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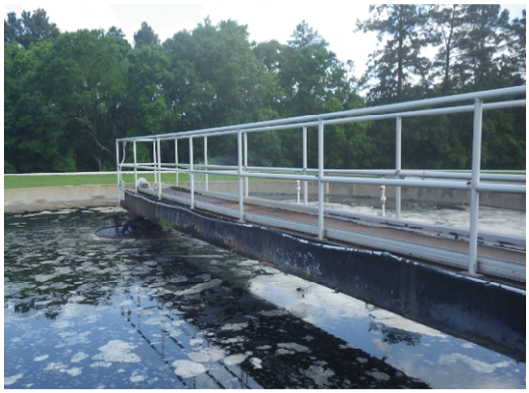

A.J. BROWN WASTEWATER TREATMENT PLANT CONDITION ASSESSMENT

Prepared for:

City of Huntsville

May 2016

Prepared by:

FREESE AND NICHOLS, INC.
11200 Broadway Street
Offices West, Suite 2332
Pearland, TX 77584
832-456-4700

FNI Project No.
HVL15299

Innovative approaches
Practical results
Outstanding service

A.J. BROWN WASTERWATER PLANT CONDITION ASSESSMENT

Prepared for:

City of Huntsville

STATE OF TEXAS
MURALI ERAT
105980
LICENSED
PROFESSIONAL ENGINEER

May 23, 2016

FREESE AND NICHOLS, INC.
TEXAS REGISTERED
ENGINEERING FIRM
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TABLE OF CONTENTS

EXECUTIVE SUMMARY 1
1.0 INTRODUCTION 1
1.1 PROJECT SUMMARY 1
1.2 Description of Existing WWTP 1
1.2.1 Permit Requirements 4
2.0 CONDITION AND CRITICALITY ASSESSMENT METHODOLOGY 7
2.1 Condition Assessment Scoring 7
2.2 Criticality Assessment Scoring 7
2.3 Risk Determination 9
3.0 FACILITY DESCRIPTION AND TREATMENT PROCESS 10
3.1 Headworks 10
3.1.1 Process Overview 10
3.1.2 Screens Existing Conditions 10
3.1.3 Recommended Improvements for Screens 13
3.1.4 Grit Removal Unit Existing Conditions 14
3.1.5 Recommended Improvements for the Grit Removal System 16
3.2 Raw Sewage and Sludge Pump Station 16
3.2.1 Overview 16
3.2.2 Raw Sewage Pumps & Piping Existing Condition 16
3.2.3 Sludge (WAS/RAS) Pump & Piping Existing Condition 21
3.2.4 Recommended Improvements for Pump Station 22
3.3 Aeration Basins 25
3.3.1 Overview 26
3.3.2 Aeration Basins No. 1 and No. 2 Existing Conditions 27
3.3.3 Aeration Basins Improvement Alternatives 29
3.4 Clarifiers 34
3.4.1 Overview 34
3.4.2 Clarifiers No. 1 and 2 Existing Conditions 35
3.4.3 Clarifiers No. 1 and 2 Recommended Improvements 38
3.5 Chlorine Contact Basins 41
3.5.1 Overview 41
3.5.2 Chlorine Contact Basin Existing Conditions 41
3.5.3 Chlorine Contact Basin Recommended Improvements 43
3.6 NON- POTABLE WATER SYSTEM 43
3.6.1 Overview 44

3.6.2 Non-potable Water Existing Conditions 44
3.6.3 Non-potable Water Recommended Improvements 45
3.7 Chlorination System 46
3.7.1 Overview 46
3.7.2 Chlorination System Existing Conditions 46
3.7.3 Chlorination System Improvements 49
3.8 Dechlorination System 50
3.8.1 Overview 51
3.8.2 De-chlorination System Existing Conditions 51
3.8.3 De-chlorination System Improvements 53
3.9 Solids Processing 53
3.9.1 Overview 53
3.9.2 Sludge Drying Beds Existing Conditions 54
3.9.1 Improvement Alternatives 55
4.0 ADDITIONAL ELECTRICAL CONSIDERATIONS & RECOMMENDATIONS 58
4.1 Controls 58
4.2 SCADA 58
4.3 Recommendations 58
5.0 RISK ASSESSMENT AND COST SUMMARY 59
6.0 RECOMMENDATIONS 61

Table of Figures

Figure 1.1 A.J. Brown WWTP Aerial Map 3
Figure 1.2 A.J. Brown Plant Schematic 5
Figure 1.3 WWTP Avg. Daily Flow Data (Jan 2010 – June 2015) 6
Figure 1.4 WWTP 2-Hr Peak Flow Data (Jan 2010 – June 2015) 6
Figure 2.1 Risk Assessment Matrix 9
Figure 3.1 Mechanical Vulcan Mensch Crawler Screen and Inlet Gate 11
Figure 3.2 Manual By-pass Bar Screen 11
Figure 3.3 Bar Screen Control Panel 12
Figure 3.4 Ovivo Detritor Grit Removal System 14
Figure 3.5 Grit Removal System Screw Conveyor 15
Figure 3.6 Raw Sewage Pumps 18
Figure 3.7 Front view of Pump Station Building 18
Figure 3.8 Electrical Equipment inside Pump Station 19
Figure 3.9 Existing Generator 19
Figure 3.10 RAS Pumps 21
Figure 3.11 WAS Pumps 21
Figure 3.12 Option 1 – Rehabilitation of Existing Pump Station and Proposed Electrical Building 24

Figure 3.13 Option 2 - Proposed Pump Station Location 25
Figure 3.14 Existing Mechanical Disc Aeration Layout 26
Figure 3.15 Aeration Basins Walkway, Access Platform and Bearings 27
Figure 3.16 Aeration Basins Broken Shaft 28
Figure 3.17 Aerator Motor and Disconnect Pit 28
Figure 3.18 Option 2 – Vertical Shaft Surface Aerators 31
Figure 3.19 Option 2 – Retrofit with Vertical Shaft Surface Aerators 32
Figure 3.20 Proposed Conventional Aeration Basin Layout 33
Figure 3.21 Clarifier No. 1 34
Figure 3.22 Clarifier No. 2 34
Figure 3.23 PVC Conduits showing PVC coating coming off 36
Figure 3.24 Stamford Baffles 39
Figure 3.25 Clarifier Scum Trough 39
Figure 3.26 Proposed Clarifiers Layout 40
Figure 3.27 Basins No. 1 and 2 41
Figure 3.28 Basin No. 3 42
Figure 3.29 Curtain Baffles 43
Figure 3.30 Non-Potable Water Pumps 44
Figure 3.31 Chlorine Ton Cylinder Storage 46
Figure 3.32 Chlorinators 47
Figure 3.33 Chlorine Cylinders and Scales 47
Figure 3.34 Chlorine Ton Cylinder Jib Crane 48
Figure 3.35 Chlorine Building Proposed Location 49
Figure 3.36 Sulfonators inside the De-chlorination Building 50
Figure 3.37 De-chlorination Building 50
Figure 3.38 De-chlorination Chamber 51
Figure 3.39 De-chlorination Building 52
Figure 3.40 Sludge Drying Beds 53
Figure 3.41 Rented Belt Press 54
Figure 3.42 Screw Press 56
Figure 3.43 Belt Filter Press 57

Table of Tables

Table ES.1 Risk Assessment Summary ES.1
Table ES.2 Improvements OPCC Summary ES.2
Table ES.3 Recommended Improvements OPCC Summary ES.5
Table 1.1 WWTP Construction History 2
Table 1.2 TPDES Permit Limits 4
Table 2.1 Condition Scoring Guidelines 7
Table 2.2 Criticality Component Scoring Legend 8
Table 2.3 Criticality Parameters and Weighting System 8
Table 2.4 Risk Ratings and Categories 9
Table 3.1 Screens Condition Rating and Category 13

Table 3.2 Screens Criticality Rating and Category 13
Table 3.3 Grit Removal Condition Rating and Category 15
Table 3.4 Grit Removal Criticality Rating and Category 15
Table 3.5 Raw Sewage Pumps Condition Rating and Category 20
Table 3.6 Raw Sewage Pumps Criticality Rating and Category 20
Table 3.7 RAS/ WAS Pumps Condition Rating and Category 22
Table 3.8 RAS/ WAS Pumps Criticality Rating and Category 22
Table 3.9 Aeration Basins Condition Rating and Category 29
Table 3.10 Aeration Basins Criticality Rating and Category 29
Table 3.11 Clarifier No. 1 Condition Rating and Category 36
Table 3.12 Clarifier No. 1 Criticality Rating and Category 37
Table 3.13 Clarifier No. 2 Condition Rating and Category 37
Table 3.14 Clarifier No. 2 Criticality Rating and Category 37
Table 3.15 Chlorine Contact Basins Condition Rating and Category 42
Table 3.16 Chlorine Contact Basins Criticality Rating and Category 42
Table 3.17 NPW Condition Rating and Category 45
Table 3.18 NPW Criticality Rating and Category 45
Table 3.19 Chlorination System Condition Rating and Category 48
Table 3.20 Chlorination System Criticality Rating and Category 49
Table 3.21 De-chlorination System Condition Rating and Category 52
Table 3.22 De-chlorination System Criticality Rating and Category 52
Table 3.23 Sludge Drying Beds Condition Rating and Category 55
Table 3.24 Sludge Drying Beds Criticality Rating and Category 55
Table 5.1 Risk Assessment Summary 59
Table 5.2 Improvements OPCC Summary 60
Table 6.1 Improvements Cost Estimate Summary 63

APPENDICES

APPENDIX A A.J. BROWN WWTP TPDES PERMIT A-1
APPENDIX B SITE VISIT SCORING SHEETS A-2
APPENDIX C OPINION OF PROBABLE CONSTRUCTOIN COST (OPCC) A-3

EXECUTIVE SUMMARY

The City of Huntsville contracted with Freese and Nichols, Inc. (FNI) on May 26, 2015 to conduct a condition assessment of the A.J. Brown Wastewater Treatment Plant (WWTP) and its treatment processes. FNI used a risk based condition assessment methodology that considered the condition and criticality of each treatment unit in evaluating the overall condition of the plant. The condition assessment measured the probability of failure for each major process and piece of equipment at the WWTP. Evaluation of the processes took into account performance, age, physical condition (such as wear and damage) and functionality of the component. Component groups varied per process and were assigned scores ranging from 1.00 - 5.00, with a condition score of one being the best and five being the worst. In addition, the criticality of each process was also considered with respect to its overall role in performance of the plant which helped determine the magnitude of the consequence of a failure. To assist in establishing a specific score, criticality was evaluated based on the amount of treatment capacity affected if all or a portion of the component was to fail, process and regulatory impact, safety and the probable length of an outage to perform a significant repair. In order to obtain an overall risk score for each treatment process, the condition and criticality scores were combined.

Table ES.1 shows all the treatment units at the plant in the order of the risk category based on the condition and criticality ratings.

Table ES.1 Risk Assessment Summary

Facility	Condition Score	Condition Rating	Criticality Score	Criticality Rating	Risk Scoring	Risk Category
Raw Sewage PS	4.25	Poor	4.20	High	8.45	Very High
RAS-WAS PS	4.15	Poor	4.20	High	8.35	Very High
Aeration Basin #1	3.65	Poor	4.40	High	8.05	High
Aeration Basin #2	3.65	Poor	4.40	High	8.05	High
Clarifier #1	2.85	Fair	4.20	High	7.05	High
Clarifier #2	2.60	Fair	3.80	High	6.40	High
NPW System	3.80	Poor	2.40	Low	6.20	Moderate
Sludge Drying Beds	2.40	Good	3.60	High	6.00	Moderate
Screens	2.70	Fair	3.00	Moderate	5.70	Low
Grit Removal	2.70	Fair	3.00	Moderate	5.70	Low
Chlorination System	1.90	Good	3.40	Moderate	5.30	Low
Chlorine Contact Basins	1.70	Good	2.80	Moderate	4.50	Low
De-chlorination System	1.65	Good	2.60	Moderate	4.25	Low

An opinion of probable construction cost (OPCC) was estimated for the improvement alternatives for each treatment unit and is summarized in **Table ES.2**. The costs presented are in year 2015 dollars and include overhead factors such as contingency, mobilization and profit. All mechanical equipment costs include an additional 25% mark-up for installation.

Table ES.2 Improvements OPCC Summary

Facility	Risk Category	Improvements	Opinion of Probable Construction Cost
Raw Sewage & Sludge PS	Very High	Option 1: Rehabilitation of Existing PS	$2,957,000
		Option 2: New PS	$3,438,000
Aeration Basins	High	Option 1: Rehab Existing Disk Aerators	$3,214,000
		Option 2: Retrofit with Vertical Surface Aerators	$3,453,000
		Option 3: New Conventional Aeration Basins	$7,330,000
Clarifiers	High	Option 1: Rehab Existing Clarifiers	$220,000
		Option 2: New Clarifiers	$2,824,000
NPW System	Moderate	New NPW pumps & Hydropneumatic tank	$211,000
Sludge Drying Beds	Moderate	Option 1: Belt Filter Press	$2,239,000
		Option 2: Screw Press	$1,827,000
Screens	Low	Install slide gate; hand rails are manual bypass screen	$24,000
		New second mechanical screen	$845,000
Grit Removal	Low	Install new handrails & access bridge at existing grit system	$28,000
		New gravity vortex grit removal system	$1,331,000
Chlorination System	Low	New chlorine building	$667,000
Chlorine Contact Basins	Low	Curtain baffles & scum baffles	$59,000
Dechlorination System	Low	New exhaust fan	$7,000

Improvements to the units that placed in the 'Very High' and 'High' risk categories should be addressed first. FNI recommends the following improvements to the treatment units at the plant:

1. Build new raw sewage and sludge pump station: The existing raw sewage and sludge pump station placed highest in the risk category. The condition of the pump station is very poor and it is very critical to the plant operation. A new pump station will have longer life time than rehabilitating the existing pump station. The electrical equipment located in the building are outdated, in very poor condition and have exceeded their life expectancy. Making repairs to the electrical is difficult since the manufacturers no longer produce some of the parts. New MCCs will increase the reliability of the power system at the plant. Refurbishing and reusing the existing pump station building as the electrical building will result in significant savings for the City.

2. Build new conventional aeration basins: The current horizontal mechanical disk aeration system in the Orbal™ basins is poor condition. No major upgrades have been made to the mechanical aeration system since its installation in 1981. The system has exceeded its life expectancy. Secondary treatment is the most critical treatment process at a wastewater treatment plant. While existing the mechanical aeration system in Orbal™ basins can be replaced, the technology itself will have difficulty meeting future stringent and/or nutrient limits. Hence, it is recommended that new conventional aeration basins with fine bubble diffusers be installed to replace the Orbal™ basins for secondary treatment. Conventional aeration basins with diffused aeration system will be more capable of biologically removing nutrients to meet future nutrient limits and will also be more energy efficient.

3. Install new clarifiers: The existing clarifiers are shallow at 10-feet of water depth. With conventional aeration basins, deeper clarifiers of at least 12-14 feet of depth is recommended for effective performance of the activated sludge process.

4. Install new aerobic digesters: The outer ring of the Orbal basin is currently used as the aerobic digester. With new conventional aeration basins and clarifiers, new aerobic digesters will be required for digesting the sludge.

5. Install a new screw press for mechanical dewatering of sludge. While the sludge drying beds did not place high on the risk category, it has an adverse impact on the plant's performance. Use of sludge drying beds severely limits the plant's sludge wasting ability. Sludge drying beds lose drying capability during wet weather events. When it rains any drying accomplished in the dry beds is lost. The City has to rent belt presses to dewater sludge after

heavy rains which increases the annual operating cost significantly. Additionally, the limitation in sludge wasting is one reason for the floating sludge issue in the clarifiers. A mechanical dewatering system will tremendously improve the plant's ability to waste, will produce dryer solids which will reduce the hauling cost, and it will help with the clarifier floating sludge issue. A screw press is recommended instead of a belt press because it is a more compact unit, emits less odor, can function continuously and will require less operator attention.

6. Install new NPW pumps and hydropneumatic tank. While the NPW system does have high risk rating, it is a critical component for a mechanical dewatering equipment as they need a steady supply of high pressure water for cleaning purposes. The current NPW pumps are not adequate to meet the additional demand with the screw press and hence, it is recommended that the NPW system improved in conjunction with installing the screw press.

7. Install second mechanical bar screen: The plant currently has only one mechanical bar screen. A second bar screen is recommended for redundancy.

8. Install new grit removal system: The existing Detritor grit removal system is in poor condition and is an outdated technology. The system is functional at this time and is rapidly approaching the end of its useful life. It is recommended that a gravity vortex type grit removal system, HeadCell, be installed that will be more efficient in removing grit.

9. New chlorination building: The chlorine ton cylinders are currently stored outside on a pad. Chlorine being a hazardous gas should be stored inside a building.

10. Install curtain baffles and scum baffles in chlorine contact basin no. 3: The existing chlorine contact basin no. 3 is unable to provide a full twenty minute contact time due to short-circuiting of flow. Installing baffles in the basin will induce a serpentine flow path and will minimize the short-circuiting. Installing scum baffles will catch the floatables in the effluent.

11. Install new exhaust fan in de-chlorination building: The existing dichlorination building does not have a function exhaust fan. Install new fan in the building.

The total construction cost for the recommended improvements is shown in **Table ES-3** below.

Table ES-3 Recommended Improvements Cost Estimate Summary

Item	Improvement	Opinion of Probable Construction Cost*
1	New Raw Sewage Pump Station & New MCCs	$3,438,000
2	New Aeration Basins	$7,330,000
3	New Clarifiers	$2,824,000
4	New Aerobic Digesters	$1,870,000
5	Mechanical Sludge Dewatering System: Screw Press	$1,827,000
6	NPW System Improvements	$211,000
7	Second Mechanical Bar Screen	$845,000
8	New Grit Removal System	$1,331,000
9	New Chlorination Building	$667,000
10	Chlorine contact basin no. 3 Improvements	$59,000
11	New exhaust fan in dichlorination system	$7,000
12	Engineering Services @ 15% (Design, Surveying, Geotech etc.)	$3,061,350
	Total:	**$23,470,350**

1.0 INTRODUCTION

1.1 PROJECT SUMMARY

The City of Huntsville contracted with Freese and Nichols, Inc. (FNI) on May 26, 2015 to conduct a condition assessment of the A.J. Brown Wastewater Treatment Plant (WWTP) and its treatment processes. FNI used a risk based condition assessment methodology that considered the condition and criticality of each treatment unit in evaluating the overall condition of the plant. This helped determine the risk of failure for each treatment unit and will allow the City to prioritize the rehabilitation of required improvements in phases. FNI was also tasked with evaluating the floating sludge at the clarifiers, and identifying any potential causes and recommend improvements to correct the issue.

A site visit was conducted to the A.J. Brown WWTP on June 8, 2015 to visually inspect the treatment units, collect data, and interview plant staff to understand the needs and issues at the plant. FNI conducted a workshop with the City on July 17, 2015 to discuss the initial results of the risk based condition assessment and recommended improvements each treatment unit. This technical memorandum presents the results of the risk based condition assessment, improvement alternatives, and Opinion of Probable Construction Cost (OPCC) for the alternatives for each treatment unit at the WWTP. The memorandum also presents recommendations on phasing of these improvements to treatment units based on the risk rating.

1.2 DESCRIPTION OF EXISTING WWTP

The A.J. Brown WWTP is currently permitted for an average daily flow of 4.15 million gallons per day (MGD) and a two hour peak flow of 7300 gallons per minute (GPM) or 10.51 MGD. The plant consists of the following treatment units:

- Headworks
    - One (1) mechanical bar screen and one (1) manual bypass screen
    - One (1) “Detritor” type grit removal system
- Raw sewage and sludge lift station
- Four (4) raw sewage pumps
- Four (4) return activated sludge pumps

- Two (2) waste activated sludge pumps
- Two (2) Orbal™ aeration basins
- Two (2) 75-feet diameter clarifiers, with telescoping valves
- Three (3) chlorine contact basins
- Chlorination system
- De-chlorination system
- Twenty two (22) Sludge drying beds

The aerial site map of the A.J. Brown WWTP is shown on **Figure 1.1**. **Table 1.1** provides an overview of construction history at the plant.

Table 1.1 WWTP Construction History

Year	Treatment Process Improvements
1982	• **A.J. Brown WWTP built**
1994	• **A.J. Brown WWTP Improvements** ➢ New chlorine contact chamber (Basin No.3) ➢ New de-chlorination chamber & building ➢ New generator ➢ New splitter box for chlorine contact chambers ➢ New chlorine storage pad

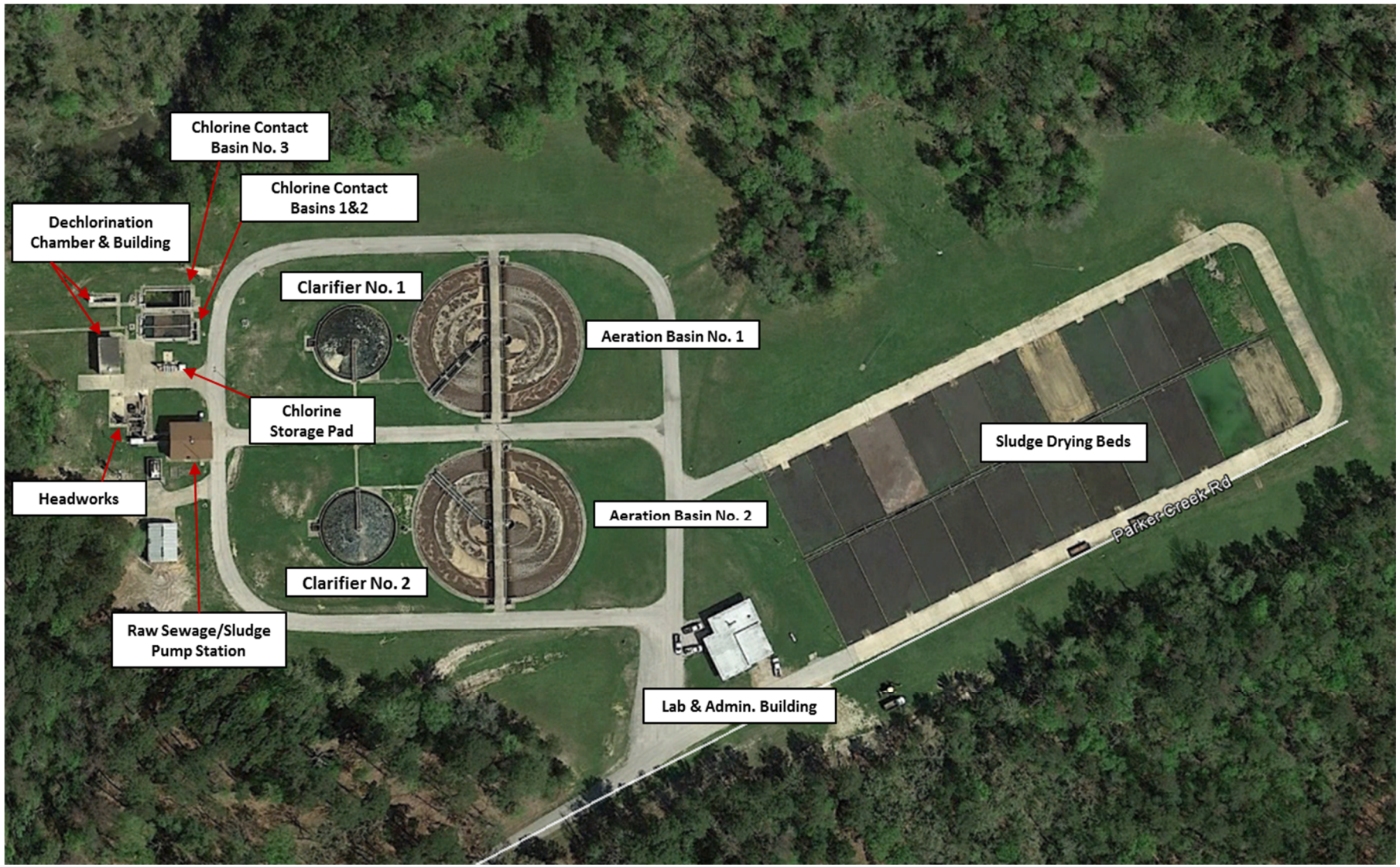


Figure 1.1 A.J. Brown WWTP Aerial Map

1.2.1 Permit Requirements

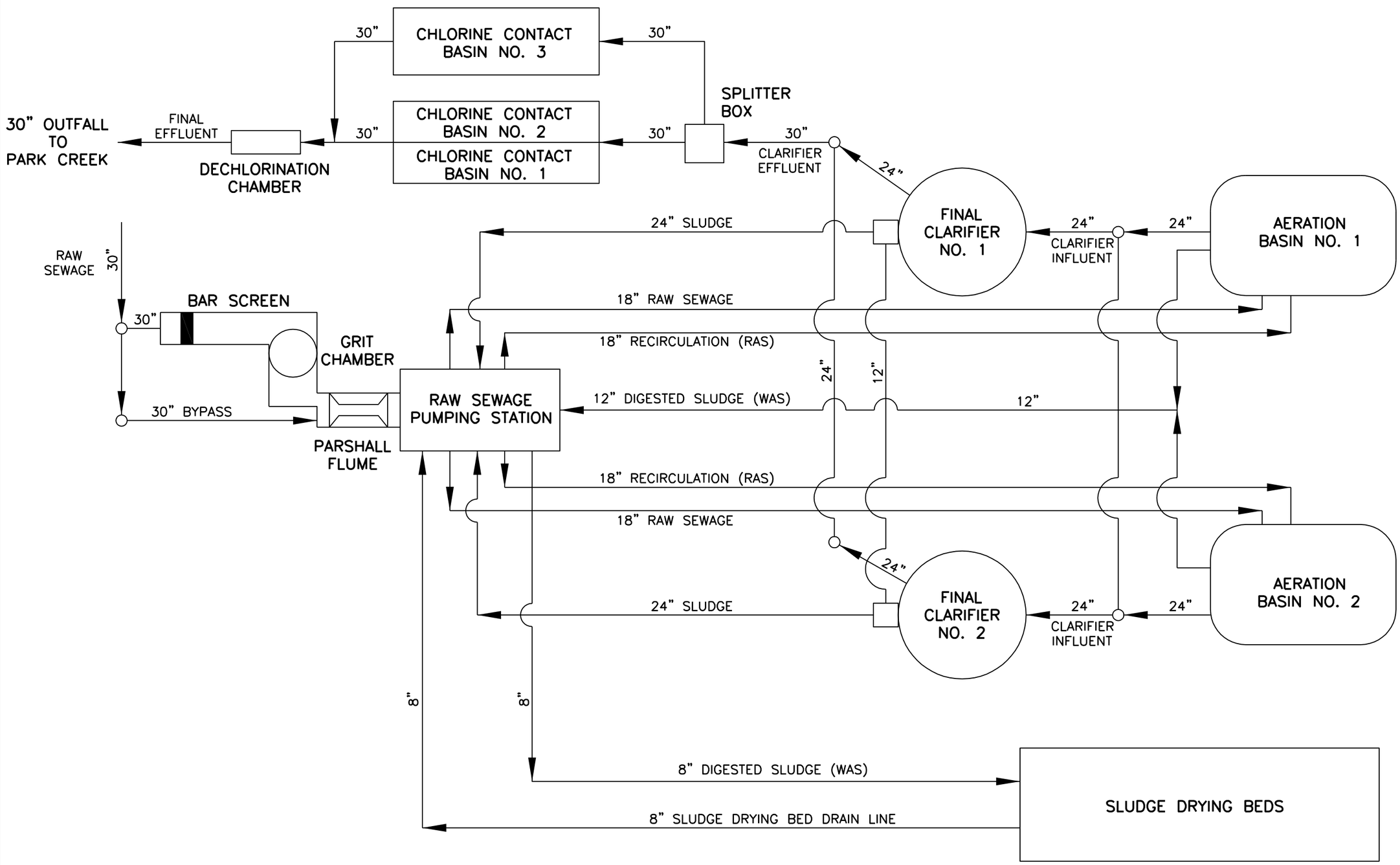
The plant schematic shown on **Figure 1.2**, provides an overview of the current plant processes. The plant is designed to remove organic wastes i.e., Biochemical Oxygen Demand (BOD), suspended solids (SS), and ammonia nitrogen (NH_3-N).

Table 1.2 details the effluent discharge limits for the plant as well as its permitted average daily and 2-hr peak flows. The plant's current TPDES permit is attached in **Appendix A**. The current permit expires on February 1, 2017.

Table 1.2 TPDES Permit Limits

Effluent Characteristics	Discharge Limitations			
	Daily Avg (mg/L)	7-day Avg (mg/L)	Daily Max (mg/L)	Single Grab (mg/L)
Flow, MGD	Report	N/A	Report	N/A
Carbonaceous Biochemical Oxygen Demand (5-day)	7	11	17	25
Total Suspended Solids	15	25	40	60
Ammonia Nitrogen	2	5	10	15
E. Coli, CFU or MPN/ 100 ml	126	N/A	394	N/A
Flow Limitations				
Annual Average Flow	4.15	MGD		
2-hour Peak	7,300	gpm		
	10.51	MGD		

Figure 1.3 and **Figure 1.4** show the average and peak daily flow data from January 2010 to May 2015. The City experienced high inflow and infiltration (I&I) during the months of May 2015 and June 2015 due to a broken 30-inch influent flow line that caused daily average flow to the plant to exceed 75% of the plant's design capacity. The broken 30-inch line has since then been repaired and the flows are expected to be below the 75% bench mark.



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Texas Registered Engineering Firm F-2144

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CITY OF HUNTSVILLE, TEXAS

A.J. BROWN WASTEWATER TREATMENT PLANT

PROCESS FLOW DIAGRAM

FREESE AND NICHOLS
11200 Broadway Street, Suite 2332
Pearland, Texas 77584
Phone – (832) 445-2700
Fax – (832) 456-4701
Web – www.freese.com

1.2
FIGURE

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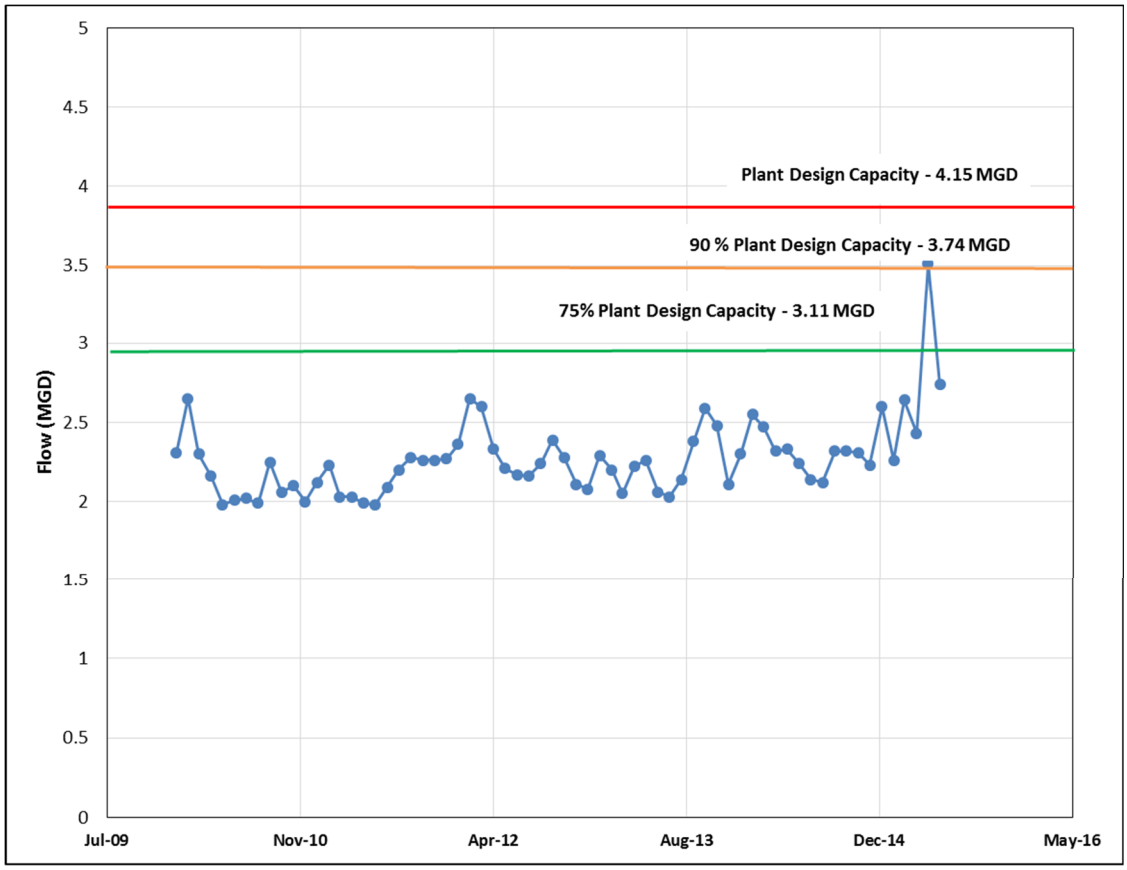


Figure 1.3 WWTP Avg. Daily Flow Data (Jan 2010 – June 2015)

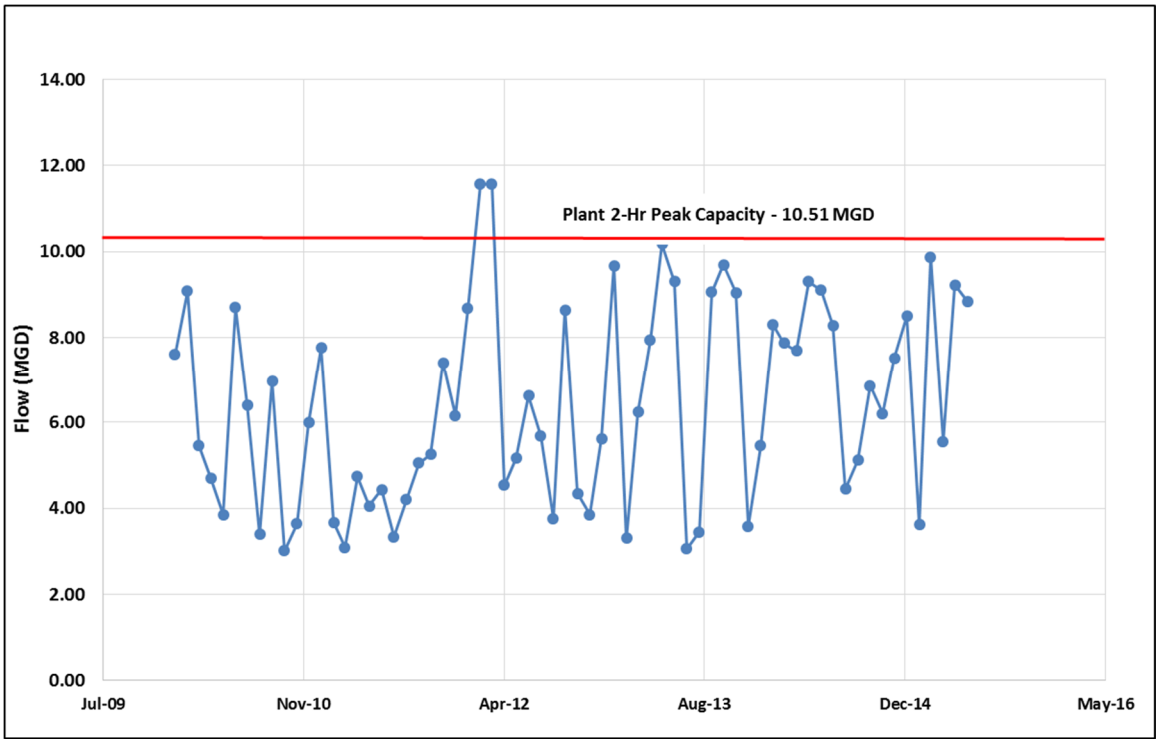


Figure 1.4 WWTP 2-Hr Peak Flow Data (Jan 2010 – June 2015)

2.0 CONDITION AND CRITICALITY ASSESSMENT METHODOLOGY

In order to quantitatively assess the risk associated with each process at the wastewater plant, a condition and criticality score was assigned to each component related to the process. This risk-based approach will allow the City to easily evaluate which components at the plant should be prioritized and how the improvements can be phased. FNI used judgement, expertise, and experience along with input from the City, to assign the scores for condition and criticality of each component.

