STATE OF TENNESSEE

Office of the Attorney General

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ATTORNEY GENERAL AND REPORTER

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August 28, 2025

Electronically Filed in TPUC Docket Room on August 28, 2025 at 8:40 a.m.

Melvin Malone
Butler Snow LLP
1320 Adams Street, Suite 1400
Nashville, TN 37208
Email: Melvin.Malone@butlersnow.com

Re: Tennessee Public Utility Commission ("TPUC" or the "Commission"), Docket No. 25-00053, *Application of Limestone Water Utility Operating Company, LLC to Expand Its Certificate of Convenience and Necessity to Serve the Sugar Loaf Road Subdivision In Sevier County, Tennessee*

Mr. Malone:

The Consumer Advocate has reviewed the *Petition* filed by Limestone Water Utility Operating Company, LLC ("Limestone") in the above-referenced CCN amendment Docket.

The *Petition* requests that the Commission "extend the company's service area to include the additional service area" described in the *Petition* and located in Sevier County, Tennessee. Accordingly, the Consumer Advocate has reviewed Limestone's compliance with the minimum filing requirements set forth in TPUC Rule 1220-04-13-.17 regarding CCN amendments.

The Consumer Advocate appreciates the time and effort that Limestone put into compiling the *Petition*, as well as their attention to the Commission's minimum filing requirements. As set forth in "Attachment A," the Consumer Advocate highlighted documents that that could not be located; documents are illegible; or clarification on filings that are necessary. Please note that this is not a discovery request by the Consumer Advocate, but a review of Limestone's compliance with TPUC's minimum filing requirements. Please note, the Commission has the authority and responsibility for determining the sufficiency of a CCN petition.

The Consumer Advocate would like to thank Limestone in advance for its attention to this letter. If you have questions, please contact me at (615) 741-2357.

Respectfully,

Karen H Stachowski

Karen H. Stachowski
Deputy Attorney General

cc: David Foster, TPUC
Kelly Cashman-Grams, TPUC

Rule 1220-04-13-.17(2)(a) General Information

1. ***Rule 1220-04-13-.17(2)(a)2*. The rule requires an organizational chart showing each officer and key personnel by name and title.** The Company filed Exhibit 5. This is an organizational chart but there are only titles. The employees in these positions are not named as required by the rule. Please file a complete organizational chart replacing Exhibit 5 with a complete chart of employee names with each title in the Docket.
2. ***Rule 1220-04-13-.17(2)(a)7*. The rule requires a complete description of the geographic territory to be served by the applicant, including the name and location of development (subdivision) and the number of acres. Include the name of the subdivision or development and the name of the wastewater system as stated in the TDEC permit. In addition, provide a legible map of the area with the proposed service territory clearly and accurately plotted.** There is internal consistency regarding the Sugar Loaf Subdivision. The Petition (p. 58 and Appendix A) states it is 58.40 acres with 18 residential lots. In the Direct Testimony of Todd Thomas (Exhibit 9 – page 12), he describes Sugar Loaf as being 20.47 acres with 10 lots. Please confirm which is correct, the Petition or Mr. Thomas' Testimony.
3. ***Rule 1220-04-13-.17(2)(a)7(i)*. The rule asks for a map to show the location of the wastewater system, i.e., treatment plant, pre-application treatment facilities, collection infrastructure, building(s) for equipment, drip fields, disposal fields and/or wetland cells. Include the physical address of the wastewater system and the associated latitude and longitude coordinates.** Exhibit 1 lacks any clearly identified detail required by the rule. For example, there are no clearly marked areas for the plant, drip fields, buildings for equipment, and no physical address. Please file a correct map in the Docket.
4. ***Rule 1220-04-13-.17(2)(a)7(ii)*. The rule asks for a map to show names of surrounding streets.** Exhibit 1 does not have the names of the surrounding streets and roads. Please file a corrected map in the Docket.
5. ***Rule 1220-04-13-.17(2)(a)7(iii)*. The rule asks for a map to show access roads and names of access roads (if available) and the other utilities necessary to provide wastewater service.** Exhibit 1 does not show the access roads (if available) and the other utilities necessary to provide service. Please file a corrected map in the Docket..
6. ***Rule 1220-04-13-.17(2)(a)7(iv)*. The rule asks for a map of all residences and habitable structures served by the wastewater system.** Exhibit 1 does not include a map of the residences and habitable structures. Please file a map that shows the details of this requirement in the docket.
7. ***Rule 1220-04-13-.17(2)(a)8*. The rule asks for a description of the type of proposed wastewater system to be constructed including the design capacity and the maximum potential number of customers the utility will service in the proposed service area. Indicate the technology used for the system (e.g., membrane, sand filter, wetland cell and/or lagoon). The type of system and design capacity should match the type and design capacity of the associated TDEC permit and permit application.** There are internal inconsistencies in the Company's Petition and supporting documentation. The Petition (p. 58 and Appendix A) states that the development is 58.40 acres with 18

