CITY OF LA MARQUE
WESTSIDE
WASTEWATER TREATMENT FACILITY
ASSESSMENT

PREPARED FOR

CITY OF LA MARQUE

PREPARED BY

SANDER ENGINEERING CORPORATION
1120 W SAM HOUSTON PKWY SOUTH, SUITE 400
HOUSTON, TEXAS 77042
TBPE FIRM REGISTRATION # 517

JUNE 2016

CITY OF LA MARQUE
WESTSIDE WASTEWATER TREATMENT PLANT FACILITY
ASSESSMENT

INDEX

CITY OF LA MARQUE
WESTSIDE WASTEWATER TREATMENT PLANT FACILITY ASSESSMENT

I. EXECUTIVE SUMMARY

The City of La Marque Westside Wastewater Treatment Facility serves the City of La Marque and has been experiencing ongoing operational problems, high flows, Enterococci, total Copper and effluent Ammonia Nitrogen violations.

This evaluation focused on the areas of treatment capacity and plant operations. Preliminary recommendations have been prepared which focus on the items that can be done immediately to address the operational problems. The final recommendations address the treatment plant deficiencies and modifications to provide a more permanent solution to the various problems identified at the wastewater treatment plant. Also included in the recommendations are items to address issues that are not directly operational or plant problems.

At the Westside WWTP, the majority of the problems being experienced are effluent ammonia nitrogen violations.

Other significant problems and deficiencies include the following:

1. Lack of operational testing equipment, specifically a field DO meter.

2. Head-work weirs are not even resulting in uneven flow distribution to the two treatment trains.

3. Procurement issues for City Staff and Departments.

4. Significant inflow and infiltration (I&I) in the collection system.

5. Total Copper limit will decrease in October 2016 from 0.020 to 0.0162 mg/l.

To alleviate some of the immediate operational problems at the plant, the following recommendations are made:

1. Purchase a field DO meter and take daily measurements of the DO levels in the aeration basin.

2. Adjust blower output an or number of blowers in operation to maintain a 2.0 mg/l dissolved oxygen level in both aeration basins.

3. Adjust the weirs at the head works to evenly distribute the influent flows to each treatment train.

4. Conduct more frequent testing of the landfill leachate and have landfill operator work at reducing the ammonia nitrogen concentration which exceeded the allowed concentrations in the two samples taken in May 2016.

To provide a permanent solution to the treatment plant deficiencies, the following recommendations are made:

1. Address the I&I problems in the collection system to reduce the peak flows into the treatment plant and peak flow violations.

2. Promote awareness of wastewater system issues to foster a more open and cooperative working partnership among the City Staff and streamline the procurement process.

3. Determine ways of reducing the copper entering the collection system in order to reduce the copper levels in the treatment plant effluent.

4. Conduct regular cleaning of outfall flume structure to reduce Enterococci violations.

CITY OF LA MARQUE
WESTSIDE WASTEWATER TREATMENT PLANT FACILITY ASSESSMENT

II. PURPOSE

This evaluation and assessment is intended to 1) determine the plant's ability and capacity to treat the current and design influent conditions; 2) make an assessment to determine the plant's capability to comply with the limitations of its permit; 3) address effluent violations being experienced at the treatment plant and 4) make recommendations on repairs, improvements, and/or operational procedures that can be implemented so the wastewater treatment plant can maintain consistent compliance with the terms of the TPDES Waste Discharge Permit.

III. SCOPE OF WORK

Perform an evaluation and assessment of the City of La Marque's Westside Wastewater Treatment Plant serving the City of La Marque in Galveston County Texas.

The work will include the following:

1. Trip(s) to the wastewater treatment plant site for plant and mechanical equipment assessments and verification of unit sizes and equipment ratings.

2. The existing operations and process control data for the past 12 months will be reviewed and evaluated. Owner to provide a copy of this information for review.

3. The influent, effluent and flow data for the previous 36 months will be evaluated if available. Owner to provide a copy of this information for review.

4. Work with the owner and operator to determine influent sources and identify potential chemical and biological contributions that could be toxic to, inhibiting or overloading the biological treatment processes at the wastewater treatment plant.

5. The mechanical equipment which is used for the treatment process will be inspected and evaluated. This includes blowers, process pumps, clarifier, chlorine system, etc.

6. The nominal rating of all treatment units for the plant will be determined based on the state design criteria in effect at the time of design and based on a rational design approach. Owner to provide copies of construction drawings, technical specifications, engineering design report and O&M manual. These items can be returned upon project completion.

7. A summary report of the evaluation and assessment findings for the wastewater treatment plant, including recommendations for repairs, improvements, and/or operational procedures that can be implemented to achieve permit compliance, will be prepared. Three copies of this report shall be provided to the owner.

8. The summary report will be reviewed with the Owner.

9. Meet with TCEQ as requested by owner to discuss report findings or other issues as needed.

IV. FINDINGS

Site visits were conducted to get information on the process equipment and treatment units and to make general observations concerning the wastewater treatment facilities. The evaluation worksheet is included in Attachment A. This worksheet shows the sizes and capacities of the existing treatment units and the minimum size requirements for the permit limitations at the governing flow conditions. A summary of this information is presented below. Permit Excerpts are included in Attachment B

The nominal rating of the wastewater treatment plant was determined in two ways. The first was based on the State Design Criteria for Sewerage Systems 30TAC Chapter 317 which was in effect at the time the facility was designed and constructed. The second was based on a rational design approach which integrates the treatment processes based on average and peak flows. This approach gives a better determination of the true treatment capacity than the minimum standards set forth in the 317 State Design Criteria. This approach also optimizes the aeration basin and secondary clarifier interaction utilizing volume flux and a predetermined peaking factor. The peaking factor used for the evaluation was four which is the peaking factor in the permit.

The State Design Criteria was revised effective August 28, 2008. A significant part of the revision was aimed at integrating treatment units in the design criteria and providing a rational design approach.

The influent BOD_5 concentrations appear to be less than the influent loading used for the design of the plant which was based on 200 mg/l BOD_5 for unit sizing. The influent BOD_5 concentration significantly impacts the sizing of the aeration basin, aerobic digester and blowers. Based on influent analysis, the plant is running at about 72% of its rated organic loading capacity and about 87% of its hydraulic capacity.

However, the dissolved oxygen levels in the Aeration Basins appear to be below 2.0 mg/l for significant periods of time. When the D.O. levels in the aeration basins are below 2.0 mg/l, nitrification will be incomplete or virtually nonexistent. Few DO reading have been available because there is no field DO meter at the plant and staff is waiting for the approval of a purchase order to get the Dissolved Oxygen meter. The influent and effluent analysis shows inconsistent ammonia nitrogen removal even though the influent ammonia nitrogen is fairly consistent.

The influent data that was collected shows the following for BOD_5, TSS, Ammonia Nitrogen (NH3-N) and Total Copper:

Westside WWTP	BOD_5	TSS	NH3-N	COPPER
Minimum	10.3 mg/l	11.0 mg/l	6.50 mg/l	0.0010 mg/l
Maximum	614.9 mg/l	918.0 mg/l	55.40mg/l	0.2640 mg/l
Average	109.8 mg/l	118.8 mg/l	22.98 mg/l	0.0361 mg/l
1 Std Deviation	55.1 mg/l	74.1 mg/l	7.67 mg/l	0.02297 mg/l
Avg + 1 Std Dev.	164.9 mg/l	192.9 mg/l	30.65 mg/l	0.05906 mg/l

Excerpts from State Design Criteria for Sewerage Systems 30TAC Chapter 317, which was in effect at the time the facility was designed and constructed, are included in Attachment C. The lab data is summarized in tables which have been included in Attachment D.

A. NOMINAL RATING BASED ON STATE DESIGN CRITERIA

The following tables summarize the nominal ratings of the primary treatment elements at the wastewater treatment plant. The nominal rating is represented by average daily flow and two hour peak flow. Calculations are shown in Attachment A.

WESTSIDE WWTP		AVG FLOW	2 hr PEAK FLOW
1.	Aeration Basin	2.866 MGD	N/A
2.	Clarifier	N/A	13.618 MGD
2.	Chlorine Basin	N/A	14.977 MGD
3.	Blowers	3.00 MGD	N/A
4.	Aerobic Digester	3.029 MGD	N/A
	TPDES Permit Values	3.00 MGD	12.00 MGD

B. NOMINAL RATING BASED ON RATIONAL DESIGN

The nominal rating of the aeration basin and secondary clarifier is shown in the table below. A peaking factor of 4.0 was used for the treatment plant. Calculations are shown in Attachment A.

	WESTSIDE WWTP	AVG FLOW	2 hr PEAK FLOW
1.	Aeration Basin	3.006 MGD	N/A
2.	Clarifier	N/A	12.025 MGD

C. GENERAL OBSERVATIONS

There are also several important non-technical problems that were identified during this evaluation. These problems are associated with the collection system and a cumbersome purchasing process.

It appears that additional education and awareness is needed to help the staff understand the impacts they can have on the plant. The Public Works Director is responsible for the water and wastewater plants and can effectively use the personnel is his department as needed but he needs additional support when getting critical supplies and equipment.

WESTSIDE WASTEWATER TREATMENT PLANT

The City of La Marque Westside Wastewater Treatment Facility serves the City of La Marque and has been experiencing ongoing operational problems, high flows, Enterococci, total Copper and effluent Ammonia Nitrogen violations. The plant is configured for single stage nitrification and is rated at 3.0 MGD. The treatment plant is a partially buried concrete plant with two parallel treatment trains. The first train was constructed in 1995 and the second train was completed in 1999. The plant has a head works structure with a flow splitter, aeration basin, circular clarifier, chlorine contact basin and aerobic digesters. The air is supplied by a total of five multi-stage centrifugal blowers. Disinfection is provided using chlorine gas and dechlorination is done using sulphur dioxide. There are a total of six submersible pumps in the on-site plant lift station.

The plant is experiencing problems meeting the effluent ammonia nitrogen (NH3-N), Enterococci and Total Copper limitations in the waste discharge permit. The effluent NH3-N problems being experienced are the result of low dissolved oxygen concentrations in the aeration basins and to some extent high flows associated with I&I.

The overall condition of the wastewater treatment plant and equipment is fair to good considering the age of this facility.

The influent strength at the Westside wastewater treatment plant appears to be fairly typical based on the data available. In addition, the Westside treatment plant experiences significant Inflow and Infiltration (I&I) during rainfall events. The amount of I&I hydraulically overloads the collection system lift stations, the treatment plant itself. These hydraulic overloads can result in high effluent TSS and partially treated $CBOD_5$ and NH3-N in the effluent. In addition, the high flows can result in Enterococci violations as well.