2.1 CONDITION ASSESSMENT SCORING

The condition assessment measured the probability of failure for each major process and piece of equipment at the WWTP. Evaluation of the processes took into account performance, age, physical condition (such as wear and damage) and functionality of the component. Component groups varied per process and were assigned scores ranging from 1.00 - 5.00, with a condition score of one being the best and five being the worst. Condition scoring followed the guidelines in **Table 2.1**. Weight factors were assigned to each component group and varied per process investigated. The sum of the weighted component ratings for each component group gave the overall condition score for each process being evaluated.

Table 2.1 Condition Scoring Guidelines

Condition Rating	Scoring Guidelines
1.00 – 2.00	**Good** condition; minor improvements recommended to enhance performance
2.01 – 3.50	**Fair** condition; improvements recommended to improve performance or efficiency
3.51 – 5.00	**Poor** condition; improvements recommended to maintain reliability

2.2 CRITICALITY ASSESSMENT SCORING

In addition to determining the probability of failure by considering physical condition, the criticality of each process was considered with respect to its overall role in performance of the plant. Performing a criticality assessment helps to determine the magnitude of the consequence of a failure. To assist in establishing a specific score, criticality was evaluated based on the amount of treatment capacity affected if all or a portion of the component was to fail, process and regulatory impact, safety and the probable length of an outage to perform a significant repair. Criticality scoring followed the guidelines in **Table 2.2**. **Table 2.3** outlines the criteria used for scoring the criticality parameters for the WWTP processes.

Table 2.2 Criticality Component Scoring Legend

Criticality Rating	Scoring Guidelines
1.00 – 2.00	**Low Impact**
2.01 – 3.50	**Moderate Impact**
3.51 – 5.00	**High Impact**

Table 2.3 Criticality Parameters and Weighting System

Capacity Affected (20%)
Based on Percent of Total Plant Capacity Lost (≤ 13%) Capacity Lost = 1 (14 - 25%) Capacity Lost = 2 (26 - 50%) Capacity Lost = 3 (51 - 85%) Capacity Lost = 4 (≥ 86%) Capacity Lost = 5
Process and Regulatory Impact (40%)
Based on Treatment Process Effectiveness w/o Component No Impact = 1 Mild = 2 Moderate = 3 Severe = 4-5
Safety (20%)
Based on Operator Safety at the Process Unlikely Harm = 1 Possible Harm = 2 Likely Harm = 3 Imminent Harm = 4-5
Outage Duration (20%)
Based on Estimated Response Time, Parts Availability and Length of Repair ≤ 2 Days = 1 3 - 15 Days = 2-3 16 - 29 Days = 3-4 ≥ 30 Days = 5

2.3 RISK DETERMINATION

Risk can be defined as the "Probability of failure (Condition) multiplied by the consequence of failure (Criticality)". In order to obtain an overall risk score for each treatment process, the condition and criticality scores were combined. **Figure 2.1** provides an example for how risk is determined given condition and criticality ratings. A fully developed risk matrix can be used, in conjunction with estimated costs, to prioritize and rank associated recommended improvements for mitigation of identified risks.

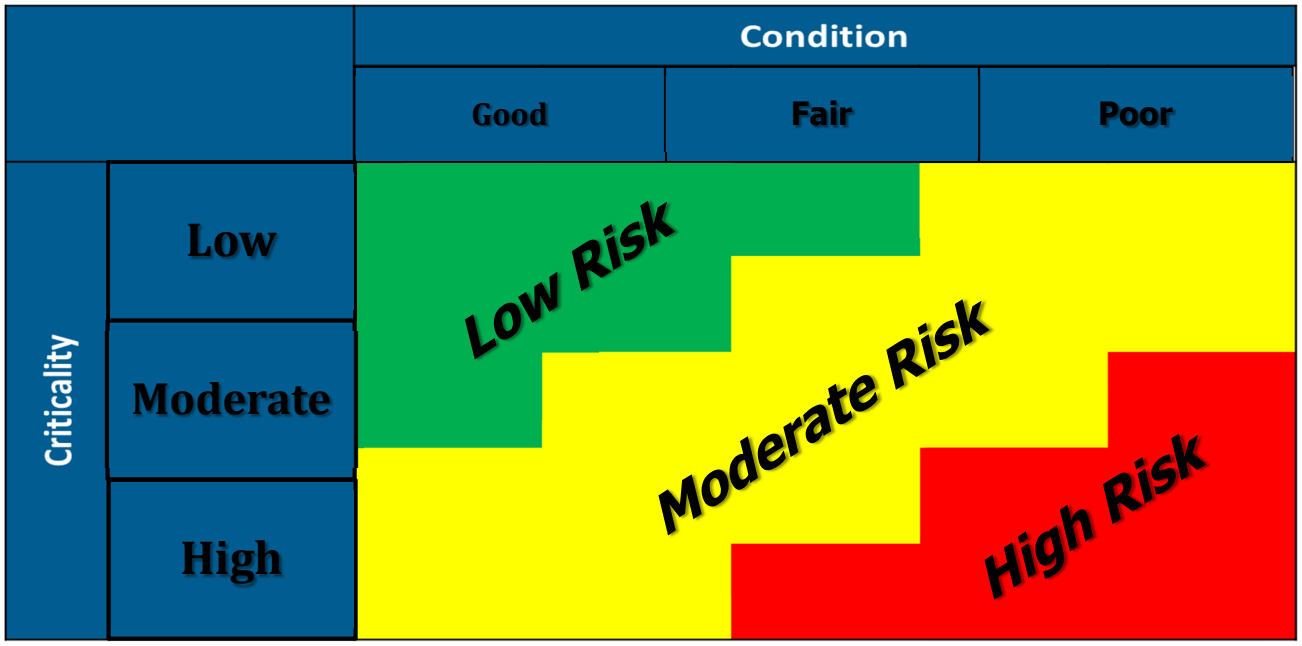


Figure 2.1 Risk Assessment Matrix

Table 2.4 shows the risk rating scores and categories as a result of condition and criticality. The condition assessment site visit sheets for each process are included for reference in **Appendix B**.

Table 2.4 Risk Ratings and Categories

Risk Rating	Risk Category
1.00 – 5.79	**Low**
5.80 - 6.39	**Moderate**
6.40 – 8.30	**High**
8.31 - 10.00	**Very High**

3.0 FACILITY DESCRIPTION AND TREATMENT PROCESS

3.1 HEADWORKS

The headworks at the plant consists of one mechanical Vulcan Mensch Crawler bar screen with 1/2" openings and of 10 MGD capacity (**Figure 3.1**), an Ovivo Detritor grit removal system (**Figure 3.4**) and one manual bar screen with 1-1/4" openings (**Figure 3.2**). The mechanical screen was installed in 1995. The grit removal system and the manual bar screen were installed when the plant was built in 1982.

3.1.1 Process Overview

Once arriving at the headworks, the raw sewage undergoes initial screening at the mechanical bar screen. Screening removes large objects, trash and debris that can clog the downstream process. The screened wastewater then enters the Detritor grit removal system where the grit is removed. The grit removal unit removes heavy inorganic solids, such as sand, gravel or clay. The grit removed from the wastewater is then dewatered and transported by a screw conveyer (**Figure 3.5**) and disposed of in trash buckets and ultimately sent to a landfill. The raw sewage then flows through a manual bypass screen, where any trash, rags and debris carried over from the mechanical screen is captured and the flow continues through a parshall flume to the raw sewage pump station.

3.1.2 Screens Existing Conditions

The mechanical screen was observed to be in good operable condition. Plant staff reported occasional over torqueing of the screen, but in general the screen has been operating with no major issues. An inlet gate, located just north of the mechanical bar screen, is hung on a rod supported by handrails, which has to be manually lifted to stop flow from entering the mechanical bar screen channel. This has been a challenge for the plant operators. It was observed that the screenings from the mechanical bar screen are collected in a dumpster without a lid. Chapter 217.123 Subchapter E of the TCEQ design criteria for domestic wastewater systems required the screenings container to have a tight fitting cover. The site visit scoring sheets are included in **Appendix B**.

Figure 3.1 Mechanical Vulcan Mensch Crawler Screen and Inlet Gate

To access the manual bypass screen, the operator has to get down to a platform in the channel via access ladders on as shown in **Figure 3.2**. It is cumbersome to convey the screenings removed from the manual bypass screen to the screenings container. The operator has to collect the trash in a bucket and manually carry the bucket up the access ladder to the screenings container. There are safety concerns at the bypass screen since there are no handrails upstream or downstream of the screen as shown in **Figure 3.2** below. The headworks structure is in good condition. Some minor concrete spalling, cracks in the pavement, and corroding of safety chains at the mechanical screen was observed but overall the headworks structure is in good condition.

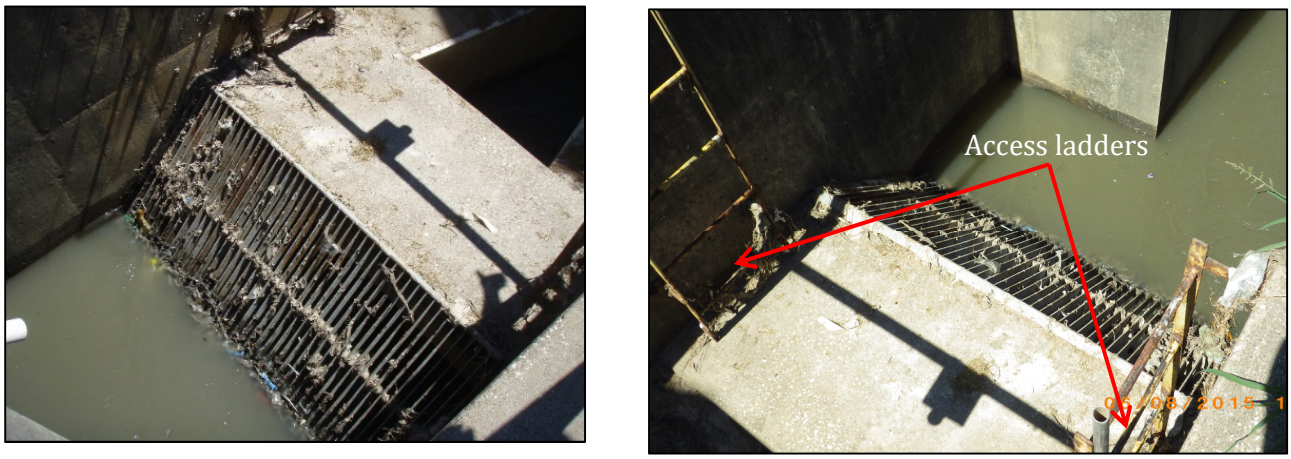


Figure 3.2 Manual By-pass Bar Screen

The bar screen control panel appears to be in good condition as shown in **Figure 3.3**. A few pushbuttons need to be replaced, but overall the control panel is good condition. Devices on the bar screen equipment have failed causing the bar screen to run continuously and overheat, but maintenance staff has corrected failed components and have done a good job keeping the equipment operational. Overheating the motor shortens the life expectancy of the motor and will cause a premature failure. Eventually components will not be available and the equipment will not automatically operate. Past high flow events have caused the motor on the bar screen to become submerged and the motor is not rated for submerged events.

Figure 3.3 Bar Screen Control Panel

Based on these observations, the screens were scored as shown in Table 3.1 for the condition rating.

Table 3.1 Screens Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Electrical	4	20%	0.80
Mechanical Equipment	2	35%	0.70
Inlet Gate	4	15%	0.60
Structure	2	30%	0.60
Condition Rating	**-**	**100%**	**2.70**
Condition Category			**FAIR**

The criticality parameter scores and overall rating for the screens is shown in **Table 3.2**. Since there is only one mechanical screen at the plant, if it were to be taken out of service for repair or maintenance there would be significant impact to the screening capabilities of the plant. Hence, a high score of 4 was given for the capacity affected. Due to the safety concerns at the manual bypass screen, a high score of 4 was given for the safety parameter.

Table 3.2 Screens Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	4	20%	0.80
Process and Regulatory Impact	2	40%	0.80
Outage Duration	3	20%	0.60
Safety	4	20%	0.80
Overall Criticality Rating	**-**	**100%**	**3.00**
Criticality Category			**MODERATE**

Combining the condition and criticality scores, the overall risk rating for the screens is 5.70.

Risk Category: MODERATE

3.1.3 Recommended Improvements for Screens

The following improvements are recommended for the screens:

- Replace the existing inlet gate that is hung on a rod with a slide gate attached to the structure that can be easily operated.

- Provide handrails at the manual by-pass screen to improve safety conditions for the operators
- Install a second mechanical bar screen for redundancy.
- Provide a dumpster with a lid with an opening or with a spring drop lid mechanism that will automatically close once screenings are deposited into the dumpster to meet TCEQ's requirement of providing a tight-fitting cover for the screenings container.

3.1.4 Grit Removal Unit Existing Conditions

The Detritor grit removal system is functional and is removing good amount of the grit from the wastewater. But the unit is reaching the end of its useful life. Corrosion was observed on the inlet baffles, screw motor, screw conveyor as well as on the walkway that houses the grit motor. The motor and drive for the screw conveyor were replaced a year ago and greasing of the unit is done every two to three days. The railing surrounding the walkway and grit structure is damaged and poses a safety hazard for Operators. The concrete structure housing the grit unit was observed to be in good condition. The MCC for the unit is past its life expectancy of 30 years. Corrosion of the flex conduits and aging of the push button station at the screw and grit motor were observed. The condition and criticality scores and ratings are shown below in **Table 3.3** and **3.4**, respectively.

Figure 3.4 Ovivo Detritor Grit Removal System

Figure 3.5 Grit Removal System Screw Conveyor

Table 3.3 Grit Removal Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Electrical	3	30%	0.90
Mechanical Equipment	3	40%	1.20
Structure	2	30%	0.60
Condition Rating	**-**	**100%**	**2.70**
Condition Category			**FAIR**

Table 3.4 Grit Removal Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	5	20%	1.00
Process and Regulatory Impact	2	40%	0.80
Outage Duration	3	20%	0.60
Safety	3	20%	0.60
Overall Criticality Rating	**-**	**100%**	**3.00**
Criticality Category			**MODERATE**

Combining the condition and criticality scores, the overall risk rating for the grit removal system is 5.70.

Risk Category: MODERATE

3.1.5 Recommended Improvements for the Grit Removal System

White the Detritor grit removal system is an older technology and is not very efficient in removing grit, the existing system at the plant seems to be functioning well and is removing good quantities of grit. It is recommended that the following improvements be made to keep the system functioning till the end of its useful and also to correct the safety concerns with the existing system:

- Retrofit the Detritor with a gravity vortex grit removal system
- Replace the motor access bridge
- Repair damaged railings
- Replace the MCC and push button at the screw and grit motor

When the existing Detritor system reaches the end of its useful, it can be replaced with a gravity vortex grit removal system, i.e., HeadCell.

3.2 RAW SEWAGE AND SLUDGE PUMP STATION

The pump station building was built in 1981 and houses the raw sewage, return activated sludge (RAS) and waste activated sludge (WAS) pumps. There are four (4) self-priming raw sewage pumps manufactured by Gorman-Rupp. Each pump has a 40 HP motor and a 10-inch influent. Two pumps serve each of the two aeration basins. The building also houses six (6) sludge pumps, which include four (4) - 40 HP RAS pumps and two (2) – 5 HP WAS pumps. Power, for the plant, is distributed through the raw sewage pump station building utilizing an Automatic Transfer Switch (ATS) and multiple Motor Control Centers (MCCs). MCCs are used to distribute power, house starters and controls for treatment equipment..

3.2.1 Overview

The screened and de-gritted wastewater flows to the wet-well located underneath the lift station building. The raw sewage pumps discharge the wastewater to the aeration basins. The RAS pumps (two per aeration basin) send the return activated sludge from the clarifiers to the aeration basins and to the digester. The WAS pumps send the digested sludge from the digesters to the sludge drying beds. The raw sewage pumps are shown in **Figure 3.6**.

3.2.2 Raw Sewage Pumps & Piping Existing Condition

The raw sewage pumps were observed to be in poor condition and they are past their useful life. The seals are leaking and the volutes show wear and tear and leakage. All the motors have been replaced

over the years except for one and the pumps have to frequently be taken out of service for repair. The check valves were replaced and installed by the City in January 2015.

The structure seems to be in good to fair condition. However, the building floor is not sloped for proper drainage. The building floods frequently during rain events. A curb is located at the front of the building to prevent rain water from entering, but water still enters the building under the front door (**Figure 3.7**). This is a severe safety hazard with all the electrical equipment in the room.

MCCs in pump station building are exposed to corrosive gasses causing enclosures and components to corrode at an accelerated rate. This electrical equipment was originally installed in 1981 and has exceeded the 30 year life expectancy. The electrical equipment has significant corrosion around the bottom of the enclosures and is putting off high amounts of heat. The elevated heat is an indication of resistance which can be contributed from high power usage, corrosion, and failing components. Components of the MCC are no longer supported by the manufacturer due to the age. Comparable replacement parts may not fit in the exact locations, match original specifications, and may necessitate further modifications to individual MCC buckets. Failure of MCC components can cause extended down time for treatment equipment of the plant. There is no air conditioning present in the building to protect the MCCs so the equipment gets very hot and has to be cooled by a portable fan that sits on the floor. Maintenance staff has done a good job of keeping the equipment cool and keeping the plant operational but elevated temperatures indicate a failure is imminent and should be a safety concern for employees.

All the electrical equipment is past its life expectancy and the controllers are outdated (**Figure 3.8**). The heaters for the room do not work and the plant staff installed a fan in the wall for exhaust.

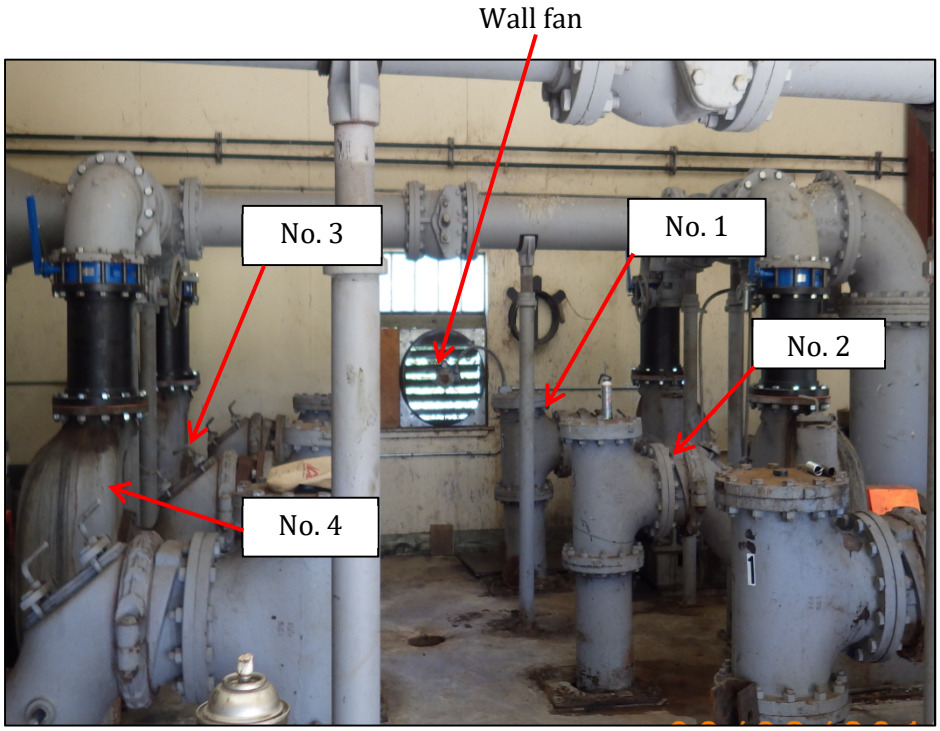


Figure 3.6 Raw Sewage Pumps

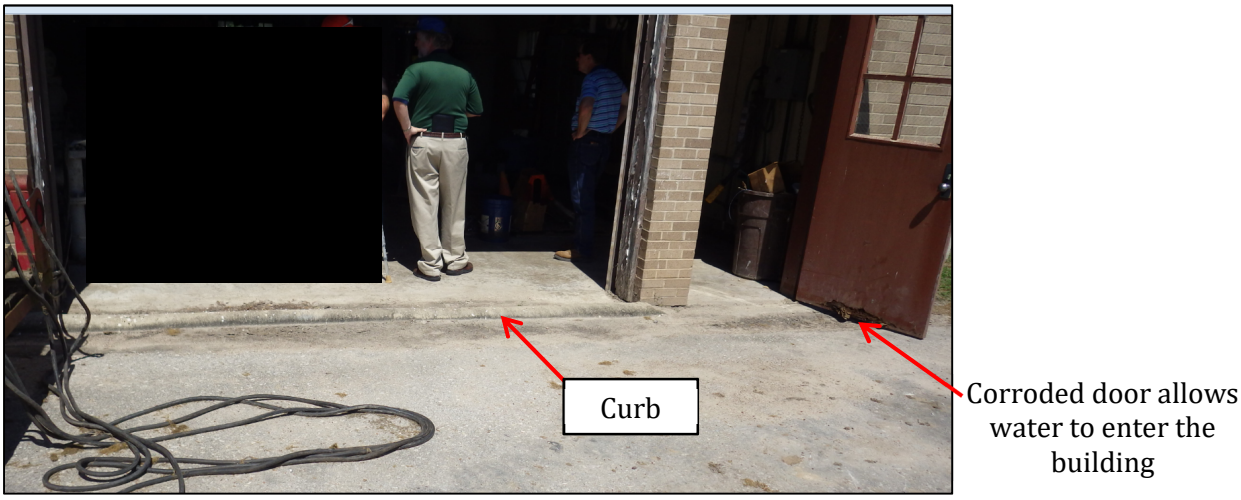


Figure 3.7 Front view of Pump Station Building

Figure 3.8 Electrical Equipment inside Pump Station

Backup power for the plant is a 900kW generator installed in 1981. The generator has recently failed and is no longer in service. The generator enclosure is corroding. A temporary generator has been parked on site till a new permanent generator is installed. The Automatic Transfer Switch (ATS) for the generator-utility power feeds is operating past its life expectancy. Replacement parts for the ATS are no longer available. A failure of the ATS can cause an extended power outage of the plant. Both the utility power and the generator power must pass through the ATS. **Figure 3.9** shows the existing generator at the plant.

Figure 3.9 Existing Generator

Based on these observation, the condition and criticality scores were given as shown below in **Tables 3.5** and **3.6**, respectively. Most of the equipment for the raw sewage pumps were rated high for condition due to the poor condition of the pumps. The process and regulatory impact criticality parameters were rated high because if the pumps are non-functional the process will be greatly affected since the raw sewage cannot be pumped to the plant causing the flow to back-up in the collection system potentially causing manhole sewage overflows. This would also greatly impact regulatory compliance.

Table 3.5 Raw Sewage Pumps Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Pumps & Motors	4	30%	1.20
Electrical	5	15%	0.75
Instrumentation	5	15%	0.75
Structure	4	25%	1.00
Piping & Valves	3	10%	0.30
HVAC	5	5%	0.25
Condition Rating	**-**	**100%**	**4.25**
Condition Category			**POOR**

Table 3.6 Raw Sewage Pumps Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	3	20%	0.60
Process & Regulatory Impact	5	40%	2.00
Outage Duration	5	20%	1.00
Safety	3	20%	0.60
Overall Criticality Rating	**-**	**100%**	**4.20**
Criticality Category			**HIGH**

Combining the condition and criticality scores, the overall risk rating for the raw sewage pump station is 8.45.

Risk Category: VERY HIGH

3.2.3 Sludge (WAS/RAS) Pump & Piping Existing Condition

The WAS and RAS pumps are housed in the same building as the raw sewage pumps and are in a similar condition to the raw water sewage pumps and are also past their useful life (**Figures 3.10** and **3.11**). The check valves are new and were installed by the City about a month ago. The condition and criticality ratings for the sludge pumps are shown in **Tables 3.7** and **3.8**.

Figure 3.10 RAS Pumps

Figure 3.11 WAS Pumps

Table 3.7 RAS/ WAS Pumps Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Pumps & Motors	4	30%	1.20
Electrical	5	15%	0.75
Instrumentation	5	15%	0.75
Structure	4	25%	1.00
Piping & Valves	2	10%	0.20
HVAC	5	5%	0.25
Condition Rating	**-**	**100%**	**4.25**
Condition Category			**POOR**

Table 3.8 RAS/ WAS Pumps Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	3	20%	0.60
Process & Regulatory Impact	5	40%	2.00
Outage Duration	5	20%	1.00
Safety	3	20%	0.60
Overall Criticality Rating	**-**	**100%**	**4.20**
Criticality Category			**HIGH**

Combining the condition and criticality scores, the overall risk rating for the sludge pump station is 8.45.

Risk Category: VERY HIGH

3.2.4 Recommended Improvements for Pump Station

Based on the condition and criticality scores, the raw sewage and sludge pump station falls under the very high risk category and therefore, is in dire need for improvements. There are two options for improvements to the pump station as discussed below.

A. Option 1: Rehabilitation the existing pump station

In this option, existing pump station will be rehabilitated and reused. The following improvements will be included in this option:

- Remove and replace all raw sewage and sludge pumps, piping and appurtenances.

- Remove all existing MCCs from the existing building. Replace and relocate new MCCs in a new separate electrical building with HVAC.
- Improve site grading around the building to prevent flooding during rain events
- Slope the building floors to the drain the prevent water stagnation.
- Remove and replace the building roofing and wood siding
- New concrete coating of the building floor
- Install new heat and ventilation system for the building

The advantages of this option are that the existing building will be reused, the electrical MCCs will be separated from the corrosive environment in a raw sewage pump station and with replacing the pumps in-kind there will be less change to the plant's operating procedures. However, the major disadvantage of rehabilitating the existing pump station is short lifespan of the existing wet well which will be approaching 40 years of age by the time these improvements are constructed. Concrete structures exposed to moisture and corrosive gases such as hydrogen sulfide are expected to have a lifetime of around 50 years. Hence, even with new mechanical equipment, the life span of this option will be short. **Figure 3.12** shows the proposed location of the new electrical building.

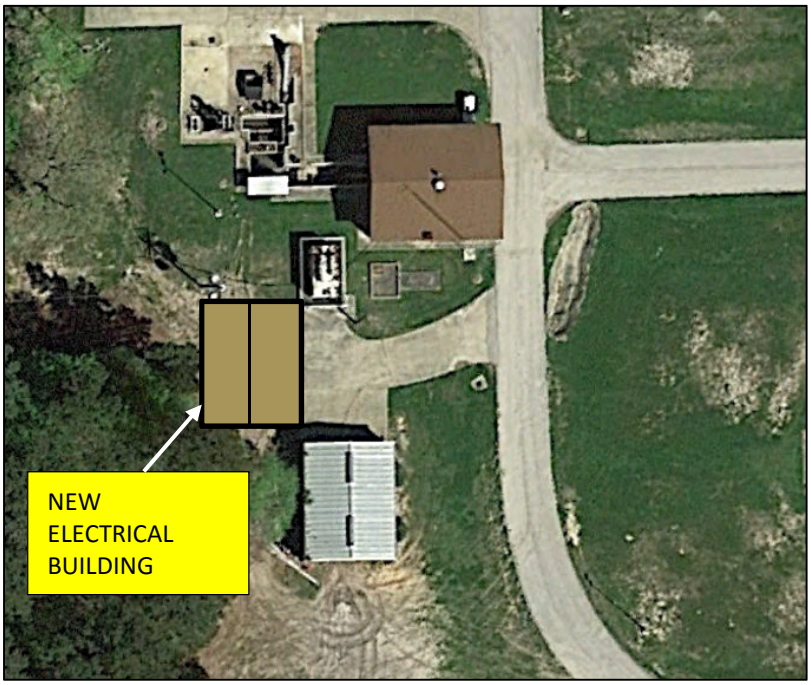


Figure 3.12 Option 1 – Rehabilitation of Existing Pump Station and Proposed Electrical Building

B. Option 2: Build a new pump station

This option will include the following improvements:

- Build a new pump station for the raw sewage and sludge pumps
- Rehabilitate the existing building to become the main electrical building:
    - Improve site grading around the building to prevent flooding during rain events
    - Slope the building floors to the drain the prevent water stagnation.
    - Remove and replace the building roofing and wood siding
    - New concrete coating of the building floor
    - Install new HVAC for the building

The major advantage of this option is the longer lifetime the pump station and higher return of investment. A new pump station structure will last for another 50 years. Eventually, when the plant is to be expanded the RAS pumps wet well can be turned in to

raw sewage wet well and a separate sludge pump station can be built closer to the clarifiers. Another major advantage of this option is repurposing the existing pump station as the main electrical building. Since the wet well underneath the existing pump station will no longer contain raw sewage the life of the structure can be extended for another 15-20 years. The disadvantage of this option is the higher capital cost compared to Option 1. **Figure 3.13** shows the proposed location of the new pump station.

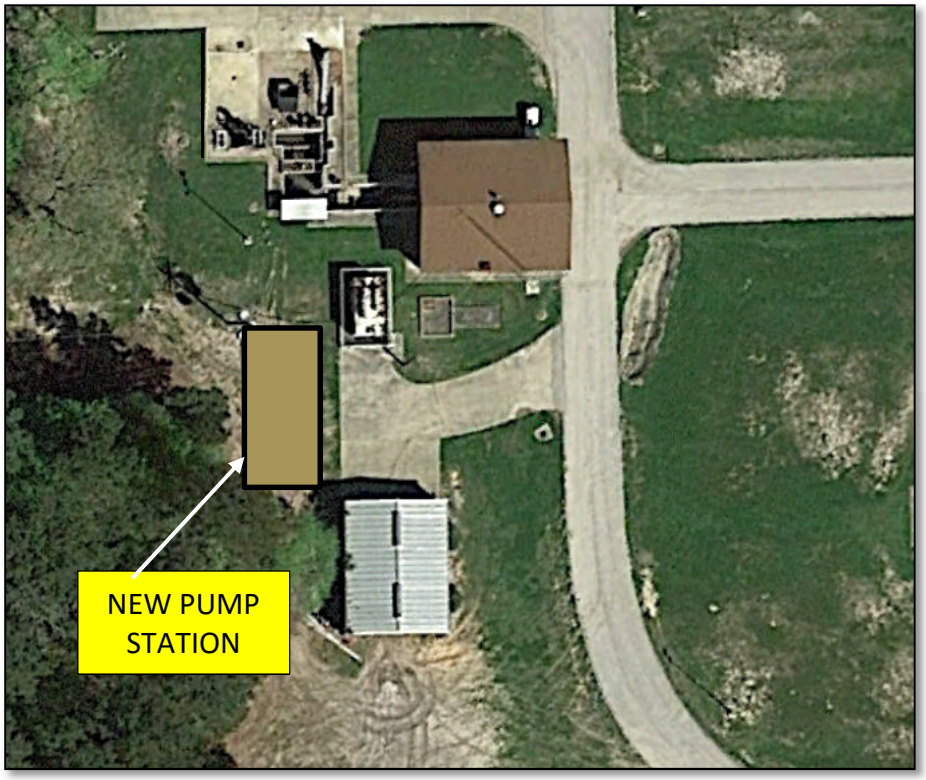


Figure 3.13 Option 2 - Proposed Pump Station Location

3.3 AERATION BASINS

There are two Orbal™ basins for secondary treatment at the plant. Both the basins have a depth of 8.5-ft. Three (3) inner rings are for aeration and one (1) outer ring is for digestion as shown in **Figure 3.14**. The outer digester ring is mixed and aerated by four (4) - 20 HP motors and the inner aeration rings are mixed and aerated by four (4) - 40 HP motors. Fixed mechanical disc aerators on rotating shafts run by the motors vigorously mix the wastewater and entrain oxygen in to the wastewater. Recesses in the disks introduce entrapped air beneath the surface as the disk turns.

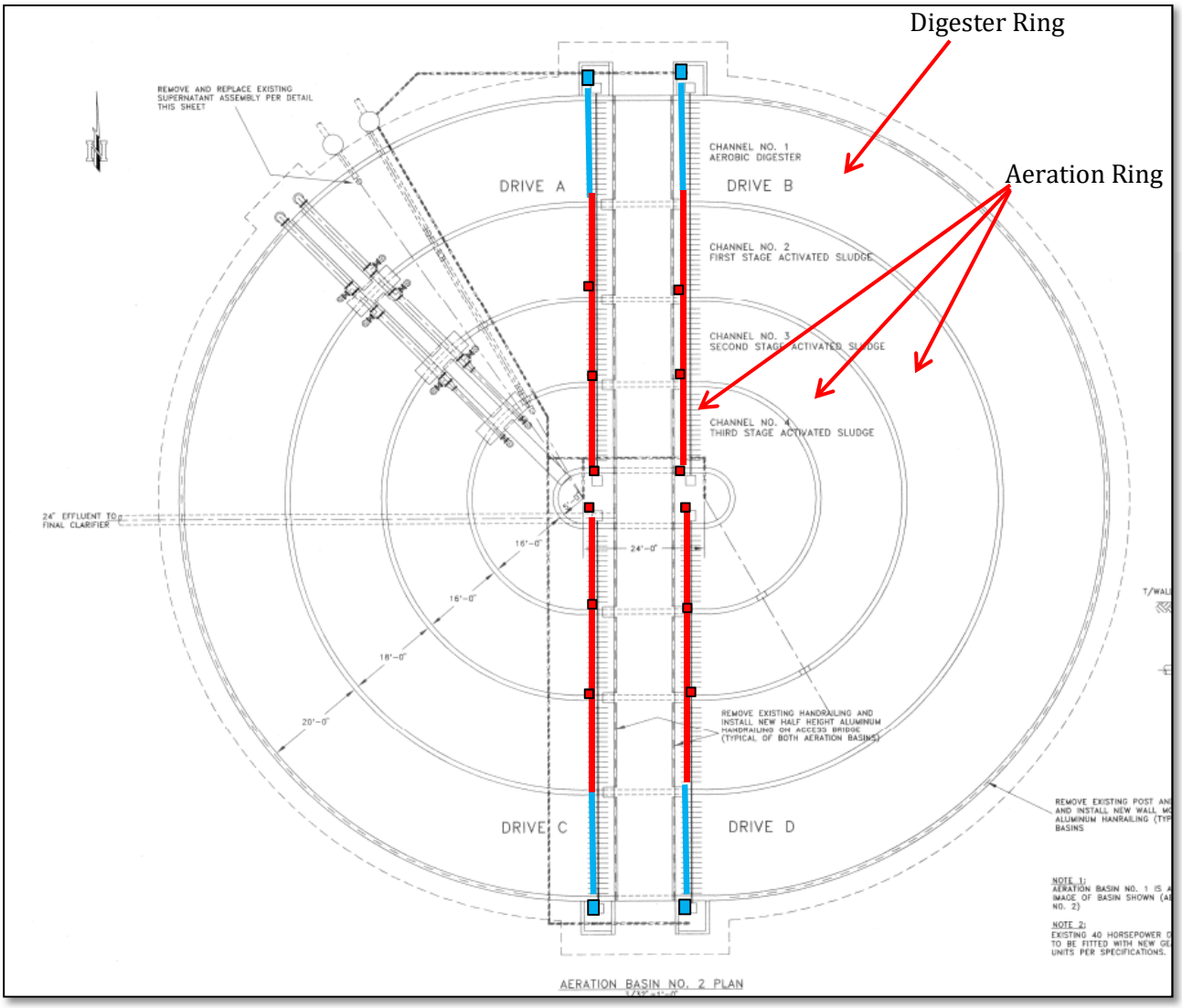


Figure 3.14 Existing Mechanical Disc Aeration Layout

3.3.1 Overview

Wastewater is pumped by the raw sewage pumps from the pump station to Aeration Basins No. 1 and 2, where it flows into the inner three rings of the basin. The mechanical aerators add oxygen to the wastewater to promote the growth of microorganisms that feed on the organic material like BOD and convert it to carbon dioxide and water. Nitrification, or the conversion of ammonia to nitrate, also occurs in the aeration rings. The wastewater then goes to the clarifiers for sludge removal. The sludge from the clarifiers are sent back to the outer ring of the basins for digestion.