residential lots. In the Direct Testimony of Todd Thomas (Exhibit 9 – page 12), he describes Sugar Loaf development as being 20.47 acres with 10 lots. Please confirm which is correct, the Petition or Mr. Thomas' Testimony

8. ***Rule 1220-04-13-.17(2)(a)11*. The rule states to identify the builder or developer that has requested the utility to provide wastewater service. Include name of company, name of primary contact, title, mailing address, email address, and phone number.** Exhibit 21 SOP names the developer as Chris Mouhourtis; Petition at 2 & 11 and Testimony at 5:8, 12:14, 13:6 and 15:1 name Mr. Mouhourtis, but in Testimony at 12:10 the developer is identified as Mr. Howell. Please file confirmation of the developer in the Docket.

Rule 1220-04-13-.17(2)(b) Property Rights-Public Need

1. ***Rule 1220-04-13-.17(2)(b)3*. The rule asks for all contracts or agreements between the builder(s) of the treatment and/or collection system, the utility, and the property and/or subdivision developer that show entitlement or ownership to the land, system specifications, costs for the wastewater system, timeline for the system to be built, and rights to the system once it is completed. Documents presented by the applicant should be signed by all parties and bear marks or stamps, such as those provided by notaries or public officials, as necessary.** Testimony states that Mr. Mouhourtis will construct the system, but the contractor's license (Exhibit 20) is for DSH. Please confirm if Mr. Mouhourtis is contracted with DSH. Also file the contract between the Developer and DSH.

Rule 1220-04-13-.17(2)(c) Managerial Ability

1. ***Rule 1220-04-13-.17(2)(c)3*. The rule asks for copies of all contracts related to any pending merger or acquisition of the applicant, corporate parent or affiliate.** Please confirm that Limestone obtained a waiver from the Commission for the requirements of this rule.
2. ***Rule 1220-04-13-.17(2)(c)4*. Proof that the party contracted to install the proposed system has a valid and current contractor's license by the applicable licensing board of the State of Tennessee.** If the builder has contracted with DSH to construct the system (see Rule 1220-04-13-.17(2)(b)3 above), then this requirement has been satisfied. If the contractor is not DSH, please identify the contractor and provide its Tennessee license.

Rule 1220-04-13-.17(2)(d) Technical Capability

1. ***Rule 1220-04-13-.17(2)(d)1*. The rule asks for a copy of the application for the State Operating Permit (SOP) filed with TDEC. Include letter from TDEC indicating the receipt of a complete application. Include any engineering and/or design reports submitted to TDEC, such as the Design Development Report and the Detailed Soils Investigation Report. If an operating permit has been issued, provide a copy of the permit. The utility shall file a copy of the TDEC permit in the docket file prior to providing service.** A draft permit has been issued and is attached as "CA MFR Review Exhibit 1 – draft SOP" and the engineer report is attached as "CA MFR Review Exhibit 2

– Engineer Report." The Consumer Advocate could not locate any engineering and/or design reports submitted to TDEC. Please provide copies of these required documents.