D. PROBLEMS IDENTIFIED

The following items are specific problems that were noted or identified as part of the site investigations, design and sizing calculations, and records review. The identified problems are listed separately for each of the wastewater treatment plants.

1. A field Dissolved Oxygen meter is needed at the wastewater treatment plant to measure the plant DO so that it can be maintained at the levels needed for consistent nitrification.

2. The return sludge flow rate is low resulting in longer solids retention in the clarifier which also suppresses the DO, creates a higher immediate oxygen demand, and stresses the nitrifying bacteria resulting in inconsistent ammonia nitrogen removal in the biological treatment process.

3. The weirs at the head works that split the flow between the two trains are not level with each other and flow is not being equally divided between the two trains. This problem will be worse during peak flow events and could result in the hydraulic capacity of the clarifier or chlorine contact basin being exceeded. The organic capacity of the train receiving more flow could also be exceeded.

4. More needs to be done to help the City promote cooperation between departments regarding the procurement of equipment needed that impacts the wastewater treatment plant operation. The procurement process needs to be stream lined.

5. There is a significant inflow and infiltration problem in the collection system serving the wastewater treatment plant. The high flows are causing effluent quality problems as well as operational problems.

6. The effluent Total Copper limits will decrease effective October 2016. The Daily Maximum limit is going from 0.020 mg/l to 0.0162 mg/l. Since the plant is experiencing total copper violations now, this reduction will result in more violations unless the copper in the influent can be reduced.

E. MODIFICATIONS NEEDED

The actual plant capacity is adequate for the existing permit limitations based on an influent strength of 200 mg/l of BOD_5 and a typical ammonia concentration of 40 mg/l or less. The plant is experiencing ongoing operational problems and effluent quality violations. As a result, steps need to be taken to solve these interim operational problems.

The modifications to solve the operational problems and optimize the capacity of the plant for its current permit limitations should be done in two phases. The first phase would involve making some immediate improvements to the plant to relieve the operational problems. The second phase would be the modifications needed to optimize and improve the overall treatment capacity of the facility and to provide the treatment capabilities necessary to meet the effluent quality limits called for in the TPDES permit.

PRELIMINARY MODIFICATIONS

1. A field DO meter is needed to monitor the dissolved oxygen levels in the aeration basins and the clarifiers. The DO in the aeration basins need to be maintained above 2.0 mg/l to provide for consistent nitrification. The blowers will need to adjusted to maintain the DO level needed.

2. The return sludge flow needs to be increased to 250 gpd/sqft of clarifier surface area which is approximately 1.4 MGD per clarifier.

3. The weirs at the head works which splits the flow between the treatment trains need to be leveled such that the flow is split evenly between the two trains.

4. More testing is needed to ensure compliance with the discharge limitations in the landfill service agreement. The Ammonia Nitrogen limit is being exceeded.

LONG TERM MODIFICATIONS

1. The inflow and infiltration into the City collection system needs to be reduced significantly to prevent flow violations and treatment violations at the wastewater treatment plant.

2. The procurement process needs to be streamlined so that necessary equipment and testing supplies can be ordered and received in a timely manner.

3. The City needs to determine ways of reducing the amount of copper entering the collection system either through the water supply or through discharges in the collection system.

4. The effluent flume structure needs to be cleaned regularly to help reduce the potential for Enterococci violations which could be associated with algae breaking loose and releasing accumulated bacteria into the effluent.

These modifications are listed and incorporated into the recommendations presented in the following sections.

V. PRELIMINARY RECOMMENDATIONS

The following recommendations are intended to address the operational problems currently being experienced at the plant. These are items that need to be done immediately in order to stabilize operations at the plant and address the immediate operational problems. These recommendations should be performed as soon as possible.

1. Purchase a field DO meter and take daily measurements of the DO levels in the aeration basin.

2. Adjust blower output an or number of blowers in operation to maintain a 2.0 mg/l dissolved oxygen level in both aeration basins.

3. Increase return sludge flow to 1.4 MGD for each clarifier.

4. Adjust the weirs at the head works to evenly distribute the influent flows to each treatment train.

5. Conduct more frequent testing of the landfill leachate and have landfill operator work at reducing the ammonia nitrogen concentration which exceeded the allowed concentrations in the two samples taken in May 2016.

VI. FINAL RECOMMENDATIONS

The following recommendations are intended to address the optimization of the overall treatment capacity of the wastewater treatment plant.

1. Address the I&I problems in the collection system to reduce the peak flows into the treatment plant and peak flow violations.

2. Promote awareness of wastewater system issues to foster a more open and cooperative working partnership among the City Staff and streamline the procurement process.

3. Determine ways of reducing the copper entering the collection system in order to reduce the copper levels in the treatment plant effluent.

4. Conduct regular cleaning of outfall flume structure to reduce Enterococci violations.

CITY OF LA MARQUE
WESTSIDE WASTEWATER TREATMENT PLANT FACILITY ASSESSMENT

ATTACHMENT A

DESIGN EVALUATION REPORT
(CALCULATIONS)

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

PROJECT SUMMARY

BASIN VOLUMES AND SURFACE AREAS BEING USED

AERATION BASIN VOLUME:	136606	cu.ft.
REAERATION BASIN VOLUME:	0	cu.ft.
PRIMARY CLARIFIER SURFACE AREA:	0	sq.ft.
SECONDARY CLARIFIER SURF. AREA:	11349	sq.ft.
CHLORINE CONTACT BASIN VOLUME:	27810	cu.ft.
AEROBIC DIGESTER VOLUME:	101079	cu.ft.
ANAEROBIC DIGESTER VOLUME:	0	cu.ft.

TPDES PERMIT LIMITS		
(C)BOD5:	10	mg/l
TSS:	15	mg/l
NH3-N:	3	mg/l
	0	mg/l
AVERAGE FLOW:	3.0000	MGD
2hr PEAK FLOW:	11.9995	MGD
	8333	gpm

RECOMMENDED PROCESS CONTROL VALUES FOR 2.6100 MGD

BOD5 LOADING:	4353	lbs./day
FOOD TO MICROORGANISM RATIO:	0.170	per day
SLUDGE VOLUME INDEX:	100	ml/g
CLARIFIER UNDERFLOW RATE:	200-300	gpd/sq.ft.
AERATION MLSS CONCENTRATION:	3005	mg/l
REAERATION CONCENTRATION:	5769	mg/l
SLUDGE AGE:	11.3	days
SLUDGE WASTED PER WEEK:	15797	lbs.
WASTE SLUDGE VOLUME PER WEEK:	344836	gallons

CLARIFIER UNDERFLOW RATE PER CLARIFIER RANGE			
#1	788	1182	gpm
#2	788	1182	gpm

DEPTH PER AEROBIC DIGESTER

#1 (ft.)	#2 (ft.)
35.55	35.55

PROCESS HYDRAULIC CAPACITY WITH 2 CLARIFIER(S) IN SERVICE

AT RECOMMENDED CONTROL POINT:	14.596	MGD	SVI = 100
AT CURRENT CONTROL POINT:	12.376	MGD	SVI = 100

NOMINAL RATING OF PLANT AS CURRENTLY CONFIGURED AND OPERATED

TYPE OF FLOW:	AVG.	PEAK	
PRIMARY CLARIFIER:	NA	NA MGD =	NA gpm
BIOLOGICAL PROCESS:	2.8664 MGD	NA	
SECONDARY CLARIFIER:	NA	13.6188 MGD	9459 gpm

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

TPDES PERMIT LIMITATIONS

FLOW		
AVERAGE:	3.0000	MGD
2 hr PEAK:	11.9995	MGD
	8333	gpm

EFFLUENT		
(C)BOD5:	10	mg/l
TSS:	15	mg/l
NH3-N:	3	mg/l
		mg/l
D.O.:	4	mg/l
pH:	6 - 9	S.U.
Cl2:	1 - 4	mg/l

CURRENT OPERATING DATA FOR INFLUENT USED FOR CALCULATIONS			MEASURED VALUES			ESTIMATED (Y or N)
BOD5:	200	mg/l	BOD5:	200	mg/l	N
TSS:	200	mg/l	TSS:	200	mg/l	N
NH3-N:	40	mg/l	NH3-N:	40	mg/l	N

AERATED SOLIDS PROCESS CONTROL PARAMETERS			ESTIMATED (Y or N)
AERATION BASIN SOLIDS (MLSS):	3300	mg/l	N
RETURN OR REAERATION SOLIDS:	7700	mg/l	N
FLOC / SETTLED VOLUME (SV30):	415	ml/l	N
SLUDGE VOLUME INDEX:	126	ml/g	N
PERCENT VOLATILES:	65.0	%	N

CURRENT PLANT FLOWS				
AVERAGE INFLUENT FLOW:	2.610	MGD		
2-hr PEAK INFLUENT FLOW:	10.440	MGD	7250	gpm
AVERAGE CLARIFIER UNDERFLOW:	1.958	MGD	CALCULATED	
CLARIFIER UNDERFLOW RATE:	0.947	MGD	MEASURED	
PRIMARY CLARIFIER UNDERFLOW:	0	gpd	0	days per week
WASTE ACTIVATED SLUDGE FLOW:	177451	gallons in	4	day(s)
RAW SLUDGE FLOW:	0	gpd	0	days per week

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

BIOLOGICAL PROCESS UNIT SIZES

AERATION BASIN (DIMENSIONS GIVEN IN FEET)

RECTANGULAR SECTION	#1	#2
LENGTH	85	85
WIDTH	41.9559	41.9559
WATER DEPTH	19.5	19.5

CIRCULAR SECT.	#1	#2
INNER DIA.	0	0
OUTER DIA.	0	0
WATER DEPTH	0	0
TOTAL DEG.	0	0

AERATION BASIN VOLUME	#1	#2
NUMBER OF BASINS IN USE:	1	1
NUMBER AVAILABLE:	1	1

UNUSABLE VOLUME

#1	1225 cu ft
#2	1252.7 cu ft

AERATION BASIN #1 VOLUME: 68317 CUBIC FEET
AERATION BASIN #2 VOLUME: 68289 CUBIC FEET

TOTAL VOLUME OF AERATION: 136606 CUBIC FEET BEING USED

REAERATION BASINS (DIMENSIONS GIVEN IN FEET)