3.3.2 Aeration Basins No. 1 and No. 2 Existing Conditions

The current mechanical aeration system at the Orbal™ basins was installed when the plant was originally built in 1981. The shafts rotating the disks are out of alignment causing excessive wear and tear on the bearings and couplings and the shafts break frequently from the vibrations. **Figure 3.16** shows a broken shaft at the plant. The plant staff reported that the bearings wear very often and have to be replaced every two to three months. To access the bearings, the operator has to step down from the concrete walkway to a platform as shown in **Figure 3.15**. There are no hand rails or means for harnessing at this platform for the operator to hold on to while replacing the bearings. This poses a safety hazard for the operators. The raw sewage and RAS piping show some signs of corrosion.

The structure was observed to be in fair condition except for some damaged railings and spalled concrete around the railings posts. The FRP access bridge for the piping is delaminating.

Conduits to aerator motors have a flexible liquid tight connection between disconnects and the motor. UV exposure over time tends to corrode the outer coating of the flexible conduit and allows rainwater to enter equipment, causing corrosion inside the equipment. Flexible conduits are required at the motor because of vibration caused from the motor. Disconnects for the aeration motors should be accessible from the walkway, without leaning over the handrail or jumping down to a structure that could possibly be submerged and making it dangerous to kill power to the motor (**Figure 3.17**).

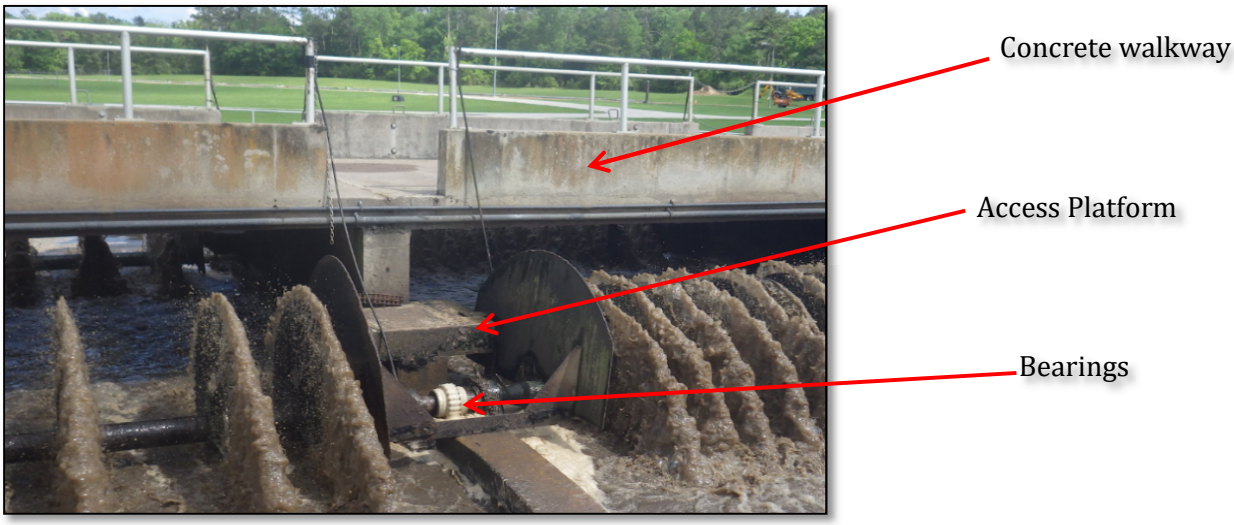


Figure 3.15 Aeration Basins Walkway, Access Platform and Bearings

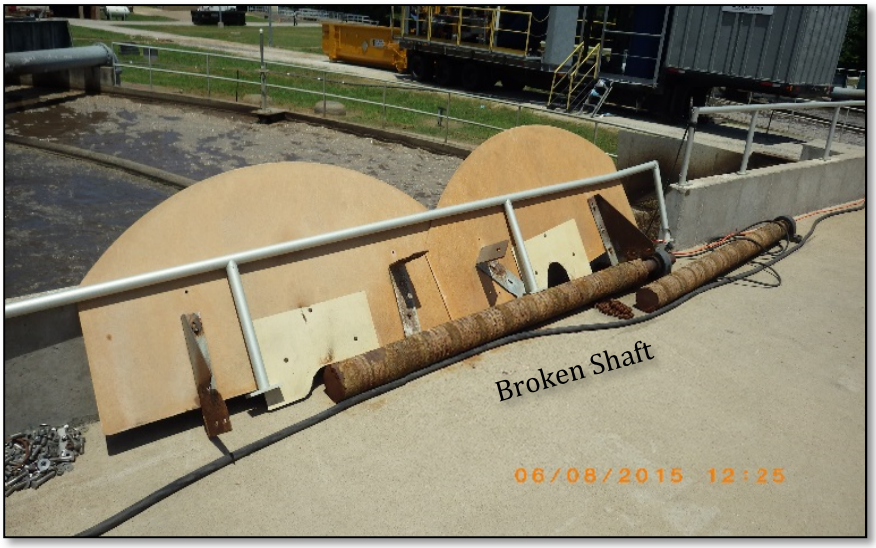


Figure 3.16 Aeration Basins Broken Shaft

Figure 3.17 Aerator Motor and Disconnect Pit

Due to the condition and criticality of the system, the risk rating ranked in high category as shown in the **Tables 3.9 and 3.10** below.

Table 3.9 Aeration Basins Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Electrical	4	15%	0.60
Mechanical Equipment	5	40%	2.00
Structure	2	30%	0.60
Piping & Valves	3	15%	0.45
Condition Rating	**-**	**100%**	**3.65**
Condition Category			**POOR**

Table 3.10 Aeration Basins Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	4	20%	0.80
Process & Regulatory Impact	5	40%	2.00
Outage Duration	4	20%	0.80
Safety	4	20%	0.80
Overall Condition Rating	**-**	**100%**	**4.40**
Condition Category			**HIGH**

Combining the condition and criticality scores, the overall risk rating for the aeration basins is 8.05.

Risk Category: VERY HIGH

3.3.3 Aeration Basins Improvement Alternatives

A. *Option 1: Rehab Existing Mechanical Disc Aeration*

In this option, the existing aged mechanical disk aeration system including the motors, gear boxes, shafts, bearings, couplings, and disks will be completely replaced with new equipment.

- The bearings and couplings are wearing out frequently because the shafts are worn out due to their age which is causing the misalignment. The newer design of shafts and bearings have a higher tolerance and would not wear out as quickly.
- It also appears that the water level in the aeration rings are at a higher elevation than originally designed to operate at, most likely due to accumulation of grit. The higher level is causing splashing of wastewater on to the bearings which is increasing the

corrosion of the bearings. The new equipment will include a grease cap to the bearing that will act as a sealing barrier from flooding and splashing of wastewater.

- The newer design of the chain coupling is an elastomer type coupling that is easier to remove and replace and will have less maintenance.
- With new motors, gearboxes, shafts and base plates for bearings will have a much better alignment and will significantly reduce the frequent wearing out of the bearings.

In addition to replacing the mechanical equipment it is also recommended that the grit accumulated inside the existing basins be removed to lower the water surface level that will not flood or wet the bearings on the sludge.

The major advantages of this option is the operator familiarity with the technology since the existing mechanical aeration system will be replaced with the same type but improved equipment. There will be minimal changes to the plant's operating procedures. The disadvantages of this option include:

With any type of mechanical aeration system there is higher potential for wear and tear of the moving parts. But the major disadvantage is that limited ability of the mechanical aeration system and Orbal™ type oxidation ditches to meet future stringent and nutrient limits. The existing secondary treatment process at the plant was not designed for nutrient removal. While the existing system can remove some amount of nutrients as is, it will not be able to meet possible future limits in Nitrogen and Phosphorous. Hence, the lifespan of this option will be until the plant is required to meet nutrient limits.

B. *Option 2: Retrofit with Vertical Surface Aerators*

In this option, the existing mechanical disk aerators in the aeration rings will be replaced with vertical shaft surface aerators as shown in **Figure 3.18**. The vertical aerators have a shorter shaft and have partially submerged impellers that are attached to motors mounted on the concrete walkway. The impellers are used to vigorously agitate the wastewater that causes entraining of air in to the wastewater.

This option will require structural modifications to the aeration rings of the Orbal™ basins to fit three 75 HP vertical surface aerators. The existing mechanical disk aerators, shafts and motors in the inner three aeration rings will be removed. The second inner wall will be cut to make an openings to fit the two vertical impellers as shown in **Figure 3.19**. The concrete

walkways will be penetrated for the shaft of the motor. The new extension of the concrete walkway will required for the motor in the inner ring.

The outer digester ring will continue to be mixed and aerated by the horizontal mechanical disk aerators, as this ring will need to stay hydraulically isolated from the inner rings due to its function as an aerobic digester. The innermost ring will still be isolated from the middle two rings. The inner loop will have a dedicated dissolved oxygen (DO) control, while the middle two rings will share a DO control, as they are hydraulically connected. The main hydraulic difference is that the flow direction will change in the inner rings but the exit of the wastewater from the inner ring will remain the same.

The advantage of this option is that the long shafts with bearings and couplings with the horizontal disk aerators will be eliminated and replaced with shorter vertical shafts that will be easier to operate and maintain. Horizontal mechanical disk aerators will still be used for the digester ring but shafts will not be as long as the ones in the aeration basin which will reduce the number of bearings that need to be maintained. However, retrofitting the vertical shaft aerators in the basin will require some significant structural modifications to the basin which as is approaching 40 years of age. This option also uses mechanical aeration in oxidation type secondary treatment and will have the same limitations in meeting future nutrient as Option 1.

Figure 3.18 Option 2 – Vertical Shaft Surface Aerators

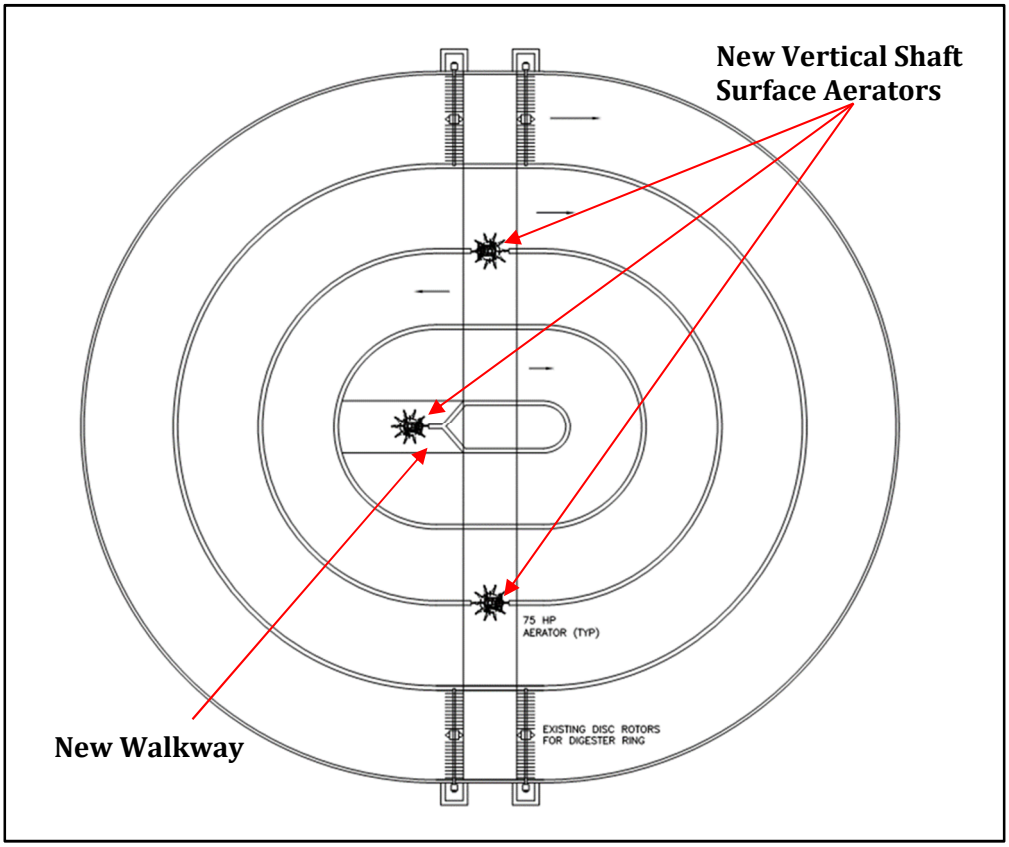
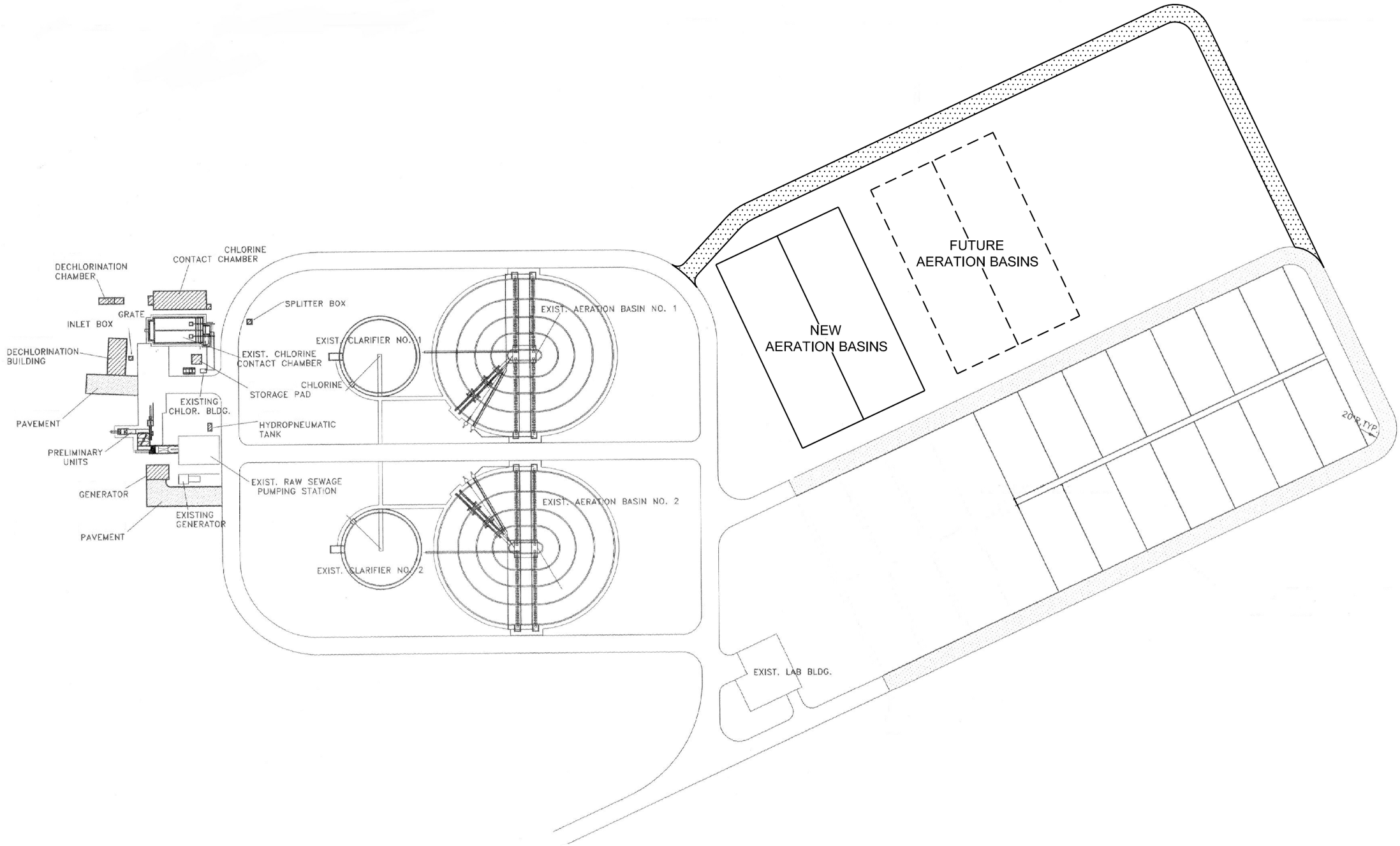


Figure 3.19 Option 2 – Retrofit with Vertical Shaft Surface Aerators

C. *Option 3: Conventional Fine Bubble Aeration System*

In this option, new conventional activated sludge aeration basins with fine bubble diffusers will be built. Two aeration basins 70-feet wide and 210-feet long will be required as shown in **Figure 3.20**. A building will be required to house the blowers for the diffused air system. Fine membrane disk diffusers will be installed in the aeration basins. The aeration basin will be master-planned to have anaerobic and anoxic zones when the plant is required to meet nutrient limits. The existing Orbal™ basin can be repurposed as aerobic digesters or as storage basins for peak wet weather flows.

The major advantage of the option is the flexibility in modification of process to achieve nutrient removal when required. The lifespan of this option is longer and energy efficiency is higher compared to other options. Fine bubble diffusers have a higher oxygen transfer efficiency compared to mechanical aeration systems. The disadvantages of this option are that this option is much higher capital cost and will require additional land area.



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CITY OF HUNTSVILLE, TEXAS

A.J. BROWN WASTEWATER TREATMENT PLANT

PROPOSED AERATION BASIN LAYOUT

FREESE AND NICHOLS
11200 Broadway Street, Suite 2332
Pearland, Texas 77584
Phone - (832) 456-4700
Fax - (832) 456-4701
Web - www.freese.com

3.2

FIGURE

3.4 CLARIFIERS

The two clarifiers at the plant (**Figures 3.21** and **3.22**) were installed in 1981 and each has a diameter of 75-ft with a depth of 10-ft. Both clarifiers have Tow-Bro® hydraulic sludge removal mechanism manufactured by Envirex, now Evoqua.

Figure 3.21 Clarifier No. 1

Figure 3.22 Clarifier No. 2

3.4.1 Overview

In the clarifiers, heavier organic solids in the mixed liquor from the aeration basins settle to the bottom due to gravity, and the lighter organic materials such as oils, fats and grease float to the top where it is removed by the scum scraper arm. The solids that settle to the bottom, known as sludge,

flows by gravity to the RAS wet well in the pump station from where it can be returned to aeration basins or sent to the digesters for further processing. The flow rate of the RAS is controlled by telescoping valves. The clear effluent from the clarifier then flows to the chlorine contact basins for disinfection.

The capacity of the activated sludge clarifiers is based on the overflow rate of each clarifier as well as the hydraulic retention time at the peak 2-hr flow rate of the plant.

3.4.2 Clarifiers No. 1 and 2 Existing Conditions

The scum scraper arms and scum troughs in both clarifiers have severely corroded. The scum baffles and weirs are new, being installed within the last two years. The concrete structure of both clarifiers is in good condition. The access bridge framing at clarifier No. 1 is in very poor condition due to corrosion. The steel check plate is corroded and there is spalled concrete at the stair landing for both basins. Clarifier No. 1 has receptacles that don't work and the wiring has been re-pulled. Clarifier No. 2 has broken PVC conduit supports and conduits are exposed to the sun.

The plant experiences periodic floating of sludge in the clarifiers. The floating typically occurs the day before wasting and usually on one clarifier not both at the same time. The wasting is done through visual observation by the operator. There are no means to measure the sludge being wasted from the clarifier. The floating sludge is typically observed at the periphery of the clarifiers. The clarifiers are shallow at ten feet. The current TCEQ Chapter 217 rules requires a minimum of twelve feet of depth for secondary clarifiers.

The following plant operational parameters were noted:

- The clarifier is operated with a high sludge blanket of 2 to 6 feet
- High MLSS concentration in aeration basin ~ 5,000-6,000 mg/L

Both these parameters are indicative of a high sludge age at the plant. With a sludge blanket of 6 feet, the sludge is staying in clarifier too long leading to denitrification in the blanket. Denitrification releases nitrogen gas which is causing the floating of the sludge. The plant is limited in its ability to waste sludge since the capacity at the sludge dry beds is dependent on weather conditions. The shallow depth of the clarifiers combined with a high sludge blanket causes carryover of solids by the density currents.

Exposed conduits around the facility have a protective PVC coating. Conduit coatings are deteriorating leaving exposed metal that are likely to corrode (**Figure 3.23**). Power conductors for

one of the clarifiers failed and was replaced by the city electrician. Some convenience receptacles and pushbutton control stations around the treatment structures are not working properly. Failure of small components like these are generally caused by exposure to H_2S (hydrogen sulfide). Conduits routed on the clarifier walkways are sagging because PVC conduit becomes soft when exposed to the heat and sun, also because conduit supports have completely rusted.

Figure 3.23 PVC Conduits showing PVC coating coming off

The condition and criticality ratings for the clarifiers are shown in the **Tables 3.11** through **3.14** below.

Table 3.11 Clarifier No. 1 Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Electrical	4	15%	0.60
Clarifier Mechanism	3	30%	0.90
Scum Baffle & Scum Scraper	3	15%	0.45
Weirs	1	15%	0.15
Structure	3	25%	0.75
Condition Rating	**-**	**100%**	**2.85**
Condition Category			**FAIR**

Table 3.12 Clarifier No. 1 Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	4	20%	0.80
Process & Regulatory Impact	5	40%	1.60
Outage Duration	4	20%	0.60
Safety	3	20%	0.80
Overall Criticality Rating	**-**	**100%**	**4.20**
Criticality Category			**HIGH**

Combining the condition and criticality scores, the overall risk rating for clarifier No. 1 is 7.05.

Risk Category: HIGH

Table 3.13 Clarifier No. 2 Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Electrical	4	15%	0.60
Clarifier Mechanism	3	30%	0.90
Scum Baffle & Scum Scraper	3	15%	0.45
Weirs	1	15%	0.15
Structure	2	25%	0.50
Condition Rating	**-**	**100%**	**2.60**
Condition Category			**FAIR**

Table 3.14 Clarifier No. 2 Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	4	20%	0.80
Process & Regulatory Impact	5	40%	2.00
Outage Duration	4	20%	0.60
Safety	2	20%	0.40
Overall Critically Rating	**-**	**100%**	**3.80**
Criticality Category			**HIGH**

Combining the condition and criticality scores, the overall risk rating for clarifier No. 2 is 6.40.

Risk Category: HIGH

3.4.3 Clarifiers No. 1 and 2 Recommended Improvements

The following changes in plant operation are recommended to limit the floating sludge issue in the clarifiers:

- Maintain a lower sludge blanket of 2 to 3 feet. This is the depth of the sludge blanket typically recommended for secondary clarifiers.
- Lower the sludge age. To lower the age, more sludge has to be wasted than currently being wasted.
- Since the plant is currently limited in its ability to waste sludge due to the use of sludge drying beds, it is recommended that a mechanical dewatering equipment be installed that will allow daily wasting of sludge that will keep the age of the sludge low.
- Install "Stamford" density current baffles in both clarifiers as shown in **Figure 3.24**. Due to the low depth of the clarifiers the probability of the density currents moving in a horizontal plane above the sludge blanket and carrying over the lighter solids and short circuiting the main volume of the tank is high. Density current baffles, otherwise called "Stamford" baffles can intercept these currents and redirect towards the center of the tank thereby minimizing short circuiting and reducing carryover of sludge.

The following mechanical improvements are recommended for the clarifiers:

- Replace the scum scraper arm and trough (**Figure 3.25**) at both clarifiers
- Install "Stamford" baffles at both clarifiers
- Replace the corroded access bridge and frame in clarifier no. 1.

Another alternative to consider is to build two new 85-feet clarifiers that are 14-feet deep if new conventional activated sludge aeration basins are to be built in-lieu of rehabilitating or retrofitting the existing Orbal™ basins discussed in the previous chapter. The existing clarifiers were built in 1981 and are approaching the end of their useful life. Installing new and deeper clarifiers, while being expensive, will have a longer life than making improvements to existing aged and shallow clarifiers. **Figure 3.26** shows the proposed location of the new clarifiers.

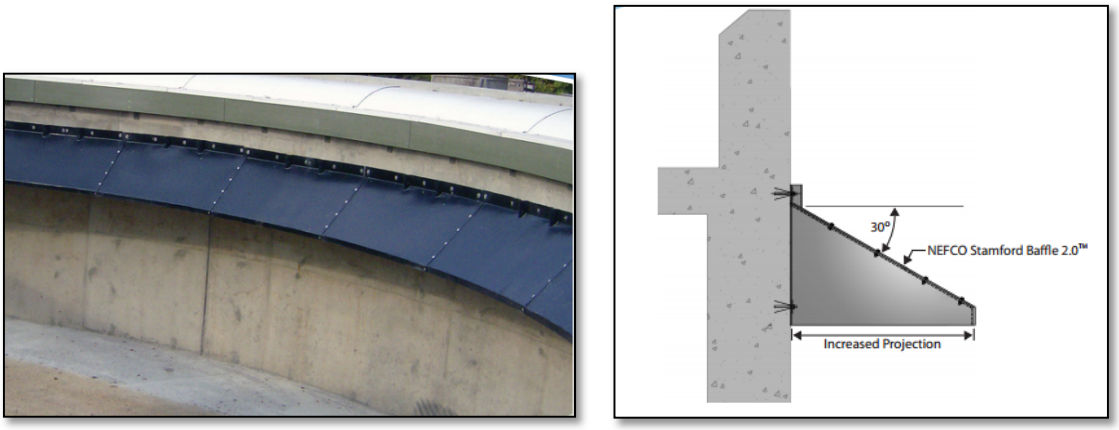
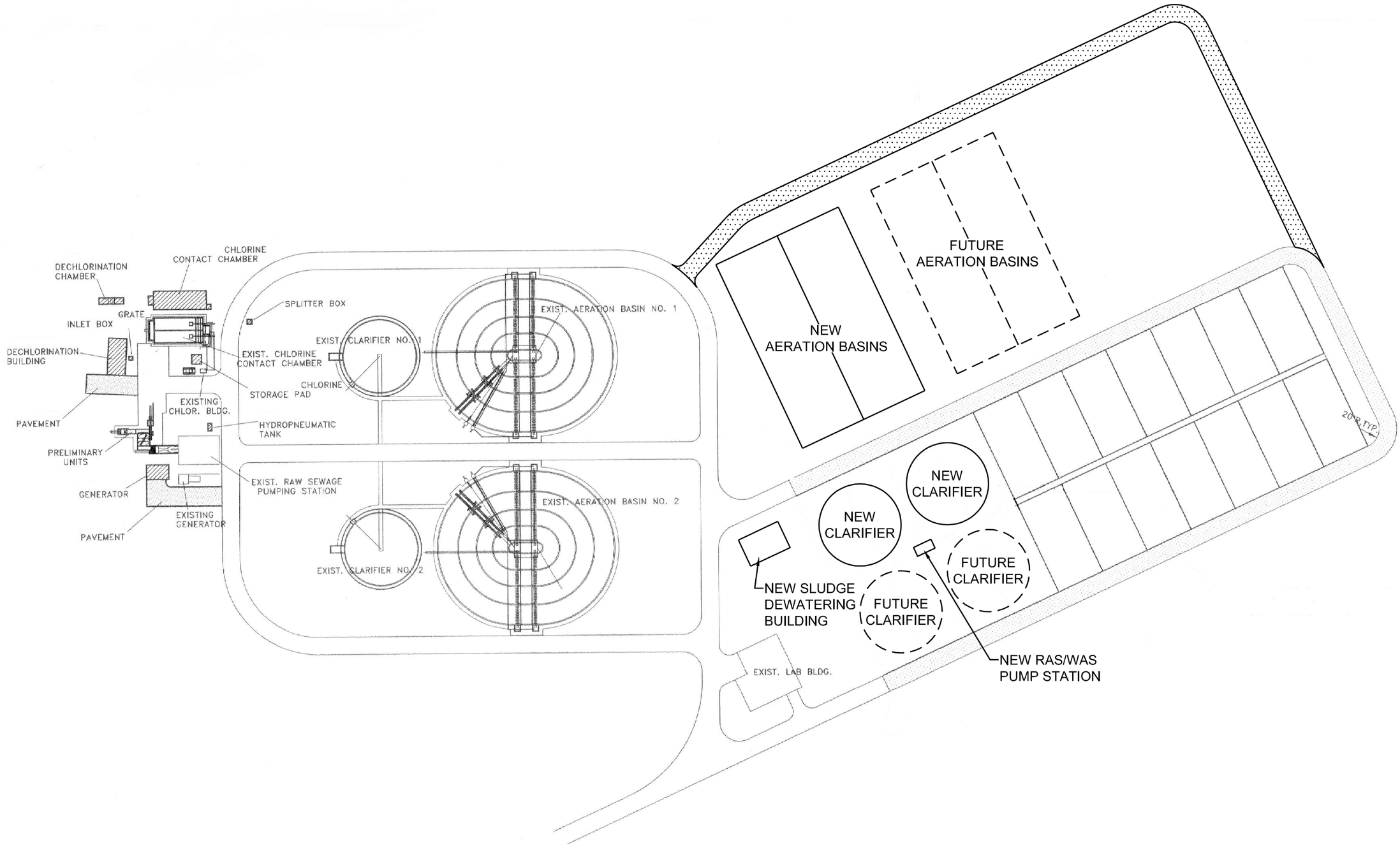


Figure 3.24 Stamford Baffles

Figure 3.25 Clarifier Scum Trough



Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

F&N JOB NO.	HVL15299
DATE	JULY, 2015
SCALE	1" = 100'
DESIGNED	MUE
DRAFTED	WBH
FILE	WW-ALL-PL-SLW02.dwg

CITY OF HUNTSVILLE, TEXAS

A.J. BROWN WASTEWATER TREATMENT PLANT

PROPOSED CLARIFIERS LAYOUT

FREESE AND NICHOLS
11200 Broadway Street, Suite 2332
Pearland, Texas 77584
Phone - (832) 456-4700
Fax - (832) 456-4701
Web - www.freese.com

3.26

FIGURE

3.5 CHLORINE CONTACT BASINS

There are three chlorine contact basins at the plant. Basins No. 1 and 2 were built in 1981 and basin No. 3 was installed during the 1994 improvements.

3.5.1 Overview

Secondary effluent from the clarifiers combines in a splitter box where chlorine is injected. The flow then splits as it goes to the chlorine contact basin chambers where it stays to allow a minimum contact time of twenty minutes. The flow then goes to the de-chlorination chamber to remove excess chlorine.

3.5.2 Chlorine Contact Basin Existing Conditions

Basins No. 1 and 2 (**Figure 3.27**) were observed to be in good condition with no major issues. Basin No. 1 does not drain all the way and Basin No. 2 had some minor spalling on the walls. The weir plates in basins No. 1 and 2 both show some signs of corrosion.

Basin No. 3 (**Figure 3.28**) is currently not in service. Plant staff reported that basin No. 3 does not provide the required full twenty minute contact time. Basin No. 3 is wider than the other two basins and a large volume of the basin is not baffled. Flow appears to be short circuiting and thus, a full twenty minute contact is not achieved in this basin. Basin No. 3 also does not have a scum baffle to catch the floatable materials.

Figure 3.27 Basins No. 1 and 2

Figure 3.28 Basin No. 3

The condition and criticality ratings for the chlorine contact basins are shown in the **Tables 3.15** and **3.16** below.

Table 3.15 Chlorine Contact Basins Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Basin No. 1	1	30%	0.30
Basin No. 2	1	30%	0.30
Basin No. 3	3	30%	0.90
Gates, Piping & Weirs	2	10%	0.20
Condition Rating	**-**	**100%**	**1.70**
Condition Category			**GOOD**

Table 3.16 Chlorine Contact Basins Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	2	20%	0.40
Process & Regulatory Impact	5	40%	2.00
Outage Duration	1	20%	0.20
Safety	1	20%	0.20
Overall Criticality Rating	**-**	**100%**	**2.80**
Criticality Category			**MODERATE**

Combining the condition and criticality scores, the overall risk rating for the chlorine contact basins is 4.50.

Risk Category: MODERATE

3.5.3 Chlorine Contact Basin Recommended Improvements

The chlorine contact basins No. 1 and 2 were observed to be in good condition and do not require any improvements. It is recommended that baffles be installed at Basin No. 3 to prevent the short circuiting and induce a serpentine flow path that will improve the contact time in the basin. An easier method to baffle the basin is to install membrane curtain baffles that can be hung on a stainless frame as shown in **Figure 3.29**.