2. ***Rule 1220-04-13-.17(2)(d)2*. The rule asks for a copy of the State Operator Certificate for the wastewater system operator of record. If the operator is a contract employee of the utility, provide a copy of the employment contract.** A copy of the license for Dana Douglas was attached as Exhibit 19. However, after review of the Petition the Consumer Advocate cannot locate a copy of a contract for Dana Douglas. In review of documents available in the TDEC Dataviewer, the Consumer Advocate found an email from Limestone dated January 15, 2025, which states that Dana Douglas is no longer with the Company. A copy of this email is attached as "CA MFR Review Exhibit 3 – Dana Jackson." Please confirm that Dana Jackson is the certified operator, and who employs him. If Mr. Jackson is an employee of a third party, please share a copy of the contract.

3. ***Rule 1220-04-13-.17(2)(d)4*. The rule asks for a list of any complaint(s), notices of violation or administrative action filed with or issued by a regulatory agency. Identify the nature of the complaint notices of violation or administrative action, which agency is involved, and how the issue was or is being resolved.** The Company provided no information in response to this requirement. Therefore, the Consumer Advocate reviewed TDEC's public dataviewers for information and found the following (A copy of all the documents or screen shots are attached collectively as "CA MFR Review Exhibit 4 – Complaints & Enforcement":

- Candlewood Lakes Drinking Water System.
    - 2025.02.05 – Settlement Agreement (still active).
- Shiloh Falls Wastewater System
    - 2025.03.27 – Compliance Evaluation Inspection & Notice of Violation – saturation and runoff.
    - 2025.04.15 – Limestone Response to NOV
    - 2025.04.17 – Limestone Corrective Action Plan (CAP) – deadline of 6/1/2025 for final design plans to be submitted
    - 2025.04.21 – TDEC Letter confirming receipt of CAP
    - 2025.08.01 – TDEC NOV (failure to follow CAP – no final design plans submitted).
- Grassland Wastewater System (Cartwright Creek).
    - 2023.02.13 - WPC22-0086 – TDEC Consent Order (still active)
    - 2025.07.16 – Notice of Incomplete Permit Application
    - 2025.07.23 – Limestone email to TDEC about Permit application with attachment (permit).
    - 2025.07.25 – Notice of Violation – Release of Sewage.
    - 2025.07.29 – Limestone Response to NOV
    - Note: Multiple Citizen Complaints – screen shots of complaints filed with TDEC provided in collective exhibit
    - 2025.07.25 – Email about Grasslands SSO & Photos
    - 2025.07.29 – Limestone Response to NOV
    - 2025.08.13 – July 2025 Monthly Operation Report (MOR) – non-compliance with permit limits for $CBOD_5$ (daily<=10mg/L) and Ammonia N (daily<=4mg/L).

- Hideaway Wastewater System (Cartwright Creek).
  - 2024.11.07 – Notice of BOD Exceedance.
- Laurel Creek.
  - 2025.07.02 – Final Inspection Letter – Plans not followed. Need corrected as-built plan filed.

Rule 1220-04-13-.17(2)(e) Financial Capability

1. ***Rule 1220-04-13-.17(2)(e)8*. The rule asks for a tariff showing products, services, terms, conditions and proposed rates to be charged for wastewater service. A tariff should include all pass-through fees, including but not limited to, customer deposits, disconnect or reconnect fees, late fees, tap fees, escrow fees, bond fees, franchise fees and taxes.** Confirm this is Phase I rates from TPUC Docket No. 24.00044. Also, please confirm that these rates could change after Phase II of TPUC Docket No. 24-00044.

2. ***Rule 1220-04-13-.17(2)(e)9*. The rule asks for estimates of costs and customers added by month for the first five (5) years based upon the construction build-out schedule for developers in the service area of the proposed wastewater system. For each year, by month, provide an estimated number of customers by customer class anticipated to be served by the wastewater system. Include the utility's basis and assumptions used for this projection. Provide this information in a spreadsheet in Microsoft Excel format with all assumptions clearly documented.** Appendix A states "Not Applicable" for this rule. Please explain why this is not applicable and provide the required information. Also, provide any spreadsheet in the native excel format.
3. ***Rule 1220-04-13-.17(2)(e)10*. The rule asks for documentation describing bonding requirements imposed by municipal governments for the proposed wastewater system.** The Company states that since the development is in one phase, this requirement is not applicable. Please confirm that the local government does not require a bond for the proposed wastewater system.
4. ***Rule 1220-04-13-.17(2)(e)11*. This rule requires a performance bond from the developer or builder of the wastewater system made to ensure construction of the wastewater system. The performance bond should be for an amount equal to or greater than the cost of the system as provided in contracts between builder, developer and/or utility.** In the Petition's Appendix, the Company states this rule is not applicable but also states that it has funding from CSWR to complete construction, if necessary. This response does not appear to comply with the intent of the rule which is to ensure that the Company and its ratepayers are left with the funding to complete a system. Please provide a copy of a performance bond from the developer. Please explain how this rule is not applicable to Limestone.

