FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF RECREATION & PARKS

BLUE SPRING STATE PARK
WASTEWATER TREATMENT FACILITY
PLANT
(FACILITY I.D. #: FLA011279)

STANDARD OPERATING PROCEDURES MANUAL

STANDARD OPERATING PROCEDURES (S.O.P.) MANUAL CONTENTS

INDEX

STANDARD OPERATING PROCEDURES (S.O.P.) MANUAL CONTENTS

INDEX - Continued

Standard Operating Procedures Manual

Current Permits
Chapter 1

Current Permits

Section 1.1
Domestic Wastewater Facilities Permit

1.1 Permit Renewal Schedule

BLUE SPRING State Park # 1 WWTP
Facilities I.D. # FLA011279

Description:

1. Permit Issue Date: **July 18, 2001**
2. Consultant Selection: **June 15, 2005**
3. Permit Application Documents Preparation (Begin): **9/15/ 2005**
4. Application Submittal Date: **January 15 2006**
5. Permit Expiration Date: **July 15, 2006**

1.2 Current Permit

1.3 - Operator's License

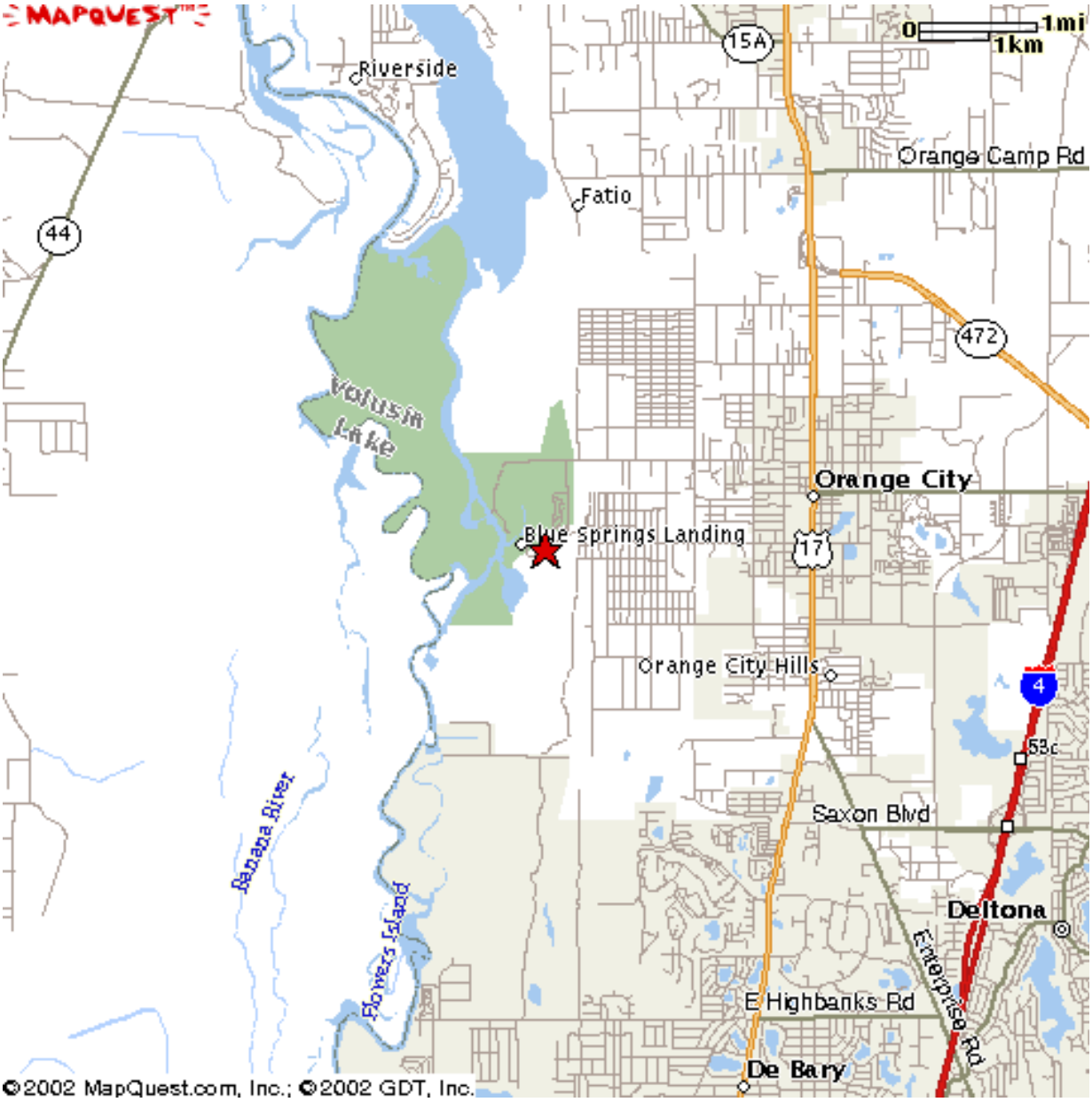
JONES, JOE ANN
Wastewater License C- 7793
3301 11TH STREET
ELKTON FL 32033

Standard Operating Procedures Manual

Site Location Map, Park Plan & Plant Configuration
Chapter 2

Site Location Map, Park Plan & Plant Configuration

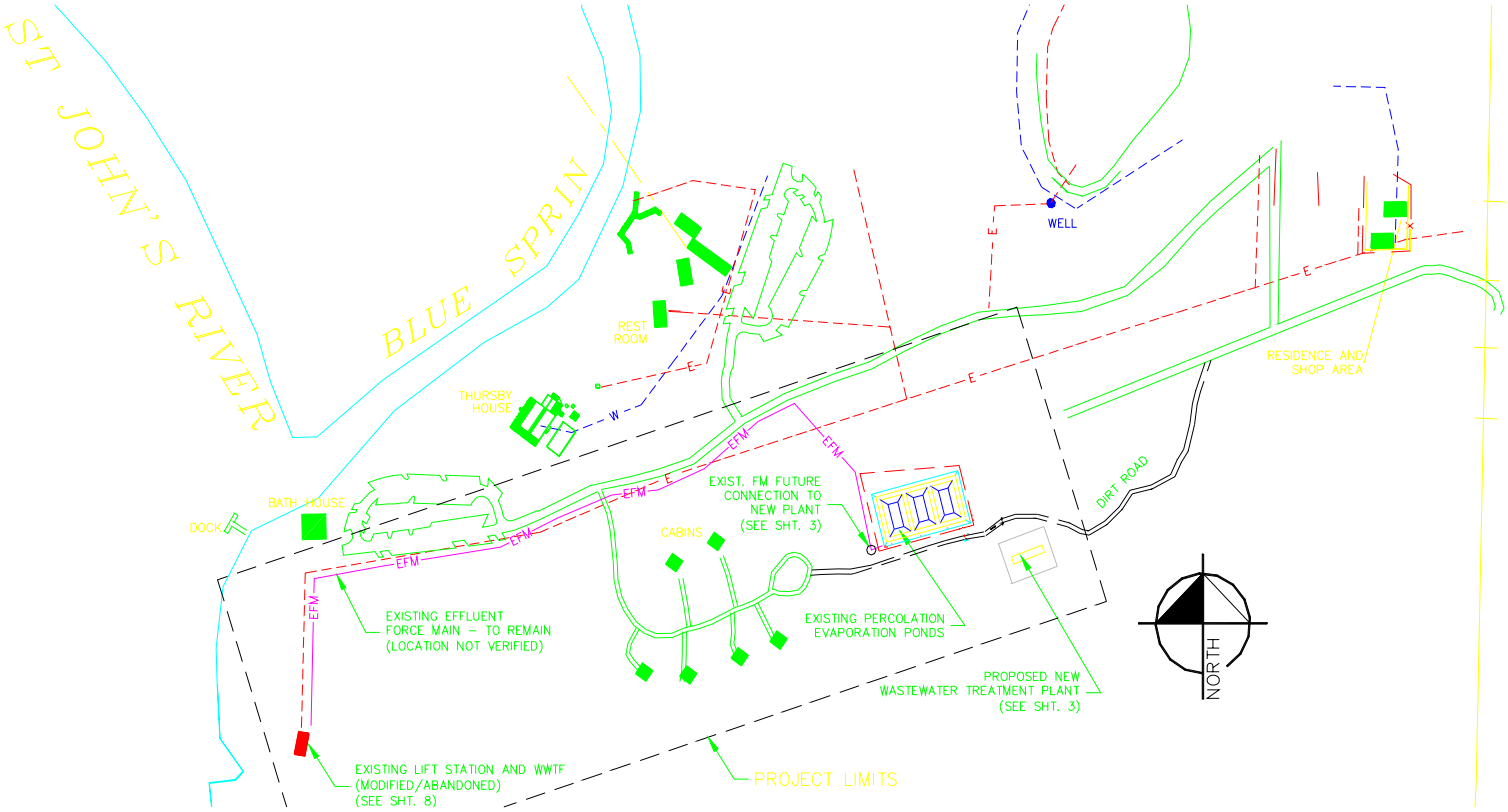
Section 2.1
Site Location Map


MAPQUEST
0
1mi
1km
15A
Riverside
Orange Camp Rd
Fatio
44
472
Volusia Lake
Orange City
Blue Springs Landing
17
Orange City Hills
4
53c
Saxon Blvd
Deltona
Enterprise Rd
E Highbanks Rd
De Bary
Flowers Island
©2002 MapQuest.com, Inc.; ©2002 GDT, Inc.

Site Location Map, Park Plan & Plant Configuration

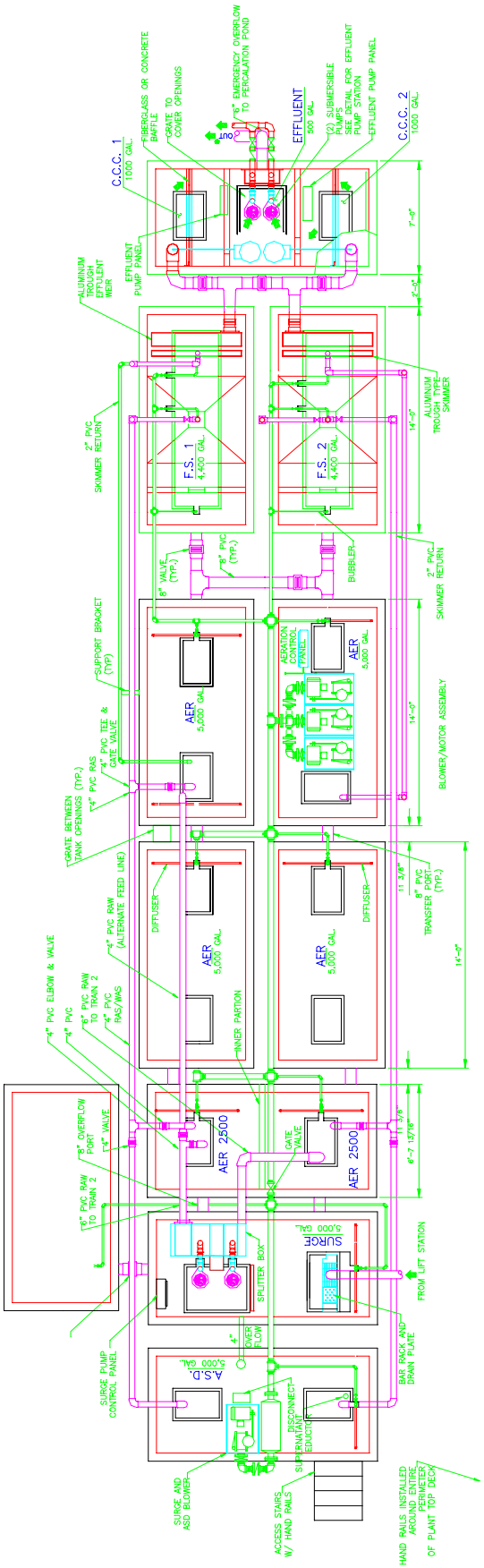
Section 2.2
Park Plan

Park Plan


ST JOHN'S RIVER
BLUE SPRIN
WELL
REST ROOM
THURSBY HOUSE
RESIDENCE AND SHOP AREA
BATH HOUSE
DOCK
CABINS
EXIST. FM FUTURE CONNECTION TO NEW PLANT (SEE SHT. 3)
DIRT ROAD
EXISTING EFFLUENT FORCE MAIN – TO REMAIN (LOCATION NOT VERIFIED)
EXISTING PERCOLATION EVAPORATION PONDS
PROPOSED NEW WASTEWATER TREATMENT PLANT (SEE SHT. 3)
NORTH
EXISTING LIFT STATION AND WWTF (MODIFIED/ABANDONED) (SEE SHT. 8)
PROJECT LIMITS

Site Location Map, Park Plan & Plant Configuration

Section 2.3
Plant Configuration


C.C.C. 1
1000 GAL
FIBERGLASS OR CONCRETE BAFFLE
GRATE TO COVER OPENINGS
3" EMERGENCY OVERFLOW TO PERCOLATION POND
EFFLUENT
900 GAL
(2) SUBMERSIBLE PUMPS INSTALL FOR EFFLUENT PUMP STATION
EFFLUENT PUMP PANEL
C.C.C. 2
1000 GAL
EFFLUENT PUMP PANEL
ALUMINUM TROUGH EFFLUENT WEIR
7'-0"
2'-0"
2" PVC SKIMMER RETURN
F.S. 1
4,400 GAL
F.S. 2
4,400 GAL
ALUMINUM TROUGH TYPE SKIMMER
14'-0"
8" VALVE (TYP.)
3" PVC (TYP.)
BUBBLER
2" PVC SKIMMER RETURN
SUPPORT BRACKET (TYP.)
AER
5,000 GAL
AERATION CONTROL PANEL
AER
5,000 GAL
3" PVC TEE & GATE VALVE
3" PVC RAS
GRATE BETWEEN TANK OPENINGS (TYP.)
14'-0"
BLOWER/MOTOR ASSEMBLY
11 5/8"
8" PVC TRANSFER PORT (TYP.)
3" PVC RAW (ALTERNATE FEED LINE)
DIFFUSER
AER
5,000 GAL
AER
5,000 GAL
DIFFUSER
14'-0"
4" PVC ELBOW & VALVE
4" PVC
3" PVC RAW TO TRAIN 2
4" PVC RAS/WAS
INNER PARTION
3" OVERFLOW PORT
4" VALVE
AER 2500
GATE VALVE
AER 2500
11 3/8"
6'-7 15/16"
3" PVC RAW TO TRAIN 2
SURGE
5,000 GAL.
SPLITTER BOX
FROM LIFT STATION
4" OVER FLOW
A.S.D.
5,000 GAL.
SURGE PUMP CONTROL PANEL
BAR RACK AND DRAIN PLATE
SUPERNATANT DISCONNECT
EDUCTOR
SURGE AND ASD BLOWER
ACCESS STAIRS W/ HAND RAILS
HAND RAILS INSTALLED AROUND ENTIRE PERIMETER OF PLANT TOP DECK

Standard Operating Procedures Manual

WWTP Operational Guide Chapter 3

WWTP Operational Guide

Section 3.1
Operational Guide

OPERATIONAL GUIDE
FOR
UTILIZING
EXTENDED AERATION ACTIVATED SLUDGE TREATMENT

3.1 - INTRODUCTION

The ownership and operation of a sewage system is a large responsibility. Through proper operation, the local ecology of the area will be safe-guarded and the health and welfare of the residents in the area will be greatly protected. This **Modular Sewage Treatment Plant** has been approved and permitted by the Florida Department of Environmental Protection (FDEP) - Domestic Wastewater Section, with permitting authority delegated to the BLUE SPRING County Environmental Protection Commission (EPC). When operated properly and maintained as provided by the manufacturer, the plant is designed by the "Engineer of Record", to fit specific rule and permitting requirements. Proper operation of the Sewage Treatment Plant assures the sanitary health and welfare of the area you serve. This will remain true when properly operated and maintained and as long as the plant is used for the design treatment loading. No other contributing wastewater flows should be introduced into the plant for treatment, nor should plant modifications be made to it's design and operation without approval and authorization by the Owner and FDEP/EPC - Domestic Wastewater Section.

SECTION 3.2 - PURPOSE & GENERAL INFORMATION

3.2.1 PURPOSE:

This Operational Guide is intended to describe Sewage Treatment Operation, Plant Start-Up Procedures, and Operation Testing and Maintenance to enable you to adequately provide sewage treatment for a long period of time with minimum operation and maintenance problems.

3.2.2 GENERAL INFORMATION:

Sewage or waste water is a combination of bodily waste and the domestic waste from park residences, business buildings, institutions, and establishments with ground surface and or storm water as may find its way into the Sewage Collecting System.. Sewage contents are generally a combination of liquids and solids. Usually the solids are less than 0.1% and are made up of inorganic and organic matter. The solids themselves are also classified as dissolved and suspended solids. Approximately 1/3 of the solids are in a suspended state and the remaining 2/3 are in solution.