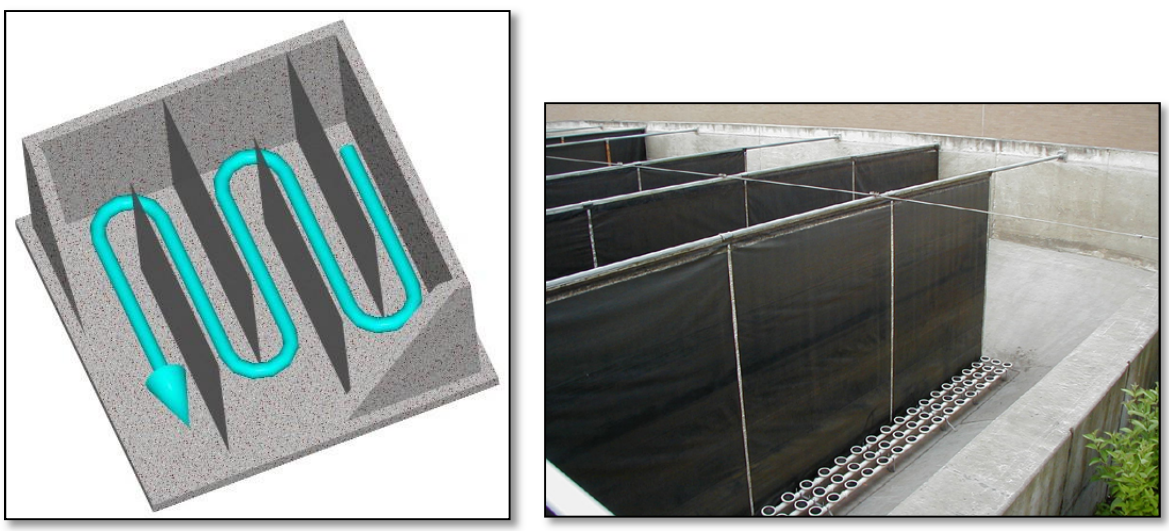


Figure 3.29 Curtain Baffles

3.6 NON- POTABLE WATER SYSTEM

The non-potable water system was installed when the plant was built in 1981. The system consists of two 7.5-HP pumps as shown in **Figure 3.30**. One pump was rebuilt ten years ago and the second pump was recently replaced. There is an existing hydropneumatic tank that is not functional. Because the hydropneumatic tank does not work, one pump has to remain in service at all times to meet the base demand required for spray water at the clarifiers.

Figure 3.30 Non-Potable Water Pumps

3.6.1 Overview

The non-potable water is used at the plant for spray water at the clarifiers to help control foam and to provide wash down water at various locations around the plant. The non-potable water pumps take chlorinated water from the chlorine contact basins.

3.6.2 Non-potable Water Existing Conditions

Since the hydropneumatic tank is not functional, the non-potable water pump has to remain in service at all times to meet the base demand required for spray water at the clarifiers which is causing excessive wear and tear of the pumps.

The pumps are leaking because they run continuously. The motor of the older pump has aged. The piping and valves are in fair condition. The structure was observed to be mostly in good condition. The PVC coated electrical conduit is beginning to get loose, the liquid tight conduit is broken and the push button station is not reliable. **Table 3.17** and **Table 3.18** show the condition and criticality rating for the NPW system.

Table 3.17 NPW Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Pumps & Motors	4	45%	1.80
Electrical	5	25%	1.25
Structure	2	15%	0.30
Piping & Valves	3	15%	0.45
Condition Rating	**-**	**100%**	**3.40**
Condition Category			**POOR**

Table 3.18 NPW Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	2	20%	0.40
Process & Regulatory Impact	3	40%	1.20
Outage Duration	3	20%	0.60
Safety	1	20%	0.20
Overall Criticality Rating	**-**	**100%**	**2.40**
Criticality Category			**LOW**

Combining the condition and criticality scores, the overall risk rating for the non-potable water system is 5.80.

Risk Category: MODERATE

3.6.3 Non-potable Water Recommended Improvements

Based on the condition of the NPW system, it is recommended that the older non-potable water pump be replaced and a new hydropneumatic tank be installed to prevent the pumps from running continuously. Both NPW pumps will need to be replaced if mechanical sludge dewatering equipment will be installed at the plant. The existing NPW pumps will not be adequate to meet the additional NPW required for mechanical dewatering systems.

3.7 CHLORINATION SYSTEM

The chlorination system consists of chlorine gas stored in ton cylinders and two chlorinators manufactured by Superior Autovalve Series 2000 each with a capacity of 500 pounds per day. The chlorinators were replaced about eight years ago. The chlorine ton cylinders are stored outside and a 3-ton jib crane is used to move the ton cylinders on and off two existing scales as shown in **Figure 3.31.**

3.7.1 Overview

Chlorine gas in injected into the effluent from the clarifiers at a splitter box located between clarifier No. 1 and the chlorine contact basins. The effluent then enters the chlorine contact basins where it is allowed the adequate amount of contact time to achieve disinfection.

Figure 3.31 Chlorine Ton Cylinder Storage

3.7.2 Chlorination System Existing Conditions

The ton cylinders are stored outside, while the chlorinators are stored inside a small building east of the cylinders (**Figure 3.32**). There are only two scales to weigh the ton cylinders (**Figure 3.33**) which are hard to switch using the existing 3-ton jib crane (**Figure 3.34**). The crane does not swing out very

far making it difficult to switch the empty cylinders with full ones. The jib crane is in fair condition and needs painting.

Figure 3.32 Chlorinators

Scales

Figure 3.33 Chlorine Cylinders and Scales

3-Ton Jib Crane

Figure 3.34 Chlorine Ton Cylinder Jib Crane

The condition and criticality ratings and categories are shown in **Tables 3.19 and 3.20** below. Since the system is fairly new, the condition rating as expected is in the good category. For the criticality rating the process and regulatory impact received a high criticality rating because the system has a very big impact on regulatory compliance. The safety rating was also ranked high due to the fact that the chlorine ton cylinders sit outside and are not contained within a building. These factors pushed the criticality assessment into a moderate category. The risk category for the system was determined to be low based on these two parameters.

Table 3.19 Chlorination System Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Electrical	3	45%	0.45
Mechanical Equipment (Chlorinators, Scales)	2	25%	0.60
Structure (Ton Cylinder Storage Pad, Hoist, Chlorinator Building)	2	15%	0.60
Safety Features (Eye wash, Shower, Gas Leak Detector)	1	15%	0.25
Condition Rating	**-**	**100%**	**1.90**
Condition Category			**GOOD**

Table 3.20 Chlorination System Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	2	20%	0.40
Process & Regulatory Impact	5	40%	2.00
Outage Duration	1	20%	0.20
Safety	4	20%	0.80
Overall Criticality Rating	**-**	**100%**	**3.40**
Criticality Category			**MODERATE**

Combining the condition and criticality scores, the overall risk rating for the chlorination system is 5.30.

Risk Category: MODERATE

3.7.3 Chlorination System Improvements

It is recommended that the chlorine ton cylinders be located inside a building as depicted in **Figure 3.35**. Since the chlorine is fed into the system at the splitter box, the proposed location of the building will avoid the chlorine gas line from having to cross under the road.

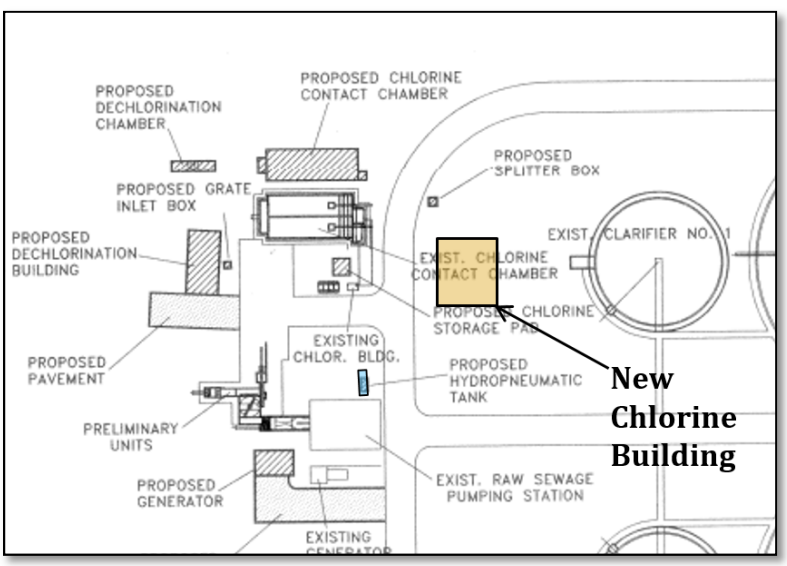


Figure 3.35 Chlorine Building Proposed Location

3.8 DECHLORINATION SYSTEM

The de-chlorination system consists of a de-chlorination chamber, and two (2) sulfonators. The system was installed when improvements were made to the plant on 1994. The sulfonators were replaced 8 years ago. The manufacturer of the system is Superior Autovalve Series 2000. Each sufonator has a capacity of 250 lbs/ day and is located inside a building as shown in **Figure 3.36**. The sulfur dioxide gas is stored in ton cylinders as shown in **Figure 3.37** and is stored inside the same building as the sulfonators.

Figure 3.36 Sulfonators inside the De-chlorination Building

Figure 3.37 De-chlorination Building

3.8.1 Overview

De-chlorination occurs as the flow enters the de-chlorination chamber (**Figure 3.38)** after exiting the chlorine contact basins. The sulfonators feed the Sulfur dioxide solution to the de-chlorination chamber to remove the residual chlorine before the flow is discharged to the creek.

Figure 3.38 De-chlorination Chamber

3.8.2 De-chlorination System Existing Conditions

There are no issues with the mechanical equipment and the de-chlorination chamber and de-chlorination building (**Figure 3.39**) were observed to be in good condition. All the safety features including an eye wash, shower and gas leak detection system are present. The exhaust fan in the de-chlorination building is not functional.

Tables 3.21 and **3.22** show the condition and criticality rating of the de-chlorination system.

The condition of the system was rated to be good. Similar to the chlorination system the process and regulatory impact received a high score since the process is also very important for regulatory compliance.

Figure 3.39 De-chlorination Building

Table 3.21 De-chlorination System Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Electrical	2	15%	0.30
Mechanical Equipment	1	25%	0.25
Structure	2	30%	0.60
Safety Features	1	25%	0.25
Building HVAC	5	5%	0.25
Condition Rating	**-**	**100%**	**1.65**
Condition Category			**GOOD**

Table 3.22 De-chlorination System Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	1	20%	0.20
Process & Regulatory Impact	5	40%	2.00
Outage Duration	1	20%	0.20
Safety	1	20%	0.20
Overall Criticality Rating	**-**	**100%**	**2.60**
Criticality Category			**MODERATE**

Combining the condition and criticality scores, the overall risk rating for the de-chlorination system is 4.25.

Risk Category: MODERATE

3.8.3 De-chlorination System Improvements

The only recommendation for this system is to repair the exhaust fan inside the building.

3.9 SOLIDS PROCESSING

There are a total of 22 sludge drying beds currently at the plant shown in **Figure 3.36** for processing waste sludge. These sludge drying beds were installed when the plant was built in 1981.

3.9.1 Overview

Sludge drying beds are used to dewater sludge via filtration and evaporation. These sludge drying beds are layered with gravel, sand and activated sludge. Digested waste activated sludge is pumped to the sludge drying beds, where it is stored and dried and hauled off to a landfill.

Figure 3.40 Sludge Drying Beds

Figure 3.41 Rented Belt Press

3.9.2 Sludge Drying Beds Existing Conditions

The sludge drying beds are in good condition. There are some minor concrete spalling and a few cracks in the containment wall. The sludge drying beds lose drying capability during wet weather events. When it rains the drying accomplished in the dry beds is lost. After the heavy rains in May 2015, the drying beds were full and plant had no means for wasting sludge. The City had to rent a belt press to dewater solids for period of two months until the sludge in the drying beds was dry enough to be hauled off. **Figure 3.41** shows the belt press that was rented to temporarily dewater the sludge. Use of sludge drying to dewater sludge is severely limiting the plant's ability to waste sludge. The ripple effect of not being able to waste enough sludge is longer retention of sludge in the treatment process, higher sludge age which in turn is a cause for the floating sludge in the clarifiers. During the time the belt press was used, the sludge was being wasted more frequently and on a regular basis and the clarifiers did not experience any floating of sludge.

The condition and criticality ratings for the sludge drying beds are shown in the **Tables 3.23** and **3.24** below.

Table 3.23 Sludge Drying Beds Condition Rating and Category

Component Group	Component Condition Rating	Weight Factor	Weight Component Rating
Structure	3	40%	1.20
Site Civil	3	25%	0.75
Piping and Valves	3	30%	0.45
Condition Rating	**-**	**100%**	**2.40**
Condition Category			**GOOD**

Table 3.24 Sludge Drying Beds Criticality Rating and Category

Criticality Parameters	Component Criticality Rating	Weight Factor	Weight Component Rating
Capacity Affected	5	20%	1.00
Process & Regulatory Impact	4	40%	1.60
Outage Duration	4	20%	0.80
Safety	1	20%	0.20
Overall Criticality Rating	**-**	**100%**	**3.60**
Criticality Category			**HIGH**

Combining the condition and criticality scores, the overall risk rating for the sludge drying beds is 6.00.

Risk Category: MODERATE

The condition category for the sludge drying beds is good but the criticality category is high due to the fact that when the sludge drying beds cannot be used it severely affects the sludge wasting ability of the plant, outage durations are long, and it adversely affects the treatment process at the plant.

3.9.1 Improvement Alternatives

It is recommended that mechanical dewatering equipment be installed that will enhance the plant's sludge wasting ability. There are two options for mechanical dewatering of sludge.

A. Option 1: Screw Press

The Screw Press is a dewatering technology that is relatively new to municipal treatment plants in the United States; however, the Screw Press has been widely used

in the industrial market for decades and in municipal treatment plants outside the United States. Flocculated sludge is pumped into a chamber which consists of a rotating auger inside of a cylindrical screen basket. Due to the inclined structure, the sludge begins dewatering by gravity while being pressed between the auger and the screen basket. As the sludge moves toward the discharge point, the diameter of the auger continually increases while the screen basket diameter continually decreases. Water is pressed through the screen basket as the pressure on the sludge increases up to the point that it is discharged. The auger operates at a very low RPM, reducing power consumption and wear on the few moving parts. A screw press is shown in **Figure 3.42**.

The Screw Press operation is fully automatic and adjusts to changing sludge characteristics, so it requires very little operator attention and maintenance is minimal. Additional advantages include a small footprint within the plant, low odor emissions, and the capability of mounting the Screw Press on a trailer so it can be used at multiple treatment plants. The main disadvantage of the Screw Press is that it typically has a lower solids loading rate than most Belt Presses, limiting the amount of sludge that can be dewatered each day. Also, Belt Presses and Centrifuges typically have a higher solids concentration in the dewatered sludge than the Screw Press.

A 300 dry pounds per her screw press unit will be required for the plant. The screw press and it associated equipment will be located in a building as shown in **Figure 3.42**.

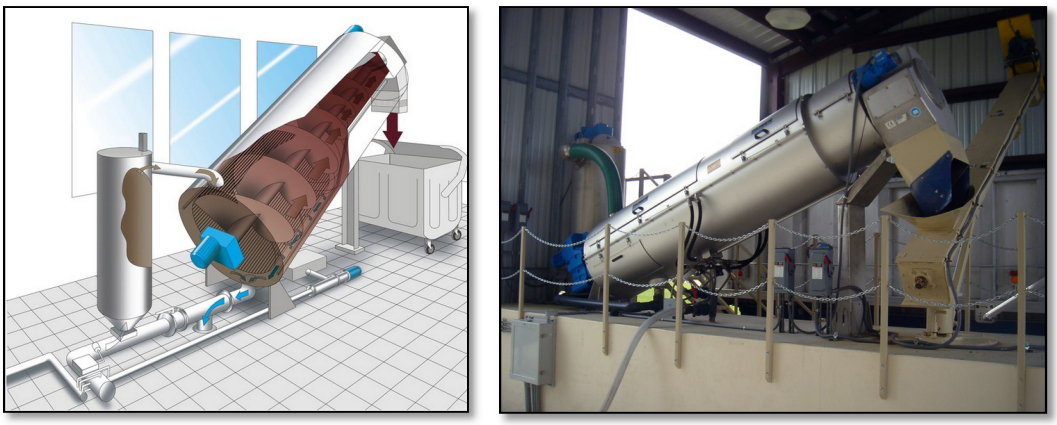


Figure 3.42 Screw Press

B. Option 2: Belt Filter Press

Belt Filter Presses (BFPs) use gravity drainage and compression between porous belts to dewater sludge. First, the sludge is mixed with polymer for flocculation to improve dewatering results. The flocculated sludge then moves into the gravitational dewatering chamber, where excess water drains through the dewatering belt and the solids are retained. Next, the thickened sludge moves into the wedge zone where increasing pressure is applied by angled belts to remove more water from the solids. The final dewatering zone is the pressure zone, in which rollers of decreasing diameter apply pressure and shear as the sludge is pressed between the belt and the rollers.

Advantages of BFPs include lower capital costs than Centrifuges, high solids content in the dewatered sludge, and low maintenance costs. However, without a cover and ventilation system, odor emissions are generally high when operating BFPs. Therefore, additional costs and footprint requirements must be considered for building a BFP housing unit with a ventilation system. Other disadvantages include the need for a continuous belt wash system and higher operation costs, as BFPs are not fully automatic and require operator attention to handle changing sludge conditions. **Figure 3.43** illustrates a Belt Filter Press.

Figure 3.43 Belt Filter Press

4.0 ADDITIONAL ELECTRICAL CONSIDERATIONS & RECOMMENDATIONS

4.1 CONTROLS

Most controls for various portions of treatment equipment reside in either the manufacturers' control panels or in the MCCs. As indicated in the power section, the MCC is in poor condition and needs to be replaced. There are remote control stations wired to the MCCs but the control stations are not working properly either. Operators must start and stop equipment at the MCC. Without troubleshooting the remote control stations it is not clear if the wiring or pushbuttons have failed.

4.2 SCADA

The plant SCADA system needs to be replaced. Controller hardware is outdated and is no longer supported by the manufacturer. Third party repairs require hardware to be removed for shipment and the current repair center has indicated they will no longer work on similar controllers used at the lift stations. Controllers are currently in need of repairs and use outdated technology. Troubleshooting existing controllers is time consuming and there is lack of documentation due to previous repairs.

4.3 RECOMMENDATIONS

Plant staff has done a great job repairing existing equipment and keeping it functional. As time progresses the repairs are becoming more difficult because of the lack of support from manufacturers. Manufacturers only keep parts on the shelves for as long as they last after production of equipment has stopped. Finding and replacing failed components with similar replacement parts will be difficult.

FNI recommends replacing the electrical distribution system and SCADA system throughout the plant. Corrosion and time have taken a toll on the components and the power distribution equipment show signs of eminent failure. Most of the controls for the plant reside inside the MCCs. Without working controls, plant staff will be required to invest more time and effort to replace, monitor, and control equipment to keep the plant within TCEQ regulations.

5.0 RISK ASSESSMENT AND COST SUMMARY

Table 5.1 shows all the treatment units at the plant in the order of the risk category based on the condition and criticality ratings. An opinion of probable construction cost (OPCC) was estimated for the improvement alternatives for each treatment unit and is summarized in **Table 5.2**. The costs presented are in year 2015 dollars and include overhead factors such as contingency, mobilization and profit. All mechanical equipment costs include an additional 25% mark-up for installation. Detailed OPCCs of the improvements are included in **Appendix C**.

Table 5.1 Risk Assessment Summary

Facility	Condition Score	Condition Rating	Criticality Score	Criticality Rating	Risk Scoring	Risk Category
Raw Sewage PS	4.25	Poor	4.20	High	8.45	Very High
RAS-WAS PS	4.15	Poor	4.20	High	8.35	Very High
Aeration Basin #1	3.65	Poor	4.40	High	8.05	High
Aeration Basin #2	3.65	Poor	4.40	High	8.05	High
Clarifier #1	2.85	Fair	4.20	High	7.05	High
Clarifier #2	2.60	Fair	3.80	High	6.40	High
NPW System	3.80	Poor	2.40	Low	6.20	Moderate
Sludge Drying Beds	2.40	Good	3.60	High	6.00	Moderate
Screens	2.70	Fair	3.00	Moderate	5.70	Low
Grit Removal	2.70	Fair	3.00	Moderate	5.70	Low
Chlorination System	1.90	Good	3.40	Moderate	5.30	Low
Chlorine Contact Basins	1.70	Good	2.80	Moderate	4.50	Low
De-chlorination System	1.65	Good	2.60	Moderate	4.25	Low

Table 5.2 Improvements OPCC Summary

Facility	Risk Category	Improvements	Opinion of Probable Construction Cost
Raw Sewage & Sludge PS	Very High	Option 1: Rehabilitation of Existing PS + New Electrical Building & New MCCs	$2,957,000
		Option 2: New PS + New MCCs	$3,438,000
Aeration Basins	High	Option 1: Rehab Existing Disk Aerators	$3,214,000
		Option 2: Retrofit with Vertical Surface Aerators	$3,453,000
		Option 3: New Conventional Aeration Basins	$7,330,000
Clarifiers	High	Option 1: Rehab Existing Clarifiers	$220,000
		Option 2: New Clarifiers	$2,824,000
NPW System	Moderate	New NPW pumps & Hydropneumatic tank	$211,000
Sludge Drying Beds	Moderate	Option 1: Belt Filter Press	$2,239,000
		Option 2: Screw Press	$1,827,000
Screens	Low	Install slide gate; hand rails are manual bypass screen	$24,000
		New second mechanical screen	$845,000
Grit Removal	Low	Install new handrails & access bridge at existing grit system	$28,000
		New gravity vortex grit removal system	$1,331,000
Chlorination System	Low	New chlorine building	$667,000
Chlorine Contact Basins	Low	Curtain baffles & scum baffles	$59,000
Dechlorination System	Low	New exhaust fan	$7,000

6.0 RECOMMENDATIONS

Improvements to the units that placed in the 'Very High' and 'High' risk categories should be addressed first. FNI recommends the following improvements to the treatment units at the plant:

12. Build new raw sewage and sludge pump station: The existing raw sewage and sludge pump station placed highest in the risk category. The condition of the pump station is very poor and it is very critical to the plant operation. A new pump station will have longer life time than rehabilitating the existing pump station. The electrical equipment located in the building are outdated, in very poor condition and have exceeded their life expectancy. Making repairs to the electrical is difficult since the manufacturers no longer produce some of the parts. New MCCs will increase the reliability of the power system at the plant. Refurbishing and reusing the existing pump station building as the electrical building will result in significant savings for the City.

13. Build new conventional aeration basins: The current horizontal mechanical disk aeration system in the Orbal™ basins is poor condition. No major upgrades have been made to the mechanical aeration system since its installation in 1981. The system has exceeded its life expectancy. Secondary treatment is the most critical treatment process at a wastewater treatment plant. While existing the mechanical aeration system in Orbal™ basins can be replaced, the technology itself will have difficulty meeting future stringent and/or nutrient limits. Hence, it is recommended that new conventional aeration basins with fine bubble diffusers be installed to replace the Orbal™ basins for secondary treatment. Conventional aeration basins with diffused aeration system will be more capable of biologically removing nutrients to meet future nutrient limits and will also be more energy efficient.

14. Install new clarifiers: The existing clarifiers are shallow at 10-feet of water depth. With conventional aeration basins, deeper clarifiers of at least 12-14 feet of depth is recommended for effective performance of the activated sludge process.

15. Install new aerobic digesters: The outer ring of the Orbal basin is currently used as the aerobic digester. With new conventional aeration basins and clarifiers, new aerobic digesters will be required for digesting the sludge.

16. Install a new screw press for mechanical dewatering of sludge. While the sludge drying beds did not place high on the risk category, it has an adverse impact on the plant's performance. Use of sludge drying beds severely limits the plant's sludge wasting ability. Sludge drying

beds lose drying capability during wet weather events. When it rains any drying accomplished in the dry beds is lost. The City has to rent belt presses to dewater sludge after heavy rains which increases the annual operating cost significantly. Additionally, the limitation in sludge wasting is one reason for the floating sludge issue in the clarifiers. A mechanical dewatering system will tremendously improve the plant's ability to waste, will produce dryer solids which will reduce the hauling cost, and it will help with the clarifier floating sludge issue. A screw press is recommended instead of a belt press because it is a more compact unit, emits less odor, can function continuously and will require less operator attention.

17. Install new NPW pumps and hydropneumatic tank. While the NPW system does have high risk rating, it is a critical component for a mechanical dewatering equipment as they need a steady supply of high pressure water for cleaning purposes. The current NPW pumps are not adequate to meet the additional demand with the screw press and hence, it is recommended that the NPW system improved in conjunction with installing the screw press.

18. Install second mechanical bar screen: The plant currently has only one mechanical bar screen. A second bar screen is recommended for redundancy.

19. Install new grit removal system: The existing Detritor grit removal system is in poor condition and is an outdated technology. The system is functional at this time and is rapidly approaching the end of its useful life. It is recommended that a gravity vortex type grit removal system, HeadCell, be installed that will be more efficient in removing grit.

20. New chlorination building: The chlorine ton cylinders are currently stored outside on a pad. Chlorine being a hazardous gas should be stored inside a building.

21. Install curtain baffles and scum baffles in chlorine contact basin no. 3: The existing chlorine contact basin no. 3 is unable to provide a full twenty minute contact time due to short-circuiting of flow. Installing baffles in the basin will induce a serpentine flow path and will minimize the short-circuiting. Installing scum baffles will catch the floatables in the effluent.

22. Install new exhaust fan in de-chlorination building: The existing dichlorination building does not have a function exhaust fan. Install new fan in the building.

The total construction cost for the recommended improvements is shown in **Table 6.1** below.

Table 6.1 Recommended Improvements Cost Estimate Summary

Item	Improvement	Opinion of Probable Construction Cost*
1	New Raw Sewage Pump Station & New MCCs	$3,438,000
2	New Aeration Basins	$7,330,000
3	New Clarifiers	$2,824,000
4	New Aerobic Digesters	$1,870,000
5	Mechanical Sludge Dewatering System: Screw Press	$1,827,000
6	NPW System Improvements	$211,000
7	Second Mechanical Bar Screen	$845,000
8	New Grit Removal System	$1,331,000
9	New Chlorination Building	$667,000
10	Chlorine contact basin no. 3 Improvements	$59,000
11	New exhaust fan in dichlorination system	$7,000
12	Engineering Services @ 15% (Design, Surveying, Geotech etc.)	$3,061,350
	Total:	**$23,470,350**

APPENDIX A
A.J. BROWN WWTP TPDES PERMIT

TPDES PERMIT NO. WQ0010781003
[For TCEQ office use only - EPA I.D. No. TX0072974]

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

This is a renewal that replaces TPDES Permit No. WQ0010781003 issued March 13, 2007.

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

City of Huntsville

whose mailing address is

1212 Avenue M
Huntsville, Texas 77340

is authorized to treat and discharge wastes from the AJ Brown/Parker Creek Wastewater Treatment Facility, SIC Code 4952

located at 94 Parker Creek Road, approximately 0.8 miles north of the intersection of State Highway 19 and Ellisor Road and 3.5 miles northeast of the intersection of State Highway 30 and U.S. Highway 190, at the north end of Ellisor Road near the City of Huntsville in Walker County, Texas 77320

to Parker Creek; thence to Harmon Creek; thence to Lake Livingston in Segment No. 0803 of the Trinity River Basin

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, **February 1, 2017**.

ISSUED DATE: March 13, 2012

For the Commission

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Outfall Number 001

1. During the period beginning upon 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 4.15 million gallons per day (MGD); nor shall the average discharge during any two-hour period (2-hour peak) exceed 7,300 gallons per minute (gpm).

Effluent Characteristic	Discharge Limitations				Min. Self-Monitoring Requirements	
	Daily Avg mg/l (lbs/day)	7-day Avg mg/l	Daily Max mg/l	Single Grab mg/l	Report Daily Avg. & Daily Max. Measurement Frequency	Sample Type
Flow, MGD	Report	N/A	Report	N/A	Continuous	Totalizing Meter
Carbonaceous Biochemical Oxygen Demand (5-day)	7 (242)	11	17	25	Two/week	Composite
Total Suspended Solids	15 (519)	25	40	60	Two/week	Composite
Ammonia Nitrogen	2 (69)	5	10	15	Two/week	Composite
E. coli, CFU or MPN/100 ml	126	N/A	394	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 5.0 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.

DEFINITIONS AND STANDARD PERMIT CONDITIONS

As required by Title 30 Texas Administrative Code (TAC) Chapter 305, certain regulations appear as standard conditions in waste discharge permits. 30 TAC § 305.121 - 305.129 (relating to Permit Characteristics and Conditions) as promulgated under the Texas Water Code (TWC) §§ 5.103 and 5.105, and the Texas Health and Safety Code (THSC) §§ 361.017 and 361.024(a), establish the characteristics and standards for waste discharge permits, including sewage sludge, and those sections of 40 Code of Federal Regulations (CFR) Part 122 adopted by reference by the Commission. The following text includes these conditions and incorporates them into this permit. All definitions in TWC § 26.001 and 30 TAC Chapter 305 shall apply to this permit and are incorporated by reference. Some specific definitions of words or phrases used in this permit are as follows:

1. Flow Measurements

   a. Annual average flow - the arithmetic average of all daily flow determinations taken within the preceding 12 consecutive calendar months. The annual average flow determination shall consist of daily flow volume determinations made by a totalizing meter, charted on a chart recorder and limited to major domestic wastewater discharge facilities with one million gallons per day or greater permitted flow.

   b. Daily average flow - the arithmetic average of all determinations of the daily flow within a period of one calendar month. The daily average flow determination shall consist of determinations made on at least four separate days. If instantaneous measurements are used to determine the daily flow, the determination shall be the arithmetic average of all instantaneous measurements taken during that month. Daily average flow determination for intermittent discharges shall consist of a minimum of three flow determinations on days of discharge.

   c. Daily maximum flow - the highest total flow for any 24-hour period in a calendar month.

   d. Instantaneous flow - the measured flow during the minimum time required to interpret the flow measuring device.

   e. 2-hour peak flow (domestic wastewater treatment plants) - the maximum flow sustained for a two-hour period during the period of daily discharge. The average of multiple measurements of instantaneous maximum flow within a two-hour period may be used to calculate the 2-hour peak flow.

   f. Maximum 2-hour peak flow (domestic wastewater treatment plants) - the highest 2-hour peak flow for any 24-hour period in a calendar month.

2. Concentration Measurements

   a. Daily average concentration - the arithmetic average of all effluent samples, composite or grab as required by this permit, within a period of one calendar month, consisting of at least four separate representative measurements.

      i. For domestic wastewater treatment plants - When four samples are not available in a calendar month, the arithmetic average (weighted by flow) of all values in the previous four consecutive month period consisting of at least four measurements shall be utilized as the daily average concentration.

ii. For all other wastewater treatment plants - When four samples are not available in a calendar month, the arithmetic average (weighted by flow) of all values taken during the month shall be utilized as the daily average concentration.

b. 7-day average concentration - the arithmetic average of all effluent samples, composite or grab as required by this permit, within a period of one calendar week, Sunday through Saturday.

c. Daily maximum concentration - the maximum concentration measured on a single day, by the sample type specified in the permit, within a period of one calendar month.

d. Daily discharge - the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in terms of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the sampling day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the sampling day.

The daily discharge determination of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily discharge determination of concentration shall be the arithmetic average (weighted by flow value) of all samples collected during that day.

e. Bacteria concentration (*E. coli* or Enterococci) - Colony Forming Units (CFU) or Most Probable Number (MPN) of bacteria per 100 milliliters effluent. The daily average bacteria concentration is a geometric mean of the values for the effluent samples collected in a calendar month. The geometric mean shall be determined by calculating the nth root of the product of all measurements made in a calendar month, where n equals the number of measurements made; or, computed as the antilogarithm of the arithmetic mean of the logarithms of all measurements made in a calendar month. For any measurement of bacteria equaling zero, a substituted value of one shall be made for input into either computation method. If specified, the 7-day average for bacteria is the geometric mean of the values for all effluent samples collected during a calendar week.

f. Daily average loading (lbs/day) - the arithmetic average of all daily discharge loading calculations during a period of one calendar month. These calculations must be made for each day of the month that a parameter is analyzed. The daily discharge, in terms of mass (lbs/day), is calculated as (Flow, MGD x Concentration, mg/l x 8.34).

g. Daily maximum loading (lbs/day) - the highest daily discharge, in terms of mass (lbs/day), within a period of one calendar month.

3. Sample Type

a. Composite sample - For domestic wastewater, a composite sample is a sample made up of a minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow, and collected at the intervals required by 30 TAC § 319.9 (a). For industrial wastewater, a composite sample is a sample made up of a minimum of three effluent portions collected in a continuous 24-hour period or during the period of daily discharge if less than 24 hours, and combined in volumes proportional to flow, and collected at the intervals required by 30 TAC § 319.9 (b).

b. Grab sample - an individual sample collected in less than 15 minutes.

4. Treatment Facility (facility) - wastewater facilities used in the conveyance, storage, treatment, recycling, reclamation and/or disposal of domestic sewage, industrial wastes, agricultural wastes, recreational wastes, or other wastes including sludge handling or disposal facilities under the jurisdiction of the Commission.

5. The term "sewage sludge" is defined as solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in 30 TAC Chapter 312. This includes the solids that have not been classified as hazardous waste separated from wastewater by unit processes.

6. Bypass - the intentional diversion of a waste stream from any portion of a treatment facility.

MONITORING AND REPORTING REQUIREMENTS

1. Self-Reporting

Monitoring results shall be provided at the intervals specified in the permit. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall conduct effluent sampling and reporting in accordance with 30 TAC §§ 319.4 - 319.12. Unless otherwise specified, a monthly effluent report shall be submitted each month, to the Enforcement Division (MC 224), by the 20th day of the following month for each discharge which is described by this permit whether or not a discharge is made for that month. Monitoring results must be reported on an approved self-report form that is signed and certified as required by Monitoring and Reporting Requirements No. 10.

As provided by state law, the permittee is subject to administrative, civil and criminal penalties, as applicable, for negligently or knowingly violating the Clean Water Act (CWA); TWC §§ 26, 27, and 28; and THSC § 361, including but not limited to knowingly making any false statement, representation, or certification on any report, record, or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, or falsifying, tampering with or knowingly rendering inaccurate any monitoring device or method required by this permit or violating any other requirement imposed by state or federal regulations.

2. Test Procedures

a. Unless otherwise specified in this permit, test procedures for the analysis of pollutants shall comply with procedures specified in 30 TAC §§ 319.11 - 319.12. Measurements, tests, and calculations shall be accurately accomplished in a representative manner.

b. All laboratory tests submitted to demonstrate compliance with this permit must meet the requirements of 30 TAC § 25, Environmental Testing Laboratory Accreditation and Certification.

3. Records of Results

a. Monitoring samples and measurements shall be taken at times and in a manner so as to be representative of the monitored activity.

b. Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period

of at least five years (or longer as required by 40 CFR Part 503), monitoring and reporting records, including strip charts and records of calibration and maintenance, copies of all records required by this permit, records of all data used to complete the application for this permit, and the certification required by 40 CFR § 264.73(b)(9) shall be retained at the facility site, or shall be readily available for review by a TCEQ representative for a period of three years from the date of the record or sample, measurement, report, application or certification. This period shall be extended at the request of the Executive Director.

c. Records of monitoring activities shall include the following:

i. date, time and place of sample or measurement;

ii. identity of individual who collected the sample or made the measurement.

iii. date and time of analysis;

iv. identity of the individual and laboratory who performed the analysis;

v. the technique or method of analysis; and

vi. the results of the analysis or measurement and quality assurance/quality control records.

The period during which records are required to be kept shall be automatically extended to the date of the final disposition of any administrative or judicial enforcement action that may be instituted against the permittee.

4. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit using approved analytical methods as specified above, all results of such monitoring shall be included in the calculation and reporting of the values submitted on the approved self-report form. Increased frequency of sampling shall be indicated on the self-report form.

5. Calibration of Instruments

All automatic flow measuring or recording devices and all totalizing meters for measuring flows shall be accurately calibrated by a trained person at plant start-up and as often thereafter as necessary to ensure accuracy, but not less often than annually unless authorized by the Executive Director for a longer period. Such person shall verify in writing that the device is operating properly and giving accurate results. Copies of the verification shall be retained at the facility site and/or shall be readily available for review by a TCEQ representative for a period of three years.