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
Davy Crockett Tower, 9th Floor
500 James Robertson Parkway
Nashville, Tennessee 37243

August 4, 2025

Jo Anna Brown
Vice President
Central States Water Resources
e-copy: JoAnna@cswrgroup.com
1630 Des Peres Rd, Ste 140
Des Peres, MO 63131

Subject: **Draft of State Operating Permit No. SOP-25014**
Limestone Water Utility Operating Company, LLC
Sugar Loaf Road Community Wastewater System
Sevierville, Sevier County, Tennessee

Jo Anna Brown:

Enclosed please find one copy of the draft state operating permit SOP-25014, which the Division of Water Resources (the Division) proposes to issue. The issuance of this permit is contingent upon your meeting all of the requirements of the Tennessee Water Quality Control Act and the rules and regulations of the Tennessee Water Quality, Oil and Gas Board.

TDEC's approval of this land application waste treatment system shall not be construed as creating a presumption of correct operation nor as warranting by the commissioner that the approved facilities will reach the designated goals. T.C.A. § 69-3-108(i). Similarly, TDEC's issuance of a state operating permit in no way guarantees that this land application system will function properly. Notwithstanding these approvals, owners and operators are required to ensure that operation of this system does not result in pollution of waters of the state, including groundwater.

If you disagree with the provisions and requirements contained in the draft permit, you have thirty (30) days from the date of this correspondence to notify the division of your objections. If your objections cannot be resolved, you may appeal the issuance of this permit. This appeal should be filed in accordance with Section 69-3-110, Tennessee Code Annotated.

If you have questions, please contact the Knoxville EFO at 1-888-891-TDEC; or, at this office, please contact Mr. Bryan Pope at (931) 224-3098 or by E-mail at *bryan.pope@tn.gov*.

Sincerely,

Brad Harris, P.E.
Manager, Land-Based Systems

Enclosure

cc: Permit File
Knoxville Environmental Field Office (EFO)
Mr.Arthur Faiello, Limestone Water Utility Operating Company, LLC arthur@cswrgoup.com

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
Davy Crockett Tower-9th Floor
500 James Robertson Parkway
Nashville, Tennessee 37243

Permit No. SOP-25014

PERMIT

For the operation of Wastewater Treatment Facilities

In accordance with the provision of Tennessee Code Annotated section 69-3-108 and Regulations promulgated pursuant thereto:

PERMISSION IS HEREBY GRANTED TO

Limestone Water Utility Operating Company, LLC
Sugar Loaf Road Community Wastewater System
Sevierville, Sevier County, Tennessee

FOR THE OPERATION OF

RMF with disinfection to fenced drip dispersal located at latitude 35.836467 and longitude -83.642241 in Sevier County, Tennessee to serve approximately 18 homes by the Sugar Loaf Road Community Wastewater System. The design capacity of the system is .01 MGD and will be dispersed on approximately 1.03 acres of suitable soils.

This permit is issued as a result of the application filed on July 21, 2025, in the office of the Tennessee Division of Water Resources. This permit is contingent on the submission and department approval of construction plans, specifications and other data in accordance with rules of the department. Updated plans and specifications must be approved before any further construction activity.

This permit shall become effective on:

This permit shall expire on:

Issuance date :

for April Grippo
Director

A. GENERAL REQUIREMENTS

The treatment system shall be monitored by the permittee as specified below:

Parameter	**Sample Type**	**Daily Maximum**	**Monthly Average**	**Measurement Frequency**
Flow *	Totalizer			Daily
BOD_5	Grab	**45** mg/l	N/A	Once/Year
Ammonia as N	Grab	**Report**	N/A	Once /Quarter
E. Coli	Grab	**941** colonies/100 ml	N/A	Once /Quarter

No E. Coli monitoring if fields are fenced

* Report average daily flow for each calendar month.

Sampling requirements in the table above apply to effluent being discharged to the drip irrigation plots.

This permit allows the operation of a wastewater collection, treatment, and storage system with disposal of treated wastewater through approved land application areas. There shall be no discharge of wastewater to any surface waters or to any location where it is likely to enter surface waters. There shall be no discharge of wastewater to any open throat sinkhole. In addition, the drip irrigation system shall be operated in a manner preventing the creation of a health hazard or a nuisance.

TDEC's approval of this land application waste treatment system shall not be construed as creating a presumption of correct operation nor as warranting by the commissioner that the approved facilities will reach the designated goals. T.C.A. § 69-3-108(i). Similarly, TDEC's issuance of a state operating permit in no way guarantees that this land application system will function properly. Notwithstanding these approvals, owners and operators are required to ensure that operation of this system does not result in pollution of waters of the state, including groundwater.

The land application component shall be operated and maintained to ensure complete hydraulic infiltration within the soil profile, transmission of the effluent away from the point of application, and full utilization of the soil profile as a portion of the treatment system.

Instances of surface saturation, ponding or pooling within the land application area as a result of system operation are prohibited. Instances of surface saturation, ponding or pooling shall be promptly investigated and noted on the Monthly Operations Report. The report shall include details regarding location(s), determined cause(s), the actions taken to eliminate the issue, and

the date the corrective actions were made. Any instances of surface saturation, ponding or pooling not associated with a major precipitation event not corrected within three days of discovery shall be reported to the local Environmental Field Office at that time for investigation. Surface saturation, ponding or pooling resulting in the discharge of treated wastewater into Waters of the State or to locations where it is likely to move to Waters of the State shall be immediately reported to the local Environmental Field Office, unless the discharge is separately authorized by a NPDES permit."

All drip fields shall be fenced sufficiently to prevent or impede unauthorized entry as well as to protect the facility from vandalism. Fencing shall be a minimum of four feet in height. Fencing shall be constructed of durable materials. Gates shall be designed and constructed in a manner to prevent or impede unauthorized entry. All designs are subject to division approval. Fence shall be installed prior to beginning of operation.

All drip lines shall be buried and maintained 6 to 10 inches below the ground surface.

The site shall be inspected by the certified operator or his/her designee, at a minimum, once per fourteen days (default) OR in accordance with an operating and maintenance inspection schedule in the permit administrative file record. The default inspection frequency will apply if an operating and maintenance inspection schedule is not submitted to be a part of the permit administrative file record. The operating and maintenance inspection schedule shall at a minimum evaluate the following via onsite visits or telemetry monitoring or a combination of the two:

- the condition of the treatment facility security controls (doors, fencing, gates, etc.),
- the condition of the drip area security controls (doors, fencing, gates, etc.),
- the condition of the site signage,
- the operational status of the mechanical parts of the treatment system (pumps, filters, telemetry equipment, etc.)
- the condition of the UV bulbs (if applicable)
- the condition of the land application area including the location of any ponding
- the name of the inspector
- the description of any corrective actions

Submission of the schedule, or revisions to the schedule, may be submitted to the division electronically. The schedule shall be submitted on or before the effective date of the permit. The permittee is responsible for maintaining evidence that the schedule, or revisions, have been submitted to the division.

B. MONITORING PROCEDURES

1. Representative Sampling

Samples and measurements taken in compliance with the monitoring requirements specified above shall be representative of the volume and nature of the monitored discharge, and shall be taken at the following location(s):

Effluent to drip irrigation plots.

2. Test Procedures

Unless otherwise noted in the permit, all pollutant parameters shall be determined according to methods prescribed in Title 40, CFR, Part 136.

C. DEFINITIONS

The "daily maximum concentration" is a limitation on the average concentration, in milligrams per liter, of the discharge during any calendar day.

The "***monthly average concentration***", other than for *E. coli* bacteria, is the arithmetic mean of all the composite or grab samples collected in a one-calendar month period.

A "grab sample" is a single influent or effluent sample collected at a particular time.