Several bacteria types are commonly found in sewage. These include (1) pathogenic, (2) anaerobic, (3) aerobic;

1. The **pathogenic** class of bacteria causes or is capable of causing disease-- such as typhoid fever, dysentery, diarrhea, etc. Those bacteria may spread disease and contaminate the area through underground and surface water supply sources.
2. **Anaerobic** bacteria is a microorganism that thrives where oxygen is not available. They perform functions in the digestion and reduction of sewage
3. **Aerobic** bacteria requires free oxygen and is necessary for the nitrification and oxidation processes in the treatment of sewage.

Bacteria is responsible for the decomposition processes; when properly used and controlled, they produce the desired results in the treatment of sewage.

SECTION 3.3 - SEWAGE TREATMENT PROCESSES, PLANT STAGES & FLOW

3.3.1 SEWAGE TREATMENT PROCESSES:

In general sewage treatment processes are classified in stages or the degree of treatment afforded. The principle stages or degrees of treatment are:

(1) **Primary and Preliminary Treatment:** Typical unit processes include screening, flow equalization, and primary settling. When all unit processes are used , this type of treatment removes up to 50% of the suspended solids and 25 to 35% of the Biochemical Oxygen Demand (B.O.D.).

(2) **Secondary with Clarification:** Typical Unit Processes include aeration and settling tankage. Supplementing primary treatment, this aerobic process removes up to 90% of the suspended solids and B.O.D..

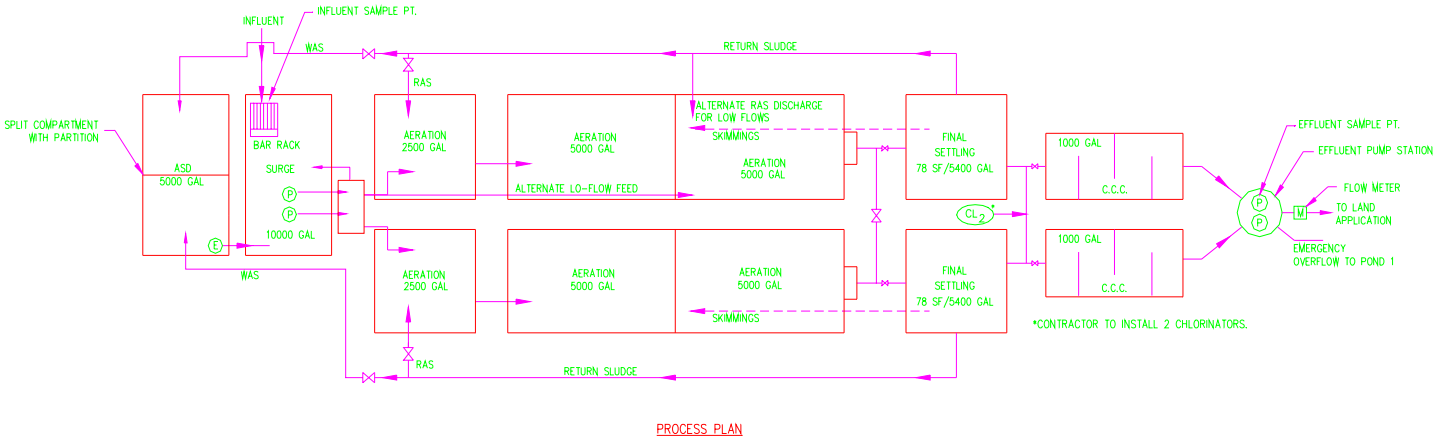
(3) **Nutrient Removal:** Typical components include an anoxic tank located either in front or in between the aeration tankage for nitrate-nitrogen reduction, and either an anaerobic tank or chemical feed system for phosphorus reduction when required.

(4) **Filtering (Tertiary) System** supplements the first two stages of treatment by removing up to 95% of the suspended solids and B.O.D through a physical filtering action. Typical unit processes include filters, filter dosing system, and filter backwashing system.

The **Blue spring State Park Sewage Treatment Plant** is designed to provide preliminary treatment via bar screening, and secondary treatment with flow equalization, aeration, dual final settling tanks, dual chlorine contact tanks, and sludge digestion.

3.3.2 PLANT STAGES & FLOW SEQUENCE

3.3.2.1 PLANT STAGES:



The Modular Sewage Treatment Plant provides the following stages of sewage treatment:

Figure No. 1 Flow Diagram of the Modular Sewage Treatment Plant

A. Influent Pump Station (located near the original historic WWTF site)
B. Aeration Tank
C. Flow Equalization Sewage Holding Tank
D. Final Settling Tank
E. Sludge Digester
F. Chlorine Contact Tank
G. Effluent Disposal

SECTION 3.4 - SETTINGS & OPERATION OF EQUIPMENT:

3.4.1 SETTINGS & OPERATION OF EQUIPMENT

The proper setting and operation of equipment will assist in obtaining treatment efficiency for the wastewater treatment facilities and provide acceptable effluent limits. It is important for the Plant Operator to set a regimen for equipment operation and make the necessary adjustments to obtain operating efficiency. The following operational sequences are intended to help the Plant Operator set and operate equipment of various plant components.

3.4.1.2 OPERATIONAL SEQUENCE:

A. Influent Pump Station

The raw sewage is received in the influent pump station. This station is located at the site of the original Blue Springs WWTF near the St John's River. Collected wastewater is discharged through a 3" force main to the flow equalization tank after passing through a bar screen. This pumping operation is automatic and is done by using electric driven submersible pumps. These pumps are of the grinder type. The pumps are controlled by four (4) mercury float switches either automatically or manually with the hand on/off switches. This pump station collects sewage flows from the entire park. .

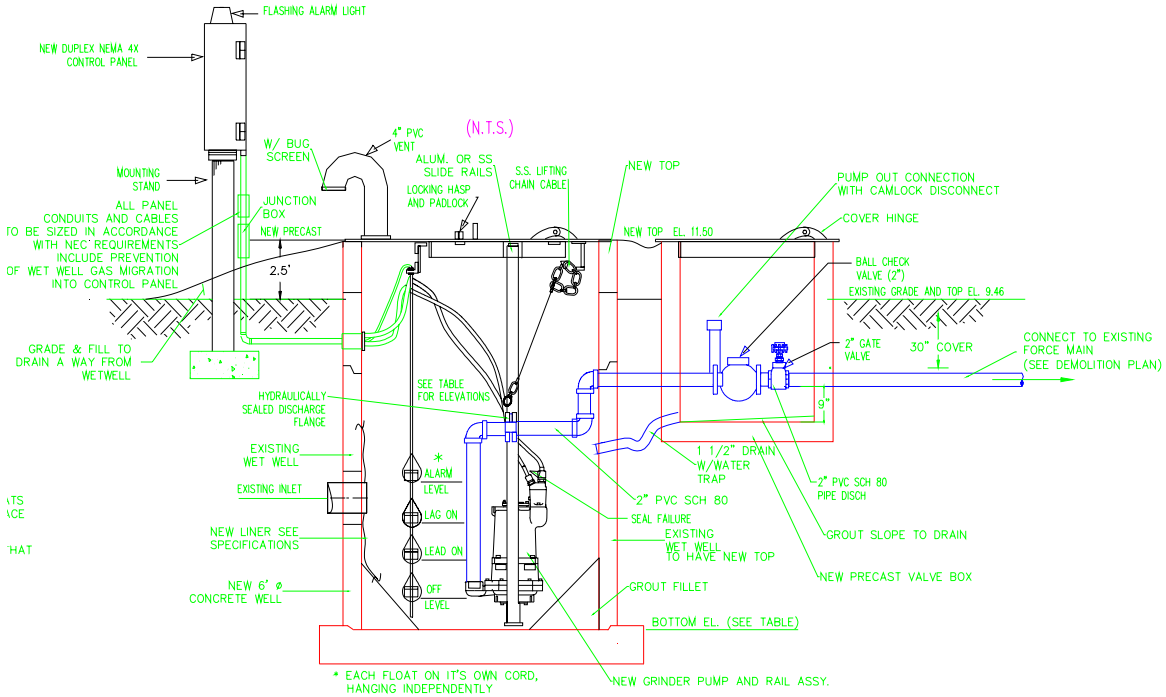
The float conditions have been set as follows: **Float #1** the low level float, turns both pumps off. **Float #2** activates the lead pump. If water level would continues to rise from an unusual flow while the lead pump is running, then **Float #3** activates lag pump. **Float #4** activates the red signal light and audible alarm in a high water condition. A alternator inside the control panel alternates lead / lag pumps each tine they are shut off. Each pump also has a run light and elapsed time meter at the panel to show when the pump is in use and it's run time.

The float switch liquid levels are established in the influent pump station to determine the PUMP ON, PUMP OFF, and the HIGH WATER POSITIONS within the wet well.

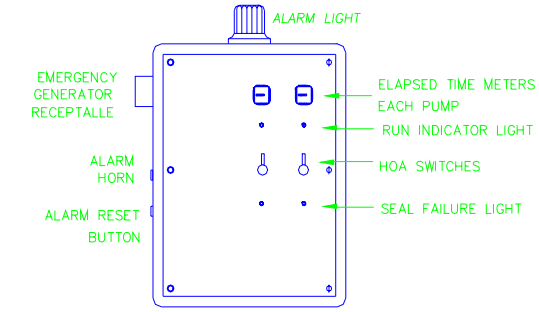
The basic components in this automatic and manually operated system include but is not limited to: Float switches, float stem with guides, alternator, elapsed time meters, over-load reset switch over-load circuit breakers, holding relay, red signal light, audible alarm and etc..

When operating the pump station, the **Float switch #2** rises to the PUMP ON POSITION, the alternator activates pump No. 1, as the lead run pump and when the liquid is lowered to the PUMP OFF POSITION, then **Float switch #1** engages control relay to then stop the pump No. 1. When the liquid rises again to the PUMP ON POSITION, the alternator then activates pump No. 2, as the lead run pump. This alternator activates the pumps in successive turns to primarily increase the life cycle of this equipment. When the pump station receives unusual high flows and **Float switch #3** reaches the HIGH WATER position both pumps are activated simultaneously by the alternator, also **Float switch #4** activates and turns on the red signal light and it's alarm on the panel box, if the liquid level continues to rise indicating trouble. The light and the alarm continues until the toggle or push button switch is replaced to the ON or RESET POSITION, and normal operations are resumed. The red light and the alarm indicates that the high water level has been reached and trouble conditions have occurred. This warns the operator that an unusual flow has occurred or the pumps are having difficulties in keeping liquid pumped down.

Figure No. 2 Influent Pump Station and Components.



WET WELL ELEVATION
(N.T.S.)



FRONT VIEW (OF OPENED PANEL)

NEMA 4X FIBERGLASS ENCLOSURE WITH PADLOCKABLE LATCHED COVER

CONTROL PANEL

B. Activated Sludge, Aeration Tankage Air Supply System

Once the raw sewage liquid has been transmitted to the aeration tanks, the first stage of the aeration treatment begins. First, the raw wastewater is f aerated in an aeration tank. This allows a certain kind of microorganism already present in the water, called aerobic bacteria, to grow. As the bacteria grow, they consume the other oxygen depleting material in the water and grow into visible "chunks" of material called floc or sludge. The term "activated sludge" comes from the this activity.

After aeration, the sludge filled water flows to a settling tank. In this tank, the sludge settles out of the water leaving a clear zone of treated water at the top and settled sludge at the bottom. The settled sludge is recycled out of the settling tank and mixed with the raw wastewater.

The clear water at the top is disinfected with chlorine, and can then be discharged.

The aerobic bacteria that causes the break-down or decomposition of the organic solids use the organic as food, as they continue to break-down additional solids. The aerobic bacteria requires oxygen in order to carry out or continue the chemical synthesis of the organic solids. If oxygen is not furnished in sufficient amounts during this break-down period, the raw sewage liquid will become septic; the color will become almost black and will emit or give off foul odors.

To avoid or help prevent the raw sewage from becoming septic, air is pumped into the aeration tanks using a blower. The aeration system performs two important functions:

1. Injects and adds oxygen to the raw sewage liquor or mixed liquor in the aeration tanks.
2. Agitates or mixes the liquid contents of the tanks.

These functions are accomplished by injecting air from the air blower through the air diffusers installed in the lower portion of the aeration tanks. The air is diffused and flows upward in the aeration tanks in the form of small bubbles. Some of the oxygen in these bubbles go into solution thereby furnishing the aerobic bacteria with the necessary oxygen to carry on the chemical breakdown.. As the air bubbles continue to rise through the aeration tank, the liquid is agitated or stirred up with a lifting effect which mixes the contents of the tank providing velocity and prevents the solids from settling.

It is necessary to supply oxygen continually to the activated sludge, or its supply will become depleted and anaerobic decomposition will begin. The activated sludge acts as a carrier for the bacteria. This sludge also attracts and absorbs the solids in the raw sewage or mixed liquor which provides the bacteria source of food. The tank contents are being agitated in a rolling and lifting effect to form the floc and prevent settling while the bacteria is being furnished oxygen.

The aeration system for the WWTP, consists of a motor with air blower, piping, valving, and diffuser units.. The air blowers (both used for primary and backup operation) provide air for surge, aeration, sludge digestor and clarifier units. The electric power for these belt driven blowers is drawn from the main control panel, as earlier mentioned. The blowers can be either operated manual with a hand off /on switch or automatically using timers. When blowers are in use, a green run indicator light located on the inner door of the control panel will illuminate. The panel also has elapsed time meters on the inner door indicating total run time of blowers. The motor is activated by the timing device located in the control box. The timer is a continuous operating device which can be set to activate the motor driven blower in increments of 15 minutes. The timer has a round dial with setting pins or latches on it. To set the timer, turn the dial in the direction indicated. The outer circumference of the dial has equally spaced pins and each pin represents 15 minutes. The Plant Operator will set the timer for efficient plant operation. All pins should be in the "DOWN POSITION" and when the operating time is

determined, place the pins in the "UP POSITION" for the selected operating time. . Front View of the Timer. Large Dial indicates hours while the smaller dial indicates days.

The amount of air to the aeration tanks can be adjusted by lengthening or lessening the period of operation. This is done by re-setting the pins to a larger or shorter time period.

The suggested settings for the automatic timers are as follows, but can be field adjusted based on the plant operator's determination for efficiency:

5:00 AM - 10:00 AM	Continuous run
10:00 AM - 1:00 PM	30 min. on - 15 minutes off
1:00 PM - 2:30 PM	Continuous run
2:30 PM - 5:00 PM	30 min. on - 15 minutes off
5:00 PM - 7:00 PM	Continuous run
7:00 PM - 9:00 PM	30 min. on - 15 minutes off
9:00 PM - 5:00 AM	15 min. on - 30 minutes off

Each air blower has a positive displacement rotary compressor operating at a fixed air volume and a fixed pressure. The air blower is belt driven by the motor. Variations of the output required by varying conditions can be made by changing the pulley sizes and the use of the timing device.

The aeration system must be adjusted and operated to provide a sufficient supply of oxygen in the tanks at all times. If sufficient dissolved oxygen in the tanks is not present, the mixed liquor becomes septic. The aeration system will operate inefficiently if too much oxygen is injected into the tanks. To much air burns the microorganism and leaves the skeleton in the liquid which creates more inactive sludge. Insufficient air causes a lack of oxygen for the bacteria which breaks up the flow and retards bacteria action. The diffusers in the aeration system may be adjusted as the conditions or the sewage change. The amount of air required varies as the characteristics of the sewage changes.

Diffusers occasionally become clogged through prolonged use and will require cleaning at intervals. If the air back pressure increases from time to time, the diffuser unit will need cleaning at more frequent intervals.

Refer to record drawings and shop drawings of wastewater plant for blower data and diffuser type.

Operating the Aeration System for Nitrogen Removal

This facility has no anoxic tankage for nitrate nitrogen removal. Special control strategies are required for nitrate control.

General

Nitrogen is present in raw wastewater in several forms; ammonia, organic nitrogen, nitrite, nitrate and nitrogen gas. Each form converts to another with the help of bacteria and plant life. This conversion is referred to as the nitrogen cycle and takes place in water and soil as well as wastewater treatment plant. TKN is ammonia plus organic nitrogen and it is this form of nitrogen that is found in raw sewage. The average amount is 30 mg/l. TKN will first be converted to Nitrite and then to Nitrate. The conversion is quick so Nitrite is generally not found in high quantities. Nitrate is then converted to Nitrogen Gas. Nitrogen re-enters the cycle when it is fixed by plant life.