6. Compliance Schedule Reports

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of the permit shall be submitted no later than 14 days following each schedule date to the Regional Office and the Enforcement Division (MC 224).

7. Noncompliance Notification

a. In accordance with 30 TAC § 305.125(9) any noncompliance which may endanger human health or safety, or the environment shall be reported by the permittee to the TCEQ. Report of such information shall be provided orally or by facsimile transmission (FAX) to the Regional Office within 24 hours of becoming aware of the noncompliance. A written submission of such information shall also be provided by the permittee to the Regional Office and the Enforcement Division (MC 224) within five working days of becoming aware of the noncompliance. The written submission shall contain a description of the noncompliance and its cause; the potential danger to human health or safety, or the environment; the period of noncompliance, including exact dates and times; if the noncompliance has not been corrected, the time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance, and to mitigate its adverse effects.

b. The following violations shall be reported under Monitoring and Reporting Requirement 7.a.:

i. Unauthorized discharges as defined in Permit Condition 2(g).

ii. Any unanticipated bypass that exceeds any effluent limitation in the permit.

iii. Violation of a permitted maximum daily discharge limitation for pollutants listed specifically in the Other Requirements section of an Industrial TPDES permit.

c. In addition to the above, any effluent violation which deviates from the permitted effluent limitation by more than 40% shall be reported by the permittee in writing to the Regional Office and the Enforcement Division (MC 224) within 5 working days of becoming aware of the noncompliance.

d. Any noncompliance other than that specified in this section, or any required information not submitted or submitted incorrectly, shall be reported to the Enforcement Division (MC 224) as promptly as possible. For effluent limitation violations, noncompliances shall be reported on the approved self-report form.

8. In accordance with the procedures described in 30 TAC §§ 35.301 - 35.303 (relating to Water Quality Emergency and Temporary Orders) if the permittee knows in advance of the need for a bypass, it shall submit prior notice by applying for such authorization.

9. Changes in Discharges of Toxic Substances

All existing manufacturing, commercial, mining, and silvicultural permittees shall notify the Regional Office, orally or by facsimile transmission within 24 hours, and both the Regional Office and the Enforcement Division (MC 224) in writing within five (5) working days, after becoming aware of or having reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant listed at 40 CFR Part 122, Appendix D, Tables II and III (excluding Total Phenols) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i. One hundred micrograms per liter (100 μg/L);

ii. Two hundred micrograms per liter (200 μg/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 μg/L) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;

iii. Five (5) times the maximum concentration value reported for that pollutant in the permit application; or

iv. The level established by the TCEQ.

b. That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

i. Five hundred micrograms per liter (500 μg/L);

ii. One milligram per liter (1 mg/L) for antimony;

iii. Ten (10) times the maximum concentration value reported for that pollutant in the permit application; or

iv. The level established by the TCEQ.

10. Signatories to Reports

All reports and other information requested by the Executive Director shall be signed by the person and in the manner required by 30 TAC § 305.128 (relating to Signatories to Reports).

11. All Publicly Owned Treatment Works (POTWs) must provide adequate notice to the Executive Director of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to CWA § 301 or § 306 if it were directly discharging those pollutants;

b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit; and

c. For the purpose of this paragraph, adequate notice shall include information on:

i. The quality and quantity of effluent introduced into the POTW; and

ii. Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

PERMIT CONDITIONS

1. General

a. When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in an application or in any report to the Executive Director, it shall promptly submit such facts or information.

b. This permit is granted on the basis of the information supplied and representations made by the permittee during action on an application, and relying upon the accuracy and completeness of that information and those representations. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked, in whole or in part, in accordance with 30 TAC Chapter 305, Subchapter D, during its term for good cause including, but not limited to, the following: Violation of any terms or conditions of this permit;

   i. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

   ii. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

c. The permittee shall furnish to the Executive Director, upon request and within a reasonable time, any information to determine whether cause exists for amending, revoking, suspending or terminating the permit. The permittee shall also furnish to the Executive Director, upon request, copies of records required to be kept by the permit.

2. Compliance

a. Acceptance of the permit by the person to whom it is issued constitutes acknowledgment and agreement that such person will comply with all the terms and conditions embodied in the permit, and the rules and other orders of the Commission.

b. The permittee has a duty to comply with all conditions of the permit. Failure to comply with any permit condition constitutes a violation of the permit and the Texas Water Code or the Texas Health and Safety Code, and is grounds for enforcement action, for permit amendment, revocation, or suspension, or for denial of a permit renewal application or an application for a permit for another facility.

c. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.

d. The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal or other permit violation that has a reasonable likelihood of adversely affecting human health or the environment.

e. Authorization from the Commission is required before beginning any change in the permitted facility or activity that may result in noncompliance with any permit requirements.

f. A permit may be amended, suspended and reissued, or revoked for cause in accordance with 30 TAC §§ 305.62 and 305.66 and TWC§ 7.302. The filing of a request by the permittee for a permit amendment, suspension and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

g. There shall be no unauthorized discharge of wastewater or any other waste. For the purpose of this permit, an unauthorized discharge is considered to be any discharge of wastewater into or adjacent to water in the state at any location not permitted as an outfall or otherwise defined in the Other Requirements section of this permit.

h. In accordance with 30 TAC § 305.535(a), the permittee may allow any bypass to occur from a TPDES permitted facility which does not cause permitted effluent limitations to be exceeded or an unauthorized discharge to occur, but only if the bypass is also for essential maintenance to assure efficient operation.

i. The permittee is subject to administrative, civil, and criminal penalties, as applicable, under TWC §§ 7.051 - 7.075 (relating to Administrative Penalties), 7.101 - 7.111 (relating to Civil Penalties), and 7.141 - 7.202 (relating to Criminal Offenses and Penalties) for violations including, but not limited to, negligently or knowingly violating the federal CWA §§ 301, 302, 306, 307, 308, 318, or 405, or any condition or limitation implementing any sections in a permit issued under the CWA § 402, or any requirement imposed in a pretreatment program approved under the CWA §§ 402 (a)(3) or 402 (b)(8).

3. Inspections and Entry

a. Inspection and entry shall be allowed as prescribed in the TWC Chapters 26, 27, and 28, and THSC § 361.

b. The members of the Commission and employees and agents of the Commission are entitled to enter any public or private property at any reasonable time for the purpose of inspecting and investigating conditions relating to the quality of water in the state or the compliance with any rule, regulation, permit or other order of the Commission. Members, employees, or agents of the Commission and Commission contractors are entitled to enter public or private property at any reasonable time to investigate or monitor or, if the responsible party is not responsive or there is an immediate danger to public health or the environment, to remove or remediate a condition related to the quality of water in the state. Members, employees, Commission contractors, or agents acting under this authority who enter private property shall observe the establishment's rules and regulations concerning safety, internal security, and fire protection, and if the property has management in residence, shall notify management or the person then in charge of his presence and shall exhibit proper credentials. If any member, employee, Commission contractor, or agent is refused the right to enter in or on public or private property under this authority, the Executive Director may invoke the remedies authorized in TWC § 7.002. The statement above, that Commission entry shall occur in accordance with an establishment's rules and regulations concerning safety, internal security, and fire protection, is not grounds for denial or restriction of entry to any part of the facility, but merely describes the Commission's duty to observe appropriate rules and regulations during an inspection.

4. Permit Amendment and/or Renewal

a. The permittee shall give notice to the Executive Director as soon as possible of any planned physical alterations or additions to the permitted facility if such alterations or additions would require a permit amendment or result in a violation of permit requirements. Notice shall also be required under this paragraph when:

i. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in accordance with 30 TAC § 305.534 (relating to New Sources and New Dischargers); or

ii. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in the permit, nor to notification requirements in Monitoring and Reporting Requirements No. 9;

iii. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

b. Prior to any facility modifications, additions, or expansions that will increase the plant capacity beyond the permitted flow, the permittee must apply for and obtain proper authorization from the Commission before commencing construction.

c. The permittee must apply for an amendment or renewal at least 180 days prior to expiration of the existing permit in order to continue a permitted activity after the expiration date of the permit. If an application is submitted prior to the expiration date of the permit, the existing permit shall remain in effect until the application is approved, denied, or returned. If the application is returned or denied, authorization to continue such activity shall terminate upon the effective date of the action. If an application is not submitted prior to the expiration date of the permit, the permit shall expire and authorization to continue such activity shall terminate.

d. Prior to accepting or generating wastes which are not described in the permit application or which would result in a significant change in the quantity or quality of the existing discharge, the permittee must report the proposed changes to the Commission. The permittee must apply for a permit amendment reflecting any necessary changes in permit conditions, including effluent limitations for pollutants not identified and limited by this permit.

e. In accordance with the TWC § 26.029(b), after a public hearing, notice of which shall be given to the permittee, the Commission may require the permittee, from time to time, for good cause, in accordance with applicable laws, to conform to new or additional conditions.

f. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under CWA § 307(a) for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition. The permittee shall comply with effluent standards or prohibitions established under CWA § 307(a) for toxic pollutants within the time provided in the regulations that established those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

5. Permit Transfer

a. Prior to any transfer of this permit, Commission approval must be obtained. The Commission shall be notified in writing of any change in control or ownership of facilities authorized by this permit. Such notification should be sent to the Applications Review and Processing Team (MC 148) of the Water Quality Division.

b. A permit may be transferred only according to the provisions of 30 TAC § 305.64 (relating to Transfer of Permits) and 30 TAC § 50.133 (relating to Executive Director Action on Application or WQMP update).

6. Relationship to Hazardous Waste Activities

This permit does not authorize any activity of hazardous waste storage, processing, or disposal that requires a permit or other authorization pursuant to the Texas Health and Safety Code.

7. Relationship to Water Rights

Disposal of treated effluent by any means other than discharge directly to water in the state must be specifically authorized in this permit and may require a permit pursuant to TWC Chapter 11.

8. Property Rights

A permit does not convey any property rights of any sort, or any exclusive privilege.

9. Permit Enforceability

The conditions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

10. Relationship to Permit Application

The application pursuant to which the permit has been issued is incorporated herein; provided, however, that in the event of a conflict between the provisions of this permit and the application, the provisions of the permit shall control.

11. Notice of Bankruptcy.

a. Each permittee shall notify the Executive Director, in writing, immediately following the filing of a voluntary or involuntary petition for bankruptcy under any chapter of Title 11 (Bankruptcy) of the United States Code (11 USC) by or against:

i. the permittee;

ii. an entity (as that term is defined in 11 USC, § 101(14)) controlling the permittee or listing the permit or permittee as property of the estate; or

iii. an affiliate (as that term is defined in 11 USC, § 101(2)) of the permittee.

b. This notification must indicate:

i. the name of the permittee and the permit number(s);

ii. the bankruptcy court in which the petition for bankruptcy was filed; and

iii. the date of filing of the petition.

OPERATIONAL REQUIREMENTS

1. The permittee shall at all times ensure that the facility and all of its systems of collection, treatment, and disposal are properly operated and maintained. This includes, but is not limited to, the regular, periodic examination of wastewater solids within the treatment plant by the operator in order to maintain an appropriate quantity and quality of solids inventory as described in the various operator training manuals and according to accepted industry standards for process control. Process control, maintenance, and operations records shall be retained at the facility site, or shall be readily available for review by a TCEQ representative, for a period of three years.

2. Upon request by the Executive Director, the permittee shall take appropriate samples and provide proper analysis in order to demonstrate compliance with Commission rules. Unless otherwise specified in this permit or otherwise ordered by the Commission, the permittee shall comply with all applicable provisions of 30 TAC Chapter 312 concerning sewage sludge use and disposal and 30 TAC §§ 319.21 - 319.29 concerning the discharge of certain hazardous metals.

3. Domestic wastewater treatment facilities shall comply with the following provisions:

   a. The permittee shall notify the Municipal Permits Team, Wastewater Permitting Section (MC 148) of the Water Quality Division, in writing, of any facility expansion at least 90 days prior to conducting such activity.

   b. The permittee shall submit a closure plan for review and approval to the Municipal Permits Team, Wastewater Permitting Section (MC 148) of the Water Quality Division, for any closure activity at least 90 days prior to conducting such activity. Closure is the act of permanently taking a waste management unit or treatment facility out of service and includes the permanent removal from service of any pit, tank, pond, lagoon, surface impoundment and/or other treatment unit regulated by this permit.

4. The permittee is responsible for installing prior to plant start-up, and subsequently maintaining, adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failures by means of alternate power sources, standby generators, and/or retention of inadequately treated wastewater.

5. Unless otherwise specified, the permittee shall provide a readily accessible sampling point and, where applicable, an effluent flow measuring device or other acceptable means by which effluent flow may be determined.

6. The permittee shall remit an annual water quality fee to the Commission as required by 30 TAC Chapter 21. Failure to pay the fee may result in revocation of this permit under TWC § 7.302(b)(6).

7. Documentation

   For all written notifications to the Commission required of the permittee by this permit, the permittee shall keep and make available a copy of each such notification under the same conditions as self-monitoring data are required to be kept and made available. Except for information required for TPDES permit applications, effluent data, including effluent data in permits, draft permits and permit applications, and other information specified as not

confidential in 30 TAC §§ 1.5(d), any information submitted pursuant to this permit may be claimed as confidential by the submitter. Any such claim must be asserted in the manner prescribed in the application form or by stamping the words confidential business information on each page containing such information. If no claim is made at the time of submission, information may be made available to the public without further notice. If the Commission or Executive Director agrees with the designation of confidentiality, the TCEQ will not provide the information for public inspection unless required by the Texas Attorney General or a court pursuant to an open records request. If the Executive Director does not agree with the designation of confidentiality, the person submitting the information will be notified.

8. Facilities that generate domestic wastewater shall comply with the following provisions; domestic wastewater treatment facilities at permitted industrial sites are excluded.

   a. Whenever flow measurements for any domestic sewage treatment facility reach 75% of the permitted daily average or annual average flow for three consecutive months, the permittee must initiate engineering and financial planning for expansion and/or upgrading of the domestic wastewater treatment and/or collection facilities. Whenever the flow reaches 90% of the permitted daily average or annual average flow for three consecutive months, the permittee shall obtain necessary authorization from the Commission to commence construction of the necessary additional treatment and/or collection facilities. In the case of a domestic wastewater treatment facility which reaches 75% of the permitted daily average or annual average flow for three consecutive months, and the planned population to be served or the quantity of waste produced is not expected to exceed the design limitations of the treatment facility, the permittee shall submit an engineering report supporting this claim to the Executive Director of the Commission.

      If in the judgment of the Executive Director the population to be served will not cause permit noncompliance, then the requirement of this section may be waived. To be effective, any waiver must be in writing and signed by the Director of the Enforcement Division (MC 149) of the Commission, and such waiver of these requirements will be reviewed upon expiration of the existing permit; however, any such waiver shall not be interpreted as condoning or excusing any violation of any permit parameter.

   b. The plans and specifications for domestic sewage collection and treatment works associated with any domestic permit must be approved by the Commission and failure to secure approval before commencing construction of such works or making a discharge is a violation of this permit and each day is an additional violation until approval has been secured.

   c. Permits for domestic wastewater treatment plants are granted subject to the policy of the Commission to encourage the development of area-wide waste collection, treatment, and disposal systems. The Commission reserves the right to amend any domestic wastewater permit in accordance with applicable procedural requirements to require the system covered by this permit to be integrated into an area-wide system, should such be developed; to require the delivery of the wastes authorized to be collected in, treated by or discharged from said system, to such area-wide system; or to amend this permit in any other particular to effectuate the Commission's policy. Such amendments may be made when the changes required are advisable for water quality control purposes and are feasible on the basis of waste treatment technology, engineering, financial, and

related considerations existing at the time the changes are required, exclusive of the loss of investment in or revenues from any then existing or proposed waste collection, treatment or disposal system.

9. Domestic wastewater treatment plants shall be operated and maintained by sewage plant operators holding a valid certificate of competency at the required level as defined in 30 TAC Chapter 30.

10. For Publicly Owned Treatment Works (POTWs), the 30-day average (or monthly average) percent removal for BOD and TSS shall not be less than 85%, unless otherwise authorized by this permit.

11. Facilities that generate industrial solid waste as defined in 30 TAC § 335.1 shall comply with these provisions:

    a. Any solid waste, as defined in 30 TAC § 335.1 (including but not limited to such wastes as garbage, refuse, sludge from a waste treatment, water supply treatment plant or air pollution control facility, discarded materials, discarded materials to be recycled, whether the waste is solid, liquid, or semisolid), generated by the permittee during the management and treatment of wastewater, must be managed in accordance with all applicable provisions of 30 TAC Chapter 335, relating to Industrial Solid Waste Management.

    b. Industrial wastewater that is being collected, accumulated, stored, or processed before discharge through any final discharge outfall, specified by this permit, is considered to be industrial solid waste until the wastewater passes through the actual point source discharge and must be managed in accordance with all applicable provisions of 30 TAC Chapter 335.

    c. The permittee shall provide written notification, pursuant to the requirements of 30 TAC § 335.8(b)(1), to the Environmental Cleanup Section (MC 127) of the Remediation Division informing the Commission of any closure activity involving an Industrial Solid Waste Management Unit, at least 90 days prior to conducting such an activity.

    d. Construction of any industrial solid waste management unit requires the prior written notification of the proposed activity to the Registration and Reporting Section (MC 129) of the Registration, Review, and Reporting Division. No person shall dispose of industrial solid waste, including sludge or other solids from wastewater treatment processes, prior to fulfilling the deed recordation requirements of 30 TAC § 335.5.

    e. The term "industrial solid waste management unit" means a landfill, surface impoundment, waste-pile, industrial furnace, incinerator, cement kiln, injection well, container, drum, salt dome waste containment cavern, or any other structure vessel, appurtenance, or other improvement on land used to manage industrial solid waste.

    f. The permittee shall keep management records for all sludge (or other waste) removed from any wastewater treatment process. These records shall fulfill all applicable requirements of 30 TAC § 335 and must include the following, as it pertains to wastewater treatment and discharge:

        i. Volume of waste and date(s) generated from treatment process;
        ii. Volume of waste disposed of on-site or shipped off-site;

iii. Date(s) of disposal;
iv. Identity of hauler or transporter;
v. Location of disposal site; and
vi. Method of final disposal.

The above records shall be maintained on a monthly basis. The records shall be retained at the facility site, or shall be readily available for review by authorized representatives of the TCEQ for at least five years.

12. For industrial facilities to which the requirements of 30 TAC § 335 do not apply, sludge and solid wastes, including tank cleaning and contaminated solids for disposal, shall be disposed of in accordance with THSC § 361.

TCEQ Revision 08/2008

SLUDGE PROVISIONS

The permittee is authorized to dispose of sludge only at a Texas Commission on Environmental Quality (TCEQ) authorized land application site or co-disposal landfill. **The disposal of sludge by land application on property owned, leased or under the direct control of the permittee is a violation of the permit unless the site is authorized with the TCEQ. This provision does not authorize Distribution and Marketing of sludge. This provision does not authorize land application of Class A Sludge. This provision does not authorize the permittee to land apply sludge on property owned, leased or under the direct control of the permittee.**

SECTION I. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE LAND APPLICATION

A. General Requirements

1. The permittee shall handle and dispose of sewage sludge in accordance with 30 TAC § 312 and all other applicable state and federal regulations in a manner that protects public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants that may be present in the sludge.

2. In all cases, if the person (permit holder) who prepares the sewage sludge supplies the sewage sludge to another person for land application use or to the owner or lease holder of the land, the permit holder shall provide necessary information to the parties who receive the sludge to assure compliance with these regulations.

3. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permitting Section (MC 148) of the Water Quality Division of any change planned in the sewage sludge disposal practice.

B. Testing Requirements

1. Sewage sludge shall be tested annually in accordance with the method specified in both 40 CFR Part 261, Appendix II and 40 CFR Part 268, Appendix I Toxicity Characteristic Leaching Procedure (TCLP) or other method that receives the prior approval of the TCEQ for the contaminants listed in 40 CFR Part 261.24, Table 1. Sewage sludge failing this test shall be managed according to RCRA standards for generators of hazardous waste, and the waste's disposition must be in accordance with all applicable requirements for hazardous waste processing, storage, or disposal. Following failure of any TCLP test, the management or disposal of sewage sludge at a facility other than an authorized hazardous waste processing, storage, or disposal facility shall be prohibited until such time as the permittee can demonstrate the sewage sludge no longer exhibits the hazardous waste toxicity characteristics (as demonstrated by the results of the TCLP tests). A written report shall be provided to both the TCEQ Registration and Reporting Section (MC 129) of the Permitting and Remediation Support Division and the Regional Director (MC Region 12) within seven (7) days after failing the TCLP Test.

   The report shall contain test results, certification that unauthorized waste management has stopped and a summary of alternative disposal plans that comply with RCRA standards for the management of hazardous waste. The report shall be addressed to:

Director, Registration, Review, and Reporting Division (MC 129), Texas Commission on Environmental Quality, P.O. Box 13087, Austin, Texas 78711-3087. In addition, the permittee shall prepare an annual report on the results of all sludge toxicity testing. This annual report shall be submitted to the TCEQ Regional Office (MC Region 12) and the Water Quality Compliance Monitoring Team (MC 224) of the Enforcement Division by September 30 of each year.

2. Sewage sludge shall not be applied to the land if the concentration of the pollutants exceeds the pollutant concentration criteria in Table 1. The frequency of testing for pollutants in Table 1 is found in Section I.C.

TABLE 1

Pollutant	Ceiling Concentration (Milligrams per kilogram)*
Arsenic	75
Cadmium	85
Chromium	3000
Copper	4300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
PCBs	49
Selenium	100
Zinc	7500

* Dry weight basis

3. Pathogen Control

All sewage sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site shall be treated by one of the following methods to ensure that the sludge meets either the Class A or Class B pathogen requirements.

a. Six alternatives are available to demonstrate compliance with Class A sewage sludge. The first 4 options require either the density of fecal coliform in the sewage sludge be less than 1000 Most Probable Number (MPN) per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in the sewage sludge be less than three MPN per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed. Below are the additional requirements necessary to meet the definition of a Class A sludge.

Alternative 1 - The temperature of the sewage sludge that is used or disposed shall be maintained at or above a specific value for a period of time. See 30 TAC § 312.82(a)(2)(A) for specific information.

Alternative 2 - The pH of the sewage sludge that is used or disposed shall be raised to above 12 std. units and shall remain above 12 std. units for 72 hours.

The temperature of the sewage sludge shall be above 52° Celsius for 12 hours or longer during the period that the pH of the sewage sludge is above 12 std. units.

At the end of the 72-hour period during which the pH of the sewage sludge is above 12 std. units, the sewage sludge shall be air dried to achieve a percent solids in the sewage sludge greater than 50%.

Alternative 3 - The sewage sludge shall be analyzed for enteric viruses prior to pathogen treatment. The limit for enteric viruses is less than one Plaque-forming Unit per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 30 TAC § 312.82(a)(2)(C)(i-iii) for specific information. The sewage sludge shall be analyzed for viable helminth ova prior to pathogen treatment. The limit for viable helminth ova is less than one per four grams of total solids (dry weight basis) either before or following pathogen treatment. See 30 TAC § 312.82(a)(2)(C)(iv-vi) for specific information.

Alternative 4 - The density of enteric viruses in the sewage sludge shall be less than one Plaque-forming Unit per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed. The density of viable helminth ova in the sewage sludge shall be less than one per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed.

Alternative 5 (PFRP) - Sewage sludge that is used or disposed of shall be treated in one of the processes to Further Reduce Pathogens (PFRP) described in 40 CFR Part 503, Appendix B. PFRP include composting, heat drying, heat treatment, and thermophilic aerobic digestion.

Alternative 6 (PFRP Equivalent) - Sewage sludge that is used or disposed of shall be treated in a process that has been approved by the U.S. Environmental Protection Agency as being equivalent to those in Alternative 5.

b. Three alternatives are available to demonstrate compliance with Class B criteria for sewage sludge.

Alternative 1

i. A minimum of seven random samples of the sewage sludge shall be collected within 48 hours of the time the sewage sludge is used or disposed of during each monitoring episode for the sewage sludge.

ii. The geometric mean of the density of fecal coliform in the samples collected shall be less than either 2,000,000 MPN per gram of total solids (dry weight basis) or 2,000,000 Colony Forming Units per gram of total solids (dry weight basis).

Alternative 2 - Sewage sludge that is used or disposed of shall be treated in one of the Processes to Significantly Reduce Pathogens (PSRP) described in 40 CFR Part 503, Appendix B, so long as all of the following requirements are met by the generator of the sewage sludge.

i. Prior to use or disposal, all the sewage sludge must have been generated from a single location, except as provided in paragraph v. below;

ii. An independent Texas Licensed Professional Engineer must make a certification to the generator of a sewage sludge that the wastewater treatment facility generating the sewage sludge is designed to achieve one of the PSRP at the permitted design loading of the facility. The certification need only be repeated if the design loading of the facility is increased. The certification shall include a statement indicating the design meets all the applicable standards specified in Appendix B of 40 CFR Part 503;

iii. Prior to any off-site transportation or on-site use or disposal of any sewage sludge generated at a wastewater treatment facility, the chief certified operator of the wastewater treatment facility or other responsible official who manages the processes to significantly reduce pathogens at the wastewater treatment facility for the permittee, shall certify that the sewage sludge underwent at least the minimum operational requirements necessary in order to meet one of the PSRP. The acceptable processes and the minimum operational and record keeping requirements shall be in accordance with established U.S. Environmental Protection Agency final guidance;

iv. All certification records and operational records describing how the requirements of this paragraph were met shall be kept by the generator for a minimum of three years and be available for inspection by commission staff for review; and

v. If the sewage sludge is generated from a mixture of sources, resulting from a person who prepares sewage sludge from more than one wastewater treatment facility, the resulting derived product shall meet one of the PSRP, and shall meet the certification, operation, and record keeping requirements of this paragraph.

Alternative 3 - Sewage sludge shall be treated in an equivalent process that has been approved by the U.S. Environmental Protection Agency, so long as all of the following requirements are met by the generator of the sewage sludge.

i. Prior to use or disposal, all the sewage sludge must have been generated from a single location, except as provided in paragraph v. below;

ii. Prior to any off-site transportation or on-site use or disposal of any sewage sludge generated at a wastewater treatment facility, the chief certified operator of the wastewater treatment facility or other responsible official who manages the processes to significantly reduce pathogens at the wastewater treatment facility for the permittee, shall certify that the sewage sludge underwent at least the minimum operational requirements necessary in order to meet one of the PSRP. The acceptable processes and the minimum operational and record keeping requirements shall be in accordance with established U.S. Environmental Protection Agency final guidance;

iii. All certification records and operational records describing how the requirements of this paragraph were met shall be kept by the generator for a minimum of three years and be available for inspection by commission staff for review;

iv. The Executive Director will accept from the U.S. Environmental Protection Agency a finding of equivalency to the defined PSRP; and

v. If the sewage sludge is generated from a mixture of sources resulting from a person who prepares sewage sludge from more than one wastewater treatment facility, the resulting derived product shall meet one of the Processes to Significantly Reduce Pathogens, and shall meet the certification, operation, and record keeping requirements of this paragraph.

In addition, the following site restrictions must be met if Class B sludge is land applied:

i. Food crops with harvested parts that touch the sewage sludge/soil mixture and are totally above the land surface shall not be harvested for 14 months after application of sewage sludge.

ii. Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of sewage sludge when the sewage sludge remains on the land surface for 4 months or longer prior to incorporation into the soil.

iii. Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of sewage sludge when the sewage sludge remains on the land surface for less than 4 months prior to incorporation into the soil.

iv. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of sewage sludge.

v. Animals shall not be allowed to graze on the land for 30 days after application of sewage sludge.

vi. Turf grown on land where sewage sludge is applied shall not be harvested for 1 year after application of the sewage sludge when the harvested turf is placed on either land with a high potential for public exposure or a lawn.

vii. Public access to land with a high potential for public exposure shall be restricted for 1 year after application of sewage sludge.

viii. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of sewage sludge.

ix. Land application of sludge shall be in accordance with the buffer zone requirements found in 30 TAC § 312.44.

4. Vector Attraction Reduction Requirements

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, or a reclamation site shall be treated by one of the following Alternatives 1 through 10 for vector attraction reduction.

Alternative 1 - The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38%.

Alternative 2 - If Alternative 1 cannot be met for an anaerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30° and 37° Celsius. Volatile solids must be reduced by less than 17% to demonstrate compliance.

Alternative 3 - If Alternative 1 cannot be met for an aerobically digested sludge, demonstration can be made by digesting a portion of the previously digested sludge with percent solids of two percent or less aerobically in the laboratory in a bench-scale unit for 30 additional days at 20° Celsius. Volatile solids must be reduced by less than 15% to demonstrate compliance.

Alternative 4 - The specific oxygen uptake rate (SOUR) for sewage sludge treated in an aerobic process shall be equal to or less than 1.5 milligrams of oxygen per hour per gram of total solids (dry weight basis) at a temperature of 20° Celsius.

Alternative 5 - Sewage sludge shall be treated in an aerobic process for 14 days or longer. During that time, the temperature of the sewage sludge shall be higher than 40° Celsius and the average temperature of the sewage sludge shall be higher than 45° Celsius.

Alternative 6 - The pH of sewage sludge shall be raised to 12 or higher by alkali addition and, without the addition of more alkali shall remain at 12 or higher for two hours and then remain at a pH of 11.5 or higher for an additional 22 hours at the time the sewage sludge is prepared for sale or given away in a bag or other container.

Alternative 7 - The percent solids of sewage sludge that does not contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 75% based on the moisture content and total solids prior to mixing with other materials. Unstabilized solids are defined as organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Alternative 8 - The percent solids of sewage sludge that contains unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 90% based on the moisture content and total solids prior to mixing with other materials at the time the sludge is used. Unstabilized solids are defined as organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Alternative 9 -

i. Sewage sludge shall be injected below the surface of the land.

ii. No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected.

iii. When sewage sludge that is injected below the surface of the land

is Class A with respect to pathogens, the sewage sludge shall be injected below the land surface within eight hours after being discharged from the pathogen treatment process.

Alternative 10- i. Sewage sludge applied to the land surface or placed on a surface disposal site shall be incorporated into the soil within six hours after application to or placement on the land.

ii. When sewage sludge that is incorporated into the soil is Class A with respect to pathogens, the sewage sludge shall be applied to or placed on the land within eight hours after being discharged from the pathogen treatment process.

C. Monitoring Requirements

Toxicity Characteristic Leaching Procedure (TCLP) Test	- annually
PCBs	- annually

All metal constituents and fecal coliform or Salmonella sp. bacteria shall be monitored at the appropriate frequency shown below, pursuant to 30 TAC § 312.46(a)(1):

Amount of sewage sludge (*) metric tons per 365-day period	Monitoring Frequency
0 to less than 290	Once/Year
290 to less than 1,500	Once/Quarter
1,500 to less than 15,000	Once/Two Months
15,000 or greater	Once/Month

(*) *The amount of bulk sewage sludge applied to the land (dry weight basis).*

Representative samples of sewage sludge shall be collected and analyzed in accordance with the methods referenced in 30 TAC § 312.7

SECTION II. REQUIREMENTS SPECIFIC TO BULK SEWAGE SLUDGE FOR APPLICATION TO THE LAND MEETING CLASS A or B PATHOGEN REDUCTION AND THE CUMULATIVE LOADING RATES IN TABLE 2, OR CLASS B PATHOGEN REDUCTION AND THE POLLUTANT CONCENTRATIONS IN TABLE 3

For those permittees meeting Class A or B pathogen reduction requirements and that meet the cumulative loading rates in Table 2 below, or the Class B pathogen reduction requirements and contain concentrations of pollutants below listed in Table 3, the following conditions apply:

A. Pollutant Limits

Table 2

Pollutant	Cumulative Pollutant Loading Rate (pounds per acre)*
Arsenic	36
Cadmium	35
Chromium	2677
Copper	1339
Lead	268
Mercury	15
Molybdenum	Report Only
Nickel	375
Selenium	89
Zinc	2500

Table 3

Pollutant	Monthly Average Concentration (milligrams per kilogram)*
Arsenic	41
Cadmium	39
Chromium	1200
Copper	1500
Lead	300
Mercury	17
Molybdenum	Report Only
Nickel	420
Selenium	36
Zinc	2800

*Dry weight basis

B. Pathogen Control

All bulk sewage sludge that is applied to agricultural land, forest, a public contact site, a reclamation site, shall be treated by either Class A or Class B pathogen reduction requirements as defined above in Section I.B.3.

Management Practices

1. Bulk sewage sludge shall not be applied to agricultural land, forest, a public contact site, or a reclamation site that is flooded, frozen, or snow-covered so that the bulk sewage sludge enters a wetland or other waters in the State.

2. Bulk sewage sludge not meeting Class A requirements shall be land applied in a manner which complies with the Management Requirements in accordance with 30 TAC § 312.44.

3. Bulk sewage sludge shall be applied at or below the agronomic rate of the cover crop.

4. An information sheet shall be provided to the person who receives bulk sewage sludge sold or given away. The information sheet shall contain the following information:

   a. The name and address of the person who prepared the sewage sludge that is sold or given away in a bag or other container for application to the land.

   b. A statement that application of the sewage sludge to the land is prohibited except in accordance with the instruction on the label or information sheet.

   c. The annual whole sludge application rate for the sewage sludge application rate for the sewage sludge that does not cause any of the cumulative pollutant loading rates in Table 2 above to be exceeded, unless the pollutant concentrations in Table 3 found in Section II above are met.

D. Notification Requirements

1. If bulk sewage sludge is applied to land in a State other than Texas, written notice shall be provided prior to the initial land application to the permitting authority for the State in which the bulk sewage sludge is proposed to be applied. The notice shall include:

   a. The location, by street address, and specific latitude and longitude, of each land application site.

   b. The approximate time period bulk sewage sludge will be applied to the site.

   c. The name, address, telephone number, and National Pollutant Discharge Elimination System permit number (if appropriate) for the person who will apply the bulk sewage sludge.

2. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permitting Section (MC 148) of the Water Quality Division of any change planned in the sewage sludge disposal practice.

E. Record keeping Requirements

The sludge documents will be retained at the facility site and/or shall be readily available for review by a TCEQ representative. The person who prepares bulk sewage sludge or a sewage sludge material shall develop the following information and shall retain the information at the facility site and/or shall be readily available for review by a TCEQ representative for a

period of five years. If the permittee supplies the sludge to another person who land applies the sludge, the permittee shall notify the land applier of the requirements for record keeping found in 30 TAC § 312.47 for persons who land apply.

1. The concentration (mg/kg) in the sludge of each pollutant listed in Table 3 above and the applicable pollutant concentration criteria (mg/kg), or the applicable cumulative pollutant loading rate and the applicable cumulative pollutant loading rate limit (lbs/ac) listed in Table 2 above.

2. A description of how the pathogen reduction requirements are met (including site restrictions for Class B sludge, if applicable).

3. A description of how the vector attraction reduction requirements are met.

4. A description of how the management practices listed above in Section II.C are being met.

5. The following certification statement:

   "I certify, under penalty of law, that the applicable pathogen requirements in 30 TAC § 312.82(a) or (b) and the vector attraction reduction requirements in 30 TAC § 312.83(b) have been met for each site on which bulk sewage sludge is applied. This determination has been made under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate the information used to determine that the management practices have been met. I am aware that there are significant penalties for false certification including fine and imprisonment."