For the purpose of this permit, "*continuous monitoring*" means collection of samples using a probe and a recorder with at least one data point per dosing cycle.

A "quarter" is defined as any one of the following three-month periods: January 1 through March 31, April 1 through June 30, July 1 through September 30, and/or October 1 through December 31.

"Wastewater" for the purpose of this permit means "sewage" as defined in TCA 69-3-103

D. REPORTING

1. Monitoring Results

Monitoring results shall be recorded consistent with the general requirements imposed in Part A above OR in accordance with the operating and maintenance inspection schedule in the permit administrative file record and submitted quarterly.

Submittals shall be postmarked no later than 15 days after the completion of the reporting period. A copy should be retained for the permittee's files. Monitoring results shall be reported in a format approved by the division. Operation reports and any communication regarding compliance with the conditions of this permit must be sent to:

Division of Water Resources
Knoxville Environmental Field Office
3711 Middlebrook Pike
Knoxville, TN 37921

Sampling results may be submitted electronically to: DWRWW.Report@tn.gov.

The first operation report is due on the 15th of the month following the quarter containing the permit effective date. Until the construction of the treatment system is complete, and the treatment system is placed into operation, operational reports shall report "monitoring not required".

2. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified in Rule 0400-40-05-.07(2)(h)2, the results of such monitoring shall be included in the calculation and reporting of the values required in the Quarterly Operation Report. Such increased frequency shall also be indicated.

3. Falsifying Reports

Knowingly making any false statement on any report required by this permit may result in the imposition of criminal penalties as provided for in Section 69-3-115 of the Tennessee Water Quality Control Act.

4. Signatory Requirement

All reports or information submitted to the commissioner shall be signed and certified by the persons identified in Rules 0400-40-06-.03 (4) (a-c).

PART II

A. GENERAL PROVISIONS

1. Duty to Reapply

The permittee is not authorized to discharge after the expiration date of this permit. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information and forms as are required to the Director of Water Resources (the "Director") no later than 180 days prior to the expiration date.

2. Right of Entry

The permittee shall allow the Director, or authorized representatives, upon the notification of permittee and presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or where records are required to be kept under the terms and conditions of this permit, and at reasonable times to copy these records.

b. To inspect at reasonable times any monitoring equipment or method or any collection, treatment, pollution management, or discharge facilities required under this permit; and

c. To sample at reasonable times any discharge of pollutants.

3. Availability of Reports

All reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division of Water Resources.

4. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also include adequate laboratory and process controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. Backup continuous pH and flow monitoring equipment are not required.

The monitoring frequency stated in this permit shall not be construed as specifying a minimum level of operator attention to the facility. It is anticipated that visits to the treatment facility by the operator will occur at intervals frequent enough to assure proper operation and maintenance, but in no case less than one visit every fourteen days OR in accordance with an operating and maintenance inspection schedule in the permit administrative file record. If monitoring reports, division’s inspection reports, or other information indicates a problem with the facility, the permittee may be subject to enforcement action and/or the permit may be modified to include increased parameter monitoring, increased monitoring frequency or other requirements as deemed necessary by the division to correct the problem. The permittee shall ensure that the certified operator is in charge of the facility and observes the operation of the system frequently enough to ensure its proper operation and maintenance regardless of the monitoring frequency stated in the permit.

Dilution water shall not be added to comply with effluent requirements.

5. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

6. Severability

The provisions of this permit are severable. If any provision of this permit due to any circumstance, is held invalid, then the application of such provision to other circumstances and to the remainder of this permit shall not be affected thereby.

7. Other Information

If the permittee becomes aware that he failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Director, then he shall promptly submit such facts or information.

B. CHANGES AFFECTING THE PERMIT

1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility.

2. Permit Modification, Revocation, or Termination

a. This permit may be modified, revoked and reissued, or terminated for cause as described in Section 69-3-108 (h) of the Tennessee Water Quality Control Act as amended.

b. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

3. Change of Ownership

This permit may be transferred to another person by the permittee if:

a. The permittee notifies the Director of the proposed transfer at least 30 days in advance of the proposed transfer date;

b. The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage, and liability between them; and

c. The Director, within 30 days, does not notify the current permittee and the new permittee of his intent to modify, revoke or reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

4. Change of Mailing Address

The permittee shall promptly provide to the Director written notice of any change of mailing address. In the absence of such notice the original address of the permittee will be assumed to be correct.

C. NONCOMPLIANCE

1. Effect of Noncompliance

Any permit noncompliance constitutes a violation of applicable State laws and is grounds for enforcement action, permit termination, permit modification, or denial of permit reissuance.

2. Reporting of Noncompliance

a. 24-Hour Reporting

In the case of any noncompliance which could cause a threat to public drinking supplies, or any other discharge which could constitute a threat to human health or the environment, the required notice of non-compliance shall be provided to the appropriate Division environmental field office within 24 hours from the time the permittee becomes aware of the circumstances. (The environmental field office should be contacted for names and phone numbers of emergency response personnel.)

A written submission must be provided within five days of the time the permittee becomes aware of the circumstances unless this requirement is waived by the Director on a case-by-case basis. The permittee shall provide the Director with the following information:

i. A description of the discharge and cause of noncompliance.

ii. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and

iii. The steps being taken to reduce, eliminate, and prevent recurrence of the non-complying discharge.

b. Scheduled Reporting

For instances of noncompliance which are not reported under subparagraph 2.a. above, the permittee shall report the noncompliance on the Quarterly Operation Report. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

3. Overflow

a. "***Overflow***" means the discharge of wastewater from any portion of the collection, transmission, or treatment system other than through permitted outfalls.

b. Overflows are prohibited.

c. The permittee shall operate the collection system so as to avoid overflows.

d. No new or additional flows shall be added upstream of any point in the collection system, which experiences chronic overflows (greater than 5 events per year) or would otherwise overload any portion of the system. Unless there is specific enforcement action to the contrary, the permittee is relieved of this requirement after: 1) an authorized representative of the Commissioner of the Department of Environment and Conservation has approved an engineering report and construction plans and specifications prepared in accordance with accepted engineering practices for correction of the problem; 2) the correction work is underway; and 3) the cumulative, peak-design, flows potentially added from new connections and line extensions upstream of any chronic overflow point are less than or proportional to the amount of inflow and infiltration removal documented upstream of that point. The inflow and infiltration reduction must be measured by the permittee using practices that are customary in the environmental engineering field and reported in an attachment to a Monthly Operating Report submitted to the local TDEC Environmental Field Office on a quarterly basis. The data measurement period shall be sufficient to account for seasonal rainfall patterns and seasonal groundwater table elevations.

e. In the event that more than 5 overflows have occurred from a single point in the collection system for reasons that may not warrant the self-imposed moratorium or completion of the actions identified in this paragraph, the permittee may request a meeting with the Division of Water Resources EFO staff to petition for a waiver based on mitigating evidence.

4. Upset

a. "***Upset***" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee

demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i. An upset occurred, and that the permittee can identify the cause(s) of the upset;

ii. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;

iii. The permittee submitted information required under "Reporting of Noncompliance" within 24-hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and

iv. The permittee complied with any remedial measures required under "Adverse Impact."

5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. 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.

6. Bypass

a. "***Bypass***" is the intentional diversion of wastewater away from any portion of a treatment facility.

b. Bypasses are prohibited, unless:

i. The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

ii. There were 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; and

iii. For anticipated bypass, the permittee submits prior notice, if possible at least ten days before the date of the bypass; or

iv. For unanticipated bypass, the permittee submits notice of an unanticipated bypass within 24 hours from the time that the permittee becomes aware of the bypass.

c. A bypass that does not cause effluent limitations to be exceeded may be allowed only if the bypass is necessary for essential maintenance to assure efficient operation.

d. "Severe property damage" when used to consider the allowance of a bypass means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which 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.

D. LIABILITIES

1. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this Permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards will not be created.

2. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law.

PART III
OTHER REQUIREMENTS

A. CERTIFIED OPERATOR

The waste treatment facilities shall be operated under the supervision of a Biological Natural System certified wastewater treatment operator and collection system shall be operated under the supervision of a grade I certified collection system operator in accordance with the Water Environmental Health Act of 1984.