RECTANGULAR SECTION	#1	#2
LENGTH	0	0
WIDTH	0	0
WATER DEPTH	0	0

CIRCULAR SECT.	#1	#2
INNER DIA.	0	0
OUTER DIA.	0	0
WATER DEPTH	0	0
TOTAL DEG.	0	0

REAERATION BASIN VOLUME	#1	#2
NUMBER OF BASINS IN USE:	0	0
NUMBER AVAILABLE:	0	0

UNUSABLE VOLUME

#1	0 cu ft
#2	0 cu ft

REAERATION BASIN #1 VOLUME 0 CUBIC FEET

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

SECONDARY CLARIFIERS	LENGTH	WIDTH OR DIAMETER
DIMENSIONS OF CLARIFIER #1:	0 FEET	85 FEET
DIMENSIONS OF CLARIFIER #2:	0 FEET	85 FEET

SECONDARY CLARIFIERS	#1	#2
NUMBER OF CLARIFIERS IN USE:	1	1
NUMBER AVAILABLE:	1	1

			SWD (ft)
SURFACE AREA CLARIFIER #1:	5675	SQUARE FEET	12.66
SURFACE AREA CLARIFIER #2:	5675	SQUARE FEET	11.78

TOTAL CLARIFIER SURFACE AREA: 11349 SQUARE FEET BEING USED

VOLUME OF HOPPER OR CONE:

		MEASURED		SLOPE OF BOTTOM		
CALCULATION OF THE	#1	N/A	FEET	12	TO	1
CONE OR HOPPER HEIGHT	#2	N/A	FEET	12	TO	1

CONE OR HOPPER HEIGHT:	CLARIFIER #1:	3.54	FEET
	CLARIFIER #2:	3.54	FEET
CONE OR HOPPER VOLUME:	CLARIFIER #1:	6699	CUBIC FEET
(SLUDGE BLANKET VOL.)	CLARIFIER #2:	6699	CUBIC FEET

TYPE OF CONE OR HOPPER:		#1	#2
CO = CIRCULAR CONE BOTTOM WITH SLUDGE RAKES		CO	CO
FH = RECTANGULAR BOTTOM WITH SLUDGE RAKES			
HO = HOPPER BOTTOM, NO RAKES	BOTTOM AREA IN SQ FT =	1	1

TOTAL CLARIFIER VOLUME: CLARIFIER #1: 71829 CUBIC FEET

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

DISINFECTION SYSTEM

CHLORINE CONTACT BASIN (DIMENSIONS GIVEN IN FEET)

RECTANGULAR SECTION	#1	#2
LENGTH	85	85
WIDTH	9.72278	9.72278
WATER DEPTH	18.1	18.1

CIRCULAR SECT.	#1	#2
INNER DIA.	0	0
OUTER DIA.	0	0
WATER DEPTH	0	0
TOTAL DEG.	0	0

CHLORINE CONTACT BASIN	#1	#2
NUMBER OF BASINS IN USE:	1	1
NUMBER AVAILABLE:	1	1

UNUSABLE VOLUME

#1	1150.75 cu ft
#2	956.27 cu ft

			SURFACE AREA (sq.ft.)
CL2 CONTACT BASIN #1 VOLUME:	13808	CUBIC FEET	826
CL2 CONTACT BASIN #2 VOLUME:	14002	CUBIC FEET	826

TOTAL CL2 CONTACT VOLUME: 27810 CUBIC FEET BEING USED

WEIR TYPE: FL CRITICAL DIMENSION: 90 Degree or Feet
(V-NOTCH-VN; RECTANGULAR-RE; CIPOLLETTI-CI; FLUME or OTHER-FL)

FLOW DEPTH OVER WEIR AT PERMITTED 2hr PEAK FLOW: 0.000 ft.
CORRECTED CL2 CONTACT VOLUME: 27810 CUBIC FEET @ PERMITTED PEAK FLOW

FLOW DEPTH OVER WEIR AT EXISTING 2hr PEAK FLOW: 0.000 ft.
CORRECTED CL2 CONTACT VOLUME: 27810 CUBIC FEET @ CURRENT PEAK FLOWS

ALTERNATIVE MEANS OF DISINFECTION USED NA

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

AEROBIC DIGESTERS UNIT SIZES

(DIMENSIONS GIVEN IN FEET)

AEROBIC DIGESTER RECTANGULAR SECTION	#1	#2
LENGTH	41.833	41.833
WIDTH	31	31
WATER DEPTH	20	20

CIRCULAR SECT.	#1	#2
INNER DIA.	0	0
OUTER DIA.	0	0
WATER DEPTH	0	0
TOTAL DEG.	0	0

AEROBIC DIGESTERS	#1	#2
NUMBER OF BASINS IN USE:	2	2
NUMBER AVAILABLE:	2	2

UNUSABLE VOLUME

#1	728.33 cu ft
#2	605.25 cu ft

			SURFACE AREA (sq.ft.)
AEROBIC DIGESTER #1 VOLUME:	25208	CUBIC FEET	1297
AEROBIC DIGESTER #2 VOLUME:	25331	CUBIC FEET	1297

TOTAL AEROBIC DIGESTER VOLUME: 101079 CUBIC FEET BEING USED

VOLUME OF HOPPER OR CONE:

CALCULATION OF THE CONE OR HOPPER HEIGHT		MEASURED	SLOPE OF BOTTOM		
	#1	0 FEET	12	TO	1.5
	#2	0 FEET	12	TO	1.5

CONE OR HOPPER HEIGHT: DIGESTER #1: 0.00 FEET
DIGESTER #2: 0.00 FEET

CONE OR HOPPER VOLUME: DIGESTER #1: 0 CUBIC FEET
DIGESTER #2: 0 CUBIC FEET

TYPE OF CONE OR HOPPER #1 #2

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

SLUDGE WASTING RATES AND UNIT PROCESS DETENTION TIMES

WASTE ACTIVATED SLUDGE (WAS)

WASTE SLUDGE CONCENTRATION:	7700	mg/l			
EFFECTIVE WAS CONCENTRATION:	7260	mg/l			
GALLONS WASTED PER WEEK:	310539.3	gallons			
AVERAGE WASTING RATE:	44363	gal/day	=	2686	pounds per day
SOURCE OF WASTE SLUDGE:	RS				
AERATION BASIN:	AB				
RETURN SLUDGE LINE:	RS				

THE (RSSS-MLSS) DIFFERENCE IS REDUCED DURING WASTING AN AVERAGE OF 10 %

ESTIMATED SLUDGE AGE FROM WASTING RATES: 10.47 days

PRIMARY CLARIFIER UNDERFLOW

SLUDGE CONCENTRATION:	0	mg/l			
GALLONS WASTED PER WEEK:	0	gallons			
AVERAGE WASTING RATE:	0	gal/day	=	0	pounds per day
RAW SLUDGE FLOW ONLY:	0	gallons per week	=	0	gpd
RAW SLUDGE WASTING RATE:	0	pounds per day			

DOES THE UNDERFLOW FROM THE PRIMARY CLARIFIER INCLUDE
WASTE ACTIVATED SLUDGE (Y or N): N PERCENTAGE OF W.A.S.: 0 %

PERCENT OF WASTE ACTIVATED SLUDGE TO AEROBIC DIGESTER: 100 %
PERCENT OF PRIMARY CLARIFIER UNDERFLOW TO ANAEROBIC DIGESTER: 0 %

DETENTION TIMES FOR THE EXISTING FLOW CONDITIONS

DETENTION TIMES	AVERAGE FLOW	PEAK FLOW	OVERFLOW AT PEAK gpd/sq.ft.
PRIMARY CLARIFIER	NA hr	NA hr	NA

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

PROCESS CONTROL SUMMARY

THE INFLUENT BOD5 CONCENTRATION USED FOR THE RECOMMENDED
PROCESS CONTROL POINT CALCULATIONS IS: 200 mg/l

RECOMMENDED PROCESS CONTROL VALUES

BOD5 LOADING:	4353	lbs./day	FOR CALCULATIONS ONLY	
FOOD TO MICROORGANISM RATIO:	0.170	per day		
SLUDGE VOLUME INDEX:	100	ml/g	FOR CALCULATIONS ONLY	
CLARIFIER UNDERFLOW RATE:	200-300	gpd/sq.ft.	250	FOR CALCULATIONS
AERATION MLSS CONCENTRATION:	3005	mg/l	80.0	PERCENT VOLATILES
REAERATION CONCENTRATION:	5769	mg/l		
SLUDGE AGE:	11.3	days	DEPTH PER AEROBIC DIGESTER	
SLUDGE WASTED PER WEEK:	15797	lbs.	#1 (ft.)	#2 (ft.)
WASTE SLUDGE VOLUME PER WEEK:	344836	gallons	35.55	35.55

WAS VOLUME ASSUMES A REDUCTION IN THE RETURN SLUDGE CONCENTRATION

CURRENT PROCESS CONTROL VALUES			STATUS	LEGEND
BOD5 LOADING:	4353	lbs./day	NA	1 = EXCELLENT
FOOD TO MICROORGANISM RATIO:	0.155	per day	1	2 = GOOD
SLUDGE VOLUME INDEX:	126	ml/g	4	3 = OKAY
CLARIFIER UNDERFLOW RATE:	83	gpd/sq.ft.	4	4 = NEEDS WORK
AERATION MLSS CONCENTRATION:	3300	mg/l	1	
REAERATION CONCENTRATION:	7700	mg/l	4	
SLUDGE AGE:	9.5	days	2	
SLUDGE WASTED PER WEEK:	18803	lbs.	2	

WAS VOLUME ASSUMES A REDUCTION IN THE RETURN SLUDGE CONCENTRATION

PROCESS HYDRAULIC CAPACITY WITH	2	CLARIFIER(S) IN SERVICE		
AT RECOMMENDED CONTROL POINT:	14.596	MGD	SVI =	100
AT CURRENT CONTROL POINT:	13.276	MGD	SVI =	100

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

NOMINAL RATING CALCULATIONS

THE NOMINAL RATING CALCULATIONS ARE BASED ON THE CURRENT STATE DESIGN CRITERIA STANDARDS SHOWN BELOW

DESIGN CRITERIA MINIMUM DESIGN STANDARDS - 30 TAC, CHAPTER 317

BIOLOGICAL PROCESS	DESIGN ORGANIC LOADINGS
CONVENTIONAL OR COMPLETE MIX:	45 lb BOD5/day/1000 cu.ft.
CONTACT STABILIZATION:	50 lb BOD5/day/1000 cu.ft.
EXTENDED AERATION:	15 lb BOD5/day/1000 cu.ft.
SINGLE STAGE NITRIFICATION:	35 lb BOD5/day/1000 cu.ft.