6. The recommended agronomic loading rate from the references listed in Section II.C.3. above, as well as the actual agronomic loading rate shall be retained. The person who applies bulk sewage sludge or a sewage sludge material shall develop the following information and shall retain the information at the facility site and/or shall be readily available for review by a TCEQ representative indefinitely. If the permittee supplies the sludge to another person who land applies the sludge, the permittee shall notify the land applier of the requirements for record keeping found in 30 TAC § 312.47 for persons who land apply:

   a. A certification statement that all applicable requirements (specifically listed) have been met, and that the permittee understands that there are significant penalties for false certification including fine and imprisonment. See 30 TAC § 312.47(a)(4)(A)(ii) or 30 TAC § 312.47(a)(5)(A)(ii), as applicable, and to the permittee's specific sludge treatment activities.

   b. The location, by street address, and specific latitude and longitude, of each site on which sludge is applied.

   c. The number of acres in each site on which bulk sludge is applied.

   d. The date and time sludge is applied to each site.

   e. The cumulative amount of each pollutant in pounds/acre listed in Table 2 applied to each site.

   f. The total amount of sludge applied to each site in dry tons.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

F. Reporting Requirements

The permittee shall report annually to the TCEQ Regional Office (MC Region 12) and Water Quality Compliance Monitoring Team (MC 224) of the Enforcement Division, by September 30 of each year the following information:

1. Results of tests performed for pollutants found in either Table 2 or 3 as appropriate for the permittee's land application practices.
2. The frequency of monitoring listed in Section I.C. that applies to the permittee.
3. Toxicity Characteristic Leaching Procedure (TCLP) results.
4. Identity of hauler(s) and TCEQ transporter number.
5. PCB concentration in sludge in mg/kg.
6. Date(s) of disposal.
7. Owner of disposal site(s).
8. Texas Commission on Environmental Quality registration number, if applicable.
9. Amount of sludge disposal dry weight (lbs/acre) at each disposal site.
10. The concentration (mg/kg) in the sludge of each pollutant listed in Table 1 (defined as a monthly average) as well as the applicable pollutant concentration criteria (mg/kg) listed in Table 3 above, or the applicable pollutant loading rate limit (lbs/acre) listed in Table 2 above if it exceeds 90% of the limit.
11. Level of pathogen reduction achieved (Class A or Class B).
12. Alternative used as listed in Section I.B.3.(a. or b.). Alternatives describe how the pathogen reduction requirements are met. If Class B sludge, include information on how site restrictions were met.
13. Vector attraction reduction alternative used as listed in Section I.B.4.
14. Annual sludge production in dry tons/year.
15. Amount of sludge land applied in dry tons/year.
16. The certification statement listed in either 30 TAC § 312.47(a)(4)(A)(ii) or 30 TAC § 312.47(a)(5)(A)(ii) as applicable to the permittee's sludge treatment activities, shall be attached to the annual reporting form.
17. When the amount of any pollutant applied to the land exceeds 90% of the cumulative pollutant loading rate for that pollutant, as described in Table 2, the permittee shall report the following information as an attachment to the annual reporting form.

a. The location, by street address, and specific latitude and longitude.

b. The number of acres in each site on which bulk sewage sludge is applied.

c. The date and time bulk sewage sludge is applied to each site.

d. The cumulative amount of each pollutant (i.e., pounds/acre) listed in Table 2 in the bulk sewage sludge applied to each site.

e. The amount of sewage sludge (i.e., dry tons) applied to each site.

The above records shall be maintained on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

SECTION III. REQUIREMENTS APPLYING TO ALL SEWAGE SLUDGE DISPOSED IN A MUNICIPAL SOLID WASTE LANDFILL

A. The permittee shall handle and dispose of sewage sludge in accordance with 30 TAC § 330 and all other applicable state and federal regulations to protect public health and the environment from any reasonably anticipated adverse effects due to any toxic pollutants that may be present. The permittee shall ensure that the sewage sludge meets the requirements in 30 TAC § 330 concerning the quality of the sludge disposed in a municipal solid waste landfill.

B. If the permittee generates sewage sludge and supplies that sewage sludge to the owner or operator of a municipal solid waste landfill (MSWLF) for disposal, the permittee shall provide to the owner or operator of the MSWLF appropriate information needed to be in compliance with the provisions of this permit.

C. The permittee shall give 180 days prior notice to the Executive Director in care of the Wastewater Permitting Section (MC 148) of the Water Quality Division of any change planned in the sewage sludge disposal practice.

D. Sewage sludge shall be tested annually in accordance with the method specified in both 40 CFR Part 261, Appendix II and 40 CFR Part 268, Appendix I (Toxicity Characteristic Leaching Procedure) or other method, which receives the prior approval of the TCEQ for contaminants listed in Table 1 of 40 CFR § 261.24. Sewage sludge failing this test shall be managed according to RCRA standards for generators of hazardous waste, and the waste's disposition must be in accordance with all applicable requirements for hazardous waste processing, storage, or disposal.

   Following failure of any TCLP test, the management or disposal of sewage sludge at a facility other than an authorized hazardous waste processing, storage, or disposal facility shall be prohibited until such time as the permittee can demonstrate the sewage sludge no longer exhibits the hazardous waste toxicity characteristics (as demonstrated by the results of the TCLP tests). A written report shall be provided to both the TCEQ Registration and Reporting Section (MC 129) of the Permitting and Remediation Support Division and the Regional Director (MC Region 12) of the appropriate TCEQ field office within 7 days after failing the TCLP Test.

   The report shall contain test results, certification that unauthorized waste management has stopped and a summary of alternative disposal plans that comply with RCRA standards for the management of hazardous waste. The report shall be addressed to: Director, Registration, Review, and Reporting Division (MC 129), Texas Commission on Environmental Quality, P. O. Box 13087, Austin, Texas 78711-3087. In addition, the permittee shall prepare an annual report on the results of all sludge toxicity testing. This annual report shall be submitted to the TCEQ Regional Office (MC Region 12) and the Water Quality Compliance Monitoring Team (MC 224) of the Enforcement Division by September 30 of each year.

E. Sewage sludge shall be tested as needed, in accordance with the requirements of 30 TAC Chapter 330.

F. Record keeping Requirements

   The permittee shall develop the following information and shall retain the information for five years.

1. The description (including procedures followed and the results) of all liquid Paint Filter Tests performed.

2. The description (including procedures followed and results) of all TCLP tests performed.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

G. Reporting Requirements

The permittee shall report annually to the TCEQ Regional Office (MC Region 12) and Water Quality Compliance Monitoring Team (MC 224) of the Enforcement Division by September 30 of each year the following information:

1. Toxicity Characteristic Leaching Procedure (TCLP) results.

2. Annual sludge production in dry tons/year.

3. Amount of sludge disposed in a municipal solid waste landfill in dry tons/year.

4. Amount of sludge transported interstate in dry tons/year.

5. A certification that the sewage sludge meets the requirements of 30 TAC § 330 concerning the quality of the sludge disposed in a municipal solid waste landfill.

6. Identity of hauler(s) and transporter registration number.

7. Owner of disposal site(s).

8. Location of disposal site(s).

9. Date(s) of disposal.

The above records shall be maintained on-site on a monthly basis and shall be made available to the Texas Commission on Environmental Quality upon request.

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 facility is not located in the Coastal Management Program boundary.

3. Chronic toxic criteria apply at the edge of the mixing zone. The mixing zone is defined as 300 feet downstream and 100 feet upstream from the point of discharge.

4. 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. 0803 of the Trinity River Basin and any subsequent updating of the water quality model for Segment No. 0803, 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.

5. 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.

New 6. 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 will be given a less frequent measurement schedule. For this permit, 1/week will 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.

CONTRIBUTING INDUSTRIES AND PRETREATMENT REQUIREMENTS

1. The permittee shall operate an industrial pretreatment program in accordance with Sections 402(b)(8) and (b)(9) of the Clean Water Act, the General Pretreatment Regulations (40 CFR Part 403) and the approved City of Huntsville POTW pretreatment program submitted by the permittee. The pretreatment program was approved on **September 30, 1982,** modified on **July 21, 1995,** and modified on **June 17, 2011.**

   The legal authority and the POTW's pretreatment program are not in compliance with the current 40 CFR Part 403 regulations *[rev. Federal Register/ Vol. 70/ No. 198/ Friday, October 14, 2005/ Rules and Regulations, pages 60134-60798]* and the 30 TAC Chapter 315, as amended. In order to ensure that the permittee has a program to assure compliance with such pretreatment standards and requirements, the permittee shall submit a modification to their pretreatment program containing all required [*i.e.* more stringent] Streamlining Rule provisions on or before **June 17, 2012** (as required by TPDES Permit No. WQ0010781002 issued on June 17, 2011).

   The POTW pretreatment program is hereby incorporated by reference and shall be implemented in a manner consistent with the following requirements:

   a. Industrial user (IU) information shall be kept current according to 40 CFR §§403.8(f)(2)(i) and (ii) and updated at a frequency set forth in the approved pretreatment program to reflect accurate characterization of all IUs;

   b. The frequency and nature of IU compliance monitoring activities by the permittee shall be consistent with the approved POTW pretreatment program and commensurate with the character, consistency, and volume of waste. The permittee is required to inspect and sample the effluent from each significant industrial user (SIU) at least once per year, except as specified in 40 CFR §403.8 (f)(2)(v). This is in addition to any industrial self-monitoring activities;

   c. The permittee shall enforce and obtain remedies for IU noncompliance with applicable pretreatment standards and requirements and the approved POTW pretreatment program;

   d. The permittee shall control through permit, order, or similar means, the contribution to the POTW by each IU to ensure compliance with applicable pretreatment standards and requirements and the approved POTW pretreatment program. In the case of SIUs (identified as significant under 40 CFR §403.3 (v)), this control shall be achieved through individual or general control mechanisms, in accordance with 40 CFR §403.8(f)(1)(iii).

      Both individual and general control mechanisms must be enforceable and contain, at a minimum, the following conditions:
      (1) Statement of duration (in no case more than five years);
      (2) Statement of non-transferability without, at a minimum, prior notification to the POTW and provision of a copy of the existing control mechanism to the new owner or operator;
      (3) Effluent limits, which may include enforceable best management practices (BMPs), based on applicable general pretreatment standards, categorical pretreatment standards, local limits, and State and local law;

(4) Self-monitoring, sampling, reporting, notification and record keeping requirements, identification of the pollutants to be monitored (including, if applicable, the process for seeking a waiver for a pollutant neither present nor expected to be present in the IU's discharge in accordance with 40 CFR §403.12(e)(2), or a specific waived pollutant in the case of an individual control mechanism), sampling location, sampling frequency, and sample type, based on the applicable general pretreatment standards in 40 CFR Part 403, categorical pretreatment standards, local limits, and State and local law;

(5) Statement of applicable civil and criminal penalties for violation of pretreatment standards and requirements, and any applicable compliance schedule. Such schedules may not extend the compliance date beyond federal deadlines; and;

New (6) Requirements to control slug discharges, if determined by the POTW to be necessary.

New e. In order to implement 40 CFR §403.8(f)(1)(iii)(A)(2), a monitoring waiver for a pollutant neither present nor expected to be present in the IU's discharge is not effective in the general control mechanism until after the POTW has provided written notice to the SIU that such a waiver request has been granted in accordance with 40 CFR §403.12(e)(2).

f. The permittee shall evaluate whether each SIU needs a plan or other action to control slug discharges, in accordance with 40 CFR §403.8(f)(2)(vi). If the POTW decides that a slug control plan is needed, the plan shall contain at least the minimum elements required in 40 CFR §403.8(f)(2)(vi);

g. The permittee shall provide adequate staff, equipment, and support capabilities to carry out all elements of the pretreatment program; and,

h. The approved program shall not be modified by the permittee without the prior approval of the Executive Director care of the Storm Water & Pretreatment Team (MC148) of the Water Quality Division, according to 40 CFR §403.18.

2. The permittee is under a continuing duty to: establish and enforce specific local limits to implement the provisions of 40 CFR §403.5, develop and enforce local limits as necessary, and modify the approved pretreatment program as necessary to comply with federal, state and local law, as amended. The permittee may develop BMPs to implement paragraphs 40 CFR §§403.5(c)(1) and (c)(2). Such BMPs shall be considered local limits and pretreatment standards.

The permittee is required to effectively enforce such limits and to modify their pretreatment program, including the Legal Authority, Enforcement Response Plan and/or Standard Operating Procedures, if required by the Executive Director to reflect changing conditions at the POTW. Substantial modifications will be approved in accordance with 40 CFR §403.18, and modifications will become effective upon approval by the Executive Director in accordance with 40 CFR §403.18.

Upon approval by the Executive Director of the substantial modification to this approved POTW pretreatment program, the requirement to develop and enforce specific prohibitions and/or limits to implement the prohibitions and limits set forth in 40 CFR

§§403.5 (a)(1), (b), (c)(1) and (3), and (d) is a condition of this permit. The specific prohibitions set out in 40 CFR §403.5(b) shall be enforced by the permittee unless modified under this provision.

3. The permittee shall prepare annually a list of IUs which during the preceding twelve (12) months were in significant noncompliance (SNC) with applicable pretreatment requirements. For the purposes of this section of the permit, "CONTRIBUTING INDUSTRIES AND PRETREATMENT REQUIREMENTS", SNC shall be determined based upon the more stringent of either criteria established at 40 CFR §403.8(f)(2)(viii) *[rev. 10/14/05]* or criteria established in the approved POTW pretreatment program. This list is to be published annually during the month of **August** in a newspaper of general circulation that provides meaningful public notice within the jurisdiction(s) served by the POTW.

In addition, each **August** the permittee shall submit an updated pretreatment program annual status report, in accordance with 40 CFR §403.12(i), to the TCEQ Storm Water & Pretreatment Team (MC148) of the Water Quality Division. The report shall contain the following information as well as the information on the attached tables in this section. The report summary shall be submitted on the Pretreatment Performance Summary (PPS) form [TCEQ-20218].

a. An updated list of all regulated IUs as indicated in this section. For each listed IU, the following information shall be included:
   (1) Standard Industrial Classification (SIC) or North American Industry Classification System (NAICS) code and categorical determination;
   (2) If the pretreatment program has been modified and approved to incorporate reduced monitoring for any of the categorical IUs as provided by 40 CFR Part 403 *[rev. 10/14/05]*, then the list must also identify:
      * categorical IUs subject to the conditions for reduced monitoring and reporting requirements under 40 CFR §§ 403.12(e)(1) and (3);
      * those IUs that are non-significant categorical industrial users (NSCIUs) under 40 CFR §403.3(v)(2); and
      * those IUs that are middle tier categorical industrial users (MTCIUs) under 40 CFR §403.12(e)(3).
   (3) Control mechanism status.
      * Indicate whether the IU has an effective individual or general control mechanism, and the date such document was last issued, reissued, or modified;
      * Indicate which IUs were added to the system, or newly identified, during the pretreatment year reporting period;
      * Include the type of general control mechanisms; and
      * Report all NSCIU annual evaluations performed, as applicable.
   (4) A summary of all compliance monitoring activities performed by the POTW during the pretreatment year reporting period. The following information shall be reported:
      * Total number of inspections performed; and
      * Total number of sampling events conducted.
   (5) Status of IU compliance with effluent limitations, reporting, and narrative standard (which may include enforceable BMPs, narrative limits, and/or operational standards) requirements. Compliance status shall be defined as follows:

Revised

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* Compliant (C) - no violations during the pretreatment year reporting period;
* Non-compliant (NC) - one or more violations during the pretreatment year reporting period but does not meet the criteria for SNC; and
* Significant Noncompliance (SNC) - in accordance with requirements described above in this section.

(6) For noncompliant IUs, indicate the nature of the violations, the type and number of actions taken (notice of violation, administrative order, criminal or civil suit, fines or penalties collected, etc.) and current compliance status. If any IU was on a schedule to attain compliance with effluent limits or narrative standards, indicate the date the schedule was issued and the date compliance is to be attained.

b. A list of each IU whose authorization to discharge was terminated or revoked during the pretreatment year reporting period and the reason for termination.

c. A report on any interference, pass through, upset, or POTW permit violations known or suspected to be caused by IUs and response actions taken by the permittee

d. An original newspaper public notice, or copy of the newspaper publication with official affidavit, of the list of significantly noncompliant IUs, giving the name of the newspaper and the date the list was published.

e. The information required by this section including the information on the attached tables must be submitted. The permittee may submit the information in tabular form using the example table format provided. Please attach on a separate sheet those explanations to document various pretreatment activities, including IU permits that have expired, BMP violations, and required sampling events not conducted by the permittee as required.

f. A summary of changes to the POTW's pretreatment program that have not been previously reported to the Approval Authority.

4. The permittee shall provide adequate written notification to the Executive Director care of the Storm Water & Pretreatment Team (MC148) of the Water Quality Division, within 30 days of the permittee's knowledge of the following:

a. Any new introduction of pollutants into the treatment works from an indirect discharger which would be subject to Sections 301 and 306 of the Clean Water Act if the indirect discharger was directly discharging those pollutants; and

b. Any substantial change in the volume or character of pollutants being introduced into the treatment works by a source introducing pollutants into the treatment works at the time of issuance of the permit.

Adequate notice shall include information on the quality and quantity of effluent to be introduced into the treatment works, and any anticipated impact of the change on the quality or quantity of effluent to be discharged from the POTW.

Revised July 2007

TPDES Pretreatment Program Annual Report Form for Updated Industrial Users List

Reporting month/year: _____, _____ to _____, _____

TPDES Permit No.: _____ Permittee:_____ Treatment Plant: _____

PRETREATMENT PROGRAM STATUS REPORT UPDATED INDUSTRIAL USERS[1] LIST																
			CONTROL MECHANISM							COMPLIANCE STATUS During the Pretreatment Year Reporting Period[4] (C = Compliant, NC = Noncompliant, SNC= Significant Noncompliance)						
										REPORTS						
Industrial User Name	SIC or NAICS Code	CIU[2]	Y/N or NR[5]	IND or GEN or NR	Last Action[6]	TBLLs or TBLLs only[7]	New User[3] (Y or N)	Times Inspected by the CA	Times Sampled by the CA	BMR	90-Day	Semi-Annual	Self-Monitoring[8]	NSCIU Certifications	Effluent Limits	Narrative Standards

1 Include all significant industrial users (SIUs), non-significant categorical industrial users (NSCIUs) as defined in 40 CFR §403.3(v)(2), and/or middle tier categorical industrial users (MTCIUs) as defined in 40 CFR §403.12(e)(3). Please do not include non-significant noncategorical IUs that are covered under best management practices (BMPs) or general control mechanisms.

2 Categorical determination (include 40 CFR citation and NSCIU or MTCIU status, if applicable).

3 Indicate whether the IU is a new user. If the answer is No or N, then indicate the expiration date of the last issued IU permit.

4 The term SNC applies to a broader range of violations, such as daily maximum, long-term average, instantaneous limits, and narrative standards (which may include enforceable BMPs, narrative limits and/or operational standards). Any other violation, or group of violations, which the POTW determines will adversely affect the operation or implementation of the local Pretreatment Program now includes BMP violations (40 CFR §403.8(f)(2)(viii)(H)).

5 Code NR= None required (NSCIUs only); IND = individual control mechanism; GEN = general control mechanism. Include as a footnote (or on a separate page) the name of the general control mechanism used for similar groups of IUs, identify the similar types of operations and types of wastes that are the same for each general control mechanism. Any BMPs through general control mechanisms that are applied to nonsignificant IUs need to be reported separately, *e.g.* the sector type and BMP description.

6 Permit or NSCIU evaluations as applicable.

7 According to 40 CFR §403.12(i)(1), indicate whether the IU is subject to technically based local limits (TBLLs) that are more stringent than categorical pretreatment standards, *e.g.* where there is one end-of-pipe sampling point at a CIU, and you have determined that the TBLLs are more stringent than the categorical pretreatment standards for any pollutant at the end-of-pipe sampling point; **OR** the IU is subject only to local limits (TBLLs only), *e.g.* the IU is a non-categorical SIU subject only to TBLLs at the end-of-pipe sampling point.

8 For those IUs where a monitoring waiver has been granted, please add the code "W" (after either C, NC, or SNC codes) and indicate the pollutant(s) for which the waiver has been granted.

TPDES Pretreatment Program Annual Report Form for Industrial User Inventory Modifications

Reporting month/year: _____, _____ to _____, _____

TPDES Permit No: _____ Permittee: _____ Treatment Plant: _____

INDUSTRIAL USER INVENTORY MODIFICATIONS					
FACILITY NAME, ADDRESS AND CONTACT PERSON	ADD, CHANGE, DELETE (Including categorical reclassification to NSCIU or MTCIU)	IF DELETION: Reason For Deletion	IF ADDITION OR SIGNIFICANT CHANGE:		
			PROCESS DESCRIPTION	POLLUTANTS (Including any sampling waiver given for each pollutant not present)	FLOW RATE [9] (In gpd) R = Regulated U = Unregulated T = Total

9 For NSCIUs, total flow must be given, if regulated flow is not determined.

TPDES Pretreatment Program Annual Report Form for Enforcement Actions Taken

Reporting month/year: _____, _____ to _____, _____

TPDES Permit No: _____Permittee:_____Treatment Plant: _____

Overall SNC ___% SNC [10] based on: Effluent Violations_____%
Reporting Violations_____% Narrative Standard Violations___%

Noncompliant Industrial Users - Enforcement Actions Taken															
Industrial User Name	Nature of Violation [11]				Number of Actions Taken					Penalties Collected (Do not Include Surcharge)	Compliance Schedule			Current Status Returned to Compliance: (Y or N)	Comments
	Effluent Limits	Reports	NSCIU Certifications	Narrative Standards	NOV	A.O.	Civil	Criminal	Other		Y or N	Date Issued	Date Due		

10 # %
__ __ Pretreatment Standards [WENDB-PSNC] (Local Limits/Categorical Standards)
__ __ Reporting Requirements [WENDB-PSNC]
__ __ Narrative Standards

11 Please specify a separate number for each type of violation, *e.g.* report, notification, and/or NSCIU certification.

BIOMONITORING REQUIREMENTS

CHRONIC BIOMONITORING REQUIREMENTS: FRESHWATER

The provisions of this Section apply to Outfall 001 for whole effluent toxicity (WET) testing.

1. Scope, Frequency and Methodology

   a. The permittee shall test the effluent for toxicity in accordance with the provisions below. Such testing will determine if an appropriately dilute effluent sample adversely affects the survival, reproduction, or growth of the test organisms.

   b. The permittee shall conduct the following toxicity tests utilizing the test organisms, procedures and quality assurance requirements specified in this Part of the permit and in accordance with "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition (EPA-821-R-02-013), or its most recent update:

      1) Chronic static renewal survival and reproduction test using the water flea (*Ceriodaphnia dubia*) (Method 1002.0). This test should be terminated when 60% of the surviving adults in the control produce three broods or at the end of eight days, whichever comes first. This test shall be conducted once per quarter.

      2) Chronic static renewal 7-day larval survival and growth test using the fathead minnow (*Pimephales promelas*) (Method 1000.0). A minimum of five replicates with eight organisms per replicate shall be used in the control and in each dilution. This test shall be conducted once per quarter.

      The permittee must perform and report a valid test for each test species during the prescribed reporting period. An invalid test must be repeated during the same reporting period. An invalid test is herein defined as any test failing to satisfy the test acceptability criteria, procedures, and quality assurance requirements specified in the test methods and permit. All test results, valid or invalid, must be submitted as described below.

   c. The permittee shall use five effluent dilution concentrations and a control in each toxicity test. These additional effluent concentrations are 31%, 41%, 55%, 73%, and 98% effluent. The critical dilution, defined as 98% effluent, is the effluent concentration representative of the proportion of effluent in the receiving water during critical low flow or critical mixing conditions.

   d. This permit may be amended to require a WET limit, Chemical-Specific (CS) effluent limits, a Best Management Practice (BMP), or other appropriate actions to address toxicity. The permittee may be required to conduct a Toxicity Reduction Evaluation after multiple toxic events.

Lethal + sub-lethal replaced w/ toxicity

e. Testing Frequency Reduction

1) If none of the first four consecutive quarterly tests demonstrates significant toxicity, the permittee may submit this information in writing and, upon approval, reduce the testing frequency to once per six months for the invertebrate test species and once per year for the vertebrate test species.

2) If one or more of the first four consecutive quarterly tests demonstrates significant toxicity, the permittee shall continue quarterly testing for that species until the permit is reissued. If a testing frequency reduction had been previously granted and a subsequent test demonstrates significant toxicity, the permittee will resume a quarterly testing frequency for that species until the permit is reissued.

2. Required Toxicity Testing Conditions

a. Test Acceptance - The permittee shall repeat any toxicity test, including the control and all effluent dilutions, which fail to meet the following criteria:

1) a control mean survival of 80% or greater;

2) a control mean number of water flea neonates per surviving adult of 15 or greater;

3) a control mean dry weight of surviving fathead minnow larvae of 0.25 mg or greater;

4) a control Coefficient of Variation percent (CV%) of 40 or less in between replicates for the young of surviving females in the water flea test; and the growth and survival endpoints in the fathead minnow test.

5) a critical dilution CV% of 40 or less for young of surviving females in the water flea test; and the growth and survival endpoints for the fathead minnow test. However, if statistically significant lethal or nonlethal effects are exhibited at the critical dilution, a CV% greater than 40 shall not invalidate the test.

6) a Percent Minimum Significant Difference of 47 or less for water flea reproduction;

7) a Percent Minimum Significant Difference of 30 or less for fathead minnow growth.

b. Statistical Interpretation

1) For the water flea survival test, the statistical analyses used to determine if there is a significant difference between the control and an effluent dilution shall be Fisher's Exact Test as described in the manual referenced above, or its most recent update.

2) For the water flea reproduction test and the fathead minnow larval survival and growth tests, the statistical analyses used to determine if there is a significant difference between the control and an effluent dilution shall be in accordance with the manual referenced above, or its most recent update.

3) The permittee is responsible for reviewing test concentration-response relationships to ensure that calculated test-results are interpreted and reported correctly. The EPA manual, "Method Guidance and Recommendation for Whole Effluent Toxicity (WET) Testing (40 CFR Part 136)" (EPA 821-B-00-004), provides guidance on determining the validity of test results.

4) If significant lethality is demonstrated (that is, there is a statistically significant difference in survival at the critical dilution when compared to the control), the conditions of test acceptability are met, and the survival of the test organisms are equal to or greater than 80% in the critical dilution and all dilutions below that, then the permittee shall report a survival No Observed Effect Concentration (NOEC) of not less than the critical dilution for the reporting requirements.

5) The NOEC is defined as the greatest effluent dilution at which no significant effect is demonstrated. The Lowest Observed Effect Concentration (LOEC) is defined as the lowest effluent dilution at which a significant effect is demonstrated. A significant effect is herein defined as a statistically significant difference at the 95% confidence level between the survival, reproduction, or growth of the test organism(s) in a specified effluent dilution compared to the survival, reproduction, or growth of the test organism(s) in the control (0% effluent).

6) The use of NOECs and LOECs assumes either a monotonic (continuous) concentration-response relationship or a threshold model of the concentration-response relationship. For any test result that demonstrates a non-monotonic (non-continuous) response, the NOEC should be determined based on the guidance manual referenced in Item 3 above.

7) Pursuant to the responsibility assigned to the permittee in Part 2.b.3), test results that demonstrate a non-monotonic (non-continuous) concentration-response relationship may be submitted, prior to the due date, for technical review. The above-referenced guidance manual will be used when making a determination of test acceptability.

8) Staff will review test results for consistency with rules, procedures, and permit requirements.

c. Dilution Water

1) Dilution water used in the toxicity tests shall be the receiving water collected at a point upstream of the discharge as close as possible to the discharge point, but unaffected by the discharge. Where the toxicity tests

are conducted on effluent discharges to receiving waters that are classified as intermittent streams, or where the toxicity tests are conducted on effluent discharges where no receiving water is available due to zero flow conditions, the permittee shall; (a) substitute a synthetic dilution water that has a pH, hardness, and alkalinity similar to that of the closest downstream perennial water unaffected by the discharge, or (b) utilize the closest downstream perennial water unaffected by the discharge.

2) Where the receiving water proves unsatisfactory as a result of pre-existing instream toxicity (i.e. fails to fulfill the test acceptance criteria of item 2.a.), the permittee may substitute synthetic dilution water for the receiving water in all subsequent tests provided the unacceptable receiving water test met the following stipulations:

a) a synthetic lab water control was performed (in addition to the receiving water control) which fulfilled the test acceptance requirements of item 2.a;

b) the test indicating receiving water toxicity was carried out to completion (i.e., 7 days);

c) the permittee submitted all test results indicating receiving water toxicity with the reports and information required in Part 3 of this Section.

3) The synthetic dilution water shall consist of standard, moderately hard, reconstituted water. Upon approval, the permittee may substitute other appropriate dilution water with chemical and physical characteristics similar to that of the receiving water.

d. Samples and Composites

1) The permittee shall collect a minimum of three composite samples from Outfall 001. The second and third composite samples will be used for the renewal of the dilution concentrations for each toxicity test.

2) The permittee shall collect the composite samples such that the samples are representative of any periodic episode of chlorination, biocide usage, or other potentially toxic substance discharged on an intermittent basis.

3) The permittee shall initiate the toxicity tests within 36 hours after collection of the last portion of the first composite sample. The holding time for any subsequent composite sample shall not exceed 72 hours. Samples shall be maintained at a temperature of 0-6 degrees Centigrade during collection, shipping, and storage.

4) If Outfall 001 ceases discharging during the collection of effluent samples, the requirements for the minimum number of effluent samples, the minimum numbers of effluent portions, and the sample holding time, are waived during that sampling period. However, the permittee must have collected an effluent composite sample volume sufficient to complete the

required toxicity tests with renewal of the effluent. When possible, the effluent samples used for the toxicity tests shall be collected on separate days if the discharge occurs over multiple days. The sample collection duration and the static renewal protocol associated with the abbreviated sample collection must be documented in the full report.

5) The effluent samples shall not be dechlorinated after sample collection.

3. Reporting

All reports, tables, plans, summaries, and related correspondence required in any Part of this Section shall be submitted to the attention of the Standards Implementation Team (MC 150) of the Water Quality Division.

a. The permittee shall prepare a full report of the results of all tests conducted in accordance with the manual referenced above, or its most recent update, for every valid and invalid toxicity test initiated whether carried to completion or not.

b. The permittee shall routinely report the results of each biomonitoring test on the Table 1 forms provided with this permit.

1) Annual biomonitoring test results are due on or before January 20th for biomonitoring conducted during the previous 12 month period.

2) Semiannual biomonitoring test results are due on or before July 20th and January 20th for biomonitoring conducted during the previous 6 month period.

3) Quarterly biomonitoring test results are due on or before April 20th, July 20th, October 20th, and January 20th, for biomonitoring conducted during the previous calendar quarter.

4) Monthly biomonitoring test results are due on or before the 20th day of the month following sampling.

c. Enter the following codes for the appropriate parameters for valid tests only:

1) For the water flea, Parameter TLP3B, enter a "1" if the NOEC for survival is less than the critical dilution; otherwise, enter a "0."

2) For the water flea, Parameter TOP3B, report the NOEC for survival.

3) For the water flea, Parameter TXP3B, report the LOEC for survival.

4) For the water flea, Parameter TWP3B, enter a "1" if the NOEC for reproduction is less than the critical dilution; otherwise, enter a "0."

5) For the water flea, Parameter TPP3B, report the NOEC for reproduction.

6) For the water flea, Parameter TYP3B, report the LOEC for reproduction.

7) For the fathead minnow, Parameter TLP6C, enter a "1" if the NOEC for survival is less than the critical dilution; otherwise, enter a "0."

8) For the fathead minnow, Parameter TOP6C, report the NOEC for survival.

9) For the fathead minnow, Parameter TXP6C, report the LOEC for survival.

10) For the fathead minnow, Parameter TWP6C, enter a "1" if the NOEC for growth is less than the critical dilution; otherwise, enter a "0."

11) For the fathead minnow, Parameter TPP6C, report the NOEC for growth.

12) For the fathead minnow, Parameter TYP6C, report the LOEC for growth

d. Enter the following codes for retests only:

1) For retest number 1, Parameter 22415, enter a "1" if the NOEC for survival is less than the critical dilution; otherwise, enter a "0."

2) For retest number 2, Parameter 22416, enter a "1" if the NOEC for survival is less than the critical dilution; otherwise, enter a "0."

4. Persistent Toxicity

The requirements of this Part apply only when a test demonstrates a significant effect at the critical dilution. A significant effect is defined as a statistically significant difference, at the 95% confidence level, between a specified endpoint (survival, growth, or reproduction) of the test organism in a specified effluent dilution when compared to the specified endpoint of the test organism in the control. Significant lethality is defined as a statistically significant difference in survival at the critical dilution when compared to the survival in the control. Significant sublethality is defined as a statistically significant difference in growth/reproduction at the critical dilution when compared to the growth/reproduction in the control.

a. The permittee shall conduct a total of 2 additional tests (retests) for any species that demonstrates a significant effect (lethal or sublethal) at the critical dilution. The two retests shall be conducted monthly during the next two consecutive months. The permittee shall not substitute either of the two retests in lieu of routine toxicity testing. All reports shall be submitted within 20 days of test completion. Test completion is defined as the last day of the test.

b. If the retests are performed due to a demonstration of significant lethality, and one or both of the two retests specified in item 4.a. demonstrates significant lethality, the permittee shall initiate the TRE requirements as specified in Part 5. The provisions of item 4.a. are suspended upon completion of the two retests and submittal of the TRE Action Plan and Schedule defined in Part 5.

If neither test demonstrates significant lethality and the permittee is testing under the reduced testing frequency provision of Part 1.e., the permittee shall return to a quarterly testing frequency for that species.

c. If the two retests are performed due to a demonstration of significant sublethality, and one or both of the two retests specified in item 4.a. demonstrates significant lethality, the permittee shall again perform two retests as stipulated in item 4.a.

d. If the two retests are performed due to a demonstration of significant sublethality, and neither test demonstrates significant lethality, the permittee shall continue testing at the quarterly frequency.

e. Regardless of whether retesting for lethal or sublethal effects, or a combination of the two, no more than one retest per month is required for a species.