TKN Removal

TKN is toxic to aquatic life. While you may not have a TKN limit as a permit condition, it is necessary

that TKN be completely reduced (<2 mg/L) in order to then successfully denitrify, or remove nitrate. If TKN removal is incomplete (a process also called nitrification), the first step is to modify the way the plant is being operated. The process of converting TKN to Nitrate is referred to as Nitrification. The bacteria that complete this conversion can be found in activated sludge if the environment is right. You will need to provide them with time to grow, oxygen and a pH above 7. In some cases, the plant will not be designed to meet the limit and a permit will be necessary to modify the plant. A microscope analyses is the best way to determine if nitrifiers are present in your activated sludge.

The pH is related to the amount of total alkalinity present in the influent. As TKN is converted to Nitrate, alkalinity drops. Eventually this will cause pH to drop below 7. If the total alkalinity is over 200 mg/l, maintaining a pH above 7 will most likely not be a problem. You may be able to use the last drinking water analyses performed on your facility to get a general idea of what your total alkalinity is.

Oxygen is related to the size of the blowers, type of diffusers, number of diffusers, and the amount of time the blowers operate. A minimum DO of 2.0 mg/l should be maintained.

Time to grow is related to the sludge age, the mean cell residency time and the mixed liquor suspended solids. Start by modifying your wasting schedule to provide a MLSS around 3,000 mg/l to provide a longer mean cell residency time.

There are several formulas which can be used to help determine if there is enough oxygen and alkalinity. You will need to have available the following information, which can be analysed either by an operator with appropriate training or may require engineering consulting assistance:

1. influent TKN (have a lab run an analyses)
2. influent Total Alkalinity
3. influent pH
4. horsepower of the blowers motor
5. total amount of time the blower runs in a 24 hour period
6. type of diffusers
7. depth of the aeration basin

Nitrate Removal - General

Nitrate is a common source of contamination to ground water. The limit for Nitrate in drinking water is 10 mg/l. High nitrates in drinking water is a threat for infants because it will build up in their blood stream and cause death from lack of oxygen. For adults it may be a carcinogen and that is why limits on wastewater effluent discharges are placed

The process of converting Nitrate to Nitrogen Gas is referred to as Denitrification. The bacteria that complete this conversion can be found in activated sludge if the environment is right. A microscope analyses is the best way to determine if denitrifiers are present in youractivated sludge. Like nitrifying organisms, you will need to provide them with time to grow, but little oxygen and a carbon source.

Time to grow is related to the sludge age, the mean cell residency time and the mixed liquor suspended solids.

Low oxygen content can be induced by the amount of time the blowers operate during a 24 hour period. The blowers should be operated with a timer which is controllable down to 15 minute increments or less. Individual diffusor valves could also be controlled with a timer. The dissolved oxygen should be allowed to drop below 0.5 mg/l during cycle off times. .

A carbon source is used by the bacteria as food. The 2 main sources of carbon found naturally in

activated sludge are from raw sewage and biological cellular decay. At some facilities, carbon is added in the form of methanol. Small facilities have experimented with using dog food as a form of carbon.

Available carbon is also related to the sludge age. When the sludge is old, higher forms of bacteria can be found. These forms of bacteria which are not denitrifiers will consume the carbon source first. Your wasting and hauling rates will effect the sludge age.

Total Nitrogen

Total Nitrogen is essentially TKN and Nitrate added together. When modifying the operation, you want to ensure that the entire nitrification cycle is taking place in the plant. First you must convert TKN to Nitrate as explained above. Then you must reduce the Nitrate to Nitrogen Gas also explained above. This is the process used at this facility.

Processes for Removing Nitrate - General Operational Guidelines

Cyclical Nitrogen Removal - There is a very simple approach to creating the anoxic times necessary for nitrate removal - The blowers are simply cycled off in a prescribed cycle.

Generally, at least 30 minutes blower off time per cycle is needed to denitrify. The exact pattern of on and off cycles is a trial and error excercise. Specialists with computer software can identify the best begining strategy.

Generally speaking, an extended aeration plant with a waste strength of around 200 mg/L BOD and up to 40 mg/L TKN, and loaded at about 60% of plant capacity will nitrify and denitrify with little difficulty. If problems are encountered, the influent should be tested for COD, BOD, alkalinity, TKN and nitrate. This data should be reviewed by an engineering consultant or operator trained to evaluate this information.

C. Flow Equalization

This facility has been equipped with flow equalization. The components consist of two interconnected 5,000 gallon surge tanks, a set of surge pumps and a flow splitter box

After passing through a bar screen, raw sewage pumps pump the flow much as a lift station does to a flow splitter box. There are some differences:

1. There is a separate off float for the lag pump. The lag and lead pump need to operate together until the off float is reached, only long enough to reduce a high water condition in the surge tank.

2. The splitter box is provided to a) split flow off to both flow trains of the wastewater plant b) to minimize the rate of flow being pumped from the surge tank to the process. The pumps will probably discharge close to 60 gpm during operation. Only about 26 gpm needs to be fed to the plant, 13 gpm through each side. The flow splitter box returns the balance of pumped flow back to the surge tank. Adjustable weirs are located in the flow splitter box. Weirs heights are intially set by the plant manufacturer. Subsequent and periodic adjustment by the operator is necessary. Using a 5 gallon bucket and a stop watch to check the rate of delivery to the plant is recommended.

3. The surge tank is aerated to control odors. A solenoid valve is used to halt the amount of air going to the plant when the liquid level is very low.

D. <u>Secondary Settling Process</u>

The mixed liquor in the aeration tank is discharged to the settling/clarifier tanks at the WWTP. The floc

or activated sludge is formed in the aeration tank and when it reaches the quiescent state of the settling tank, the sludge being heavier than the water settles to the bottom. This sludge is classified as inorganic and organic material. The inorganic sludge consists of minerals, etc. The organic solids generally contain about 65% volatile solids which support a rapid development of microorganisms. These microorganisms carry out the reduction or oxidation of the organic matter depending on the availability of atmosphere oxygen. The character of the sludge gives the most useful check for controlling plant operations. The total solids of sewage include floating solids suspended solids, and fixed solids. Operation of the plant is governed by the amount of sludge in the mixed liquor and this is determined by the Mohlmann Sludge Index. The volume of sludge settled in 30 minutes (%) divided by the suspended solids (%) gives the sludge index. A value of 100 or below indicates that the sludge will settle satisfactorily. A rising index indicates poor settling. The sludge is returned to the aeration tank or front of the plant and mixed with the incoming sewage at a range of 1 to 4 to 1 depending on the type and freshness of the sewage. When indicated by the sludge index, the sludge is drawn off the to the sludge holding tank or drying bed.

After the activated sludge has separated and clarified from the liquids in the settling tanks, and these liquid should be clear or possibly have a fine floc a few inches below the surface. This clarified liquid then flows into the chlorine contact tank of each Train for additional treatment.

The flow or the mixed liquor from the aeration tank to the settling tank with the sludge being returned to the aeration tank or the digestor is shown in Figure No. 1.

E <u>Digester</u>

The use of the digeste is important to the operation of a wastewater treatment plant. The tank provides a holding volume for waste sludge and also a means to decant the liquid so that the volume hauled off is minimized. The periodic settling of an aerobic digestor allows solids reduction. Decanted liquor is returned to the front of the plant and then aerated. This process should reduce the need for frequent hauling of sludge by thickening the residuals to 1-3. The determination of reduction of volatile suspended solids (vss) is done by calculating the vss of the return activated sludge and the vss of the thickened sludge in the digestor. When it is necessary to determine the amount of VSS reduction that is occured, care must be taken to reduce the suspended solids to nonvolatile solids before doing the calculations and to test the liquid for volatile and non volatile content.

Through biochemical processes, the organic solids are digested or broken down into simpler or more stable compounds. When the sludge has been completely digested, it is of no further use in the sewage treatment processes and is then drawn off from the digestor. The sludge age is determined by days. The sludge begins to deteriorate if left in the plant for a long period..

F. <u>Chlorine Contact Chamber</u>

The function of the chlorine contact chamber/s is to provide disinfection. The parameter range of total chlorine residual that should be maintained is 0.5-2.0 ppm. Two tanks are provided which flow to a effluent dosing tank.

The chlorination system used for this WWTP is hypochlorination, because it provides adequate disinfection of the treated effluent and is relatively safe in handling. Each CCC has its own chlorinator.

At the WWTP, the chlorine is introduced for effluent treatment (disinfection) by achieving appropriate chlorine contact and proper levels of chlorine residuals within the Chlorine Contact Chamber. .

An electrical metering pump(s) and solution holding tank(s) is supplied at the W.W.T.P.. The pump draws electric power form the main control panel. The pumps can be activated automatically or manual. When in manual mode both stroke rate and percent stroke must be adjusted by hand. The Plant Operator shall determine the correct amount of chlorine to be fed to the CCC of the WWTP, and set the stroke rate and percent stroke on the metering pump to achieve desired GPD of chlorine. (Remember the CL2 in the holding tanks are diluted with

water, the solution pumped is often 10% chlorine, this must be considered when setting pump).

G Effluent Disposal System (Percolation/Evaporation Pond)

Chlorinated effluent from the treatment plant can be discharged to the three percolation ponds adjacent to the treatment plant.

Effluent is pumped to the disposal system because 1) the original piping and distribution to the three ponds are all small diameters pipes and 2) pumping facilitates the use of an effluent turbine flow meter.

In the event of failure of both submersible pumps in the dosing tank, which operates like a lift station, water will flow by gravity to the first pond

All of the three ponds should be loaded and rested on an alternating 7 day load, 14 day rest cycle.

It is important to control vegetation in the ponds, which have a tendency to reduce percolation as well as reduce maintainability.

Annually, accumulated sludge in the bottom of the ponds should be removed.

Any overflows from the evaporation ponds shall be reported as an abnormal event to the FDEP..

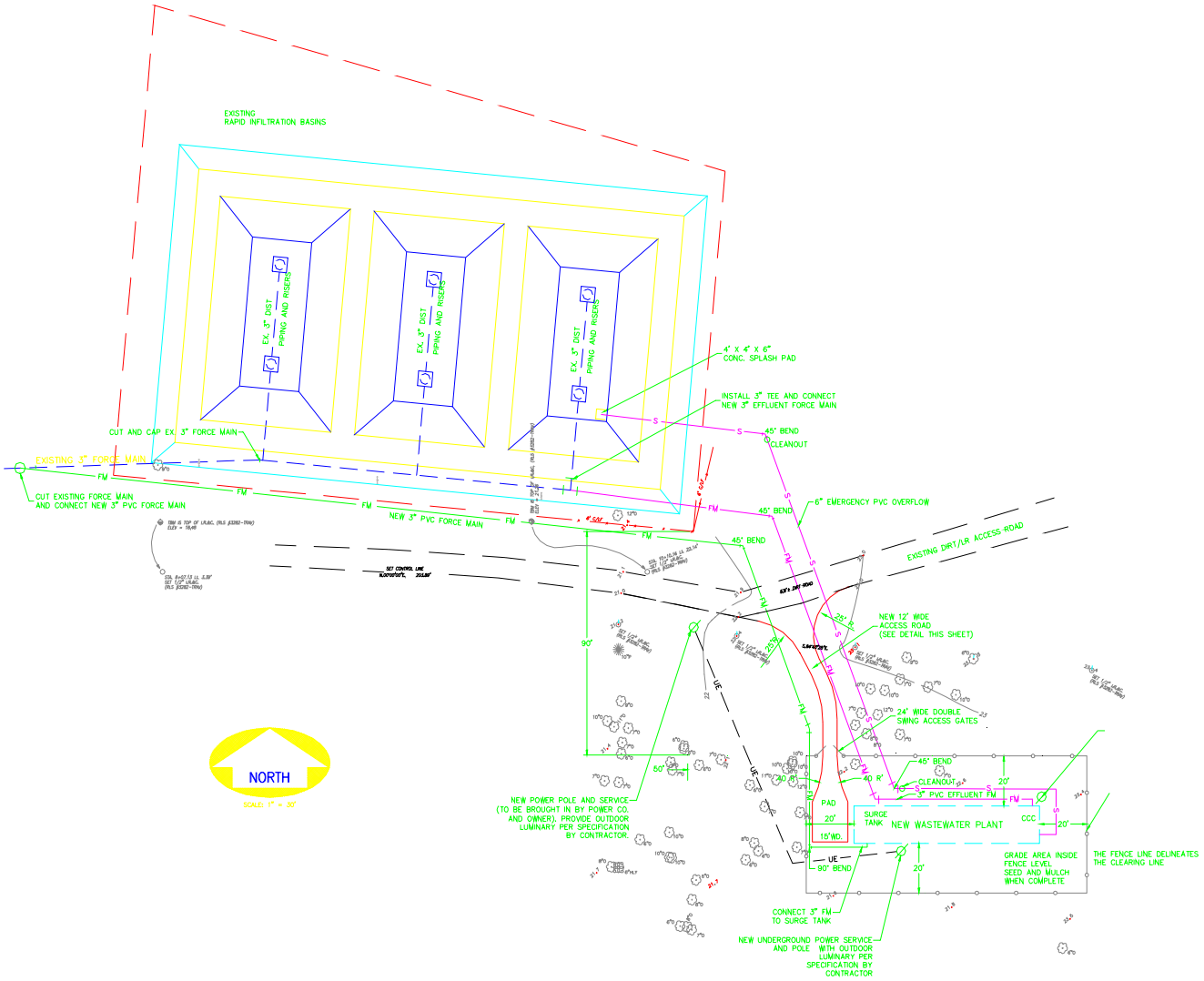


Figure 4 Effluent Disposal System

SECTION 4 - OPERATIONAL PROCEDURES:

4.1 OPERATIONAL PROCEDURES

The treatment process needs to be checked. As the flows change, the characteristics of the sewage changes which requires adjustments in operations. Operational tests are necessary to determine the characteristics of the mixed liquor in each stage of treatment so proper treatment adjustments can be made.

A. Characteristics Of The Mixed Liquor

1. Color:

The mixed liquor at first will have a dark gray appearance blending to a light brown and later to a light chocolate or a dark brown.

2. Odor:

When the mixed liquor has the lighter colors, it gives off an odor similar to dish water and possibly a fresh grease or lard odor. As the color changes to dark brown, the liquor will have a slight earthy odor.

3. Flocculation:

After the aeration tanks have been in operation, the solids will adhere and form a floc. As floc forms, it is carried to the settling tank. The liquid in the settling tank is not turbulent and the floc being heavier than the liquid, settles to the bottom of the tank.

4. Sludge:

The solids or floc is called “activated sludge”. This sludge is active and is returned to the aeration tanks a food for the aerobic bacteria. The sludge, if allowed to remain in the settling tank will become septic and rise to the surface.

SECTION 5 - CHECKS, TESTS, RECORDS, AND REPORTING:

5.1 CHECKS, TESTS, RECORDS AND REPORTING

During plant operations, the operator should be on the alert and observe each phase of treatment and immediately correct any malfunction. The Plant records should be maintained at the Park Office & at each Train.

5.1.1 CHECKS

1. Check for trash and sand accumulations in the wet well. Remove sand and trash when necessary.
2. Aeration tanks should have a smooth rolling action. Frothing or foaming is generally caused by excessive air producing a violent, turbulent action. Check floc for formation, size, and settlement.
3. Scum and / or grease should be removed from the settling tanks and promptly taken to a disposal point. The sides of the settling tanks should be scraped and the removed solids pushed downward so that they may be picked up by the sludge pump and returned to the

aeration tanks or the sludge holding tank.

4. Sludge holding tank is to be checked for volume and excess sludge drawn-off when necessary.
5. Filter components are checked operationally for proper functioning of the pumps and level controls.
6. Chlorination unit to be checked for operation.
7. Effluent from the backwash chamber should be clear with a few or no fine floating or suspended solids.
8. The stilling well should be checked each day. Solids should be collected and disposed in a covered container and disposed of in a sanitary landfill.

5.1.2 TESTS

It is realized that Operators in some sewage treatment plants have little equipment to perform elaborate laboratory tests; however, by observation, an alert operator can determine irregularities in the operations. In addition to visual observation, the following tests will be helpful in determining the efficiency of the operations.

All testing shall be performed in accordance with the permit requirement and must be performed by using approved FDEP or EPA methods.

1. **Dissolved Oxygen:**
   This test enables the operator to calculate the plant loading and to determine if adjustments in the air supply should be made. Water normally contains oxygen in solution; and when the maximum amount of oxygen is contained in solution, the water is saturated. This dissolved oxygen is consumed by the bacteria creating a deficiency in the oxygen supply. The amount of dissolved oxygen in liquid is expressed in parts per million (PPM). This test may be done by using the Dissolved Oxygen Test Kit.