CLARIFIER RATINGS FOR PLANT PEAKING FACTORS GREATER THAN TWO

	OVERFLOW RATE	DETENTION TIME
PRIMARY CLARIFIER:	1800 gal/day/sq.ft.	NA hr.
ACTIVATED SLUDGE EXCEPT EXTENDED AERATION		
SECONDARY:	1400 gal/day/sq.ft.	1.3 hr.
ENHANCED SECONDARY:	1200 gal/day/sq.ft.	1.5 hr.
ACTIVATED SLUDGE EXTENDED AERATION		
SECONDARY:	1000 gal/day/sq.ft.	1.8 hr.
ENHANCED SECONDARY:	800 gal/day/sq.ft.	2.2 hr.

CHLORINE CONTACT BASIN
PEAK FLOW DETENTION TIME OF: 20 minutes

DIGESTERS	HEATED	UNHEATED
ANAEROBIC DIGESTER		
PRIMARY CLARIFIER SLUDGE ONLY	14.5	20.5 cu.ft. per lb BOD5 per day

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

WASTEWATER TREATMENT PLANT CONFIGURATION INFORMATION

TREATMENT PROCESS AND CODES

BIOLOGICAL PROCESS	CODE
CONVENTIONAL OR COMPLETE MIX	CO
CONTACT STABILIZATION	CS
EXTENDED AERATION	EA
SINGLE STAGE NITRIFICATION	SN

CLARIFIER

SECONDARY	SE
ENHANCED SECONDARY	EH

DIGESTERS	HEATED	UNHEATED
ANAEROBIC PRIMARY SLUDGE ONLY:	HNP	UNP
ANAEROBIC PRIMARY AND W.A.S.:	HNW	UNW
AEROBIC DIGESTER:		AD

SPECIFIC TREATMENT PLANT CONFIGURATION

PLANT NUMBER:	1	2	IN OPERATION
BIOLOGICAL PROCESS:	SN	SN	SN
SECONDARY CLARIFIER:	EH	EH	EH
AEROBIC DIGESTER:	AD	AD	AD
ANAEROBIC DIGESTER:	NA	NA	NA

CORRECTION OF OVERFLOW RATES BASED ON DETENTION TIME IN THE CLARIFIER

DOES THE CLARIFIER HAVE A HOPPER BOTTOM (YES or NO)? NO

	SEC. CLARIFIER	#1	#2
MINIMUM SWD: 10 ft	ACTUAL SWD (ft.)	12.66	11.78

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

NOMINAL RATING SUMMARY:

NOTE: ALL VALUES IN SUMMARY ARE REPRESENTED AS FLOW IN MGD

INFLUENT BOD5 CONCENTRATION USED FOR NOMINAL RATING: 200 mg/l
BOD5 CONCENTRATION TO BIOLOGICAL PROCESS (35% REMOVAL): 200 mg/l

PLANT NUMBER:	1		2	
TYPE OF FLOW:	AVG.	PEAK	AVG.	PEAK
PRIMARY CLARIFIER:	NA	NA	NA	NA
BIOLOGICAL PROCESS:	1.4335	NA	1.4329	NA
SECONDARY CLARIFIER:	NA	6.8094	NA	6.8094
CHLORINE CONTACT BASIN:	NA	7.4363	NA	7.5410
AEROBIC DIGESTER:	0.7556	NA	0.7593	NA
ANAEROBIC DIGESTER	NA	NA	NA	NA

NOMINAL RATING OF THE WASTEWATER TREATMENT PLANT AS CURRENTLY CONFIGURED AND OPERATED

TYPE OF FLOW:	AVG.		PEAK			
PRIMARY CLARIFIER:	NA		NA	MGD =	NA	gpm
BIOLOGICAL PROCESS:	2.8664	MGD	NA			
SECONDARY CLARIFIER:	NA		13.6188	MGD =	9458	gpm
CHLORINE CONTACT BASIN:	NA		14.9773	MGD =	10401	gpm
AEROBIC DIGESTER:	3.0299	MGD	NA			
ANAEROBIC DIGESTER:	NA	MGD	NA			

PROCESS CONTROL AND NOMINAL RATING WORK SHEET
WASTEWATER TREATMENT PLANT EVALUATION
CITY OF LA MARQUE - WESTSIDE WASTEWATER TREATMENT PLANT

PROJECT NAME: CITY OF LA MARQUE - WESTSIDE WWTP ASSESSMENT
PROJECT No. 16-057 TPDES PERMIT No. WQ0010410-003

RATIONAL DESIGN RATING OF THE WASTEWATER TREATMENT AS CURRENTLY CONFIGURED AND OPERATED

TARGET PEAKING FACTOR:	4	times average flow
ORGANIC LOADING RATIO:	0.170	per day
SLUDGE VOLUME INDEX:	100	ml/g
INFLUENT BOD5:	200	mg/l
BOD5 TO PROCESS:	200	mg/l

CLARIFIER LOADING CRITERIA

INITIALLY THE CLARIFIER LOADING IS DETERMINED BY THE CHLORINE CONTACT BASIN SIZING OR THE STATE DESIGN CRITERIA ALLOWABLE CLARIFIER LOADING.

CLARIFIER LOADING

CHLORINE CONTACT BASIN BASIS:	1320	gpd/sq.ft.	
CRITERIA ALLOWABLE LOADINGS:	1200	gpd/sq.ft.	Current Configuration
CRITERIA ALLOWABLE LOADINGS:	1219	gpd/sq.ft.	1.8 hr Detention Time Basis
PRACTICAL MAXIMUM:	1800	gpd/sq.ft.	
OPTIMIZED CLARIFIER LOADING:	1060	gpd/sq.ft.	

BIOLOGICAL PROCESS OPTIMIZATION

ALLOWABLE FLOC VOLUME:	33.50	percent

FLOC VOLUME MUST BE LESS THAN 40 PERCENT

AERATION MLSS CONCENTRATION:	3350	mg/l
REAERATION CONCENTRATION:	6900	mg/l

CITY OF LA MARQUE
WESTSIDE WASTEWATER TREATMENT PLANT FACILITY ASSESSMENT

ATTACHMENT B

PERMIT EXCERPTS

TPDES PERMIT NO.
WQ0010410003
[For TCEQ office use only - EPA I.D. No. TX0114821]

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. Box 13087
Austin, Texas 78711-3087

This is a renewal that replaces TPDES Permit No. WQ0010410003 issued October 23, 2008.

PERMIT TO DISCHARGE WASTES
under provisions of
Section 402 of the Clean Water Act
and Chapter 26 of the Texas Water Code

City of La Marque

whose mailing address is

1111 Bayou Road
La Marque, Texas 77568

is authorized to treat and discharge wastes from the Westside Wastewater Treatment Facility, SIC Code 4952

located at 2701 Woodland Street, adjacent to Mahan Park approximately 1,300 feet southwest of the intersection of Woodland and Lake Streets, on the North Bank of Highland Bayou in Galveston County, Texas 77568

to a drainage ditch; thence to Highland Bayou; thence to West Bay in Segment No. 2424 of the the Bays and Estuaries

only according with effluent limitations, monitoring requirements and other conditions set forth in this permit, as well as the rules of the Texas Commission on Environmental Quality (TCEQ), the laws of the State of Texas, and other orders of the TCEQ. The issuance of this permit does not grant to the permittee the right to use private or public property for conveyance of wastewater along the discharge route described in this permit. This includes, but is not limited to, property belonging to any individual, partnership, corporation, or other entity. Neither does this permit authorize any invasion of personal rights nor any violation of federal, state, or local laws or regulations. It is the responsibility of the permittee to acquire property rights as may be necessary to use the discharge route.

This permit shall expire at midnight, **October 1, 2016.**

ISSUED DATE: May 22, 2013

For the Commission

INTERIM EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS Outfall Number 001

1. During the period beginning upon the date of issuance and lasting through two years and three hundred sixty five days, the permittee is authorized to discharge subject to the following effluent limitations:

   The annual average flow of effluent shall not exceed 3.0 million gallons per day (MGD); nor shall the average discharge during any two-hour period (2-hour peak) exceed 8,333 gallons per minute (gpm).

Effluent Characteristic	Discharge Limitations				Min. Self-Monitoring Requirements	
	Daily Avg.	7-day Avg.	Daily Max.	Single Grab	Report Daily Avg. & Daily Max.	
	mg/l (lbs/day)	mg/l	mg/l	mg/l	Measurement Frequency	Sample Type
Flow, MGD	Report	N/A	Report	N/A	Continuous	Totalizing Meter
Carbonaceous Biochemical Oxygen Demand (5-day)	10 (250)	15	25	35	Two/week	Composite
Total Suspended Solids	15 (375)	25	40	60	Two/week	Composite
Ammonia Nitrogen	3 (75)	6	10	15	Two/week	Composite
Total Copper	0.009 (0.23)	N/A	0.020	0.028	Two/week	Composite
Enterococci, CFU or MPN/100 ml	35	N/A	104	N/A	One/week	Grab

2. The effluent shall contain a chlorine residual of at least 1.0 mg/l after a detention time of at least 20 minutes (based on peak flow) and shall be monitored daily by grab sample. The permittee shall dechlorinate the chlorinated effluent to less than 0.1 mg/l chlorine residual and shall monitor chlorine residual daily by grab sample after the dechlorination process. An equivalent method of disinfection may be substituted only with prior approval of the Executive Director.
3. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per week by grab sample.
4. There shall be no discharge of floating solids or visible foam in other than trace amounts and no discharge of visible oil.
5. Effluent monitoring samples shall be taken at the following location(s): Following the final treatment unit.
6. The effluent shall contain a minimum dissolved oxygen of 4.0 mg/l and shall be monitored twice per week by grab sample.
7. The annual average flow and maximum 2-hour peak flow shall be reported monthly.

FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS Outfall Number 001

1. During the period beginning upon three years from the date of issuance and lasting through the date of expiration, the permittee is authorized to discharge subject to the following effluent limitations:

   The annual average flow of effluent shall not exceed 3.0 million gallons per day (MGD); nor shall the average discharge during any two-hour period (2-hour peak) exceed 8,333 gallons per minute (gpm).