5. Toxicity Reduction Evaluation

a. Within 45 days of the retest that demonstrates significant lethality, or within 45 days of being so instructed due to multiple toxic events, the permittee shall submit a General Outline for initiating a Toxicity Reduction Evaluation (TRE). The outline shall include, but not be limited to, a description of project personnel, a schedule for obtaining consultants (if needed), a discussion of influent and effluent data available for review, a sampling and analytical schedule, and a proposed TRE initiation date.

b. Within 90 days of the retest that demonstrates significant lethality, or within 90 days of being so instructed due to multiple toxic events, the permittee shall submit a TRE Action Plan and Schedule for conducting a TRE. The plan shall specify the approach and methodology to be used in performing the TRE. A TRE is a step-wise investigation combining toxicity testing with physical and chemical analysis to determine actions necessary to eliminate or reduce effluent toxicity to a level not effecting significant lethality at the critical dilution. The TRE Action Plan shall lead to the successful elimination of significant lethality for both test species defined in item 1.b. As a minimum, the TRE Action Plan shall include the following:

1) Specific Activities - The TRE Action Plan shall specify the approach the permittee intends to utilize in conducting the TRE, including toxicity characterizations, identifications, confirmations, source evaluations, treatability studies, and alternative approaches. When conducting characterization analyses, the permittee shall perform multiple characterizations and follow the procedures specified in the document entitled, "Toxicity Identification Evaluation: Characterization of Chronically Toxic Effluents, Phase I" (EPA/600/6-91/005F), or alternate procedures. The permittee shall perform multiple identifications and follow the methods specified in the documents entitled, "Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/080) and "Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/081). All characterization, identification, and confirmation tests shall be conducted in an orderly and logical progression;

2) Sampling Plan - The TRE Action Plan should describe sampling locations, methods, holding times, chain of custody, and preservation techniques. The effluent sample volume collected for all tests shall be adequate to perform the

toxicity characterization/ identification/ confirmation procedures, and chemical-specific analyses when the toxicity tests show significant lethality. Where the permittee has identified or suspects specific pollutant(s) and source(s) of effluent toxicity, the permittee shall conduct, concurrent with toxicity testing, chemical-specific analyses for the identified and suspected pollutant(s) and source(s) of effluent toxicity;

3) Quality Assurance Plan - The TRE Action Plan should address record keeping and data evaluation, calibration and standardization, baseline tests, system blanks, controls, duplicates, spikes, toxicity persistence in the samples, randomization, reference toxicant control charts, as well as mechanisms to detect artifactual toxicity; and

4) Project Organization - The TRE Action Plan should describe the project staff, project manager, consulting engineering services (where applicable), consulting analytical and toxicological services, etc.

c. Within 30 days of submittal of the TRE Action Plan and Schedule, the permittee shall implement the TRE with due diligence.

d. The permittee shall submit quarterly TRE Activities Reports concerning the progress of the TRE. The quarterly reports are due on or before April 20th, July 20th, October 20th, and January 20th. The report shall detail information regarding the TRE activities including:

1) results and interpretation of any chemical-specific analyses for the identified and suspected pollutant(s) performed during the quarter;

2) results and interpretation of any characterization, identification, and confirmation tests performed during the quarter;

3) any data and substantiating documentation which identifies the pollutant(s) and source(s) of effluent toxicity;

4) results of any studies/evaluations concerning the treatability of the facility's effluent toxicity;

5) any data which identifies effluent toxicity control mechanisms that will reduce effluent toxicity to the level necessary to meet no significant lethality at the critical dilution; and

6) any changes to the initial TRE Plan and Schedule that are believed necessary as a result of the TRE findings.

Copies of the TRE Activities Report shall also be submitted to the U.S. EPA Region 6 office.

e. During the TRE, the permittee shall perform, at a minimum, quarterly testing using the more sensitive species; testing for the less sensitive species shall continue at the frequency specified in Part 1.b.

f. If the effluent ceases to effect significant lethality (herein as defined below) the permittee may end the TRE. A "cessation of lethality" is defined as no significant lethality for a period of 12 consecutive months with at least monthly testing. At the end of the 12 months, the permittee shall submit a statement of intent to cease the TRE and may then resume the testing frequency specified in Part 1.b. The permittee may only apply the "cessation of lethality" provision once.

This provision accommodates situations where operational errors and upsets, spills, or sampling errors triggered the TRE, in contrast to a situation where a single toxicant or group of toxicants cause lethality. This provision does not apply as a result of corrective actions taken by the permittee. "Corrective actions" are herein defined as proactive efforts which eliminate or reduce effluent toxicity. These include, but are not limited to, source reduction or elimination, improved housekeeping, changes in chemical usage, and modifications of influent streams and effluent treatment.

The permittee may only apply this cessation of lethality provision once. If the effluent again demonstrates significant lethality to the same species, the permit will be amended to add a WET limit with a compliance period, if appropriate. However, prior to the effective date of the WET limit, the permittee may apply for a permit amendment removing and replacing the WET limit with an alternate toxicity control measure by identifying and confirming the toxicant and an appropriate control measure.

g. The permittee shall complete the TRE and submit a Final Report on the TRE Activities no later than 28 months from the last test day of the retest that confirmed significant lethal effects at the critical dilution. The permittee may petition the Executive Director (in writing) for an extension of the 28-month limit. However, to warrant an extension the permittee must have demonstrated due diligence in their pursuit of the TIE/TRE and must prove that circumstances beyond their control stalled the TIE/TRE. The report shall provide information pertaining to the specific control mechanism(s) selected that will, when implemented, result in reduction of effluent toxicity to no significant lethality at the critical dilution. The report will also provide a specific corrective action schedule for implementing the selected control mechanism(s). A copy of the TRE Final Report shall also be submitted to the U.S. EPA Region 6 office.

h. Based upon the results of the TRE and proposed corrective actions, this permit may be amended to modify the biomonitoring requirements, where necessary, to require a compliance schedule for implementation of corrective actions, to specify a WET limit, to specify a BMP, and to specify CS limits.

TABLE 1 (SHEET 1 OF 4)

BIOMONITORING REPORTING

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

		Date Time		Date Time
Dates and Times Composites Collected	No. 1 FROM:	_____	TO:	_____
	No. 2 FROM:	_____	TO:	_____
	No. 3 FROM:	_____	TO:	_____

Test initiated: _____ am/pm _____ date

Dilution water used: _____ Receiving water _____ Synthetic Dilution water

NUMBER OF YOUNG PRODUCED PER ADULT AT END OF TEST

REP	Percent effluent					
	0%	31%	41%	55%	73%	98%
A						
B						
C						
D						
E						
F						
G						
H						
I						
J						
Survival Mean						
Total Mean						
CV%*						
PMSD						

*Coefficient of Variation = standard deviation x 100/mean (calculation based on young of the surviving adults)
Designate males (M), and dead females (D), along with number of neonates (x) released prior to death.

TABLE 1 (SHEET 2 OF 4)

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

1. Dunnett's Procedure or Steel's Many-One Rank Test or Wilcoxon Rank Sum Test (with Bonferroni adjustment) or t-test (with Bonferroni adjustment) as appropriate:

   Is the mean number of young produced per adult significantly less than the number of young per adult in the control for the % effluent corresponding to significant nonlethal effects?

   CRITICAL DILUTION (98%): _____ YES _____ NO

PERCENT SURVIVAL

	Percent effluent					
Time of Reading	0%	31%	41%	55%	73%	98%
24h						
48h						
End of Test						

2. Fisher's Exact Test:

   Is the mean survival at test end significantly less than the control survival for the % effluent corresponding to lethality?

   CRITICAL DILUTION (98%): _____ YES _____ NO

3. Enter percent effluent corresponding to each NOEC\LOEC below:

   a.) NOEC survival = _____% effluent

   b.) LOEC survival = _____% effluent

   c.) NOEC reproduction = _____% effluent

   d.) LOEC reproduction = _____% effluent

TABLE 1 (SHEET 3 OF 4)

BIOMONITORING REPORTING

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL

		Date Time		Date Time
Dates and Times Composites Collected	No. 1	FROM: _____	TO:	_____
	No. 2	FROM: _____	TO:	_____
	No. 3	FROM: _____	TO:	_____

Test initiated: _____ am/pm _____ date

Dilution water used: _____ Receiving water _____ Synthetic dilution water

FATHEAD MINNOW GROWTH DATA

Effluent Concentration	Average Dry Weight in replicate chambers					Mean Dry Weight	CV%*
	A	B	C	D	E		
0%							
31%							
41%							
55%							
73%							
98%							
PMSD							

* Coefficient of Variation = standard deviation x 100/mean

1. Dunnett's Procedure or Steel's Many-One Rank Test or Wilcoxon Rank Sum Test (with Bonferroni adjustment) or t-test (with Bonferroni adjustment) as appropriate:

   Is the mean dry weight (growth) at 7 days significantly less than the control's dry weight (growth) for the % effluent corresponding to significant nonlethal effects?

   CRITICAL DILUTION (98%): _____ YES _____ NO

TABLE 1 (SHEET 4 OF 4)

BIOMONITORING REPORTING

FATHEAD MINNOW GROWTH AND SURVIVAL TEST

FATHEAD MINNOW SURVIVAL DATA

Effluent Concentration	Percent Survival in replicate chambers					Mean percent survival			CV%*
	A	B	C	D	E	24h	48h	7 day	
0%									
31%									
41%									
55%									
73%									
98%									

* Coefficient of Variation = standard deviation x 100/mean

2. Dunnett's Procedure or Steel's Many-One Rank Test or Wilcoxon Rank Sum Test (with Bonferroni adjustment) or t-test (with Bonferroni adjustment) as appropriate:

   Is the mean survival at 7 days significantly less than the control survival for the % effluent corresponding to lethality?

   CRITICAL DILUTION (98%): _____ YES _____ NO

3. Enter percent effluent corresponding to each NOEC\LOEC below:

   a.) NOEC survival = _____% effluent

   b.) LOEC survival = _____% effluent

   c.) NOEC growth = _____% effluent

   d.) LOEC growth = _____% effluent

24-HOUR ACUTE BIOMONITORING REQUIREMENTS: FRESHWATER

The provisions of this section apply to Outfall 001 for whole effluent toxicity (WET) testing.

1. Scope, Frequency and Methodology

   a. The permittee shall test the effluent for lethality in accordance with the provisions in this Section. Such testing will determine compliance with the Surface Water Quality Standard, 307.6(e)(2)(B), of greater than 50% survival of the appropriate test organisms in 100% effluent for a 24-hour period.

   b. The toxicity tests specified shall be conducted once per six months. The permittee shall conduct the following toxicity tests utilizing the test organisms, procedures, and quality assurance requirements specified in this section of the permit and in accordance with "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition" (EPA-821-R-02-012), or its most recent update:

      1) Acute 24-hour static toxicity test using the water flea (*Daphnia pulex* or *Ceriodaphnia dubia*). A minimum of five replicates with eight organisms per replicate shall be used in the control and in each dilution.

      2) Acute 24-hour static toxicity test using the fathead minnow (*Pimephales promelas*). A minimum of five replicates with eight organisms per replicate shall be used in the control and in each dilution.

      A valid test result must be submitted for each reporting period. The permittee must report, and then repeat, an invalid test during the same reporting period. The repeat test shall include the control and the 100% effluent dilution and use the appropriate number of organisms and replicates, as specified above. An invalid test is herein defined as any test failing to satisfy the test acceptability criteria, procedures, and quality assurance requirements specified in the test methods and permit.

   c. In addition to an appropriate control, a 100% effluent concentration shall be used in the toxicity tests. The control and dilution water shall consist of standard, synthetic, moderately hard, reconstituted water.

   d. This permit may be amended to require a WET limit, a Best Management Practice (BMP), Chemical-Specific (CS) limits, or other appropriate actions to address toxicity. The permittee may be required to conduct a Toxicity Reduction Evaluation after multiple toxic events.

2. Required Toxicity Testing Conditions

   a. Test Acceptance - The permittee shall repeat any toxicity test, including the control, if the control fails to meet a mean survival equal to or greater than 90%.

   b. Dilution Water - In accordance with item 1.c., the control and dilution water shall consist of standard, synthetic, moderately hard, reconstituted water.

c. Samples and Composites

1) The permittee shall collect one composite sample from Outfall 001.

2) The permittee shall collect the composite samples such that the samples are representative of any periodic episode of chlorination, biocide usage, or other potentially toxic substance discharged on an intermittent basis.

3) The permittee shall initiate the toxicity tests within 36 hours after collection of the last portion of the composite sample. Samples shall be maintained at a temperature of 0-6 degrees Centigrade during collection, shipping, and storage.

4) If Outfall 001 ceases discharging during the collection of the effluent composite sample, the requirements for the minimum number of effluent portions are waived. However, the permittee must have collected a composite sample volume sufficient for completion of the required test. The abbreviated sample collection, duration, and methodology must be documented in the full report.

5) The effluent samples shall not be dechlorinated after sample collection.

3. Reporting

All reports, tables, plans, summaries, and related correspondence required in any Part of this Section shall be submitted to the attention of the Standards Implementation Team (MC 150) of the Water Quality Division.

a. The permittee shall prepare a full report of the results of all tests conducted in accordance with the manual referenced above, or its most recent update thereof, for every valid and invalid toxicity test initiated.

b. The permittee shall routinely report the results of each biomonitoring test on the Table 2 forms provided with this permit.

1) Semiannual biomonitoring test results are due on or before January 20th and July 20th for biomonitoring conducted during the previous 6 month period.

2) Quarterly biomonitoring test results are due on or before January 20th, April 20th, July 20th, and October 20th, for biomonitoring conducted during the previous calendar quarter.

c. Enter the following codes on for the appropriate parameters for valid tests only:

1) For the water flea, Parameter TIE3D, enter a "0" if the mean survival at 24-hours is greater than 50% in the 100% effluent dilution; if the mean survival is less than or equal to 50%, enter a "1."

2) For the fathead minnow, Parameter TIE6C, enter a "0" if the mean survival at 24-hours is greater than 50% in the 100% effluent dilution; if the mean survival is less than or equal to 50%, enter a "1."

d. Enter the following codes for retests only:

1) For retest number 1, Parameter 22415, enter a "0" if the mean survival at 24-hours is greater than 50% in the 100% effluent dilution; if the mean survival is less than or equal to 50%, enter a "1."

2) For retest number 2, Parameter 22416, enter a "0" if the mean survival at 24-hours is greater than 50% in the 100% effluent dilution; if the mean survival is less than or equal to 50%, enter a "1."

4. Persistent Mortality

The requirements of this Part apply when a toxicity test demonstrates significant lethality, here defined as a mean mortality of 50% or greater to organisms exposed to the 100% effluent concentration after 24-hours.

a. The permittee shall conduct 2 additional tests (retests) for each species that demonstrates significant lethality. The two retests shall be conducted once per week for 2 weeks. Five effluent dilution concentrations in addition to an appropriate control shall be used in the retests. These additional effluent concentrations are 6%, 13%, 25%, 50% and 100% effluent. The first retest shall be conducted within 15 days of the laboratory determination of significant lethality. All test results shall be submitted within 20 days of test completion of the second retest. Test completion is defined as the 24th hour.

b. If one or both of the two retests specified in item 4.a. demonstrates significant lethality, the permittee shall initiate the TRE requirements as specified in Part 5 of this Section.

5. Toxicity Reduction Evaluation

a. Within 45 days of the retest that demonstrates significant lethality, the permittee shall submit a General Outline for initiating a Toxicity Reduction Evaluation (TRE). The outline shall include, but not be limited to, a description of project personnel, a schedule for obtaining consultants (if needed), a discussion of influent and effluent data available for review, a sampling and analytical schedule, and a proposed TRE initiation date.

b. Within 90 days of the retest that demonstrates significant lethality, the permittee shall submit a TRE Action Plan and Schedule for conducting a TRE. The plan shall specify the approach and methodology to be used in performing the TRE. A TRE is a step-wise investigation combining toxicity testing with physical and chemical analysis to determine actions necessary to eliminate or reduce effluent toxicity to a level not effecting significant lethality at the critical dilution. The TRE Action Plan shall lead to the successful elimination of significant lethality for both test species defined in item 1.b. As a minimum, the TRE Action Plan shall include the following:

1) Specific Activities - The TRE Action Plan shall specify the approach the permittee intends to utilize in conducting the TRE, including toxicity characterizations, identifications, confirmations, source evaluations, treatability studies, and alternative approaches. When conducting

characterization analyses, the permittee shall perform multiple characterizations and follow the procedures specified in the document entitled, "Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures" (EPA/600/6-91/003), or alternate procedures. The permittee shall perform multiple identifications and follow the methods specified in the documents entitled, "Methods for Aquatic Toxicity Identification Evaluations, Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/080) and "Methods for Aquatic Toxicity Identification Evaluations, Phase III Toxicity Confirmation Procedures for Samples Exhibiting Acute and Chronic Toxicity" (EPA/600/R-92/081). All characterization, identification, and confirmation tests shall be conducted in an orderly and logical progression;

2) Sampling Plan - The TRE Action Plan should describe sampling locations, methods, holding times, chain of custody, and preservation techniques. The effluent sample volume collected for all tests shall be adequate to perform the toxicity characterization/ identification/ confirmation procedures, and chemical-specific analyses when the toxicity tests show significant lethality. Where the permittee has identified or suspects specific pollutant(s) and source(s) of effluent toxicity, the permittee shall conduct, concurrent with toxicity testing, chemical-specific analyses for the identified and suspected pollutant(s) and source(s) of effluent toxicity;

3) Quality Assurance Plan - The TRE Action Plan should address record keeping and data evaluation, calibration and standardization, baseline tests, system blanks, controls, duplicates, spikes, toxicity persistence in the samples, randomization, reference toxicant control charts, as well as mechanisms to detect artifactual toxicity; and

4) Project Organization - The TRE Action Plan should describe the project staff, project manager, consulting engineering services (where applicable), consulting analytical and toxicological services, etc.

c. Within 30 days of submittal of the TRE Action Plan and Schedule, the permittee shall implement the TRE with due diligence.

d. The permittee shall submit quarterly TRE Activities Reports concerning the progress of the TRE. The quarterly TRE Activities Reports are due on or before April 20th, July 20th, October 20th, and January 20th. The report shall detail information regarding the TRE activities including:

1) results and interpretation of any chemical-specific analyses for the identified and suspected pollutant(s) performed during the quarter;

2) results and interpretation of any characterization, identification, and confirmation tests performed during the quarter;

3) any data and substantiating documentation which identifies the pollutant(s) and source(s) of effluent toxicity;

4) results of any studies/evaluations concerning the treatability of the facility's effluent toxicity;

5) any data which identifies effluent toxicity control mechanisms that will reduce effluent toxicity to the level necessary to eliminate significant lethality; and

6) any changes to the initial TRE Plan and Schedule that are believed necessary as a result of the TRE findings.

Copies of the TRE Activities Report shall also be submitted to the U.S. EPA Region 6 office.

e. During the TRE, the permittee shall perform, at a minimum, quarterly testing using the more sensitive species; testing for the less sensitive species shall continue at the frequency specified in Part 1.b.

f. If the effluent ceases to effect significant lethality (herein as defined below) the permittee may end the TRE. A "cessation of lethality" is defined as no significant lethality for a period of 12 consecutive weeks with at least weekly testing. At the end of the 12 weeks, the permittee shall submit a statement of intent to cease the TRE and may then resume the testing frequency specified in Part 1.b. The permittee may only apply the "cessation of lethality" provision once.

This provision accommodates situations where operational errors and upsets, spills, or sampling errors triggered the TRE, in contrast to a situation where a single toxicant or group of toxicants cause lethality. This provision does not apply as a result of corrective actions taken by the permittee. "Corrective actions" are herein defined as proactive efforts which eliminate or reduce effluent toxicity. These include, but are not limited to, source reduction or elimination, improved housekeeping, changes in chemical usage, and modifications of influent streams and effluent treatment.

The permittee may only apply this cessation of lethality provision once. If the effluent again demonstrates significant lethality to the same species, the permit will be amended to add a WET limit with a compliance period, if appropriate. However, prior to the effective date of the WET limit, the permittee may apply for a permit amendment removing and replacing the WET limit with an alternate toxicity control measure by identifying and confirming the toxicant and an appropriate control measure.

g. The permittee shall complete the TRE and submit a Final Report on the TRE Activities no later than 18 months from the last test day of the retest that demonstrates significant lethality. The permittee may petition the Executive Director (in writing) for an extension of the 18-month limit. However, to warrant an extension the permittee must have demonstrated due diligence in their pursuit of the TIE/TRE and must prove that circumstances beyond their control stalled the TIE/TRE. The report shall specify the control mechanism(s) that will, when implemented, reduce effluent toxicity as specified in item 5.g. The report will also specify a corrective action schedule for implementing the selected control mechanism(s). A copy of the TRE Final Report shall also be submitted to the U.S. EPA Region 6 office.

h. Within 3 years of the last day of the test confirming toxicity, the permittee shall comply with 307.6.(e)(2)(B), which requires greater than 50% survival of the test organism in 100% effluent at the end of 24-hours. The permittee may petition the Executive Director (in writing) for an extension of the 3-year limit. However, to warrant an extension the permittee must have demonstrated due diligence in their pursuit of the TIE/TRE and must prove that circumstances beyond their control stalled the TIE/TRE.

The requirement to comply with 307.6.(e)(2)(B) may be exempted upon proof that toxicity is caused by an excess, imbalance, or deficiency of dissolved salts. This exemption excludes instances where individually toxic components (e.g. metals) form a salt compound. Following the exemption, the permit may be amended to include an ion-adjustment protocol, alternate species testing, or single species testing.

i. Based upon the results of the TRE and proposed corrective actions, this permit may be amended to modify the biomonitoring requirements where necessary, to require a compliance schedule for implementation of corrective actions, to specify a WET limit, to specify a BMP, and to specify a CS limit.

TABLE 2 (SHEET 1 OF 2)

WATER FLEA SURVIVAL

GENERAL INFORMATION

	Time	Date
Composite Sample Collected		
Test Initiated		

PERCENT SURVIVAL

Time	Rep	Percent effluent					
		0%	6%	13%	25%	50%	100%
24h	A						
	B						
	C						
	D						
	E						
	MEAN						

Enter percent effluent corresponding to the LC50 below:

24 hour LC50 = _____% effluent

TABLE 2 (SHEET 2 OF 2)

FATHEAD MINNOW SURVIVAL

GENERAL INFORMATION

	Time	Date
Composite Sample Collected		
Test Initiated		

PERCENT SURVIVAL

Time	Rep	Percent effluent					
		0%	6%	13%	25%	50%	100%
24h	A						
	B						
	C						
	D						
	E						
	MEAN						

Enter percent effluent corresponding to the LC50 below:

24 hour LC50 = _____% effluent

APPENDIX B
SITE VISIT SCORING SHEETS

A.J. Brown WWTP

Screens

Inspection Date:

Facility Information	
Year in Service:	1995
No. of Units:	1
Capacity:	10 MGD
Manufacturer/ Screen Type:	Vulcan
Screening Conveyor/ Handling Process:	1/2" Spacing Mensch Crawler Screen
Septage Receiving:	No Compactor
Odor Control:	No Odor Control

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Electrical	2	20%	0.40	• Corrosion detected on liquid tight fittings • Conduit box at the motor submerges - Incorrect type of fittings • Inside panel is operable • Enclosure door devices need attention • Screen operates continuously - Maintenance will be done • Timer is not operable
Mechanical Equipment (Mechanical & Manual Screens)	2	35%	0.70	• Screen operates based on a float • The float triggers the operation of the screen • The isolation gate is a challenge - Mechanical parts are in good condition • The screen has experienced over torquing • There is a gate used to direct flow to the manual screen • Fittings and motor may not be waterproof • Manual bar screen has 1-1/4 inch spacings • The bar screen is manually cleaned - Maintenance has to climb down the screen to clean it • The dumpster at the mechanical screen does not have a cover and does not meet regulations.
Inlet Gate	4	15%	0.60	• The gate diverting flow to manual bar screen is held up by a metal pole - Has to be manually lifted with a crane to open.
Structure	2	30%	0.60	• Very minor concrete spalls detected • Sealant has failed at expansion joint between structure and pavement • Flatwork/pavement is cracked • Structure is in operable condition • Steel ladders need to be painted • Safety chains are rusted - Not attached across opening
Condition Rating	-	100%	**2.30**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	2	20%	0.40	If the capacity of the screens are affected, the flow can get backed up and overflow the manholes upstream.
Process & Regulatory Impact	2	40%	0.80	
Safety	4	20%	0.80	Operators have to get down into the channel to clean the manual bar screen, which is a safety hazard.
Outage Duration	2	20%	0.40	Assuming 15 days outage to repair. Manual bar screen can be used when the mechanical bar screen is not operable.
Overall Criticality Rating	-	100%	**2.40**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Screens	2.30	2.40	4.70	**Moderate**

A.J. Brown WWTP

Grit Removal System

Inspection Date:

Facility Information	
Year in Service:	1982
No. of Units:	1
Capacity:	
Manufacturer/ Screen Type:	Ovivo Detritor
Grit Conveyor/ Handling Process:	Screw Conveyor
Septage Receiving:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Electrical	4	30%	1.20	• Flex conduits are corroding from UV rays • Push button station seems to be aging at the screw and grit motor • PVC coated conduits losing PVC - allows corrosion • MCC has exceeded the life expectancy of 30 years • Screw motor shows corrosion
Mechanical Equipment	3	40%	1.20	• Grit system is functionable, but severe corrosion is present • Motor and drive was replaced less than a year ago • Greasing is done every 2-3 days. • The system is functional but is reaching the end of it's useful life - Will need to be replaced • Grit removal is not required for process compliance • Air compressor is not being used • Effluent flow meter received work in May 2015 • Ultrasonic installed in December 2014
Structure	3	30%	0.90	• Railing is damaged - Post is broken from base - Midrail is disconnected/not safe • Walking bridge is corroded - Carbon steel – may have been painted at one time • Concrete structure is in operating condition
Condition Rating	-	100%	**3.30**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	5	20%	1.00	
Process & Regulatory Impact	2	40%	0.80	Grit removal is not a regulatory requirement. It is good to have, but it is not mandatory.
Safety	4	20%	0.80	Bridge and railing supporting the grit removal unit and drive have severe corrosion and presents a safety hazard for anyone trying to work on the motor on the bridge.
Outage Duration	2	20%	0.40	Assuming 16-29 days to repair
Overall Criticality Rating	-	100%	**3.00**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	3.30	3.00	6.30	High

A.J. Brown WWTP

Raw Sewage PS

Inspection Date:

Facility Information	
Year in Service:	1981
Type of Facility:	
Number of Pumps:	4-Raw Sewage, 4-RAS, 2-WAS
Design Point:	
Horsepower:	40 HP for Raw and RAS, 5-HP for WAS
Monitoring:	
Generator:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Pumps and Motors	4	30%	1.20	• Motors were rebuilt several times • Seals are leaking often • All motors have been replaced over the years except for one • Volutes show wear and tear and leakage • Pumps are self Priming - 10" for raw and RAS, 4" for WAS. • Constant speed • Conduit to motors is loose or broken • Some motors have been replaced
Electrical – MCC, Back-up Power, Cables	5	15%	0.75	• Corrosion located on the bottom of MCC's • Past life expectancy • Flooding in room results in corrosion • Generator has failed • 90% of plant is powered from here • MCC is hot
Instrumentation - SCADA, alarms	5	15%	0.75	• Controllers are outdated • Repairs cannot be made
Structure - Hatches, Corrosion, Cracks, Leaking	4	25%	1.00	• Flatwork/sidewalks around PS cracks, sealant has failed at exposed joints • Soffit of roof overhang is falling and coming loose - Wood siding needs replaced - Eave boards need replacing • Structure observed to be in fair condition • Plates at pipe penetrations & thru slabs are severely deteriorated • 1 ton bridge crane observed to be in good condtion • Bottom of door is corroded • No cracks in brick veneer – good • Few ceiling panals are loose/sagging •No proper drainage in the room - Severe safety hazard with the electrical equipment in the room. •Floors are not sloped •The curb located at the front of the building does not help with the drainage - Water enters the building from under the door.
Piping and Valves	3	10%	0.30	• All check valves were replaced in January 2015 - Installed by the City. • Valves are identified as Miliken check valves.
HVAC	5	5%	0.25	• No HVAC present • Heaters are not operating • Windows are left open for air intake • A fan was installed on the wall for exhaust • A mobile fan sites on the floor of the pump room to help keep the electrical equipment cooler
Condition Rating	-	100%	**4.25**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	3	20%	0.60	Pumps serve two separate trains. If pumps to one train does not operate, there will still be service to the other treatment train.
Process & Regulatory Impact	5	40%	2.00	The treatment process will be severely affected if the pumps are not working. If pumps are not functional, flow will get backed up and overflow the manholes which violates regulations.
Safety	5	20%	1.00	There is no proper drainage in the room, which is a severe safety hazard with all the electrical equipment in the room.
Outage Duration	3	20%	0.60	Assuming 15 days to repair
Overall Criticality Rating	-	100%	**4.20**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk	4.25	4.20	8.45	Extreme

A.J. Brown WWTP

Sludge (RAS/WAS) PS

Inspection Date:

Facility Information	
Year in Service:	
Type of Facility:	
Number of Pumps:	
Design Point:	
Horsepower:	
Monitoring:	
Generator:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Pumps and Motors	4	30%	1.20	• Returned activated sludge pumps are in bad shape. • The City constantly has to work on them. • See Raw Sewage pump station tab. • Some motors have been replaced
Electrical – MCC, Back-up Power, Cables	5	15%	0.75	• Generator is not operable • MCC powering equipment has exceeded its life expectancy
Instrumentation - SCADA, alarms	5	15%	0.75	• MCC powering equipment has exceeded life expectancy • Controllers are outdated and repairs are required
Structure - Hatches, Corrosion, Cracks, Leaking	4	25%	1.00	• Flatwork/sidewalks around PS cracks, sealant has failed at exposed joints • Soffit of roof overhang is falling/coming loose – wood siding needs replaced – eave boards need replacing • Structure good/fair condition • Plates ate pipe penetrations & thru slabs are severely deteriorated • 1 ton bridge crane good condtion • Bottom of door corroded • No cracks in brick veneer – good • Few ceiling panals are loose/sagging •No proper drainage in the room and is a sever safety hazard with the elctrical equipment in the room. •Floors are not sloped. •The curb located at the front of the building does not help with the drainage and water enters the building from under the door.
Piping and Valves	2	10%	0.20	• All check valves were replaced in January and were installed by the City. • Valves are Miliken check valves.
HVAC	5	5%	0.25	• No HVAC. • Heaters don't work. • Windows left open for air intake. • A fan was put in on the wall for exhaust. • A mobile hfan sites on the floor of the pump room to help keep the electrical equipment cooler.
Condition Rating	-	100%	**4.15**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	3	20%	0.60	Pumps serve two separate trains. If pumps to one train goes out there will still be service to the other treatment train.
Process & Regulatory Impact	5	40%	2.00	The treatment process will be severely affected if the pumps are not working. If pumps not functional flow will get backed up and overflow the manholes which violates regulations.
Safety	5	20%	1.00	No proper drainage in the room which is a severe safety hazard with all the electrical equipment in the room.
Outage Duration	3	20%	0.60	Assuming 15 days to repair
Overall Criticality Rating	-	100%	**4.20**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	4.15	4.20	8.35	**Extreme**

A.J. Brown WWTP

Aeration Basin #1

Inspection Date:

Facility Information	
Dimensions:	8.5 ft depth
Mechanical Aerator Motor HP:	20 for outer shaft, 40 for inner shaft
No. of Units:	2 Total
Year Installed:	
Manufacturer:	
Notes:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Electrical	4	15%	0.60	• One aerator motor has broken flux conduit - Exposes motor box to elements/rain • Motor disconnects not accessible
Mechanical Equipment	4	40%	1.60	• Mechanical Disc aerator. • Outer track is the digester, three inner tracks are the aeration basins. • Basins consist of all original material and gear boxes. • The Rota shaft has been replaced. • The digester has 4-20HP mechanical disc aerators and the aeration basin has 4-40HP disc aerators all on the same shaft. • There is excessive wear and tear on the shaft. • The shafts break often. • Bearings have to be replaced every 2-3 months. • Operators have to get down unto the pad to work on the bearings which is a safety hazard. • There is a decanting/ telescoping valve on the digester.
Structure	2	30%	0.60	• Damage railing • Spalled concrete at railing post (3 places)
Piping and Valves	3	15%	0.45	• Some rusting • Can use some painting
Condition Rating	-	100%	**3.25**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	4	20%	0.80	Two aeration basins present. About half the capacity lost if one train goes down.
Process & Regulatory Impact	5	40%	2.00	BOD and NH3 removal done via this process, which is critical to meet regulatory conditions.
Safety	4	20%	0.80	Operators have to get down unto the pad to work on the bearings which is a safety hazard.
Outage Duration	4	20%	0.80	Assuming 29 days outage for repair.
Overall Criticality Rating	-	100%	**4.40**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk	3.25	4.40	7.65	**High**

A.J. Brown WWTP

Aeration Basin #2

Inspection Date:

Facility Information	
Dimensions:	8.5 ft depth
Mechanical Aerator Motor HP:	20 for outer shaft, 40 for inner shaft
No. of Units:	2 Total
Year Installed:	
Manufacturer:	
Notes:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Electrical	3	15%	0.45	• Conduit broke loose from motor box • MCC powering equipment is a big concern
Mechanical Equipment	4	40%	1.60	• Mechanical Disc aerator. • Outer track is the digester, three inner tracks are the aeration basins. • Basins consist of all original material and gear boxes. • The Rota shaft has been replaced. • The digester has 4-20HP mechanical disc aerators and the aeration basin has 4-40HP disc aerators all on the same shaft. • There is excessive wear and tear on the shaft. • The shafts break often. • Bearings have to be replaced every 2-3 months. • Operators have to get down unto the pad to work on the bearings which is a safety hazard. • There is a decanting/ telescoping valve on the digester.
Structure	2	30%	0.60	• FRP bridge is delaminating MV damage • Mino concrete spalls at rail • Bent railing
Piping and Valves	3	15%	0.45	• Some rusting • Can use some painting • Fair condition
Condition Rating	-	100%	**3.10**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	4	20%	0.80	Two aeration basins present. About half the capacity lost if one train goes down.
Process & Regulatory Impact	5	40%	2.00	BOD and NH3 removal done via this process, which is critical to meet regulatory conditions.
Safety	4	20%	0.80	Operators have to get down unto the pad to work on the bearings which is a safety hazard.
Outage Duration	4	20%	0.80	Assuming 29 days outage for repair.
Overall Criticality Rating	-	100%	**4.40**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	3.10	4.40	7.50	**High**

A.J. Brown WWTP

Clarifier #1

Inspection Date:

Facility Information	
Year Installed:	1981
Manufacturer:	
Type of Mechanism:	
Scum Baffle:	New scrapper
Weir Type:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Electrical	3	15%	0.45	• Receptacles doesn't work • Repulled wiring to clarifier due to fault
Clarifier Mechanism	3	30%	0.90	• Drive Unit is 4 years old. • Unit is 10ft deep. • There is no way to measure how much is being wasted. • This is done using operator intuition. • The unit is an outward trough clarifier. • The scum trough and arm are old and rusted. • The upper and gear motor bull gears are new. • Only one spray nozzle is in service. • The other 3 are hard to work on since they are located under the bridge, so the City does not use them.
Scum Baffle & Scum Scraper	3	15%	0.45	• Scum scrapper is old and rusted. • Scum baffle is new. Installed about a year or two ago.
Weirs	1	15%	0.15	• Weirs are new. Installed about a year or two ago.
Structure	3	25%	0.75	• Bridge framing in very poor condition - Corroded/metal section loss – in particular bottom flange at midspan (carbon steel/painted) - Steel check plate corroded • Concrete structure good condition • Spalled concrete at stair landing
Condition Rating	-	100%	**2.70**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	4	20%	0.80	Two treatment trains present. Capacity may be split and may not have redundancy.
Process & Regulatory Impact	5	40%	2.00	Process required for regulatory compliance for suspended solids.
Safety	4	20%	0.80	Bridge framing in very poor condition.
Outage Duration	3	20%	0.60	Assuming 15 days repair. Local reps are available.
Overall Criticality Rating	-	100%	**4.20**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	2.70	4.20	6.90	**High**