   Generally, 1-2 ppm of DO is preferred in the aeration tanks within 10 minutes of blower startup. Less than 0.2 mg/L of DO should be in the anoxic tank.

2. **Carbonaceous Biochemical Oxygen Demand ($CBOD_5$) - This test must be performed by an approved lab.:**
   This lab test takes 5 days and gives a direct measure of oxidizable materials and describes the concentration or strength of sewage entering and leaving the plant. Also this test can help to evaluate the plant's operating efficiency , and whether additional aeration is needed during periods of high BOD.

   The 5-day B.O.D. denotes the treatment required. The $CBOD_5$ is the preferred test because it is nitrogen limited. The oxygen content of sewage is rapidly used up by the oxidation process of the micro-organisms. The CBOD is a measure of the oxygen required to stabilize the sewage and is expressed in milligrams per liter, 5-day B.O.D. This test is done under controlled conditions and is done in a laboratory.

   BOD tests should be taken of the influent and effluent as required by permit.

3. **Settleability:**

   This test for **settleable solids** can be done quickly and it indicates the percent (%) of settleable solids in the mixed liquor in the aeration tank. If compared with the effluent sample test, the comparative results will show how the sludge settles. Visual inspections and laboratory tests is the basis of

determining the degree of treatment being attained and corrective measures to improve the treatment. As an expedient to making some of the sludge tests, two (2) quart Mason Jars may be used (Figure No. 8) instead of some of the more expensive or 1000 ml graduated cylinders. If Mason Jars are used, they should be graduated in 10 equal spaces as shown.

A grab sample shall be taken from the outlet end of the last aeration tank/basin prior to entering the settling tank (A coffee can, fastened to a broom handle, works well for obtaining samples). Use the clear liquid from the top of the container (Graduated cylinder/Mason Jar) used to collect grab sample. On a graduated cylinder markings are present on the sides, however when using a glass jar a tape is placed and marked in 10 equal spaces. Number from 10 at the top, to 0 at the bottom.

Care must be taken to obtain the sample slowly so that it will be a true representative of the prevailing conditions. Do not include surface scum in the sample. Keep the sampler below the aeration liquid level surface (perhaps 2 feet) and remove it after the surface scum has been pushed away.

Pour the sample into the jar, along the inclined sides ,if a graduated cylinder is used, so that it does not splash and receive further aeration, at this point. Observe the time (30 minutes) allowed for the sample to set in the container. After a 30 minute settling period, the sample color and odor can be checked.

Other duties can be carried out while the sample settling period is taking place. The setteables within the sample should begin separating immediately and be well on the way in 10 minutes if everything is operating properly. A good indicator for the plant's operation will be if 20 to 40% of the sample's solids material have settled within the timed 30 minute period allowed to settle. This will vary as the solids content in the aeration tank (MLSS) varies.

The plant operator should develop a schedule which permits adequate time to take samples at a pre-determined time of a day, so that the flow and temperature will be similar, and thereby, give a good running comparison of grab samples.

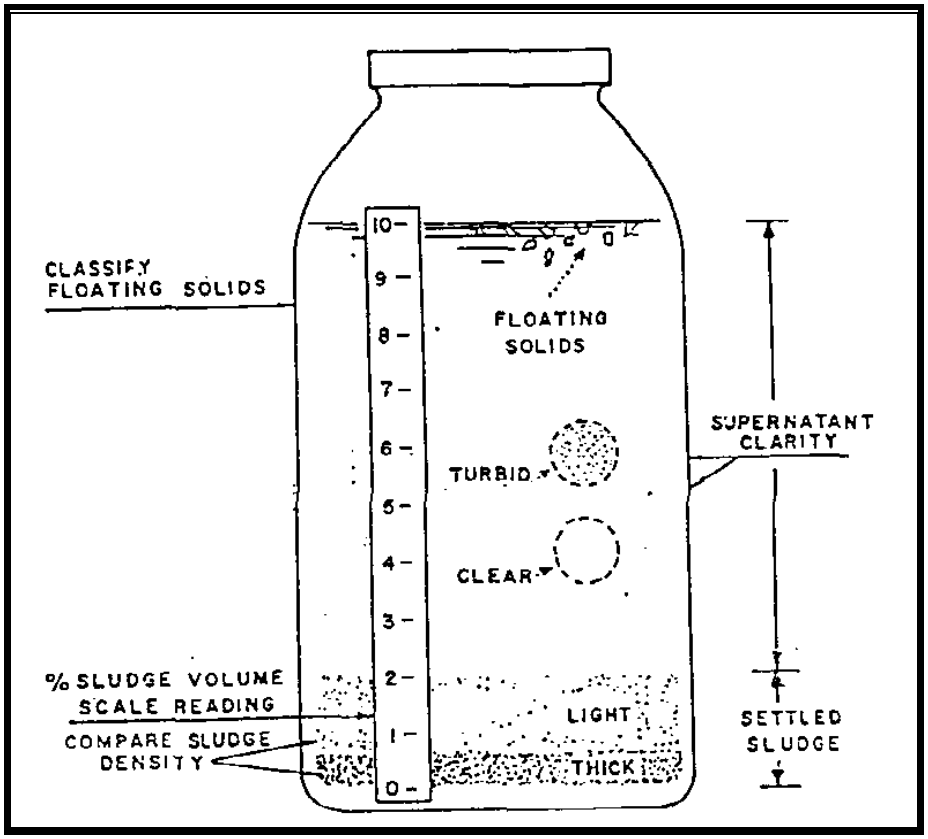


Figure No .5. Mason Jar for Minimum Operational Tests.

Mixed Liquor Suspended Solids

Periodically the MLSS should be tested by a laboratory. Twice a year is recommended as a minimum and more often if process problems are apparrent.

Generally, MLSS between 2700-4000 are acceptable. Higher values indicate wasting is needed, lower indicates insufficient solids are in the plant.

The laboratory should also check the percent Volatile: 70% is a normal value.

TEST 1 Mixed Liquor from the Aeration Tank

1. Percent of sludge volume - scale reading
   a. Type or amount of sludge - dense or light
   b. General Density - thickness
2. Clarity of liquid (supernatant) clear, cloudy, or turbid.

TEST 2 Effluent from the Settling Tank

1. Presence of settled sludge - if the sludge is not settling and being returned to the aeration tanks.
2. Clarity of the supernatant - indicated suspended solids - clear, cloudy, or dark.
3. Floating solids - type dust, floc, or none.

4. Suspended Solids - This test must be performed by an approved lab:

The test can also be made easily. The suspended solids when compared with the settleable solids indicated the suspended solid concentration and is a controlling point in plant operation. The results are indicated by determining the Mohlman Sludge Index. This index is expressed as the volume of milliliters occupied by 1 gram of activated sludge after settling 30 minutes. If a low index is indicated such as 60, 65, or 75, the sludge is settling too fast and will appear in the treated effluent. Conversely when the index range is 250 and above, the sludge becomes bulky and it will appear in the effluent. Too much sludge reduces the design capacity of the plant and adversely effects the quality of the effluent.

$$\text{Sludge index} = \frac{\text{settleable solids in ml per liter} \times 1000}{\text{ppm Suspended Solids}}$$

5. Hydrogen Ion Concentration (pH)

Field tests for pH shall be conducted using an EPA approved pH probe. This probe shall be calibrated with two known standards and temperature compensated to provide known pH values. **(Indicator kits for pH are not acceptable for testing.)** The measurement of pH must follow the criteria and requirement listed in the FDEP - Quality Assurance (QA) Manual.

5.1.3 RECORDS

A daily inspection of each unit should be made by the operator and any unusual condition recorded, faulty conditions are to be corrected immediately on so recorded. Plant Operating Data should be fully compiled and recorded each day and as determined applicable for each plant component and effluent parameters. Flow calibration, back flow certification and other tests pertaining to pH levels, Chlorine residual, sludge analysis, etc., are to be recorded so that the information can be referred to in future operations and maintenance of the plant. A current copy of the operation permit(s) for the facilities should also be made available at the plant's site.

Records of power consumption, supplies, and chemicals as well as tools and equipment acquired be kept for costing purposes.

Air temperature, wind direction, weather conditions, etc., will be helpful in investigations of nuisance complaints.

Records are necessary to:

1. Indicate whether the plant is operating properly.
2. Show necessary corrective action taken when deficiencies occur.
3. Aid in alleged pollution or nuisance complaints.
4. Assist in planning changes or adding to the plant.
5. Help in preparing monthly reports.
6. Assist in determining operation over a period of time.

5.1.4 REPORTING

Report flow, performance data as required by the FDEP permit on the required forms.

Representatives of the Florida Department of Environmental Protection - Domestic Wastewater Section can be helpful in plant operations. Get to know your local representatives. They understand the local treatment problems and can recommend necessary changes in treatment procedures.

SECTION 6 - MAINTENANCE, LUBRICATION, TROUBLE SHOOTING & PROBLEM DIAGNOSIS:

6.1 MAINTENANCE

The purpose of maintenance is to preserve and to keep the machinery in a good operating condition. The structures, decking, stairs, handrails should be clean. The surrounding grounds should be grassed with a limited number of trees and shrubs, making the plant have a PLEASING APPEARANCE, it is necessary to have PERIODIC MAINTENANCE. Periodic maintenance schedules must be made and CARRIED OUT to have a well run plant. Good housekeeping is the key to cleanliness, operation, and appearance.

Your plant is designed to operate at peek efficiency with a minimum amount of maintenance. The maintenance and appearance of your plant is indicative of the operations. In general, good maintenance - good appearance means good operations.

Maintenance can be defined as the act of preserving and the keeping in proper condition, or the work of keeping machines, structures, and grounds in good condition.

Maintenance is a continuous job. In order to be sure that all items are properly maintained, a check list should be followed. Some of the items on your check list should include the following:

A. DAILY MAINTENANCE CHECK LIST

1. Collect settling sample first. Allow 30 minutes for settling while attending to other items.
2. Clean side walls of each tank at and above water level.
3. Clean Decks and Weirs.
4. Check all equipment, pumps, motor, overload, circuit breakers, etc., for proper operations.
5. Check diffusion units for proper operation. Clean and clear plugged or clogged diffuser outlets.
6. Pump in the inlet-structure to be checked for operation.
7. Check sludge return pump flow and operation. Clean if signs of clogging are observed.
8. Inspect air blower, motor, v-belts, muffler, and filter.
9. Perform pH tests.
10. Perform chlorine residual tests.
11. Perform other tests as necessary.
12. Check chlorinator and supply.
13. Make proper entries in your daily log. The log entries shall include the record date, time, operator's initials and pertinent field notes regarding plant's normal and abnormal operation conditions.
14. Record flow from flow meter(s).

CLEAN OUTSIDE GROUNDS - TRIM AND CUT GRASS AND SHRUBS AS NECESSARY.

B. WEEKLY MAINTENANCE CHECK LIST

1. Scrape the sides and sloping bottom of the settling tank to remove any solids so that they will not decompose and turn septic.
2. Check oil level in blower timing gear housing. Add or change oil if necessary. DO NOT OVERFILL.
3. Remove floating trash from Lift Station Wet Well.
4. Remove floating trash from lift station wet well.
5. Electrical panel-control box should be checked for dryness and corrosion.

C. MONTHLY MAINTENANCE CHECK LIST

1. Clean trash and grit chamber.
2. Clean air diffusers.
3. Check painted areas for blistering, peeling, and scaling. Repaint.
4. Check safety devices. Repair if necessary.
5. Make necessary tests.
6. Make monthly report of operations.

D. SEMI-ANNUAL MAINTENANCE CHECK LIST

1. Check oil level in blower.
2. Drain and refill after 1500 hours of operation. Follow instructions in Manufacturer's Manual DO NOT OVERFILL.
3. Clean ejector pumps, remove any clogging material at the inlet and in the discharge lines.
4. Check each electrical motor to insure smooth running conditions. Have faulty wiring or contacts replaced.
5. Make summary of plant operations costs of chemicals and other costs, gallons of sewage treated, condition of effluent.
6. Clean trash and grit chamber.
7. Contact your Field Service Representative for an evaluation of your plant operations and for recommendations on improvements and adjustments.

Other items should be added to the check list as you gain experience with the plant and its peculiarities.

6.2 LUBRICATION:

A. BLOWER

Remove square head oil fill plug on rear end. Remove oil level plug at the end of gear case. Fill gear case until oil drips out of oil level hole. Recommended oil Texaco Motor Oil SAE 40 or equivalent (non-foaming) or as recommended by the manufacturer. Drain, flush, and refill every 1500 hours. BE SURE THAT THE AIR VENTS ARE KEPT OPEN AND CLEAN.

Bearings on the drive end of the blower require grease lubrication every 500 hours of operation. Bearings which requires grease lubrication will have a grease fitting. To prevent damage to grease seals, add only a small amount of grease and the grease vents must be kept open at all times. Recommended grease, Texaco Marfax Multipurpose No. 2 ball bearing grease or equivalent.

CHANGE OR ADD OIL WHEN NEEDED
CAUTION: DO NOT OVER - LUBRICATE

6.3 TROUBLE SHOOTING & PROBLEM DIAGNOSIS

6.3.1 TROUBLE SHOOTING

No matter how well your plant is designed, manufactured, and installed there will be times when additional services and changes in operational procedures will be required. When changes in operation are necessary, the operator should recognize the trouble, determine the cause, and take some corrective action. The trouble-shooting chart below is intended as an aid to the operator to detect the trouble and make corrections

before more serious troubles develop.

Influent Structure

Problem	Possible Cause	Solution
Sluggish discharge to Aeration Tank	Cloth, paper, or other material clogging pump, intake, or discharge pipe.	Clean interior pump and discharge pipe
Pump Vibrating	Impeller Sprung	Replace or repair
Odor - Flies	Septicity	Supply air if air is going to the intake structure, increase air timing cycle.

Aeration System

Problem	Possible Cause	Solution
Mixed liquor in aeration tanks not rolling even	Stoppage in diffusion tube, air pressure not equal. Compressor drive belts loose.	Check air pressure. Clean diffuser unit. Replace or tighten Drive belts - clean Filter Screen.
Motor and Blower.	Filter Screen clogged. Over-Lubrication, excess oil in timing gear case. Grease seals leaking moisture in compressor impeller. Too low operating speed.	Clean, drain, and refill. Refill to proper level. Replace seals. Clean with mineral spirits. Increase blower speed.
	Gas cock valves on diffusers closed or partially closed.	Open gas cock valves to full open position.
Lack of air volume	Slipping belts. Worn Clearances	Tighten belts. Re-establish Clearance.
Electric Motors not working	Over-load re-set buttons in off position. Over-load circuit breakers in off position.	Reset over-load reset buttons. Determine the cause for the circuit breaker to trip
Loss of oil	Head plate, gear case drive cover vents plugged. Worn seal.	Clean vents
Excessive foaming	Over aeration Excess caustics or detergents in system. Too many or not enough solids.	Reduce air timing cycle to Aeration Tanks. Disperse foam with spray nozzles. Adjust sludge wasting rate.
Excess clogging of Diffusion tubes.	Excess of solids in mixed liquor.	Draw-off sludge. Follow recommendations for sludge draw-off

Mixed liquor remaining a dishwash color and is greasy with dishwater odor. Increase in sludge index of mixed liquor	Too much air. Sewage intake partially clogged. Plant under loaded. Not enough air.	Reduce air timing cycle. Check lines for proper flow. Reduce air timing cycle. Increase air timing cycle.
Air pressure relief	Air pressure high.	Readjust valve. Replace valve seat. Check valves and put in full-open position. Clean diffusers.
Air pressure too low	Restricted or clogged air lines. Restricted or clogged diffusers. Compressor-blower too slow.	Clean lines. Clean diffusers. Increase speed of blower by changing pulleys on motor and blower.

Settling System

Problem	**Possible Cause**	**Solution**
Floating solids in settling tank.	Solids collected on sidewalls.	Scrape sidewalls at regular intervals forcing the solids downward.
Scum forming on Weir Side of Settling Tank.	Solids collecting on tank sidewall.	Clean or scrape sidewall more often until condition is corrected.
	Intake line to sludge pump clogged intake.	Clean air line and pump or restricted. Too much air. Check B.O.D. and compare with loading. Adjust air supply.
Scum forming on influent side of settling tank.	Natural occurrence	Adjust diffusers
Settling emitting odor.	Scum layer too thick.	Diffuse some air about 12-inches below surface to break-up scum. Skim scum free from liquid surface and dispose of it.
Sludge pump not working properly.	Air line restricted or clogged. Air pump intake clogged.	Clean air line. Clean pump intake.
Plant produces foul odors.	Too much air.	Reduce air supply. Clean Solids collecting on tank side side wall often until walls. Pump clogged or restricted corrected. Clean air lines and pump intakes.