Effluent Characteristic	Discharge Limitations				Min. Self-Monitoring Requirements	
	Daily Avg.	7-day Avg.	Daily Max.	Single Grab	Report Daily Avg. & Daily Max.	
	mg/l (lbs/day)	mg/l	mg/l	mg/l	Measurement Frequency	Sample Type
Flow, MGD	Report	N/A	Report	N/A	Continuous	Totalizing Meter
Carbonaceous Biochemical Oxygen Demand (5-day)	10 (250)	15	25	35	Two/week	Composite
Total Suspended Solids	15 (375)	25	40	60	Two/week	Composite
Ammonia Nitrogen	3 (75)	6	10	15	Two/week	Composite
Total Copper	0.00766 (0.19)	N/A	0.0162	0.020	Two/week	Composite
Enterococci, CFU or MPN/100 ml	35	N/A	104	N/A	One/week	Grab

2. The effluent shall contain a chlorine residual of at least 1.0 mg/l after a detention time of at least 20 minutes (based on peak flow) and shall be monitored daily by grab sample. The permittee shall dechlorinate the chlorinated effluent to less than 0.1 mg/l chlorine residual and shall monitor chlorine residual daily by grab sample after the dechlorination process. An equivalent method of disinfection may be substituted only with prior approval of the Executive Director.
3. The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored once per week by grab sample.
4. There shall be no discharge of floating solids or visible foam in other than trace amounts and no discharge of visible oil.
5. Effluent monitoring samples shall be taken at the following location(s): Following the final treatment unit.
6. The effluent shall contain a minimum dissolved oxygen of 4.0 mg/l and shall be monitored twice per week by grab sample.
7. The annual average flow and maximum 2-hour peak flow shall be reported monthly.

OTHER REQUIREMENTS

1. The permittee shall employ or contract with one or more licensed wastewater treatment facility operators or wastewater system operations companies holding a valid license or registration according to the requirements of 30 TAC Chapter 30, Occupational Licenses and Registrations and in particular 30 TAC Chapter 30, Subchapter J, Wastewater Operators and Operations Companies.

   This Category B facility must be operated by a chief operator or an operator holding a Category B license or higher. The facility must be operated a minimum of five days per week by the licensed chief operator or an operator holding the required level of license or higher. The licensed chief operator or operator holding the required level of license or higher must be available by telephone or pager seven days per week. Where shift operation of the wastewater treatment facility is necessary, each shift that does not have the on-site supervision of the licensed chief operator must be supervised by an operator in charge who is licensed not less than one level below the category for the facility.

2. The Executive Director has reviewed this action for consistency with the goals and policies of the Texas Coastal Management Program (CMP) in accordance with the regulations of the Coastal Coordination Council (CCC) and has determined that the action is consistent with the applicable CMP goals and policies.

3. The permittee shall comply with the requirements of 30 TAC § 309.13 (a) through (d). In addition, by ownership of the required buffer zone area, the permittee shall comply with the requirements of 30 TAC § 309.13(e).

4. The permittee shall provide facilities for the protection of its wastewater treatment facilities from a 100-year flood.

5. There is no mixing zone established for this discharge to an intermittent stream. Acute toxic criteria apply at the point of discharge.

6. The permittee is hereby placed on notice that this permit may be reviewed by the TCEQ after the completion of any new intensive water quality survey on Segment No. 2424 of the the Bays and Estuaries and any subsequent updating of the water quality model for Segment No. 2424, in order to determine if the limitations and conditions contained herein are consistent with any such revised model. The permit may be amended, pursuant to 30 TAC §305.62, as a result of such review. The permittee is also hereby placed on notice that effluent limits may be made more stringent at renewal based on, for example, any change to modeling protocol approved in the TCEQ Continuing Planning Process.

7. Violations of daily maximum limitations for the following pollutants shall be reported orally or by facsimile to TCEQ Region 12 within 24 hours from the time the permittee becomes aware of the violation followed by a written report within five working days to TCEQ Region 12 and the Enforcement Division (MC 224).

POLLUTANT	MAL (µg/l)
Total Copper	10

   Test methods utilized shall be sensitive enough to demonstrate compliance with the permit

effluent limitations. Permit compliance/noncompliance determinations will be based on the effluent limitations contained in this permit with consideration given to the MAL for the parameters specified above.

When an analysis of an effluent sample for any of the parameters listed above indicates no detectable levels above the MAL and the test method detection level is as sensitive as the specified MAL, a value of zero (0) shall be used for that measurement when determining calculations and reporting requirements for the self-reporting form. This applies to determinations of daily maximum concentration, calculations of loading and daily averages, and other reportable results.

When a reported value is zero (0) based on this MAL provision, the permittee shall submit the following statement with the self-reporting form either as a separate attachment to the form or as a statement in the comments section of the form. "The reported value(s) of zero (0) for Total Copper on the self-reporting form for ***monitoring period date range*** is based on the following conditions: 1) the analytical method used had a method detection level as sensitive as the MAL specified in the permit and 2) the analytical results contained no detectable levels above the specified MAL."

When an analysis of an effluent sample for a parameter indicates no detectable levels and the test method detection level is not as sensitive as the MAL specified in the permit, or an MAL is not specified in the permit for that parameter, the level of detection achieved shall be used for that measurement when determining calculations and reporting requirements for the self-reporting form. A zero (0) may not be used.

8. In accordance with 30 TAC §319.9, a permittee that has at least twelve months of uninterrupted compliance with its bacteria limit may notify the commission in writing of its compliance and request a less frequent measurement schedule. To request a less frequent schedule, the permittee shall submit a written request to the TCEQ Wastewater Permitting Section (MC 148) for each phase that includes a different monitoring frequency. The request must contain all of the reported bacteria values (Daily Avg. and Daily Max./Single Grab) for the twelve consecutive months immediately prior to the request. If the Executive Director finds that a less frequent measurement schedule is protective of human health and the environment, the permittee may be given a less frequent measurement schedule. For this permit, 1/week may be reduced to 2/month. **A violation of any bacteria limit by a facility that has been granted a less frequent measurement schedule will require the permittee to return to the standard frequency schedule**, and the permittee may not apply for another reduction in measurement frequency for at least 24 months from the date of the last violation. The Executive Director may establish a more frequent measurement schedule if necessary to protect human health or the environment.

9. A certified operator shall inspect the facility daily and maintain at the plant site a record of these inspections. These records shall be available at the plant site for inspection by authorized representatives of the commission for at least three years.

10. The permittee shall comply with the following schedule of activities for the attainment of water quality-based final effluent limitations on page 2a for Total Copper at Outfall 001:

    a. Determine exceedance cause(s);
    b. Develop control options;
    c. Evaluate and select control mechanisms;

d. Implement corrective action; and
e. Attain final effluent limitations no later than three years from the date of permit issuance.

The permittee shall submit quarterly progress reports in accordance with the following schedule. The requirement to submit quarterly progress reports shall expire three years from the date of permit issuance.

PROGRESS REPORT DATES
January 1
April1
July 1
October 1

The quarterly progress reports shall include a discussion of the interim requirements that have been completed at the time of the report and shall address the progress towards attaining the water quality-based final effluent limitations on page 2a for Total Copper at Outfall 001 no later than three years from the date of permit issuance.

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

All reports shall be submitted to the TCEQ Regional Office (MC Region 12) and the Water Quality Compliance Monitoring Team of the Enforcement Division (MC 224) of the TCEQ.

CITY OF LA MARQUE
WESTSIDE WASTEWATER TREATMENT PLANT FACILITY ASSESSMENT

ATTACHMENT C

30 TAC CHAPTER 317 EXCERPTS
(EXISTING PLANT DESIGN CRITERIA)

infectious waste; therefore, containers must provide vector control if wastes are not disposed of daily at a Type 1 landfill.

(5) Preaeration. Because preaeration may be proposed when a particular problem is anticipated, evaluation of these units will be on a case-by-case basis. Diffuser equipment shall be arranged for greatest efficiency, with consideration given to maintenance and inspection.

(6) Flow equalization. Equalization should be considered to minimize random or cyclic peaking of organic or hydraulic loadings. Equalization units should be provided after screening and grit removal.

(A) Aeration. Aeration may be required for odor control. When required, air supply must be sufficient to maintain 1.0 mg/1 of dissolved oxygen in the wastewater.

(B) Volume. A diurnal flow graph with supporting calculations used for sizing the equalization facility must be provided in the engineering report. Generally, an equalization facility requires a volume equivalent to 10 % to 20 % of the anticipated dry weather 30-day average flow. Tankage should be divided into separate compartments to allow for operational flexibility, repair and cleaning.

(c) Flow measuring devices and sampling points. A means for measuring effluent flow shall be provided at all plants. Consideration should be given to providing a means to monitor influent flow. Where average influent and effluent flows are significantly different, e.g., plants with large water surfaces located in areas of high rainfall or evaporation or plants using a portion of effluent for irrigation, both influent and effluent must be measured. Consideration should be given to internal flow monitoring devices to measure returned activated sludge and/or to facilitate splitting flows between units with special attention being given when units are of unequal size. All plants shall be provided with a readily accessible area for sampling effluent.

(d) Clarifiers.

(1) Inlets. Clarifier inlets shall be designed to provide uniform flow and stilling. Vertical flow velocity through the inlet stilling well shall not exceed 0.15 feet per second at peak flow. Inlet distribution channels shall not have deadened corners and shall be designed to prevent the settling of solids in the channels. Inlet structures should be designed to allow floating material to enter the clarifier.

(2) Scum removal. Scum baffles and a means for the collection and disposal of scum shall be provided for primary and final clarifiers. Scum collected from final clarifiers in plants utilizing the activated sludge process, or any modification thereof, and aerated lagoons may be discharged to aeration basin(s) and/or digester or disposed of by other approved methods. Scum from all other final clarifiers and from primary clarifiers shall be discharged to the sludge digester or other approved method of disposal. Discharge of scum to any open drying area is not acceptable. Mechanical skimmers shall be used in units with a design flow greater than 25,000 gallons per day. Smaller systems may use hydraulic differential skimming provided that the scum pickup is capable of removing

scum from the entire operating surface of the clarifier. Scum pumps shall be specifically designed for this purpose.

(3) Effluent weirs. Effluent weirs shall be designed to prevent turbulence or localized high vertical flow velocity in the clarifiers. Weirs shall be located to prevent short circuiting flow through the clarifier and shall be adjustable for leveling. Weir loadings shall not exceed 20,000 gallons per day peak design flow per linear foot of weir length for plants with a design flow of 1.0 mgd or less. Special consideration will be given to weir loadings for plants with a design flow in excess of 1.0 mgd, but such loadings shall not exceed 30,000 gallons per day peak flow per linear foot of weir.

(4) Sludge lines. Means for transfer of sludge from primary, intermediate, or final clarifiers for subsequent processing shall be provided so that treatment efficiency will not be adversely affected. Gravity sludge transfer lines shall not be less than eight inches in diameter.

(5) Basin sizing. Overflow rates are based on surface area of clarifiers. The surface areas required shall be computed using the following criteria. The actual clarifier size shall be based on whichever is the larger size from the two surface area calculations (peak flow and design flow surface loading rates). The final clarifier solids loading for all activated sludge treatment processes shall not exceed 50 pounds of solids per day per square foot of surface area at peak flow rate. The following design criteria for clarifiers are based upon a side water depth of 10 feet and shall be considered acceptable:

Clarifier	Maximum Surface[a] Loading @ Peak Flow (gal/day/sq ft)	Minimum Effective[c] Detention Time @ Peak Flow (hrs)	Maximum Surface[a] Loading @ Design Flow (gal/day/sq ft)	Minimum Effective[c] Detention Time @ Design Flow (hrs)
Primary & Intermediate	1800	----	1000	----
Final:				
Fixed Film Secondary	1600	1.1	800	2.2
Fixed Film Enhanced Secondary[b]	1400	1.3	700	3.0
Activated Sludge (except extended air)				
Secondary	1400	1.3	700	2.6
Enhanced Secondary[b]	1200	1.5	600	3.0
Extended Air Secondary	1000	1.8	500	3.6
Extended Air Enhanced Secondary[b]	800	2.2	400	4.5
Second Stage Nitrification	1200	1.5	600	3.0

a Does not include recirculation

b Enhanced Secondary Treatment refers to enhanced solids removal achieved through reducing the hydraulic and solids loading to the clarifier

c Overflow rate and side water depth (SWD) may be adjusted, keeping the detention time unchanged, over a range of 8 ft. to 16 ft. of SWD. The detention time is based on the effective volume and the overflow rate of the circular or rectangular clarifier. (The effective volume includes all liquid above the sludge blanket). For cone bottom tanks, the top of the sludge blanket is considered to be at the top of the cone. For flat bottom tanks, a sludge blanket of 3 ft. should be allowed for development of maximum return sludge concentration.

(6) Sidewater depth. The minimum sidewater depth for conventional primary and intermediate clarifiers is seven feet. All final clarifiers shall have a minimum side-water depth of 8 feet. Final clarifiers having a surface area equal to or greater than 1,250 square feet (diameter equal to or greater than 40 feet) must be provided with a minimum sidewater depth of 10 feet.

(7) Hopper bottom clarifiers. Hopper bottom clarifiers without mechanical sludge collecting equipment will only be approved for those facilities with a permitted design flow of less than 25,000 gallons per day. The required sidewater depth (SWD) for hopper bottom clarifiers may be computed using the following equation: SWD = 160 QD + 4, where SWD equals required sidewater depth in feet and QD equals design flow in million gallons per day. Furthermore, SWD as computed above for any flow may be reduced by crediting the upper one-third of the hopper as effective sidewater depth if the following conditions are met:

(A) clarifier surface loading rate is reduced by at least 15 % from maximum loading rate as per paragraph (5) of this subsection;

(B) influent stilling baffle and effluent weir are designed to prevent short circuiting;

(C) detention time at peak flow is at least 1.8 hours for secondary treatment and 2.4 hours for advanced treatment; and

(D) an appropriate form of flow equalization is used.

(8) Sludge collection equipment. All conventional clarifier units that treat flow from a treatment plant facility with a design flow of 25,000 gallons per day or greater shall be provided with mechanical sludge collecting equipment. Hopper bottom clarifiers must have a smooth wall finish and a hopper slope of not less than 60 degrees.

(9) BOD_5 removal. It shall be assumed that the BOD_5 removal in a primary clarifier is 35 percent, unless satisfactory evidence is presented to indicate that the efficiency will be otherwise. In plant efficiency calculations, it shall be assumed that the BOD_5 removal in intermediate and final clarifiers is included in the calculation for the efficiency of the treatment unit preceding the intermediate or final clarifier.

(e) Trickling filters.

(1) General. Trickling filters are secondary aerobic biological processes which are used for treatment of sewage.

(2) Basic design parameters. Trickling filters are classified according to applied hydraulic loading in million gallons per day per acre of filter media surface area, (mgd/acre) and organic loadings in pounds BOD per day per 1000 cubic feet of filter media, (lb BOD/day - 1000 cu ft). The following factors should be considered in the selection of the design hydraulic and organic loadings: strength of the influent sewage, effectiveness of pretreatment, type of filter media, and treatment efficiency required. Typical ranges of applied hydraulic and organic loadings for the different classes of trickling filters are presented in the following table for illustrative purposes. The design engineer shall submit sufficient operating data from existing trickling filters of similar construction and operation to justify his efficiency calculations for the filters, and a filter efficiency formula from a reliable source acceptable to the commission. The formula of the National Research Council may be used when rock media is used in the trickling filter(s).

(III) Supplemental diffused air should be considered for mechanical drive systems to help remove excess biomass from the media and to help maintain the minimum dissolved oxygen concentration.

(ii) Air Drives.

(I) Each RBC unit shall have air diffusers mounted below the media and off-center from the vertical axis of the RBC unit. Air cups mounted on the outside of the media shall collect the air to provide the driving force and maintain the required rpm.

(II) Blowers shall provide enough air flow for each RBC unit plus additional capacity to double the air flow rate to any one unit while the others are running normally.

(III) The blowers shall be capable of providing the required air flow with the largest unit out of service.

(IV) The air diffuser line to each unit shall be mounted such that it can be removed without draining the tank or removing the RBC media.

(V) An air control valve shall be installed on the air diffuser line to each RBC unit.

(E) Dissolved oxygen. The RBC plant shall be designed to maintain a minimum dissolved oxygen concentration of one milligram per liter at all stages during the peak organic flow rate. Supplemental aeration may be required.

(F) Nitrification. The design of a RBC plant to achieve nitrification is dependent upon a number of factors including the concentration of ammonia in the influent, effluent ammonia concentration required, BOD_5 removal required, minimum operational temperatures, and ratio of peak to design hydraulic flow. Each of these factors will impact the number of stages of treatment required and the allowable ammonia nitrogen loading (lb NH^3/day/1,000 ft^2 media) required to achieve the desired levels of nitrification for a given facility. The engineer shall submit appropriate data supporting the design.

(G) Design flexibility. The designer of a RBC plant should consider provisions to provide additional operational flexibility such as controlled flow to multiple first stages, alternate flow and staging arrangements, removable baffles between stages, and provision for step feed and supplemental aeration.

(g) Activated sludge facilities.

(1) Organic loading rates. Aeration tank volumes should be based upon full scale experience, pilot scale studies, or rational calculations based upon commonly accepted design parameters such as food to microorganism ratio, mixed liquor suspended solids, and the solids retention time. Other factors to be considered include size of the treatment plant, diurnal load variations, return

flows and soluble organic loads from digesters or sludge dewatering operations and degree of treatment required. Temperature, pH, and dissolved oxygen concentration are particularly important to consider when designing for nitrification. As a general rate, minimum aeration tank volumes shall be as set forth in the following table. Calculations must be submitted to fully justify the basis of design for any aeration basins not conforming to these minimum recommendations.

DESIGN ORGANIC LOADINGS

Process	Aeration Tank Organic Loading lb BOD_5/day/1000 cu ft
Conventional[A]	45
Complete Mix	45
Contact Stabilization[B]	50
Extended Aeration	15
Oxidation Ditch[C]	15
Single Stage Nitrification	35

(A) The conventional activated sludge process is characterized by having a plug flow hydraulic regime wherein particles are discharged in the same sequence in which they enter the aeration basin. Plug flow may be approximated in long tanks with a high length-to-width ratio.

(B) The contact stabilization process divides the aeration tank volume between the reaeration zone and the contact zone. The ratio of reaeration volume to contact volume ranges from 1:1 to 2:1. The hydraulic detention time in the contact zone shall be sufficient to provide removals of soluble substrates to the required levels. For domestic flows normally two hours is sufficient in the contact zone. Contact zone volume shall be based upon acceptable removal kinetics for soluble BOD_5 and ammonia nitrogen.

(C) Oxidation ditches (which are organically loaded consistent with §317.4(g)(1) of this title (relating to Wastewater Treatment Facilities.)) shall have a minimum hydraulic retention time of 20 hrs. based on design flow. These oxidation ditch systems shall provide final clarification and return sludge capability equal to that required for the extended aeration process. There shall be a minimum of two rotors per ditch, each capable of supplying the required oxygenation capacity and maintaining a minimum channel velocity of 1.0 fps with one rotor out of service. The ditch shall be lined with reinforced concrete or other acceptable erosion resistant liner material. Provision shall be made to easily vary the liquid level in the ditch to control the immersion depth of the rotor for flexibility of operation. A motor of sufficient size to maintain the proper rotor speed for continuous operation shall be provided. Rotor bearings should have grease fittings that are readily accessible to maintenance personnel. Gear housing and outboard bearings should be shielded from rotor splash.

(2) Aeration basin general design considerations. Aeration tank geometry shall be arranged to provide optimum oxygen transfer and mixing for the type aeration device proposed. Aeration tanks must be constructed of reinforced concrete, steel with corrosion resistant linings or

coatings, or lined earthen basins. Liquid depths shall not be less than 8.0 feet when diffused air is used. All aeration tanks shall have a freeboard of not less than 18 inches at peak flow. Access walkways with properly designed safety handrails shall be provided to all areas that require routine maintenance. Where operators would be required to climb heights greater than four (4) feet, properly designed stairways with safety handrails should be provided. The shape of the tank and the installation of aeration equipment should provide a means to control short circuiting through the tank. For plants designed for design flows greater than 2.0 mgd the total aeration basin volume shall be divided among two or more basins. Each treatment facility shall be designed to hydraulically pass the design two-hour peak flow with one basin out of service.

(3) Sludge pumps, piping, and return sludge flow measurement. The pumps and piping for return activated sludge shall be designed to provide variable underflow rates of 200 to 400 gallons per day per square foot for each clarifier. If mechanical pumps are used, sufficient pumping units shall be provided to maintain design pumping rates with the largest single unit out of service. Sludge piping and/or channels shall be so arranged that flushing can be accomplished. A minimum pipe line velocity of 3 feet per second should be provided at an underflow rate of 200 gallons per day per square foot. Some method shall be provided to measure the return sludge flow from each clarifier.

(4) Aeration system design.

(A) General design consideration. Aeration systems shall be designed to maintain a minimum dissolved oxygen concentration of 2.0 mg/l throughout the basin at the maximum diurnal organic loading rate and to provide thorough mixing of the mixed liquor. The design oxygen requirements for activated sludge facilities are presented in the following table. The minimum air volume requirements may be reduced with appropriate supporting performance evaluations from the manufacturer.

Process	Minimum O_2 Required lb O_2/lb BOD_5	Minimum[i] Air Required SCF/lb BOD_5
Conventional	1.2	1800
Complete Mix	1.2	1800
Contact Stabilization	1.2	1800
Extended Aeration	2.2	2850
Oxidation Ditch	1.6(2.2)[ii]	----
Nitrification	2.2	3200

(i) Minimum air volume requirements are based upon a transfer efficiency of 4.0 percent in wastewater for all activated sludge processes except extended aeration, for which a wastewater transfer efficiency of 4.5 percent is assumed.

(ii) Value in parentheses represents the minimum oxygen requirement for ditch type systems which will achieve nitrification.

(B) Diffused air systems.

(i) Volumetric aeration requirements. Volumetric aeration requirements shall be as determined from the preceding table unless certified diffuser performance data is presented which demonstrates transfer efficiencies greater than those used in the preparation of the table. Wastewater transfer efficiencies may be estimated for:

(I) coarse bubble diffusers by multiplying the clean water transfer efficiency by 0.65;

(II) fine bubble diffusers by multiplying the clean water transfer efficiency by 0.45. The maximum allowable wastewater transfer efficiency shall be 12.0 percent. Plants treating greater than 10 percent industrial wastes shall provide data to justify actual wastewater transfer efficiencies. Wastewater oxygen transfer efficiencies greater than 12% are considered innovative technology. See §317.1(a)(2)(C) of this title (relating to General Provisions) for performance bond requirements. Clean water transfer efficiencies obtained at 20 degrees Celsius shall be adjusted to reflect field conditions (i.e., wastewater transfer efficiencies) by use of the following equation:

$$\text{Air Flowrate} = \frac{(\text{lbs. } BOD_5/\text{day})(\text{lbs.} O_2 \text{ Req'd/lb. } BOD_5)}{\text{Required (scfm)} \quad \text{Wastewater T.E.} \times 0.23 \times 0.075 \times 1440}$$

Where: Wastewater T.E. = Wastewater Transfer Efficiency, %

0.23 = lb 0_2/lb air @ 20 degrees C

1440 = minutes/day

0.075 = lb air/(cubic foot)

(ii) Mixing requirement. Air requirements for mixing should be considered along with those required for the design organic loading. The designer is referred to Table 14-V, aerator mixing requirements in WASTEWATER TREATMENT PLANT DESIGN, a joint publication of the American Society of Civil Engineers and the Water Pollution Control Federation.

(iii) Blowers and compressors. Blowers and compressors shall be of such capacity to provide the required aeration rate as well as the requirements of all supplemental units such as airlift pumps. Multiple compressor units shall be provided and shall be arranged so the capacity of the total air supply may be adjusted to meet the variable organic load to be placed on the treatment facility. The compressors shall be designed so that the maximum design air requirements can be met with the largest single unit out of service. The blower/compressor units shall automatically restart after a period of power outage or the operator or owner shall be notified by some method such as telemetry or an auto-dialer. The specified capacity of the blowers or air compressors, particularly centrifugal blowers, should take into account that the air intake temperature may reach 104 degrees F(40 degrees C) or higher and the pressure may be less than standard (14.7 pounds per square inch absolute). The capacity of the motor drive should also take into account that the intake air may be 10 degrees F (-12

degrees C) or less and may require oversizing of the motor or a means of reducing the rate of air delivery to prevent overheating or damage to the motor.

(iv) Diffusers and piping. Each diffuser header shall include a control valve. These valves are basically for open/close operation but should be of the throttling type. The depth of each diffuser shall be adjustable. The air diffuser system, including piping, shall be capable of delivering 150 percent of design air requirements. The aeration system piping should be designed to minimize headlosses. Typical air velocities in air delivery piping systems are presented in the following table.

Pipe Diameter (Inches)	Velocity (Feet/min.-Std.Air)
1 - 3	1,200 - 1,800
4 - 10	1,800 - 3,000
12 - 24	2,700 - 4,000
30 - 60	3,800 - 6,500

(5) Mechanical aeration systems. Mechanical aeration devices shall be of such capacity to provide oxygen transfer to and mixing of the tank contents equivalent to that provided by compressed air. A minimum of two mechanical aeration devices shall be provided. Two speed or variable speed drive units should be considered. The oxygen transfer capability of mechanical surface aerators shall be calculated by the use of a generally accepted formula and the calculations presented in the engineering report. Proposed clean water transfer rates in excess of 2.0 lbs. per horsepower-hour shall be justified by performance data. In addition to providing sufficient oxygen transfer capability for oxygen transfer, the mechanical aeration devices shall also be required to provide sufficient mixing to prevent deposition of mixed liquor suspended solids under any flow condition. A minimum of 100 horsepower per million gallons of aeration basin volume shall be furnished.

(h) Nutrient removal.

(1) Nitrogen removal. Biological systems designed for nitrification and denitrification may be utilized for the conversion/removal of nitrogen. Various physical/chemical processes may be considered on a case-by-case basis.

(2) Phosphorous removal.

(A) Chemical treatment. Addition of lime or the salts of aluminum or iron may be used for the chemical removal of soluble phosphorous. The phosphorous reacts with the calcium, aluminum or iron ions to form insoluble compounds. These insoluble compounds may be flocculated with or without the addition of a coagulant aid such as a polyelectrolyte to facilitate separation by sedimentation. When adding salts of aluminum or iron, the designer should evaluate the wastewater to ensure sufficient alkalinity is available to prevent excessive depression of the wastewater or effluent pH. This is of particular importance when the system will also be required to achieve nitrification. The designer is referred to NUTRIENT CONTROL, Manual of Practice FD-7 Facilities

(4) Sludge pumps. Selection of sludge transfer pumps shall be based on both the quantity and character of the anticipated solids load to be handled by them. Where mechanical pumps are used, a sufficient number of pumps shall be provided so that the design pumping capacity is available with the largest sludge pump out of service. Air lift pumps are an acceptable mechanism for sludge transfer. Duplicate design pumping capacity is not required when air lift pumps are used. Pumps used for pumping sludge shall be specifically designed for that purpose. Centrifugal sludge pumps shall have a positive suction head unless they are self-priming or equipped with some other priming device acceptable to the commission.

(5) Sludge stabilization. Sludge stabilization is required for all biological treatment processes with the exception of extended aeration processes (with a solids retention time of 20 days or more) in which case the sludge may be drawn directly to a sludge dewatering facility.

(6) Sizing. Sizing requirements must be determined using the BOD_5 and design flow of the raw sewage influent to the plant.

(b) Aerobic digesters.

(1) Sludge thickening. Aerobic digesters should be provided with sludge thickening capability.

(2) Aeration. Air supplied from air compressors or blowers through diffusers shall be not less than 30 scfm per 1,000 cubic feet of aerobic digester volume. If a separate system of air compressors or blowers will supply air to the digester, then the compressor or blower system shall be designed so that the air requirements can be met with the largest single unit out of service. If mechanical aerators are used, a minimum of 1.5 horsepower per 1000 cubic feet must be provided.

(3) Mixing. Adequate mixing of the sludge shall be provided to keep the solids in suspension and to bring the deoxygenated liquid continuously to the aeration device. The amount of mixing shall be based upon the sludge characteristics, the tank geometry and type of aeration/mixing devices.

(4) Volume. A digester shall provide a minimum sludge retention time of 15 days. The design volume of the aerobic digesters may be calculated using 20 cubic feet per lb BOD_5 per day. This volume should be provided in two cells capable of operating as a single or two-step unit.

(5) Sludge withdrawal. Provisions shall be made to include an effective means of removing solids from the digester.

(c) Anaerobic digesters.

(1) Volume. The following minimum design criteria shall be used in computing the capacity of digesters with and without facilities for heating the sludge undergoing digestion and without sludge thickening ahead of the digester. Variances to the below-referenced table for minimum digester volume may be granted provided that it can be demonstrated to the satisfaction of the commission that a minimum solids retention time (SRT) of 30 days will be provided for unheated digesters and a

(E) Media. A minimum depth of 12 inches of filtering material, of which four to six inches is coarse sand, is required. To exclude surface water and eroded earth, the bed shall be protected by a permanent wall which shall extend at least 12 inches but not more than 24 inches above the finished surface of the beds.

(2) Vacuum filters, belt filters, belt filter presses, and other mechanical dewatering filters.

(A) Multiple units. Where dewatering of sludge is proposed, the design engineer shall provide data to document sufficient capacity, alternate disposal means or storage facilities capable of maintaining normal daily operations during breakdowns, upsets, etc.

(B) Filtrate. The filtrate from the filters shall be returned to the head of the treatment works or to the aeration system. Consideration shall be given to the impact of the returned filtrate on the treatment units and to providing odor and insect control facilities.

(3) Portable dewatering units. If sludge is to be treated using portable mechanical dewatering units, provisions shall be made in the facility plan or preliminary engineering report for the location and connection of the portable dewatering unit(s) during facility operation.

§317.6. Disinfection.

(a) General policy. Facilities for disinfection shall be provided to protect the public health and as an aid to plant operation.

(b) Chlorination facilities.

(1) Chlorination equipment. Chlorination equipment shall be selected and installed which is capable of applying desired amounts of chlorine continuously to the effluent. Chlorination equipment may also be installed to control odors and generally assist treatment. To accomplish these objectives, points of chlorine application may be established at the head of the plant for prechlorination, in the effluent chlorine contact chamber or other suitable locations.

(A) Capacity. Chlorination equipment shall have a capacity greater than the highest expected dosage to be applied. Chlorination systems shall be capable of operating under all design hydraulic conditions. Duplicate equipment with automatic switch over should be considered for standby service, so that continuous chlorination can be provided.

(B) Controls. Means for automatic proportioning of the chlorine amount to be applied in accordance with the rate of effluent being treated is encouraged for all plants and may be required if a maximum chlorine residual is required in the applicable discharge permit. Manual control will be permitted where the rate of effluent flow is relatively constant and for pre-chlorination applications. Consideration shall also be given to controlling chlorine feed by use of demand.

(C) Measurements. A scale for determining the amount of chlorine used daily, as well as the amount of chlorine remaining in the container, shall be provided.

(D) Safety equipment. Self contained breathing apparatus shall be available for use by plant personnel. The equipment should be located at a safe distance from the chlorine facilities to insure accessibility. Self-contained breathing apparatus shall be located outside the entrance to the chlorine facility.

(E) Housing. Housing of chlorination equipment and cylinders of chlorine shall be in separate rooms above ground level, with the door opening to the outside, as a measure of safety. Doors should be equipped with panic hardware. The chlorination room should be separated from other rooms by gas tight partitions and should be equipped with a clear glass, gas-tight window which permits the chlorinator to be viewed without entering the room. Forced mechanical ventilation shall be included in chlorination rooms which will provide a complete air change a minimum of every three minutes. The exhaust equipment should be automatically activated by external light switches and gas detectors that are provided with contact closures or relays. No other equipment shall be installed or stored in the chlorinator room. Vents from chlorinators, vaporizers, and pressure reducing values should be piped to the outdoors at a point not frequented by personnel, nor near a fresh air intake. Detectors and alarms should be located in each area containing chlorine gas under pressure. If gas withdrawal chlorine storage cylinders are subjected to direct sun, pressure reducing devices must be provided at the cylinders. Fire protection devices and fireproof construction is required for all chlorine storage areas. Electrical controls in chlorine facilities must be replaceable or protected against corrosion. Separate, trapless floor drains or a drain to an ample dilution point shall be provided from the chlorine storage room and from liquid feed chlorinator rooms.

(F) Emergency chlorination. Emergency power should be provided for chlorination facilities.

(G) Other. Chlorine rooms shall maintain a minimum temperature of 65 degrees F. Chlorinate solution should be prepared using treated effluent. If potable water is used, the potable water supply system must be protected by an adequate backflow prevention device. When a booster pump is required, duplicate equipment should be provided.

(2) Pellets. The use of pellet systems will be considered for approval on a case-by-case basis.

(3) Chlorine contact chamber design criteria.

(A) Initial mixing. Rapid initial mixing of the chlorine solution and wastewater is essential for effective disinfection. Effective initial mixing can be accomplished by applying the chlorine solution in a highly turbulent flow regime created by in-line diffusers, submerged hydraulic structures, mechanical mixers or jet mixers. The mean velocity gradient in the area of turbulent flow, or G value, shall exceed 500 sec.-1 with residence times of three to 15 seconds. Calculations supporting the design G value shall be presented in the engineering report. Mixing devices for which the mean velocity gradient is difficult to verify shall be justified by pilot or full-scale performance data.

(B) Contact time. Contact chambers shall be designed to provide a minimum average hydraulic residence time (chamber volume divided by flow) of 20 minutes at the design peak hydraulic flow.

(C) Contact chamber configuration. Pipe contact chambers shall be sized so that a scour velocity of at least one foot per second will be obtained at the existing maximum daily dry weather flow rate. If adequate initial mixing is not provided, contact chambers shall have a flow pathway length-to-width ratio of at least 40 and a maximum depth-to-width ratio of no greater than 1.0. This length-to-width ratio may be accomplished by baffling.

(D) Sludge and scum removal. Contact chambers shall either be provided with a means to remove sludge and scum, such as a small hydraulic dredge and skimmers, without taking the contact tank out of service, or shall be configured so that one-half of the contact chamber can be drained for cleaning without interrupting flow through the other half.

(c) Other means of disinfection.

(1) Chemical disinfection is not normally required when the total residence time in the wastewater treatment system (based on design flow) is at least 21 days.

(2) Ultraviolet light (U.V.) disinfection.

(A) General. Ultraviolet disinfection systems are considered applicable to treated wastewaters with daily average BOD_5 and TSS concentrations consistently less than 20 mg/l.

(B) Definitions:

(i) Ultraviolet Module - A grouping of UV germicidal lamps of a specified arc length in a quartz or teflon sleeve, sealed and supported in a single stainless steel or some other non-corrosive frame.

(ii) Ultraviolet Bank - A grouping of UV modules which span the entire width and depth (of flow) of the reactor.

(C) Sizing, configuration and required dosage. Ultraviolet disinfection units will be designed in accordance with methodologies presented in the U.S. Environmental Protection Agency Design Manual, Municipal Disinfection, EPA/625/1-86/021. Turbulent flow is necessary due to non-uniform intensity fields in an ultraviolet reactor. Proposed design shall have a Reynolds' number of greater than 6,000 at average design flows. Disinfection systems shall consist of a minimum of two ultraviolet banks in series and shall be capable of providing disinfection to permitted fecal coliform levels at the design daily average flow with the largest bank out of service.

(D) System details. The ultraviolet unit shall be configured so that there is adequate space for the removal and maintenance of lamps. One person should be able to replace lamps without the aid of mechanical lifting devices, special tools or equipment. Drains shall be provided to completely drain the ultraviolet reactor unless the equipment can be easily removed from the effluent

CITY OF LA MARQUE
WESTSIDE WASTEWATER TREATMENT PLANT FACILITY ASSESSMENT

ATTACHMENT D

SUMMARY TABLES OF LABORATORY DATA

City of La Marque
Wastewater Treatment Plant Evaluation
3/1/2010 thru 5/31/2016
Influent and Effluent Data
6/9/2016

		EFFLUENT										
DATE	FLOW	Enterococci	CBOD	CBOD	DO	NH3-N	NH3-N	pH	TSS	TSS	Copper	Copper
mm/dd/yyyy	MGD	MPN/100 mL	mg/l	lbs/day	mg/L	mg/l	lbs/day	S.U.	mg/l	lbs/day	mg/l	lbs/day
Average	1.916	39	2.6	46.56	7.8	1.62	35.24	7.00	3.0	58.26	0.00401	0.07
Median	1.484	6	2.0	27.33	7.7	0.19	3.49	7.02	2.0	29.09	0.00290	0.04
Minimum	0.778	1	1.0	11.82	4.7	0.10	0.65	5.80	2.0	12.98	0.00100	0.01
Maximum	10.970	2420	25.7	870.24	10.1	32.90	1919.06	7.80	23.4	1084.94	0.06180	0.88
Std Dev	1.332	216	1.8	70.46	0.8	3.65	108.17	0.26	2.3	106.52	0.00431	0.11
Avg + Std Dev	3.247	255	4.4	117.02	8.5	5.27	143.41	7.25	5.3	164.78	0.00832	0.18
75 Percentile	1.941	16	2.4	40.42	8.3	1.42	22.91	7.18	3.0	44.71	0.00500	0.07
80 Percentile	2.131	21	2.7	47.07	8.5	1.96	33.76	7.22	3.4	54.07	0.00500	0.08
85 Percentile	2.374	27	3.1	59.22	8.6	2.65	62.00	7.26	3.8	71.01	0.00587	0.10
90 Percentile	2.984	34	4.0	88.00	8.8	4.31	97.26	7.30	4.8	101.31	0.00730	0.16
93 Percentile	3.742	55	4.5	108.00	8.9	5.74	134.53	7.34	5.6	134.26	0.00900	0.24
95 Percentile	4.755	76	4.9	123.96	9.0	8.08	170.70	7.37	6.8	203.10	0.01046	0.27
96 Percentile	5.241	82	5.7	137.75	9.0	9.92	196.76	7.39	7.6	238.20	0.01201	0.32
97 Percentile	5.788	95	6.1	163.12	9.2	11.90	220.72	7.41	8.3	290.38	0.01391	0.37
98 Percentile	6.320	145	7.0	233.69	9.4	13.77	303.79	7.42	8.8	336.27	0.01651	0.45
99 Percentile	7.945	744	10.6	336.72	9.7	17.50	344.27	7.48	15.4	549.70	0.02122	0.59
Count	576	154	650	574	650	651	575	651	650	574	650	575

City of La Marque
Wastewater Treatment Pla
3/1/2010 thru 5/31/2016
Influent and Effluent Data
6/9/2016

		INFLUENT										
DATE	FLOW	BOD5	BOD5	COD	NH3-N	NH3-N	pH	TSS	TSS	VSS	ORG. CONC.	Copper
mm/dd/yyyy	MGD	mg/l	lbs/day	mg/l	mg/l	lbs/day	Units	mg/l	lbs/day	mg/l	%	mg/l
Average	1.916	109.8	1653.9	211.5	22.98	321.8	8.20	118.8	1859.9	84.8	72.0	0.03610
Median	1.484	102.0	1326.1	208.5	22.90	292.8	7.10	106.0	1345.2	76.0	72.1	0.03110
Minimum	0.778	10.3	132.4	42.0	6.50	98.1	4.40	11.0	313.5	6.0	15.2	0.00100
Maximum	10.970	614.9	11237.7	493.0	55.40	2397.4	719.00	918.0	23780.4	596.0	107.1	0.26400
Std Dev	1.332	55.1	1158.6	75.8	7.67	157.9	27.99	74.1	1962.5	50.1	10.8	0.02297
Avg + Std Dev	3.247	164.9	2812.5	287.3	30.65	479.6	36.18	192.9	3822.5	134.9	82.8	0.05906
75 Percentile	1.941	128.0	1935.2	259.5	27.60	337.6	7.23	145.5	1924.9	104.5	79.2	0.04615
80 Percentile	2.131	142.0	2092.2	278.0	28.90	358.5	7.27	156.0	2170.8	112.0	80.5	0.04970
85 Percentile	2.374	155.0	2437.2	288.0	30.10	389.5	7.30	170.0	2569.9	123.0	82.5	0.05600
90 Percentile	2.984	170.1	2910.0	301.1	32.20	435.4	7.34	196.0	3237.3	136.2	85.2	0.06250
93 Percentile	3.742	181.3	3319.7	320.2	33.96	504.7	7.36	213.5	4095.9	151.0	87.0	0.06850
95 Percentile	4.755	194.0	3729.8	335.4	34.90	566.7	7.40	228.5	5504.4	164.3	89.3	0.07765
96 Percentile	5.241	202.6	4190.5	341.7	35.70	595.2	7.42	248.0	5894.3	173.3	90.7	0.08000
97 Percentile	5.788	216.5	4610.4	362.7	37.77	671.7	7.45	270.0	6708.8	186.0	92.1	0.08530
98 Percentile	6.320	228.1	5467.9	389.7	40.81	746.4	7.46	288.0	8580.7	202.6	94.0	0.09100
99 Percentile	7.945	302.5	6321.7	426.2	46.03	893.1	7.56	343.0	9881.6	249.3	96.5	0.10050
Count	576	650	574	370	649	575	647	651	575	635	635	651