
HYDR-2     10    1.0       8.0       0.0       0.0       0.0
HYDR-2     11    1.0       8.0       0.0       0.0       0.0
HYDR-2     12    1.0       8.0       0.0       0.0       0.0
HYDR-2     13    1.0       8.0       0.0       0.0       0.0
HYDR-2     14    1.0       8.0       0.0       0.0       0.0
HYDR-2     15    1.0       8.0       0.0       0.0       0.0
ENDATA10
INITIAL    1      30.1     0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    2      30.1     0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    3      30.1     0.0     3.0     0.2     0.1     0.0     0.0     0.0
INITIAL    4      30.1     0.0     3.0     0.2     0.1     0.0     0.0     0.0
INITIAL    5      30.1     0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    6      30.1     0.0     3.0     0.2     0.1     0.0     0.0    50.0
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INITIAL    7      30.1     0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    8      30.1     0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    9      30.1     0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    10     30.1     0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    11     30.1     0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    12     30.1     0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    13     30.1     0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    14     30.1     0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    15     30.1     0.0     3.0     0.1     0.1     0.0     0.0     0.0
ENDATA11
COEF-1     1    11.0   3.0  0.0    0.0  134.1   0.06    0.0    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     2    11.0   3.0  0.0    0.0  133.3  0.066    0.0    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     3    15.0   0.0  0.0    0.0  436.5  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     4    15.0   0.0  0.0    0.0  427.4  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     5    15.0   0.0  0.0    0.0  320.8  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     6    15.0   0.0  0.0    0.0  303.0  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     7    15.0   0.0  0.0    0.0  169.1  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     8    15.0   0.0  0.0    0.0  204.9  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     9    15.0   0.0  0.0    0.0  186.2  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     10   15.0   0.0  0.0    0.0  356.0  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     11   11.0   3.0  0.0    0.0  133.3  0.066    0.0    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     12   11.0   3.0  0.0    0.0  132.5  0.072    0.0    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     13   11.0   3.0  0.0    0.0  131.8  0.078    0.0    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     14   11.0   3.0  0.0    0.0  145.1  0.084    0.0    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     15   11.0   3.0  0.0    0.0  158.1   0.09    0.0    0.0    0.0    0.0    0.0    0.0    0.0
ENDATA12
COEF-2     1      0.02    0.0    0.0    0.2    0.0    0.0    0.0
COEF-2     2      0.02    0.0    0.0    0.1    0.0    0.0    0.0
COEF-2     3      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     4      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     5      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     6      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     7      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     8      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     9      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     10     0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     11     0.02    0.0    0.0    0.1    0.0    0.0    0.0
COEF-2     12     0.02    0.0    0.0    0.1    0.0    0.0    0.0
COEF-2     13     0.02    0.0    0.0    0.1   0.94    0.0    0.0
COEF-2     14     0.02    0.0    0.0    0.1   0.94    0.0    0.0
COEF-2     15     0.02    0.0    0.0    0.1   2.33    0.0    0.0
```

```
ENDATA13
ENDATA14
ENDATA15
ENDATA16
ENDATA17
ENDATA18
NONPNT     1        2.00   0.08
NONPNT     2        3.73   0.15
NONPNT     3        0.28   0.09
NONPNT     4        0.16   0.19
NONPNT     5        0.19   0.08
NONPNT     6        0.27   0.29
NONPNT     7        0.46   0.34
NONPNT     8        0.56   0.36
NONPNT     9        2.23   0.98
NONPNT     10       0.09   0.37
NONPNT     11       3.27   0.13
NONPNT     12       14.7   0.65
NONPNT     13       25.9   1.33
NONPNT     14       40.5   2.14
NONPNT     15       59.5   3.21
ENDATA19
HDWTR-1     1  WEST BAYOU LACASSINE          0.1    30.1     0.0    15.0   250.0
HDWTR-1    11  W. B. LACASSINE TRIB         0.10    30.1     0.0    33.7     0.0
ENDATA20
HDWTR-2     1        4.2     3.45     0.28     0.05     0.05
HDWTR-2    11        3.0     2.74     1.51     0.54     0.26
ENDATA21
HDWTR-3     1       0.00      1.9
HDWTR-3    11        0.0      0.0
ENDATA22
JUNCTION   61   10    CONFLUENCE OF TRIB WITH WBL
ENDATA23
WSTLD-1     2  LACASSINE HIGH SCHL    0.0178     30.0      0.0       20      170
WSTLD-1    26  LACASSINE MILL         0.9282     30.0      0.0      0.0      0.0
ENDATA24
WSTLD-2     2        2.0     69.0  0.0      5.0     10.0  0.0     0.05
WSTLD-2    26        5.0    14.38  0.0     0.00     0.00  0.0     0.00
ENDATA25
WSTLD-3     2       0.00      0.0      0.0      0.0
WSTLD-3    26       0.00      0.0      0.0      0.0
```

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ENDATA26
LOWER BC TEMP                                      30.0
LOWER BC SALINITY                                   0.0
LOWER BC CONSERVATIVE MATERIAL 1                   18.3
LOWER BC CONSERVATIVE MATERIAL 2                  200.8
LOWER BC DISSOLVED OXYGEN                           3.7
LOWER BC BIOCHEMICAL OXYGEN DEMAND                 1.23
LOWER BC ORGANIC NITROGEN                          0.29
LOWER BC AMMONIA NITROGEN                          0.12
LOWER BC NITRATE + NITRITE                        16.38
LOWER BC PHOSPHORUS                                0.00
LOWER BC CHLOROPHYLL A                             0.00
LOWER BC COLIFORM                                  0.00
LOWER BC NONCONSERVATIVE MATERIAL                  0.00
ENDATA27
ENDATA28
ENDATA29
NUMBER OF PLOTS = 2
NUMBER OF REACHES IN PLOT 1 =  7
PLOT RCH  1  2 11 12 13 14 15
NUMBER OF REACHES IN PLOT 2 =  8
PLOT RCH  3  4  5  6  7  8  9 10
ENDATA30
OVERLAY 1                   OPDATA2.TXT   WEST BAYOU LACASSINE SUMMER SEASON TMDL PROJECTION
OVERLAY 2                   OPDATA3.TXT   WEST LACASSINE TRIBUTARY SUMMER SEASON TMDL PROJECTION
ENDATA31
END
```

ATTACHMENT E

Winter season projection input and TMDL calculations

WEST BAYOU LACASSINE WINTER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: BENTHIC SOURCES

Input to blue shaded areas

		Calibration Benthic Source Loads and Rates									Split to Background and Man-made Calibration Benthic Load				Adjustment of Calibration Benthic Load				Projection Input Source Rates					
Reach No.	Reach Length (mi)	Cal Width (ft)	Benthic NH_3-N (mg/ft^2-d)	Theta for NH3 Decay	Nonpoint CBOD (lb/d)	Nonpoint CBOD (mg/ft^2d)	Nonpoint Org-N (lb/d)	Nonpoint Org-N (mg/ft^2d)	SOD (mg/ft^2d)	Theta for SOD	Tot Cal Benthic Load (mgO/ft^2d)	Bkgrnd Cal Benthic Load (gmO/m^2d)	Bkgrnd Cal Benthic Load (mgO/ft^2d)	Man-made Cal Benthic Load (mgO/ft^2d)	MOS for man-made load (%)	Reduct-ion of man-made Load (%)	Reduct-ion of Bkgrnd Load (%)	Reduced Total Cal Benthic Load (mgO/ft^2d)	Benthic NH_3-N (mg/ft^2-d)	Nonpoint CBOD (mg/ft^2d)	Nonpoint CBOD (lb/d)	Nonpoint Org-N (mg/ft^2d)	Nonpoint Org-N (lb/d)	SOD (mg/ft2-d)
1	1.40	18.80	0.00	1.083	2.600	8.494	0.10	0.33	140.00	1.065	149.987	1.000	92.903	57.084	10.00	0.00	0.00	156.330	0.00	8.85	2.82	0.34	0.11	145.9203
2	0.60	35.30	0.00	1.083	4.884	19.828	0.20	0.80	140.00	1.065	163.501	1.000	92.903	70.598	10.00	0.00	0.00	171.345	0.00	20.78	5.32	0.84	0.22	146.7167
3	1.50	4.00	0.00	1.083	0.700	10.032	0.24	3.44	480.00	1.065	505.750	1.000	92.903	412.847	10.00	0.00	0.00	551.621	0.00	10.94	1.11	3.75	0.38	523.5363
4	0.50	3.31	0.00	1.083	0.100	5.195	0.12	6.23	470.00	1.065	503.687	1.000	92.903	410.784	10.00	0.00	0.00	549.330	0.00	5.67	0.27	6.80	0.32	512.5900
5	0.20	5.72	0.00	1.083	0.100	7.516	0.04	3.01	350.00	1.065	371.256	1.000	92.903	278.353	10.00	0.00	0.00	402.184	0.00	8.14	0.28	3.26	0.11	379.1573
6	0.60	6.12	0.00	1.083	0.150	3.512	0.16	3.75	330.00	1.065	350.634	1.000	92.903	257.731	10.00	0.00	0.00	379.271	0.00	3.80	0.39	4.05	0.41	356.9516
7	0.60	7.94	0.00	1.083	0.300	5.415	0.22	3.97	180.00	1.065	203.561	1.000	92.903	110.658	10.00	0.00	0.00	215.856	0.00	5.74	0.60	4.21	0.44	190.8722
8	0.70	8.60	0.00	1.083	0.400	5.713	0.26	3.71	220.00	1.065	242.685	1.000	92.903	149.782	10.00	0.00	0.00	259.327	0.00	6.11	0.75	3.97	0.49	235.0868
9	0.70	20.01	0.00	1.083	2.400	14.733	1.05	6.45	200.00	1.065	244.189	1.000	92.903	151.286	10.00	0.00	0.00	260.999	0.00	15.75	2.57	6.89	1.12	213.7677
10	0.20	20.01	0.00	1.083	0.100	2.149	0.40	8.59	390.00	1.065	431.424	1.000	92.903	338.521	10.00	0.00	0.00	469.037	0.00	2.34	0.11	9.34	0.43	424.0019
11	0.40	35.30	0.00	1.083	3.256	19.828	0.13	0.80	140.00	1.065	163.501	1.000	92.903	70.598	10.00	0.00	0.00	171.345	0.00	20.78	4.03	0.84	0.16	146.7167
12	1.00	40.00	0.00	1.083	15.510	33.341	0.69	1.48	140.00	1.065	180.119	1.000	92.903	87.216	10.00	0.00	0.00	189.810	0.00	35.13	16.34	1.56	0.73	147.5322
13	1.00	57.48	1.00	1.083	27.530	41.182	1.41	2.11	140.00	1.065	195.392	1.000	92.903	102.489	10.00	0.00	0.00	206.779	1.06	43.58	29.13	2.23	1.49	148.1593
14	1.00	77.44	1.00	1.083	43.230	48.000	2.29	2.54	155.00	1.065	219.190	1.000	92.903	126.287	10.00	0.00	0.00	233.222	1.06	51.07	46.00	2.71	2.44	164.9226
15	1.00	99.99	2.50	1.083	63.990	55.027	3.45	2.97	170.00	1.065	250.010	1.000	92.903	157.107	10.00	0.00	0.00	267.467	2.67	58.87	68.46	3.17	3.69	181.8698