LEAVES SHOULD BE REMOVED FROM TANK SURFACES IMMEDIATELY AS THEY CAN BE THE

MAIN CAUSE OF PUMP CLOGGING.

Chlorination

Too little or too much chlorine.	Improper setting of the regulator	Change dosage by holding both discs. Knurled nut is turned counter-clockwise. Rotate outside disc to change dosage.
No chlorine residual.	Regulator not properly adjusted.	Readjust regulator. Clean Chlorine feed line clogged. line. For immediate flash chlorination, place on manual operation. This allows continuous feeding. When sufficient chlorine has been supplied, re-set to Defective Chlorinator. Automatic. Repair.

6.3.2 PROBLEM DIAGNOSIS

When changes in plant operation becomes inefficient or troublesome, the operator should observe and recognize the problems, to determine the cause, and take some corrective action. The problem diagnosis checklist below is intended as an aid to the operator to detect the trouble and make corrections before more serious troubles develop.

Observation:

White, thick, billowing or sudsy foam on the aeration tank surface. (Too much food, and not enough microorganisms.)

Probable Cause	Check	Remedy
1. Overloaded aeration tank. (Low MLSS)	1. Check BOD loading. 2. Check for cloudy effluent. 3. Check D.O.	1. Stop WAS or maintain minimum WAS. 2. Maintain sufficient RAS. 3.Maintain D.O. between 1.0 - 3.0 mg/l.
2. Excessive sludge wasting tank. (Low MLSS)	1. Decrease in MLVSS. 2. Decrease MCRT 3. Increase in F/M. 4. D.O. levels. 5. Increase in WAS.	1. Reduce WAS. 2. Increase RAS 1 - 3 ft sludge blanket.

3. Toxic Waste	1. Take MLSS sample. (Look for metals. temperature & bactericide)	1. Establish new culture. 2. Enforce Industrial Waste Ordinances.
4. Hydraulic washout	1. Detention time in aeration tank. 2. Surface overflow rate in F/S.	1. Reduce RAS.

Observation:

Shinny, dark tan foam on the aeration tank surface. (Not enough food for microorganisms.)

Probable Cause	**Check**	**Remedy**
1. Aeration tank underloaded due to insufficient sludge wasting. (High MLSS)	1. Increase in MLVSS 2. Increase in MCRT. 3. Decrease in F/M. 4. DO levels.	1. Increase WAS.

Observation:

Dark brown, almost black sudsy foam on the aeration tank surface.

Probable Cause	**Check**	**Remedy**
1. Anaerobic conditions are occurring in the aeration tank.	1. Plugged diffusers. 2. Under aeration.	1. Repair diffusers or air pipe or blower/s & etc.

Observation:

Localized clouds of homogenous sludge solids rising in certain areas of the clarifier. Mixed liquor settles fairly well with clear supernatant.

Probable Cause	**Check**	**Remedy**
1. Denitrification occurring.	1. Setteability test, (stir sludge to see if bubbles are released.)	1. Stop WAS or maintain 2. Adjust RAS (Maintain sludge blanket 1 - 3 ft. in F/S.
2. Temperature currents.	1. Perform temperature and D.O. in F/S.	1. Install additional baffles
3. Solids washout hydraulic overload.	1. Check aeration tank detention time. 2. Surface overflow rate in F/S.	1. Reduce RAS. 2. Use additional aeration if available.
4. Equipment is malfunctioning.	1. Plugged RAS of WAS lines. 2. Broken Sludge collector.	1. Repair or replace the faulty equipment.
5. Equipment is malfunctioning.	1. Sludge removal rate.	1. Adjust RAS rates Maintain sludge blanket 1

- 3 ft..

2. Sludge blanket depth in F/S.

Observation:

Localized clouds of fluffy homogenous sludge rising in certain areas of the clarifier. Mixed liquor settles slowly, leaving stragglers in supernatant.

Probable Cause	**Check**	**Remedy**
1. Overloaded aeration tank. (Low MLSS)	1. Decrease in MLVSS. 2. Decrease in MCRT. 3. Increase in F/M. 4. Lower air to maintain D.O. level.	1. Decrease WAS.

Observation:

Clouds of billowing homogenous sludge rising and extending throughout the clarifier. Mixed liquor settles slowly, but supernatant is fairly clear.

Probable Cause	**Check**	**Remedy**
1. Low D.O. in aeration tank.	1. Check D.O. level.	1. Maintain 1 - 3 mg/l D.O.
2. pH in aeration is less than 6.5	1. Monitor influent pH.	1. Add alkaline agent to pH, such as caustic soda and lime.

Observation:

Clouds of billowing homogenous sludge rising and extending throughout the clarifier. Mixed liquor settles slowly, but supernatant is fairly clear. (Too much food)

Probable Cause	**Check**	**Remedy**
1. Improper organic loading.	1. Decrease in MLVSS.	1. Decrease WAS.
2. RAS.	Decrease in MCRT.	2. Temporarily increase
	3. Increase in F/M.	3. Maintain 1 - 3 mg/l D.O.
	4. Change D.O. levels.	
2. Filamentous organisms.	1. ML under microscope to determine type of organism.	1. Chlorinate influent.
		2. Chlorinate RAS.
3. Wastewater nutrient deficiencies.	1. Check nutrient levels of influent.	1. Add nitrogen, phosphorus or iron.

Observation:

Sludge clumps rising to and dispersing on the clarifier surface. Mixed liquor settles fairly well, but settled sludge rises to the surface within four (4) hours after test has been started.

Probable Cause	**Check**	**Remedy**
1. Denitrification	1. Check D.O. 2. Check R.A.S. rates.	1. Increase WAS. 2. Maintain 1 - 3 mg/l D.O.

	3. Check sludge blanket depth. depth.	3. Adjust RAS 1 - 3 ft.
2. Septicity.	1. Check mechanical function of F/S equipment, diffusers & etc..	1. Repair equipment.

Observation:

Secondary effluent from the clarifier is cloudy. Mixed liquor settles poorly, leaving cloudy supernatant. (Not enough microorganisms for food coming into the plant.)

Probable Cause	**Check**	**Remedy**
1. MLSS in aeration tank is to low.	1. B.O.D. loading.	1. Don't waste sludge.
2. Increase in organic loading.	1. Check organic loading.	1. Reduce WAS. 2. Increase R.A.S.
3. Toxic shock loading.	1. Microscope exam. (Look for inactive protozoa)	1. Reestablish new culture.

Observation:

Fine dispersed floc extending throughout the clarifier with little islands of sludge accumulated on the surface and discharging over weirs. (Bug bones, low F/M; they are eating each other.)

Probable Cause	**Check**	**Remedy**
1. Aeration approaching underloaded conditions.	1. Increase in MLVSS. 2. Increase in MCRT. 3. Decrease in F/M. 4. Decrease in WAS. 5. Decrease in organic loading.	1. Increase WAS. 2. Adjust RAS, 1 - 3 ft. depth.

Observation:

Small particles of ash-like material floating on the clarifier surface.

Probable Cause	**Check**	**Remedy**
1. Beginning of denitrification.	1. Stir sample to see if the floc will settle out and bubbles release.	1. Increase WAS. 2. Adjust RAS, 1 - 3 ft. depth.
2. Grease in the mixed liquor.	1. Perform grease analysis.	1. Find the source and stop it.

Observation:

Particles of straggler floc extending throughout the clarifier and discharging over weirs.

Probable Cause	**Check**	**Remedy**
1. Aeration tank underloaded. (Low MLSS)	1. Decrease MLVSS. 2. Decrease MCRT. 3. Increase F/M.	1. Decrease WAS. 2. Adjust RAS, 1 - 3 ft. Depth. 3. Decrease CFM.

4. Increase or decrease organic loading.

SECTION 7 - SAFETY

7.1 SAFETY:

To you, the Owner or the Operator, CLEANLINESS is the FIRST WORD IN SAFETY. A clean plant generally is a well run plant. The Regulatory Agencies require notification when a abnormal event **(Note: See Chapter 7.1 for reporting requirements)** or failure occurs at the plant.

A. FENCING OR ENCLOSURES

Fencing should be provided around the sewage treatment plant to prevent anyone from falling into the open tanks and to keep unauthorized persons from tampering with the equipment.

B. GUARDS AND HANDRAILS

All moving parts on motors, pumps, and blowers should have guards i.e. exposed motor drive shafts, shafts to pumps, pulleys and belts on the blower. Handrails may be provided around open tanks and stairwells, if required.

C. ELECTRICAL SYSTEM

Exposed wiring should be replaced. Control panel boxes are to be kept shut at all times. Protect panel boxes from the weather and keep dry.

D. EQUIPMENT

All equipment should be in good operating order. Do not work on moving equipment. Replace guards prior to operating equipment.

E. SAFETY EQUIPMENT

All safety equipment should be stored at the plant in a secure place. Gas masks, safety lines, ladders should be tested at regular intervals to see that they are in good working order.

F. IMMUNIZATION

Your own physician or your County Health Officer can advise you on the immunization shots you should have. Operations of a Sewage Treatment Plant is not dangerous but you should be protected from epidemic bacteria that you could contact.

G. CLEANLINESS

Keep the plant clean. Keep clean yourself. When making repairs or adjustments, keep as clean as you can and wash immediately when the repairs are completed.

SECTION 8 - DEFINITION & TERMS:

8.1 DEFINITION & TERMS

The following glossary includes definitions of terms commonly used in sewage treatment practices;

8.1.1 GLOSSARY

AEROBIC - A type of micro-organism that lives only in the presence of free oxygen.

ANAEROBIC - A bacteria that is able to exist without free oxygen.

AERATION - Bringing about the intimate contact of air and a liquid.

B.O.D. - Biochemical Oxygen Demand. A method of measurement to determine the proportion of waste.

BULKING SLUDGE - A phenomenon that occurs in activated sludge plants. The sludge occupies excessive volumes and does not readily concentrate.

CAUSTIC - A substance that causes burning or corroding, such as lye, sewer or pipe cleaners, etc.

C.F.M. - Cubic feet per minute

CHLORIDE - A compound of chlorine with another element.

COAGULATION - The agglomeration of clumping together of colloidal or fine suspended matter by physical or chemical action.

COLLOID - Finely divided solids which will not settle but may be removed by coagulation or biochemical action.

COMMINUTION - The process of screening sewage and cutting or grinding the screenings into particles fine enough to pass screen openings.

DIFFUSER - A porous plate or tube which air is forced into and divided into small bubbles for diffusion in liquids.

DISSOLVED OXYGEN (D.O.) - Oxygen dissolved in sewage or water and expressed in ppm.

EFFLUENT - A liquid that flows out of a containing space.

FC - Fecal coliforms

FLOC - A colony of biological life and resembles small woolly fluffy masses.

F/M Ratio - Food-to-microorganism ratio

FS - Fecal streptococci

INERT - Inactive, sluggish, devoid of active properties.

INFLUENT - Flowing in.

MCRT - Mean cell residence time

MIXED LIQUOR - The mixture found in the aeration stage of the Extended Aeration System.

M.L.S.S. - Mixed-liquor Suspended Solids.

M.L.V.S.S. - Mixed-liqour Volatile sSspended sSolids

NITRIFICATION - The oxidation of organic nitrogen into nitrates through biochemical action.

ORGANIC - Produced by, composed of containing organs.

OXIDATION - The converting of organic matter contained in sewage to a more stable or a mineral form.

pH - A method of measuring the ratio between acids and alkali.

PROTOZOA - Small one-celled animals including amoebae, cilitates, and flagellants.

R.A.S. - Return activated sludge

SLUDGE INDEX - The volume in milliliters occupied by aerated mixed liquor containing 1 gram of dry solids after settling 30 minutes.

SUPERNATANT LIQUOR - The liquor overlying deposited solids.

SLUDGE SEEDING - The inoculation of undigested sewage solids with sludge that has undergone decomposition.

SUSPENDED SOLIDS (S/S) - Solids that float on the surface of a liquid or are in suspension in the liquid.

TOTAL SOLIDS - All of the solids in sewage including suspended solids.

TURBID - Muddy; cloudy; dense; dark.

W.A.S. - Waste activated sludge

WEIR - An instrument used to govern the flow of liquid from the surface of the settling tank.

Standard Operating Procedures Manual

(Flow Calibration Methods) Chapter 4

Flow Calibration Methods

Section 4.1
Collection/Transmission System
(PUMP-DOWN METHOD)

4.1 Flow Calibration Methods (Pump-Down / Hour Meter)

This wastewater plant utilizes an inline flow meter measuring pumped effluent water to record flow. Calibration should be performed by a trained factory representative or if allowed by FDEP, readings can be compared with a pump down test of the dosing tank.

Historical records or reports of when this calibration is performed shall be kept and made obtainable for inspection at the Park t Office & plant site.

The attached form, Titled; Flow Calibration using pump down method, can be used for a reporting document.

After performing the drawdown test, the result of the volume pumped during a given period of time as directly measured and calculated in the dosing tank may be compared with the readings taken by the turbine flow meter. If within 5%, the meter can be taken to be reasonably accurate. If not accurate, the meter will need to checked to see if clogged or needing cleaning. After such inspection, retest. If accuracy is still lacking, the meter will need to be factory serviced.

The s form shall be updated and certified annually and maintained on site at the treatment plant for inspection purposes.

FLOW CALIBRATION USING PUMP DOWN METHOD
(PUMP STATION)

Wet Well Capacity **(Gallons/Foot and Gallons/Inches) for Rectangular Tank**
(Dimensions: _____ L X _____ W X _____ H):
Formula: Measures: Feet & Inches
Length _____ X Width _____ X 7.48 Gallons/CuFt = _____ Gallons/Foot
_____ Gallons/Foot divided by 12 inches = _____ Gallons/Inches

Wet Well Capacity **(Gallons/Foot and Gallons/Inches) for Circular Tank, _____ Foot Diameter**
(Dimensions: _____ Radius Squared X 3.1416 X _____ GALLONS CUBIC FT):
Formula: Measures: Feet & Inches
Radius Squared _____ X 3.1416 X 7.48 Gallons/CuFt = _____ Gallons/Foot
_____ Gallons/Foot divided by 12 inches = _____ Gallons/Inches

PUMP # 1, DATE: _____

DRAW DOWN # ____	**DRAW DOWN # ____**	**DRAW DOWN # ____**
START (DEPTH,FT.)	**START** (DEPTH,FT.)	**START** (DEPTH,FT.)
STOP (DEPTH,FT. or IN.)	**STOP** (DEPTH,FT. or IN.)	**STOP** (DEPTH,FT. or IN.)
# INCHES PUMPED	**# INCHES PUMPED**	**# INCHES PUMPED**
WELL CAPACITY (Gallon/Inches)	**WELL CAPACITY** (Gallon/Inches)	**WELL CAPACITY** (Gallon/Inches)
GALLONS PUMPED	**GALLONS PUMPED**	**GALLONS PUMPED**
TIME PUMPED	**TIME PUMPED**	**TIME PUMPED**
GALLONS PER MINUTE (GPM)	**GALLONS PER MINUTE** (GPM)	**GALLONS PER MINUTE** (GPM)
GALLONS PER HOUR (GPH)	**GALLONS PER HOUR** (GPH)	**GALLONS PER HOUR** (GPH)

AVERAGE GALLONS PER HOUR = _____

FLOW CALIBRATION USING PUMP DOWN METHOD
(PUMP STATION - CONTINUED)

PUMP # 2, DATE: _____

DRAW DOWN # ___	**DRAW DOWN #** ___	**DRAW DOWN #** ___
START (DEPTH,FT.)	**START** (DEPTH,FT.)	**START** (DEPTH,FT.)
STOP (DEPTH,FT. or IN.)	**STOP** (DEPTH,FT. or IN.)	**STOP** (DEPTH,FT. or IN.)
# INCHES PUMPED	**# INCHES PUMPED**	**# INCHES PUMPED**
WELL CAPACITY (Gallon/Inches)	**WELL CAPACITY** (Gallon/Inches)	**WELL CAPACITY** (Gallon/Inches)
GALLONS PUMPED	**GALLONS PUMPED**	**GALLONS PUMPED**
TIME PUMPED	**TIME PUMPED**	**TIME PUMPED**
GALLONS PER MINUTE (GPM)	**GALLONS PER MINUTE** (GPM)	**GALLONS PER MINUTE** (GPM)
GALLONS PER HOUR (GPH)	**GALLONS PER HOUR** (GPH)	**GALLONS PER HOUR** (GPH)

AVERAGE GALLONS PER HOUR = _____

Plant Name: _____ Plant ID # _____
Lift Station location: _____
Description: _____

	PUMP 1	**PUMP 2**
Previous Pump Calibration (GPH)		
Current Pump Calibration (GPH)		
Percent Difference - Efficiency		

Test Done By: _____ Date: _____
Company: _____ Address: _____
Phone: _____

Signature of Permittee: _____ **Date:** _____

Page 2 **12/09/98**
SOP Draft - Pump Down Form
FPS

Standard Operating Procedures Manual

Operation, Maintenance & Performance Inspections Chapter 5

Operation & Maintenance

Section 5.1
Operation, Maintenance & Performance Inspections

BLUE SPRING STATE PARK
WASTEWATER TREATMENT PLANT

5.1 This **OPERATION, MAINTENANCE & PERFORMANCE INSPECTIONS** guide is intended to help the licensed operator, engineer of record and other responsible park/recreation area personnel to evaluate the condition of the facility, and will provide reasonable assurances that the above referenced wastewater treatment facilities, both treatment and disposal components operation, maintenance, permit conditions and limitations shall be met during its approved operating period.

It is recommended that a inspection regime be established by the involved parties for the purpose of confirming that **continuos bimonthly records** are generated to verify the plant operation conditions. The primary objectives of this inspection is to make the following assessments:

1. **Evaluate the capability of the treatment and disposal facilities to function as intended.**

2. **Evaluate the physical condition of each treatment unit / component, the treatment efficiencies of each treatment process, the overall treatment efficiency of the treatment plant, performance trends and the operation and maintenance program.**

I. Treatment Facility - Extended Aeration Plant

1) The treatment facility is a previously permitted operating treatment plant consisting of concrete tanks, pumps, controls valves and piping (plastic and galvanized). Each of the facilities treatment units / components identification,, physical condition and maintenance are listed on the following form:

BLUE SPRING ST ATE PARK WWTF

OPERATION, MAINTENANCE & PERFORMANCE INSPECTION FORM

Treatment Facility - Extended Aeration Plant with a design treatment capacity of 0.025 MGD

1) The treatment facility is a previously permitted operating treatment plant consisting of concrete tanks, pumps, controls valves and piping (plastic and galvanized). Each of the facilities treatment units / components identification, physical condition and maintenance are listed on the following form:

1. Influent Pump Station & Control Panel Circular concrete enclosure with duplex submersible pump to convey raw sewage to the plant's headworks to begin treatment process. (NEMA 4, enclosure) with electrical power breakers, generator receptacle, relays, contactors and accessories.	**Hands-On-Automatic (HOA) Switches** Checked regularly for function efficiency. **Elapsed Time Meters** Checked regularly for function efficiency. **Contactors** Checked regularly for function efficiency. **Relays** Checked regularly for function efficiency. **Alternators** Checked regularly for function efficiency. **Panel Breakers** Checked regularly for function efficiency. **Pump Reset Switches** Checked regularly for function efficiency. **Indicator Lights** Checked regularly for function efficiency. **Submersible Pumps** Checked semi-annually for function efficiency. **Station Piping** Checked semi-annually for function efficiency. **Panel Wiring** Checked Monthly for function efficiency. **Alarm Horn & Light**	DATE: _____ _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____

2. <u>Surge Tank</u> Rectangular concrete tank(s) with aeration piping for plant's treatment process.	**<u>Tank</u>** Hose down tank periodically. Check Tank integrity semi-annually. Apply protective coating to tanks, when necessary. **<u>Diffusers</u>** Clean aeration line diffuser when necessary. Checked regularly for function efficiency. **<u>Aeration Piping</u>** Check and clean aeration line/s when necessary. Checked regularly for function efficiency.	DATE: _____ _____ _____ _____ _____ _____ DATE: _____ _____ _____ _____ _____ DATE: _____ _____ _____ _____ _____
3. <u>Aeration Tanks</u> Rectangular concrete tanks (3) with aeration piping (PVC) for plant's treatment process.	**<u>Tank</u>** Hose down tank periodically. Check Tank integrity semi-annually. Apply protective coating to tanks, when necessary. **<u>Diffusers</u>** Clean aeration line diffuser when necessary. Checked regularly for function efficiency. **<u>Aeration Piping</u>** Check and clean aeration line/s when necessary. Checked regularly for function efficiency.	DATE: _____ _____ _____ _____ _____ _____ DATE: _____ _____ _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____

4 <u>Secondary Clarifier (Settling) Tank</u> Rectangular concrete tank for detention area for secondary clarification through the plant's treatment process.	**<u>Tank</u>** Hose down tank periodically. Tank interior kept clean by brushing, etc. Remove trash regularly. Check Tank integrity semi-annually. Apply protective coating to tanks, when necessary. Checked regularly for function efficiency. **<u>Return Activated Sludge Line</u>** Check and clean line/s regularly. Checked regularly for function efficiency. **<u>Weirs</u>** Check and clean line/s regularly. Checked regularly for function efficiency.	DATE: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ DATE: _____ _____ _____ _____ _____ DATE: _____ _____ _____
5. <u>Aeration Motors/Blowers</u> air blowers to produce forced air through aeration lines and valves for plant's treatment process.	**<u>Blowers</u>** Check motor oil monthly. Grease quarterly. Replace belts and filters , when necessary. Checked regularly for function efficiency.	DATE: _____ _____ _____ _____ _____ _____ _____
6. <u>Aeration Lines and Valves</u> Galvanized piping aeration lines with brass gate control valves.	**<u>Aeration Piping</u>** Check and clean aeration line/s when necessary. Checked regularly for function efficiency.	DATE: _____ _____ _____ _____ _____

7. <u>Digester Tank</u> Rectangular concrete tank with aeration lines utilized for plant's treatment process and sludge holding.	**<u>Tank</u>** Hose down tank periodically. Check Tank integrity semi-annually. Check and clean R.A.S. line/s when necessary. Checked regularly for function efficiency. Apply protective coating to tanks, when necessary. • Pump out tank when needed and dispose sludge at the municipal treatment facility.	DATE: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____
8. <u>Chlorine Injector System (Hypochlorination)</u> Liquid type chlorine injection by steener pump for plant's effluent treatment process.	**<u>Chlorine Injector System</u>** Keep barrel full with solution. Replace tubing and hoses, when needed. Check and adjust dosing time as necessary to achieve proper chlorine residuals results. Keep replacement parts on hand for stenner pumps and controls. Checked regularly for function efficiency.	DATE: _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

9. <u>Chlorine Contact Chamber</u> Rectangular concrete tank with chlorine injection system for plant's effluent treatment process and introduce flows to equalization system prior to filter and disposal.	**<u>Chamber</u>** Clean out tank chambers, when necessary. Check Tank integrity semi-annually. Apply protective coating to tank, when necessary. Take BOD, TSS, PH, Chlorine, Nitrate and Fecal samples.	DATE: _____ _____ _____ _____ _____ _____ _____ _____

10. <u>Plant Blowers Control Panel</u> NEMA 4 enclosure with electrical power breakers, blowers relays, contactors and accessories.	**<u>Hands-On-Automatic (HOA)</u>** **<u>Switches</u>** Checked regularly for function efficiency. **<u>Elapsed Time Meters</u>** Checked regularly for function efficiency. **<u>Contactors</u>** Checked regularly for function efficiency. **<u>Relays</u>** Checked regularly for function efficiency. **<u>Alternators</u>** Checked regularly for function efficiency. **<u>Panel Breakers</u>** Checked regularly for function efficiency. **<u>Blower/s Reset Switches</u>** Checked regularly for function efficiency. **<u>Indicator Lights</u>** Checked regularly for function efficiency. **<u>Panel Wiring</u>** Checked Monthly for function efficiency. **<u>Emergency Generator Receptacle</u>** Checked monthly for function efficiency. **<u>Enclosure</u>** Perform routine maintenance.	DATE: _____ _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____

11. <u>Effluent Dose Control Panel</u>	**<u>Enclosure</u>**	DATE: _____
NEMA 4 enclosure with primary electrical power breakers.	Perform routine maintenance. Keep clean and paint enclosure, when needed. Replace defective or worn parts, when needed. Power supply equipment (breakers, terminals & etc.) checked regularly for function efficiency.	_____ _____ _____ _____ _____ _____ _____ _____ _____

12.. <u>Flow Equalization Tank & Control Panel</u> (NEMA 4 Enclosure) with pump's relay, contactors and accessories.	**<u>Hands-On-Automatic (HOA) Switches</u>** Checked regularly for function efficiency. **<u>Elapsed Time Meters</u>** Checked regularly for function efficiency. **<u>Contactors</u>** Checked regularly for function efficiency. **<u>Relays</u>** Checked regularly for function efficiency. **<u>Alternators</u>** Checked regularly for function efficiency. **<u>Panel Breakers</u>** Checked regularly for function efficiency. **<u>Pump Reset Switches</u>** Checked regularly for function efficiency. **<u>Indicator Lights</u>** Checked regularly for function efficiency. **<u>Submersible Pumps</u>** Checked semi-annually for function efficiency. **<u>Piping</u>** Checked semi-annually for function efficiency. **<u>Panel Wiring</u>** Checked Monthly for function	DATE: _____ _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____

14. <u>Filter Tank & Control Panel</u> Metallic enclosure (NEMA 4X, Stainless Steel) with pump/s relay, contactors and accessories. NOT APPLICABLE TO THIS PLANT	**<u>Hands-On-Automatic (HOA) Switches</u>** Checked regularly for function efficiency. **<u>Elapsed Time Meters</u>** Checked regularly for function efficiency. **<u>Contactors</u>** Checked regularly for function efficiency. **<u>Relays</u>** Checked regularly for function efficiency. **<u>Alternators</u>** Checked regularly for function efficiency. **<u>Panel Breakers</u>** Checked regularly for function efficiency. **<u>Pump Reset Switches</u>** Checked regularly for function efficiency. **<u>Indicator Lights</u>** Checked regularly for function efficiency. **<u>Submersible Pumps</u>** Checked semi-annually for function efficiency. **<u>Station Piping</u>** Checked semi-annually for function efficiency. **<u>Panel Wiring</u>** Checked Monthly for function efficiency.	DATE: _____ _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____ _____ DATE: _____ _____

14. <u>Plant Emergency Generator</u> (Standby fixed generator for emergencies when electrical power from power company is not available).	**<u>Enclosure</u>** Perform routine maintenance including periodic testing and exercising of system in accordance with manufacturer recommendations. Keep clean and paint enclosure, when needed. Replace defective or worn parts, when needed. Power supply equipment (fuses, terminals & etc.) checked regularly for function efficiency.	DATE: _____ _____ _____ _____ _____ _____ _____ _____ _____

15. <u>Effluent Disposal Ponds</u> .	Check system daily. Check water elevation daily to determine whether system is functioning efficiency. Maintain and cut grass in berms regularly to prevent high growth. Repair pipe breaks, when necessary. Checked regularly for function efficiency. Operate as per recommendations of Engineer of Record.	DATE: _____ _____ _ _____ _ _____ _ _____ _ _____ _ _____ _ _____ _ _____ _ _____ _ _____ _ _____ _ _____ _ _____ _

GRAVITY SEWER SYSTEM

System Description:

8" gravity sewer system serving the Park. See Record drawings for layout.

Pump Stations:

See WWTP discussion for pump station information.

O&M Requirements:

Annually inspect all manholes for signs of accumulated grit and debris. Pump and remove in accordance with standard industry practice and safety measures.

Biannually lamp maholes to verify no breaks or intrusions in sewer system or accumulations of debris. Pig lines as often as such inspections indicate are necessary.

Inspect service connections and cleanouts to ensure tight connection made, caps on, and no stormwater intrusion through cleanouts.

Standard Operating Procedures Manual

Record Keeping
Chapter 6

6 .0 Required Documents to Maintain:

- Current permit
- Record Drawings
- Operation and Maintenance Manual
- Operator's Log Book
- Monthly Operating Report Data (Forms and Laboratory Data)
- Flow Meter Calibration Certificate
- RPZ Certification
- Latest Sludge Analysis if required by permit
- Current Sludge Hauler's and Residuals Management Facility Agreement
- Sludge Hauling Records on Approved Form

Record Keeping

Section 6.1
Sample Custody & Documentation

6.1 SAMPLE CUSTODY AND DOCUMENTATION

The following discussions outline the minimum record keeping requirements as they relate to sample collection, sample handling and sample analysis activities. The protocols and requirements outlined in this section emphasize the use of unequivocal, accurate and methodical records to document all activities affecting sample data.

Additional requirements may be imposed by specific DEP programs (e.g. Drinking Water) or other agencies (e.g. HRS, EPA, etc.). If applicable, the organization shall meet the DEP QA requirements and the additional or more stringent requirements of the other programs or agencies.

There are two levels of custody: 1) Sample custody or tracking and 2) Legal or evidentiary chain of custody.

1. Sample custody or tracking is required by DEP. It includes all records and documentation necessary to trace a sample from point of origin through final report and sample disposal. Sample custody requires that each event or procedure to which the sample is subjected be documented. These include, but are not limited to: sample collection, field preservation, sample receipt and log in, sample preparation, sample analysis and sample disposal. In addition, those tasks or activities that relate to each of the above-mentioned events (e.g. reagent preparation, calibration, preventive maintenance, quality control measures, etc.) must be documented/ The history of the sample must be readily understood through the documentation.

2. Legal or Evidentiary **Chain of Custody (COC)** is a special type of sample custody which requires that the physical possession, transport and storage of a sample be documented in writing. The records must account for all periods of time from sample container acquisition through sample disposal. COC protocols are not required by the Department, But are recommended. If implemented, the minimum documentation requirements outlined in section 6 must be followed.

GENERAL REQUIREMENTS FOR CUSTODY AND DOCUMENTATION

<u>Record Keeping System Design - General Requirements</u>

Each organization shall design and maintain a record keeping system that is succinct and efficient:

1. All records shall be maintained in a manner which facilitates documentation tracking and allows historical reconstruction of all analytical events and ancillary procedures that produced the resultant sample analytical data.

2. The system shall unequivocally link all documentation associated with a sampling event from sample collection through the final analytical result and sample disposal. This may be accomplished through either direct or

cross-references to specific documentation.

3. The system shall be straightforward and shall facilitate the retrieval of all working files and archived records for inspection and verification purposes.

4. Final reports, data summaries, or other condensed versions of data that have been prepared by external parties shall be linked to internal records by an unequivocal cross-referencing mechanism (usually field and/or laboratory ID numbers).

5. Records of monitoring information shall include:
the date, exact place, and time of sampling or measurement;
the person responsible for performing the sampling or measurement;
the date(s) analyses (field or laboratory) were performed;
the person responsible for performing the analyses;
the analytical techniques or methods used; and
the results of such analyses.

6.1.2 Documentation Criteria - All records of monitoring must be retained for at least three (3) years.

1. The history of a sample must be clearly evident from the retained records and documentation. Copies or originals of all documentation which are associated with the analysis or sample collection event must be kept. This includes the documentation that is sent to or received from all sampling and analysis organizations.

2. All applicable documentation specified in this section shall be available for inspection during any sampling-site, facility (laboratory or offices) or data audit conducted by authorized representatives of DEP.

3. The records must contain enough information so that excessive clarifications, interpretations or explanations of the data are not required from the originator.

4. All documentation and record entries shall clearly indicate the nature and intent of each entry.

   a. All documentation entries shall be signed or initialed by responsible staff. The reason for the signature or initials shall be clearly indicated in the records (e.g. sampled by; prepared by; reviewed by; etc.).

   b. Often documentation requirements can be met by making brief references to the standard operating procedures manual written or other approved methodology promulgated by external sources. If these standard procedures are

routinely repeated in your operations (e.g. sample preparation procedures, decontamination protocols, analytical method, etc.), then citing these references may be appropriate. Such citations must specifically identify the document, method of SOP, and must include the revision number or revision date. Copies of all revisions must be retained as part of the laboratory documentation.

6.1.3 Record-keeping Protocols

1. Entries into all records shall be made with waterproof ink.

2. Entries in records shall not be obliterated by erasures or markings. All corrections to record-keeping errors shall be made by one line marked through the error. The individual making the correction shall sign (or initial) and date the correction.

3. All reports submitted to the Department shall be submitted with original signatures.

Record Keeping

Section 6.2
Preparation of Field Sampling Supplies and Equipment

6.2 PREPARATION OF FIELD SAMPLING SUPPLIES AND EQUIPMENT

Note: field sampling and testing requirements of the FDEP are subject to periodic change. Use latest guidelines as may be provided by the FDEP.

All parties providing sample containers, preservation reagents or sampling equipment shall maintain tracking records.

A system of records or codes shall be designed to link cleaning records, preservation or reagent preparation records and trip blanks (if applicable) to the associated equipment, containers, preserved containers, analyte-free water and preservatives which may be shipped in sampling kits.

These records shall be maintained by the party responsible for providing any or all of the above-mentioned equipment, containers and/or reagents.

6.2.1 Content Requirements For Sampling Kit Documentation

The contents of each prepared sampling kit (see Appendix A for definition) shall be documented. A packing list or similar record shall be transmitted to the receiving party with the sampling kit and a copy or other record shall be retained by the preparing party.

6.2.1.1 The following information shall be transmitted to the receiving party:

a. Quantity, description and material composition of all containers, container closures or closure liners (if method specified) and all sampling equipment;

b. Intended application for each container type indicated by approved analytical method or method group;

c. Type and concentration of preservative added to clean sample containers and/or shipped as additional preservative;

d. Intended use of any additional preservatives or reagents;

e. Description of any analyte-free water (i.e. deionized, organic-free, etc.);

f. Types and number of any quality control blanks (e. g., trip blanks);

g. Date of kit preparation; and

h. Description and material composition of all reagent transfer implements, e.g., pipettes, shipped in the kit.

This information may be in the form of a packing slip.

6.2.1.2 In addition to maintaining records of the above information, the preparing party shall maintain records or cross reference links of the following information:

a. Lot numbers of any commercially obtained sources of analyte-free water (if provided);

b. Material composition of all reagent and analyte-free water containers (if provided);

c. A code or reference (i.e., lot numbers) to dates in container and/or equipment cleaning logs;

d. A code or reference that links preservatives to preparation logs for preservatives or vendor lots;

e. Name of receiver of kit;

f. Project name for kit use, if known;

g. Name of individual(s) preparing the kit; and

h. Date the kit was shipped or provided.

6.2.1.3 If the sampling kits are prepared for internal use (i.e. they will not be shipped to any external party, including branch offices of the same organization) and the sampling kits are used for collecting routine (i.e. daily, weekly, monthly or yearly monitoring) samples, the records in 6.2.1.1 and 6.2.1.2 may be reduced to the following:

a. The cleaning records for sampling equipment and /or sample containers (see 6.2.3 below) shall indicate who received the cleaned containers or equipment and the date of receipt.

b. The preservation and/or reagent preparation records shall indicate that the preservative or reagent was prepared for use in the field.

6.2.2 Documentation for Preservatives

Sample preservatives and other reagent preparations shall be traceable to preparation dates and vendor sources and/or lot numbers.

6.2.3 Documentation of Cleaning Procedures for Sampling Equipment and containers for Samples, Reagents and Analyte-Free Water

Records shall be maintained for all container or equipment cleaning. This requirement shall apply to all containers and

equipment cleaned or prepared for use in field sampling activities. Field-meter probes or other devices contacting the sample or sample source are also included in this category:

1. The material composition, size and any other description of all sample, preservative or analyte-free water containers, container closures and closure liners or sampling equipment cleaned or prepared;

2. A detailed, step-by-step description of the cleaning protocols including cleaning agents, water types or other reagents used in the procedure. Reference to internal SOPs may be used (see 6.1.2.4.b);

3. Date of cleaning;

4. Individuals (s) responsible for cleaning;

5. Storage conditions (i.e. wrapped in foil, boxed, etc.) shall be described (internal SOPs may be referenced);

6. Storage location for cleaned containers and equipment;

7. Unique ID numbers or codes assigned to individual containers or pieces of equipment;

8. The number of cleaned containers or equipment if prepared or cleaned in groups or lots (i.e., cleaned or prepared in the same session, using the same lots of cleaning materials). A group or lot number may be assigned., This code must be linked to any individual Ids (if used), the cleaning date (see 6.2.3.3 above) and any sampling kit Ids and records.

9. Any quality control information concerning the cleanliness of the containers and/or equipment must be retained and must be linked to the set (see 6.2.3.8).

10. The intended end use of the equipment and/or containers shall be indicated (e.g. Teflon bailers cleaned for organics; 30 plastic containers cleaned for metals, etc.).

Record Keeping

Section 6.3
Custody and Documentation Requirements for Field Operations

6.3 CUSTODY AND DOCUMENTATION REQUIREMENTS FOR FIELD OPERATIONS

The following documentation requirements shall be followed for all field-sampling operations.

6.3.1 General Protocols

1. Copies of all COC forms (if applicable) or sample transmittal forms shall be maintained with project records. If the sampling and analysis activities are performed by the same organization at the same physical location (e.g. wastewater sampling and analysis and if all records are maintained in a central location, a single copy of the COC form (if used) or the laboratory transmittal form may be retained.

2. Entries into all field records shall be made with waterproof ink.

3. Errors in all documents shall be deleted with one line (see Section 6.1.3.2).

4. All documentation/logs shall be signed/initialed by the appropriate personnel.

5. It is recommended that all time be recorded using 24 hour notation (e.g., 2:00 PM is 1400 hours).

6.3.2 Sample Identification Requirements

1. All sample containers must be labeled (tagged).

   a. At a minimum, the label or tag shall identify the sample with the field ID number.

   b. Additional information (i.e. preservation, sampler's name, etc.) may be included as a part of the tag or label.

   c. The label or tag shall be attached so that it does not contact any portion of the sample that is removed or poured from the container.

2. The Field ID number shall be a unique number or code that is assigned to EACH sample container. The assigned code must unequivocally link the collected sample to the time or date of sampling, and may include information concerning the location of the sampling point. Samples that are routinely collected from the same location must be identified by more than the designated location code.

3. At a minimum, the ID numbers must be recorded on all sample tags (or labels), in the field records, and on all transmittal records or COC forms.

4. Ancillary records (photographs, videotapes, maps, etc.) must be easily traced to specific sampling events and are subject

to the same custody requirements as other records discussed in this Section.

6.3.3 Required Documentation

All activities related to sampling events shall be documented in the field records. At a minimum, the types of records that must be maintained include, but are not limited to the following:

1. Sample labels/tags (with identifying ID#s).

2. Sample seals (if required).

3. Sample transmittal forms (or COC forms).

4. Field sheets, logs, notebooks or other records.

6.3.4 Required Information

6.3.4.1 Sample Transmittal Records

All samples that are submitted to a laboratory must be accompanied by a sample transmittal or Chain of Custody record . This record may be designed as individual forms for each sample or a summary form for a set of samples. AT A MINIMUM, the information transmitted to the laboratory shall include:

a. Site name and address (Client Code may be acceptable if samples are considered sensitive information and if the field records clearly trace the code to a specified site and address).

b. Date and time (military time preferred) of sample collection.

c. Name of sampler responsible for sample transmittal.

d. Field ID#(s) (see 6.3.2 above).

e. Number of samples.

f. Intended analyses - The analytical method number shall be listed if the sample results are related to a QAPP or other document (e.g. DEP Rule or permit) which specifies the method to be used.

g. Preservation (may be indicated on sample label/field sheets).

h. Comments section (about sample or sample conditions).

i. Appropriate place for identification of common carrier (if used).

6.3.4.2 Field Records

The following information must be documented in the records maintained by the sampling organization. This information may be recorded in bound notebooks or on field sheets that have been designed for a specific purpose. All loose records (i.e. field sheets, photographs, etc.) shall be unequivocally linked to the sampling event by code, facility name and/ or client name and address.

a. General Information - the following information shall be recorded for all sampling events:

1. Names of all personnel and visitors on site during sampling.

2. Date and time (military time preferred) of sample collection.

3. Ambient field conditions, to include, but not limited to information such as weather, tides, etc.

4. Specific description of sample location including site name and address. The specific sampling point must be further identified.

5. Field ID# (see 5.3.2 above) for each sample container and parameters to be analyzed.

6. Field measurement data (e.g., pH, specific conductance, etc.)

    a. Records shall indicate when measurements were taken; and

    b. Calibration information to include: time of all calibrations or calibration checks, concentration(s) of standards and calibration acceptance (information may be kept in a separate calibration log)

7. Sample sequence - identify the order in which each sample is taken (time of sample collection is acceptable).NOTE: If the collection time is used, the time that each sample aliquot is collected (i.e. VOC, metals, nutrients, etc.) MUST BE NOTED.
8. Preservative used - information must include, but is not limited to:

    a. Preservative name;
    b. pH verification (if applicable);

c. Amount/quantity of preservative that is added (if adding preservatives in the field); and;
d. Amount/quantity of additional preservative that is added (if using sample containers with premeasured preservatives).

9. Purging and sampling equipment used (ID# if applicable).

10. Field decontamination performed. All field-sampling equipment decontamination, whether performed in the field, on site or in a headquarters facility or laboratory, must be documented per 6.2.3 above.

11. Types of QC samples collected. Include when and where collected. Include when and where collected, preservative (if applicable) and type (e.g. , trip blank, equipment blank, duplicate, etc. QC samples must be documented in the same manner as all other samples.

12. Use and location of fuel powered units (if applicable).

13. Composite samples (if collected) shall indicate number of samples in the composite and approximate amount/quantity of each subsample.

14. Signature of sampler(s).

a. Additional documentation for wastewater effluent shall include:

1. Beginning and ending times (24hrs) for timed composite sampling;

2. Type of composite (e.g. flow proportioned, continuous, etc.);

6.3.5 Sample transport:

1. All sample transmittal forms shall be placed in waterproof bags and sealed in the transport containers with the samples.

2. Shipped by common carrier, transport containers should be securely sealed with strapping tape or other means to prevent lids from accidentally opening. COC Seals (if used) shall be applied after containers have been secured.

3. All Shipping bills from common carriers shall be kept with the COC or transmittal forms.

Record Keeping

Section 6.4
Sampling

6.4 SAMPLING

Package plant effluent sampling may be required by various agencies. Sampling may include BOD, suspended solids, fecal coliform, pH, DO, Nitrate, total residual chlorine and flow. However, sampling is a key tool in proper operation of a plant and the following six tests should be easy to perform on site in order to evaluate performance and allow early correction of possible problem conditions. **Samples shall be collected and analyzed in accordance with the "General Conditions", Section IX, paragraph 18, of the facility's wastewater permit.**

The jar test, also called the thirty (30) minute settlement test, is perhaps the most important operational test. The sample for the jar test is taken from a representative area of the aeration basin after the blower has been on a minimum of five (5) minutes. Jar test samples should be taken at the same place and at the same time of day. Do not take the sample near the influent line, a return sludge line or a skimmer return. The sample is taken in a 1 or 2 quart wide mouth mason jar or equivalent. The jar must be marked off in equal increments, usually 10% increments, starting at the bottom. After sampling, place the jar in a shady area where it will not be disturbed and as you accomplish other tasks, observe it frequently. The jar test will show the percentage solids under aeration. In the first ten minutes, a good sludge will settle to at least 70%, particles will floc well and form a uniform blanket that leaves clear liquid above it as it settles. In thirty minutes a good sludge should have settled at least 50% and have a sponge-like appearance. A range of 10% to 70% is generally acceptable. When solids exceed 70% sludge "wasting" (removal from the system) is necessary. If sludge is bulking or your clarifier has at least 3' of clarity at peak load, wasting with a 70% solids in the jar test may not be necessary. A 20% to 50% sludge volume that compacts well with the overlying area being clear (called supernatant) is considered the optimum. Very rapid sedimentation usually denotes a high amount of inorganic material (mud, clay, sand, etc.) in the sample or old sludge age. A diluted milky white sample designates under loading and/or over-aeration. A "black" odorous mixed liquor (MLSS) is, of course, septic. A "fluffy" brown sample containing a material that fails to settle or does not settle readily, indicates bulking. A small amount of scum on the surface of the jar test liquid is not relevant as the skimmer would remove the scum in the clarifier. The foregoing statement leads us to the conclusion that the jar test simulates the sedimentation occurring in the clarifier, exclusive of sludge removal, hydraulic surges, and poor baffling. Therefore, the supernatant in the jar test could be considered the clarifier effluent. In a properly operated, loaded and designed plant the clarifier should produce better clarity effluent than in a sixty (60) minute settleability test. By using this procedure clarifier problems can be isolated if the jar test results are good but the clarifier effluent is poor.

Other evaluations made possible by the simple jar test are uniform mixing and return activated sludge volume. Obviously two properly taken jar tests from different representatives points in an aeration basin should produce similar percent solids results if mixing is adequate. Low RAS percent concentrations in the jar test in relation to the MLSS usually indicate an excessive return sludge rate. RAS percent concentration of 80-90% is usually the optimum if the sludge blanket is at the proper level.

Once every several weeks try running the jar test for two hours. Good MLSS should stay down for at least two hours and preferably four hours. If it rises within this time span, you may have problems in your clarifier.

A core sampler is an excellent and inexpensive way of determining sludge blanket depth. A Secchi disc can be used to determine depth of clarity in a clarifier. Text book theory recommends maintaining no more than 25% of the clarifier liquid depth as sludge blanket; however, if you can maintain at least 3' of clarity at peak flow, your effluent should not suffer.

Effluent clarity is an excellent indicator of good treatment. Never judge clarity by observing an outfall. All such samples should be caught in a clean, clear, glass jar.

The optimum MLSS pH is between 6.8-7.4; however, ranges between 6.5-8.5 may be acceptable. Lime or acetic acid may be fed to raise or lower the pH, respectively.

While exact readings are difficult and expensive to obtain, useful approximate dissolved oxygen (DO) results can be obtained through the use of some field test kits. pH testing is best run on aeration sufficiently to sample the overlying liquid. An exact reading from any depth can be obtained with a DO meter directly from the aeration basin. DO results from the aeration basin should never be less than 1 mg/1 at the end of the off cycle and should be 2-3 mg/1 while the blower is running.

A chlorine residual of 0.5 mg/1 during high flow periods is generally adequate if effluent quality is good. This sample is taken at the outfall.

Record Keeping

Section 6.5
Sampling and Monitoring Requirements

6.5 Sampling and Monitoring Requirements

1. Sampling, Monitoring Limitations and Requirements shall be performed in accordance to the **current permit**. See page 2 of permit

2. The frequency and sampling collection points shall be performed in accordance to the **current permit. See page 3 of permit**.

3. Sampling, and Monitoring methods shall be performed also as described on the **Sampling, Section 6.4** and the **Plant Operational Guide, Section 3.1**.

4. The enclosed permit1 Section 1.1, in the **current permit, General Conditions,** Titled; Daily Sample Results -, DEP Form # 62-620.910(10) can be used for a reporting document. This form shall be updated daily.

5. For the purpose of reporting, DEP approved analytical methods shall be followed. The approved methods are listed in Table 2.3 of DEP-QA-001/92.

Record Keeping

Section 6.6
Location and/or Disposition of all Records and Documents

6.6 Location and/or Disposition of all Records and Documents

I. General Information - All records of monitoring must be maintained for at least three (3) years.

1. All pertinent records or documents shall be maintained and kept for inspection in accordance to the **permit conditions, Part V, Operation and Maintenance Requirements, Recordkeeping Requirements**, at;

   The Blue Spring State Park - Administrative Offices

2. These pertinent records or documents shall be keep in good condition as best possible so they can be retrieved and reviewed when deemed necessary by the appropriate authorities.

3. These pertinent records or documents shall be keep at the district office and other locations can be supplied copies where it is determined by the permittee, owner, plant operator and other appropriate authorities that their accessibility is convenient for inspection.

Reporting

Section 7.1
Report of Abnormal Events

Standard Operating Procedures Manual

Reporting
Chapter 7

7.1 Reporting of Abnormal Event Procedures:

1. Definition: **Abnormal event**; an occurrence at a domestic wastewater treatment facility which is not permitted nor permittable under the rules of the Florida Administrative Code. An abnormal event may be caused by mechanical failure, human error, or natural causes, but has the potential to impact public health or the environment adversely. Abnormal events which must be reported under this definition include, but are not limited to, the following.

a. Any unanticipated bypass which causes any reclaimed water or effluent to exceed any permit limitation or results in an unpermitted discharge;

b. Any upset which causes any reclaimed water or the effluent to exceed any limitation in the permit;

c. Violation of a maximum daily discharge limitation for any of the pollutants specifically listed in the permit for such notice; and

d. Any unauthorized discharge to surface or ground waters.

e. Any failures or breaches to containment structures.

II. Upon the occurrence of an abnormal or other unusual event at a State Park domestic wastewater treatment facility, the following procedures will be followed:

a. Reporting Requirements: As soon as the occurrence is recognized, the licensed operator or other designated agent of the permittee (park manager or superintendent) shall report the occurrence orally (telephone or voice-mail) or electronically (FAX or e-mail) within 24 hours to the Regulatory District Office and delegated local program (as applicable).

Central District (407-894-7555)

b. Written Reports: A written report shall also be provided within five days of the time the park personnel become aware of the circumstances. The written submission shall contain: a description of the noncompliance and its cause; the period of noncompliance including exact dates and time, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. If the oral report has been received within 24 hours, the noncompliance has been corrected, and the noncompliance did not endanger health or the environment, the Regulatory District (and delegated local program, if applicable) will waive the written report.
III. Corrective Action - When an abnormal event has occurred and has been discovered by park personnel, the licensed operator of other designated agent of the permittee (park manager or superintendent) must assess the situation and take the following actions to assure that the noncompliant condition is corrected in a timely manner:

a. Determine whether use of spare equipment or treatment plant components would expeditiously eliminate the noncompliant condition. If so, implement and notify permittee.

b. Determine whether de-watering or pumping of facilities would temporarily eliminate the noncompliant condition until permanent corrective action is implemented. Any pumping or de-watering operations must be accomplished by a Department approved residuals hauler. If hauling of raw sewage or mixed liquor is required, destination must be to another permitted wastewater treatment facility. Residuals must be disposed of in accordance with the appropriate permit condition. Effluent may be landspread on an approved residuals landspreading site, with the regulatory district's approval.

c. If the above measures do not restore the facility to compliant status, make an assessment and determination, in conjunction with appropriate park, park district, and Division of Recreation and Parks staff, in coordination with the cognizant regulatory district and delegated local program (if applicable), if closure of a portion of, or the entire park is required to abate the problem, restore compliance, and safeguard public health and the environment.

d. If a written report is required under II.b. above, the corrective actions taken must be included in the report.

Reporting

Section 7.2
Report of Discharge Monitoring Reports (DMR)

7.2 Discharge Monitoring Reports

1. Discharge Monitoring Reports shall be documented in accordance to the **current permit**

2. The frequency monitoring and sampling shall be performed in accordance to the **current permit Under Part I, Reclaimed Water and Effluent Limitations and Monitoring Requirements**.

3. The enclosed permit form in Section 1.1, in the **current permit, General Conditions,** Titled; DEPARTMENT OF ENVIRONMENTAL PROTECTION DISCHARGE MONITORING REPORT, PART A, DEP Form # 62-620.910(10) can be used for a reporting document. This form shall be updated monthly as required.

Form [62-620.910(10) - Discharge Monitoring Report] is a precoded form that is provided by the permitting office to the permit holder at the time of permit issuance. If you need a new copy, contact your district permitting office. Below is a list of the districts and the counties that are in each district.

NORTHWEST DISTRICT
160 Government Center

PENSACOLA, FL. 32501-5794
850-595-8300 Fax 850-595-8417
Contacts: William E. Schaal / Gerri Lowe

Bay	Gadsen	Liberty	Santa Rosa
Calhoun	Gulf	Jackson	Wakula
Escambia	Holmes	Jefferson (partial)	Walton
Franklin	Leon	Okaloosa	Washington

NORTHEAST DISTRICT
7825 Baymeadows Way Suite 200B

JACKSONVILLE, FL 32256-7590
904–448–4330 Fax 904-448-4366
Contacts: Jerry Owen / Judy Franson

Alachua	Dixie	Lafayette	Putnam
Baker	Duval	Levy	St. Johns
Bradford	Flagler	Jefferson (partial)	Suwannee
Clay	Gilchrist	Madison	Taylor
Columbia	Hamilton	Nassau	Union

CENTRAL DISTRICT
3319 Magurie Boulevard

ORLANDO, Florida 32803-3767
407-894-7555 Fax 407-897-2966
Contacts: Chris Ferraro

Brevard	Lake	Orange	Seminole
Indian River	Marion (partial)	Osceola	Volusia

SOUTHEAST DISTRICT
400 North Congress Avenue

WEST PALM BEACH, FL 33401
561-681-6600 Fax 561-681-6755
Contacts: Al Mueller / Linda Tschappat

Broward	Martin	Palm Beach
Dade	Okeechobee	St. Lucie

SOUTH DISTRICT
2295 Victoria Avenue Suite 364

FT. MYERS, FL 33901
813-332-6975 Fax 813-332-6969
Contacts: Abdul Ahmadi / Irene Kidd

Charlotte	Glades	Highlands	Monroe
Collier	Hendry	Lee	

SOUTHWEST DISTRICT
3804 Coconut Palm Drive

TAMPA, FL 33619-8318
813-744-6100 Fax 813-744-6084
Contacts: Mike Hickey / Diana Booth

Citrus	Hernan	Pasco	Manatee
Desoto	Hillsborough	Pinellas	Sarasota
Hardee	Marion (partial)	Polk	Sumter

Standard Operating Procedures Manual

Residuals Management Chapter 8

8.1 Residuals Handling and Management

1. Residuals Handling and Management for the WWTP shall be performed in accordance to the **current permit, Part II, Residuals Management Requirements**. Also historical records or reports of the residuals management shall be kept and made obtainable for inspection at the District Office & plant site.

2. The frequency of the residual disposal shall be determined by the plant operator on the basis of weather conditions and park attendance. This residual disposal shall be performed in accordance to the **current permit, Part II, Residuals Management Requirements**.

3. Residuals shall be handled by an DEP permitted hauler and transported to the site or facility shown in the following pages for stabilization and disposal as required by the **current permit, Part II, Residuals Management Requirements**. (This is currently the Shelley's Septic Tank Residuals Management Facility located in Zellwood Florida).

4. Residuals shall be collected from the digestor compartment of the plant, then hauled by an DEP permitted hauler to the approved disposal site or facility as identified on the following pages.

8.2 EPA Rule 503, Rule 62-640 : Stabilization in Aerobic Digestion and Lime Stabilization

The following information is provided in the event sludge is ever applied directly to an agricultural use site from the Blue Spring State Park WWTF.

The disposal of waste sludge from domestic wastewater plants in Florida is regulated by the FDEP under their rule 62-640, by the Federal Government under EPA rule 503, and often by local regulation which varies.

The relationship of the rules to each other is complex, but generally, WWTP owners have two ways to comply with rule 62-640 and rule 503. First, if the Owner elects to use a sludge hauler solely to haul his waste sludge to a land application site, the Owner will usually have to have on file with FDEP an Agricultural Use Plan (AUP). In many cases, the Owner will also need to obtain approval

from the USEPA for the same site. In the second case, the Owner can enter into a contract with a sludge hauler who holds a permit from the FDEP to haul, treat and dispose of sludge himself. The hauler will have a type of permit known as a Regional Residuals Treatment Facility or Regional residuals Management Facility permit.

The primary difference between the first and second case is that in the first case, the sludge hauler is not permitted by FDEP to treat sludge, and so the Owner will hold the State FDEP AUP and the Federal permit, whereas in the second case, the hauler will usually hold those responsibilties.

In March of 1998, FDEP rule 62-640 was updated to conform better with EPA rule 503 requirements.

Aerobic Digestion

To meet class B stabilization standards using aerobic digestion, rule 62-640 F.A.C. requires that the aerobic digester provide a minimum of 40 days solids retention time in accordance with the standards of a Process to Significantly Reduce Pathogens (PSRP), presently contained in CFR 503.

Several methods to meet CFR 503 standards for Vector Attractor Reduction (VAR), defined as 38% VSS reduction, are available. Referring to the USEPA technical manual, Sludge Treatment and Disposal, a design graph is available for predicting VSS destruction in aerobic digesters based on the multiplier of temperature times solids retention time. Generally, 38% VSS destruction is expected at a temperature of 20 degrees C when the digester solids retention time is in excess of 40 days. It is suggested that facilility operators relying on aerobic digesters to meet CFR 503 strandards for VAR, confirm 38% VSS destruction by having the digested sludge periodically given a Specific Oxygen Uptake Rate (SOUR) test. (Standards for this test are contained in CFR 503).

Lime Stabilization in Small Aerobic Digesters

To meet class B Standards for sludge stabilization using lime stabilization the pH of the sludge being treated must be raised to pH 12 for 2 hours. To meet Federal Vector Attractor Reduction standards, the sludge must then be held at pH 11.5 for an additional 22 hours. (Note: Rules can change frequently)

To accomplish this in a small aerobic digester, the following needs to occur:

1 Sufficient lime must be added. For manual addition of bagged lime, the use of hydrated lime is recommended. (NOT quicklime). Safety gloves, goggles and a respiratory mask are advisable.

Lime should be added when the wind is not blowing.

2. The approximate dosage required is 0.3# of hydrated lime per pound of solids.

Example:

Size of Digester	3375 gallons
Solids Concentration	1%
Solids, Pounds	=8.34*3375*1*10000/1,000,000
	= 281 #
Dosage Rqd	=0.3 * 281# = 84 # hydrated lime

There is a certain variability in this: the dosage actually required could vary significantly, and experience with the individual plant sludge is needed.

3. The limed sludge needs to be vigorously mixed. The aeration diffusers should be open and operating during the 24 hour stabilization period.

4. Written records in the plant logbook of the process should be maintained. The pH should be monitored at least every half hour during the first two hours and at least three times during the next 22 hours. To ensure adequate mixing is occurring, samples from different parts of the tank should be checked.

Standard Operating Procedures Manual

Certifications
Chapter 9

Certifications

Section 9.1
RPZ Checks

9.1 Certifications Requirements - RPZ Checks

1. Certification Requirements for RPZ checks shall be performed in accordance to the **current permit (**. These checks shall be performed by a trained and certified operator / technician. These checks shall be made on-site and comply with the methods approved by DEP. Also historical records or data of these checks shall be kept and made obtainable for inspection at the Park Offices.

2. The frequency of these checks shall be performed in accordance to the **current permit**

3. The attached form, Titled; Inspection Report, Cross - Connection and Backflow - Prevention Assembly, can be used for a reporting document.

9.2 Normal Maintenance

Daily: Check RPZ for leaking and repair if needed.

Other maintenance: Refer to operations and maintenance form that comes with individual unit and inspect, test, and rebuild per manufacturer's recommendations.

Certifications

Section 9.2
Flow Meters

9.2

Certifications Requirements - Flow Meter Checks

1. Certification Requirements for Flow Meters checks shall be performed in accordance to the **current permit** . These checks shall be performed by a trained and certified operator / technician. These checks shall be made on-site and comply with the methods approved by DEP. Also historical records or data of these checks shall be kept and made obtainable for inspection at the District & Park Offices.

2. The frequency of these checks shall be performed in accordance to the **current permit**.

3. The influent pump station, effluent pump station at each Train (#1 & 2), along with the flow equalization system at this plant shall be calibrated by utilizing the pump down method or use of factory servicing of the turbine flow meter. The frequency of these checks shall be performed in accordance to the **current permit**.

4. The Permittee shall provide an approved flow measurement devices on the domestic wastewater treatment plant to monitor the influent (ahead of any return flows) and/ or effluent flow, as appropriate.

5. The forms provided in Sections 4.1 & 4.2, can be used for a reporting document.

Standard Operating Procedures Manual

Other Equipment Calibrations Chapter 10

Other Equipment Calibrations

Section 10.1
pH Meters

10.1.1 General Concerns

A. The pH meter is field calibrated on a daily basis at the first site. Since field meters do bump around from site to site, calibration is likely to change. Calibration checks must be made as follows;

1. Minimum Quality Control Requirements
   a. The QA Rules no longer require the generation of historical derived QA Targets of precision and accuracy for field measurements. In lieu of taking duplicate measurements and using independent QC check standards, more frequent continuing calibrations shall be performed.

   b. Once the meter has been calibrated, these checks shall take place at intervals of no more than 4 hours and at the end of the sampling day. For instance: the pH meter will be checked against the pH buffer.

   c. If a field meter fails a continuing calibration, a complete initial calibration must be performed. In this way, meter response will be addressed without the need for generating historical precision and accuracy statistics.

B. Calibration may be checked on a weekly basis in the office or laboratory to ensure the % theoretical slope is not less than 90%, indicating a bad electrode. This should be noted in the calibration records. If % slope cannot be determined on your meter, or the manufacturer's optimum specifications are different, manufacturers recommendation for maintaining optimum meter performance shall be followed.

C. There are several interference's to keep in mind with pH measurement:
   1. sodium at pH> or = 10 can be reduced or eliminated by using a low sodium error electrode;
   2. coating of oils, greases, and particulates may impair the electrode's response. The electrode bulb should be patted dry with lint-free paper or cloth and rinsed with deionized water. If not, acetone may be used to clean very hard to remove films, but must be used sparingly so the electrode surface is not damaged;
   3. temperature effects on the electromteric measurement of pH are controlled by using instruments having temperature compensation or by calibrating the meter at the temperature of the samples;
   4. poorly buffered solutions with low specific conductance (<200 umhos/cm) may cause fluctuations in the pH readings. Equilibrate electrode by immersing in several aliquots of sample before taking pH count.

D. Follow the instructions with each type of pH meter. Use secondary standard buffer solutions (pH of 4, 7, 10) purchase from commercial vendors for calibration. Do not reuse buffers.

E. Each meter/electrode system must be calibrated at a minimum of two points, at least three pH units apart, bracketing the expected sample pH. Check historical data for expected pH or use pH paper on an aliquot to estimate.

F. Under normal conditions a pH measurement should be accurate to +/- 0.1 pH unit. Remember the needle of the pH meter must align with its image on the gauge to get an accurate reading. Similar care must be taken when recording digital read-out.

10.1.2 Calibration and Field Use

A. Check the battery before mobilizing and turn on the meter when you reach the first facility and allow it to equilibrate to ambient temperature.

B. Calibrate the meters prior to taking samples:

1. Estimate the sample pH range (e.g., history, operator, litmus)
2. Turn function switch to pH position
3. Select the appropriate buffers to bracket the expected sample pH, either pH 4 buffer and pH 7 and pH 10.
4. Remove the protective cap, rinse the electrode with deionized water (DI) and dab dry with lint-free paper or cloth.
5. Place and swirl the electrode in the pH 7 buffer and turn the calibration knob until the reading is 7.0. Repeat step 4 above.
6. Place and swirl the electrode in the pH 7 buffer solution (pH 4 or 10). Adjust the temperature knob until the reading is that of the pH standard. Repeat step 4 above.
7. Measure the temperature of the second buffer solution.
8. Turn the slope indicator until the arrow of the temperature compensator points to the temperature of the buffer. The percent to the theoretical slope should be read from the slope scale. A slope of less than 90% (or one not meeting the manufacturer's specifications) indicates a faulty electrode or contaminated buffer and the problem should be corrected before proceeding.

C. After calibration follow these procedures to take a pH reading of a freshly collected sample:

1. Pour enough fresh sample into the pH measuring cup to take a reading and measure its temperature. If it differs more than 2 C from the buffer temperature , adjust for the difference by turning the slope indicator until the arrow to the temperature compensator points to the sample's temperature.

2. Place and swirl the pH electrode in the sample (in the cup) and read the pH value. In the case of low specific conductance and meter drift, add 1 ml of sample, swirl and read pH. Note: to take 1M KCI solution, take 74.55 grams of primary standard grade KCI and add it to a 1 liter volumetric flask. Add DI to the 1 liter line on the flask and mix. Solutions of appropriate strength may be purchased from commercial laboratory suppliers.

3. Turn the meter off after the last reading, discard the sample in the cup, rinse the electrode thoroughly with deionized water and replace the electrode's rubber cap.

Other Equipment Calibrations

Section 10.2
Residual Chlorine Meters

10.2 Chlorine Measurements

Residual chlorine is unstable in aqueous solutions and as such its concentration decreases rapidly with time.

Exposure to sunlight (or other strong light) or agitation will accelerate chlorine reduction; therefore, analysis should begin immediately after sampling. Field colorimetric kits are available to test for the presence of chlorine. The colorimetric method which requires the use of a spectrophotometer (HACH DR-100) and the amperometric method are approved by EPA. Some visual colorimetric test using DPD chemistry and color wheels are EPA approved for domestic wastewater sources. The colorimetric spectrophotometer method is more desirable because of its ability to be calibrated. The subjective nature of assessing a titration endpoint used in the amperometric method reduces precision. The colorimetric method reduces human error. The amperometric method is better to use when there are matrix interferences in the wastewaters. For example, the lignins in pulp and paper wastewaters could cause a background color interference in the colorimetric method. A complete discussion of the methods are found in Standard Methods for the Examination of Water & Wasterwater, 17th. Edition.

Other Equipment Calibrations

Section 10.3
Calibration Documentation

10.3 Calibration Documentation

Records must be maintained to document and verify acceptable instrument or measuring system calibration for each analysis.

10.3.1 Records must be maintained for all standard preparations and working standards must be easily traced to intermediate and primary standards used for preparation.

10.3.2 Acceptable calibration verification (% recoveries, correlation coefficients) must be recorded and easily identified with applicable daily calibrations.

10.3.3 If calibration acceptance criteria are based on manufacturer's instrument specifications or acceptable recoveries specified by QC check sample suppliers, then records of such activities must be maintained. Such records must be easily accessible and must establish verification of acceptance criteria.

10.3.4 Laboratories must have available for inspection a table specifying calibration acceptance criteria for all parameters.