A.J. Brown WWTP

Clarifier #2

Inspection Date:

Facility Information	
Year Installed:	1981
Manufacturer:	
Type of Mechanism:	
Scum Baffle:	New scrapper
Weir Type:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Electrical	4	15%	0.60	• PVC conduit supports broken • PVC conduit exposed to sun • P.B.S. work • Receptacles don't work
Clarifier Mechanism	3	30%	0.90	• Drive Unit is 4 years old. • Unit si 10ft deep. • There is no way to measure how much is being wasted. • This is done using operator intuition. • The unit is an outward trough clarifier. • The scum trough and arm are old and rusted. • The upper and gear motor bull gears are new. • Only one spray nozzle is in service. • The other 3 are hard to work on since they are located under the bridge, so the City does not use them.
Scum Baffle & Scum Scraper	3	15%	0.45	• Scum scrapper is old and rusted. • Scum baffle is new. Installed about a year or two ago.
Weirs	1	15%	0.15	• Weirs are new. Installed about a year or two ago.
Structure	3	25%	0.75	• Bridge framing in very poor condition o Corroded/metal section loss – in particular bottom flange at midspan (carbon steel/painted) o Steel check plate corroded • Concrete structure good condition • Spalled concrete at stair landing
Condition Rating	-	100%	**2.85**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	4	20%	0.80	Two treatment trains present. Capacity may be split and may not have redundancy.
Process & Regulatory Impact	4	40%	1.60	Process required for regulatory compliance for suspended solids.
Safety	1	20%	0.20	Bridge framing in very poor condition.
Outage Duration	4	20%	0.80	Assuming 15 days repair. Local reps are available.
Overall Criticality Rating	-	100%	**3.40**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	2.85	3.40	6.25	**High**

A.J. Brown WWTP

Chlorine Contact Basins

Inspection Date:

Facility Information	
Notes:	
Year Built:	
Basin 1:	1981
Basin 2:	1981
Basin 3:	1994
Notes:	

Scoring Guidelines	
1	**Very good** condition; no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Basin #1	1	30%	0.30	• Basins 1 and 2 are connected. • No issues with these basins. • Floors don't drain all the way.
Basin #2	1	30%	0.30	• Minor spilling of past concrete repairs • Flatwork around basins in fair to poor condition at all basins
Basin #3 (not in service)	3	30%	0.90	• Basin 3 was added in 1994 when the City did the SO2 upgrades. • Chamber does not work and the City hardly uses it. • There is not enough contact time in the basin. • Flow not getting full 20 min contact time, so there is a high chlorine residual in the effluent with this basin. • Basin may have short circuiting.
Gates, Piping & Weirs	2	10%	0.20	• Weir plate corroded • No issues noted • Gates operable
Condition Rating	-	100%	**1.70**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	2	20%	0.40	Three basins present with only two in use at the moment.
Process & Regulatory Impact	5	40%	2.00	Disinfection and chlorine residual level required for compliance per Discharge permit.
Safety	1	20%	0.20	No safety issues
Outage Duration	1	20%	0.20	Redundancy in units present. No power required. No mechanical parts present for repair.
Overall Criticality Rating	-	100%	**2.80**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	1.70	2.80	4.50	**Moderate**

A.J. Brown WWTP

Non-Potable Water System

Inspection Date:

Facility Information	
Year in Service:	1981
Type of Facility:	
Number of Pumps:	2
Capacity:	
Horsepower:	
Location:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Pumps and Motors	4	40%	1.60	• Goulds Pumps, no tags present. • These pumps are orginal to the plant. • The one on the left/ northern pump was rebuilt 10 years ago. • There is no strainer and the pumps are leaking. • Pumps run 24/7 to provide water to the apray nozzle at the clarifier. • There is no hydroneumatic tank so pumps operate all the time. • Motors are aging
Electrical – MCC, Back-up Power, Cables	5	15%	0.75	• MCC feeding pumps is weak point, otherwise the equipment around the box is due to age • PVC coated conduit beginning to loose • Liquid tight conduit broken • Push button stations not reliable
Structure - Hatches, Corrosion, Cracks, Leaking	2	30%	0.60	• Vertical crack in one wall at top • Safety chain is rusty
Piping and Valves	3	15%	0.45	• Fair condition
Condition Rating	-	100%	**3.40**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	2	20%	0.40	Two NPW pumps present. Some redundancy provided.
Process & Regulatory Impact	2	40%	0.80	NPW not required for regulatory compliance. Used as a convenience.
Safety	1	20%	0.20	No safety issues.
Outage Duration	2	20%	0.40	Assuming 10 days to repair.
Overall Criticality Rating	-	100%	**1.80**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	3.40	0.40	3.80	**Moderate**

A.J. Brown WWTP

Chlorination System

Inspection Date:

Facility Information	
Year in Service:	Replaced 8 years ago
No. of Chlorinators:	2
Chlorinators Capacity:	500lbs/day for each
Manufacturer:	Superior Autovalve Series 2000
Notes:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Electrical	3	15%	0.45	• Push button stations not reliable • Sulffer should be outside of room
Mechanical Equipment (Chlorinators, Scales)	2	30%	0.60	• Ton cylinders on a vacuum. • Chlorinators sit in a little building. • Leak detectors are less than 2 months old. • A chlorine building is needed and City would like it across the road so Cl2 line does not cross the road. There are two scales. • Cylinders are cumbersome to switch with the jib crane. • It takes 3 operators to switch the cylinders. • Two to operate the system and one person to watch.
Structure - Ton Cylinder Storate Pad, Hoist, Chlorinator Building	2	30%	0.60	• Some cracks in loadbrg masonry walls – not significant • Overall bldg. structure in good condition • 3 ton jlb crane – fair condition – needs painting
Safety Features (Emergency Eyewash/Shower, Gas Leak Detector)	1	25%	0.25	• Leak detector present and new.
Condition Rating	-	100%	**1.90**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	2	20%	0.40	Redundancy provided with the system.
Process & Regulatory Impact	5	40%	2.00	Chlorination system required to meet regulatory compliance
Safety	1	20%	0.20	No safety issues.
Outage Duration	1	20%	0.20	Assuming less than 2 days repair.
Overall Criticality Rating	-	100%	**2.80**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	1.90	2.80	4.70	Moderate

A.J. Brown WWTP

Dechlorination System

Inspection Date:

Facility Information	
Year in Service:	Sulfonators replaced 8 years ago
No. of Sulfonators:	2
Sulfonators Capacity:	250lbs/day
Manufacturer:	Superior Autovalve Series 2000
Notes:	

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Electrical	2	15%	0.30	• Exhaust fan in room does not work • Powered from P.S. which is rated a 5 • Lighting burned out
Mechanical Equipment (Sulfonators, Scales & Piping)	1	25%	0.25	• No issues, no concerns. • Leak detectors are less than 2 months old.
Structure - Building, Hoist, Dechlorination Chamber	2	30%	0.60	• Fair Condition
Safety Features (Emergency Eyewash/Shower, Gas Leak Detector)	1	25%	0.25	• Leak detection is new
Building HVAC	5	5%	0.25	• No HVAC • Exhaust fan in sulfonator room works but louvers don't • Exhaust fan in electrical room does not work
Condition Rating	-	100%	**1.65**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	1	20%	0.20	Redundancy provided with system.
Process & Regulatory Impact	5	40%	2.00	Required for regulatory compliance.
Safety	1	20%	0.20	No safety issues.
Outage Duration	1	20%	0.20	Assuming less than 2 days repair.
Overall Criticality Rating	-	100%	**2.60**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	1.65	2.60	4.25	**Moderate**

A.J. Brown WWTP

Sludge Drying Beds

Inspection Date:

Facility Information
Year Built:
Access:
Sludge Drying Operation Sequence:
Hauler:

Scoring Guidelines	
1	**Very good** condition, no improvements recommended to maintain function
2	**Good** condition, minor improvements recommended to enhance performance
3	**Fair** condition, improvements recommended to improve performance or efficiency
4	**Poor** condition, improvements recommended to maintain reliability
5	**Very Poor**, rehabilitation or replacement required

CONDITION ASSESSMENT

Component Group	Component Condition Rating	Weight Factor	Weighted Component Rating	Comments
Structure	3	40%	1.20	• Minor concrete spalling • Few cracks in containment walls
Site Civil	1	25%	0.25	• All sludge drying beds are full. • There are 22 beds in total. • No capacity because of rain and sludge not being able to dry. • City had to rent a 2meter belt press to dewater the sludge at the time of the site visit. • The belt press will allow 8-10 beds to be cleaned. • City fills 2 beds/week during the school year.
Piping and Valves	3	15%	0.45	
Condition Rating	-	80%	**1.90**	

CRITICALITY ASSESSMENT

Criticality Paramters	Component Criticallity Rating	Weight Factor	Weighted Component Rating	Comments
Capacity Affected	5	20%	1.00	During wet weather, plant unable to sludge to dry and the sludge stays in the beds longer greatly affecting the capacity of the drying beds. When this occurs the city has to rent a belt press to help dewater the sludge.
Process & Regulatory Impact	5	40%	2.00	Dewaterring not required for regulatory compliance.
Safety	1	20%	0.20	No safety issues.
Outage Duration	5	20%	1.00	When the beds cannot be used, City has to rent a portable dewaterring system to dry sludge which it very costly. Assuming 30 out of service.
Overall Criticality Rating	-	100%	**4.20**	

RISK BASED ASSESSMENT

	Condition Rating	Criticality Rating	Overall Risk Rating	Risk Category
Example Lift Station Risk Rating	1.90	4.20	6.10	High

APPENDIX C
OPINION OF PROBABLE CONSTRUCTION COST (OPCC)

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Lizanne Douglas/John Manning	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PUMP STATION BUILDING (RAW SEWAGE) - OPTION 1 REPLACE EXISTING PUMPS AND REHAB BUILDING					
	SITE CIVIL				
1	REPLACE CORRODED PS DOOR	1	LS	$ 6,000.00	$6,000
2	IMPROVE SITE DRAINAGE	500	SY	$ 20.00	$10,000
3	ELECTRICAL MCCs DEMOLITION	1	LS	$ 30,000.00	$30,000
4	PUMP AND PIPING DEMOLITION	1	LS	$ 90,000.00	$90,000
	MECHANICAL				
5	NEW RAW SEWAGE PUMPS	4	EA	$ 47,857.50	$191,430
6	NEW RAS PUMPS	4	EA	$ 47,857.50	$191,430
7	NEW WAS PUMPS	2	EA	$ 27,000.00	$54,000
8	REPLACE ALL PIPING AND VALVES	1	LS	$ 270,000.00	$270,000
	STRUCTURAL				
9	NEW CMU ELECTRICAL BUILDING (20' x 30')	600	SF	$ 250.00	$150,000
10	CONCRETE FOUNDATION	60	CY	$ 600.00	$36,000
11	EXCAVATION	148	CY	$ 20.00	$2,963
12	BACKFILL	148	CY	$ 20.00	$2,963
	ELECTRICAL				
13	FULL REPLACEMENT OF ELECTRICAL SYSTEM				
	NEW MCCs	1	LS	$ 250,000.00	$250,000
	480V PANEL	1	LS	$ 18,750.00	$18,750
	120/208 PANEL	1	LS	$ 7,500.00	$7,500
	TRANSFORMER	1	LS	$ 7,500.00	$7,500
	SCADA	1	LS	$ 125,000.00	$125,000
	MISCELLANEOUS (DUCT BANKS ETC.)	1	LS	$ 125,000.00	$125,000
14	POWER SUPPLY AND CONTROLS FOR NEW PUMPS	1	LS	$ 247,401.00	$247,401
	HVAC				
15	ADD HEAT AND VENTILLATION IN EXISTING LIFT STATION	1	LS	$ 8,000.00	$8,000
16	HVAC FOR NEW ELECTRICAL BUILDING	1	LS	$ 25,000.00	$25,000
		SUBTOTAL:			$1,849,000
		MOBILIZATION		5%	$92,500
		SUBTOTAL:			$1,941,500
		OVERHEAD & PROFIT		18%	$332,900
		SUBTOTAL:			$2,274,400
		CONTINGENCY		30%	$682,400

PROJECT TOTAL	**$2,957,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Lizanne Douglas/Jared Barber	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
PUMP STATION BUILDING (RAW SEWAGE) - OPTION 2 NEW PUMP STATION					
	SITE CIVIL				
1	EXCAVATION/ HAULING	930	CY	$ 50.00	$46,511
2	DEWATERING	42	DAYS	$ 1,000.00	$42,000
3	SHORING	4,020	SF	$ 75.00	$301,500
4	MISCELLANEOUS SITE WORK	1	LS	$ 50,000.00	$50,000
5	ELECTRICAL MCCs DEMOLITION	1	LS	$ 30,000.00	$30,000
6	PUMP AND PIPING DEMOLITION	1	LS	$ 90,000.00	$90,000
7	DEMOLITION OF BUILDING ROOFING	2,500	SF	$ 2.00	$5,000
	STRUCTURAL				
8	CONCRETE	200	CY	$ 900.00	$180,000
9	HOIST SYSTEM	1	LS	$ 20,000.00	$20,000
10	NEW ROOFING FOR EXISTING PS BUILDING	2,500	SF	$ 8.00	$20,000
11	REPLACE WOOD SIDING	1	LS	$ 15,000.00	$15,000
12	REPLACE DOOR	4	LS	$ 6,000.00	$24,000
13	NEW FLOOR LINING	1,350	SF	$ 12.00	$16,200
14	MISCELLANEOUS STRUCTURAL IMPROVEMENTS	1	LS	$ 15,000.00	$15,000
	MECHANICAL				
15	LIFT STATION PIPING	1	LS	$ 300,000.00	$300,000
16	SUBMERSIBLE PUMP	6	EA	$ 58,500.00	$351,000
	ELECTRICAL				
17	FULL REPLACEMENT OF ELECTRICAL SYSTEM				
18	NEW MCCs	1	LS	$ 312,500.00	$312,500
19	480V PANEL	1	LS	$ 31,250.00	$31,250
20	120/208 PANEL	1	LS	$ 12,500.00	$12,500
21	TRANSFORMER	1	LS	$ 12,500.00	$12,500
22	SCADA	1	LS	$ 125,000.00	$125,000
23	MISCELLANEOUS (DUCT BANKS ETC.)	1	LS	$ 125,000.00	$125,000
	HVAC				
24	HVAC FOR EXISTING PUMP STATION BUILDING	1	LS	$ 25,000.00	$25,000

SUBTOTAL:		$2,150,000
MOBILIZATION	5%	$107,500
SUBTOTAL:		$2,257,500
OVERHEAD & PROFIT	18%	$387,000
SUBTOTAL:		$2,644,500
CONTINGENCY	30%	$793,400

PROJECT TOTAL **$3,438,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
AERATION BASINS - OPTION 1 REHAB EXISTING MECHANICAL DISC AERATION SYSTEM					
SITE CIVIL					
1	CLEANOUT EXISTING AERATION BASINS				
	GRIT REMOVAL FROM THE AERATION BASINS	285	WET TON	$ 200.00	$57,031
	GRIT TRANSPORTATION AND DISPOSAL	285	WET TON	$ 80.00	$22,813
	MISCELLANEOUS - CRANE, PUMP, DEWATERING EQUIPMENT	1	LS	$ 15,000.00	$15,000
MECHANICAL					
2	NEW ORBAL EQUIPMENT:	2	EA	$ 750,000.00	$1,500,000
	FOUR (4) 20 HP DISC AERATOR DRIVE ASSEMBLY PER BASIN				
	FOUR (4) 40 HP DISC AERATOR DRIVE ASSEMBLY PER BASIN				
	236 COMPLETE DISC ASSEMBLIES PER BASIN				
	16 SHAFTS PER BASIN				
	24 BEARINGS PER BASIN				
	8 SHAFT COUPLINGS				
3	DEMOLITION OF EXISTING ORBAL EQUIPMENT	1	LS	$ 50,000.00	$50,000
ELECTRICAL AND INSTRUMENTATION					
4	POWER SUPPLY AND CONTROL SYSTEM	1	LS	$ 350,000.00	$350,000

SUBTOTAL:		$1,994,900
MOBILIZATION	5%	$99,800
SUBTOTAL:		$2,094,700
OVERHEAD & PROFIT	18%	$377,100
SUBTOTAL:		$2,471,800
CONTINGENCY	30%	$741,600

PROJECT TOTAL **$3,214,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	A.J. Brown Wastewater Treatment Condition Assessment	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
AERATION BASINS - OPTION 2 RETROFIT WITH VERTICAL SURFACE AERATORS					
SITE CIVIL					
1	CLEANOUT EXISTING AERATION BASINS				
	GRIT REMOVAL FROM THE AERATION BASINS	285	WET TON	$ 200.00	$57,031
	GRIT TRANSPORTATION AND DISPOSAL	285	WET TON	$ 80.00	$22,813
	MISCELLANEOUS - CRANE, PUMP, DEWATERING EQUIPMENT	1	LS	$ 15,000.00	$15,000
STRUCTURAL					
2	STRUCTURAL MODIFICATIONS	1	LS	$ 750,000.00	$750,000
	NEW CONCRETE WALKWAYS & ACCESS PLATFORMS				
	BREAK IN INNER RING WALL				
	PIPING MODIFICATIONS				
MECHANICAL					
3	NEW VERTICAL SURFACE AERATOR ASSEMBLY IN AERATION RINGS	1	LS	$ 558,750.00	$558,750
	INCLUDES VERTICAL AERATORS, MOTORS, IMPELLERS, SHAFTS &				
	CONTROL SYSTEM				
4	NEW DISC AERATOR ASSEMBLY FOR DIGESTER RINGS	1	LS	$ 375,000.00	$375,000
	INCLUDES DISCS, MOTOR, SHAFTS, BEARINGS AND COUPLINGS				
5	DEMOLITION OF EXISTING ORBAL EQUIPMENT	1	LS	$ 15,000.00	$15,000
ELECTRICAL AND INSTRUMENTATION					
6	POWER SUPPLY AND CONTROL SYSTEM	1	LS	$ 350,000.00	$350,000

SUBTOTAL:		$2,143,600
MOBILIZATION	5%	$107,200
SUBTOTAL:		$2,250,800
OVERHEAD & PROFIT	18%	$405,200
SUBTOTAL:		$2,656,000
CONTINGENCY	30%	$796,800

PROJECT TOTAL	**$3,453,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Lizanne Douglas

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
AERATION BASINS - OPTION 3 CONVENTIONAL FINE BUBBLE AERATION SYSTEM					
SITE CIVIL					
1	CLEARING	1.3	AC	$ 7,700.00	$9,625
2	SITE GRADING	3,600	SY	$ 3.00	$10,800
3	NEW PAVING (CONCRETE DRIVEWAYS, SIDEWALKS, CURBS)	200	SY	$ 135.00	$27,000
4	SEEDING AND HYDROMULCHING	0.5	AC	$ 12,000.00	$6,000
STRUCTURAL					
5	CONCRETE FOUNDATION	1,750	CY	$ 600.00	$1,050,000
6	EXCAVATION	5,222	CY	$ 20.00	$104,444
7	BACKFILL	3,602	CY	$ 20.00	$72,044
8	CONCRETE WALLS	1,380	CY	$ 750.00	$1,035,000
9	NEW BLOWER BUILDING (25' X 25')	625	SF	$ 250.00	$156,250
10	MISCELLANEOUS	1	LS	$ 50,000.00	$50,000
MECHANICAL					
11	AERATION SYSTEM	1	LS	$ 1,312,500.00	$1,312,500
	SIX (6) AERATION GRIDS				
	FINE BUBBLE DISC DIFFUSERS				
	THREE (3) 200 HP TURBO BLOWERS W/ SOUND ENCLOSURE				
12	YARD PIPING	1	LS	$ 196,875.00	$196,875
13	HVAC	1	LS	$ 20,000.00	$20,000
ELECTRICAL AND INSTRUMENTATION					
14	POWER SUPPLY & CONTROL SYSTEM	1	LS	$ 500,000.00	$500,000

SUBTOTAL:		$4,550,600
MOBILIZATION	5%	$227,600
SUBTOTAL:		$4,778,200
OVERHEAD & PROFIT	18%	$860,100
SUBTOTAL:		$5,638,300
CONTINGENCY	30%	$1,691,500

PROJECT TOTAL **$7,330,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CLARIFIERS - OPTION 1 REHAB CURRENT CLARIFIERS					
STRUCTURAL					
1	NEW ACCESS BRIDGE IN CLARIFIER NO. 1	1	LS	$ 30,000.00	$30,000
MECHANICAL					
2	STAMFORD BAFFLES	2	EA	$ 40,625.00	$81,250
3	NEW SCUM SCRAPER ARM AND TROUGH	2	EA	$ 12,500.00	$25,000
		SUBTOTAL:			$136,300
		MOBILIZATION		5%	$6,900
		SUBTOTAL:			$143,200
		OVERHEAD & PROFIT		18%	$25,800
		SUBTOTAL:			$169,000
		CONTINGENCY		30%	$50,700

PROJECT TOTAL	**$220,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CLARIFIERS - OPTION 2					
SITE CIVIL					
1	CLEARING	1	AC	$ 7,700.00	$8,226
2	SITE GRADING	2,555	SY	$ 3.00	$7,664
3	NEW PAVING	100	SY	$ 60.00	$6,000
STRUCTURAL					
4	CONCRETE FOUNDATION	984	CY	$ 600.00	$590,599
5	EXCAVATION	4,737	CY	$ 20.00	$94,744
6	BACKFILL	711	CY	$ 20.00	$14,212
7	CONCRETE WALLS	504	CY	$ 750.00	$378,108
8	GROUT BOTTOM	25	CF	$ 40.00	$1,000
MECHANICAL					
9	CLARIFIER EQUIPMENT - 85' Dia	2	EA	$ 175,000.00	$350,000
	INCLUDES ACCESS BRIDGE, SCUM ARM, TROUGH, SPRAY SYSTEM				
10	YARD PIPING	1	LS	$ 52,500.00	$52,500
ELECTRICAL AND INSTRUMENTATION					
11	POWER SUPPLY AND CONTROL SYSTEM	1	LS	$ 250,000.00	$250,000
		SUBTOTAL:			$1,753,100
		MOBILIZATION		5%	$87,700
		SUBTOTAL:			$1,840,800
		OVERHEAD & PROFIT		18%	$331,400
		SUBTOTAL:			$2,172,200
		CONTINGENCY		30%	$651,700

PROJECT TOTAL **$2,824,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Lizanne Douglas	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
NON POTABLE WATER SYSTEM					
MECHANICAL					
1	REPLACE NPW PUMPS AND PIPING	2	EA	$ 15,000.00	$30,000
2	INSTALL NEW HYDRO-PNEUMATIC TANK (1,000 GALLONS)	1	LS	$ 10,500.00	$10,500
3	FOUNDATION FOR HYDRO-PNEUMATIC TANK	1	LS	$ 20,000.00	$20,000
4	NEW HYDRO-TANK AND PUMP CONTROLS	1	LS	$ 5,000.00	$5,000
5	NEW HYDRO-TANK AIR COMPRESSOR	1	LS	$ 2,500.00	$2,500
6	STRAINER - SELF CLEANING	2	EA	$ 14,400.00	$28,800
ELECTRICAL AND INSTRUMENTATION					
7	POWER SUPPLY AND CONTROL SYSTEM	1	LS	$ 35,000.00	$35,000
		SUBTOTAL:			$131,800
		MOBILIZATION		5%	$6,600
		SUBTOTAL:			$138,400
		OVERHEAD & PROFIT		18%	$23,800
		SUBTOTAL:			$162,200
		CONTINGENCY		30%	$48,700

PROJECT TOTAL **$211,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
SLUDGE HANDLING - OPTION 1 : BELT FILTER PRESS					
SITE CIVIL					
1	CLEARING	0.20	AC	$ 7,700.00	$1,540
2	SITE GRADING	223	SY	$ 3.00	$668
3	NEW PAVING	30	SY	$ 135.00	$4,050
STRUCTURAL					
4	CONCRETE FOUNDATION	120	CY	$ 600.00	$72,000
5	EXCAVATION	285	CY	$ 20.00	$5,704
6	BACKFILL	285	CY	$ 20.00	$5,704
7	NEW DEWATERING BUILDING (30' X 45')	1,350	SF	$ 250.00	$337,500
MECHANICAL					
8	ONE 1.2 METER 3-BELT FILTER PRESS	1	LS	$ 500,000.00	$500,000
9	SLUDGE PUMPS	3	EA	$ 18,750.00	$56,250
10	BELT CONVEYOR SYSTEM	1	LS	$ 18,750.00	$18,750
11	YARD PIPING	1	LS	$ 37,500.00	$37,500
12	VENTILATION SYSTEM	1	LS	$ 18,750.00	$18,750
13	CANOPY	1	LS	$ 31,250.00	$31,250
14	MISCELLANEOUS	1	LS	$ 50,000.00	$50,000
ELECTRICAL AND INSTRUMENTATION					
15	POWER SUPPLY AND CONTROL SYSTEM	1	LS	$ 250,000.00	$250,000
		SUBTOTAL:			$1,389,700
		MOBILIZATION		5%	$69,500
		SUBTOTAL:			$1,459,200
		OVERHEAD & PROFIT		18%	$262,700
		SUBTOTAL:			$1,721,900
		CONTINGENCY		30%	$516,600

PROJECT TOTAL	**$2,239,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
SLUDGE HANDLING - OPTION 1 : SCREW PRESS					
SITE CIVIL					
1	CLEARING	0.20	AC	$ 7,700.00	$1,540
2	SITE GRADING	124	SY	$ 3.00	$371
3	NEW PAVING	20	SY	$ 135.00	$2,700
STRUCTURAL					
4	CONCRETE FOUNDATION	70	CY	$ 600.00	$42,000
5	EXCAVATION	181	CY	$ 20.00	$3,630
6	BACKFILL	181	CY	$ 20.00	$3,630
7	NEW DEWATERING BUILDING (25' X 30')	750	SF	$ 250.00	$187,500
MECHANICAL					
8	ONE SCREW PRESS	1	LS	$ 437,500.00	$437,500
9	SLUDGE PUMPS	3	EA	$ 18,750.00	$56,250
10	BELT CONVEYOR SYSTEM	1	LS	$ 18,750.00	$18,750
11	YARD PIPING	1	LS	$ 37,500.00	$37,500
12	VENTILATION SYSTEM	1	LS	$ 18,750.00	$18,750
13	CANOPY	1	LS	$ 31,250.00	$31,250
14	MISCELLANEOUS	1	LS	$ 42,500.00	$42,500
ELECTRICAL AND INSTRUMENTATION					
15	POWER SUPPLY AND CONTROL SYSTEM	1	LS	$ 250,000.00	$250,000
		SUBTOTAL:			$1,133,900
		MOBILIZATION		5%	$56,700
		SUBTOTAL:			$1,190,600
		OVERHEAD & PROFIT		18%	$214,400
		SUBTOTAL:			$1,405,000
		CONTINGENCY		30%	$421,500

PROJECT TOTAL	**$1,827,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
SCREENS - OPTION 1					
MECHANICAL					
1	ONE (36" X 36") SLIDE GATE	1	LS	$ 12,500.00	$12,500
2	HANDRAILS AT MANUAL BYPASS SCREEN	1	LS	$ 2,000.00	$2,000
		SUBTOTAL:			$14,500
		MOBILIZATION		5%	$800
		SUBTOTAL:			$15,300
		OVERHEAD & PROFIT		18%	$2,800
		SUBTOTAL:			$18,100
		CONTINGENCY		30%	$5,500

PROJECT TOTAL	**$24,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
SCREENS - OPTION 2 - SECOND 10 MGD FINE SCREEN					
STRUCTURAL					
1	CONCRETE FOUNDATION	30	CY	$ 600.00	$18,000
2	EXCAVATION	629	CY	$ 20.00	$12,587
3	BACKFILL	552	CY	$ 20.00	$11,040
4	CONCRETE WALLS	50	CY	$ 750.00	$37,500
MECHANICAL					
5	ONE 10 MGD CLIMBER TYPE SCREEN	1	LS	$ 210,000.00	$210,000
6	ONE SCREENINGS CONVEYANCE AND COMPACTION UNIT	1	LS	$ 75,000.00	$75,000
7	MANUAL BYPASS SCREEN	1	LS	$ 15,000.00	$15,000
8	SLIDE GATES	2	EA	$ 12,500.00	$25,000
9	COATINGS	1	LS	$ 20,000.00	$20,000
ELECTRICAL AND INSTRUMENTATION					
10	POWER SUPPLY AND CONTROL SYSTEM	1	LS	$ 100,000.00	$100,000
		SUBTOTAL:			$524,200
		MOBILIZATION		5%	$26,300
		SUBTOTAL:			$550,500
		OVERHEAD & PROFIT		18%	$99,100
		SUBTOTAL:			$649,600
		CONTINGENCY		30%	$194,900

PROJECT TOTAL **$845,000**

NOTES:

FREESE AND NICHOLS

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OPINION OF PROBABLE CONSTRUCTION COSTS

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CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
HEADCELL GRIT REMOVAL SYSTEM					
STRUCTURAL					
1	CONCRETE FOUNDATION	40	CY	$ 600.00	$24,000
2	EXCAVATION	2,388	CY	$ 20.00	$47,763
3	BACKFILL	2,196	CY	$ 20.00	$43,923
4	CONCRETE WALLS	90	CY	$ 750.00	$67,500
MECHANICAL					
5	ONE 10 MGD HEADCELL UNIT	1	LS	$ 336,250.00	$336,250
6	ONE GRIT WASHING AND DEWATERING SYSTEM	1	LS	$ 51,250.00	$51,250
7	SLIDE GATES	2	EA	$ 12,500.00	$25,000
8	MISCELLANEOUS	1	LS	$ 60,000.00	$60,000
9	COATINGS	1	LS	$ 20,000.00	$20,000
ELECTRICAL AND INSTRUMENTATION					
10	POWER SUPPLY AND CONTROL SYSTEM	1	LS	$ 150,000.00	$150,000
		SUBTOTAL:			$825,700
		MOBILIZATION		5%	$41,300
		SUBTOTAL:			$867,000
		OVERHEAD & PROFIT		18%	$156,100
		SUBTOTAL:			$1,023,100
		CONTINGENCY		30%	$307,000

PROJECT TOTAL **$1,331,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
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Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
NEW CHLORINATION BUILDING					
SITE CIVIL					
1	CLEARING	0.20	AC	$ 7,700.00	$1,540
2	SITE GRADING	132	SY	$ 3.00	$396
3	NEW PAVING	30	SY	$ 135.00	$4,050
STRUCTURAL					
4	CONCRETE FOUNDATION	80	CY	$ 600.00	$48,000
5	EXCAVATION	185	CY	$ 20.00	$3,704
6	BACKFILL	185	CY	$ 20.00	$3,704
7	NEW CMU BUILDING (20' X 40')	800	SF	$ 250.00	$200,000
MECHANICAL					
8	MONORAIL - 2 TON	1	LS	$ 43,750.00	$43,750
9	VENTILATION SYSTEM	1	LS	$ 31,250.00	$31,250
10	TON CYLINDER SCALES	2	EA	$ 7,500.00	$15,000
11	GAS DETECTION SYSTEM	1	LS	$ 3,750.00	$3,750
12	MISCELLANEOUS	1	LS	$ 8,625.00	$8,625
				$ -	$0
ELECTRICAL AND INSTRUMENTATION					
13	POWER SUPPLY AND CONTROL SYSTEM	1	LS	$ 50,000.00	$50,000
		SUBTOTAL:			$413,800
		MOBILIZATION		5%	$20,700
		SUBTOTAL:			$434,500
		OVERHEAD & PROFIT		18%	$78,300
		SUBTOTAL:			$512,800
		CONTINGENCY		30%	$153,900

PROJECT TOTAL	**$667,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
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Outstanding service

OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
CHLORINE CONTACT BASINS - OPTION 1					
MECHANICAL					
1	CURTAIN BAFFLES (12' X 12') IN CHLORINE CONTACT BASIN NO.3	3	EA	$ 10,833.33	$32,500
2	SCUM BAFFLE	1	LS	$ 3,750.00	$3,750
		SUBTOTAL:			$36,250
		MOBILIZATION		5%	$1,900
		SUBTOTAL:			$38,150
		OVERHEAD & PROFIT		18%	$6,900
		SUBTOTAL:			$45,050
		CONTINGENCY		30%	$13,600

PROJECT TOTAL	**$59,000**

NOTES:

FREESE AND NICHOLS

Innovative approaches
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OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Murali Erat

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
DECHLORINATION SYSTEM - OPTION 1					
MECHANICAL					
1	NEW EXHAUST FAN	1	EA	$ 3,750.00	$3,750
		SUBTOTAL:			$3,750
		MOBILIZATION		5%	$200
		SUBTOTAL:			$3,950
		OVERHEAD & PROFIT		18%	$800
		SUBTOTAL:			$4,750
		CONTINGENCY		30%	$1,500

PROJECT TOTAL	**$7,000**

NOTES:

FREESE AND NICHOLS

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OPINION OF PROBABLE CONSTRUCTION COSTS

PROJECT TITLE	**A.J. Brown Wastewater Treatment Condition Assessment**	DATE	8/3/2015
CLIENT	City of Huntsville	GROUP	1150
% OF SUBMITTAL	Conceptual	PM	Lizanne Douglas

ESTIMATOR	CHECKED BY	FNI PROJECT NO.
Murali Erat	Isaac Brooks	HVL15299

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
AEROBIC DIGESTERS BASINS - WITH COARSE BUBBLE AERATION SYSTEM					
SITE CIVIL					
1	CLEARING	0.5	AC	$ 7,700.00	$3,850
2	SITE GRADING	500	SY	$ 3.00	$1,500
3	NEW PAVING (CONCRETE DRIVEWAYS, SIDEWALKS, CURBS)	50	SY	$ 135.00	$6,750
4	SEEDING AND HYDROMULCHING	0.5	AC	$ 12,000.00	$6,000
STRUCTURAL					
5	CONCRETE FOUNDATION	340	CY	$ 600.00	$204,000
6	EXCAVATION	1,121	CY	$ 20.00	$22,418
7	BACKFILL	814	CY	$ 20.00	$16,270
8	CONCRETE WALLS	700	CY	$ 750.00	$525,000
9	MISCELLANEOUS	1	LS	$ 50,000.00	$50,000
MECHANICAL					
10	AERATION SYSTEM	1	LS	$ 250,000.00	$250,000
	TWO (2) AERATION GRIDS				
	COARSE BUBBLE DIFFUSERS				
	THREE (3) 200 HP TURBO BLOWERS W/ SOUND ENCLOSURE				
11	YARD PIPING	1	LS	$ 25,000.00	$25,000
ELECTRICAL AND INSTRUMENTATION					
12	POWER SUPPLY & CONTROL SYSTEM	1	LS	$ 50,000.00	$50,000
				SUBTOTAL:	$1,160,800
				MOBILIZATION 5%	$58,100
				SUBTOTAL:	$1,218,900
				OVERHEAD & PROFIT 18%	$219,500
				SUBTOTAL:	$1,438,400
				CONTINGENCY 30%	$431,600

PROJECT TOTAL **$1,870,000**

NOTES: