

# GREATER GETTYSBURG DEVELOPMENT COMPANY

## ROCK CREEK FARM WASTEWATER TREATMENT PLANT AND INFLUENT PUMP STATION

ADAMS COUNTY, PA

# DESIGN ENGINEER'S REPORT



Prepared by:



Entech Engineering, Inc.  
201 Penn Street | PO Box 32 | Reading, PA 19603-0032  
(p) 610.373.6667 (f) 610.373.7537

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STATION  
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**ROCK CREEK FARM WASTEWATER TREATMENT PLANT  
DESIGN ENGINEER'S REPORT**

**1.0 INTRODUCTION**

This Design Engineer's Report (DER) is intended to supplement the drawings with regard to details for the process design for the Rock Creek Farm Wastewater Treatment Plant (WWTP) Project and Influent Pump Station. Many of the details discussed within this document are better illustrated in the design drawings and should be referred to principally.

The project is being undertaken by Greater Gettysburg Development Company, LLC (GGD) with a business address of 601 Mason Dixon Road, Gettysburg, PA 17325. GGD will be constructing an active adult community known as Gettysburg Commons to be located along Shiver's Corner Road in Straban Township, Adams County. The discharge location of treated sewage will be to an Unnamed Tributary to Rock Creek. The UNT is classified as a WWF per PA Chapter 93 classifications.

GGD has retained Martin and Martin, Inc. as the design engineer for the WWTP and Influent Pump Station. Martin and Martin, Inc. will be the design engineer submitting the PA DEP Water Quality Management Part II permit application on behalf of GGD. Martin and Martin, Inc. has contracted with Dutchland, Inc. to design, build and install a precast influent pump station and a post tensioned activated sludge treatment system utilizing the Modified Ludzack Ettinger process for wastewater treatment and nutrient removal. In addition to the design and construction of the Influent Pump Station and WWTP Dutchland will be preparing the Design Engineers Report, WWTP and Influent Pump Station plans, and PA DEP WQM II Modules 3, 4, 5, 6, 7, 8, 9, and 22.

In March 2006 PADEP issued NPDES permit No. PA 02447715 and WQM permit No. 0105407 to GGD authorizing construction of the WWTP and discharge of treated sewage effluent. In May 2008 the PA DEP terminated these permits because it determined that the discharge under these permits would cause or contribute to a violation of water quality standards. In May 2017 the PA DEP reissued NPDES permit PA 0247715.

GGD will be constructing Gettysburg Commons in a phased approach. This design is for the first phase, Phase I.

## 1.1 PROJECT OBJECTIVES

The purpose of this project is to achieve the following:

- A. Provide a new wastewater treatment plant.
- B. Provide a system that will meet anticipated discharge criteria.
- C. Provide a system that is safe, dependable, and easy to operate.
- D. Install a system in a phased approach that can be easily expanded to accommodate future connections

## 2.0 DESIGN BASIS

The design basis for this project was derived from information collected by Martin and Martin, Inc. and can be seen in the Water Quality Management Part II permit application modules.

*It is important to note that this Phase I design is based on the construction of 740 EDUs serving 1,480 persons. The flow per EDU is based on 135 gpd. NPDES permit PA 0247715 is based on 0.270 MGD and a Total Nitrogen and Total Phosphorus discharge mass load of 5,479 lbs/year and 274 lbs/year, respectively. Since this design is for Phase I, which is only a average flow of 0.1 MGD, the nutrient effluent criteria (on a concentration basis) for this WWTP has been prorated for a flow of 0.1 MGD. As GGD builds out the development during future phases it is realized stricter nutrient discharge criteria will come into effect on a concentration basis and alternative process technologies or nutrient trading will need to be implemented.*

The wastewater treatment plant has been designed based on the influent and effluent criteria listed below.

Parameter	Monthly Average Influent		Monthly Average Effluent	
	Concentration	Mass	Concentration	Mass
Average Flow	0.1 MGD			
Peak Flow	0.2 MGD			
CBOD5	250 mg/l	209 lbs/day	N/A	N/A
BOD5	N/A	N/A	10 mg/l	8.34 lbs/day
Ammonia – N	45 mg/l	37.5 lbs/day	1 mg/l – summer 3 mg/l – winter	0.834 lbs/day 2.5 lbs/day
Total Kjeldahl Nitrogen	45 mg/l	37.5 lbs/day	N/A	N/A
Total Nitrogen	N/A	N/A	15 mg/l	12.51 lbs/day
pH	6 – 9 SU	N/A	6 – 9 SU	N/A
Oil & Grease	< 100 mg/l	N/A	N/A	N/A

Total Phosphorus	10 mg/l	8.34 lbs/day	0.9 mg/l	0.75 lbs/day
Fecal Coliform	N/A	N/A	2000 CFU/100 ml – Winter 200 CFU/100 ml - Summer	N/A
Minimum Dissolved Oxygen	N/A	N/A	5.0 mg/l	N/A

### 3.0 PROCESS DESIGN

#### 3.1 PROCESS FLOW DESCRIPTION

The proposed process flow will start at a new influent pumping station. The influent will be pumped to the wastewater treatment plant. Flow from the pump station will discharge into a manual bar screen and flow splitter box. The flow splitter will allow flow to be distributed to future treatment trains. From the bar screen and flow splitter box wastewater will flow to the Equalization (EQ) Tank. Flow from the EQ Tank will be pumped to a flow splitter/spillback box where flow will be regulated and split to a two train biological system. The design basis for the biological system is a Modified Ludzack Ettinger (MLE) process. Influent from the EQ tank will flow to an Anoxic zone followed by an Aerobic zone. A portion of the mixed liquor from aeration will be recycled to the anoxic zones and the remainder will be settled in gravity clarifiers. Once the biological process is complete, effluent from the clarifiers of each train will then combine and flow into a rapid, down flow gravity filter. Filtered effluent from the clearwell will then discharge to an ultraviolet disinfection/post aeration/flow metering tank. The treated wastewater is then discharged to the outfall at an unnamed tributary of Rock Creek.

The system will have two chemical feeds; a metal salt for phosphorus removal and an alkalinity feed system. The metal salt is incorporated to precipitate and then remove soluble phosphorus in the biological process. An alkaline agent is being added to ensure that there is sufficient alkalinity for nitrification.

The solids generated by the treatment process will be wasted from the gravity clarifiers to a common Sludge Holding Tank. Supernatant from the Sludge Holding Tank will be pumped back to the influent EQ Tank for further treatment. Stabilized solids will be removed from the sludge holding tank by a local hauler to a permitted site.

As can be seen in the design drawings, the process will be a common wall concrete structure except for the UV/Post Aeration/Flow Metering Tank which will be a stand alone structure.

## **3.2 INFLUENT PUMP STATION**

### **3.2.1 PUMP STATION FLOW RATES**

The Influent Pump Station will be based on the total build out of the Gettysburg Commons development (all phases).

Average Daily Flow = 0.27 MGD

Peak Factor = 3.0

Peak Flow = 0.81 MGD

### **3.2.2 FORCE MAIN VELOCITY AND PIPE DIAMETER SELECTION**

The Pump Station and force main will be all new construction. The force main will be six (6) inch diameter Ductile Iron Pipe. All exposed piping will be Class 53 epoxy lined and all buried pipe will be mechanical joint, Class 52, epoxy lined.

The wastewater generated by the development will be collected by a proposed gravity collection system which will then be conveyed to a proposed pump station located within the project area. The pump station will then pump the wastewater through a proposed six inch forcemain on the WWTP site. The total length of the force main is approximately 254 feet.

The velocity calculation results are as follows:

Pump Pumping through 6" DIP Force Main at the design Peak Pump Rate:

6" DIP: 4.6 feet/second at 563 gpm Simplex

Refer to Appendix B for the Hydraulic calculations.

### 3.2.3 WET WELL SIZING

Based on the pump selection for the Pump Station the maximum pumping rate will be set at 563 gpm. The pumps will be on variable frequency drives. The initial pump operating settings, pump on/off, will be set and the detention time calculated based on a pumping rate of 563 gpm.

The wet well was designed with adequate volume below the invert in so the operator can adjust the operating heights of the pump settings based on actual flows.

The Wet Well is sized based on the effective volume of a normal pump operation cycle between the Pumps Off elevation and the Lead Pump On elevation. Effective wet well volume calculations are as follows.

Wet Well Inside Dimensions = 6'-0" diameter

Lead Pump On Elevation = 505.5 ft

Pumps Off Elevation = 502.0 ft

A. Wet Well Volume (Lead Pump On – Pumps Off)

$$V = \text{area} \times h$$

$$V = (\pi \times (6.0 \text{ ft})^2) / 4 \times (505.50 \text{ ft} - 502.0 \text{ ft}) \times (7.481 \text{ gal} / \text{ft}^3)$$

$$V = 740 \text{ gallons}$$

Holding time and pump run time are based on the effective volume of the wet well and the calculated maximum monthly flow rate. DEP defines the maximum monthly flow rate as the average daily flow times a peak factor of 1.33. This calculation is provided below:

B. Flow (Maximum Monthly Flow Rate)

QMMF = Maximum Monthly Flow Rate

$$QMMF = QAVG \times 1.33^*$$

QAVG = Average Daily Flow Rate

$$= 270,000 \text{ gpd} / 1,440 \text{ minutes}$$

$$= 188 \text{ gpm}$$

\* - Peak Factor per the PADEP (Keith Dudley, P.E., PADEP, Chief, Municipal Planning and Finance, Water Management Program).

C. Holding time, th (fill time)

$$th = V / QMMF$$

$$th = (740 \text{ gallons}) / (188 \text{ gpm} \times 1.33) = 3 \text{ min}$$

The holding time (fill time) should be less than thirty (30) minutes as which is the recommended maximum holding time for short tributary flow distances by the PADEP (Domestic Wastewater Facilities Manual dated 10/97).

D. Run Time (tr)

$$tr = V / (QPUMP - QMMF)$$

$$= (740 \text{ gallons}) / (583 \text{ gpm} - 250 \text{ gpm})$$

$$= 2.2 \text{ minutes}$$

E. Total Cycle Time (tc)

$$\begin{aligned}t_c &= t_h + t_r \\ &= 3 \text{ minutes} + 2.2 \text{ minutes} \\ &= 5.2 \text{ minutes per cycle}\end{aligned}$$

F. Total Cycles Per Day

$$\begin{aligned}\text{Cycles} &= 1,440 \text{ min per day} \div 5.2 \text{ min per cycle} \\ &= 276 \text{ cycles per day} \\ &= 138 \text{ cycles per day per pump} \\ &= 5.8 \text{ pump starts per hour}\end{aligned}$$

### 3.2.4 HYDRAULIC ANALYSIS

The Pump Station will be a new force main. The force main is a 6" DIP. The force main is approximately 254 linear feet from the proposed pump station valve vault to the discharge flow splitter box.

Force main and pump station drawings were developed based on drawings developed by Martin and Martin, Inc. These drawings were used to develop the hydraulic calculations associated with the Pump Station.

Details of the hydraulics are presented in the Appendix.

Based on the system having a high point at elevation 535.5' and a low water level in the wet well of elevation 495.0' the system static head was calculated as follows:

A. Static Head (HS)

$$\begin{aligned}\text{High Point in Force Main} \\ &= 535.5 \text{ ft}\end{aligned}$$

$$\begin{aligned}\text{Water Level Pump Station Pumps Off} \\ &= 495.0 \text{ ft}\end{aligned}$$

$$\begin{aligned} \text{HS} &= 535.5 \text{ ft.} - 495.0 \text{ ft.} \\ &= 40.5 \text{ ft.} \end{aligned}$$

B. Total Dynamic Head and Force Main/Pump Station Friction Head Losses

The design peak pumping rate for the Pump Station was chosen as 563 gpm. The total dynamic head at the calculated peak pumping rate of 563 gpm is approximately 65 feet. The plot of this point on the pump curve shows the point is at the recommended operating point for the pump.

Pumping: 563 gpm at 65 feet TDH

### 3.2.5 PUMP SELECTION

Based on the pumping scenarios analyzed and hydraulic calculations the selected pump is a Pentair Hydromatic Solids Handling Pump, Model S4P with a 10" in. diameter impeller, 4" discharge connection and a 15 horsepower, 460 volt, three-phase 3600 rpm motor, with a shut off head of 114 feet.

The pump's minimum and maximum design operating points are as follows:

563 gpm at a total dynamic head of 65 feet TDH, simplex operation.

The pump(s) will be on VFDs allowing the pumps to pump at a rate as low as 200 gpm at 45 ft TDH.

### 3.2.6 BUOYANCY CALCULATIONS

The precast concrete wet well and valve vault have been designed to not be buoyant at the design bury depths. For Buoyancy Calculation see Appendix.

### 3.3 INFLUENT EQUALIZATION

Influent Equalization is being provided to mitigate any peak loading to the plant that may occur from the upstream pumping station. Aeration is being provided to keep the tank completely mixed and to prevent the contents from going anaerobic.

Two submersible pumps will pump influent up to a flow regulation box. The flow regulation box will have dissipation baffles, slide gates to isolate a train, and an adjustable overflow gate to vary the rate of spillback into the EQ tank (flow regulation), and provide a continuous, operator adjustable flow to the Anoxic Tanks.

Adequate control of the flow regulation system will negate the need for peak flow design criteria downstream of the Equalization structure. Therefore all downstream processes of EQ were sized based on the design flowrate of 0.1 MGD.

Each Equalization pump shall be designed to be able to handle the entire flow, in order to provide a back-up pump. The pumps shall alternate automatically every time one pump shuts off. Four mercury floats shall operate the pumps. The low level float (first float) shall shut the pump off, and trigger the alternator. The second float from the floor shall bring one pump on line. The third float from the floor shall bring the second (back-up) pump on line. The fourth float from the floor shall engage the high level alarm.

An overflow port from EQ to the Anoxic Zones will be provided. Aeration will be provided by coarse bubble diffusers.

Detailed process calculations can be seen in Appendix A.

#### EQ Tank

Tank Dimensions: 27 ft x 12 ft x 18 ft D (14 ft SWD)

Effective Tank Volume: 33,929 gal.

Equalization Capacity at a Peak Flow of 0.2 MGD: 8.1 hours

#### EQ Pumps

Type: Submersible Goulds 3887

Quantity = 2

Size: 1 Hp

Design Condition: 70 gpm at 18 ft TDH

EQ Aeration

Diffuser Type: Coarse

Aeration Criteria for Mixing: 0.2 scfm/ft<sup>2</sup>

Air Requirement: 67 scfm

EQ Blowers

Number of Blowers: 1 (swing aeration tank blower can be used as spare)

Type: Positive Displacement, Roots URAI 33

Size: 7.5 HP

Operating Condition: 65 scfm at 6.6 psig

### 3.4 Anoxic Tanks

The treatment process is designed to achieve total nitrogen reduction. The process utilized is the Modified Ludzack Ettinger process which utilizes an anoxic zone ahead of an oxic zone. The function of the anoxic zone is to remove the nitrate nitrogen created by nitrification in the downstream aeration tanks. Nitrified mixed liquor is returned to the anoxic zone via a submersible pump in the aeration tank. Heterotrophic bacteria present in the mixed liquor will utilize the incoming carbon from the raw wastewater as the electron donor and the nitrate in the internal recycle mixed liquor as the electron acceptor. In this process the nitrogen present in the nitrate gets reduced to nitrogen gas. Mixing by the use of a submersible propeller mixer is provided in the anoxic zone and the dissolved oxygen levels remain near zero to allow the autotrophic bacteria to utilize the carbon and nitrates and denitrification occurs. Return activated sludge from the clarifiers is directed to the anoxic zone to provide an adequate concentration of denitrifying organisms.

The maximum design recirculation rate will be 400% of the average daily flow. Increasing the recirculation rates can provide a greater level of denitrification. The pumps will be on

variable frequency drives allowing the internal recycle flows to be increased or decreased as necessary.

Anoxic zone volume requirements were based on textbook denitrification rates. Detailed process calculations can be seen in the Appendix.

Anoxic Tanks

Number of Tanks: 2

Tank Dimensions (per train): 14 ft x 9.25 ft x 18 ft D (16 ft SWD)

Effective Tank Volume (per train): 15,499 gal.

Design (calculated) Internal Recycle Rate (per train): 69 gpm

Design (calculated) Return Activated Sludge Rate (per train): 69 gpm

Total Return Flow to Anoxic (per train): 138 gpm

Specific Denitrification Rate at 10 deg C = 0.03 lbs NO<sub>3</sub>/lb MLVSS/day

Where: F/M = design F/M ratio = 0.15 lbs BOD/lbs MLVSS

Nitrate Load to the Anoxic Zone = 21.3 lbs NO<sub>3</sub>/day

Required Anoxic Zone Volume (total) = 30,900 gal

Anoxic Zone Volume Provided (total) = 31,000 gal

Anoxic Zone Mixer

Number: 2 (1 per train)

Type: Submersible Propeller, Flygt 4620

Power: 2.3 HP

Internal Mixed Liquor Recycle Pumps

Number: 2 (1 per train)

Type: submersible, Goulds 3887

Design condition: 70 gpm at 5 ft TDH

Power: 1 HP (on VFD)

**3.5 Aeration Tanks**

The primary function of Aeration is to remove the organic load and then advance the nitrification process. The organic load is reduced through biological consumption which

requires the addition of oxygen. The BOD content in wastewater provides the necessary food source for the bacteria.

Nitrification is the process by which ammonia is oxidized into nitrite and then nitrate. Working under aerobic conditions, two groups of autotrophic microorganisms accomplish nitrification. The bacteria species *Nitrosomonas* is primarily responsible for converting ammonia into nitrite, while the bacteria species *Nitrobacter* converts nitrite into nitrate. Both organisms are strict aerobes and are very sensitive to changes in their environment. Rapid changes to pH, temperature, dissolved oxygen levels and other factors can result in a large-scale die off. The rate at which nitrification will occur in a wastewater treatment facility is regulated by the numbers of nitrifiers available.

Typically dissolved oxygen levels of at least 1 - 2 mg/L must be provided to achieve complete nitrification.

Settled sludge shall be pumped from the clarifiers back to the anoxic zone. The return sludge rate shall be set by the operator in the range of 50% to 150% of the average daily flow.

One dissolved oxygen probe shall be installed in each aeration tank. The D.O. probes shall control the blowers to provide the appropriate amount of D.O. within the aeration structures. Each probe and controller shall operate independent of the other probe and will control the VFD blower motors to maintain a consistent amount of dissolved oxygen within the aeration structures.

Aeration tank sizing was based on maintaining a design F/M ratio and hence solids inventory. The required sludge age for nitrification was calculated using textbook values for nitrification kinetic constants as well as the design solids production. Using these values the required volume was determined in order to maintain a mixed liquor concentration in the aeration tanks of 3,500 mg/l.

Detailed process calculations can be seen in Appendix A.

#### Aeration Tanks

Number of Tanks: 2

Tank Dimensions (per train): 23.25 ft x 14 ft x 18 ft D (16 ft SWD)

Effective Tank Volume (per train): 38,956 gal.

Hydraulic Retention Time = 18.7 hours

Design F/M: 0.15

Design MLSS Concentration = 3,500 mg/l

Maximum RAS Rate = 150% of Forward Flow

Design Sludge Age Required for Nitrification: 9.5 days (SRT provided = 10.2 days)

Organic Loading = 20 lbs BOD/1,000 ft<sup>3</sup>/day

Aeration Design

Type of Diffusers: Fine Bubble disc

BOD O<sub>2</sub> Requirement: 1.25 lbs O<sub>2</sub>/lb BOD/day

BOD Actual Oxygen Demand: 261 lbs O<sub>2</sub>/day

Ammonia O<sub>2</sub> Requirement: 4.6 lbs O<sub>2</sub>/lb NH<sub>3</sub>/day

Ammonia Actual Oxygen Demand: 173 lbs O<sub>2</sub>/day

Total Actual Oxygen Demand: 433 lbs O<sub>2</sub>/day

Design AOR/SOR = 0.3

Standard Oxygen Transfer Rate = 1,462 lbs O<sub>2</sub>/day

Air Required (total): 477 scfm

Air Required (per train): 238 scfm

Total Pressure: 7.4 psig

Aeration Blowers

Number: 2 Operating (1 standby)

Type: Positive Displacement, Roots URAI 45

Size: 15 HP

### 3.6 Clarifiers

Wastewater will flow from the aeration tank of each train to each clarifier. The influent into each clarifier will flow into a baffled inlet to dissipate the inlet velocity and prevent short-circuiting of the wastewater. The concrete baffle shall extend above the working water level in the clarifier, and extend below the influent pipe invert elevation.

Each clarifier structure shall contain two hoppers, each which shall have a 1 ft. square bottom, and a side slope of approximately 50°. Solids will settle in the hopper and will be pumped by a submersible pump to the anoxic zone or the sludge holding tank. The operator shall be able to waste sludge to the sludge holding tank by closing the pump sludge return valve and opening the pump sludge waste valve.

The return rate of sludge to the anoxic zone (or sludge holding) from the pumps shall be adjusted through the use of a variable frequency drive supplied with each pump.

One skimmer assembly shall be provided for each clarifier structure. Each skimmer assembly shall consist of a 6-inch diameter stainless steel pipe with a 1-inch slot and v-notches (as detailed), which can be rotated into the water to draw off scum. The skimmer assembly shall be the width of the hopper. Each skimmer shall be equipped with a handle so it can be rotated by the operator from the walkway above the clarifier. A notched device shall be provided to allow the operator to lock the skimmer into the necessary rotated position. The skimmer assembly shall be connected to a 3-inch air lift pump which will pump the skimmed water to the aeration structures.

The sludge in the clarifier(s) will settle to the bottom of the hopper, and separation will occur. The sludge shall be removed from the clarifier (returned to anoxic or wasted to the sludge holding structure) and clear supernatant will be left on the top.

Each clarifier shall contain one adjustable aluminum effluent v-notch weir trough. The supernatant will flow over the weir trough. An integral aluminum scum baffle shall be affixed to the weir trough to keep floating material from entering the weir trough before being skimmed off. The weir trough shall be equipped with adjustable slide gates to adjust the liquid level in the clarifier and aeration. Each weir trough shall have 14 linear feet of weir for liquid overflow on each side, for a total of 28 linear feet.

Detailed process calculations can be seen in Appendix A.

Clarifiers

Clarifier Dimensions: 14 ft x 14 ft x 18 ft D (16 ft SWD)

Clarifier Area (total): 392 ft<sup>2</sup>

Surface Overflow Rate: 340 gpd/ft<sup>2</sup>

Surface Loading Rate: 15 lbs/day/ft<sup>2</sup>

Design MLSS Concentration: 3,500 mg/l

Design Settled Sludge Concentration: 8,500 mg/l

Weir Overflow Rate: 1,786 gpd/ft

Clarifier Volume (per train): 19,627 gal

Clarifier Detention Time: 4.6 hours

### 3.7 Downflow Gravity Sand Filter

The tertiary filter (including filter cells, mudwell, filter backwash clearwell) shall make up the total tertiary filter system.

Clarified effluent will flow from the clarifiers to the tertiary filter. The filter media shall be contained within aluminum containment housing with a wall dividing the housing it into two equal filter cells. The filter cells shall have 3.5 ft of freeboard. Each cell shall be 8 ft x 2.5 ft to provide 20 sq. ft., for a total combined area of 40 sq. ft. Each cell shall be designed to be capable of filtering the entire forward flow of 0.1 MGD.

The tertiary filter shall be designed so that one cell can be taken off of line by routing all of the influent into one cell. Each cell shall typically operate independent of the other. Normally the filter unit will be set up to evenly distribute the flow to both cells.

The tertiary filter type is a gravity, mixed-media system. The media shall consist of anthracite coal, specialized sand, and stone. The influent will flow through a weir that can be used to isolate either cell. The influent will flow down through the media, to the filter nozzles (3 mm). From the nozzles, the filtered wastewater will flow through the filter discharge piping and into the clearwell. The clearwell will be aerated to keep the effluent fresh.

One high level (backwash) float shall be located approximately 12 inches below the top of the filter in each filter cell. If a high water level condition occurs, the backwash and air purge cycle will begin for that cell. The required backwash pump will engage, while the air compressor located within the control building shuts off the forward flow by engaging the pneumatic pinch valve on the discharge pipe leading to the clearwell. The air scour blower will engage for a pre-selected period of time, followed by a backwash cycle. The duplex backwash pumps are located within the clearwell. The engaged backwash pump will run for a pre-selected length of time. The backwash water used to cleanse the filter unit shall spill over the sides of the filter, into the mudwell where it will be pumped to the equalization structure for treatment. The mudwell will be aerated to keep the backwash mixed and prevent solids deposition.

Filter nozzle/strainers shall be installed at the filter floor as depicted in the plans, to allow the filtered wastewater to drain out of the filter. The Filter nozzle/strainers shall be by Orthos Liquid Systems, Inc., model DSP. Sixteen nozzles shall be provided for each square ft. of filter area, 6-inches, center to center.

The mudwell shall be located under the filter media containment housing. The function of the mudwell shall be to capture and return the backwash water that was used to cleanse the filter media to the equalization structure.

Clearwell backwash water will enter the mudwell when a filter cell requires a backwash cycle for cleansing. The backwash water (from the filter clearwell) will be pumped up through the filter, and will spill over the sides, into the mudwell.

Detailed process calculations can be seen in Appendix A.

#### Filter

Filter Box Dimensions (total): 8 ft x 5 ft x 8 ftD (3.5 ft SWD)

Surface Loading Rate: 1.7 gpm/ft<sup>2</sup>

Backwash Rate: 18 gpm/ft<sup>2</sup>

Air Scour Rate: 4 scfm per ft<sup>2</sup>

#### Mudwell

Mudwell Dimensions: 14' x 13' – 1" x 18' D (7' – 10" SWD)

Mudwell Effective Volume: 10,741 gal

Mudwell Pumps

Number: 2

Type: Submersible, Goulds 3887, 1 HP

Design Condition: 162 gpm at 19 ft TDH

Size: 1 Hp

Mudwell Aeration

Diffuser Type: Coarse

Air Requirement: 0.2 scfm/ft<sup>2</sup>

Air Flow Required: 37 scfm

Blower: To be shared with the Post aeration tank blower (swing aeration tank blower can be used as spare)

Clearwell

Clearwell Tank Dimensions: 14' x 13' – 1" x 18' D (7' – 10" SWD)

Clearwell Effective Volume: 10,741 gal

Clearwell Pumps

Number: 2

Type: Submersible, Goulds 3888

Design Condition: 360 gpm at 18.5 ft TDH

Size: 3 Hp

Clearwell Aeration

Diffuser Type: Coarse

Air Requirement: 0.2 scfm/ft<sup>2</sup>

Air Flow Required: 37 scfm

Blower: To be shared with the Post aeration tank blower (swing aeration tank blower can be used as spare)

### 3.8 Ultraviolet Disinfection (UV)/ Post Aeration/ Flow Metering

The ultraviolet system shall be a Trojan UV3200K-PTP as manufactured by Trojan Technologies. The system is an open channel system and will be located in a tank downstream of the main tanks, at a lower elevation. Flow from the clearwell will flow by gravity to the UV systems. Effluent from the UV system will flow into the same tank (at a lower water level than the UV units) where post aeration and flow metering will occur. The two UV units will be configured in parallel, as one reactor will serve as a fully redundant system. The system, one unit, will be sized to handle a peak flow, 0.1 MGD with one reactor in service.

Post aeration will be provided to maintain a residual Dissolved Oxygen concentration of 5 mg/l. Disinfected and aerated effluent will then flow over a 60 degree V notch weir box. An ultrasonic level transducer will be located just upstream of the weir and will correlate water level to flow over the weir. The transducer shall be located within a baffled area. The flow meter transducer will work in conjunction with the v-notch box and will send a signal to the flow meter control panel. At the flow meter control panel, the flow will be displayed as an instantaneous reading, and it will also be plotted onto a seven-day (weekly) chart.

#### UV/Post Aeration/Flow Metering

UV/Post Aeration/Flow Metering Tank Dimensions: 15' x 6' x 10' D (6' SWD)

Effective Volume: 5,538 gal

#### UV Disinfection

Number of UV Units: 2 Trojan UV3200K-PTP

Number of lamps per system: 4

Design UV Transmittance = 65%

Maximum Flow per Unit: 0.28 MGD

Design Dose = 32,989 uWs/cm<sup>2</sup>

#### Post Aeration

Air Requirement: 0.2 scfm/ft<sup>2</sup>

Post Aeration Air Flow: 93 scfm

#### Post Aeration Blower

Number: 1 (swing aeration tank blower can be used as spare)

Type: Positive Displacement, Roots URAI 36

Design Condition: Mudwell Air + Clearwell Air + Post Aeration Air = 37 scfm + 37 scfm + 93 scfm = 166 scfm at 4.4 psig

Size: 5 HP

### 3.9 Sludge Holding Tank

Sludge will enter the aerated sludge holding tank when sludge is wasted from the clarifier. The operator will periodically remove sludge from the clarifier by closing the sludge return valve, and opening the sludge waste valve.

The solids in the sludge holding tank will begin to settle, and the supernatant will be left on the top, when the operator turns the air off for a few hours in the sludge holding tank.

One submersible decant pump on a hoist will be used to periodically remove the supernatant, to condense the sludge. The decant pump will return the supernatant to the beginning of the plant so it can be treated. The operator shall utilize the decant pump by turning on the pump and lowering it into the supernatant. When the proper depth of the pump is reached, it shall be secured with a stainless steel chain until the decanting of the supernatant is complete. The decant pump shall normally be turned off.

Air will be provided in the sludge holding tank through coarse bubble diffusers.

Sludge that is held in the sludge holding tank will be pumped out and hauled by tanker truck to a PA DEP approved facility for treatment.

An alum feed will be provided to precipitate any phosphorus that is released from the solids in the sludge holding tank.

Detailed process calculations can be seen in the Appendix.

#### Sludge Holding Tank

Sludge Holding Tank Dimensions: 27' x 20'-5" x 18' D (16' SWD)

Sludge Holding Tank Effective Volume: 66,243 gal

Waste Activated Sludge Production: 7,479 gpd

Waste Activated Sludge Concentration from Clarifier: 8,500 mg/l

Assumed Sludge Concentration by Thickening by Decanting: 20,000 mg/l

Sludge Holding Storage Time: 20.8 days

### 3.10 CHEMICAL FEED SYSTEM

An alkaline agent and a metal salt will be used for pH control and Phosphorus removal, respectively.

There will be a chemical feed pump for the purpose of introducing a metal salt for TP control in the plant as well as pH control. The metal salt and alkaline agent shall be dispensed by chemical feed pumps located within the control building. Secondary containment will be provided. The metal salt shall be added in the final aeration structure just before the clarifiers and sludge holding tank, as shown on the plans. The alkalinity addition will take place in the Equalization tank. The diffused air in the aeration and equalization tanks will create the mixing necessary for the chemical reactions to take place.

#### Chemical Metering Equipment

Number of Pumps: 4 (1 operating, 1 standby for each chemical)

Tote/Drum Mixers: 2 (one for each chemical)

### 4.0 PROCESS CONTROLS

Electrical controls for the plant blowers, mixers, and pumps shall be provided within one or more control panels, to be wall-mounted within the control building. Controls shall include: motor circuit breakers, across-the-line magnetic type motor starters and motor thermal overload protection. The panel(s) shall control the operation of all plant blowers, pumps, and mixers including starters, on-off breakers, indicator lights, and elapsed time meters. The control panel(s) shall include a fifteen minute multiple twenty-four hour time clock to permit automatic operation of the treatment facility throughout the day for each motor. A three-position "hand-off-auto" (H-O-A) selector switch shall be installed for each

motor, to allow the motors to operate either on a continuous run basis or according to the cycle established by setting the time clock.

The blowers are controlled by Variable Frequency Drives (VFD) which adjust the speed of the blowers based on the air demand as determined by the DO probes and controller. The dissolved oxygen probes will read the actual dissolved oxygen in the aeration tank and send that data to the controller. The controller can be set to maintain a set level of DO in the aeration tanks. It sends the signal to the VFD to adjust the blower speed to maintain the DO set point.

The Internal Recycle and RAS/WAS pumps will also be on VFDs. These will be operator adjustable to control pumping rates.

## **5.0 TANK STRUCTURES**

The process tanks will be common wall construction, precast post tensioned tanks. The process tanks will have a perimeter drain installed at elevation 519.0 ft. This will prevent uplift from buoyancy forces when any of the major process trains are taken off line.

The UV/Post Aeration/Flow Metering will be a stand alone structure. This will be a precast structure. Anti-buoyancy measures will be provided in the form of a concrete collar around the base of the tank.

The Influent Pump Station and Valve Vault will be precast structure. Anti-buoyancy measures in the form of a concrete collar will be provide.

## **6.0 APPENDICES**

- Appendix A – NPDES Permit
- Appendix B – Pump Station Calculations
- Appendix B – Process Design Calculations
- Appendix C – Equipment Cutsheets

# **APPENDIX A**

# **NPDES PERMIT**



**pennsylvania**  
DEPARTMENT OF ENVIRONMENTAL  
PROTECTION

Attachment to Discovery A-22 (Wastewater) MAY 08 2017

MAY 05 2017

CERTIFIED MAIL NO. 9171 9690 0935 0133 8801 63

Richard Klein  
Greater Gettysburg Development Company, LLC  
601 Mason Dixon Road  
Gettysburg, PA 17325

Re: Final NPDES Permit- Sewage  
Gettysburg Commons STP  
NPDES Permit No. PA0247715  
Authorization ID No. 977808  
Straban Township, Adams County

Dear Mr. Klein:

Your NPDES permit is enclosed. Please read the permit carefully. The permit expires on the date identified on page 1 of the permit. A renewal application must be submitted to this office 180 days prior to the permit expiration date, if a discharge is expected to continue past the expiration date of the permit.

The permit requires that you use the Department of Environmental Protection's (DEP's) electronic Discharge Monitoring Report (eDMR) system to report the results of self-monitoring activities. The information you must submit within 30 days to register for use of the eDMR system is available at [www.dep.state.pa.us/edmr](http://www.dep.state.pa.us/edmr). DEP has also enclosed paper DMR templates and DMR instructions with the permit. It is recommended that you retain the DMR templates in the event you are unable to submit DMRs electronically through the eDMR system.

Also enclosed is a Supplemental Form Inventory, which identifies the forms that are attached to the permit and must be submitted as attachments to eDMR reports, as applicable (see individual form instructions). The submission of other supplemental forms may be required in accordance with the permit. We encourage you to use the spreadsheet versions of supplemental forms that contain appropriate validation and DEP-approved calculations.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The

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Mr. Richard Klein

- 2 -

appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

**IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.**

**IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.**

If you have any questions, please contact Reza H Chowdhury at 717.705.4823.

Sincerely,



Maria D. Bebenek, P.E.  
Environmental Program Manager  
Clean Water Program

Enclosures

cc: U.S. Environmental Protection Agency  
Martin & Martin Inc.  
Victor Landis, Operations Chief, PADEP SCRO  
Central Office, Division of Operations, Monitoring and Data Systems

Mr. Richard Klein

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Mr. Joseph McDowell, P.E.  
Design Engineer  
Martin and Martin, Inc.  
37 South Main Street  
Chambersburg, PA 17201



**AUTHORIZATION TO DISCHARGE UNDER THE  
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM  
DISCHARGE REQUIREMENTS FOR NON-MUNICIPAL  
SEWAGE TREATMENT WORKS**

**NPDES PERMIT NO: PA0247715**

In compliance with the provisions of the Clean Water Act, 33 U.S.C. Section 1251 *et seq.* ("the Act") and Pennsylvania's Clean Streams Law, as amended, 35 P.S. Section 691.1 *et seq.*,

**Greater Gettysburg Development Company, LLC  
601 Mason Dixon Road  
Gettysburg, PA 17325**

is authorized to discharge from a facility known as **Gettysburg Commons STP**, located in **Straban Township, Adams County**, to **Unnamed Tributary of Rock Creek** in Watershed(s) **13-D** in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts A, B and C hereof.

**THIS PERMIT SHALL BECOME EFFECTIVE ON** June 1, 2017

**THIS PERMIT SHALL EXPIRE AT MIDNIGHT ON** May 31, 2022

The authority granted by this permit is subject to the following further qualifications:

1. If there is a conflict between the application, its supporting documents and/or amendments and the terms and conditions of this permit, the terms and conditions shall apply.
2. Failure to comply with the terms, conditions or effluent limitations of this permit is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. (40 CFR 122.41(a))
3. A complete application for renewal of this permit, or notice of intent to cease discharging by the expiration date, must be submitted to DEP at least 180 days prior to the above expiration date (unless permission has been granted by DEP for submission at a later date), using the appropriate NPDES permit application form. (40 CFR 122.41(b), 122.21(d)(2))

In the event that a timely and complete application for renewal has been submitted and DEP is unable, through no fault of the permittee, to reissue the permit before the above expiration date, the terms and conditions of this permit, including submission of the Discharge Monitoring Reports (DMRs), will be automatically continued and will remain fully effective and enforceable against the discharger until DEP takes final action on the pending permit application. (25 Pa. Code §§ 92a.7(b), (c))

4. This NPDES permit does not constitute authorization to construct or make modifications to wastewater treatment facilities necessary to meet the terms and conditions of this permit.

**DATE PERMIT ISSUED**

MAY 05 2017

**ISSUED BY**

Maria D. Bebenek

**Maria D. Bebenek, P.E.  
Clean Water Program Manager  
Southcentral Regional Office**

**PART A - EFFLUENT LIMITATIONS, MONITORING, RECORD KEEPING AND REPORTING REQUIREMENTS**

I. A. For Outfall 001, Latitude 39° 52' 39.00", Longitude 77° 11' 18.00", River Mile Index 0.88, Stream Code 59207

Receiving Waters: Unnamed Tributary of Rock Creek

Type of Effluent: Sewage Effluent

1. The permittee is authorized to discharge during the period from June 1, 2017 through May 31, 2022.
2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) <sup>(1)</sup>		Concentrations (mg/L)			Instant. Maximum	Minimum <sup>(2)</sup> Measurement Frequency	Required Sample Type
	Average Monthly	Average Weekly Report Daily Max	Minimum	Average Monthly	Maximum			
Flow (MGD)	Report	Report	XXX	XXX	XXX	XXX	Continuous	Measured
pH (S.U.)	XXX	XXX	6.0	XXX	9.0	XXX	1/day	Grab
Dissolved Oxygen	XXX	XXX	5.0	XXX	XXX	XXX	1/day	Grab
Carbonaceous Biochemical Oxygen Demand (CBOD5)	25	XXX	XXX	10.0	XXX	20	1/week	8-Hr Composite
Total Suspended Solids	25	XXX	XXX	10.0	XXX	20	1/week	8-Hr Composite
Fecal Coliform (No./100 ml) Oct 1 - Apr 30	XXX	XXX	XXX	2000 Geo Mean	XXX	10000	1/week	Grab
Fecal Coliform (No./100 ml) May 1 - Sep 30	XXX	XXX	XXX	200 Geo Mean	XXX	1000	1/week	Grab
Ultraviolet light intensity (mW/cm <sup>2</sup> )	XXX	XXX	Report	XXX	XXX	XXX	1/day	Recorded
Ammonia-Nitrogen Nov 1 - Apr 30	7.5	XXX	XXX	3.0	XXX	6	2/week	Composite 8-Hr
Ammonia-Nitrogen May 1 - Oct 31	2.5	XXX	XXX	1.0	XXX	2	2/week	Composite 8-Hr
Total Phosphorus	0.75	XXX	XXX	0.3	XXX	0.6	2/week	Composite 8-Hr

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At discharge from facility

**PART A - EFFLUENT LIMITATIONS, MONITORING, RECORDKEEPING AND REPORTING REQUIREMENTS  
(Continued)**Additional Requirements

1. The permittee may not discharge:
  - a. Floating solids, scum, sheen or substances that result in observed deposits in the receiving water. (25 Pa Code § 92a.41(c))
  - b. Oil and grease in amounts that cause a film or sheen upon or discoloration of the waters of this Commonwealth or adjoining shoreline, or that exceed 15 mg/l as a daily average or 30 mg/l at any time (or lesser amounts if specified in this permit). (25 Pa. Code § 92a.47(a)(7), § 95.2(2))
  - c. Substances in concentration or amounts sufficient to be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life. (25 Pa Code § 93.6(a))
  - d. Foam or substances that produce an observed change in the color, taste, odor or turbidity of the receiving water, unless those conditions are otherwise controlled through effluent limitations or other requirements in this permit. For the purpose of determining compliance with this condition, DEP will compare conditions in the receiving water upstream of the discharge to conditions in the receiving water approximately 100 feet downstream of the discharge to determine if there is an observable change in the receiving water. (25 Pa Code § 92a.41(c))
2. If the permit requires the reporting of average weekly statistical results, the maximum weekly average concentration and maximum weekly average mass loading shall be reported, regardless of whether the results are obtained for the same or different weeks.
3. The permittee shall monitor the sewage effluent discharge(s) for the effluent parameters identified in the Part A limitations table(s) during all bypass events at the facility, using the sample types that are specified in the limitations table(s). Where the required sample type is "composite", the permittee must commence sample collection within one hour of the start of the bypass, wherever possible. The results shall be reported on the Daily Effluent Monitoring supplemental form (3800-FM-BPNPSM0435) and be incorporated into the calculations used to report self-monitoring data on Discharge Monitoring Reports (DMRs).

Footnotes

- (1) When sampling to determine compliance with mass effluent limitations, the discharge flow at the time of sampling must be measured and recorded.
- (2) This is the minimum number of sampling events required. Permittees are encouraged, and it may be advantageous in demonstrating compliance, to perform more than the minimum number of sampling events.

Supplemental Information

The effluent limitations for Outfall 001 were determined using an effluent discharge rate of 0.27 MGD.

**PART A - EFFLUENT LIMITATIONS, MONITORING RECORDKEEPING AND REPORTING REQUIREMENTS**

I. B. For Outfall 001, Latitude 39° 52' 39.00", Longitude 77° 11' 18.00", River Mile Index 0.88, Stream Code 59207

Receiving Waters: Unnamed Tributary of Rock Creek

Type of Effluent: Sewage Effluent

1. The permittee is authorized to discharge during the period from June 1, 2017 through May 31, 2022.
2. Based on the anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply (see also Additional Requirements and Footnotes).

Parameter	Effluent Limitations						Monitoring Requirements	
	Mass Units (lbs/day) <sup>(1)</sup>		Concentrations (mg/L)			Instant. Maximum	Minimum <sup>(2)</sup> Measurement Frequency	Required Sample Type
	Monthly	Annual	Monthly	Monthly Average	Maximum			
Ammonia--N	Report	Report	XXX	Report	Report	XXX	2/week	8-Hr Composite
Kjeldahl--N	Report	XXX	XXX	Report	Report	XXX	2/week	8-Hr Composite
Nitrate-Nitrite as N	Report	XXX	XXX	Report	Report	XXX	2/week	8-Hr Composite
Total Nitrogen	Report	Report	XXX	Report	Report	XXX	1/month	Calculation
Total Phosphorus	Report	Report	XXX	Report	Report	XXX	2/week	8-Hr Composite
Net Total Nitrogen	Report	5479	XXX	XXX	XXX	XXX	1/month	Calculation
Net Total Phosphorus	Report	274	XXX	XXX	XXX	XXX	1/month	Calculation

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):  
at discharge from facility

Footnotes:

(1) See Part C for Chesapeake Bay Requirements.

(2) This is the minimum number of sampling events required. Permittees are encouraged, and it may be advantageous in demonstrating compliance, to perform more than the minimum number of sampling events required.

## II. DEFINITIONS

At Outfall (XXX) means a sampling location in outfall line XXX below the last point at which wastes are added to outfall line (XXX), or where otherwise specified.

Average refers to the use of an arithmetic mean, unless otherwise specified in this permit. (40 CFR 122.41(l)(4)(iii))

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures and other management practices to prevent or reduce the pollutant loading to surface waters of the Commonwealth. The term also includes treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. The term includes activities, facilities, measures, planning or procedures used to minimize accelerated erosion and sedimentation and manage stormwater to protect, maintain, reclaim, and restore the quality of waters and the existing and designated uses of waters within this Commonwealth before, during and after earth disturbance activities. (25 Pa. Code § 92a.2)

Bypass means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR 122.41(m)(1)(i))

Calendar Week is defined as the seven consecutive days from Sunday through Saturday, unless the permittee has been given permission by DEP to provide weekly data as Monday through Friday based on showing excellent performance of the facility and a history of compliance. In cases when the week falls in two separate months, the month with the most days in that week shall be the month for reporting.

Clean Water Act means the Federal Water Pollution Control Act, as amended. (33 U.S.C.A. §§ 1251 to 1387).

Composite Sample (for all except GC/MS volatile organic analysis) means a combination of individual samples (at least eight for a 24-hour period or four for an 8-hour period) of at least 100 milliliters (mL) each obtained at spaced time intervals during the compositing period. The composite must be flow-proportional; either the volume of each individual sample is proportional to discharge flow rates, or the sampling interval is proportional to the flow rates over the time period used to produce the composite. (EPA Form 2C)

Composite Sample (for GC/MS volatile organic analysis) consists of at least four aliquots or grab samples collected during the sampling event (not necessarily flow proportioned). The samples must be combined in the laboratory immediately before analysis and then one analysis is performed. (EPA Form 2C)

Daily Average Temperature means the average of all temperature measurements made, or the mean value plot of the record of a continuous automated temperature recording instrument, either during a calendar day or during the operating day if flows are of a shorter duration.

Daily Discharge means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day. (25 Pa. Code § 92a.2, 40 CFR 122.2)

Daily Maximum Discharge Limitation means the highest allowable "daily discharge."

Discharge Monitoring Report (DMR) means the DEP or EPA supplied form(s) for the reporting of self-monitoring results by the permittee. (25 Pa. Code § 92a.2, 40 CFR 122.2)

Estimated Flow means any method of liquid volume measurement based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters and batch discharge volumes.

~~Geometric Mean~~ means the average of a set of n sample results given by the nth root of their product.

~~Grab Sample~~ means an individual sample of at least 100 mL collected at a randomly selected time over a period not to exceed 15 minutes. (EPA Form 2C)

~~Hazardous Substance~~ means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the Clean Water Act. (40 CFR 122.2)

~~Hauled-In Wastes~~ means any waste that is introduced into a treatment facility through any method other than a direct connection to the sewage collection system. The term includes wastes transported to and disposed of within the treatment facility or other entry points within the collection system.

~~Immersion Stabilization~~ (i-s) means a calibrated device is immersed in the wastewater until the reading is stabilized.

~~Instantaneous Maximum Effluent Limitation~~ means the highest allowable discharge of a concentration or mass of a substance at any one time as measured by a grab sample. (25 Pa. Code § 92a.2)

~~Measured Flow~~ means any method of liquid volume measurement, the accuracy of which has been previously demonstrated in engineering practice, or for which a relationship to absolute volume has been obtained.

~~Monthly Average Discharge Limitation~~ means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month. (25 Pa. Code § 92a.2)

~~Municipal Waste~~ means garbage, refuse, industrial lunchroom or office waste and other material, including solid, liquid, semisolid or contained gaseous material resulting from operation of residential, municipal, commercial or institutional establishments and from community activities; and sludge not meeting the definition of residual or hazardous waste under this section from a municipal, commercial or institutional water supply treatment plant, waste water treatment plant or air pollution control facility. (25 Pa. Code § 271.1)

~~Residual Waste~~ means garbage, refuse, other discarded material or other waste, including solid, liquid, semisolid or contained gaseous materials resulting from industrial, mining and agricultural operations and sludge from an industrial, mining or agricultural water supply treatment facility, wastewater treatment facility or air pollution control facility, if it is not hazardous. The term does not include coal refuse as defined in the Coal Refuse Disposal Control Act. The term does not include treatment sludges from coal mine drainage treatment plants, disposal of which is being carried on under and in compliance with a valid permit issued under the Clean Streams Law. (25 Pa Code § 287.1)

~~Severe Property Damage~~ means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR 122.41(m)(1)(ii))

~~Stormwater~~ means the runoff from precipitation, snow melt runoff, and surface runoff and drainage. (25 Pa. Code § 92a.2)

~~Stormwater Associated With Industrial Activity~~ means the discharge from any conveyance that is used for collecting and conveying stormwater and that is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant, and as defined at 40 CFR 122.26(b)(14)(i) - (ix) and (xi) and 25 Pa. Code § 92a.2.

~~Total Dissolved Solids~~ means the total dissolved (filterable) solids as determined by use of the method specified in 40 CFR Part 136.

~~Toxic Pollutant~~ means those pollutants, or combinations of pollutants, including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains may, on the basis of information available to DEP

cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, including malfunctions in reproduction, or physical deformations in these organisms or their offspring. (25 Pa. Code § 92a.2)

## III. SELF-MONITORING, REPORTING AND RECORDKEEPING

## A. Representative Sampling

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity (40 CFR 122.41(j)(1)). Representative sampling includes the collection of samples, where possible, during periods of adverse weather, changes in treatment plant performance and changes in treatment plant loading. If possible, effluent samples must be collected where the effluent is well mixed near the center of the discharge conveyance and at the approximate mid-depth point, where the turbulence is at a maximum and the settlement of solids is minimized. (40 CFR 122.48, 25 Pa. Code § 92a.61)
2. Records Retention (40 CFR 122.41(j)(2))

Except for records of monitoring information required by this permit related to the permittee's sludge use and disposal activities which shall be retained for a period of at least 5 years, all records of monitoring activities and results (including all original strip chart recordings for continuous monitoring instrumentation and calibration and maintenance records), copies of all reports required by this permit, and records of all data used to complete the application for this permit shall be retained by the permittee for 3 years from the date of the sample measurement, report or application, unless a longer retention period is required by the permit. The 3-year period shall be extended as requested by DEP or the EPA Regional Administrator.

3. Recording of Results (40 CFR 122.41(j)(3))

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. The exact place, date and time of sampling or measurements.
- b. The person(s) who performed the sampling or measurements.
- c. The date(s) the analyses were performed.
- d. The person(s) who performed the analyses.
- e. The analytical techniques or methods used; and the associated detection level.
- f. The results of such analyses.

## 4. Test Procedures

- a. Facilities that test or analyze environmental samples used to demonstrate compliance with this permit shall be in compliance with laboratory accreditation requirements of Act 90 of 2002 (27 Pa. C.S. §§ 4101-4113) and 25 Pa. Code Chapter 252, relating to environmental laboratory accreditation.
- b. Test procedures (methods) for the analysis of pollutants or pollutant parameters shall be those approved under 40 CFR Part 136 or required under 40 CFR Chapter I, Subchapters N or O, unless the method is specified in this permit or has been otherwise approved in writing by DEP. (40 CFR 122.41(j)(4)), 122.44(i)(1)(iv))
- c. Test procedures (methods) for the analysis of pollutants or pollutant parameters shall be sufficiently sensitive. A method is sufficiently sensitive when 1) the method minimum level is at or below the level of the effluent limit established in the permit for the measured pollutant or pollutant parameter; or 2) the method has the lowest minimum level of the analytical methods approved under 40 CFR Part 136 or required under 40 CFR Chapter I, Subchapters N or O, for the measured pollutant or pollutant parameter; or 3) the method is specified in this permit or has been otherwise approved in writing by DEP for the measured pollutant or pollutant parameter. Permittees have the option of providing matrix or sample-specific minimum levels rather than the published levels. (40 CFR 122.44(i)(1)(iv))

## 5. Quality/Assurance/Control

In an effort to assure accurate self-monitoring analyses results:

- a. The permittee, or its designated laboratory, shall participate in the periodic scheduled quality assurance inspections conducted by DEP and EPA. (40 CFR 122.41(e), 122.41(i)(3))
- b. The permittee, or its designated laboratory, shall develop and implement a program to assure the quality and accurateness of the analyses performed to satisfy the requirements of this permit, in accordance with 40 CFR Part 136. (40 CFR 122.41(i)(4))

## B. Reporting of Monitoring Results

1. The permittee shall effectively monitor the operation and efficiency of all wastewater treatment and control facilities, and the quantity and quality of the discharge(s) as specified in this permit. (25 Pa. Code §§ 92a.3(c), 92a.41(a), 92a.44, 92a.61(i) and 40 CFR §§ 122.41(e), 122.44(i)(1))
2. The permittee shall use DEP's electronic Discharge Monitoring Report (eDMR) system to report the results of compliance monitoring under this permit (see [www.dep.pa.gov/edmr](http://www.dep.pa.gov/edmr)). Permittees that are not using the eDMR system as of the effective date of this permit shall submit the necessary registration and trading partner agreement forms to DEP's Bureau of Clean Water (BCW) within 30 days of the effective date of this permit and begin using the eDMR system when notified by DEP BCW to do so. (25 Pa. Code §§ 92a.3(c), 92a.41(a), 92a.61(g) and 40 CFR § 122.41(l)(4))
3. Submission of a physical (paper) copy of a Discharge Monitoring Report (DMR) is acceptable under the following circumstances:
  - a. For a permittee that is not yet using the eDMR system, the permittee shall submit a physical copy of a DMR to the DEP regional office that issued the permit during the interim period between the submission of registration and trading partner agreement forms to DEP and DEP's notification to begin using the eDMR system.
  - b. For any permittee, as a contingency a physical DMR may be mailed to the DEP regional office that issued the permit if there are technological malfunction(s) that prevent the successful submission of a DMR through the eDMR system. In such situations, the permittee shall submit the DMR through the eDMR system within 5 days following remedy of the malfunction(s).
4. DMRs must be completed in accordance with DEP's published DMR instructions (3800-FM-BPNPSM0463). DMRs must be received by DEP no later than 28 days following the end of the monitoring period. DMRs are based on calendar reporting periods and must be received by DEP in accordance with the following schedule:
  - Monthly DMRs must be received within 28 days following the end of each calendar month.
  - Quarterly DMRs must be received within 28 days following the end of each calendar quarter, i.e., January 28, April 28, July 28, and October 28.
  - Semiannual DMRs must be received within 28 days following the end of each calendar semiannual period, i.e., January 28 and July 28.
  - Annual DMRs must be received by January 28, unless Part C of this permit requires otherwise.
5. The permittee shall complete all Supplemental Reporting forms (Supplemental DMRs) attached to this permit, or an approved equivalent, and submit the signed, completed forms as attachments to the DMR, through DEP's eDMR system. DEP's Supplemental Laboratory Accreditation Form (3800-FM-BPNPSM0189) must be completed and submitted to DEP with the first DMR following issuance of this permit, and anytime thereafter when changes to laboratories or methods occur. (25 Pa. Code §§ 92a.3(c), 92a.41(a), 92a.61(g) and 40 CFR § 122.41(l)(4))
6. The completed DMR Form shall be signed and certified by either of the following applicable persons, as defined in 25 Pa. Code § 92a.22:

- For a corporation - by a principal executive officer of at least the level of vice president, or an authorized representative, if the representative is responsible for the overall operation of the facility from which the discharge described in the NPDES form originates.
- For a partnership or sole proprietorship - by a general partner or the proprietor, respectively.
- For a municipality, state, federal or other public agency - by a principal executive officer or ranking elected official.

If signed by a person other than the above and for co-permittees, written notification of delegation of DMR signatory authority must be submitted to DEP in advance of or along with the relevant DMR form. (40 CFR § 122.22(b))

7. If the permittee monitors any pollutant at monitoring points as designated by this permit, using analytical methods described in Part A III.A.4. herein, more frequently than the permit requires, the results of this monitoring shall be incorporated, as appropriate, into the calculations used to report self-monitoring data on the DMR. (40 CFR 122.41(l)(4)(ii))

### C. Reporting Requirements

1. The permittee shall give notice to DEP as soon as possible but no later than 30 days prior to planned physical alterations or additions to the permitted facility. A permit under 25 Pa. Code Chapter 91 may be required for these situations prior to implementing the planned changes. A permit application, or other written submission to DEP, can be used to satisfy the notification requirements of this section.

Notice is required when:

- a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR §122.29(b). (40 CFR 122.41(l)(1)(i))
  - b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are not subject to effluent limitations in this permit. (40 CFR 122.41(l)(1)(ii))
  - c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. (40 CFR 122.41(l)(1)(iii))
  - d. The planned change may result in noncompliance with permit requirements. (40 CFR 122.41(l)(2))
2. Planned Changes to Waste Stream – Under the authority of 25 Pa. Code § 92a.24(a), the permittee shall provide notice to DEP as soon as possible but no later than 45 days prior to any planned changes in the volume or pollutant concentration of its influent waste stream as a result of indirect discharges or hauled-in wastes, as specified in paragraphs 2.a. and 2.b., below. Notice shall be provided on the "Planned Changes to Waste Stream" Supplemental Report (3800-FM-BPNPSM0482), available on DEP's website. The permittee shall provide information on the quality and quantity of waste introduced into the facility, and any anticipated impact of the change on the quantity or quality of effluent to be discharged from the facility. The Report shall be sent via Certified Mail or other means to confirm DEP's receipt of the notification. DEP will determine if the submission of a new application and receipt of a new or amended permit is required.
    - a. Introduction of New Pollutants (25 Pa. Code § 92a.24(a))

New pollutants are defined as parameters that meet all of the following criteria:

- (i) Were not detected in the facilities' influent waste stream as reported in the permit application; and

- (ii) Have not been approved to be included in the permittee's influent waste stream by DEP in writing.

The permittee shall provide notification of the introduction of new pollutants in accordance with paragraph 2 above. The permittee may not authorize the introduction of new pollutants until the permittee receives DEP's written approval.

b. Increased Loading of Approved Pollutants (25 Pa. Code § 92a.24(a))

Approved pollutants are defined as parameters that meet one or more of the following criteria:

- (i) Were detected in the facilities' influent waste stream as reported in the permittee's permit application; or
- (ii) Have been approved to be included in the permittee's influent waste stream by DEP in writing; or
- (iii) Have an effluent limitation or monitoring requirement in this permit.

The permittee shall provide notification of the introduction of increased influent loading (lbs/day) of approved pollutants in accordance with paragraph 2 above when (1) the cumulative increase in influent loading (lbs/day) exceeds 20% of the maximum loading reported in the permit application, or a loading previously approved by DEP, or (2) may cause an exceedance in the effluent of Effluent Limitation Guidelines (ELGs) or limitations in Part A of this permit, or (3) may cause interference or pass through at the facility, or (4) may cause exceedances of the applicable water quality standards in the receiving stream. Unless specified otherwise in this permit, if DEP does not respond to the notification within 30 days of its receipt, the permittee may proceed with the increase in loading. The acceptance of increased loading of approved pollutants may not result in an exceedance of ELGs or effluent limitations and may not cause exceedances of the applicable water quality standards in the receiving stream.

3. Reporting Requirements for Hauled-In Wastes

a. Receipt of Residual Waste

- (i) The permittee shall document the receipt of all hauled-in residual wastes (including but not limited to wastewater from oil and gas wells, food processing waste, and landfill leachate), as defined at 25 Pa. Code § 287.1, that are received for processing at the treatment facility. The permittee shall report hauled-in residual wastes on a monthly basis to DEP on the "Hauled In Residual Wastes" Supplemental Report (3800-FM-BPNPSM0450) as an attachment to the DMR. If no residual wastes were received during a month, submission of the Supplemental Report is not required.

The following information is required by the Supplemental Report. The information used to develop the Report shall be retained by the permittee for five years from the date of receipt and must be made available to DEP or EPA upon request.

- (1) The dates that residual wastes were received.
- (2) The volume (gallons) of wastes received.
- (3) The license plate number of the vehicle transporting the waste to the treatment facility.
- (4) The permit number(s) of the well(s) where residual wastes were generated, if applicable.
- (5) The name and address of the generator of the residual wastes.

## (6) The type of wastewater.

The transporter of residual waste must maintain these and other records as part of the daily operational record (25 Pa. Code § 299.219). If the transporter is unable to provide this information or the permittee has not otherwise received the information from the generator, the residual wastes shall not be accepted by the permittee until such time as the permittee receives such information from the transporter or generator.

- (ii) The following conditions apply to the characterization of residual wastes received by the permittee:
  - (1) If the generator is required to complete a chemical analysis of residual wastes in accordance with 25 Pa. Code § 287.51, the permittee must receive and maintain on file a chemical analysis of the residual wastes it receives. The chemical analysis must conform to the Bureau of Waste Management's Form 26R except as noted in paragraph (2), below. Each load of residual waste received must be covered by a chemical analysis if the generator is required to complete it.
  - (2) For wastewater generated from hydraulic fracturing operations ("frac wastewater") within the first 30 production days of a well site, the chemical analysis may be a general frac wastewater characterization approved by DEP. Thereafter, the chemical analysis must be waste-specific and be reported on the Form 26R.

## b. Receipt of Municipal Waste

- (i) The permittee shall document the receipt of all hauled-in municipal wastes (including but not limited to septage and liquid sewage sludge), as defined at 25 Pa. Code § 271.1, that are received for processing at the treatment facility. The permittee shall report hauled-in municipal wastes on a monthly basis to DEP on the "Hauled In Municipal Wastes" Supplemental Report (3800-FM-BPNPSM0437) as an attachment to the DMR. If no municipal wastes were received during a month, submission of the Supplemental Report is not required.

The following information is required by the Supplemental Report:

- (1) The dates that municipal wastes were received.
- (2) The volume (gallons) of wastes received.
- (3) The BOD<sub>5</sub> concentration (mg/l) and load (lbs) for the wastes received.
- (4) The location(s) where wastes were disposed of within the treatment facility.
- (ii) Sampling and analysis of hauled-in municipal wastes must be completed to characterize the organic strength of the wastes, unless composite sampling of influent wastewater is performed at a location downstream of the point of entry for the wastes.

## 4. Unanticipated Noncompliance or Potential Pollution Reporting

- a. Immediate Reporting - The permittee shall immediately report any incident causing or threatening pollution in accordance with the requirements of 25 Pa. Code Sections §§ 91.33 and 92a.41(b).
  - (i) If, because of an accident, other activity or incident a toxic substance or another substance which would endanger users downstream from the discharge, or would otherwise result in pollution or create a danger of pollution or would damage property, the permittee shall immediately notify DEP by telephone of the location and nature of the danger. Oral notification to the Department is required as soon as possible, but no later than 4 hours after the permittee becomes aware of the incident causing or threatening pollution.

- (ii) If reasonably possible to do so, the permittee shall immediately notify downstream users of the waters of the Commonwealth to which the substance was discharged. Such notice shall include the location and nature of the danger.
  - (iii) The permittee shall immediately take or cause to be taken steps necessary to prevent injury to property and downstream users of the waters from pollution or a danger of pollution and, in addition, within 15 days from the incident, shall remove the residual substances contained thereon or therein from the ground and from the affected waters of this Commonwealth to the extent required by applicable law.
- b. The permittee shall report any noncompliance which may endanger health or the environment in accordance with the requirements of 40 CFR 122.41(l)(6). These requirements include the following obligations:
- (i) 24 Hour Reporting - The permittee shall orally report any noncompliance with this permit which may endanger health or the environment within 24 hours from the time the permittee becomes aware of the circumstances. The following shall be included as information which must be reported within 24 hours under this paragraph:
    - (1) Any unanticipated bypass which exceeds any effluent limitation in the permit;
    - (2) Any upset which exceeds any effluent limitation in the permit; and
    - (3) Violation of the maximum daily discharge limitation for any of the pollutants listed in the permit as being subject to the 24-hour reporting requirement. (40 CFR 122.44(g))
  - (ii) Written Report - A written submission shall also be provided within 5 days of the time the permittee becomes aware of any noncompliance which may endanger health or the environment. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, 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 reoccurrence of the noncompliance.
  - (iii) Waiver of Written Report - DEP may waive the written report on a case-by-case basis if the associated oral report has been received within 24 hours from the time the permittee becomes aware of the circumstances which may endanger health or the environment. Unless such a waiver is expressly granted by DEP, the permittee shall submit a written report in accordance with this paragraph. (40 CFR 122.41(l)(6)(iii))
5. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under paragraph C.4 of this section or specific requirements of compliance schedules, at the time DMRs are submitted, on the Non-Compliance Reporting Form (3800-FM-BPNPSM0440). The reports shall contain the information listed in paragraph C.4.b. (ii) of this section. (40 CFR 122.41(l)(7))

**PART B****I. MANAGEMENT REQUIREMENTS****A. Compliance**

1. The permittee shall comply with all conditions of this permit. If a compliance schedule has been established in this permit, the permittee shall achieve compliance with the terms and conditions of this permit within the time frames specified in this permit. (40 CFR 122.41(a)(1))
2. The permittee shall submit reports of compliance or noncompliance, or progress reports as applicable, for any interim and final requirements contained in this permit. Such reports shall be submitted no later than 14 days following the applicable schedule date or compliance deadline. (25 Pa. Code § 92a.51(c), 40 CFR 122.47(a)(4))

**B. Permit Modification, Termination, or Revocation and Reissuance**

1. This permit may be modified, terminated, or revoked and reissued during its term in accordance with Title 25 Pa. Code § 92a.72 and 40 CFR 122.41(f).
2. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition. (40 CFR 122.41(f))
3. In the absence of DEP action to modify or revoke and reissue this permit, the permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time specified in the regulations that establish those standards or prohibitions. (40 CFR 122.41(a)(1))

**C. Duty to Provide Information**

1. The permittee shall furnish to DEP, within a reasonable time, any information which DEP may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. (40 CFR 122.41(h))
2. The permittee shall furnish to DEP, upon request, copies of records required to be kept by this permit. (40 CFR 122.41(h))
3. Other Information - Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to DEP, it shall promptly submit the correct and complete facts or information. (40 CFR 122.41(l)(8))
4. If the sewage treatment facility provides service in part or whole to a municipality, through a contract or agreement between the operator and municipality, an annual report shall be submitted to DEP by March 31 containing the following information, at a minimum:
  - a. The information identified in 25 Pa. Code § 94.12.
  - b. A "Solids Management Inventory" if specified in Part C of this permit.
  - c. The total volume of hauled-in residual and municipal wastes received during the year, by source.

**D. General Pretreatment Requirements**

Where pollutants contributed by indirect dischargers result in interference or pass through, and a violation is likely to recur, the permittee shall develop and enforce specific limits for indirect dischargers and other users, as appropriate, that together with appropriate facility or operational changes, are necessary to ensure

renewed or continued compliance with this permit or sludge use or disposal practices. The permittee shall submit a copy of such limits to DEP when developed. (25 Pa. Code § 92a.47(d))

#### E. Proper Operation and Maintenance

1. The permittee shall employ operators certified in compliance with the Water and Wastewater Systems Operators Certification Act (63 P.S. §§ 1001-1015.1).
2. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes, but is not limited to, adequate laboratory controls including appropriate quality assurance procedures. This provision also includes the operation of backup or auxiliary facilities or similar systems that are installed by the permittee, only when necessary to achieve compliance with the terms and conditions of this permit. (40 CFR 122.41(e))

#### F. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge, sludge use or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR 122.41(d))

#### G. Bypassing

1. Bypassing Not Exceeding Permit Limitations - The permittee may allow a bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions in paragraphs two, three and four of this section. (40 CFR 122.41(m)(2))
2. Other Bypassing - In all other situations, bypassing is prohibited and DEP may take enforcement action against the permittee for bypass unless:
  - a. A bypass is unavoidable to prevent loss of life, personal injury or "severe property damage." (40 CFR 122.41(m)(4)(i)(A))
  - b. There are no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance. (40 CFR 122.41(m)(4)(i)(B))
  - c. The permittee submitted the necessary notice required in G.4.a. and b. below. (40 CFR 122.41(m)(4)(i)(C))
3. DEP may approve an anticipated bypass, after considering its adverse effects, if DEP determines that it will meet the conditions listed in G.2. above. (40 CFR 122.41(m)(4)(ii))
4. Notice
  - a. Anticipated Bypass – If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible, at least 10 days before the bypass. (40 CFR 122.41(m)(3)(i))
  - b. Unanticipated Bypass – The permittee shall submit oral notice of any other unanticipated bypass within 24 hours, regardless of whether the bypass may endanger health or the environment or whether the bypass exceeds effluent limitations. The notice shall be in accordance with Part A III.C.4.b.

#### H. Sanitary Sewer Overflows (SSOs)

An SSO is an overflow of wastewater, or other untreated discharge from a separate sanitary sewer system (which is not a combined sewer system), which results from a flow in excess of the carrying capacity of the system or from some other cause prior to reaching the headworks of the sewage treatment facility. SSOs are not authorized under this permit. The permittee shall immediately report any SSO to DEP in accordance with Part A III.C.4 of this permit.

## II. PENALTIES AND LIABILITY

### A. Violations of Permit Conditions

Any person violating Sections 301, 302, 306, 307, 308, 318 or 405 of the Clean Water Act or any permit condition or limitation implementing such sections in a permit issued under Section 402 of the Act is subject to civil, administrative and/or criminal penalties as set forth in 40 CFR 122.41(a)(2).

Any person or municipality, who violates any provision of this permit; any rule, regulation or order of DEP; or any condition or limitation of any permit issued pursuant to the Clean Streams Law, is subject to criminal and/or civil penalties as set forth in Sections 602, 603 and 605 of the Clean Streams Law.

### B. Falsifying Information

Any person who does any of the following:

- Falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit, or
- Knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit (including monitoring reports or reports of compliance or noncompliance)

Shall, upon conviction, be punished by a fine and/or imprisonment as set forth in 18 Pa.C.S.A § 4904 and 40 CFR 122.41(j)(5) and (k)(2).

### C. Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance pursuant to Section 309 of the Clean Water Act or Sections 602, 603 or 605 of the Clean Streams Law.

Nothing in this permit shall be construed to preclude the institution of any legal action or to relieve the permittee from any responsibilities, liabilities or penalties to which the permittee is or may be subject to under the Clean Water Act and the Clean Streams Law.

### D. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. (40 CFR 122.41(c))

**III. OTHER RESPONSIBILITIES****A. Right of Entry**

Pursuant to Sections 5(b) and 305 of Pennsylvania's Clean Streams Law, and Title 25 Pa. Code Chapter 92a and 40 CFR 122.41(i), the permittee shall allow authorized representatives of DEP and EPA, upon the presentation of credentials and other documents as may be required by law:

1. To enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit; (40 CFR 122.41(i)(1))
2. To have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit; (40 CFR 122.41(i)(2))
3. To inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and (40 CFR 122.41(i)(3))
4. To sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act or the Clean Streams Law, any substances or parameters at any location. (40 CFR 122.41(i)(4))

**B. Transfer of Permits**

1. Transfers by modification. Except as provided in paragraph 2 of this section, a permit may be transferred by the permittee to a new owner or operator only if this permit has been modified or revoked and reissued, or a minor modification made to identify the new permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (40 CFR 122.61(a))
2. Automatic transfers. As an alternative to transfers under paragraph 1 of this section, any NPDES permit may be automatically transferred to a new permittee if:
  - a. The current permittee notifies DEP at least 30 days in advance of the proposed transfer date in paragraph 2.b. of this section; (40 CFR 122.61(b)(1))
  - b. The notice includes the appropriate DEP transfer form signed by the existing and new permittees containing a specific date for transfer of permit responsibility, coverage and liability between them; (40 CFR 122.61(b)(2))
  - c. DEP does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue this permit, the transfer is effective on the date specified in the agreement mentioned in paragraph 2.b. of this section. (40 CFR 122.61(b)(3))
  - d. The new permittee is in compliance with existing DEP issued permits, regulations, orders and schedules of compliance, or has demonstrated that any noncompliance with the existing permits has been resolved by an appropriate compliance action or by the terms and conditions of the permit (including compliance schedules set forth in the permit), consistent with 25 Pa. Code 92a.51 (relating to schedules of compliance) and other appropriate Department regulations. (25 Pa. Code § 92a.71)
3. In the event DEP does not approve transfer of this permit, the new owner or operator must submit a new permit application.

**C. Property Rights**

The issuance of this permit does not convey any property rights of any sort, or any exclusive privilege. (40 CFR 122.41(g))

**D. Duty to Reapply**

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for a new permit. (40 CFR 122.41(b))

#### E. Other Laws

The issuance of this permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations.

#### IV. ANNUAL FEE

Permittees shall pay an annual fee in accordance with 25 Pa. Code § 92a.62. Annual fee amounts are specified in the following schedule and are due on each anniversary of the effective date of the most recent new or reissued permit. All flows identified in the schedule are annual average design flows. (25 Pa. Code 92a.62)

Small Flow Treatment Facility (SRSTP or SFTF)	\$0
Minor Sewage Facility < 0.05 MGD (million gallons per day)	\$250
Minor Sewage Facility ≥ 0.05 and < 1 MGD	\$500
Minor Sewage Facility with CSO (Combined Sewer Overflow)	\$750
Major Sewage Facility ≥ 1 and < 5 MGD	\$1,250
Major Sewage Facility ≥ 5 MGD	\$2,500
Major Sewage Facility with CSO	\$5,000

As of the effective date of this permit, the facility covered by the permit is classified in the following fee category:  
**Minor Sewage Facility ≥ 0.05 and < 1 MGD.**

Invoices for annual fees will be mailed to permittees approximately three months prior to the due date. In the event that an invoice is not received, the permittee is nonetheless responsible for payment. Throughout a five year permit term, permittees will pay four annual fees followed by a permit renewal application fee in the last year of permit coverage. Permittees may contact the DEP at 717-787-6744 with questions related to annual fees. The fees identified above are subject to change in accordance with 25 Pa. Code § 92a.62(e).

Payment for annual fees shall be remitted to DEP at the address below by the anniversary date. Checks should be made payable to the Commonwealth of Pennsylvania.

PA Department of Environmental Protection  
 Bureau of Clean Water  
 Re: Chapter 92a Annual Fee  
 P.O. Box 8466  
 Harrisburg, PA 17105-8466

**PART C****I. CHESAPEAKE BAY NUTRIENT REQUIREMENTS**

A. The Annual Net Total Nitrogen (TN) and Annual Net Total Phosphorus (TP) Mass Load effluent limitations ("Cap Loads") in Part A of this permit are required in order to meet the downstream water quality standards of the State of Maryland, as required by 25 Pa. Code Chapter 92a, the federal Clean Water Act, and implementing regulations.

B. Definitions

**Annual Net Mass Load (lbs):** The sum of Monthly Total Mass Loads for one year beginning October 1<sup>st</sup> and ending September 30<sup>th</sup>, adjusted for credits sold and applied and offsets applied. Annual Net Mass Loads are compared to Cap Loads to determine compliance.

**Cap Load (lbs):** The mass load of a pollutant authorized by an NPDES permit. Cap Loads for TN and TP are implemented in NPDES permits by the establishment of Annual Net Mass Load limits. The term "Net" is used to recognize that Credits and Offsets may be used to comply with the limits. The Annual Net Mass Load must be less than or equal to the Cap Load to achieve compliance.

**Certification:** Written approval by DEP of a proposed pollutant reduction activity to generate credits before the credits are verified and registered to be used to comply with NPDES permit effluent limitations.

**Compliance Year:** The year-long period starting October 1<sup>st</sup> and ending September 30<sup>th</sup>. The Compliance Year will be named for the year in which it ends. For example, the period of October 1, 2015 through September 30, 2016 is Compliance Year 2016.

**Credit:** The tradable unit of compliance that corresponds with a unit of reduction of a pollutant as recognized by DEP which, when certified, verified and registered, may be used to comply with NPDES permit effluent limitations.

**Delivery Ratio:** A ratio that compensates for the natural attenuation of a pollutant as it travels in water before it reaches a defined compliance point.

**Offset:** The pollutant load reduction measured in pounds (lbs) that is created by an action, activity or technology which when approved by DEP may be used to comply with NPDES permit effluent limitations, conditions and stipulations under 25 Pa. Code Chapter 92a (relating to NPDES permitting, monitoring and compliance.) The offset may only be used by the NPDES permittee that DEP determines is associated with the load reduction achieved by the action, activity or technology.

**Registration:** An accounting mechanism used by DEP to track certified and verified credits before they may be used to comply with NPDES permit effluent limitations.

**Total Mass Load (lbs):**

**Monthly Total Mass Load** = The sum of the actual daily discharge loads for TN and TP (lbs/day) divided by the number of samples per month, multiplied by the number of days in the month in which there was a discharge. The daily discharge load for TN and TP (lbs/day) equals the average daily flow (MGD) on the day of sampling, multiplied by that day's sample concentration for TN and TP (mg/l), multiplied by 8.34.

**Annual Total Mass Load** = The sum of the Monthly Total Mass Loads for one year beginning October 1<sup>st</sup> and ending September 30<sup>th</sup>.

**Total Nitrogen:** For concentration and load, Total Nitrogen is the sum of Total Kjeldahl-N (TKN) plus Nitrite-Nitrate as N (NO<sub>2</sub>+NO<sub>3</sub>-N), where TKN and NO<sub>2</sub>+NO<sub>3</sub>-N are measured in the same sample.

**Truing Period:** The time provided following each Compliance Year for a permittee to comply with Cap Loads through the application of Credits and Offsets. The Truing Period will start on October 1<sup>st</sup> and end on November 28<sup>th</sup> of the same calendar year, unless DEP extends this period. During this period, compliance for the specified year may be achieved by using registered Credits that were generated during that Compliance Year. For example, Credits that are used to achieve compliance in Compliance Year 2016 must have been generated during Compliance Year 2016. Approved Offsets that have been generated may also be applied during the Truing Period.

**Verification:** Assurance that the verification plan contained in a certification, permit or other approval issued by DEP has been implemented. Verification is required prior to registration of the credits for use in an NPDES permit to comply with NPDES permit effluent limitations.

#### C. Nutrient Credits

1. Credits may be used for compliance with the Cap Loads when authorized under 25 Pa. Code § 96.8 (Use of offsets and tradable credits from pollution reduction activities in the Chesapeake Bay Watershed), including amendments, updates and revisions thereto; in accordance with DEP's Phase 2 WIP Wastewater Supplement (see [www.dep.pa.gov/npdes-bay](http://www.dep.pa.gov/npdes-bay)); and in accordance with DEP's Phase 2 WIP Nutrient Trading Supplement (see [www.dep.pa.gov/nutrient\\_trading](http://www.dep.pa.gov/nutrient_trading)).
2. Where effluent limitations for TN and/or TP are established in Part A of the permit for reasons other than the Cap Load assigned for protection of the Chesapeake Bay ("local nutrient limits"), the permittee may purchase and apply credits for compliance with the Cap Load(s) only when the permittee has demonstrated that local nutrient limits have been achieved.
3. Where local nutrient limits are established in Part A of the permit, the permittee may sell any credits generated only after the permittee has demonstrated that local nutrient limits have been achieved and those credits have been verified in accordance with the procedures established in the Phase 2 WIP Nutrient Trading Supplement.

#### D. Use of Offsets for Compliance

1. Offsets can only be used by the permittee to comply with its Cap Loads. Offsets are not eligible for use as Credits.
2. Offsets must be approved by DEP in writing before they may be applied for compliance with Cap Loads.
3. Offsets that are approved under this permit are listed in Part A, Footnotes. These Offsets may be applied each Compliance Year toward compliance with the Cap Loads. The application of these Offsets must be reported on an annual basis. Additional Offsets may be approved throughout the permit term.
4. Offsets may be approved for the connection of on-lot sewage disposal systems that existed prior to January 1, 2003 to public sewers. Twenty five pounds (25 lbs) of TN Offsets per year may be approved for each on-lot system retirement. These approved Offsets are cumulative. For example, if 10 on-lot systems are retired in year 1 (250 lbs TN approved Offsets) and 10 on-lot systems are retired in year 2, 500 lbs TN Offsets may be used toward compliance with the TN Cap Load in year 2 and thereafter.
5. For DEP to approve on-lot system retirement Offsets, the permittee must submit documentation indicating the on-lot systems existed prior to January 1, 2003 and were eliminated by connection to public sewers after January 1, 2003. This documentation must be retained by the permittee for as long as the Offsets are used to achieve compliance with Cap Loads.
6. Offsets may be approved for the transfer of load between facilities owned by the same entity if (1) the facility receiving Offsets does not discharge to waters classified as impaired for nutrients and (2) the Delivery Ratios approved by DEP for TN or TP, as applicable, are the same. Delivery ratios for the facility authorized to discharge under this permit are listed in DEP's Phase 2 Watershed Implementation Plan (WIP) Wastewater Supplement, available at the following website:

[www.dep.pa.gov/npdes-bay](http://www.dep.pa.gov/npdes-bay)

Such Offsets may only be applied in the Compliance Year in which the transfer occurred, and are not cumulative.

7. Offsets may be approved for the acceptance of hauled-in septage at the permittee's facility from residential sources within the municipal Act 537 planning area. Three pounds (3 lbs) of TN Offsets per year may be approved per 1,000 gallons of septage accepted and processed at the facility. Offsets may be approved for the acceptance of residential septage only. For the purpose of these Offsets, septage is defined as material removed from a septic tank by pumping. No other hauled-in wastes, including but not limited to holding tank wastes, solids and sludges generated at other facilities, may be approved. Such approved Offsets may only be applied in the Compliance Year in which the septage was accepted, and are not cumulative.

#### E. Reporting Requirements

1. eDMR System – The permittee shall utilize DEP's electronic Discharge Monitoring Report (eDMR) system to submit DMR data and Supplemental DMR forms.
2. Supplemental Reports – The permittee shall utilize DEP's Annual Chesapeake Bay Spreadsheet ("Spreadsheet"), available at [www.dep.pa.gov/npdes-bay](http://www.dep.pa.gov/npdes-bay), to record all nutrient concentrations and loads throughout the Compliance Year. The permittee shall also use the Spreadsheet to document all Credits sold and purchased and Offsets applied in order to calculate the facility's Annual Net Mass Loads for TN and TP. The permittee shall submit the Spreadsheet through the eDMR system at the time the Annual DMR is submitted.

## II. SOLIDS MANAGEMENT

- A. The permittee shall manage and properly dispose of sewage sludge and/or biosolids by performing sludge wasting that maintains an appropriate mass balance of solids within the treatment system. The wasting rate must be developed and implemented considering the specific treatment process type, system loadings, and seasonal variation while maintaining compliance with effluent limitations. Holding excess sludge within clarifiers or in the disinfection process is not permissible.
- B. The permittee shall submit the Supplemental Reports entitled, "Supplemental Report – Sewage Sludge/Biosolids Production and Disposal" (Form No. 3800-FM-BPNPSM0438) and "Supplemental Report – Influent & Process Control" (Form No. 3800-FM-BPNPSM0436), as attachments to the DMR on a monthly basis. When applicable, the permittee shall submit the Supplemental Reports entitled, "Supplemental Report – Hauled In Municipal Wastes" (Form No. 3800-FM-BPNPSM0437) and "Supplemental Report – Hauled In Residual Wastes" (Form No. 3800-FM-BPNPSM0450), as attachments to the DMR.

## II. OTHER REQUIREMENTS

- A. No storm water from pavements, area ways, roofs, foundation drains or other sources shall be directly admitted to the sanitary sewers associated with the herein approved discharge.
- B. The approval herein given is specifically made contingent upon the permittee acquiring all necessary property rights by easement or otherwise, providing for the satisfactory construction, operation, maintenance or replacement of all sewers or sewerage structures associated with the herein approved discharge in, along, or across private property, with full rights of ingress, egress and regress.
- C. Collected screenings, slurries, sludges, and other solids shall be handled and disposed of in compliance with 25 Pa. Code, Chapters 75, and in a manner equivalent to the requirements indicated in Chapters 271, 273, 275, 283, and 285 (related to permits and requirements for landfilling, land application, incineration, and storage of sewage sludge), Federal Regulation 40 CFR 257, Pennsylvania Clean Streams Law, Pennsylvania Solid Waste Management Act of 1980, and the Federal Clean Water Act and its amendments.

The permittee is responsible to obtain or assure that contracted agents have all necessary permits and approvals for the handling, storage, transport, and disposal of solid waste materials generated as a result of wastewater treatment.

- D. If, after the issuance of this permit, DEP approves a municipal sewage facilities official plan or an amendment to an official plan under Act 537 (Pennsylvania Sewage Facilities Act, the Act of January 24, 1966, P.L. 1535 as amended) in which sewage from the herein approved facilities will be treated and disposed of at other planned facilities, the permittee shall, upon notification from the municipality or DEP, provide for the conveyance of its sewage to the planned facilities, abandon use and decommission the herein approved facilities including the proper disposal of solids, and notify DEP accordingly. The permittee shall adhere to schedules in the approved official plan, amendments to the plan, or other agreements between the permittee and municipality. This permit shall then, upon notice from DEP, terminate and become null and void and shall be relinquished to DEP.
- E. The permittee shall optimize chlorine dosages used for disinfection or other purposes to minimize the concentration of Total Residual Chlorine (TRC) in the effluent, meet applicable effluent limitations, and reduce the possibility of adversely affecting the receiving waters. Optimization efforts may include an evaluation of wastewater characteristics, mixing characteristics, and contact times, adjustments to process controls, and maintenance of the disinfection facilities. If DEP determines that effluent TRC is causing adverse water quality impacts, DEP may reopen this permit to apply new or more stringent effluent limitations and/or require implementation of control measures or operational practices to eliminate such impacts.
- Where the permittee does not use chlorine for primary or backup disinfection, but proposes the use of chlorine for cleaning or other purposes, the permittee shall notify DEP prior to initiating use of chlorine and monitor TRC concentrations in the effluent on each day in which chlorine is used. The results shall be submitted as an attachment to the DMR.
- F. Notification of the designation of the responsible operator must be submitted to the permitting agency by the permittee within 60 days after the effective date of the permit and from time to time thereafter as the operator is replaced.
- G. The permittee shall obtain a Water Quality Management (WQM) permit from DEP for construction of treatment facilities and complete construction in accordance with the WQM permit application prior to commencing discharges authorized by this permit.

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT  
 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)  
**DISCHARGE MONITORING REPORT (DMR)**

**PERMITTEE NAME/ADDRESS**

Greater Gettysburg Development Co.  
 LLC  
 601 Mason Dixon Road  
 Gettysburg, PA 17325  
 Gettysburg Commons STP  
 Straban Township  
 Adams County  
 13-D

PA0247715  
 PERMIT NUMBER

001  
 OUTFALL NUMBER

Reporting Frequency: Monthly

DMR Effective From: June 1, 2017

DMR Effective To: May 31, 2022

Permit Expires: May 31, 2022

Permit Application Due: December 2, 2021

Check Here if No Discharge

**MONITORING PERIOD**

YEAR	MO	DAY	TO	YEAR	MO	DAY

NOTE: Read instructions before completing this form

PARAMETER	SAMPLE MEASUREMENT PERMIT REQUIREMENT	QUANTITY OR LOADING		QUALITY OR CONCENTRATION			NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	UNITS	VALUE	VALUE	UNITS			
Flow	MEASUREMENT	Report Avg Mo	XXX	XXX	XXX	XXX			
	PERMIT REQUIREMENT	Report Daily Max	XXX	XXX	XXX	XXX		Continuous	Measured
pH	MEASUREMENT	XXX	XXX	6.0 Min	XXX	9.0 Max			
	PERMIT REQUIREMENT	XXX	XXX	5.0 Min	XXX	XXX		1/day	Grab
DO	MEASUREMENT	XXX	XXX	XXX	XXX	XXX			
	PERMIT REQUIREMENT	XXX	XXX	XXX	XXX	XXX		1/day	Grab
CBOD5	MEASUREMENT	25 Avg Mo	XXX	XXX	10.0 Avg Mo	XXX			8-Hr Composite
	PERMIT REQUIREMENT	25 Avg Mo	XXX	XXX	10.0 Avg Mo	XXX		1/week	Composite
TSS	MEASUREMENT	XXX	XXX	XXX	XXX	XXX			
	PERMIT REQUIREMENT	XXX	XXX	XXX	XXX	XXX		1/week	Composite
Fecal Coliform Oct 1 - Apr 30	MEASUREMENT	XXX	XXX	2000 Geo Mean	10000 IMAX	No./100 ml			
	PERMIT REQUIREMENT	XXX	XXX	XXX	XXX	10000 IMAX		1/week	Grab

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel who are authorized to compile the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn testimony).

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER  
 TYPED OR PRINTED

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE  
 AREA CODE NUMBER

DATE  
 YEAR MO DAY

COMMENTS (Report all violations on the "Non-Compliance Reporting Form")

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT  
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)  
DISCHARGE MONITORING REPORT (DMR)**

**PERMITTEE NAME/ADDRESS**

Greater Gettysburg Development Co.  
LLC

601 Mason Dixon Road  
Gettysburg, PA 17325

Gettysburg Commons STP

Siraban Township

Adams County

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PA0247715  
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Check Here if No Discharge

NOTE: Read Instructions before completing this form

MONITORING PERIOD			
YEAR	MO	DAY	TO
	YEAR	MO	DAY

PARAMETER	SAMPLE MEASUREMENT PERMIT REQUIREMENT	QUANTITY OR LOADING		QUALITY OR CONCENTRATION			NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	UNITS	VALUE	VALUE	UNITS			
Fecal Coliform May 1 - Sep 30	SAMPLE MEASUREMENT PERMIT REQUIREMENT	XXX	XXX	XXX	200	1000			
	PERMIT REQUIREMENT	XXX	XXX	XXX	Geo Mean	IMAX	No./100 ml	1/week	Grab
UV Intensity	SAMPLE MEASUREMENT PERMIT REQUIREMENT	XXX	XXX	XXX	Report Min	XXX	mW/cm <sup>2</sup>	1/day	Recorded
	PERMIT REQUIREMENT	XXX	XXX	XXX	XXX	XXX			
Nitrate-Nitrite	SAMPLE MEASUREMENT PERMIT REQUIREMENT	XXX	XXX	XXX	Report Avg Mo	XXX	mg/L	2/week	8-Hr Composite
	PERMIT REQUIREMENT	XXX	XXX	XXX	XXX	XXX			
Nitrate-Nitrite	SAMPLE MEASUREMENT PERMIT REQUIREMENT	XXX	XXX	XXX	Report Total Mo	XXX	lbs	1/month	Calculation
	PERMIT REQUIREMENT	XXX	XXX	XXX	XXX	XXX			
Total Nitrogen	SAMPLE MEASUREMENT PERMIT REQUIREMENT	XXX	XXX	XXX	Report Avg Mo	XXX	mg/L	1/month	Calculation
	PERMIT REQUIREMENT	XXX	XXX	XXX	XXX	XXX			
Total Nitrogen Effluent Net	SAMPLE MEASUREMENT PERMIT REQUIREMENT	XXX	XXX	XXX	Report Total Mo	XXX	lbs	1/month	Calculation
	PERMIT REQUIREMENT	XXX	XXX	XXX	XXX	XXX			

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a protocol designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	TELEPHONE	DATE
TYPED OR PRINTED	AREA CODE NUMBER	YEAR MO DAY

COMMENTS (Report all violations on the "Non-Compliance Reporting Form")

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT  
 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)  
 DISCHARGE MONITORING REPORT (DMR)

PERMITTEE NAME/ADDRESS

Greater Gettysburg Development Co.  
 LLC

ADDRESS  
 601 Mason Dixon Road  
 Gettysburg, PA 17325

FACILITY  
 Gettysburg Commons STP

LOCATION  
 Straban Township

ADAMS COUNTY

WATERSHED  
 13-D

PA0247715  
 PERMIT NUMBER

001  
 OUTFALL NUMBER

Reporting Frequency: Monthly

DMR Effective From: June 1, 2017

DMR Effective To: May 31, 2022

Permit Expires: May 31, 2022

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Check Here if No Discharge

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MONITORING PERIOD					
YEAR	MO	DAY	YEAR	MO	DAY
			TO		

PARAMETER	SAMPLE MEASUREMENT PERMIT REQUIREMENT	QUANTITY OR LOADING			QUALITY OR CONCENTRATION			NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	UNITS	VALUE	VALUE	VALUE	UNITS			
Total Nitrogen	MEASUREMENT	Report	XXX	XXX	XXX	XXX	XXX			
	PERMIT REQUIREMENT	Total Mo	XXX	lbs	XXX	XXX	XXX	1/month	Calculation	
Ammonia Nov 1 - Apr 30	MEASUREMENT	7.5	XXX	XXX	XXX	3.0	Avg Mo	mg/L	8-Hr Composite	
	PERMIT REQUIREMENT	Avg Mo	XXX	lbs/day	XXX	XXX	XXX	2/week	Calculation	
Ammonia May 1 - Oct 31	MEASUREMENT	2.5	XXX	XXX	XXX	1.0	Avg Mo	mg/L	8-Hr Composite	
	PERMIT REQUIREMENT	Avg Mo	XXX	lbs/day	XXX	XXX	XXX	2/week	Calculation	
Ammonia	MEASUREMENT	Report	XXX	XXX	XXX	XXX	XXX	1/month	Calculation	
	PERMIT REQUIREMENT	Total Mo	XXX	lbs	XXX	XXX	XXX	1/month	Calculation	
TKN	MEASUREMENT	XXX	XXX	XXX	XXX	XXX	XXX	2/week	8-Hr Composite	
	PERMIT REQUIREMENT	XXX	XXX	XXX	XXX	Report Avg Mo	mg/L	2/week	8-Hr Composite	
TKN	MEASUREMENT	Report	XXX	XXX	XXX	XXX	XXX	1/month	Calculation	
	PERMIT REQUIREMENT	Total Mo	XXX	lbs	XXX	XXX	XXX	1/month	Calculation	

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	TELEPHONE	DATE
TYPED OR PRINTED	AREA CODE NUMBER	YEAR MO DAY
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT		

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn statements).

COMMENTS (Report all violations on the "Non-Compliance Reporting Form")

**COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT  
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)  
DISCHARGE MONITORING REPORT (DMR)**

PERMITTEE NAME/ADDRESS  
Greater Gettysburg Development Co.  
LLC

NAME  
601 Mason Dixon Road  
Gettysburg, PA 17325

FACILITY  
Gettysburg Commons STP

LOCATION  
Straban Township  
Adams County

WATERSHED  
13-D

PA0247715  
PERMIT NUMBER

001  
OUTFALL NUMBER

Reporting Frequency: Monthly  
DMR Effective From: June 1, 2017  
DMR Effective To: May 31, 2022  
Permit Expires: May 31, 2022  
Permit Application Due: December 2, 2021

Check Here if No Discharge

NOTE: Read Instructions before completing this form

MONITORING PERIOD						
YEAR	MO	DAY	TO	YEAR	MO	DAY

PARAMETER	SAMPLE MEASUREMENT REQUIREMENT	QUANTITY OR LOADING		QUALITY OR CONCENTRATION			UNITS	NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	UNITS	VALUE	VALUE	VALUE				
Total Phosphorus	0.75 Avg Mo	XXX	lbs/day	XXX	0.3 Avg Mo	XXX	mg/L		2/week	8-Hr Composite
	Report Total Mo	XXX		XXX	XXX	XXX			1/month	Calculation
Total Phosphorus Effluent Net	Report Total Mo	XXX	lbs	XXX	XXX	XXX			1/month	Calculation
		XXX		XXX	XXX	XXX				

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	TELEPHONE		DATE		
TYPED OR PRINTED	AREA CODE	NUMBER	YEAR	MO	DAY
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT					
COMMENTS (Report all violations on the "Non-Compliance Reporting Form")					

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to untruthful certification).

COMMONWEALTH OF PENNSYLVANIA  
 DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT  
 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)  
**DISCHARGE MONITORING REPORT (DMR)**

PERMITTEE NAME/ADDRESS

Greater Gettysburg Development Co.  
 LLC  
 601 Mason Dixon Road  
 Gettysburg, PA 17325  
 Gettysburg Commons STP  
 Straban Township  
 Adams County  
 13-D

PA0247716  
 PERMIT NUMBER

001  
 OUTFALL NUMBER

Reporting Frequency: Annually  
 DMR Effective From: June 1, 2017  
 DMR Effective To: May 31, 2022  
 Permit Expires: May 31, 2022  
 Permit Application Due: December 2, 2021

MONITORING PERIOD						
YEAR	MO	DAY	TO	YEAR	MO	DAY

Check Here if No Discharge

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PARAMETER	SAMPLE MEASUREMENT PERMIT REQUIREMENT	QUANTITY OR LOADING		QUALITY OR CONCENTRATION			NO. EX	FREQUENCY OF ANALYSIS	SAMPLE TYPE
		VALUE	UNITS	VALUE	VALUE	UNITS			
Total Nitrogen (Total Load, lbs)	MEASUREMENT								
	PERMIT REQUIREMENT	5479	Total Annual	XXX	XXX	XXX		1/year	Calculation
Total Nitrogen (Total Load, lbs)	MEASUREMENT								
	PERMIT REQUIREMENT	XXX	Report Total Annual	XXX	XXX	XXX		1/year	Calculation
Ammonia-Nitrogen (Total Load, lbs)	MEASUREMENT								
	PERMIT REQUIREMENT	XXX	Report Total Annual	XXX	XXX	XXX		1/year	Calculation
Total Phosphorus (Total Load, lbs)	MEASUREMENT								
	PERMIT REQUIREMENT	274	Total Annual	XXX	XXX	XXX		1/year	Calculation
Total Phosphorus (Total Load, lbs)	MEASUREMENT								
	PERMIT REQUIREMENT	XXX	Report Total Annual	XXX	XXX	XXX		1/year	Calculation

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the records and complete, true, correct, and accurate. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See Pa. C.S. § 4904 (relating to unsworn falsification).

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	TELEPHONE		DATE		
	AREA CODE	NUMBER	YEAR	MO	DAY
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT					

COMMENTS (Report all violations on the "Non-Compliance Reporting Form")



## INSTRUCTIONS FOR COMPLETING DISCHARGE MONITORING REPORTS (DMRs)

### General

One or more Discharge Monitoring Reports (DMRs) are attached to your permit for reporting the results of self-monitoring activities as required by your permit. You should make copies of the DMRs for your ongoing use, unless you elect to participate in the Department of Environmental Protection's (DEP's) electronic DMR (eDMR) program (see [www.dep.state.pa.us/edmr](http://www.dep.state.pa.us/edmr)).

- Reporting frequencies will vary depending on the monitoring frequencies listed in your permit, and are generally monthly, quarterly semi-annually and annually.
- Your reports must be received by DEP on the 28<sup>th</sup> day of the month following the end of the reporting period, unless otherwise specified in Part C of your permit.
- Your permit may require submission of DMRs to other agencies, including the U.S. Environmental Protection Agency (EPA).
- If you receive DMRs in the mail from EPA, please discontinue use of DMR Form No. 3800-FM-BPNPSM0462 and begin using EPA's DMRs.
- DMRs will generally include pre-populated information for permittee name and address, facility location, permit number, outfall number, permit expiration date, parameter names, and permit requirements. If you identify any errors on a DMR issued by DEP, please contact the DEP regional office that issued your permit. If you identify any errors on a DMR issued by EPA, please contact DEP's Central Office at 717-787-6744. **DO NOT make changes to DMRs issued to you.**
- You may use computer-generated replicas of Form No. 3800-FM-BPNPSM0462 or of EPA's DMR if you receive prior approval from DEP and EPA. **DEP reserves the right to instruct you to discontinue the submission of computer-generated DMRs if the permit requirements you entered on the form are inaccurate.**

### Instructions

1. Enter statistical results into each blank field below the "VALUE" column headers. Results must be reported in the same units shown on the DMR.
2. Sum the total number of excursions or exceedances of permit limits across the row for each parameter and enter the value into the "NO. EX" field. For example, if the permit contains limits of 6.0 S.U. (Minimum) and 9.0 S.U. (Maximum) for pH, and the Minimum and Maximum results are 5.9 S.U. and 9.1 S.U., respectively, enter "2" into the "NO. EX" field.
3. Report the actual sampling frequency and sample type utilized during the reporting period in the fields corresponding to "Frequency of Analysis" and "Sample Type", respectively.
4. Type the name of the principal executive officer (or an authorized agent designated by a principal executive officer) who is taking responsibility for the report, sign the report (should be in ink), enter the telephone number of the responsible individual, and record the date that the report was signed. Mail only original, signed copies of DMRs.
5. In the Comments section at the bottom of the DMR, you may write a brief summary of violations in this section; however, DEP requests that all violations during the monitoring period be reported in more detail on DEP's **Non-Compliance Reporting Form** (3800-FM-BPNPSM0440) and be submitted as an attachment to the DMR. Other uses of the Comments Section include explanations of attachments to the DMR, explanations for the unavailability of data, and brief summaries of issues that have affected operations or effluent quality during the monitoring period. Always consider attaching a letter or separate document to explain your situation in more detail.



### No Discharge or No Data Available

If there was no discharge at all from an outfall during the monitoring period, check the "No Discharge" box on the top of the DMR. Complete the information above and below the table and mail the DMR to the appropriate agencies. Be sure to sign and date the DMR.

If there was no discharge of a specific parameter (e.g., if a chlorine limit is in the permit but chlorine was not used for disinfection during the entire reporting period), or if data are not available for a specific parameter for the entire reporting period, do not leave the DMR blank. Instead, report one of the following No Data Indicator (NODI) codes that apply to your situation in the appropriate value field, and **provide an explanation as an attachment to the DMR:**

- A** Use if you are exempted from monitoring the parameter because of a General Permit condition.
- E** Use if all samples or results are not available for the reporting period due to equipment failure or because sample collection was overlooked or samples could not be collected for the parameter.
- GG** Use if your permit requires sample collection and analysis only under certain conditions and those conditions were not met during the reporting period (e.g., report chlorine results only when chlorination system is used).
- FF** Other: use if there is any reason for the absence of data that is not covered by those above.

If you have at least one result for a parameter, the value should be reported and not a NODI code.

### Calculations

The following explains how to calculate statistical values that are commonly required by permits:

**Monthly Average** – For Loading (lbs/day), sum the total of daily loadings and divide by the number of samples during the month. To calculate the daily loading, multiply the daily concentration (mg/l) by the flow (MGD) on the date of sampling and a conversion factor of 8.34. For Concentration, sum the total of daily concentrations and divide by the number of samples.

**Weekly Average** – For Loading (lbs/day), sum the total of average daily loadings during each week of the reporting period (beginning on a Sunday and ending on a Saturday) and divide by the number of samples during the week. For Concentration, sum the total of daily concentrations each week and divide by the number of samples. Report the maximum weekly average on the DMR.

**Maximum Daily ("Daily Max")** – Report the maximum concentration or load measured during a 24-hour period during the reporting period; if multiple measurements are taken daily, include all data in the analysis.

**Instantaneous Maximum ("IMAX")** – Report the maximum result obtained by a grab sample for a specific pollutant over the entire reporting period covered by a DMR.

**Instantaneous Minimum ("Minimum")** – Report the minimum result obtained by a grab sample for a specific pollutant over the entire reporting period covered by a DMR.

**Total Monthly Load (lbs)** – Sum the total of average daily loadings, divide by the number of samples during the month, and multiply by the number of days in the month.

**Geometric Mean** – Report the average of a set of  $n$  sample results given by the  $n$ th root of their product. If any result is zero (0), substitute 1 for the calculation. For example, five samples were analyzed with the following results: 20, 300, 400, 500, and 0. The calculation of geometric mean is as follows (note that you will need to use the power function on a calculator):

$$\sqrt[5]{20 \cdot 300 \cdot 400 \cdot 500 \cdot 1} = \sqrt[5]{1,200,000,000} = (1,200,000,000)^{1/5} = 65$$



## Non-Detect Data

### Conventional and Toxic Parameters

For calculating average values of data sets in which there are some "detections" (results at or above the laboratory reporting limit) and some "non-detect" data (results reported below the laboratory reporting limit), use the reporting limit for non-detect data. In other words, ignore the less than (<) symbol for statistical calculations and include the < symbol with the statistical result if there is at least one non-detect result in the data set. For example, four samples were analyzed with the following results: < 1.0, 2.0, < 1.0, and 1.0. The average statistical result is < 1.3.

Where the permit includes an effluent limitation for a parameter that is less than the most sensitive detection limit available, and the laboratory reports a value at or below the lowest level specified by the permit, you may use zero (0) in the calculation in lieu of the reporting limit, if the parameter is identified in 25 Pa. Code Chapter 16, Appendix A, Tables 2A and 2B. In general, parameters with limitations that are less than the most sensitive detection limit will be identified in Part C of the permit, if applicable.

### Bacteria Parameters

Report all "non-detect" (e.g., < 2) and "too numerous to count" (TNTC) (e.g., > 2,000) results on DMR supplemental forms as reported by the laboratory. Do not report "TNTC" on supplemental forms, but instead report a value qualified with the ">" symbol. Where a data set includes one or more "non-detect" and/or TNTC results, calculate the geometric mean by ignoring qualifying symbols, but report the value with the symbol. If a data set includes both ">" and "<" qualifiers, the ">" qualifier takes precedence for reporting. For all "non-detect" values, specify in the Comments section of the DMR the maximum volume filtered at the laboratory.

*Example 1* – For results are determined, < 2, 10, 20, and 30. The geometric mean should be reported as  $< (2 \cdot 10 \cdot 20 \cdot 30)^{0.25} = < 10$ . Specify the maximum volume filtered for the < 2 result in the DMR Comments.

*Example 2* – Three results are determined, < 2, 1,000, and > 2,000. The geometric mean should be reported as  $> (2 \cdot 1,000 \cdot 2,000)^{0.333} = > 158$ .

### Rounding and Precision

Statistical values reported on the DMR should be rounded to the same number of decimal places as the limit for the parameter as set forth in the permit. If the permit does not contain a limit but requests monitoring only, statistical values for concentration results should be rounded to the maximum number of decimal places in the data set as reported by the laboratory or the instrument used for analysis. If mass loads must be reported and there is no limit, round statistical values to the nearest whole number, unless the calculated number is less than one, in which case the value should be rounded to one significant figure (e.g., 0.1, 0.05, etc.). If the number you are rounding is followed by 5, 6, 7, 8, or 9, round the number up, otherwise round down.

The documents "Discharge Monitoring Reports Overview and Summary" (3800-BK-DEP3047) and "Management of Non-Detect Results for Discharge Monitoring Reports" (3800-FS-DEP4262) contain more information and are incorporated by reference. These documents are available on DEP's website.

**Supplemental Form Inventory**

The following supplemental forms (indicated in the check box column) are attached to this permit and must be completed and submitted to DEP in accordance with the permit and the supplemental form instructions. If the eDMR system is used to submit DMR reports, the spreadsheet versions of these supplemental forms, where applicable, should be used and attached to the eDMR submissions. A link to DEP's supplemental form website is available when logging into the eDMR system.

Check Box	Supplemental Form Name and No.
<input checked="" type="checkbox"/>	Daily Effluent Monitoring (3800-FM-BPNPSM0435)
<input checked="" type="checkbox"/>	Influent & Process Control (3800-FM-BPNPSM0436)
<input checked="" type="checkbox"/>	Hauled in Municipal Wastes (3800-FM-BPNPSM0437)
<input checked="" type="checkbox"/>	Sewage Sludge/Biosolids Production and Disposal (3800-FM-BPNPSM0438)
<input type="checkbox"/>	Chemical Additives Usage (3800-FM-BPNPSM0439)
<input checked="" type="checkbox"/>	Non-Compliance Reporting Form (3800-FM-BPNPSM0440)
<input type="checkbox"/>	CSO Monthly Summary Report (3800-FM-BPNPSM0441)
<input type="checkbox"/>	CSO Detailed Report (3800-FM-BPNPSM0442)
<input type="checkbox"/>	Groundwater Monitoring Data Report (3800-FM-BPNPSM0443)
<input type="checkbox"/>	TMDL Annual Load Summary (3800-FM-BPNPSM0448)
<input type="checkbox"/>	Land Application Systems (3800-FM-BPNPSM0449)
<input checked="" type="checkbox"/>	Hauled in Residual Wastes (3800-FM-BPNPSM0450)
<input type="checkbox"/>	Surface Water Monitoring Data Report (3800-FM-BPNPSM0461)
<input checked="" type="checkbox"/>	Lab Accreditation Form (3800-FM-BPNPSM0189)
<input type="checkbox"/>	Whole Effluent Toxicity Test Summary Report (3800-FM-BPNPSM0485)
<input type="checkbox"/>	Storm Water Annual Inspection Form (3800-PM-WSFR0083v)
<input type="checkbox"/>	Storm Water Additional Information (3800-PM-WSFR0083t)
<input type="checkbox"/>	Other: <input type="text"/>





## INSTRUCTIONS FOR COMPLETING SEWAGE SLUDGE / BIOSOLIDS SUPPLEMENTAL REPORT

1. Enter Facility Name, Municipality, County, Watershed No., Month, Year, NPDES Permit No., and Permit Expiration Date.

### Biosolids Production Information

2. For each off-site removal event for liquid sewage sludge or biosolids and for dewatered sewage sludge or biosolids, and for each event where dewatered sewage sludge or biosolids are incinerated on-site, list the date of the event, identify the gallons (liquid) or tons (dewatered) removed or incinerated and the percent solids (e.g., 10%, 20%, etc.) Report only sewage sludge or biosolids that have been removed from the plant digesters and other solids which have been **permanently** removed from the treatment process. Do not include sewage sludge or biosolids from other facilities that are processed at your facility. (If there were no off-site removal events during the month, check the box above the table).

Calculate dry tons for liquid sewage sludge or biosolids by multiplying the volume (gallons) by the percent solids and by a conversion factor of 0.0000417. For example, if 2,500 gallons of liquid biosolids is removed, and the percent solids is 3.0%, dry tons is calculated as:

$$2,500 \text{ gallons} \times 3.0\% \times 0.0000417 = 0.31 \text{ dry tons}$$

Calculate dry tons for dewatered sewage sludge or biosolids by multiplying the tons dewatered by the percent solids and by a conversion factor of 0.01. For example, if 5 tons of dewatered biosolids is removed, and the percent solids is 50%, dry tons is calculated as:

$$5 \text{ tons} \times 50\% \times 0.01 = 2.5 \text{ dry tons}$$

The % Solids of liquid or dewatered sewage sludge or biosolids must be determined periodically through laboratory testing. Do not estimate or guess this value. An acceptable test method is method 2540B in *Standard Methods for the Examination of Water and Wastewater*, 18th edition, where samples are dried at 103-105°C. Other references such as ASTM may have equivalent tests which are also acceptable.

### Biosolids and Incinerator Ash Disposal and Beneficial Use Information

3. Report sewage sludge, biosolids, and ash disposal and beneficial use information by disposal/application site. There are columns for four possible sites per month - if more sites are needed, attach additional pages. For each Site Name, listed at the top of the column, enter the Municipality and County of the site, the DEP Permit No. (i.e., Biosolids permit number for land application, landfill waste management permit number, etc.), Type of Material (sewage sludge, biosolids, or incinerator ash), Dry Tons Applied/Disposed at the site for the month, Type of Disposal/Use (e.g., reed beds, agricultural utilization, composting, landfill, other treatment plant, etc.) and the name of the hauler (company or individual name).
4. Type the name of the person who prepared the form, the person's job title, and sign and date the form after reading the certification statement.



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

**SUPPLEMENTAL REPORT  
DAILY EFFLUENT MONITORING**

Facility Name: Gettysburg Commons STP      Month: \_\_\_\_\_      Year: \_\_\_\_\_  
 Municipality: Siraban Township      NPDES Permit No.: PA0247715      Outfall No.: 001  
 Watershed: 13-D      County: Adams      Renewal application due 180 days prior to expiration  
 Laboratories: \_\_\_\_\_      This permit will expire on MAY 31 2022

Day	Flow		pH		DO		CBOD5		TSS		Fecal Coliform		UV Intensity		Ammonia		Total Phosphorus		
	Q	MGD	Q	S.U.	Q	mg/L	Q	mg/L	Q	mg/L	Q	No./100 ml	Q	mW/cm²	Q	mg/L	Q	mg/L	
1																			
2																			
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Avg																			

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Prepared By: \_\_\_\_\_      Signature: \_\_\_\_\_  
 Title: \_\_\_\_\_      Date: \_\_\_\_\_



**INSTRUCTIONS FOR COMPLETING  
DAILY EFFLUENT MONITORING  
SUPPLEMENTAL REPORT**

Use this form to report daily monitoring results for the parameters that must be monitored in effluent for compliance with the permit. Results for influent parameters are normally reported on Form 3800-FM-BPNPSM0436.

1. Enter Facility Name, Municipality, County, Watershed No., Laboratories, Month, Year, NPDES Permit No., Outfall No., and Permit Expiration Date (it is noted that this information may be pre-populated if you have received this form with your permit). For Laboratories, list the names of all laboratories where samples were analyzed during the month, including on-site analysis.
2. In the column headers, below "Effluent Parameters," enter the names of parameters in the permit. Since limited space is provided, abbreviation may be necessary. If there are more parameters for an outfall than columns provided on the form, attach an additional sheet.
3. Below parameter names, and to the right of "Q" (Qualifier) column headers, enter the units associated each parameter (it is noted that this information may be pre-populated if you have received this form with your permit).
4. Enter monitoring results for parameters in the rows corresponding to the day of the month in which samples were collected. Enter results exactly as reported by the laboratory, or if measured with on-site equipment, to the level of precision recommended by the equipment manufacturer. Enter data qualifiers such as "<," ">," "J," and others in the "Q" column.
5. Calculate and report average values at the bottom of the table in accordance with the DMR Instructions (3800-FM-BPNPSM0463) and DEP guidance (3800-BK-DEP3047). Note – for bacteria, calculate and report the geometric mean value.
6. Type the name of the person who prepared the form, the person's job title, and sign and date the form after reading the certification statement.



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

**SUPPLEMENTAL REPORT  
DAILY EFFLUENT MONITORING**

Facility Name: Gettysburg Commons STP  
Municipality: Straban Township County: Adams  
Watershed: 13-D  
Laboratories: \_\_\_\_\_

Month: \_\_\_\_\_ Year: \_\_\_\_\_  
NPDES Permit No.: PA0247715 Outfall No.: \_\_\_\_\_  
Renewal application due 180 days prior to expiration  
This permit will expire on May 31, 2022

Day	Effluent Parameters											
	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q
1												
2												
3												
4												
5												
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I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Prepared By: \_\_\_\_\_ Signature: \_\_\_\_\_  
Title: \_\_\_\_\_ Date: \_\_\_\_\_



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

### SUPPLEMENTAL REPORT - HAULED IN MUNICIPAL WASTES

Facility Name: Gatysburg Commons STP  
Municipality: Straban Township  
Watershed: 13-D

County: Adams

Month: \_\_\_\_\_ Year: \_\_\_\_\_  
NPDES Permit No.: PA0247715  
Renewal application due **180 days** prior to expiration  
This permit will expire on **May 31, 2022**

Day	SEPTAGE			SLUDGE			OTHER (specify):			DAILY TOTALS					
	Gallons	BOD <sub>5</sub> (mg/l)	BOD <sub>5</sub> (lbs)	Disposal Location	Gallons	BOD <sub>5</sub> (mg/l)	BOD <sub>5</sub> (lbs)	Disposal Location	Gallons	BOD <sub>5</sub> (mg/l)	BOD <sub>5</sub> (lbs)	Gallons	BOD <sub>5</sub> (lbs)		
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31															
Avg														Monthly Totals:	

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Prepared By: \_\_\_\_\_ Signature: \_\_\_\_\_  
Title: \_\_\_\_\_ Date: \_\_\_\_\_



**INSTRUCTIONS FOR COMPLETING  
HAULED IN MUNICIPAL WASTES  
SUPPLEMENTAL REPORT**

This form is intended for documenting the receipt of municipal wastes including sewage sludge, septage and other municipal wastewaters hauled in from other facilities for processing and/or disposal at your facility. This form should not be used for reporting receipt of residual wastes (e.g., food processing wastes, oil and gas wastewater, landfill leachate, etc.) - please use Form 3800-FM-BPNPSM0450 for reporting this information.

1. Enter Facility Name, Municipality, County, Watershed No., Month, Year, NPDES Permit No., and Permit Expiration Date.
2. For septage, sludge and other wastewaters (specify type in the space provided), record the daily volume received in gallons, the daily BOD<sub>5</sub> concentration (average), the daily BOD<sub>5</sub> load in lbs (average), and the disposal location. For disposal location, specify the plant location or tank receiving hauled in wastes (e.g., headworks, primarily clarifier, digester, etc.).
3. Determine daily BOD<sub>5</sub> concentrations in mg/l by sampling loads in accordance with the permit or otherwise as determined by the facility. Periodic sampling of loads is encouraged to improve confidence in reported results.
4. Calculate the average, daily total and monthly total values and report the values in the spaces provided.
5. Type the name of the person who prepared the form, the person's job title, and sign and date the form after reading the certification statement.





**INSTRUCTIONS FOR COMPLETING  
HAULED IN RESIDUAL WASTES  
SUPPLEMENTAL REPORT**

Use this form to document receipt of residual wastes at your treatment facility (e.g., food processing waste, landfill leachate, oil and gas wastewaters). Municipal wastes such as sewage sludge and septage should be documented on the Hauled in Municipal Wastes Supplemental Report (3800-FM-BPNPSM0437).

1. Enter Facility Name, Municipality, County, Watershed No., Month, Year, NPDES Permit No., and Permit Expiration Date.
2. Enter the date for each day in which the facility receives residual wastes. If wastewater is received from more than one generator on the same day, repeat the date in a separate row.
3. Report the total volume received each day from each generator (source), in whole gallons.
4. Report the license plate number of the vehicle hauling the wastewater to the treatment facility. If more than one vehicle is used by a generator, report the date and total volume hauled by each vehicle daily (use separate rows as necessary).
5. For oil and gas wastewaters, enter the permit number of the well from which the wastewater was generated. For other wastewaters, this column may remain blank.
6. Report the source of each load of residual waste, including the generator name, address, and state. For oil and gas wastewaters, report the location of the well(s) generating the wastewater.
7. Enter Wastewater Type, typically frac water, drilling fluids or production water for oil and gas wastewaters, or other types such as food processing waste or leachate.
8. If the wastewater has been analyzed and reported on a Residual Waste Form 26R, or a separate waste characterization using the parameters from Form 26R, enter "Yes" under the column "Chemical Analysis", otherwise enter "No".
9. Type the name of the person who prepared the form, the person's job title, and sign and date the form after reading the certification statement.





### NON-COMPLIANCE REPORTING FORM

Use this supplemental form to report all permit violations and any other non-compliance that may endanger health or the environment, in accordance with your permit. Complete all sections that apply. If you are reporting violations of permit limits, monitoring requirements or schedules that do not pose an immediate threat to health or the environment, you may attach this form to the Discharge Monitoring Report (DMR). Title 25, Pa. Code §§ 91.33 and 91.34 (regarding incidents causing or threatening pollution and activities utilizing pollutants, respectively), in part requires immediate notification by telephone to the Department of pollution incidents, remediation, and may require an additional report on the incident or plan of pollution prevention measures. If you are reporting other non-compliance events, and the reporting deadline does not coincide with your submission of the DMR, it should be submitted separately to the Department by the reporting deadline set forth in the permit. See instructions for more information.

Facility Name: Gettysburg Commons STP Month: \_\_\_\_\_ Year: \_\_\_\_\_  
Municipality: Straban Township County: Adams Permit No.: PA0247715

Violations of Permit Effluent Limitations\*

Date	Parameter	Permit Limit	Units	Statistical Code	Result	Units	Cause of Violation	Corrective Action Taken

Sanitary Sewer Overflows and Other Unauthorized Discharges\*

Event Date	Substance Discharged	Location	Volume (gals)	Duration (hrs)	Receiving Waters	Impact on Waters	Cause of Discharge	Date DEP Notified

Other Permit Violations\*

- Sample collection less frequent than required Explain \_\_\_\_\_
- Sample type not in compliance with permit Explain \_\_\_\_\_
- Violation of permit schedule Explain \_\_\_\_\_
- Other Explain \_\_\_\_\_
- Other Explain \_\_\_\_\_

**\* If the space provided is not sufficient to record all information, please attach additional sheets.**

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Prepared By: \_\_\_\_\_ Signature: \_\_\_\_\_  
Title: \_\_\_\_\_ Date: \_\_\_\_\_



## INSTRUCTIONS FOR COMPLETING NON-COMPLIANCE REPORTING FORM

Use this supplemental form to report all permit violations and any other non-compliance that may endanger health or the environment, in accordance with your permit. Complete all sections that apply. If you are reporting violations of permit limits, monitoring requirements or schedules that do not pose an immediate threat to health or the environment, you may attach this form to the Discharge Monitoring Report (DMR). If you are reporting other non-compliance events, and the deadline for a written report (e.g., 5 days) does not coincide with your submission of the DMR, this form should be submitted separately to the Department by the reporting deadline set forth in the permit.

If you are unsure of whether an incident constitutes non-compliance that may endanger health or the environment, it is recommended that you notify the Department verbally as soon as possible after you become aware of the incident. Title 25, Pa. Code §§ 91.33 and 91.34 (regarding incidents causing or threatening pollution and activities utilizing pollutants, respectively), in part requires immediate notification by telephone to the Department of pollution incidents, remediation, and may require an additional report on the incident or plan of pollution prevention measures.

### Instructions:

1. Enter the name of the facility, the municipality and county where it is located, the month and year when violations occurred, and the NPDES or WQM permit number for the facility.
2. If there were violations of permit effluent limitations during the month, check the box next to "Violations of Permit Effluent Limitations." (Note – if using the electronic version of this form, check the boxes first, and then select Tools – Unprotect Document to enter additional information). Enter the date of the violation (if a violation of a minimum or maximum limit, the date of sample collection, or if a violation of an average limit, the end of the monitoring period), the parameter name, the permit limit and units, the statistical code (e.g., "MIN", "MAX", "MO AVG", etc.), the measured result and units, the cause of the violation and the corrective action taken. **If there are more than two violations during the monitoring period and/or if the space provided is insufficient to explain the cause or corrective action, please attach additional pages.**
3. If there are Sanitary Sewer Overflow (SSO) discharges or other unauthorized discharges from the facility (e.g., spills, leaks, etc.) that enter or have the potential to enter waters of the Commonwealth, including groundwater, notify DEP by phone as soon as possible, and document the discharge on this form by checking the box next to "Sanitary Sewer Overflows and Other Unauthorized Discharges." Record the event (discharge) date, the substance discharged (e.g., sewage, on-site chemicals, etc.), the location where the discharge occurred (e.g., manhole number, pump station name, equipment description, etc.), the volume discharged (gallons), the approximate duration of the discharge (hours), the receiving waters (name of stream or groundwater), the impact on the receiving waters, if observed (e.g., solids deposition, foam, fish kill, etc.), the cause of the discharge, and the date on which the Department was verbally notified. **If there are more than two discharge events during the monitoring period and/or if the space provided is insufficient to explain the discharge, please attach additional pages.**
4. If there are other violations of the permit, check the box next to "Other Permit Violations," and check the appropriate box that describes the violation type. If not identified on the form, check the box next to "Other" and provide a written explanation. **If the space provided is insufficient to explain the violation, please attach additional pages.**
5. Type your name and title and sign and date the form after reading the certification statement.

If you have questions about completing this form, contact the Clean Water Program Operations Section of the Department in your region:

Southeast Region – (484) 250-5970  
Northeast Region – (570) 826-2553  
Southcentral Region – (717) 705-4707

Northcentral Region – (570) 327-3636  
Southwest Region – (412) 442-4060  
Northwest Region – (814) 332-6942

# **APPENDIX B**

# **PUMP STATION CALCULATIONS**

# Attachment to Discovery A-22 (Wastewater)

PROJECT: Rock Creek WWTP  
 Entech Project No. 5759.01  
 Dutchland Job: 13041-WT

Entech Engineering, Inc.  
 Dutchland, Inc.  
 Design Calculations

ENGINEER: Daniel B. Klein, P.E.  
 DATE: 10/06/2017

## Influent Forcemain Hydraulics

### **Design Flows**

Max Design Flow = 0.81 MGD = 563 gpm  
 Average Design Flow = 0.27 MGD 187.5 gpm

Pump Off = 495 ft  
 Pipe Invert Leaving Wet Well = 515.5 ft  
 Discharge Elevation Into Flow Splitter Box = 535.5 ft  
 Maximum Piping Elevation = 535.5 ft

### **Segment 1 (Discharge) - Pump Volute to 4" x 6" Tee inch**

Pipe Diameter 4" Pipe I.D. (in.) 4

C Factor 100 - Hazen Williams

Flow 563 gpm

Maximum pipe velocity in 4 inch diameter pipe = 14.36 ft/sec.

### Minor Losses - $h_f$

Fitting Type	Quantity	K
6" x 4" Reducer	1	0.75
90	1	0.6
Pump Inlet	1	1

### Pipe Length

Total Length 4 feet

Headloss from Friction ( $h_f$ ) in 4 inch pipe

$$h_f = 10.44 * L * Q^{1.85} / (C^{1.85} * D^{4.87})$$

Flow (gpm)	V (ft/s)	$V^2/2g$ (ft)	$h_{fd}$ Discharge Friction (ft)	$h_{md}$ Discharge Minor Losses (ft)
0	0.00	0.00	0.00	0.00
25	0.64	0.01	0.00	0.01
50	1.28	0.03	0.01	0.06
75	1.91	0.06	0.03	0.13
100	2.55	0.10	0.05	0.24
125	3.19	0.16	0.07	0.37
150	3.83	0.23	0.10	0.53
175	4.46	0.31	0.14	0.73
200	5.10	0.40	0.18	0.95
225	5.74	0.51	0.22	1.20
250	6.38	0.63	0.27	1.48
275	7.01	0.76	0.32	1.79
300	7.65	0.91	0.37	2.14
325	8.29	1.07	0.43	2.51
350	8.93	1.24	0.50	2.91
375	9.56	1.42	0.56	3.34
400	10.20	1.62	0.63	3.80
425	10.84	1.82	0.71	4.29
450	11.48	2.04	0.79	4.80
475	12.11	2.28	0.87	5.35
500	12.75	2.52	0.96	5.93
525	13.39	2.78	1.05	6.54
550	14.03	3.05	1.14	7.18
575	14.66	3.34	1.24	7.85
600	15.30	3.63	1.34	8.54
625	15.94	3.94	1.45	9.27
650	16.58	4.27	1.56	10.03

### **Segment 2 (Discharge) - 6 inch to Flow Splitter Box Discharge**

## Attachment to Discovery A-22 (Wastewater)

PROJECT: Rock Creek WWTP  
 Entech Project No. 5759.01  
 Dutchland Job: 13041-WT

Entech Engineering, Inc.  
 Dutchland, Inc.  
 Design Calculations

ENGINEER: Daniel B. Klein, P.E.  
 DATE: 10/06/2017

Pipe Diameter	6"	Pipe I.D. (in.)	6
C Factor	100	- Hazen Williams	
Flow	563	gpm	
Maximum pipe velocity in	6	inch diameter pipe =	6.38 ft/sec.

Minor Losses -  $h_f$

Fitting Type	Quantity	K
Discharge	1	1
90	2	0.6
45	5	0.5
Plug Valve	2	0.5
Flow Meter	1	0.75
Tee	1	0.65

Pipe Length

Total Length            250    feet

Headloss from Friction ( $h_f$ ) in            6    inch pipe

$$h_f = 10.44 * L * Q^{1.85} / (C^{1.85} * D^{4.87})$$

Flow (gpm)	V (ft/s)	$V^2/2g$ (ft)	$h_{fd}$ Discharge Friction (ft)	$h_{md}$ Discharge Minor Losses (ft)
0	0.00	0.00	0.00	0.00
25	0.28	0.00	0.03	0.01
50	0.57	0.00	0.12	0.04
75	0.85	0.01	0.25	0.08
100	1.13	0.02	0.42	0.14
125	1.42	0.03	0.64	0.22
150	1.70	0.04	0.90	0.32
175	1.98	0.06	1.19	0.43
200	2.27	0.08	1.53	0.57
225	2.55	0.10	1.90	0.72
250	2.83	0.12	2.31	0.89
275	3.12	0.15	2.75	1.07
300	3.40	0.18	3.23	1.27
325	3.68	0.21	3.75	1.50
350	3.97	0.24	4.30	1.73
375	4.25	0.28	4.89	1.99
400	4.53	0.32	5.51	2.27
425	4.82	0.36	6.16	2.56
450	5.10	0.40	6.85	2.87
475	5.38	0.45	7.57	3.20
500	5.67	0.50	8.32	3.54
525	5.95	0.55	9.11	3.90
550	6.23	0.60	9.92	4.28
575	6.52	0.66	10.78	4.68
600	6.80	0.72	11.66	5.10
625	7.08	0.78	12.57	5.53
650	7.37	0.84	13.52	5.98

## Attachment to Discovery A-22 (Wastewater)

PROJECT: Rock Creek WWTP  
 Entech Project No. 5759.01  
 Dutchland Job: 13041-WT

Entech Engineering, Inc.  
 Dutchland, Inc.  
 Design Calculations

ENGINEER: Daniel B. Klein, P.E.  
 DATE: 10/06/2017

### Static Head

MWL at Pump Intake = 495.00 feet  
 Highpoint in Piping = 535.50 feet

Static Discharge Head = 40.50 feet

Atmospheric pressure at sea level (68 F) 33.96 feet

Vapor Pressure of water at 45 F 0.34

### Total Dynamic Head

Total Flow (gpm)	Static Heads		Discharge Losses		TDH	NPSH <sub>A</sub>
	h <sub>d</sub> , Static Discharge Head (ft)	H <sub>stat</sub> , Total Static Head (ft)	h <sub>fD</sub> , Total Discharge Friction Loss (ft)	Sh <sub>mD</sub> , Total Discharge Minor Losses (ft)		
0	40.5	40.5	0.0	0.00	40.5	74.12
25	40.5	40.5	0.0	0.02	40.6	74.12
50	40.5	40.5	0.1	0.09	40.7	74.12
75	40.5	40.5	0.3	0.21	41.0	74.12
100	40.5	40.5	0.5	0.38	41.4	74.12
125	40.5	40.5	0.7	0.59	41.8	74.12
150	40.5	40.5	1.0	0.85	42.4	74.12
175	40.5	40.5	1.3	1.16	43.0	74.12
200	40.5	40.5	1.7	1.52	43.7	74.12
225	40.5	40.5	2.1	1.92	44.5	74.12
250	40.5	40.5	2.6	2.37	45.4	74.12
275	40.5	40.5	3.1	2.87	46.4	74.12
300	40.5	40.5	3.6	3.41	47.5	74.12
325	40.5	40.5	4.2	4.00	48.7	74.12
350	40.5	40.5	4.8	4.64	49.9	74.12
375	40.5	40.5	5.4	5.33	51.3	74.12
400	40.5	40.5	6.1	6.06	52.7	74.12
425	40.5	40.5	6.9	6.84	54.2	74.12
450	40.5	40.5	7.6	7.67	55.8	74.12
475	40.5	40.5	8.4	8.55	57.5	74.12
500	40.5	40.5	9.3	9.47	59.3	74.12
525	40.5	40.5	10.2	10.44	61.1	74.12
550	40.5	40.5	11.1	11.46	63.0	74.12
575	40.5	40.5	12.0	12.53	65.0	74.12
600	40.5	40.5	13.0	13.64	67.1	74.12
625	40.5	40.5	14.0	14.80	69.3	74.12
650	40.5	40.5	15.1	16.01	71.6	74.12

Item number	: Default	Size	: Hydromatic - S4P/S4PX
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: SUB_S_E_AH_00008_C_4 Rev 2012-03-23
Quote number	:	Date last saved	: 17 Oct 2017 11:25 AM

**Operating Conditions**

Flow, rated	: 575.0 (0.00) USgpm
Differential head / pressure, rated (requested)	: 65.00 (0.00) ft
Differential head / pressure, rated (actual)	: 65.74 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Frequency	: 60 Hz

**Liquid**

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

**Performance**

Speed, rated	: 1750 rpm
Impeller diameter, rated	: 10.00 in
Impeller diameter, maximum	: 10.00 in
Impeller diameter, minimum	: 6.50 in
Efficiency	: 66.54 (0.00) %
NPSH required / margin required	: - (-) / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 28 / - Metric units
Minimum Continuous Stable Flow	: 100.0 USgpm
Head, maximum, rated diameter	: 114.8 ft
Head rise to shutoff	: 76.62 %
Flow, best eff. point	: 462.8 USgpm
Flow ratio, rated / BEP	: 124.26 (0.00) %
Diameter ratio (rated / max)	: 100.00 %
Head ratio (rated dia / max dia)	: 98.87 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

**Material**

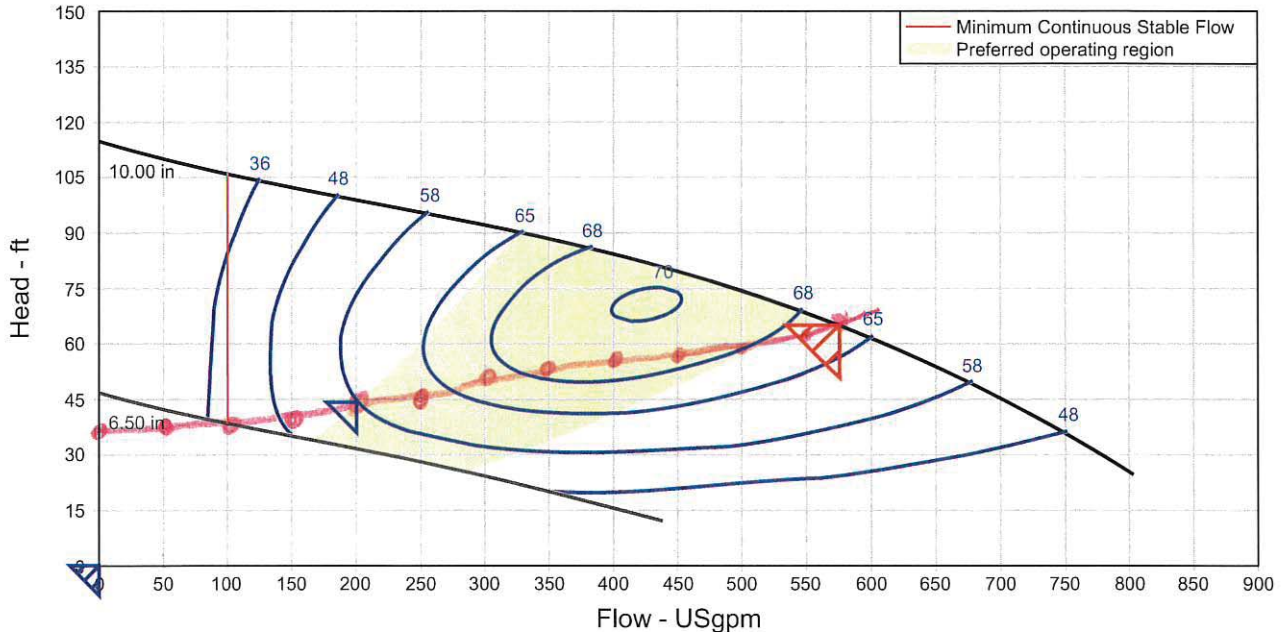
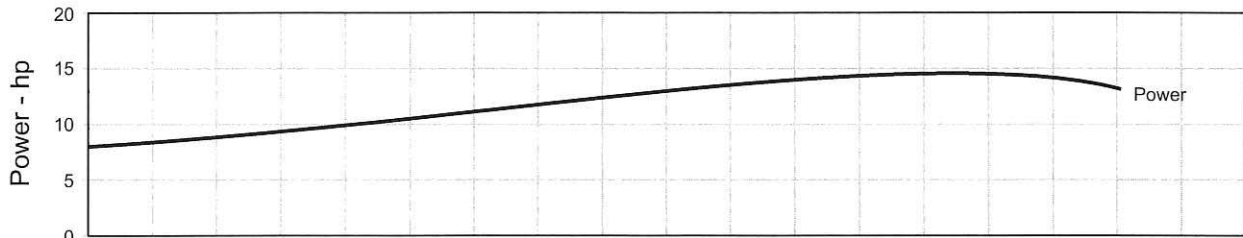
Material selected	: Standard
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**Pressure Data**

Maximum working pressure	: 49.69 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

**Driver & Power Data (@Max density)**

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 9.44 (0.00) hp
Power, rated	: 14.18 (0.00) hp
Power, maximum, rated diameter	: 14.56 hp
Minimum recommended motor rating	: 15.00 hp / 11.19 kW



# INFLUENT PUMP STATION PUMPS



# HYDROMATIC<sup>®</sup> SUBMERSIBLE SOLIDS HANDLING PUMPS





## HYDROMATIC®

### Hydromatic® Submersible Solids Handling Pumps Are Field Proven and Reliable

You can depend on Hydromatic pumps to provide years of reliable service. As one of the oldest submersible pump manufacturers in the world, Hydromatic offers you field-proven pumps and systems for all your requirements. We also supply complete technical support and ongoing engineering assistance for the life of the pump.

### Rugged, Safe Pumps

When government regulations or area classifications require hazardous location pumps, you can depend on Hydromatic submersible solids handling pumps.

Now you can get certified, Class I, Division 1, Group C and/or D hazardous location pumps for applications such as sewage wet wells where flammable gases exist.

### Get the Same Reliability

With Hydromatic hazardous location pumps, you get the same reliability and efficiency designed into the non-hazardous location pumps. Plus, you get added safety advantages with FM approved, hazardous location, Hydromatic pumps.

Reliable, safe operation is ensured because all castings are inspected for porosity before, during and after machining. After assembly each hazardous location pump is thoroughly inspected to ensure reliable performance.

### Vortex – Recessed Impeller Option

Hydromatic pumps are available with recessed impellers which are virtually impossible to clog. They perform up to shut-off head without damage. The recessed impeller creates a liquid vortex in the volute which directs all spherical solids, slurry, sludge, grit, stringy or fibrous material through the pump without clogging. Recessed impeller pumps are ideal for a broad range of sewage and special waste-handling situations, including high head and low flows and where large solids are present.

### H Series – Greater Pump Efficiency

The H Series solids handling pumps, with the enhanced geometry of the monovane impeller, provide greater pump efficiency and steeper non-overloading performances while passing up to a full 3" spherical solid, as is required by the "Ten States Standards" policy for submersible solids handling pumps. H Series pumps are available with horsepower ratings from 7.5 to 15 with speeds up to 1750 RPM.

## Installations:

### Municipal

- Wastewater transfer
- Wastewater treatment plants
- Wastewater lift stations
- Subdivisions
- Airports
- Storm water

### Commercial

- Building wastewater systems
- Wastewater
- Hospitals
- Motels
- Apartments
- Schools
- Churches
- Universities
- Campgrounds
- Amusement parks

### Industrial

- Wastewater
- Sump
- Spray wash
- Storm water

# Standard Pump Features

## A. Motor

Oil filled to efficiently dissipate heat and lock out damaging moisture so you receive reliable pumping service. Easily field serviceable.

## B. Connection Box

Two epoxy barriers and a compression fitting prevent water contamination of the motor area, assuring long-term reliable operation. Additionally, epoxy encapsulation and stripped leads positively eliminate "wicking" from the cable.

## C. Bearings

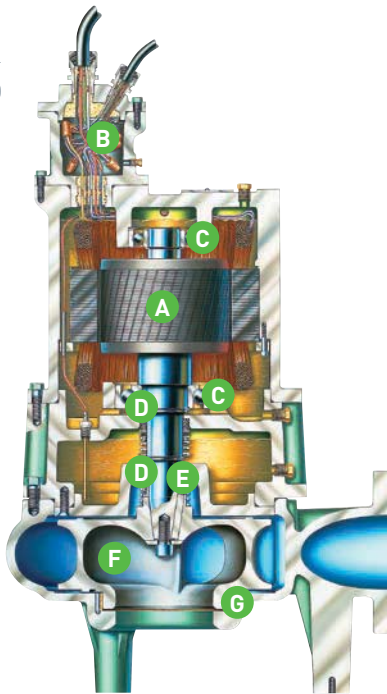
Heavy-duty upper and lower ball bearings are submerged in oil to provide permanent lubrication and ensure long service life.

## D. Seals

A dual seal system operates in an oil chamber to provide long pump service life. Various seal options available.

## E. Shaft

The stainless steel shaft eliminates corrosion and fatigue for longer pump life. The minimum shaft overhang decreases deflection and increases bearing and seal life. Tapered shaft allows for easy removal of impeller.



## F. Impeller

Hydromatic solids handling pumps are available with a wide range of impellers for different applications. Pump-out vanes on the top shroud prevent the buildup of materials in the seal area and extend the life of the thrust bearing by significantly reducing axial thrust.

## G. Renewable Case Wear Ring

Easily replaceable, true wear ring, with a top pullout design for easy disassemble operation.

## Hazardous Location Pump Features

### Flame-Proof Joints

Flame-proof joints have 1-1/4" flame paths. These close tolerance joints prevent any internal spark or fire from escaping into the environment.

### Motor Housing

The hazardous location housing wall is thicker throughout the case to give you extra containment capability.

### Heavy-Duty Bearings

Hydromatic pumps provide you heavy-duty bearings (minimum B-10 life of 50,000 hours) for long pump life.

### Two Moisture Sensors

Two moisture sensors in the oil chamber provide extra security. The sensors are electrically isolated and made with stainless steel connections and stainless steel probes.

### Labyrinth Joint

The special labyrinth joint gives you added protection by preventing flame or spark travel to the media being pumped.

## Oil-Filled Motor

### Dependable Operation

The Hydromatic pump's oil-filled motor keeps the windings cool, eliminates moisture, and permanently lubricates the bearings, to provide reliable pumping service.

The oil bath keeps the motor and bearings cool by dissipating heat and maintaining the correct operating temperature. The oil transfers heat generated in the motor windings to the housing where it is dissipated by the surrounding wet well media. Airborne moisture contamination is locked out so that moisture, which condenses with temperature changes, does not cause premature motor and bearing failure.

The oil bath also permanently lubricates the bearings which minimizes heat and flushes contaminant away from bearing races. Maintenance costs are reduced because bearings do not require routine service and motors do not require a secondary cooling apparatus. Oil-filled motors ensure dependable, reliable service!

## Dual Seal System/Moisture Sensor

### Dual Seal System Gives Long Pump Service Life

The mechanical dual seal system protects the motor from water with one upper shaft seal and one below an oil chamber. The oil chamber provides lubrication for the seals and traps any moisture that may leak through the lower seal. The upper seal operates entirely in oil. The dual seal design gives the pump exceptionally long service life by keeping pumped media out of the motor housing.

### Moisture Sensor Decreases Downtime and Maintenance Costs

The moisture sensor, provided as a standard feature on all solids handling pumps, saves money and decreases downtime by allowing you to take corrective action before an expensive bearing or motor failure occurs. The internal sensor detects the presence of moisture in the oil chamber and signals that the lower seal is beginning to leak.

Some manufacturers put a moisture sensor in the motor area and moisture is not detected until after it affects the bearings and motor itself.

# System Operations

## Rail Systems for Easy Pump Retrieval

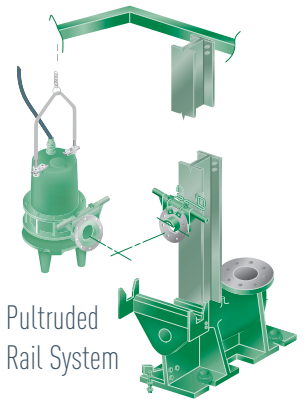
To easily raise and lower your pump(s) for service and maintenance, you can choose from among three rail systems.



Hydr-O-Rail System



MTM Rail System



Pultruded Rail System

## Novus Series – A New Generation of Custom Controls

Custom built to your specifications and individually tested, the Hydromatic Novus Series is available in five different models: 1000, 1000 Plus, 2000, 3000 and 4000. The series starts with the dependable yet inexpensive Hydromatic Novus 1000 Series which features basic relay logic controls in a quality NEMA 3R painted steel enclosure. The next model is the Hydromatic Novus 1000 Plus Series offering additional features in a NEMA 4X enclosure for Hydromatic 2 hp grinder packages.



The Hydromatic Novus 2000, 3000 and 4000 Series offer more advanced features. These series use state-of-the-art digital controllers that are optimized for submersible pumps in simplex, duplex or triplex wastewater lift stations.



Novus 2000 Simplex Controller Unit

Novus 2000 Duplex Controller Unit



740 EAST 9TH STREET,  
ASHLAND, OHIO 44805  
WWW.HYDROMATIC.COM

269 TRILLIUM DRIVE, KITCHENER,  
ONTARIO, CANADA N2G 4W5  
WWW.HYDROMATIC.COM

# **APPENDIX C**

# **PROCESS DESIGN**

# **CALCULATIONS**

**Design Flows and Loadings**

---

Design Population =	1,480 people	
Number of Residences =	740 EDUs	
Flow per EDU =	135 gpd	
<b>Influent Parameters</b>		
Average Daily Flow =	0.1 MGD 100,000 gpd 69.4 gpm	
Peak Flow =	0.2 MGD 200,000 gpd 139 gpm	
CBOD <sub>5</sub> =	250 mg/l 209 lbs/day	
TSS =	250 mg/l 209 lbs/day	
TKN =	45 mg/l 37.5 lbs/day	
Total Phosphorus =	10 mg/l 8.3 lbs/day	
pH =	6 - 9 S.U.	
Oil & Grease =	100 mg/l	
Wastewater Temperature =	10 degrees C Minimum	
<b>Effluent Parameters</b>		
BOD <sub>5</sub> =	10 mg/l	
TSS =	10 mg/l	
NH <sub>3</sub> -N =	1 mg/l Summer 3 mg/l Winter	
TP =	0.9 mg/l	Based on 274 lbs TP/year (at 0.27 MGD) but proportioned to 0.1 MGD
Total Nitrogen =	15 mg/l	Based on 5,479 lbs TN/year (at 0.27 MGD) but proportioned to 0.1 MGD
Fecal Coliform =	200 CFU per 100 ml	
Dissolved Oxygen =	5 mg/l minimum	

**EQ Tank**

---

Length =	27 ft
Width =	12 ft
Side Water Depth =	14 ft
Tank Depth =	18 ft
Working Volume =	33,929 gal
Total Volume =	43,623 gal
Area =	324 ft <sup>2</sup>
Detention Time at Peak Flow = (assumes ADF leaving tank)	8.1 hours
Aeration Criteria =	0.2 scfm/s.f.
Aeration Required =	64.8 scfm
Static Pressure =	6.1 psi
Diffuser Pressure =	0.25 psi
Pressure at Top of Dropleg =	6.3 psi

**Process Calculations - Carbonaceous Removal/Nitrification/Denitrification**

Assumed F/M = 0.15 lb BOD/lb MLVSS/day  
 Assumed SVI = 150 ml/g (after 30 minutes)  
 2.4 ft<sup>3</sup>/lb  
 Assumed Volatile Yield = 0.6 lbs VSS/lb BOD Removed  
 Assumed VSS/TSS = 0.7  
 Heterotrophic Decay Rate = 0.07  
 Mass of required Biomass = 1,986 lbs  
 Volume of Biomass = 4,771 ft<sup>3</sup>  
 35,684 gal  
 k<sub>d</sub> at 20 C = 0.12 day<sup>-1</sup>  
 k<sub>d</sub> at WW Temp = 0.08 day<sup>-1</sup>

$$\Delta M = (Y \times ([BOD]_{in} - [BOD]_{out})) / (1 + (k_d \times \theta \times (T - 20)) \times SRT) + [nvTSS]_{in} + [nbVSS]_{in} \times Q$$

Where:  $\Delta M$  = Mass of solids produced (lb/day)

Y = volatile cell yield (VSS/BOD remove)

$\theta$  = Arrhenius temperature correction factor = 1.04

k<sub>d</sub> = decay rate (d)

SRT = solids retention time (days)

nvTSS<sub>in</sub> = nonvolatile influent suspended solids (mg/l)

nbVSS<sub>in</sub> = nonbiodegradable influent suspended solids (mg/l)

T = minimum wastewater temperature (degrees C)

nvTSS<sub>in</sub> = 50 mg/l (assumes 20% of influent TSS is nonvolatile)  
 nbVSS<sub>in</sub> = 75 mg/l (assumes 30% of influent TSS is volatile non-biodegradable)  
 M = 187 lbs TSS/day

Observed Yield = 0.90 MLSS/BOD  
 Assumed Solids Concentration = 0.35% Solids Fraction  
 Calculated Volume of Waste Sludge = 6,408 gal/day  
 Design Settled Solids Concentration = 0.85% Solids Fraction  
 Mean cell residence time = 10.2 days  
 Required Aeration Volume = Mass of required biomass/solids concentration  
 0.068 MG  
 68,027 gal  
 9,268 ft<sup>3</sup>  
 Aeration HRT = 18.70 hours  
 Aeration Organic Loading Rate = 20.0 lbs BOD/1,000ft<sup>3</sup>/day

Length = 23.25 ft = 22 ft 4.56 inches  
 Width per train = 14 ft  
 Total Width = 28 ft  
 Side Water Depth = 16 ft  
 Tank Depth = 18 ft  
 Number of Trains = 2  
 Volume per train = 38,956 gal  
 Working Volume = 77,912 gal  
 Total Volume = 105,558 gal  
 Detention Time at ADF = 18.70 hours

SRT Required for Nitrification  
 From Metcalf & Eddy, Edition IV, pages 614 and 705

Coefficient	Base Value	Theta	Symbol
Maximum Specific Growth Rate of Nitrifying bacteria, g VSS/g VSS-day	0.75	1.07	$\mu_{nm}(T)$
Half-Velocity constant for nitrifiers	0.74	1.053	$K_n(T)$
Nitrifier decay rate	0.08	1.04	$K_{dn}(T)$
Dissolved Oxygen, mg/l	2		DO
Half-Velocity Constant for Dissolved Oxygen, mg/l	0.5		$K_o$
Minimum Water Temperature, °C	9		T
Safety Factor	1.5		SF

Kinetic Constants

$\mu_{nm}$  = 0.75 g VSS/g VSS-day  
 $K_n$  = 0.74  
 $K_{dn}$  = 0.08  
 D.O. = 2 mg/l  
 $k_o$  = 0.5 mg/l  
 T minimum = 10 degrees C  
 SF = 1.5

$u(T) = u \times \theta^{(T - 20)}$   
 Theta = 1.07  
 $\mu_{nm}(T) = 1.053$   
 $K_n(T) = 1.04$   
 $K_{dn}(T) =$

Temperature Adjusted Kinetic Constants

$\mu_{nm}(T) = 0.38$  g VSS/g VSS-day  
 $K_n(T) = 0.44$   
 $K_{dn}(T) = 0.05$

$$\mu_n = \left( \mu_{nm}(T) \times \frac{TENH_3}{TENH_3 + K_n(T)} \times \frac{DO}{DO + K_o} \right) - K_{dn}(T)$$

$\mu_n$  = 0.16 days<sup>-1</sup>  
 SRT<sub>min</sub> = 6.35 days  
 SRT = 9.52 days

**Denitrification Kinetics**

$\mu_{DN}$  = Based on Figure 8-23 Metcalf & Eddy, 4th Edition  
 0.08 day<sup>-1</sup>  
 Temperature Adjusted specific denitrification rate  
 $\mu_{DN}(T) = \mu_{DN} \theta^{(T-20)}$  = 0.03 NO<sub>3</sub>/MLVSS/day  
 Assumed Effluent Dissolved Organic Nitrogen = 0.5 mg/l  
 Assumed Nitrogen Assimilated in Solids = 10% of Mass of solids produced/Tank Volume  
 22.4 mg/l  
 Effluent Particulate Nitrogen = 12 % of Effluent TSS  
 0.72 mg/l  
 Nitrogen Available = 20.4 mg/l  
 17.0 lbs/day  
 Effluent NO<sub>3</sub> Allowed = 12.8 mg/l  
 RAS ratio = 1  
 Effluent Nitrate Concentration = 12.8 mg/l  
 Calculated Internal Recycle Ratio = -0.41  
 Design Internal Recycle Ratio = 1.00  
 Design recycle flow rate to Anoxic = 0.20 MGD  
 NO<sub>3</sub> Load to Anoxic = 21.3 lbs NO<sub>3</sub>/day  
 Required Anoxic Volume = 0.0309 MG  
 0.031 MG  
 Design Denite Capacity = 21.32 lbs NO<sub>3</sub>/day  
 BOD/TKN = 5.6  
 Number of Anoxic Tanks = 2  
 Required Anoxic Volume = 15,436 gal per tank  
 0.0154 MG per tank  
 Length of Anoxic Tank = 9.25 ft  
 Width of Anoxic Tank = 14 ft  
 WL of Anoxic Tank = 16 ft  
 Tank Depth = 18 ft  
 Working Volume of Anoxic Tank = 2,072 ft<sup>3</sup> per train  
 15,499 gal per train  
 Total Volume = 17,436 gal per train  
 Safety Factor = 1.0  
 F/M<sub>anoxic</sub> = 0.329  
 Anoxic HRT = 7.4 hrs per train  
 14.9 hrs total

**Clarifier Design**

Average Daily Flow =	0.1 MGD		
Peak Hourly Flow =	0.2 MGD		
MLSS =	3,500 mg/l		
Recycle Sludge Concentration =	8,500 mg/l		
RAS Flow =	100,000 gpd total		
	50,000 gpd per clarifier		
Clarifier Dimensions =	14 ft x	14 ft x	16 ft
Tank Depth =	18 ft		
Number of Clarifiers =	2		
Clarifier Area =	196 ft <sup>2</sup> per clarifier		
Total Clarifier Area =	392 ft <sup>2</sup> total - 2 clarifiers		
Upstream Baffle Width =	3 ft		
Upstream Baffle Length =	14 ft		
Upstream Baffle Area =	42 ft <sup>2</sup>		
Upstream Baffle Wall Thickness =	0.5 ft		
Clarifier Area - Baffle Area =	147 ft <sup>2</sup>		
Hopper Angle =	50 degrees =	0.872665 radians	
Length of Hopper Center =	4 ft		
Length Wall to Hopper =	5.0		
Hopper Height =	6.0 ft		
Height Above Hopper =	10.0 ft		
Hopper Volume (one clarifier) =	567.7 ft <sup>3</sup> =	4,246 gal	
Volume above Hopper (1 Clarifier) =	1968.1 ft <sup>3</sup> =	14,721 gal	
Clarifier Volume Working (1 Clarifier) =	2,536 ft <sup>3</sup> =	18,968 gal	
Clarifier Volume (1 Clarifier) =	19,627 gal		
Clarifier Volume Working (2 clarifiers)	5,072 ft <sup>3</sup> =	37,935 gal	
Clarifier Volume Total (2 clarifiers)	39,253 gal		
Surface Overflow Rate at ADF =	340 gpd/ft <sup>2</sup>		
Surface Overflow Rate at Peak flow =	680 gpd/ft <sup>2</sup>		
Solids Loading Rate at ADF =	15 lbs/day/ft <sup>2</sup>		
Solids Loading Rate at Peak flow =	30 lbs/day/ft <sup>2</sup>		
Weir Length per Clarifier =	28 ft		
Weir Length Total =	56 ft		
Weir Overflow Rate at ADF =	1786 gpd/Lf.		
Weir Overflow Rate at PH =	3571 gpd/Lf.		
Detention Time at ADF =	4.55 hrs.		

## Sludge Holding Tank Design

---

Length =	27 ft	
Width per Train =	20.5 ft	
Side Water Depth =	16 ft	
Tank Depth =	18 ft	
Area =	553.5 ft <sup>2</sup>	
Total Working Volume =	66,243 gal	
Total Volume =	74,523 gal	
Detention Time at ADF =	10.34 days	
TSS production =	187 lb TSS/day	
MLSS Concentration =	3,500 mg/l	
Sludge Concentration from Clarifier = (assumed)	8,500 mg/l	
WAS flowrate =	7,479 gpd (includes chemical sludge)	
WAS flowrate thickened to	20,000 mg/l	by decanting in sludge holding
	3,179 gpd	
Sludge Holding Storage =	20.8 days	
Supernatant Flow =	4,300 gpd	

**Filter Design**

Filter Structure

Quantity =	1
Number of Cells =	2
Total Length =	8 ft
Length per cell =	8 ft
Total Width =	5 ft
Width per cell =	2.5 ft
Total Depth =	8 ft
Total Area =	40 ft <sup>2</sup>
Area per cell =	20 ft <sup>2</sup>
Design Surface Loading rate =	5 gpm/ft <sup>2</sup>
Total Required Surface area =	13.9 ft <sup>2</sup>
Total Actual Surface Loading rate =	1.7 gpm/ft <sup>2</sup>
Nozzle Model =	3 mm - DSP
Total Nozzle Quantity =	64

Clearwell

Length =	13.1 ft
Width =	14 ft
MWL =	7.83 ft
Total Depth =	18 ft
Total Working Volume =	1,436 ft <sup>3</sup>
Total Volume =	10,741 gal
Backwash Rate Requirement =	18 gpm/ft <sup>2</sup>
Backwash Flow Requirement =	360 gpm
	48 ft <sup>3</sup> /min
Face Velocity =	2.4 ft/min
Filter media diameter =	0.005 ft
Media SG =	2.65
Water Viscosity =	1.41E+05 ft <sup>2</sup> /s at 10 C
Particle Settling Velocity =	0.5 ft/s

(alpha)e =	0.57
alpha =	0.4

L =	3 ft
Le =	4.2 ft

density of medium =	2,650 kg/m <sup>3</sup>
density of water =	1,000 kg/m <sup>3</sup>

backwash headloss =	2.97 ft
static head =	14 ft
Pipe losses =	1.5 ft
TDH =	18.47 ft

Back wash pump quantity =	2
Pump Selection =	Goulds 3888 D4 3 HP

Backwash time =	7.5 min per cell
Required Volume =	3,240 gal

Mudwell

Required Minimum Volume =	3,240 gal
Length =	14 ft
Width =	13.1 ft
MWL =	7.83 ft
Total Depth =	18 ft
Total Working Volume =	1,436 ft <sup>3</sup>
Total Volume =	10,741 gal
	24,693 gal

Required pump flow =	162 gpm
Static Head =	14 ft
Line losses =	5 ft
TDH =	19 ft
Pump Quantity =	2
Pump Selection =	Goulds 3887 1 HP

Diffuser =	Coarse
Air Requirement =	0.2 scfm/ft <sup>2</sup>
	36.68 scfm/ft <sup>2</sup>

Diffuser Number =	2
Diffuser Drops =	1

**Aeration Design**

Aeration

AOR (BOD) =	261 lbs O <sub>2</sub> /day
AOR (NH <sub>3</sub> -N) =	173 lbs O <sub>2</sub> /day
AOR =	433 lbs O <sub>2</sub> /day
AOR/SOR = $\alpha \cdot \theta^{(T-20)} \cdot (\text{Beta} \cdot \text{Cs}_{20} - \text{Cl}) / \text{Cs}_{20} \cdot F$	
AOR/SOR =	0.30
alpha =	0.65
Beta =	0.95
Theta =	1.024
T =	10 deg C
F (fouling factor) =	0.8
Cs <sub>20</sub> =	9.08 mg/l
Cl =	2 mg/l
SOR =	1,426 lbs O <sub>2</sub> /day
	59 lbs O <sub>2</sub> /day

Air Requirement

The ability to transfer O<sub>2</sub> into the water under standard conditions is:

$$\text{SCFM} = (\text{SOR lb/ hour}) / (60 \times 0.0175 \times \text{SOTE/ft} \times \text{Dsub})$$

477 scfm  
238 scfm

Where:

0.0173 lb O<sub>2</sub> per cubic foot of air at standard conditions

SOTE/ft =	Standard O <sub>2</sub> transfer efficiency per foot submergence =	0.0075 per foot
Dsub = diffuser submergence =		16 ft
SOTE =		0.12

Minimum static Pressure =	6.94 psi
Pressure across diffuser and line losses =	0.50 psi
Total Pressure =	7.44 psi

Blower BHP =	6.7 BHP per Train
Number of Blowers =	3 2 operating (1 spare)
Blower Rating =	238 scfm
	7.44 psi

Model =	Roots 45 URAI
	15 HP

EQ Blower

Quantity =	2 1 operating, 1 spare (shared with aeration)
EQ Air Requirement for Mixing =	0.2 scfm/ft <sup>2</sup>
Area =	324 ft <sup>2</sup>
EQ Air Required =	64.8 scfm

Minimum static Pressure =	6.07 psi
Pressure across diffuser and line losses =	0.50 psi
Total Pressure =	6.57 psi

Blower BHP =	1.64 BHP
--------------	----------

Recommended model and power =	Roots 33 URAI
	7.5 HP

SHT Blower

SHT Air Requirement for Mixing =	0.4 scfm/ft <sup>2</sup>
Area =	553.50 ft <sup>2</sup> per train
SHT Air Required =	221 scfm
SHT Airlift Air =	0.00 scfm

Minimum static Pressure =	6.94 psi
Pressure across diffuser and line losses =	0.50 psi
Total Pressure =	7.44 psi

Blower BHP =	6.25 BHP
--------------	----------

Blower HP =	15 HP
Recommended model and power =	Roots 45 URAI

Mudwell/Clearwell/UV-Post Air Blower

Mudwell Air Requirement =	0.2 scfm/ft <sup>2</sup>
	37 scfm

Clearwell Air Requirement =	0.20 scfm/ft <sup>2</sup>
	37 scfm

UV-Post Air Requirement =	0.20 scfm/ft <sup>2</sup>
	93 scfm

Total Air Required =	166 scfm
----------------------	----------

Minimum static Pressure =	3.39 psi
Pressure across diffuser and line losses =	0.50 psi
Total Pressure =	3.89 psi

Blower BHP =	2.6 BHP
--------------	---------

Blower HP =	5 BHP
Recommended model and power =	Roots 36 URAI

## **Pump and Mixing System Design**

---

### Clarifier Pumps

Quantity = 2 1 for each clarifier  
Model = 3887 HP = 1

### Aeration Recycle Pumps

Quantity = 2 1 for each train  
Model = 3887 HP = 1

### EQ Pumps

Quantity = 2  
Model = 3887 HP = 1

### Clearwell Pumps

Quantity = 2  
Model = Goulds 3888 T HP = 3

### Mudwell Pumps

Quantity = 2  
Model = Goulds 3887 HP = 1

### Mixers

Quantity = 2  
Model = 4620 Flygt HP = 2.3

## UV System Design

---

Model =	PTP 3200 K	
Number of Units =	2	
Configuration =	Parallel with flow splitter box	
Tank Length =	15 ft	
Tank Width =	6.17 ft	
MWL =	6 ft	
Volume =	555 ft <sup>3</sup>	
	4,154 gal	
Discharge Weir =	60 degree V notch	
Diffuser =	Coarse	
Number of Drops =	1	
Size =	24 inch	

## Alkalinity System Design

---

Sufficient alkalinity is required for nitrification. Approximately 7.1 mg alkalinity (as CaCO<sub>3</sub>) is required for every mg NH<sub>3</sub>-N nitrified. Assume 0% alkalinity restored from denitrification process. Assume 20% solution strength (2.02 lbs/gal) of sodium carbonate.

### Feed Determination

For nitrification (TKN -> NO<sub>3</sub>-N), the max amount nitrified a 0.1 MGD and with  
0 % restored from Denitrification:

Amount Nitrified = (MGD x inf TKN x 8.34) x amount restored from denite = 37.53 lbs/day

Since 7.1 mg CaCO<sub>3</sub> is required per mg nitrified, the amount of alkalinity required is:  
= 7.1 x amount nitrified = 266.46 lbs/day as CaCO<sub>3</sub>

EQ WT soda ash/ EQ WT CaCO<sub>3</sub> = 53/100 = 0.53

Equivalent amount of Soda Ash = 141.23 lbs/day

The average sodium carbonate feed is:  
69.91 gal/day  
2.91 gph

## Phosphorus Chemical System Design

Assume no Phosphorus is removed biologically

Formula for liquid Alum =	$Al_2(SO_4)_3 \cdot 18H_2O$
Alum strength =	48%
S.G. of liquid alum =	1.2
Density of alum =	10.008 lbs/gal
Weight of Alum per gallon =	4.80 lbs/gal
Molecular weight of Alum =	666.5
Molecular weight of Aluminum =	26.98
Number of moles of aluminum per mol of alum =	2
Aluminum per gal =	0.39 lbs/gal
Theoretical Aluminum dosage =	1 mol Al per mol P
Molecular weight of Phosphorus =	30.97
Aluminum required =	0.87 lb Al per lb P
Alum dose based on PA DEP =	1.6 lbs Alum per lb P
Alum dose =	0.29 gal alum per lb P
Alum required per day =	2.2 gal/day
Required minimum storage time =	0.09 gph 10 days
Required minimum storage volume =	22 gal

### Phosphorus Sludge Production

Sludge production =	10 lbs TSS per lb P
Phosphorus removed chemically =	7.5894 lbs P/day
Sludge Production =	75.894 lbs TSS
Volume of Waste Sludge Production =	1,071 gpd at 8,500 mg/l from clarifier

# **APPENDIX D**

# **EQUIPMENT CUTSHEETS**

# **INFLUENT EQ, INTERNAL RECYCLE, AND MUDWELL PUMPS**



**EQ, CLARIFIER, RECYCLE, and  
MUDWELL: 1.0 HP**

# WS\_BF Series

## Model 3887BF

SUBMERSIBLE SEWAGE PUMP

## Wastewater

### FEATURES

**Impeller:** Cast iron, semi-open, non-clog, dynamically balanced with pump out vanes for mechanical seal protection.

**Casing:** Cast iron flanged volute type for maximum efficiency. Designed for easy installation on A10-20 slide rail or base elbow rail systems.

**Mechanical Seal:** SILICON CARBIDE VS. SILICON CARBIDE sealing faces for superior abrasive resistance, stainless steel metal parts, BUNA-N elastomers.

**Shaft:** Corrosion-resistant, 300 series stainless steel. Threaded design. Locknut on all models to guard against component damage on accidental reverse rotation.

**Fasteners:** 300 series stainless steel.

Capable of running dry without damage to components.

Designed for continuous operation when fully submerged.

EXTENDED WARRANTY AVAILABLE FOR RESIDENTIAL APPLICATIONS.

### AGENCY LISTINGS



Tested to UL 778 and CSA 22.2 108 Standards  
By Canadian Standards Association  
File #LR38549

### APPLICATIONS

Specifically designed for the following uses:

- Homes
- Water transfer
- Sewage systems
- Light industrial
- Dewatering/Effluent
- Commercial applications

Anywhere waste or drainage must be disposed of quickly, quietly and efficiently.

### SPECIFICATIONS

#### Pump

- Solids handling capabilities: 2" maximum
- Capacities: up to 185 GPM
- Total heads: up to 38 feet TDH
- Discharge size: 2" NPT threaded companion flange as standard. 3" option available but must be ordered separately. (Order no. A1-3)
- Temperature: 104°F (40°C) continuous  
140°F (60°C) intermittent.

### MOTORS

- Fully submerged in high grade turbine oil for lubrication and efficient heat transfer. All ratings are within the working limits of the motor.
- Class B insulation

#### Single phase (60 Hz):

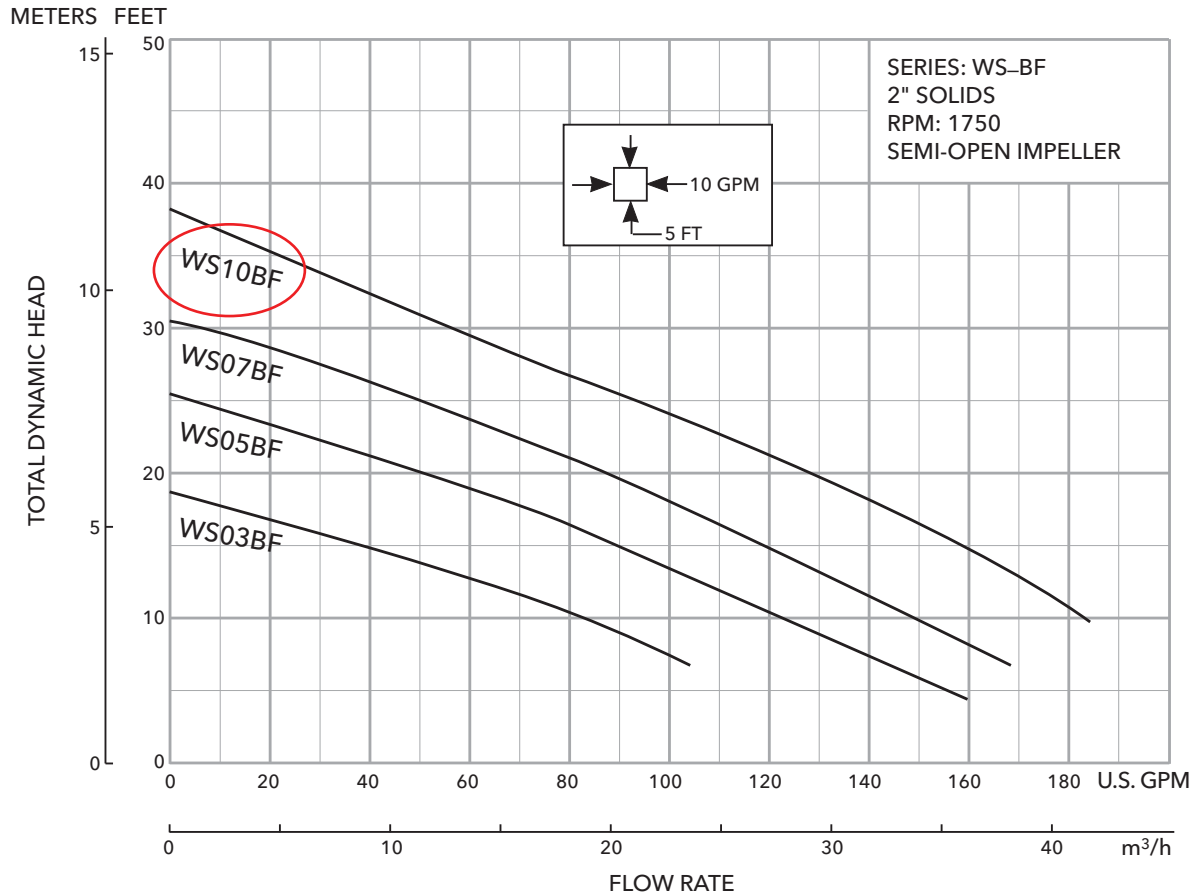
- Capacitor start motors for maximum starting torque.
- Built-in overload with automatic reset.
- SJTOW or STOW severe duty oil and water resistant power cords.
- ½ - 1 HP models have NEMA three prong grounding plugs.

#### Three phase (60 Hz):

- Class 10 overload protection must be provided in separately ordered starter unit.
- STOW power cords all have bare lead cord ends.
- **Bearings:** Upper and lower heavy duty ball bearing construction.
- **Designed for Continuous Operation:** Pump ratings are within the motor manufacturer's recommended working limits, can be operated continuously without damage when fully submerged.
- **Power Cable:** Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. Standard cord is 20'. Optional lengths are available.
- **Motor Cover O-ring:** Assures positive sealing against contaminants and oil leakage.

### MOTOR AND MODEL INFORMATION

Order Number	HP	Phase	Volts	RPM	Impeller Dia. (In.)	Max. Amps	LRA	KVA Code	Full Load Motor Eff.	Resistance		Wt. (Lbs.)		
										Start	Line-Line			
WS0311BF	0.33	1	115	1750	4.69	10.7	30.0	M	54	11.9	1.7	63		
WS0318BF	0.33	1	208			6.8	19.5	K	51	9.1	4.2			
WS0312BF	0.33	1	230			4.9	14.1	L	53	14.5	8.0			
WS0511BF	0.5	1	115		5.00	14.5	31.1	J	55	9.3	1.4	65		
WS0518BF	0.5	1	208			8.0	19.5	K	51	9.1	4.2			
WS0512BF	0.5	1	230			7.3	16.5	J	54	11.7	5.6			
WS0538BF	0.5	3	200			3.8	12.3	K	75	-	6.7			
WS0532BF	0.5	3	230			3.3	9.7	K	75	-	9.9			
WS0534BF	0.5	3	460			1.7	4.9	K	75	-	39.4			
WS0537BF	0.5	3	575			1.4	4.3	K	68	-	47.8			
WS0718BF	0.75	1	208			5.38	11.0	39.0	K	65	2.6		1.4	85
WS0712BF	0.75	1	230				9.4	24.8	J	57	4.8		2.3	
WS0738BF	0.75	3	200		4.1		21.2	H	74	-	4.3			
WS0732BF	0.75	3	230		3.6		17.3	J	76	-	5.6			
WS0734BF	0.75	3	460		1.8		8.9	J	76	-	22.4			
WS0737BF	0.75	3	575		1.5		7.3	J	71	-	29.2			
WS1018BF	1	1	208		5.75	14.0	39.0	K	65	2.6	1.4	85		
WS1012BF	1	1	230			12.3	30.5	H	60	4.3	1.8			
WS1038BF	1	3	200			6.0	21.2	H	74	-	4.3			
WS1032BF	1	3	230			5.8	17.3	J	76	-	5.6			
WS1034BF	1	3	460	2.9		8.9	J	76	-	22.4				
WS1037BF	1	3	575	2.4		7.3	J	71	-	29.2				



**PERFORMANCE RATINGS** (gallons per minute)

Order No.	WS03BF	WS05BF	WS07BF	WS10BF
HP ▶	1/3	1/2	3/4	1
RPM ▶	1750	1750	1750	1750
Total Head Feet of Water	10 ▶	80	122	145
	15	36	90	116
	20	-	50	86
	25	-	-	48
	30	-	-	-
	35	-	-	-

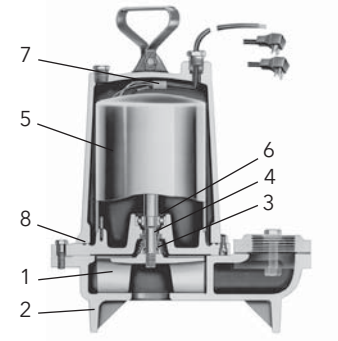
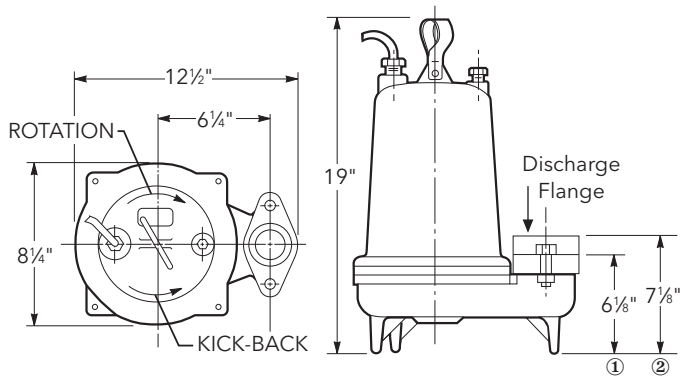
**COMPONENTS**

Item No.	Description
1	Impeller
2	Casing
3	Mechanical Seal
4	Motor Shaft
5	Motor
6	Ball Bearings
7	Power Cable
8	Casing O-Ring

\* For available repair parts, see repair parts book.

**DIMENSIONS**

(All dimensions are in inches. Do not use for construction purposes.)



**Discharge Flange:**

- ① 2" NPT standard
- ② 3" NPT optional (order an A1-3)



Xylem, Inc.  
 2881 East Bayard Street Ext., Suite A  
 Seneca Falls, NY 13148  
 Phone: (866) 325-4210  
 Fax: (888) 322-5877  
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# CLEARWELL PUMPS



**FEATURES**

Impeller: Cast iron, two vane semi-open, non-clog with pump-out vanes for mechanical seal protection. Balanced for smooth operation. Silicon bronze impeller available as an option.

Casing: Heavy duty gray cast iron, ASTM A48, Class 30. Volute type casing with 4", 125#, ANSI flanged, horizontal discharge. Compatible with A10-40 cast iron or A10-40B cast iron and brass (non-sparking) guide rail assembly.

Dual Mechanical Seals: Silicon carbide vs. silicon carbide outer seal and ceramic vs. carbon inner seal, stainless steel metal parts, BUNA-N elastomers. Upper and lower shaft seals are positioned independently and are separated by an oil-filled chamber.

Shaft: 300 series stainless steel keyed design.

Fasteners: 300 series stainless steel.

Capable of running dry temporarily without damage to seals or motor.

**CLEARWELL PUMP- 3 HP**

# WS\_D4 Series

## Model 3888D4

SUBMERSIBLE SEWAGE PUMPS

## Wastewater

### APPLICATIONS

Used in a variety of residential, commercial and industrial applications such as:

- Sewage systems, Flood and Pollution Control, Dewatering/Effluent, Farms, Hospitals, Trailer Courts, Motels

### SPECIFICATIONS

#### Pump:

- Maximum solid size: 3"
- Discharge size: 4", 125 # ANSI flange
- Maximum capacity: 620 GPM
- Maximum total head: 60 feet
- 300 Series stainless steel fasteners
- 20' Power cord
- Standard silicon carbide/silicon carbide outer seal

#### Motor:

- Maximum ambient temperature: 104° F (40° C) continuous duty, 140° F (60° C) intermittent duty
- Rated for continuous duty when fully submerged
- Insulation: Class F
- 60 Hertz
- Single row ball bearings
- 300 Series stainless steel keyed shaft

#### Single Phase:

- 1.5 - 5 HP; 208 and 230 volts
- Built-in thermal overloads with automatic reset
- Built-in capacitors

#### Three Phase:

- 1.5 - 7.5 HP; 200, 230, 460 and 575 volts
- Class 10 overload protection must be provided in control panel

### MOTORS

- Fully submerged in oil-filled chamber: High grade turbine oil surrounds motor for more efficient heat dissipation, permanent lubrication of bearings and mechanical seal for complete protection against outside environment.
- Class F insulation
- Designed for Continuous Operation: Pump ratings are within the motor manufacturer's recommended working limits and can be operated continuously without damage when fully submerged.
- Bearings: Upper and lower heavy duty ball bearing construction for precision positioning of parts and to carry thrust loads.
- Power Cable: Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. 20 foot standard with optional lengths available.
- O-ring: Assures positive sealing against contaminants and oil leakage.

### AGENCY LISTINGS



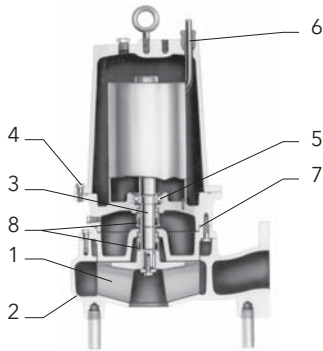
Tested to UL 778 and CSA 22.2 108 Standards  
By Canadian Standards Association  
File #LR38549

### MODEL AND MOTOR INFORMATION

Order No.	HP	Phase	Volts	RPM	Impeller Dia. (in.)	Maximum Amps	L.R. Amps	KVA Code	Power Cable	F.L. Motor Efficiency %	Resistance		Wt. (lbs.)
											Start	Line-Line	
WS1518D4M	1.5	1	208	1750	5.63	17.2	50.8	B	14/3	80	1.1	0.9	195
WS1512D4M			230			14.7	29.5	E		70	1.4	1.8	
WS1538D4M			200			11.5	40.9	H		81		1.7	
WS1532D4M		3	230			10.0	40.0	F	14/4	83	NA	2.3	
WS1534D4M			460			5.0	20.0	F		83		9.3	
WS1537D4M			575			4.0	14.4	H		74		14.8	
WS1518D4	1.5	1	208	1750	6.25	17.2	50.8	B	14/3	80	1.1	0.9	195
WS1512D4			230			14.7	29.5	E		70	1.4	1.8	
WS1538D4			200			11.5	40.9	H		81		1.7	
WS1532D4		3	230			10.0	40.0	F	14/4	83	NA	2.3	
WS1534D4			460			5.0	20.0	F		83		9.3	
WS1537D4			575			4.0	14.4	H		74		14.8	
WS2018D4	2	1	208	1750	6.63	20.3	50.8	B	14/3	80	1.1	0.9	200
WS2012D4			230			17.3	36.9	D		75	1.4	1.5	
WS2038D4			200			13.3	40.9	H		81		1.7	
WS2032D4		3	230			11.6	40.0	F	14/4	83	NA	2.3	
WS2034D4			460			5.8	20.0	F		83		9.3	
WS2037D4			575			4.6	14.4	H		74		14.8	
WS3018D4	3	1	208	1750	7.00	25.5	50.8	B	10/3	80	1.1	0.9	208
WS3012D4			230			21.5	46.4	C		79	1.0	1.0	
WS3038D4			200			16.6	53.8	G		85		1.3	
WS3032D4		3	230			14.4	49.5	H	14/4	83	NA	1.9	
WS3034D4			460			7.2	24.8	H		83		7.5	
WS3037D4			575			5.8	17.3	G		78		11.6	
WS5012D4	5	1	230	1750	7.25	26.5	57.7	A	10/3	80	1.0	0.8	210
WS5038D4			200			19.1	73.9	F		84		0.9	
WS5032D4			3			230	16.6	63.6		E	10/4	85	
WS5034D4		460				8.3	31.8	E	85			4.8	
WS5037D4		575				6.6	22.8	E	80			7.4	
WS7532D4		7.5	3			230	1750	7.69	23.0	105.0	G	10/4	
WS7534D4	460			11.5	52.5	G			83	NA	2.8		
WS7537D4	575			9.2	42.0	E			84		4.4		

## Wastewater

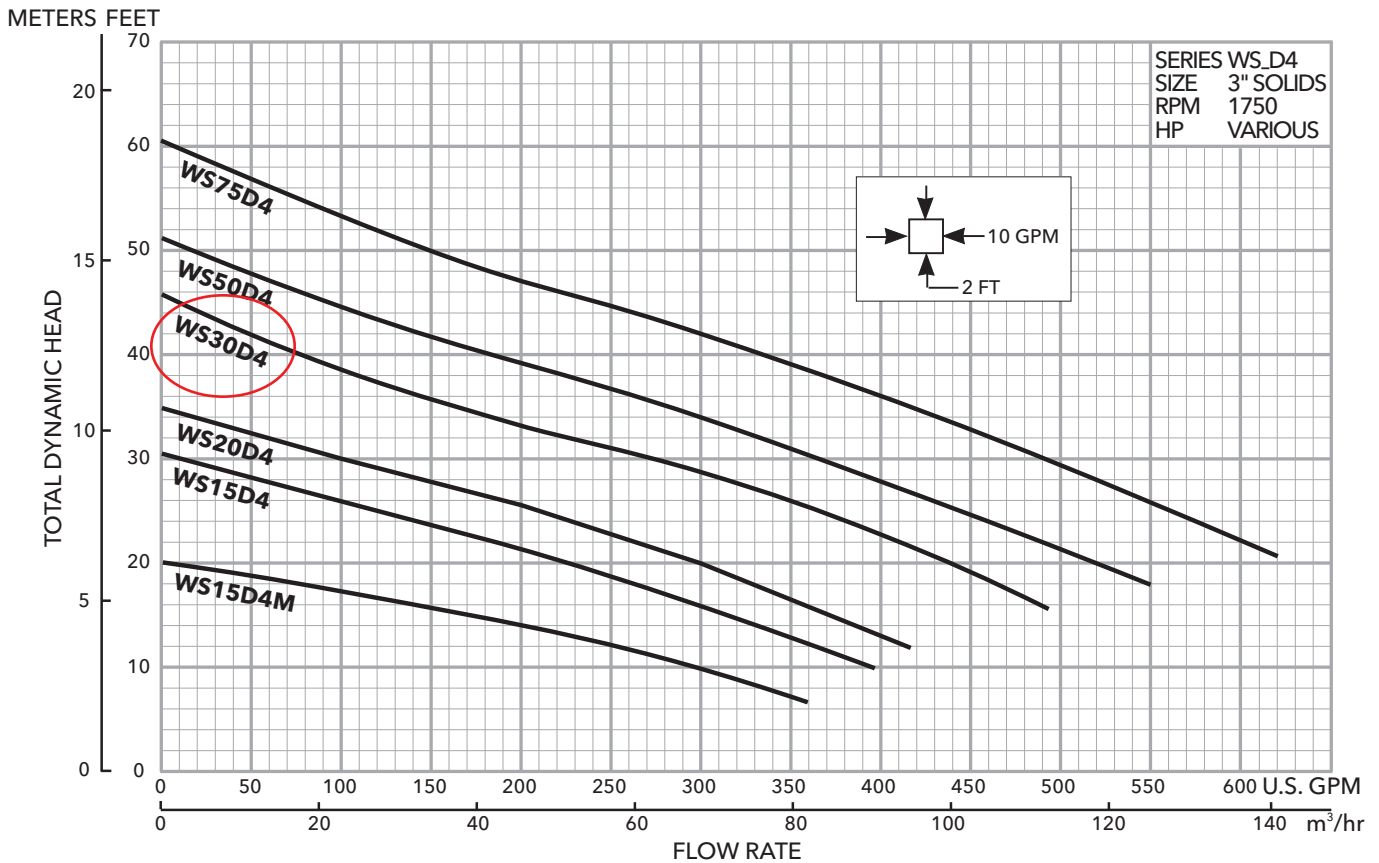
### MATERIALS OF CONSTRUCTION



Item No.	Part Name	Material				
		Standard	Optional			
1	Impeller, non-clog	1003	1179			
2	Casing	1003				
3	Shaft-keyed	300 Series SS				
4	Fasteners	300 Series SS				
5	Ball bearings	Steel				
6	Power cable	STOW, 20 feet	Additional lengths			
7	O-ring	BUNA-N				
8	<b>Outer Mech. Seal</b>	<b>Service</b>	<b>Rotary</b>	<b>Stationary</b>	<b>Elastomers</b>	<b>Metal Parts</b>
	OPT	Heavy duty	Silicon Carbide	Tungsten Carbide	BUNA-N	300 Series SS
	STD	Mild abrasives	Silicon carbide		BUNA-N	300 Series SS
<b>Material Code</b>		<b>Engineering Standard</b>				
1003		Cast iron – ASTM A48 Class 30				
1179		Silicon bronze – ASTM C87600				

### PERFORMANCE RATINGS (gallons per minute)

Series No.	WS15D4M	WS15D4	WS20D4	WS30D4	WS50D4	WS75D4	
HP	1½	1½	2	3	5	7½	
RPM	1750						
Total Head Feet of Water	10	300	395				
	15	170	320	370			
	20		230	300	440	520	
	25		120	205	365	440	
	30			100	270	360	510
	35				160	275	440
	40				80	175	355
	45					85	260
	50						155
	55						80

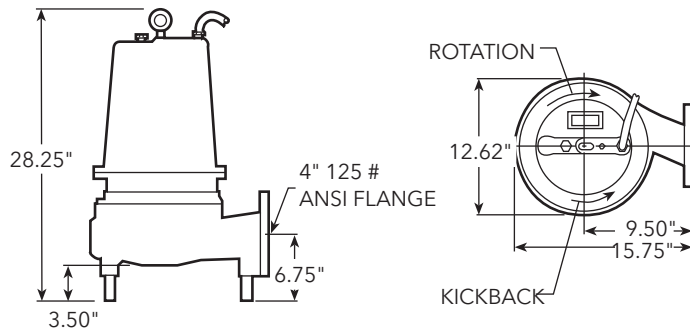


## APPLICATION DATA AND CONSTRUCTION DETAILS

Maximum Solid Size	3"	
Minimum Casing Thickness	5/16"	
Casing Corrosion Allowance	1/8"	
Maximum Working Pressure	30 PSI	
Maximum Submergence	50 feet	
Minimum Submergence	Fully submerged for continuous operation 6" below top of motor for intermittent operation	
Maximum Environmental Temperature	40° C (104° F) continuous operation, 60° C (140° F) intermittent operation	
Power Cable - Type (See Motor Information for AWG data/size.)	Type SJTOW: single phase, 1½ and 2 HP Type STOW: single phase, 1½ - 3 HP and 5 HP, 460 V Type STOW: single phase, 3 and 5 HP, three phase 5 HP, 230 V and 7½ HP	
Motor Cover, Bearing Housing, Seal Housing, Casing	Gray Cast Iron - ASTM A48, Class 30	
Impeller - Standard, Optional	Gray Cast Iron - ASTM A48 or Cast Bronze - ASTM B584 C87600	
Motor Shaft	AISI 300 Series Stainless Steel	
Motor Design	NEMA 56 Frame, oil filled with Class F Insulation	
Motor Overload Protection	Single phase: on winding thermal overload protection auto reset Three phase: requires Class 10 overloads in control panel	
External Hardware	300 Series Stainless Steel	
Impeller Type	Semi-open with pump out vanes on back shroud	
Oil Capacity - Seal Chamber	1.5 quarts	
Oil Capacity - Motor Chamber	1½-5 HP single and three phase: 7 quarts 7½ HP three phase: 6.5 quarts	
Mechanical Seals - Standard	Upper	Carbon/Ceramic; Type 21
	Lower	Silicon Carbide/Silicon Carbide; Type 31
Mechanical Seals - Optional Lower	Silicon Carbide/Tungsten Carbide; Type 31	

## DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)



Xylem, Inc.  
 2881 East Bayard Street Ext., Suite A  
 Seneca Falls, NY 13148  
 Phone: (866) 325-4210  
 Fax: (888) 322-5877  
[www.xyleminc.com/brands/gouldswatertechology](http://www.xyleminc.com/brands/gouldswatertechology)

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# **SUBMERSIBLE MIXERS**



# ANOXIC MIXER

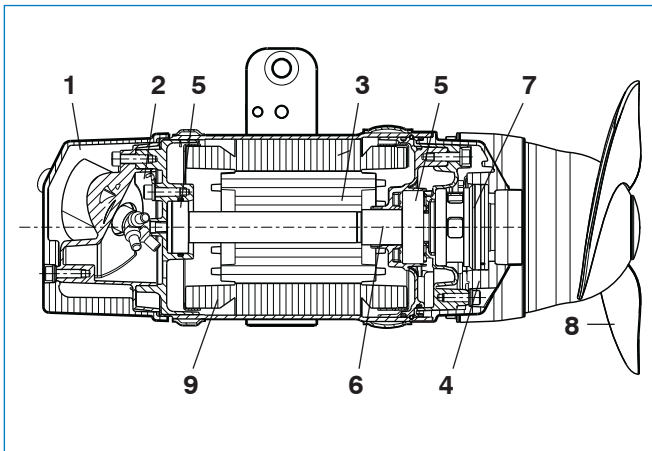
## Heavy duty, direct drive mixer

Nominal Thrusts: 130 to 1,250 N



### Applications:

4620 mixers are used in industrial processes such as Pulp & Paper, Chemicals, Food & Beverage and more. Also found in Municipal and Industrial waste treatment, Mining, Marine and Agricultural uses.



### Materials of Construction:

- 316 Stainless Steel

### Approvals:

CSA tested and approved to UL Standard for Safety #778.

Factory Mutual Research tested and approved. (Pending)  
Suitable for use in:

Class I Div 1 groups C and D

Class II Div 1 groups E; F and G

Class III Div 1 Hazardous locations



### Specifications

#### 1. Cable Entry

Cable entry consists of a compressible rubber bushing to seal off motor area and relieve strain on the cable. Cable entry housing is constructed of vinyl ester for shock and chemical resistance.

#### 2. Junction Box

Box is sealed off from surrounding liquid and stator casing via terminal board and an O-ring.

#### 3. Motor

Squirrel cage, 3 phase induction shell type design NEMA B motors are specifically designed for each mixer frame size. Non-overloading for full performance range. Motor insulation is Class H with a maximum working temperature of 180°C (356°F). Combined service factor of 1.10. Motors can be run continuously or intermittently. The stator is cooled by the surrounding mixed media.

#### 4. Oil Casing

An environmentally friendly white paraffin based, FDA approved, non-toxic oil lubricates and cools the seals and acts as an additional barrier to prevent liquid from penetrating the motor area. Pressure build-up within the casing is reduced by an inner and outer oil compartment design which transports any foreign liquids away from rotating components. Casing is constructed of vinyl ester for shock and chemical resistance.

#### 5. Bearings

Bearings are rated in excess of 100,000 hours of operation (L-10aa rated life). Shaft is supported by a single row angular contact ball bearing and single row cylindrical roller bearing, plus a heavy duty single row angular contact ball bearing on the propeller side.

#### 6. Shaft

Motor shaft and rotor are a single integral unit. Shaft is completely isolated and cannot come in contact with the mixed media.

#### 7. Active Shaft Seals

Outer mechanical seal isolates the oil housing and surrounding liquids and is tungsten carbide lapped end faced running in oil. Inner mechanical seal operates between oil casing and stator casing. Only seal faces operate in the mixed media, all other components are within motor housing. One seal face of the inner seal pair has laser etched spiral grooves. As the seal rotates, these grooves act to pump any leakage back into the oil casing from out of the stator housing.

#### 8. Propeller

Two bladed, 316 stainless steel propeller. Blades have large width, thin profile and smooth surface with a back swept design for optimum efficiency and non clogging operation. The blades are laser cut to exacting tolerances. Propeller is available in other materials - consult Flygt.

#### 9. Monitoring Equipment

The stator incorporates three thermal switches connected in series (one in each phase) which open at 260°F (125°C).

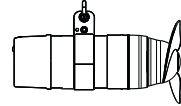
### Flygt products are affiliated with the following associations:



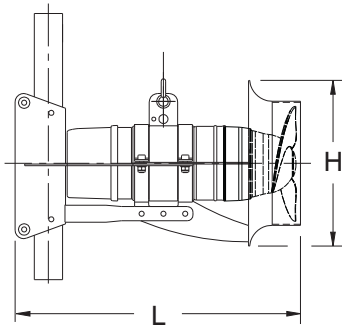
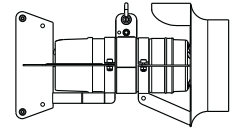
Weights

Weight of mixer without cable:

min. 26.5 lbs

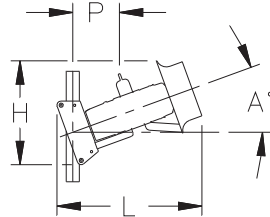


max. 37.5 lbs



ALL DIMENSIONS IN INCHES

DIMENSION CHART					
A°	-20	-10	0	10	20
H	15 1/2	13 3/8	11 1/2	13 1/8	15 5/8
L	21 3/4	21	19 7/8	21 1/8	21 3/4
P	9 3/4	9 1/2	8 1/4	8 1/8	7 5/8



Power Cable for Warm Liquid Mixers HCR cable - to 195°F (90°C)			
HP	Volts	Cable Size	Part No.
2.3	All	7G2.5 11.4 mm (0.45")	94 20 91

Propeller Performance

Model	*Prop. Code	Ø	Poles	Max. Motor HP Rating	Shaft HP*	% Full Load	Power Input (kW)	Prop. Speed (RPM)	Prop. Dia. (inches)	Prop. Blade Angles (Degree)	Nominal Thrust (N)
<b>Mixer With Jet Ring</b>	042107SJ	1	4	1.2	0.7	54	0.70	1710	8 9/32"	7°	130
	042107SJ	3	4	2.3	1.0	38	0.95	1675	8 9/32"	7°	1,250
	042113SJ	3	4	2.3	1.6	58	1.55	1675	8 9/32"	13°	295
	042115SJ	3	4	2.3	2.0	85	1.95	1675	8 9/32"	15°	370
<b>Mixer Without Jet Ring</b>	042107SF	1	4	1.2	0.9	85	0.90	1740	8 9/32"	7°	150
	042107SF	3	4	2.3	1.2	44	1.15	1675	8 9/32"	7°	145
	042113SF	3	4	2.3	2.0	79	1.95	1675	8 9/32"	13°	305

\*Propellers also available in High Chrome, See Mixer Catalog for details.

**Liquid Temperatures:** Mixers constructed in 316SS are assembled using components that will withstand liquid temperatures up to 195°F. Cable sizes shown below are based on max. liquid temperature of 104°F. Refer to power cable chart above for liquid temperatures above 104°F.

Motor Data

Rated Output Power HP (kW)	Ø	Volts nom.	Full Load Amps	Locked Rotor Amps	Locked Rotor KVA	NEC Code Letter	Rated Input Power kW	Poles/RPM	Cable Size	Cable Part Number	Max. Cable Length (FT.)
2.3 (1.7)	3	200	8.0	41	13.5	G	2.3	4/1685	4G2.5+2x1.5 17.5 mm (0.69")	94 20 59	145
		230	7.7	37							175
		460	3.6	18							405
		575	2.8	14							1200
1.2 (.9)	1	115	11	58	6.7	F	1.3	4/1710			50
		230	5.5	26							200

Efficiency				Power Factor			Electrical Service Specifications
HP	100% Load	75% Load	50% Load	100% Load	75% Load	50% Load	
1.2	71.5	70.2	63.6	0.99	0.99	0.99	Voltage Tolerances: ±5% (Rated Output), ±10% (without overheating) Frequency Tolerance: ±5% Voltage Balance (Phase to Phase): ±1% VFD compatible
2.3	75.2	75.5	72.5	0.80	0.71	0.57	

Xylem Inc., Flygt products, reserves the right to modify performance, specifications or design without notice.

# FUBBLE DIFFUSERS



## INNOVATIVE FINE BUBBLE MEMBRANE & CERAMIC DISC AERATION SYSTEMS



### **Practice Leads to Improvement**

Aquarius Technologies' fine pore aeration system has been developed by a team of engineers with an unparalleled background of experience in the design, application and operation of wastewater treatment aeration systems.

Through years of practice we have come to understand that high performance diffuser installations require equally well engineered piping support systems. The result is Aquarius Technologies' innovative, high-performance, energy saving design.

## Attachment to Discovery A-22 (Wastewater)

### Piping Grid Design is Important

A diffused aeration system is only as good as the reliability of the air delivery system. Aquarius Technologies has developed a unique approach to the design of the pipe jointing and pipe support system. This design approach has been extensively field-tested.

### Proven System Effectiveness Features:

- Minimum 2% titanium dioxide used in the PVC to prevent UV degradation
- Anti-rotational threaded union piping joints
- Guide supports for expansion and contraction

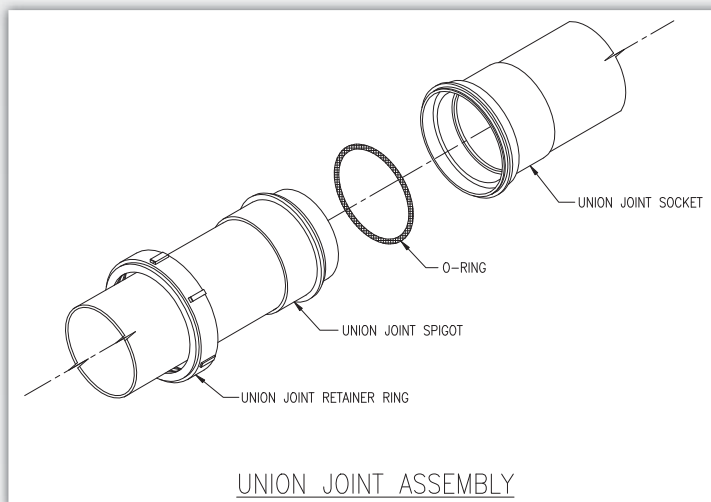
### High Performance Joint Design for Durability in all Environmental Conditions

The joint and support system is an integral part of the overall system design. The two most common forms of fixed joint connections are flanged assemblies or threaded couplings. Aquarius' fixed joint system is reliable, easy to install and prevents joint problems found in other systems.

### Special Threading and Retaining Mechanism Increase Joint Reliability

Aquarius Technologies has designed a proprietary threaded coupling and has made an investment in special tooling to replace the older, more expensive and labor intensive methods of flange installation.

The Aquarius joint has a greater thread profile and thicker retainer ring than competitive joints, resulting in a stronger more reliable joint. The sealing o-ring is also compressed on four sides versus two sides producing a greater sealing force and positive air seal.



### Heavy Duty Anti-Rotation Joint Eliminates Blow-Outs

The joint incorporates an anti-rotational feature with infinite angular rotation and reduced joint stress. Other suppliers design their pipe joining system with expansion couplings or slip joints. In this configuration, which typically has a maximum pipe engagement of no more than a couple inches, the ends of the connecting pipes are free to move within the joint. Considerable evidence is available to substantiate that this design significantly increases the chances of leaking and blow apart.

### Eliminate Mechanical Failure in Adverse Conditions

Our system of guide type supports and threaded union joints is field proven in dealing with blower outages, air-on/air-off cycling, water hammer and variations in air temperature. These are all areas that have resulted in common mechanical failure of other piping designs. The Aquarius piping design eliminates the potential for blow apart or failure of expansion or slip on type joint fittings commonly occurring with other manufacturers systems.



### Diffuser Holder

Aquarius Technologies' diffuser holder offers several advantages over competitive designs. The diffuser is mounted in a holder that is sonic and solvent welded to the crown of the air distribution header at the factory.

Certain competitive designs utilize a small diameter nipple connection with a friction fit connection to the header piping. The long-term mechanical reliability of this design is suspect, since plastic will yield with force over time, and the small diameter connection may be insufficient to resist the forces of normal operation and maintenance thereby also resulting in mechanical failure.

Other competitive designs which utilize a clamping saddle and sealing gasket to fix the diffuser holder to the pipe. This design requires the contractor to perform the installation, resulting in the potential for field installation error, leakage and higher installed costs than factory installed holder designs.

### Factory Installed, Sonic and Solvent Welded Design Provides:

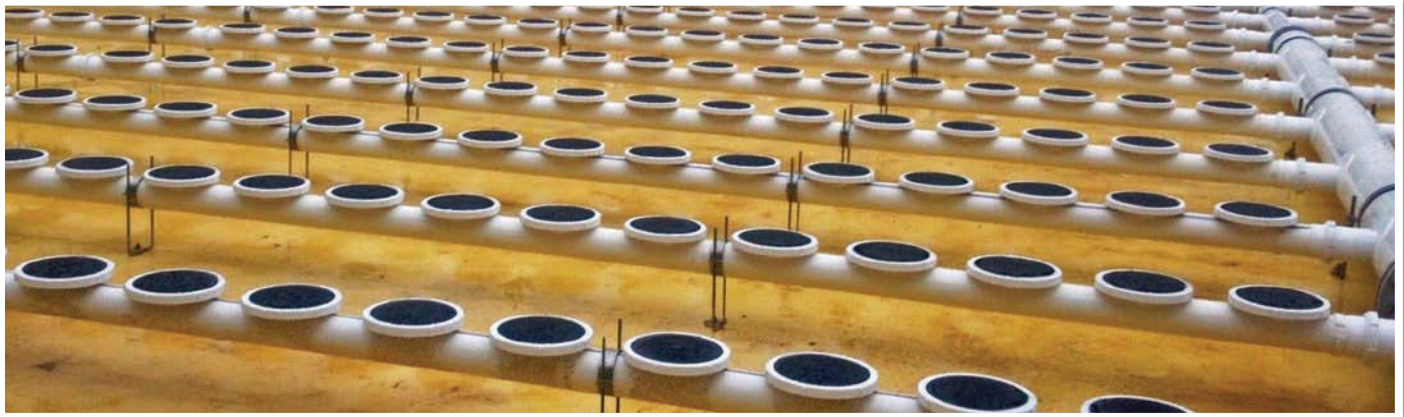
- A mechanical bond stronger than the pipe material itself
- Unparalleled long-term structural integrity
- No sealing gaskets to be improperly installed in the field
- The elimination of field installation of the holder

## Membrane Disc Diffusers

### EPDM Diffusers Extend Membrane Life in Aggressive Environments

The life and performance of a membrane diffuser is dependent on the environment in which it operates. Some wastewaters are more aggressive to membrane diffusers than others. By focusing on the more aggressive environments, we have been able to analyze how membrane diffuser elements age in service and understand the impact on diffuser life.

As a result of this research, Aquarius Technologies has developed a proprietary, advanced-EPDM based membrane that has 10% less extractable oil than similar type diffusers. This provides greater chemical stability, longer life and lower cost of ownership.



## Standard Membrane Disc Diffuser

### Reduce Hardware Requirements, Improve Oxygen Distribution

The production of Aquarius Technologies' standard disc diffuser and quality control procedures utilized in the manufacturing process are an extremely important aspect in determining the performance characteristics of the diffuser. Focusing on producing a diffuser with very tight tolerance on physical dimensions and an optimized perforation configuration Aquarius Technologies has been able to develop a finished product that has:

- 19% improved average uniformity of air distribution than other diffusers in the marketplace
- 5% oxygen transfer enhancement over similar diffuser designs

In addition, oxygen transfer doesn't have a linear relationship to diffuser density. Therefore, a smaller number of Aquarius Technologies diffusers is required to distribute a set volume of oxygen as compared to competitive 9" diffusers.

**AN AQUARIUS TECHNOLOGIES  
STANDARD DISC DIFFUSER  
SYSTEM TYPICALLY REQUIRES**

**25-35% FEWER  
DIFFUSERS**

**THAN THE COMPETITION TO  
DELIVER THE SAME OXYGEN  
TRANSFER CAPABILITY**

## Low Pressure Membrane Disc Diffuser

### Fouling Resistant with Ultra-Wide Operating Range

Low pressure disc diffusers share the same chemical formulation and profile with the standard disc diffusers, however the perforation pattern is unique in that the apertures produce low headloss resistance to airflow and expand gradually, yet readily, as airflow is increased. This allows the diffuser to be operated at a wide range of airflow rates while maintaining consistently efficient oxygen transfer efficiency.

The ability of the diffuser apertures to open larger and defeat fouling at the aperture itself makes the diffuser ideally suited for heavy solids applications or applications with a propensity to for scaling. Moreover the diffuser's ability to operate at elevated airflow rates while exhibiting low headloss makes it economically suited for aerated mixing applications, such as flow equalization and aerated channels.



## Superior Ceramic Disc Diffusers



### Uniform Airflow Distribution

Aquarius Technologies' high temperature bonded alumina oxide ceramic diffuser features a contoured profile and peripheral channel for seating of the top mounted o-ring gasket. This diffuser design and its production method is more costly than the competition's flat disc, but it is superior because it is chemically inert with varied density of the ceramic material across the diffuser to insure uniform air bubble distribution.

### Positive Sealing

Moreover, by compressing the ceramic materials at the peripheral o-ring seat, air is forced to exit toward the center of the disc during operation. This serves to prevent the "short circuiting" near the retainer ring that may occur as the diffuser foul. It also provides a seat that insures a positive seal.

### Applications and Operations

The Aquarius membrane disc diffuser system is well suited for activated sludge aeration, BNR swing zones, sludge digestion, flow equalization, and mixing applications. The membrane disc diffuser system is well suited for air-on/air-off applications and shows excellent fouling resistance in most applications.

Aquarius Technologies' ceramic disc diffuser system is well suited for activated sludge aeration applications, as well as certain industrial applications which may be aggressive toward traditional membrane diffuser systems.

Aquarius Technologies' low pressure disc diffuser was developed for special applications such as heavy solids, aerated mixing and certain industries with ultra-high aeration rates.

### Disc Diffuser Operating Range

- **Fine Bubble 0.5 - 4 scfm normal range, with 1.25 - 1.5 scfm as the design point, and up to 7 scfm short term peak**
- **Low Pressure Membrane 0.5 - 10 scfm normal range, with 3 scfm as the design point**
- **Diffuser densities between 2.5% - 25% floor coverage**
- **Standard oxygen transfer rates between 1.5% - 2.75% per foot of diffuser submergence depending on diffuser type, diffuser density, submergence and airflow rate**

Aquarius Technologies Inc.

1103 Mineral Springs Drive, Ste. 300  
Port Washington, WI 53074

P: 262.268.1500 • F: 262.268.1515 • E: [info@aquariustechnologies.com](mailto:info@aquariustechnologies.com)



[aquariustechnologies.com](http://aquariustechnologies.com)

# COARSE BUBBLE DIFFUSERS

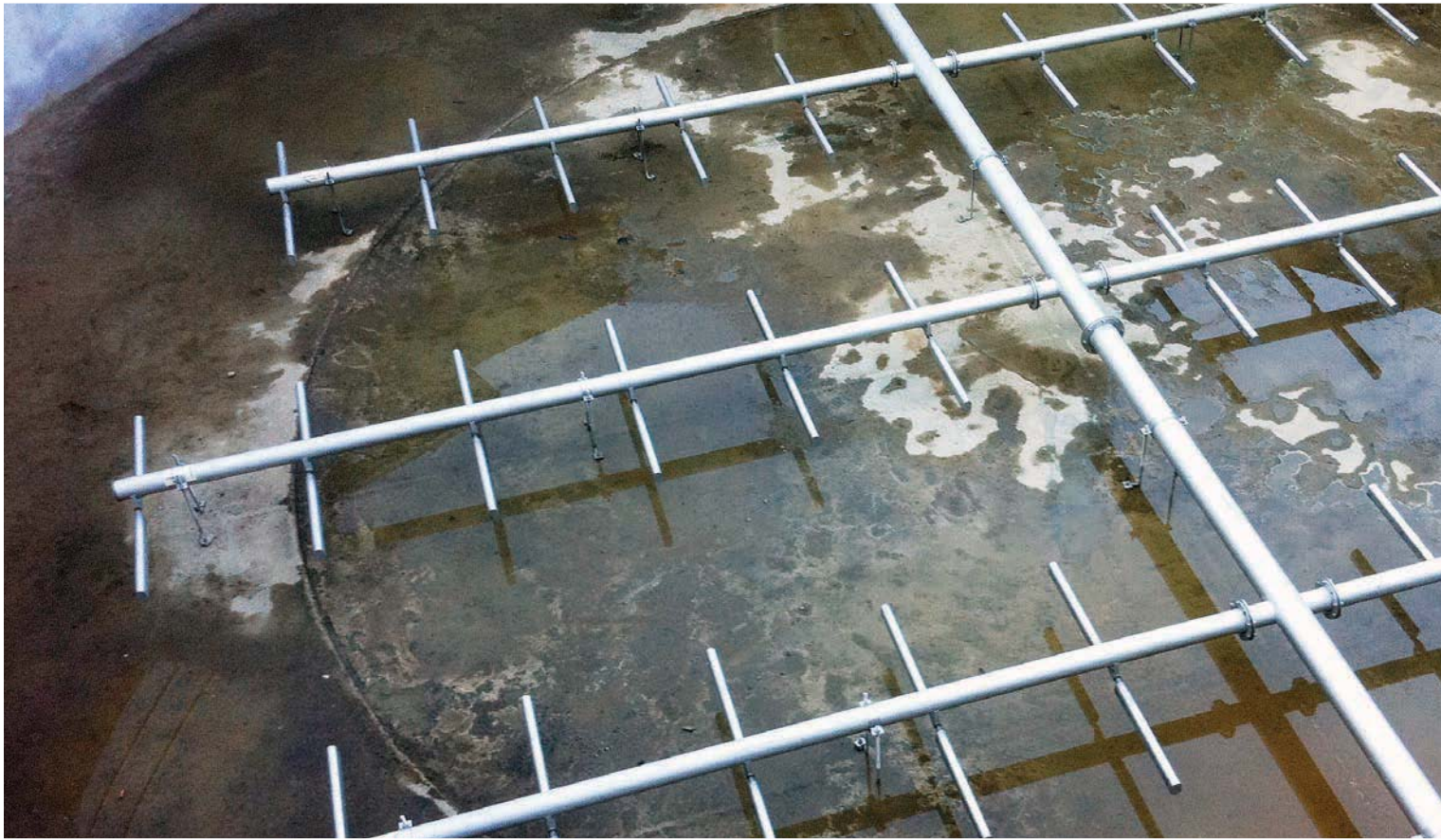


## COARSE BUBBLE AERATION SYSTEMS



Aquarius Technologies coarse bubble aeration system has been developed by our team of engineers with an unparalleled background of experience in the design, application and operation of wastewater treatment aeration systems. This experience comes with the knowledge to select the right diffuser system for the application and engineer that system to have an economical capital cost, be easy to install and designed to meet almost any process requirement.

# Wide Band Stainless Steel Diffuser

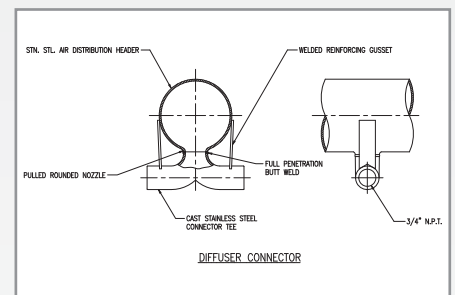
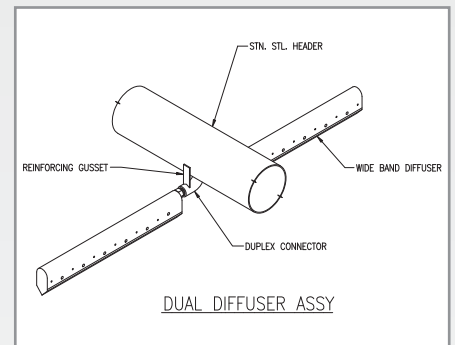


## Long Life and Proven Performance

The Aquarius Technologies' wide band stainless steel diffuser system is based on a proven design developed over forty years ago. The diffuser system is used in a wide array of applications from activated sludge to aerated mixing and aerobic digestion. The most beneficial characteristics of the wide band stainless steel coarse bubble diffuser system are the robust construction and reliable performance over its decades long design life.

## Wide Band Stainless Steel Diffuser System Features

- Wide range of diffuser airflow from 5 – 50 scfm
- Low headloss over the full range of operation
- Full length bottom diffuser deflector prevents material from being pulled into the body of the diffuser
- Mutually reinforced gusseted diffuser connector for unmatched long-term strength and durability
- Constructed of 304L and 316L stainless steel
- NPT connectors throughout for ease of installation
- Welded assemblies are passivated following fabrication using full immersion method
- Produced in the USA for the highest quality fabrication



# SPECIAL APPLICATION COARSE BUBBLE AERATION SYSTEMS

Aquarius Technologies' knows that every application is unique and selecting the right diffuser for the job makes all the difference in whether the system performs up to expectations or falls short. Whether it is our wide band stainless steel diffuser system, diaphragm check valve diffuser system, single drop diffuser system or cast in place diffuser system, you can rely on Aquarius making the right coarse bubble aeration equipment selection to fit your needs.

## Diaphragm Check Valve Diffuser

### A Design Method that Prevents Clogging

Aquarius Technologies' diaphragm check valve diffuser system utilizes either a stainless steel or PVC piping system and has been designed for applications where traditional fixed orifice coarse bubble or fine bubble diffuser systems can have a propensity to clog.

### Prevention with Underside Diffusion

The diaphragm check valve diffuser resists clogging due to the air release being on the underside of the diffuser and the diaphragm cap seals tightly to the base when the air is shut-off, thus preventing backflow into the diffuser or piping system. The diaphragm check valve diffuser is attached to the piping system using an NPT connection to factory installed threaded bosses on the crown of the pipe.



## Single Drop Diffuser

### Maintenance without Tank Drain Down

Aquarius Technologies' single drop diffuser system has been designed for challenging applications which require the ability to maintain the diffuser system without tank drain down. The single drop diffuser system does not have any small orifices or pipe restrictions below the liquid level which would clog or plug, however in the rare occurrence, the vertical drop piping and diffusers can be rodded-out from the top of the tank. This may be especially beneficial in heavy solids applications, such as mechanically thickened aerobic digesters or sludge holding.



### Single Drop Diffuser System Features

- Corrosion resistant 304 stainless steel, 316 stainless steel or galvanized piping system construction
- Corrosion resistant PVC single drop diffuser assembly
- Large diameter diffuser and piping for non-clog operation

## Cast In Place Diffuser

### Clear Floor Space for Ease of Clean-out

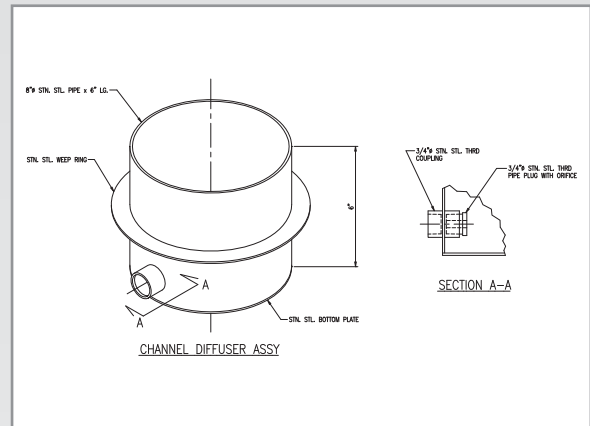
Aquarius Technologies' cast in place diffuser has been designed for aerated mixing where an unobstructed tank floor is required for sand or grit clean-out.

### Cast in Place Diffuser Features

- Corrosion resistant stainless steel construction
- Non-clog and low headloss operation
- Removable air flow control orifice
- Can be cleaned or maintained by compressed air purging

### Cast in Place Diffuser Applications

- Flow equalization
- Storm water holding
- Influent or mixed liquor channels



Aquarius Technologies Inc.

1103 Mineral Springs Drive, Ste. 300  
Port Washington, WI 53074

P: 262.268.1500 • F: 262.268.1515 • E: [info@aquariustechnologies.com](mailto:info@aquariustechnologies.com)



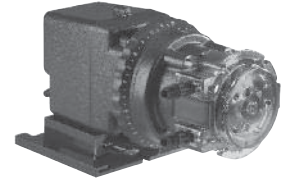
[aquariustechnologies.com](http://aquariustechnologies.com)

# CHEMICAL FEED PUMPS

# STENNER

## CLASSIC series

# SINGLE HEAD ADJUSTABLE OUTPUT PUMP 0-25 psi (0-1.7 bar)

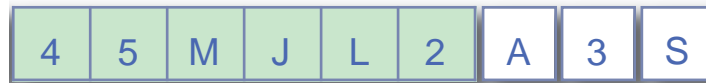


### OUTPUT

Model	Item Number Prefix	Pump Tube Number	Gallons per Day	Liters per Day	Gallons per Hour	Liters per Hour	Ounces per Minute	Milliliters per Minute	Liters per Day	Liters per Hour	Milliliters per Minute
45M1	45MJL1	#1	0.2 to 3.0	0.8 to 11.4	0.01 to 0.13	0.03 to 0.48	0.02 to 0.27	0.56 to 7.92	0.6 to 9.1	0.02 to 0.38	0.31 to 6.32
45M2	45MJL2	#2	0.5 to 10.0	1.9 to 37.9	0.02 to 0.42	0.08 to 1.58	0.04 to 0.89	1.32 to 26.32	1.5 to 30.3	0.06 to 1.26	1.04 to 21.04
45M3	45MJL3	#3	1.1 to 22.0	4.2 to 83.3	0.05 to 0.92	0.18 to 3.47	0.10 to 1.96	2.92 to 57.85	3.3 to 66.6	0.14 to 2.78	2.29 to 46.25
45M4	45MJL4	#4	1.7 to 35.0	6.4 to 132.5	0.07 to 1.46	0.27 to 5.52	0.15 to 3.11	4.44 to 92.01	5.1 to 106.0	0.21 to 4.42	3.54 to 73.61
45M5	45MJL5	#5	2.5 to 50.0	9.5 to 189.3	0.10 to 2.08	0.40 to 7.89	0.22 to 4.44	6.60 to 131.43	7.6 to 151.4	0.32 to 6.31	5.28 to 105.14
85M1	85MJL1	#1	0.3 to 5.0	1.1 to 18.9	0.01 to 0.21	0.05 to 0.79	0.03 to 0.44	0.76 to 13.13	0.9 to 15.1	0.04 to 0.63	0.52 to 10.49
85M2	85MJL2	#2	0.8 to 17.0	3.0 to 64.4	0.03 to 0.71	0.13 to 2.68	0.07 to 1.51	2.08 to 44.65	2.4 to 51.5	0.10 to 2.15	1.67 to 35.76
85M3	85MJL3	#3	2.0 to 40.0	7.6 to 151.4	0.08 to 1.67	0.32 to 6.31	0.18 to 3.55	5.27 to 105.14	6.1 to 121.1	0.25 to 5.05	4.24 to 84.10
85M4	85MJL4	#4	3.0 to 60.0	11.4 to 227.1	0.13 to 2.5	0.48 to 9.46	0.27 to 5.33	7.92 to 157.71	9.1 to 181.7	0.38 to 7.57	6.32 to 126.18
85M5	85MJL5	#5	4.3 to 85.0	16.3 to 321.8	0.18 to 3.54	0.68 to 13.4	0.38 to 7.55	11.32 to 223.40	13.0 to 257.4	0.54 to 10.73	9.03 to 178.75
Approximate Output @ 60Hz									Approximate Output @ 50Hz		

**NOTICE:** The information within this chart is solely intended for use as a guide. The output data is an approximation based on pumping water under a controlled testing environment. Many variables can affect the output of the pump. Stenner Pump Company recommends that all metering pumps undergo field calibration by means of analytical testing to confirm their outputs.

### BUILD AN ITEM NUMBER



Select **Item Number Prefix** from output chart above

**Voltage & Hertz**

- A** 120V 60Hz
- B** 220V 60Hz
- C** 230V 50Hz, CEE7 Cord *INTERNATIONAL*
- D** 250V 50Hz, CEE7 Cord *INTERNATIONAL*

NOTE: Contact the factory for additional voltage and cord options.

**Suction & Discharge Tubing**

- 1** 1/4" White
- 2** 1/4" UV Black
- 3** 3/8" White
- 4** 3/8" UV Black
- 5** 6 mm White *EUROPE*

NOTE: O.D. does not affect output.

**Tube Material**

- S** Santoprene®
- T** Tygothane® (#1, 2 & 5 only)

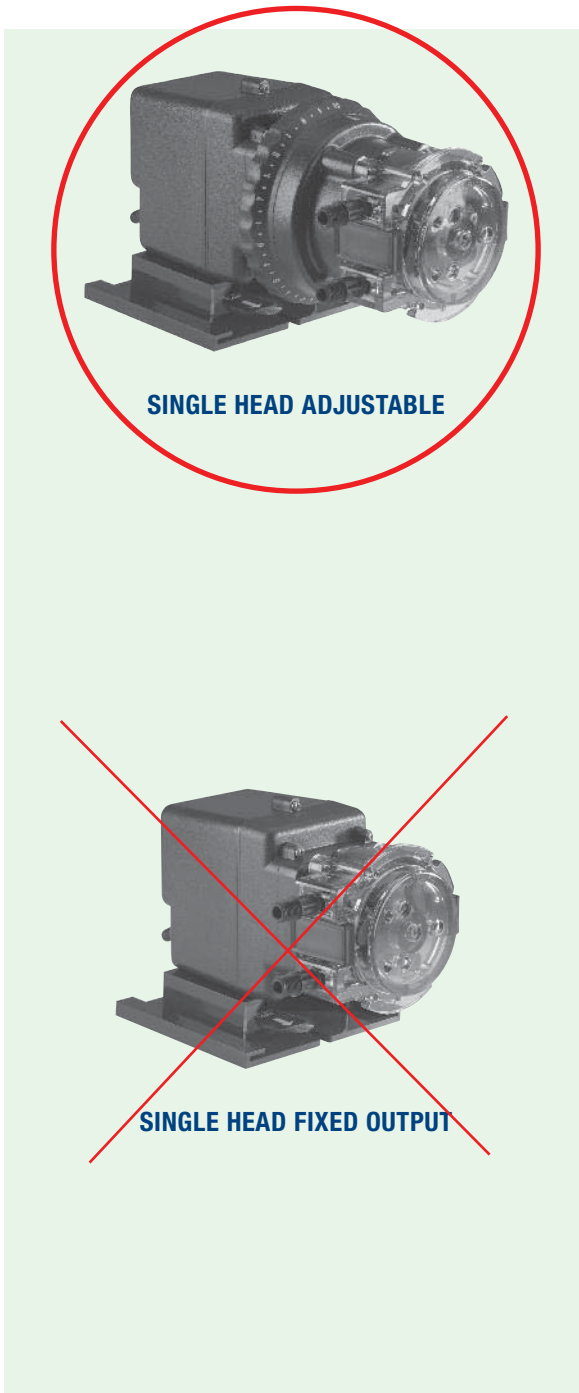
NOTE: Application specific, refer to chemical resistance guide for chemical compatibility.

# STENNER

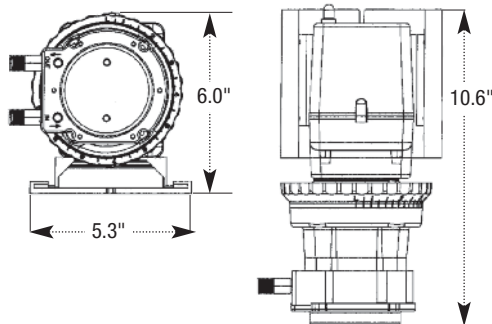
## CLASSIC series

# SINGLE HEAD ADJUSTABLE & FIXED OUTPUT PUMPS

The Classic Series metering pumps are a mechanical design, available in adjustable or fixed outputs. Typical installations include wired to a well pump pressure switch, activated by a water meter for proportional feed or with a controller.



The Classic Series single head adjustable metering pump is built with three detachable components; the motor, feed rate control, and the pump head. The output is determined by three factors; the rpm of the motor gears, the percentage setting on the feed rate control, and the size of the pump tube. The motor shaft rotates at a fixed rpm, which drives the feed rate control to intermittently engage the roller assembly within the pump head according to the setting on the external dial ring. The dial ring is labeled L to 10 and has a 20:1 turndown.



**Shipping Weight** 9 lbs (4 kg)  
**Box Dimensions** 13 x 8 x 9 in. (33.0 x 20.4 x 22.9 cm)

**Tank Systems are also available** shipped pre-assembled for quick installations, refer to page 30.



Attachment to Discovery A-22 (Wastewater)

The Classic Series Single Head Pumps are categorized into two sub-series, the 45 and 85.

**45 SERIES**

0.2 to 22.0 gpd up to 100 psi  
 0.2 to 50.0 gpd up to 25 psi

- 26 rpm
- Adjustable output 5%-100%, 2.5% increments
- ~~Fixed output~~

**85 SERIES**

0.3 to 40.0 gpd up to 100 psi  
 0.3 to 85.0 gpd up to 25 psi

- 44 rpm
- Adjustable output 5%-100%, 2.5% increments
- ~~Fixed output~~

The following pages display charts with pump output detail and are organized by pressure rating.

**Features**

- 3-point roller design assists in anti-siphon protection
- Pump head requires no valves, allows for easy maintenance
- Self-priming against maximum working pressure, foot valve not required
- Pump does not lose prime or vapor lock
- Pumps off-gassing solutions and can run dry
- Output volume is not affected by back pressure
- Easy to change pump tube; lubrication is not required
- Pump tubes and pump heads interchange between models

**Accessory Kit Shipped With Each Pump**

- 3 connecting nuts 1/4" or 3/8"
- 3 ferrules 1/4" or 6 mm EUROPE OR 2 ferrules 3/8"
- 1 injection check valve 100 psi (6.9 bar) OR 1 injection fitting 25 psi (1.7 bar)
- 1 weighted suction line strainer 1/4", 3/8" or 6 mm EUROPE
- 1 20' roll suction/discharge tubing 1/4" or 3/8", white or UV black OR 6 mm white EUROPE
- 1 additional pump tube
- 2 additional latches
- 1 mounting bracket
- 1 manual

**SPECIFICATIONS**

**Maximum Operating z** 125°F (52°C)

**Maximum Suction Lift**

25 ft (7.6 m) vertical lift, based on water

**Motor Type** 1/30 HP, shaded pole, class B

**Duty Cycle** Continuous

**Motor Voltage (Amp Draw)**

120V 60Hz 1PH (1.7)

220V 60Hz 1PH (0.9)

230V 50Hz 1PH (0.9) INTERNATIONAL

250V 50Hz 1PH (0.9) INTERNATIONAL

**Power Cord Type** SJTOW

**Power Cord Plug End**

120V 60Hz NEMA 5/15

220V 60Hz NEMA 6/15

230V 50Hz CEE 7/III

250V 50Hz CEE 7/III

**MATERIALS OF CONSTRUCTION**

**All Housings** Polycarbonate

**Pump Tube & Check Valve Duckbill** Santoprene®, optional Tygothane® #1, #2 & #5 tubes, FDA approved

**CV Duckbill with Tygothane® Tube** Pellathane®†

**Pump Head Rollers** HDPE

**Roller Bushings** Oil impregnated sintered bronze

**Suction/Discharge Tubing, Ferrules 1/4" & 6 mm** Polyethylene, FDA approved

**Tube Fittings, Check Valve Fittings**

Gray fittings: Type 1 Rigid PVC, NSF listed

Black fittings: PP, NSF listed

**Connecting Nuts** PP or Type 1 Rigid PVC

**3/8" Adapter** Type 1 Rigid PVC, NSF listed

**Suction Line Strainer** PP or Type 1 Rigid PVC body with Type 1 Rigid PVC cap, NSF listed; ceramic weight

**All Fasteners** Stainless steel

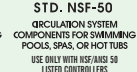
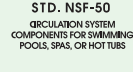
**Pump Head Latches** Polypropylene

**AGENCY LISTINGS**

- Models (Santoprene® only) tested by Water Quality Association to conform to ANSI/NSF STD 61
- Adjustable models (Santoprene® only) tested by ETL to conform to ANSI/NSF STD 50
- Fixed output models (Santoprene® only) tested by ETL to conform to ANSI/NSF STD 50 only when used with ANSI/NSF STD 50 listed controllers



METERING PUMP  
LR79565



Listings vary by model

\* Santoprene® is a registered trademark of Exxon Mobil Corporation.

\*\* Tygothane® is a registered trademark of Saint-Gobain Performance Plastics.

† Pellathane® is a registered trademark of The Dow Company.

# UV DISINFECTION SYSTEM

WASTEWATER DISINFECTION

# MODEL 3075K





## Simple, Dependable UV Solutions

Proven, chemical-free disinfection from the industry leader

Trojan Technologies is an ISO 9001: 2000 registered company that has set the standard for proven UV technology and ongoing innovation for more than 25 years. With unmatched scientific and technical expertise, and a global network of water treatment specialists, representatives and technicians, Trojan is trusted more than any other firm as the best choice for municipal UV solutions. Trojan has the largest UV installation base – over 4,000 municipal installations worldwide.

In North America alone, almost one in five wastewater treatment plants rely on our proven, chemical-free disinfection solutions.

The TrojanUV3000™PTP (Packaged Treatment Plant) and TrojanUV3000™B are two of the reasons why. These simple, robust, and operator-friendly systems have demonstrated their effective, reliable performance in over 1,000 installations around the world. The TrojanUV3000™PTP is

pre-engineered for quick, inexpensive installation with pipe runs using pre-fabricated, flanged stainless steel channels, or into existing chlorine contact basins and effluent channels. The TrojanUV3000™B offers increased capacity and is available with a controller that enables flow pacing to maximize operating efficiency and extend lamp life. The system turns UV lamp banks on and off automatically to ensure the required dose is met using the fewest lamps and least electricity.

Robust, operator-friendly solutions designed for economical disinfection

### System Monitor/Control Center



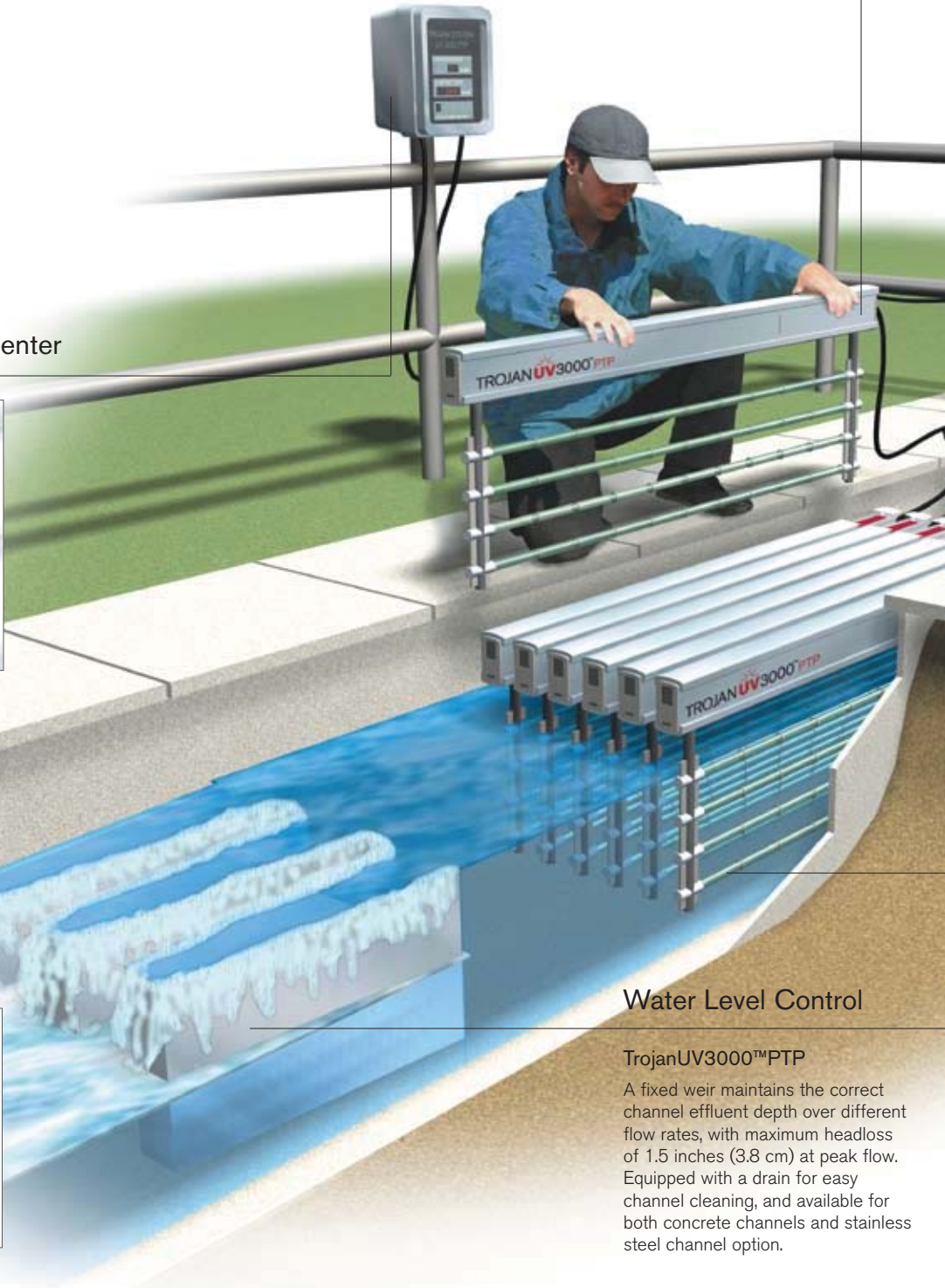
#### TrojanUV3000™PTP – Optional

The optional System Monitor includes a submersible UV sensor, and provides digital output of UV intensity at each bank. Elapsed time display provides continuous readout of actual hours of operation (lamp hours). A dry contact enables a remote low UV intensity alarm.



#### TrojanUV3000™B

The System Control Center (SCC) provides control of all UV functions, tracks lamp hours, and uses a submersible UV sensor (one per bank) to monitor UV intensity. The SCC is capable of "flow pacing" – automatically turning banks of UV lamps off or on in response to changes in the flow rate in order to conserve power and prolong lamp life.



### Water Level Control

#### TrojanUV3000™PTP

A fixed weir maintains the correct channel effluent depth over different flow rates, with maximum headloss of 1.5 inches (3.8 cm) at peak flow. Equipped with a drain for easy channel cleaning, and available for both concrete channels and stainless steel channel option.

### Electronic Ballast



#### TrojanUV3000™PTP/B

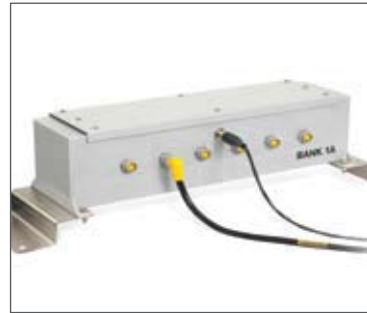
The electronic ballast is mounted within its own TYPE 4X (IP65)-rated watertight enclosure within the module frame, and is cooled by convection.

### Power Distribution



#### TrojanUV3000™PTP

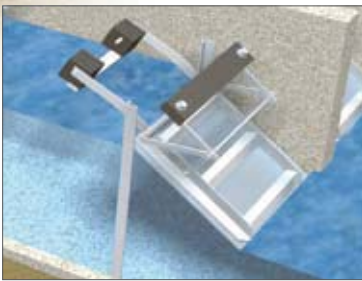
Each Power Distribution Receptacle (PDR) powers two (2) UV modules and allows for quick and safe electrical disconnect. The duplex ground fault interrupter receptacles ensure operator safety, and are mounted inside Type 3R rain shield boxes.



#### TrojanUV3000™B

The Power Distribution Center (PDC) is constructed of fiberglass and is mounted across the channel. The PDC distributes power to individual modules and allows electrical isolation of each module for easy service.

### UV Modules



#### TrojanUV3000™PTP/B

UV lamps are mounted on stainless steel frames. Lamps are enclosed in quartz sleeves, and submerged horizontally and parallel to water flow. A bank is made up of multiple modules placed in parallel positions. All wiring, from ballasts to lamps, runs inside the module frame. A display showing individual lamp status is provided on top of each module.

### Stainless Steel Effluent Channel



#### TrojanUV3000™PTP - Optional

An optional Type 304 stainless steel channel, complete with UV Module Support Rack, can be used. Channel can be installed as a freestanding structure connected to flanged pipes using the optional transition boxes.

#### TrojanUV3000™B

Available with a fixed weir or Automatic Level Control (ALC) gate in the channel to maintain the appropriate water level over the lamps. Trojan engineers will work with you to select the appropriate level control device for your application.

## Key Benefits

TrojanUV3000™PTP / ~~TrojanUV3000™B~~

### **Increased operator, community and environmental safety.**

The TrojanUV3000™PTP and TrojanUV3000™B use environmentally friendly ultraviolet light – the safest alternative for wastewater disinfection. No disinfection by-products are created, and no chlorine compounds must be transported, stored or handled by plant staff.

**Proven disinfection** based on actual dose delivery testing (bioassay validation), and over 1,000 TrojanUV3000™PTP and TrojanUV3000™B installations worldwide. Verified field performance data eliminates sizing assumptions resulting from theoretical dose calculations.

**Reduced engineering and installation costs.** The TrojanUV3000™PTP can be equipped with pre-fabricated stainless steel channels and transition boxes for in-line integration with existing flanged piping – thus minimizing engineering and installation costs. Both systems can be easily retrofitted into existing chlorine contact tanks and effluent channels, and come pre-tested, pre-assembled and pre-wired to minimize installation costs.

**Designed for simplicity and reliability.** Using Trojan's most proven, modular design and robust components, including low-pressure lamps, these systems are straightforward to operate and require minimal operator involvement.

**Operator-friendly maintenance.** Trojan lamps are guaranteed for 12,000 hours (15 months) of operation, and can be replaced, without tools, in less than three minutes per lamp. Modules are electrically separate, allowing a single module to be removed without disrupting flow or taking the system off-line.

**Outdoor installation flexibility.** All components of the TrojanUV3000™PTP and TrojanUV3000™B systems can be installed outdoors, eliminating the need and costs of a building, shelter, and air conditioning for ballast cooling.

**Well suited to changing regulations.** Trojan UV systems do not have any negative impact on receiving waters, making them a strategic, long-term choice as regulations become increasingly stringent.

**Guaranteed performance and comprehensive warranty.** Trojan UV systems include a Lifetime Disinfection Performance Guarantee, the best lamp warranty in the industry, and offer lamps from multiple approved suppliers. Ask for details.



## Advanced, Self-Contained UV Modules

Compact footprint simplifies installation and eliminates air conditioning costs

### Benefits:

- Space-saving, electronic ballasts are housed right in the modules, not in separate external cabinets, to minimize footprint size, installation time and costs
- Convection cooling of the ballast eliminates costs associated with air conditioning or forced-air cooling
- Lamps are protected in a fully-submersible, Type 316 stainless steel frame
- All wiring and cables are safely enclosed inside the waterproof module frame – fully protecting them from effluent and UV light
- Modules are electrically separated from each other, allowing them to be individually removed for maintenance and a spare module quickly inserted to maintain maximum performance



*The advanced, self-contained modules of the TrojanUV3000™PTP and TrojanUV3000™B incorporate convection-cooled ballasts and feature a UV lamp status indicator (below) for at-a-glance confirmation that all lamps are operating.*

- Streamlined module minimizes headloss and prevents build-up of debris on the lamps
- All module wiring is pre-installed and factory-tested



Trojan's Innovative Ballasts and Enclosures Provide Significant Advantages	
<b>Module-Mounted Ballasts</b>	<ul style="list-style-type: none"> <li>▪ Take up less space and reduce footprint, minimizing installation time and costs</li> </ul>
<b>Convection Cooling</b>	<ul style="list-style-type: none"> <li>▪ Housing the ballasts in the module allows for natural convection cooling to dissipate the heat of the ballasts into the air</li> <li>▪ The ballasts are kept sealed and protected</li> <li>▪ No air conditioning or forced-air cooling required</li> </ul>
<b>Clean, Water-Tight Protection</b>	<ul style="list-style-type: none"> <li>▪ Some suppliers use external cabinets with forced-air cooling. This introduces dust and moisture onto circuit boards and other electronic components, greatly reducing the life of these components</li> <li>▪ Internal housing in Trojan's sealed module keeps all components dry and clean</li> </ul>
<b>Internal Cabling</b>	<ul style="list-style-type: none"> <li>▪ All lamp-ballast wiring is contained within the module frame. This configuration protects wires and cables from exposure to effluent, debris fouling and UV light</li> <li>▪ Internal cabling allows all electrical connections within the module to be factory-tested</li> </ul>

TROJAN UV3000™PTP

~~TROJAN UV3000™B~~

## Proven Performance, Components and Design

Validated through regulatory-endorsed bioassay testing and over 1,000 installations worldwide

### Benefits:

- Performance data is generated from actual field testing (bioassay validation) over a range of flow rates, effluent quality and UVTs
- Provides regulatory-endorsed, physical verification that systems will perform as expected – ensuring public and environmental safety
- Most accurate assessment of system sizing needs
- Low-pressure lamps and ballasts have proven their outstanding reliability in thousands of installations
- Open-channel design allows cost-effective installation into existing effluent channels & chlorine contact basins
- Systems can be installed outdoors to reduce building capital costs
- Modular design is scalable for precise sizing, and expandable to meet new regulatory or capacity requirements



*The TrojanUV3000™PTP and TrojanUV3000™B feature a gravity-fed, open-channel design that delivers cost savings at installation through simple retrofits into existing effluent channels and chlorine contact tanks. Rugged, proven components make operation and maintenance extremely cost-effective.*

## Designed & Built for Easy Maintenance

User-friendly design requires minimal service and operator involvement

### Benefits:

- Trojan lamps are warranted for 12,000 hours (15 months)
- Routine maintenance can be scheduled and completed without disrupting disinfection
- Replacement of UV lamps can be completed without tools and requires less than 3 minutes per lamp



*Lightweight, self-contained modules are operator-friendly and make routine maintenance quick and easy. Modules can be individually removed for periodic sleeve cleaning and lamp replacement after 12,000 hours (15 months). An optional, mobile cleaning rack simplifies maintenance procedures.*



## Highly Flexible Installation Configurations

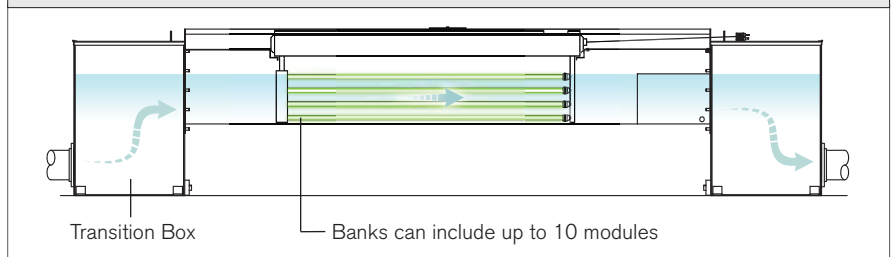
TrojanUV3000™PTP is pre-engineered for cost-effective integration with piping or channels

### Benefits:

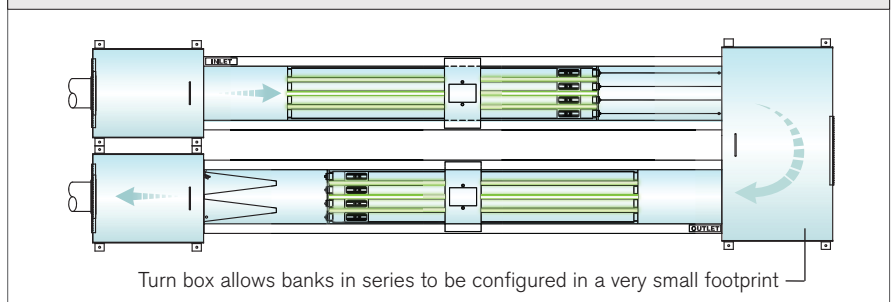
- Systems are pre-designed to meet disinfection requirements with minimal engineering costs
- Systems can be installed in series to treat higher flows or provide additional redundancy
- Pre-engineered stainless steel channels with built-in weirs are installed as a freestanding structure
- Stainless steel channels are easily integrated with existing flanged piping using Trojan's highly flexible transition boxes (Figure 1)
- Optional turn boxes minimize system footprint by connecting stainless steel channels and allowing two banks in series to be installed side-by-side (Figure 2)
- Transition boxes allow flanged pipe connection on any of three sides for flexible integration (Figure 3)



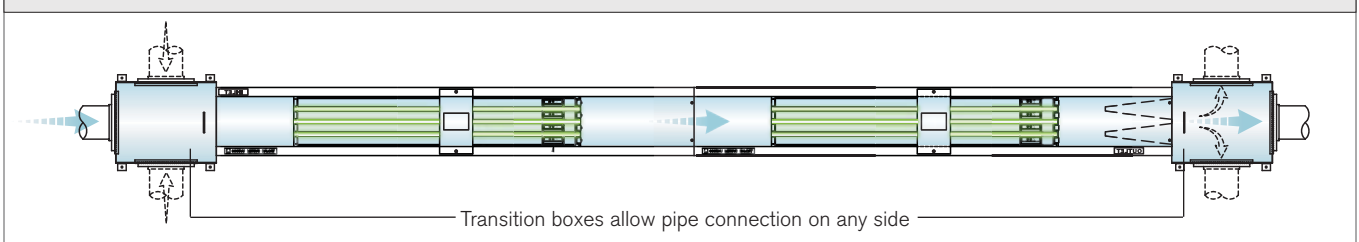
**Figure 1: Banks in Series – Side View**



**Figure 2: Banks in Series With Turn Box – Overhead View**



**Figure 3: Banks in Series – Overhead View**



The TrojanUV3000™PTP is pre-engineered for simple, effective, low cost wastewater disinfection. The optional 304 stainless steel channels feature a UV module support rack, and can be installed as a freestanding unit. Trojan turn boxes and transition boxes allow systems to be incorporated with maximum flexibility and minimal footprint.



## Flow Pacing Reduces O&M Costs

TrojanUV3000™B system controller offers flow-pacing for increased operating efficiency

### Benefits:

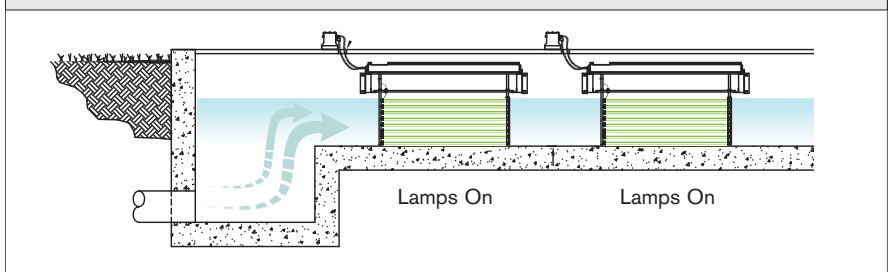
- The System Control Center (SCC) provides monitoring and control of all UV functions
- The SCC provides digital display of bank status, lamp hours, and UV intensity ( $\text{mW}/\text{cm}^2$ )
- The SCC allows the TrojanUV3000™B to be flow paced – meaning the UV lamps of individual banks are turned on and off automatically in response to variations in flow rate (based on a flow meter signal)
- Flow pacing maximizes operating efficiency by matching UV output to disinfection requirements, and reducing electrical consumption during periods of low flow by turning lamps off (Figures 1 & 2)
- Flow pacing also increases the operating life of UV lamps, thereby reducing the frequency, expense and labor required for lamp replacement



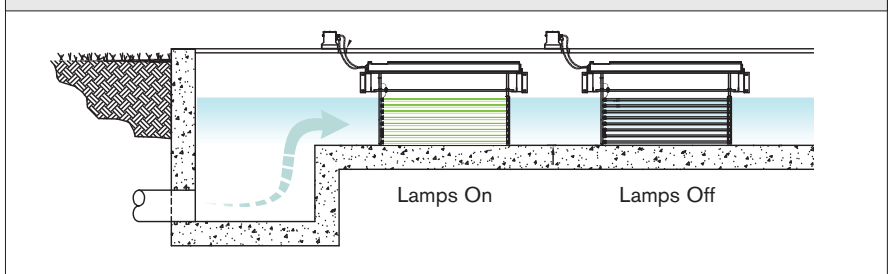
*The System Control Center of the TrojanUV3000™B monitors lamp hours and uses a submerged UV Sensor to feed accurate data on UV intensity for at-a-glance system status. The SCC also allows flow pacing to minimize operating and maintenance costs by turning banks on and off based on flow requirements*

## Flow Pacing Optimizes System Efficiency

**Figure 1: Operation During Periods of High Flow**



**Figure 2: Operation During Periods of Low Flow**




**TROJAN UV3000™ PTP**

~~**TROJAN UV3000™ B**~~

### System Specifications

System Characteristics	TrojanUV3000™PTP	TrojanUV3000™B
Typical Applications	Up to 3 MGD (473 m <sup>3</sup> /hr)	1 – 5 MGD (158 – 789 m <sup>3</sup> /hr)
Lamp Type	Low-pressure	
Ballast Type	Electronic; non-variable	
Input Power Per Lamp	45 or 87.5 Watts	87.5 Watts
Lamp Configuration	Horizontal, parallel to flow	
Module Configuration	2 or 4 lamps per module	4, 6 or 8 lamps per module
Bank Configuration	Up to 10 modules per bank	Up to 20 modules per bank
<b>Channel Configurations</b>		
Lamp Banks in Series	Up to 2	Up to 3
Channel Options	Stainless Steel (Trojan option) or Concrete (by others)	Concrete (by others)
Flanged Transition Connections	Optional for stainless steel channels	—
U-Turn Connector Box	Optional for stainless steel channels	—
Level Control Device Options	Fixed weir	ALC gate or fixed weir
<b>Enclosure Ratings</b>		
System Monitor/Control Center	Fiberglass (3R)	
Ballast Enclosure	TYPE 4X (IP65)	
Ballast Cooling Method	Convection; no air conditioning or forced air required	
Installation Location	Indoor or outdoor	
<b>System Monitoring &amp; Controls</b>		
Controller	Optional; Monitoring only	Monitoring and bank control
UV Intensity Monitoring	Optional	Optional
Flow Pacing	—	Optional
Inputs Required	None	4-20 mA flow signal for Flow Pacing
Local Status Indication	Lamp Age (hours) UV Intensity (mW/cm <sup>2</sup> ) Bank Status (on/off) Low Intensity Alarm Lamp Failure Alarm	
Remote Alarms	UV Intensity (4-20 mA) Common Alarm (discrete)	
Location	Indoor or outdoor	
Maximum Distance from UV Channel	15 ft. (4.5 m)	20 ft. (6 m)
<b>Electrical Requirements</b>		
Power Distribution	Individual GFI Receptacles	Power Distribution Centre
Quantity Required	1 receptacle per 2 modules	1 PDC per bank
Power Input	120V, single phase	120V, single phase 208V, 3-phase 240V, single phase

Find out how your wastewater treatment plant can benefit from the TrojanUV3000™PTP or TrojanUV3000™B – call us today.

#### Head Office (Canada)

3020 Gore Road  
London, Ontario  
Canada N5V 4T7  
Telephone: (519) 457-3400  
Fax: (519) 457-3030

[www.trojanuv.com](http://www.trojanuv.com)

Trojan UV Technologies UK Limited (UK): +44 1905 77 11 17  
Trojan Technologies (The Netherlands): +31 70 391 3020  
Trojan Technologies (France): +33 1 6081 0516  
Trojan Technologies Italia (Italy): +39 02 39231431  
Trojan Technologies Espana (Spain): +34 91 564 5757  
Trojan Technologies Deutschland GmbH (Germany): +49 6024 634 75 80  
Hach/Trojan Technologies (China): 86-10-65150290

#### Products in this brochure may be covered by one or more of the following patents:

U.S. 4,872,980; 5,006,244; 5,418,370; RE 36,896; 6,342,188; 6,635,613; 6,646,269; 6,663,318; 6,719,491; 6,830,697; 7,018,975  
Can. 1,327,877; 2,117,040; 2,239,925; 2,286,309; 2,371,870; 2,383,686

Other patents pending.

# BLOWERS

## SPECIFICATIONS

# ROOTS™ UNIVERSAL RAI® Rotary Positive Displacement Blowers

Frames 22 thru 718

## BASIC BLOWER DESCRIPTION

Universal RAI blowers are heavy duty blowers designed with detachable rugged steel mounting feet that permit easy in-field adaptability to either vertical or horizontal installation requirements.

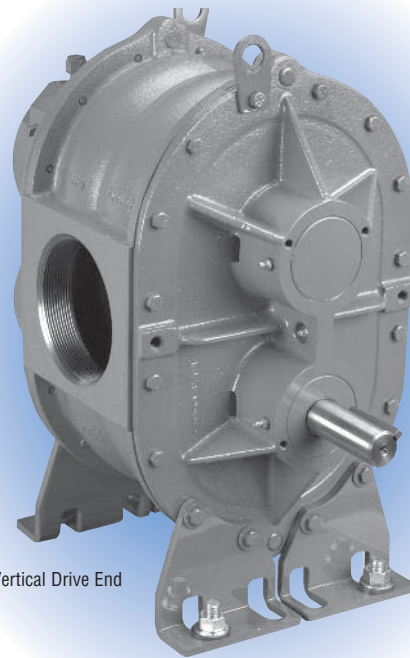
Because of the detachable mounting feet, these units can be easily adapted to any of four drive shaft positions - right hand, left hand, bottom or top. The compact, sturdy design is engineered for continuous service when operated in accordance with speed and pressure ratings.

The basic model consists of a cast iron casing and cast iron involute impellers. Carburized and ground alloy steel spur timing gears are secured to the steel shafts with a taper mounting and locknut. Oversized anti-friction bearings are used, with a cylindrical roller bearing at the drive shaft to withstand V-belt pull. The Universal RAI features thrust control, with splash oil lube on the gear end and grease lube on the drive end. After standard tests, the unit is sprayed with a protective paint and boxed or placed on skids.

Available accessories include driver, relief valve, inlet and discharge silencers, inlet filter, check valve, extended base, v-belt or flexible coupling and drive guards.

## STRONGEST WARRANTY IN THE INDUSTRY

ROOTS™ Universal RAI® blowers are warranted for two years plus an additional 6 months for shipping and construction where required. ROOTS synthetic oil assures top performance and warranty acceptance for lubricants.



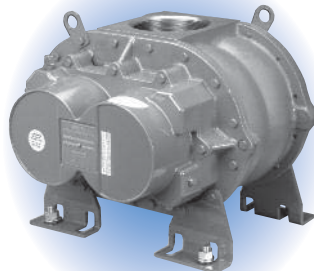
Vertical Drive End

## DESIGN AND CONSTRUCTION FEATURES

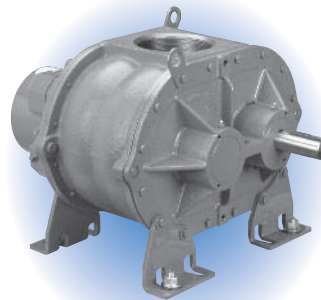
- Steel detachable mounting feet
- Rigid one-piece cast iron casing
- Anti-friction bearings
- Thrust control
- Splash oil lubricated spur timing gears
- Connections in standard pipe sizes
- Balanced, precision machined bi-lobe impellers
- Ground steel shafts



Vertical Gear End

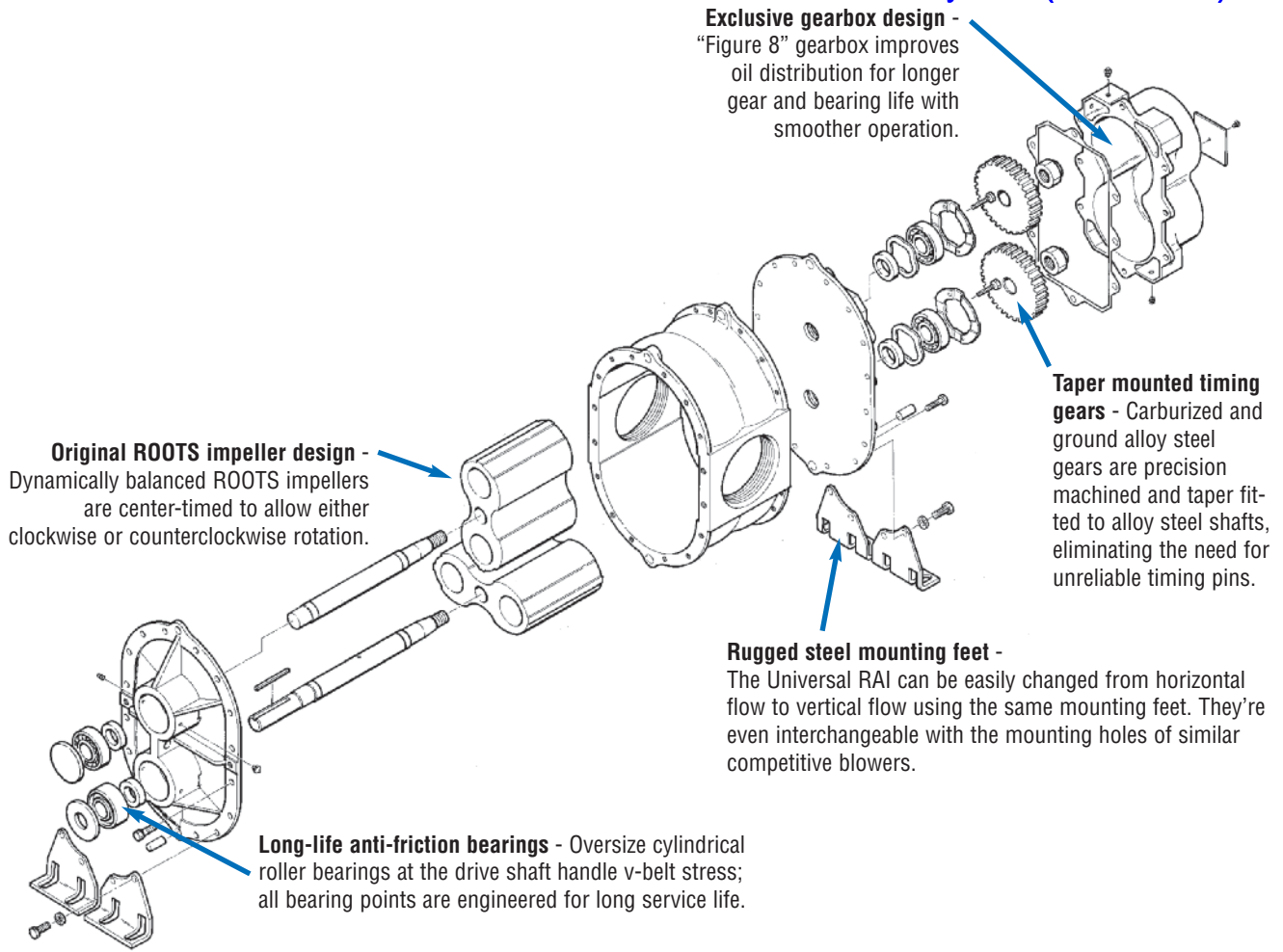


Horizontal Gear End

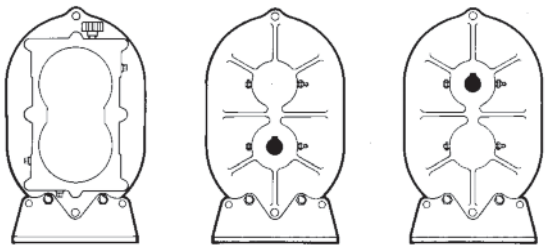


Horizontal Drive End

## Attachment to Discovery A-22 (Wastewater)

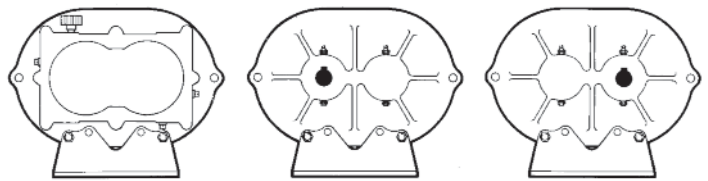


**Versatile mounting** - You can mount the Universal RAI in multiple positions to accommodate your specific needs. With your choice of 17 frame sizes, there's a URAI that fits right into your OEM or replacement application.



Vertical Gear End    Drive Shaft Bottom    Drive Shaft on Top

**Vertical Mounting** (Horizontal Air Flow)

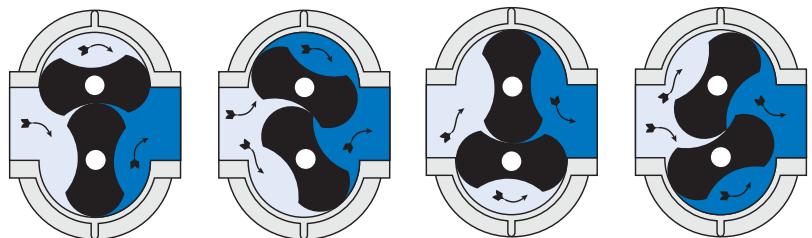


Horizontal Gear End    Drive Shaft on Left    Drive Shaft on Right

**Horizontal Mounting** (Vertical Air Flow)

## BI-LOBE OPERATING PRINCIPLE

Two figure-eight lobe impellers mounted on parallel shafts rotate in opposite directions. As each impeller passes the blower inlet, it traps a finite volume of air and carries it around the case to the blower outlet, where the air is discharged. With constant speed operation, the displaced volume is essentially the same regardless of pressure, temperature or barometric pressure. Timing gears control the relative position of the impellers to each other and maintain small but finite clearances. This allows operation without lubrication being required inside the lobe cavity.



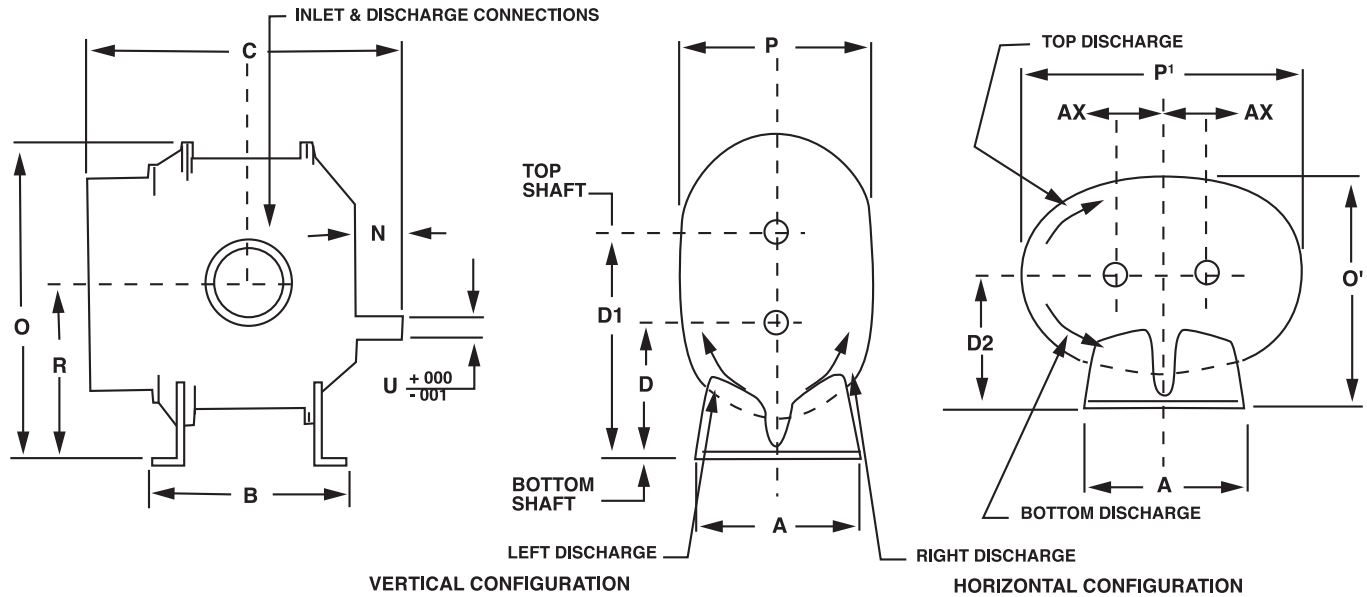
## Attachment to Discovery A-22 (Wastewater)

### URAI BLOWER PERFORMANCE

Frame Size	Speed RPM	1 PSI		6 PSI		7 PSI		10 PSI		12 PSI		13 PSI		14 PSI		15 PSI		Max. Vacuum			
		CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	CFM	BHP	"HG	CFM
22	1160	10	0.1																4	6	0.2
	3600	49	0.3	38	1.6	36	1.8	32	2.6	29	3.1								14	28	1.8
	5275	76	0.5	64	2.4	63	2.7	59	3.8	56	4.6								15	53	2.8
24	1160	24	0.2																6	12	0.5
	3600	102	0.6	83	3.1	81	3.6												14	69	3.5
	5275	156	0.9	137	4.6	135	5.4												15	119	5.5
32	1160	40	0.2	21	1.4	19	1.6												10	18	1.1
	2800	113	0.6	95	3.4	93	3.9	86	5.6	82	6.7	81	7.2	79	7.8	77	8.3		15	78	4.1
	3600	149	0.9	131	4.4	129	5.2	122	7.3	118	8.7	117	9.4	115	10.1	113	10.8		16	110	5.3
33	1160	55	0.3	31	1.9	28	2.2												10	27	1.5
	2800	156	0.9	132	4.6	129	5.4	120	7.7	116	9.2								14	113	5.2
	3600	205	1.2	181	6.1	178	7.0	170	9.9	165	11.9								15	159	7.3
36	1160	95	0.5	61	3.1	57	3.6												10	55	2.5
	2800	262	1.5	229	7.7	224	8.9												12	213	7.5
	3600	344	2.1	310	10.1	306	11.7												15	278	12.1
42	860	38	0.2	18	1.4	15	1.6												8	19	0.9
	1760	92	0.5	72	2.8	69	3.3	62	4.7	58	5.6								14	56	3.2
	3600	204	1.4	183	6.1	181	7.1	173	9.9	169	11.8	167	12.8	165	13.7	163	14.7		16	160	7.7
45	860	79	0.5	42	2.7	37	3.2												8	46	1.8
	1760	188	1.0	151	5.7	146	6.6	133	9.4										12	134	5.5
	3600	410	2.7	374	12.2	369	14.1	356	19.8										16	332	15.4
47	860	105	0.6	59	3.6	53	4.2												8	63	2.4
	1760	249	1.3	203	7.5	196	8.7												12	181	7.3
	3600	542	3.5	496	16.1	490	18.6												15	452	19.1
53	700	72	0.4	42	2.4	38	2.8												10	36	2.0
	1760	211	1.2	181	6.3	177	7.3	167	10.3	160	12.3	157	13.3	155	14.4				14	158	7.1
	2850	355	2.5	325	10.7	321	12.3	310	17.2	304	20.5	301	22.1	298	23.8	295	25.4		16	291	13.4
56	700	123	0.7	78	4.1	72	4.7												10	70	3.3
	1760	358	2.0	312	10.5	306	12.2	290	17.3	280	20.6	276	22.3						14	276	11.8
	2850	598	4.0	553	17.7	547	20.5	531	28.7	521	34.2	517.0	37.0						16	501	22.4
59	700	187	1.0	130	5.9														8	135	3.9
	1760	529	2.9	472	15.3	464	17.8												12	445	14.9
	2850	881	5.9	824	26.0	816	30.0												15	770	30.8
65	700	140	0.8	93	4.5	86	5.3	70	7.5										12	71	4.4
	1760	400	2.4	353	11.9	347	13.8	330	19.4	320	23.2	316	25.1	311	27.0	307	28.9		16	300	15.2
	2350	546	3.8	499	16.4	492	19.0	475	26.5	466	31.6	461	34.1	457	36.6	452	39.1		16	445	25.6
68	700	224	1.2	149	7.3	139	8.5												10	135	5.9
	1760	643	3.7	567	18.9	557	21.9	530	31.0	515	37.0	507	40.1	500	43.1				15	495	22.7
	2350	876	5.6	801	25.9	790	29.9	763	42.1	748	50.2	740	54.2	733	58.3				16	715	32.8
615	700	420	2.3	279	13.6	260	15.9												8	292	8.9
	1760	1205	6.6	1063	34.9	1044	40.6												12	997	33.9
	2350	1641	9.7	1500	47.6	1481	55.2												14	1389	53.4
76	575	192	1.1	134	6.1	126	7.1	105	10.2										12	117	6.0
	1400	527	3.0	468	15.4	460	17.8	439	25.3	427	30.2	421	32.7	415	35.1	410	37.6		16	413	19.7
	2050	790	5.3	731	23.4	723	27.0	702	37.9	690	45.1	684	48.7	679	52.4	673	56.0		16	674	29.5
711	575	362	1.9	271	11.1	258	13.0	226	18.6										12	228	10.9
	1400	970	5.2	880	27.7	867	32.2	835	45.7										15	793	33.5
	2050	1450	8.8	1359	41.8	1347	48.4	1315	68.2										16	1256	53.1
718	575	600	3.1	470	18.1														10	446	14.8
	1400	1590	8.1	1460	44.8														12	1398	43.6
	2050	2370	13.3	2240	66.9														12	2178	64.7

Notes: 1. Performance based on inlet air at standard pressure of 14.7 psia, standard temperature of 68° F, and specific gravity of 1.0.  
 2. Vacuum ratings based on inlet air at standard temperature of 68°F, discharge pressure of 30" Hg and specific gravity of 1.0.

OUTLINE DRAWING & DIMENSIONS



Universal RAI® Blower Dimensions

Frame Size	A	B	C	Drive Shaft Location			N	O	O'	P	P'	R	U	Keyway	Inlet & Disch. Dia.	AX	Approx. Net Wt. (lbs.)
				D	D1	D2											
22	5.13	5.00	9.75	3.75	6.25	3.75	2.50	9.63	6.88	6.25	9.25	5.00	.625	.188 x .094	1.0 NPT	1.25	32
24	5.13	7.00	11.75	3.75	6.25	3.75	2.50	9.63	6.88	6.25	9.25	5.00	.625	.188 x .094	2.0 NPT	1.25	43
32	7.25	6.75	11.25	5.00	8.50	5.00	2.44	12.81	8.88	7.75	12.13	6.75	.750	.188 x .094	1.25 NPT	1.75	69
33	7.25	7.63	12.13	5.00	8.50	5.00	2.44	12.81	8.88	7.75	12.13	6.75	.750	.188 x .094	2.0 NPT	1.75	74
36	7.25	10.00	14.63	5.00	8.50	5.00	2.56	12.81	8.88	7.75	12.13	6.75	.750	.188 x .094	2.5 NPT	1.75	102
42	8.00	7.25	13.00	6.25	10.25	6.25	3.18	15.06	10.63	8.75	13.63	8.25	.875	.188 x .094	1.5 NPT	2.00	88
45	8.00	10.00	15.50	6.25	10.25	6.25	2.94	15.06	10.63	8.75	13.63	8.25	.875	.188 x .094	2.5 NPT	2.00	109
47	8.00	11.75	17.63	6.25	10.25	6.25	3.31	15.06	10.50	8.50	13.63	8.25	.875	.188 x .094	3.0 NPT	2.00	128
53	10.50	8.38	15.38	6.25	11.25	6.75	3.68	17.38	11.88	10.25	17.25	8.75	1.125	.250 x .125	2.5 NPT	2.50	143
56	10.50	11.00	18.00	6.25	11.25	6.75	3.38	17.38	12.25	11.00	17.25	8.75	1.125	.250 x .125	4.0 NPT	2.50	170
59	10.50	14.00	21.18	6.25	11.25	6.75	3.88	17.38	12.25	11.00	17.25	8.75	1.125	.250 x .125	4.0 NPT	2.50	204
65	11.00*	10.00	18.38	8.75	14.75	8.75	3.56	21.63	15.13	12.75	19.75	11.75	1.375	.312 x .156	3.0 NPT	3.00	245
68	11.00*	13.00	21.38	8.75	14.75	8.75	3.69	21.63	15.13	12.75	19.75	11.75	1.375	.312 x .156	5.0 NPT	3.00	285
615	11.00*	20.00	28.38	8.75	14.75	8.75	3.69	21.63	16.25	15.00	19.75	11.75	1.375	.312 x .156	6.0 FLG	3.00	425
76	14.00**	11.75	19.94	11.00	18.00	11.00	4.06	26.13	20.69	19.38	23.25	14.50	1.562	.375 x .188	4.0 NPT	3.50	400
711	14.00**	16.75	25.19	11.00	18.00	11.00	4.31	26.13	19.50	17.00	23.25	14.50	1.562	.375 x .188	6.0 FLG	3.50	530
718	14.00**	23.75	32.19	11.00	18.00	11.00	4.31	26.13	19.50	17.00	23.25	14.50	1.562	.375 x .188	8.0 FLG	3.50	650

\*17.00 in horizontal configuration  
 \*\*21.00 in horizontal configuration

Dresser Roots

Houston, Texas Headquarters • U.S. Toll Free Phone: 1-877-363-ROOT(S) (7668) • Direct Phone: +1 832-590-2600  
 Connersville, Indiana Operations • U.S. Toll Free Phone: 1-877-442-7910 • Direct Phone: +1 765-827-9285  
 United Kingdom Operations • Phone: +44 (0) 1695 52600  
 USA/Canada Sales • Phone: +1 773-444-3360  
 Houston, Texas Factory Service • Phone: +1 713-896-4810  
 Mexico City Sales and Factory Service • Phone: +52 55 5889 5811  
 Dubai Sales and Factory Service • Phone: +971 4-8830831  
 Malaysia Sales • Phone: +60 3 2163 0480  
 China Sales • Phone: +86 10 8486 2440  
 Shanghai Factory Service • Phone: +86 21 5858 7638



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# **INSTRUMENTATION AND VFDS**



a xylem brand

# Aeration Tank D.O. Probe

DOCUMENT #W102



Parameters:  
Dissolved Oxygen (optical)  
Temperature



The FDO's lower energy green light excitation technology extends the sensor cap lifetime.

## YSI IQ SensorNet FDO®

### Optical Dissolved Oxygen Sensor

The FDO is an optical, luminescent based DO sensor for the IQ SensorNet system. During the biological nutrient removal process at wastewater treatment plants, continuous and precise measurement of dissolved oxygen concentration is of vital importance for optimal performance and trouble-free operation. Efficiency and energy demand is mainly determined by the performance of the aeration control system. The FDO is a reliable, proven, long-term solution for continuous DO data that can help optimize your process and lower energy costs.

- **Intelligent Sensor Cap**

The sensor cap is individually factory calibrated. Calibration data is stored on a chip that is embedded in the sensor cap. No need to enter calibration coefficients. When a new cap is installed, the coefficients are recognized and sent directly to the controller terminal eliminating the need to manually enter information.

- **Equal Path Reference System**

The optical measurement and reference paths are identically designed. This allows for identical aging of the components which enables accurate compensation and eliminates calibrations. That's correct, there is no calibration required.

- **Green Light Technology**

Softer, low-intensity excitation light increases the lifetime of the cap. This translates into a two year warranty on the standard cap.



Learn More:

Scan with a smart phone or tablet, to see the FDO angled sensor tip allow bubbles to pass by.

## IQ SensorNet FDO Optical Dissolved Oxygen General Specifications

Sensor Cap Replacement	Yes; the cap, can be replaced. Automatic recognition by the sensor of the cap including the factory calibration.	
Calibration Capability	Yes; not required, factory calibrated	
Interferences	None	
Minimum Flow Rate	None; no flow requirement	
Response Time at 25 °C	700 IQ and 700 IQ SW - T90 = <150 seconds; T95 = <200 seconds 701 IQ and 701 IQ SW - T90 = <80 seconds	
Signal Output	Digital	
Lightning Protection	Yes	
Power Consumption	0.7 watts	
Maximum Pressure	10 bars (145 psi); with sensor connection cable	
Electrical Connections	2-wire shield cable with quick sensor connection	
Conformance/Certifications	EN 61326, Class B, FCC Class A; Intended for indispensable operation, CE, cETLus	
Temperature Conditions	Operating Temperature: 23 to 122 °F (-5 to 50 °C) Storage Temperature: -13 to 122 °F (-25 to 50 °C)	
Sensor	Material:	Housing - VA steel 1.4571; Sensor Cap and Locking Cap - POM (Polyoxmethylen), PVS, silicone, PMMA
	Rating:	IP-68; waterproof
	Dimensions:	400 L x 40 D mm (15.75 L x 1.57 D in)
	(length x diameter)	400 L x 59.5 D mm (15.75 L x 2.34 D in) Salt Water version
	Weight:	900 g (1.98 lbs) 1,500 g (3.31 lbs) Salt Water version
	Warranty:	2 years

## IQ SensorNet FDO Optical Dissolved Oxygen Technical Specifications

## Dissolved Oxygen Range

Concentration	0 to 20.00 mg/L
Saturation	0 to 200.0%

## Dissolved Oxygen Resolution

Concentration	0.01 mg/L
Saturation	0.1%

## Temperature

Measurement	23 to 140 °F (-5 to 60 °C)
Compensation	32 to 140 °F (0 to 60 °C)

## IQ SensorNet FDO Ordering Information (order 2020 XT terminal, modules, cables, sensors separately)

FDO 700 IQ (#201 650Y)	Optical DO sensor for monitoring and control; includes 1 factory calibrated sensor cap.
FDO 700 IQ SW (#201 652Y)	Salt Water Design Optical DO sensor for monitoring and control; includes 1 factory calibrated sensor cap.
FDO 701 IQ (#201 660Y)	Optical DO sensor for monitoring and control; faster response time; includes 1 fast response factory calibrated cap.
FDO 701 IQ SW (#201 653Y)	Salt Water Design Optical DO sensor for monitoring and control; faster response time; includes 1 fast response factory calibrated cap.
SC-FDO 700 (#201 654Y)	Replacement; universal factory calibrated sensor cap for FDO 700 IQ and FDO 700 IQ SW
SC-FDO 701 (#201 655Y)	Replacement; fast response factory calibrated sensor cap for FDO 701 IQ and FDO 701 IQ SW

## YSI

1725 Brannum Lane, Yellow Springs, OH 45387  
Tel +1 937.767.7241 800.897.4151 (US)  
environmental@ysi.com  
YSI.com

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# Probe Controller

DOCUMENT #W100



**Parameters:**

- Dissolved Oxygen (optical or electrochemical)
- pH
- ORP/Redox
- Conductivity/Salinity
- Temperature
- Turbidity\*
- TSS (total suspended solids)\*
- Ammonium
- Nitrate
- Potassium
- COD (chemical oxygen demand)\*
- TOC (total organic carbon)\*
- DOC (dissolved organic carbon share of TOC)\*
- SAC (spectral absorption coefficient)\*
- BOD (biochemical oxygen demand)\*

\* ultrasonic cleaning for sensors

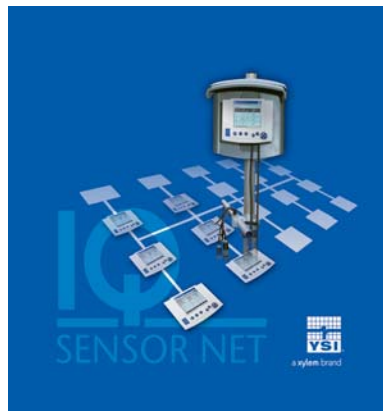
**YSI IQ SensorNet 2020 XT**

**Continuous Water Quality Monitoring for Process Control**

Powerful yet simple, the YSI IQ SensorNet 2020 XT is a modular water quality system for complete process control designed for wastewater. The 2020 XT network can accept additional sensors easily at any time and grow as your facility grows. Benefits include better network visibility and management, early detection of network failures, improved compliance with regulatory targets, and cost savings (energy, pump/blower maintenance, labor).

- 3-year instrument warranty
- User-replaceable cables and sensors. Many sensors provide ultrasonic cleaning.
- Centralized power supply along entire network; 2-wire cable provides power and communications
- Lightning protection along network
- 2020 XT provides tactile buttons; easily use while wearing gloves
- Modular expansion from 1 to 20 sensors; ability to extend network with additional modules
- Up to 48 output channels are possible
- LED status light
- Programmable access permission
- System redundancy if two terminals are used; use in one location or move from point to point

Building a system is easy...choose the IQ SensorNet 2020 XT, determine which modules are needed (control, communications, etc.), determine distances for cabling and select parameters.



[YSI.com/IQSN2020](http://YSI.com/IQSN2020)

## IQ SensorNet 2020 XT Terminal/Controller Specifications

Certifications	ETL, cETL (conforms with relevant UL and Canadian standards), CE
Electromagnetic Compatibility	EN 61326, Class B; FCC Class A, EMC for indispensable operation
Integrated Lightning Protection	According to EN 61326 enhanced over-voltage protection for <i>entire system</i> , implemented in each component
Cable	2-wire with shield for power supply and communications; resistant to polarity reversal; comprehensive EMC shield control; cable topology within network can be in the form of a line, tree, star or multiple star Total cable length max. = 1000 m (3280 ft) without signal amplifying; with signal amplifying module MIQ/JBR add an additional 1000 m
Radio	Radio transmission Class 1 with a range of 100 m (328 ft); max 300 m (984 ft)
Module Coupling at Rear	Combined mechanical and electrical connection for rapid coupling to modules; no wiring required
USB Interface	USB-A (host)
Display	Graphic display; resolution 320 x 240 pixels; visible area 114 x 86 mm (4.49 x 3.39 in); backlit
Control Keys/Buttons	5 operation keys: 3 master keys for Measurement (M), Calibration (C), Set/System settings (S) 2 function keys for confirmation/switching menu OK (OK) and Escape (ESC) 4 directional button for quick selection of software functions and input of alphanumeric values
Datalogger	MIQ/TC 2020 XT; data memory for up to 525,600 data sets
Electrical	Directly via the IQ SensorNet when coupled to an MIQ module
Temperature Conditions	Operating Temperature: -4 to 131 °F (-20 to 55 °C) Storage Temperature: -13 to 149 °F (-25 to 65 °C)
Enclosure	Material: ASA (Acrylonitrile-Styrene-Acryloesterpolymer) Rating: IP-66, equivalent to NEMA 4X (not suitable for conduit connection) Dimensions: 210 W x 170 H x 40 D mm (8.27 W x 6.69 H x 1.57 D in) Weight: 0.7 kg (1.54 lbs) Warranty: 3 years

## IQ SensorNet 2020 XT Module (MIQ) Specifications

Module Coupling at Front	Combined mechanical and electrical connection for rapid docking and removal of the terminal and docking additional modules
Module Coupling at Rear	Combined mechanical and electrical connection for docking additional modules; a total of 3 modules as a stacked mounted unit
Cable Feeds	4 screw cable glands M 16 x 105
Terminal Connections	Screw terminal strips; terminal area for solid connectors 0.2 to 4.0 mm for flexible connectors 0.2 to 2.5 mm; accessible through cover Used for connecting sensors or as an input/output or for looping through/branching of the IQ SensorNet cable
Additional Functions	Two LEDs (yellow and red) for monitoring the operating voltage; lightning protection; connection resistant to reversed polarity; integrated local identity; integrated switchable terminal resistor (SN terminator)
Enclosure	Material: PC 20% GF (Polycarbonate with 20% fiberglass) Rating: IP-66, equivalent to NEMA 4X (not suitable for conduit connection) Dimensions: 144 W x 144 H x 52 D mm (5.67 W x 5.67 H x 2.05 D in) Weight: 0.5 kg (1.1 lbs) Warranty: 3 years

## IQ SensorNet 2020 XT Ordering Information (order 2020 XT, modules, cables, sensors separately)

MIQ/TC 2020 XT Item #470 000Y	Central terminal/controller unit only. Required to be installed once at any point, remains in the system and cannot be removed. Operation mode is shown through status LED. Up to 20 sensors can be connected.
MIQ/TC 2020 XT-H3 #470 016Y	Multiparameter system consisting of 2020 XT, MIQ/CR3 (3 analog and 3 relays) and MIQ/PS (power supply). Up to 20 sensors Item can be connected.
MIQ/TC 2020 XT-H3 C6 #470 017Y	Multiparameter system consisting of 2020 XT, MIQ/C6 (6 analog outputs) and MIQ/PS (power supply). Up to 20 sensors can Item be connected.

### YSI

1725 Brannum Lane, Yellow Springs, OH 45387  
Tel +1 937.767.7241 800.897.4151 (US)  
environmental@ysi.com  
YSI.com

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a xylem brand

# N3 TECO AC Drive

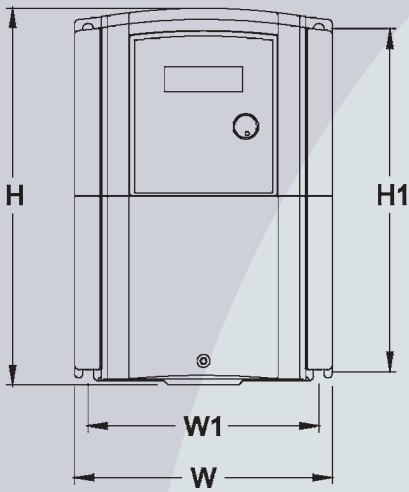
- Sensorless Vector AC Drive
- PID Control with Sleep Mode
- Simple Full Featured Operator with Speed Potentiometer
- PC Programming Software
- RS485 Interface Option
- EEPROM Program Copy Unit
- .5 to 3HP, 230V, 50/60Hz, 1-Phase
- .5 to 25HP, 230V, 50/60Hz, 3-Phase
- 1 to 30HP, 460V, 50/60Hz, 3-Phase
- UL, cUL, and CE Approved



# DIMENSIONS AND WEIGHTS Attachment to Discovery A-22 (Wastewater)

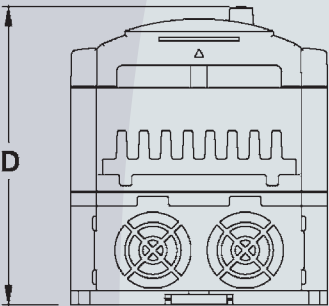
## 230V 1-Phase Input / 3-Phase Output

MODEL NO.	HP CT	DRIVE AMPS CT	DIMENSIONS (Inches)			APPROX. WT. (lbs.)
			HEIGHT	WIDTH	DEPTH	
N3-2P5-CS	.5	3.1	6.42	3.54	5.79	3
N3-201-CS	1	4.5	6.42	3.54	5.79	3
N3-202-CS	2	7.5	7.36	5.04	5.83	4
N3-203-CS	3	10.5	7.36	5.04	5.83	5



## 230V 3-Phase Input / 3-Phase Output

MODEL NO.	HP CT	DRIVE AMPS CT	DIMENSIONS (Inches)			APPROX. WT. (lbs.)
			HEIGHT	WIDTH	DEPTH	
N3-2P5-C	.5	3.1	6.42	3.54	5.79	3
N3-201-C	1	4.5	6.42	3.54	5.79	3
N3-202-C	2	7.5	6.42	3.54	5.79	3
N3-203-C	3	10.5	7.36	5.04	5.83	4
N3-205-C	5	17.5	7.36	5.04	5.83	5
N3-207-C	7.5	26.0	10.24	7.32	7.68	13
N3-210-C	10	35.0	10.24	7.32	7.68	13
N3-215-N1	15	48.0	14.17	10.43	9.70	27
N3-220-N1	20	64.0	14.17	10.43	9.70	27
N3-225-N1	25	80.0	14.17	10.43	9.70	29



## 460V 3-Phase Input / 3-Phase Output

MODEL NO.	HP CT	DRIVE AMPS CT	DIMENSIONS (Inches)			APPROX. WT. (lbs.)
			HEIGHT	WIDTH	DEPTH	
N3-401-C	1	2.3	6.42	3.54	5.79	3
N3-402-C	2	3.8	6.42	3.54	5.79	3
N3-403-C	3	5.2	7.36	5.04	5.83	4
N3-405-C	5	8.8	7.36	5.04	5.83	4
N3-407-C	7.5	13.0	10.24	7.32	7.68	13
N3-410-C	10	17.5	10.24	7.32	7.68	13
N3-415-C	15	25.0	10.24	7.32	7.68	13
N3-420-N1	20	32.0	14.17	10.43	9.70	27
N3-425-N1	25	40.0	14.17	10.43	9.70	29
N3-430-N1	30	48.0	14.17	10.43	9.70	29

**NOTE: Suffix CS = Chasis Unit 1-Phase  
C = Chasis Unit 3-Phase  
N1 = NEMA 1**

## SPECIFICATIONS

Control Mode	Sensorless Vector and V/Hz
Input Voltage Rating	230V 1-Phase and 3-Phase; 460V 3-Phase
Input Voltage Tolerance	+10%, -15Hz
Frequency Control Range	0 to 400Hz
Speed Control Accuracy	+/- 0.5% (Sensorless Vector Mode)
Speed Commands	0 to 10VDC, 0 to 20mA, Pulse Input
Overload Capacity	150% Current of Drive Rating for 1 Minute
Braking	DC Injection Braking; Dynamic Braking (optional)
Protective Functions	Motor and Inverter Overload, Overvoltage, Overheating, Peak Overcurrent
Programmable I/O	6 Digital Input (NPN or PNP), 2 Relay Outputs
Ambient Temperature	-10°C to +50°C, (14°F to 122°F)
Enclosure	IP20 Protective Chassis/NEMA 1

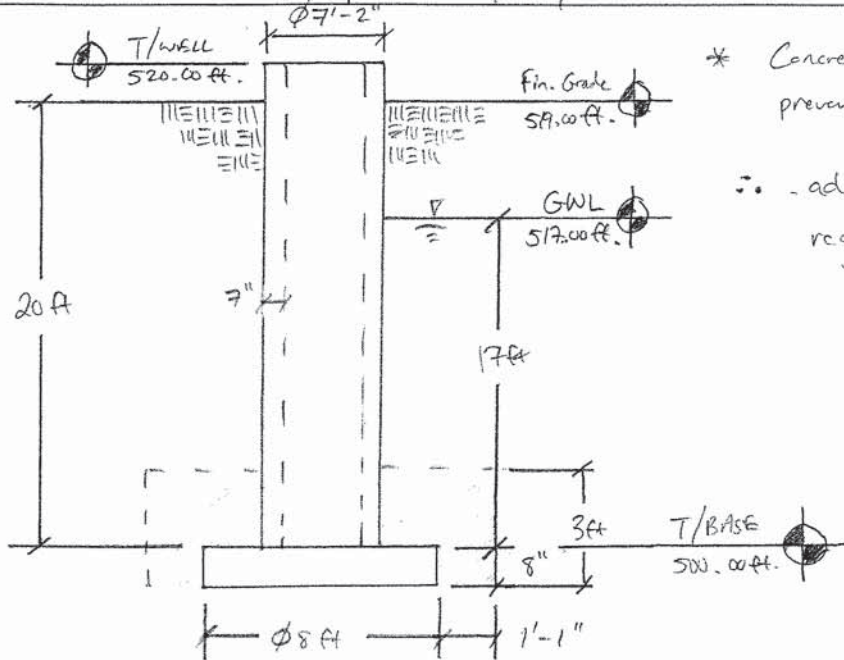
**TECO** **Westinghouse**

5100 N. IH-35  
Round Rock, Texas 78681  
1-800-279-4007  
[www.tecowestinghouse.com](http://www.tecowestinghouse.com)

# BUOYANCY CALCULATIONS



PROJECT	Rock Creek Farms	DESIGNED BY	CAJ	DATE	10/17
DESCRIPTION	Pump Station	CHECKED BY	JCA	JOB NO.	13041-WT
DESCRIPTION	Buoyancy Cales			DATE	10/26/17



\* Concrete must be added to prevent the well from floating  
 ∴ - add concrete in shaded region

$$W_{conc} = \left[ \frac{\pi (7.167^2 - 6^2) (20)}{4} + \frac{\pi (10.167^2) (8/12)}{4} + \frac{\pi (10.167^2 - 7.167^2) (2.333)}{4} \right] (0.150)$$

$$W_{conc} = 58.618 \text{ k}$$

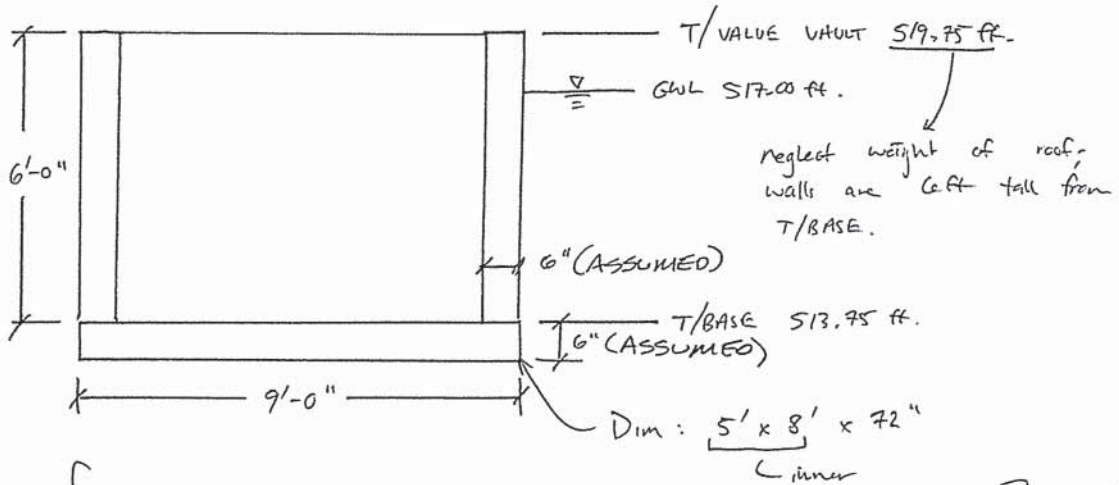
$$W_{water} = \left[ \frac{\pi (10.167^2) (3)}{4} + \frac{\pi (7.167^2) (2.333)}{4} \right] (-0.624)$$

$$W_{water} = 48.76 \text{ k}$$

$$\frac{W_{conc}}{W_{water}} \geq 1.10 = \frac{58.618}{48.76} = 1.20 \text{ ok}$$



PROJECT Rock Creek Farms	ENGINEER CAJ	PAGE 1	OF 1
DESCRIPTION VALVE VAULT BUOYANCY CHECK	CHECKED BY JCA	JOB NO. 13041-WT	
DESCRIPTION			DATE 10/31/17



$$W_{conc} = \left[ (9 \text{ ft})(6 \text{ ft})(9/12 \text{ ft}) + (6 \text{ ft})(9/12 \text{ ft})(6 \text{ ft})(2) + (8 \text{ ft})(9/12 \text{ ft})(6 \text{ ft})(2) \right] (0.15)$$

$$= 16.65 \text{ k}$$

$$W_{water} = (9 \text{ ft})(6 \text{ ft})(3.75 \text{ ft})(0.0024 \text{ k/ft}^3)$$

$$= 12.64 \text{ k}$$

$$\frac{W_{conc}}{W_{water}} \geq 1.10 = \frac{16.65 \text{ k}}{12.64 \text{ k}} = 1.32 \quad \underline{\underline{OK}}$$