West Bayou Lacassine West Bayou Lacassine Tributary

WEST BAYOU LACASSINE WINTER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: BENTHIC SOURCES

Input to blue shaded areas

		Projection Oxygen Demanding Load Allocation				Projection MOS			
Projection Stream Temp (^oC)	Projection Stream Width (ft)	**NH_3-N (lb O_2/d)**	**CBOD (lb O_2/d)**	**Org-N (lb O_2/d)**	**SOD (lb O_2/d)**	**NH_3-N (lb O_2/d)**	**CBOD (lb O_2/d)**	**Org-N (lb O_2/d)**	**SOD (lb O_2/d)**
15.1	19.59	0.0	8.0	0.3	140.6	0.0	0.9	0.0	15.6
15.1	36.72	0.0	18.7	0.8	113.6	0.0	2.1	0.1	12.6
15.1	5.82	0.0	9.8	3.4	160.6	0.0	1.1	0.4	17.8
15.1	8.21	0.0	5.1	6.1	73.9	0.0	0.6	0.7	8.2
15.1	14.53	0.0	7.3	2.9	38.7	0.0	0.8	0.3	4.3
15.1	14.57	0.0	3.4	3.6	109.6	0.0	0.4	0.4	12.2
15.1	15.07	0.0	5.2	3.8	60.6	0.0	0.6	0.4	6.7
15.1	15.07	0.0	5.5	3.6	87.1	0.0	0.6	0.4	9.7
15.1	20.01	0.0	14.2	6.2	105.2	0.0	1.6	0.7	11.7
15.1	20.01	0.0	2.1	8.4	59.6	0.0	0.2	0.9	6.6
15.1	41.72	0.0	18.7	0.8	86.0	0.0	2.1	0.1	9.6
15.1	40.00	0.0	31.6	1.4	207.3	0.0	3.5	0.2	23.0
15.1	57.48	2.0	39.2	2.0	299.2	0.2	4.4	0.2	33.2
15.1	77.44	2.7	46.0	2.4	448.7	0.3	5.1	0.3	49.9
15.1	99.99	8.7	53.0	2.9	638.9	1.0	5.9	0.3	71.0
	Total	13.3	267.8	48.6	2629.8	1.5	29.8	5.4	292.2

BAYOU LACASSINE WINTER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: HEADWATER AND TRIBUTARIES

Input to blue shaded areas

	Calibration Concentrations								MOS & Reduction						Projection Input Concentrations			
Name	Chl-a (ug/l)	UCBOD (mg/l)	Org-N (mg/l)	NH_3-N (mg/l)	NOx-N (mg/l)	Org-P (mg/l)	Dis-P (mg/l)	Equiv-alent Cal UBOD (mg/l)	Bkgrnd cal UBOD (mg/l)	Man-made Cal UBOD (mg/l)	MOS (%)	Reduction of Cal Bkgrnd Load (%)	Reduction of Cal Man-made Load (%)	Reduced Cal UBOD Load (%)	Chl-a (ug/l)	UCBOD (mg/l)	Org-N (mg/l)	NH_3-N (mg/l)
WBL Headwater	2.00	3.62	0.29	0.05	0.05	0.00	0.00	5.17	3.00	2.17	10	0	20	4.93	1.91	3.45	0.28	0.05
Tributary Headwater	0.00	3.00	1.65	0.59	0.28	0.00	0.00	13.24	3.00	10.24	10	0	20	12.10	0.00	2.74	1.51	0.54

BAYOU LACASSINE WINTER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: HEADWATER AND TRIBUTARIES

Input to blue shaded areas

Projection Input Concentrations				**Projection Oxygen Demanding Load Allocations**			**Projection MOS**		
NOx-N (mg/l)	Org-P (mg/l)	Dis-P (mg/l)	Projection Critical Flow (cfs)	**UCBOD (lb O_2/d)**	**Org-N (lb O_2/d)**	**NH_3-N (lb O_2/d)**	**UCBOD (lb O_2/d)**	**Org-N (lb O_2/d)**	**NH_3-N (lb O_2/d)**
0.05	0.00	0.00	1.00	1857.42	148.80	25.65	1.86	0.15	0.03
0.26	0.00	0.00	1.00	1475.93	811.76	290.27	1.48	0.81	0.29
			Total	3333.35	960.56	315.92	3.34	0.96	0.32

BAYOU LACASSINE WINTER PROJECTION AND TMDL WORKSHEET - REDUCTION TO MEET CRITERIA: POINT SOURCES
Input to blue shaded areas

Name	$CBOD_5$ (mg/l)	UCBOD (mg/l)	MOS (%)	Projection UCBOD (mg/l)	Org-N (mg/l)	NH_3-N (mg/l)	NO_3-N (mg/l)	Projection Flows: Design Flows (mgd)	Projection Flows: MOS (%)	Projection Flows: Projection Flows (mgd)	Projection Flows: Projection Flows (cfs)	**Projection Oxygen Demanding Waste Load Allocations: UCBOD (lb O_2/d)**	**Projection Oxygen Demanding Waste Load Allocations: Org-N (lb O_2/d)**	**Projection Oxygen Demanding Waste Load Allocations: NH3-N (lb O_2/d)**	**Projection MOS: UCBOD (lb O_2/d)**	**Projection MOS: Org-N (lb O_2/d)**	**Projection MOS: NH3-N (lb O_2/d)**
Lacassine High School	30.0	69.0	0.0	69.0	5.00	10.00	0.05	0.0092	20	0.0115	0.0178	5.3	1.8	3.5	1.3	0.4	0.9
Lacassine Syrup Mill	10.0	23.0	20.0	28.8	0.00	0.00	0.00	0.6000	0	0.6000	0.9282	115.1	0.0	0.0	0.0	0.0	0.0
											Total	120.4	1.8	3.5	1.3	0.4	0.9

BAYOU LACASSINE WINTER PROJECTION AND TMDL WORKSHEET
TMDL CALCULATIONS

PARAMETER	WLA (lb/day)	LA (lb/day)	MOS (lb/day)	TMDL (lb/day)
UCBOD	120.4	3601.1	34.4	3755.9
ORG-N	1.8	1009.1	6.8	1017.7
NH_3-N	3.5	329.2	2.7	335.4
SOD	--	2629.8	292.2	2922.0
TOTAL	125.6	7569.3	336.1	8031.0

ATTACHMENT F

Winter season TMDL projection input file

```
CNTROL01     Bayou West Lacassine including West Lacassine Tributary
CNTROL02     WBL W/MILL @ 10/0/0/5 & 0.0% NP REDUCTION: LacWinTmdlProj_42.dat
CNTROL12  NO METR
ENDATA01
MODOPT01  NO TEMP
MODOPT02  NO SALI
MODOPT03  NO CONS                                                    CHLORIDE
MODOPT04  NO CONS                                                    CONDUCTIVITY
MODOPT05 YES DISS
MODOPT06 YES BIOC
MODOPT07 YES NITR
MODOPT08  NO PHOS
MODOPT09  NO CHLO
MODOPT10  NO MACR
MODOPT11  NO COLI
MODOPT12  NO NONC
ENDATA02
PROGRAM  MAXIMUM ITERATION LIMIT                  1000.0
PROGRAM  N INHIBITION                                1.0
PROGRAM  KL MINIMUM                                  0.7
ENDATA03
CORRCT01 NH3 DECAY    1.07
CORRCT02 BENTHAL     1.065
CORRCT03 REAERATI    1.024
ENDATA04
ENDATA05
ENDATA06
ENDATA07
REACH ID   1   WL Begin West Bayou Lacassine             6.4         5       0.2
REACH ID   2   WL West Bayou Lacassine                     5       4.4       0.2
REACH ID   3   TR West Lacassine Trib Headwater            5       3.5       0.1
REACH ID   4   TR West Lacassine Trib                    3.5       3.0       0.1
REACH ID   5   TR West Lacassine Trib                    3.0       2.8       0.1
REACH ID   6   TR West Lacassine Trib                    2.8       2.2       0.1
REACH ID   7   TR West Lacassine Trib                    2.2       1.6       0.1
REACH ID   8   TR West Lacassine Trib                    1.6       0.9       0.1
REACH ID   9   TR West Lacassine Trib                    0.9       0.2       0.1
REACH ID   10  TR West Lacassine Trib                    0.2       0.0       0.1
REACH ID   11  WL West Bayou Lacassine                   4.4         4       0.2
REACH ID   12  WL West Bayou Lacassine                     4         3       0.2
REACH ID   13  WL West Bayou Lacassine                     3         2       0.2
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REACH ID   14  WL West Bayou Lacassine                    2         1       0.2
REACH ID   15  WL West Bayou Lacassine at confl           1         0       0.2
ENDATA08
HYDR-1     1   3.68E-02  0.43      1.39      0.45      0.00      0.00
HYDR-1     2   1.03E-02  0.43      2.65      0.45      0.00      0.00
HYDR-1     3   0.215     0.190     0.800     0.285     0.00      0.060
HYDR-1     4   0.215     0.190     0.800     0.285     0.00      0.060
HYDR-1     5   0.1387    0.2910    0.180     1.059     0.43      0.060
HYDR-1     6   0.1387    0.2910    0.180     1.05      0.43      0.060
HYDR-1     7   0.245     0.350     0.098     1.05      0.22      0.060
HYDR-1     8   0.245     0.350     0.098     1.05      0.22      0.060
HYDR-1     9   0.040     1.000     0.000     0.000     1.25      0.060
HYDR-1     10  0.040     1.000     0.000     0.000     1.25      0.060
HYDR-1     11  1.03E-02  0.43      2.65      0.45      0.00      0.00
HYDR-1     12  6.10E-03  1.0       4.10      0.00      0.00      0.00
HYDR-1     13  2.98E-03  1.0       5.84      0.00      0.00      0.00
HYDR-1     14  1.84E-03  1.0       7.02      0.00      0.00      0.00
HYDR-1     15  1.22E-03  1.0       8.20      0.00      0.00      0.00
ENDATA09
HYDR-2     1     1.0       8.0       0.0       0.0       0.0
HYDR-2     2     1.0       8.0       0.0       0.0       0.0
HYDR-2     3     0.0       8.0       0.0       0.0       0.0
HYDR-2     4     0.0       8.0       0.0       0.0       0.0
HYDR-2     5     0.0       8.0       0.0       0.0       0.0
HYDR-2     6     0.0       8.0       0.0       0.0       0.0
HYDR-2     7     0.0       8.0       0.0       0.0       0.0
HYDR-2     8     0.0       8.0       0.0       0.0       0.0
HYDR-2     9     1.0       8.0       0.0       0.0       0.0
HYDR-2     10    1.0       8.0       0.0       0.0       0.0
HYDR-2     11    1.0       8.0       0.0       0.0       0.0
HYDR-2     12    1.0       8.0       0.0       0.0       0.0
HYDR-2     13    1.0       8.0       0.0       0.0       0.0
HYDR-2     14    1.0       8.0       0.0       0.0       0.0
HYDR-2     15    1.0       8.0       0.0       0.0       0.0
ENDATA10
INITIAL    1      15.10    0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    2      15.10    0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    3      15.10    0.0     3.0     0.2     0.1     0.0     0.0     0.0
INITIAL    4      15.10    0.0     3.0     0.2     0.1     0.0     0.0     0.0
INITIAL    5      15.10    0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    6      15.10    0.0     3.0     0.2     0.1     0.0     0.0    50.0
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INITIAL    7      15.10    0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    8      15.10    0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    9      15.10    0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    10     15.10    0.0     3.0     0.2     0.1     0.0     0.0    50.0
INITIAL    11     15.10    0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    12     15.10    0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    13     15.10    0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    14     15.10    0.0     3.0     0.1     0.1     0.0     0.0     0.0
INITIAL    15     15.10    0.0     3.0     0.1     0.1     0.0     0.0     0.0
ENDATA11
COEF-1     1    11.0   3.0  0.0    0.0  145.9   0.06    0.0    0.0    0.0
COEF-1     2    11.0   3.0  0.0    0.0  146.7  0.066    0.0    0.0    0.0
COEF-1     3    15.0   0.0  0.0    0.0  523.5  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     4    15.0   0.0  0.0    0.0  512.6  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     5    15.0   0.0  0.0    0.0  379.2  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     6    15.0   0.0  0.0    0.0  357.0  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     7    15.0   0.0  0.0    0.0  190.9  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     8    15.0   0.0  0.0    0.0  235.1  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     9    15.0   0.0  0.0    0.0  213.8  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     10   15.0   0.0  0.0    0.0  424.0  0.080   0.05    0.0    0.0    0.0    0.0    0.0    0.0
COEF-1     11   11.0   3.0  0.0    0.0  146.7  0.066    0.0    0.0    0.0
COEF-1     12   11.0   3.0  0.0    0.0  147.5  0.072    0.0    0.0    0.0
COEF-1     13   11.0   3.0  0.0    0.0  148.2  0.078    0.0    0.0    0.0
COEF-1     14   11.0   3.0  0.0    0.0  164.9  0.084    0.0    0.0    0.0
COEF-1     15   11.0   3.0  0.0    0.0  181.9   0.09    0.0    0.0    0.0
ENDATA12
COEF-2     1      0.02    0.0    0.0    0.2    0.0    0.0    0.0
COEF-2     2      0.02    0.0    0.0    0.1    0.0    0.0    0.0
COEF-2     3      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     4      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     5      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     6      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     7      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     8      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     9      0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     10     0.04   0.05    0.0   0.25    0.0    0.0    0.0
COEF-2     11     0.02    0.0    0.0    0.1    0.0    0.0    0.0
COEF-2     12     0.02    0.0    0.0    0.1    0.0    0.0    0.0
COEF-2     13     0.02    0.0    0.0    0.1   1.06    0.0    0.0
COEF-2     14     0.02    0.0    0.0    0.1   1.06    0.0    0.0
COEF-2     15     0.02    0.0    0.0    0.1   2.67    0.0    0.0
```

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ENDATA13
ENDATA14
ENDATA15
ENDATA16
ENDATA17
ENDATA18
NONPNT     1        2.82   0.11
NONPNT     2        5.32   0.22
NONPNT     3        1.11   0.38
NONPNT     4        0.27   0.32
NONPNT     5        0.28   0.11
NONPNT     6        0.39   0.41
NONPNT     7        0.60   0.44
NONPNT     8        0.75   0.49
NONPNT     9        2.57   1.12
NONPNT     10       0.11   0.43
NONPNT     11       4.03   0.16
NONPNT     12       16.3   0.73
NONPNT     13       29.1   1.49
NONPNT     14       46.0   2.44
NONPNT     15       68.5   3.69
ENDATA19
HDWTR-1     1  WEST BAYOU LACASSINE         1.00    15.1     0.0    15.0   250.0
HDWTR-1    11  W. B. LACASSINE TRIB         1.00    15.1     0.0    33.7     0.0
ENDATA20
HDWTR-2     1        7.8     3.45     0.28     0.05     0.05
HDWTR-2    11        7.0     2.74     1.51     0.54     0.26
ENDATA21
HDWTR-3     1        0.0      1.9
HDWTR-3    11        0.0      0.0
ENDATA22
JUNCTION   61   10    CONFLUENCE OF TRIB WITH WBL
ENDATA23
WSTLD-1     2  LACASSINE HIGH SCHL    0.0178     30.0      0.0       20      170
WSTLD-1    26  LACASSINE MILL         0.9282     30.0      0.0      0.0      0.0
ENDATA24
WSTLD-2     2        2.0    69.0   0.0      5.0     10.0  0.0     0.05
WSTLD-2    26        5.0    28.75  0.0     0.00     0.00  0.0     0.00
ENDATA25
WSTLD-3     2       0.00      0.0      0.0      0.0
WSTLD-3    26       0.00      0.0      0.0      0.0
```

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ENDATA26
LOWER BC TEMP                                      15.1
LOWER BC SALINITY                                   0.0
LOWER BC CONSERVATIVE MATERIAL 1                   13.0
LOWER BC CONSERVATIVE MATERIAL 2                  289.6
LOWER BC DISSOLVED OXYGEN                          6.65
LOWER BC BIOCHEMICAL OXYGEN DEMAND                 3.28
LOWER BC ORGANIC NITROGEN                          0.70
LOWER BC AMMONIA NITROGEN                          0.23
LOWER BC NITRATE + NITRITE                         5.31
LOWER BC PHOSPHORUS                                0.00
LOWER BC CHLOROPHYLL A                             0.00
LOWER BC COLIFORM                                  0.00
LOWER BC NONCONSERVATIVE MATERIAL                  0.00
ENDATA27
ENDATA28
ENDATA29
NUMBER OF PLOTS = 2
NUMBER OF REACHES IN PLOT 1 =  7
PLOT RCH  1  2 11 12 13 14 15
NUMBER OF REACHES IN PLOT 2 =  8
PLOT RCH  3  4  5  6  7  8  9 10
ENDATA30
OVERLAY 1                   OPDATA2.TXT   WEST BAYOU LACASSINE WINTER SEASON TMDL PROJECTION
OVERLAY 2                   OPDATA3.TXT   WEST LACASSINE TRIBUTARY WINTER SEASON TMDL PROJECTION
ENDATA31
END
```