B. PLACEMENT OF SIGNS

The permittee shall place a sign at the entrance to the land application area if fenced or all reasonable approaches to the land application area. The sign should be clearly visible to the public. The minimum sign size should be two feet by two feet (2' x 2') with one-inch (1") letters. The sign should be made of durable material

**RECLAIMED WASTEWATER
DRIP IRRIGATION
(PERMITTEE'S NAME)
(PERMITTEE'S PHONE NUMBER)
TENNESSEE DIVISION OF WATER RESOURCES
Knoxville Environmental Field Office
PHONE NUMBER: 1-888-891-8332**

No later than sixty (60) days from the effective date of the permit, the permittee shall have the above sign(s) on display in the location specified. New facilities must have the signs installed upon commencing operation.

C. ADDITION OF WASTE LOADS

The permittee may not add waste loads to the existing treatment system without the knowledge and approval of the division.

D. SEPTIC (STEP) TANK OPERATION

The proper operation of this treatment system depends, largely, on the efficient use of the septic tank. The solids that accumulate in the tank shall be removed at a frequency that is sufficient to insure that the treatment plant will comply with the discharge requirements of this permit.

E. SEPTAGE MANAGEMENT PRACTICES

The permittee must comply with the provisions of Rule 0400-48-01-.22. If the septage is transported to another POTW for disposal, the permittee shall note the amount of septage wasted in gallons and name of the facility the hauler intends to use for disposal of the septage on the monthly operation report. Sludge or any other material removed by any treatment works must be disposed of in a manner which prevents its entrance into or pollution of any surface or subsurface waters. Additionally, the disposal of such sludge or other material must be in compliance with the Tennessee Solid Waste Disposal Act, TCA 68-31-101 et seq. and Tennessee Hazardous Waste Management Act, TCA 68-46-101 et seq.

F. OWNERSHIP OF THE TREATMENT FACILITIES

a. The permittee shall own the treatment facilities (and the land upon which they are constructed) including the land to be utilized for drip or spray irrigation. Evidence of ownership of the treatment facility and land application site(s) must be furnished to the division for approval prior to initiation of operation the wastewater collection and treatment system for sewer service to any structure.

b. Where the treatment facility serves private homes, condominiums, apartments, retirement homes, nursing homes, trailer parks, or any other place where the individuals being served have property ownership, rental agreements, or other agreements that would prevent their being displaced in the event of abandonment or noncompliance of the sewerage system, ownership of the treatment facilities must be by a municipality, a public utility, a wastewater authority, or a privately owned public utility (having a Certificate of Convenience and Necessity from the Tennessee Public Utility Commission) or another public agency.

Attachment 1

RATIONALE

Limestone Water Utility Operating Company, LLC

STATE OPERATION PERMIT NO. SOP-25014
Sevierville, Sevier County, Tennessee

Permit Writer: Bryan Pope

FACILITY CONTACT INFORMATION:
Ms. Jo Anna Brown
Vice President
Phone: (314) 736-4672
JoAnna@cswrgroup.com
1630 Des Peres Rd, Ste 140
Des Peres, MO 63131

Activity Description:	Treatment of domestic wastewater via a decentralized wastewater system to support construction of Sugar Loaf Road Community Wastewater System serving 18 homes.
Facility location:	Latitude 35.836467 and Longitude -83.642241
Name of the nearest stream:	No discharge allowed.
Treatment system:	RMF with disinfection to fenced drip dispersal
Permit period:	This permit will be issued for a five-year period effective from the issuance date on the title page.
Terms & Conditions:	BOD_5 is a standard measure of sewage strength. The 45 mg/L daily maximum limit is the required treatment standard for domestic wastewater in Tennessee. Ammonia and BOD5 reporting serve to demonstrate the treatment system is meeting minimum treatment standards. Land application, versus stream discharge, enables reduced monitoring frequency for these parameters. Narrative conditions for drip disposal and septage management are proposed in support of proper system operation to prevent runoff to streams and avoidance of nuisance conditions. E. coli limits apply when the disposal area is not fenced.
Financial Security:	Municipalities and Utility Districts are government entities exempt from the financial security requirement in TCA 69-3-122.

Annual Maintenance Fee: An annual maintenance fee for the permit will apply after permit issue and upon receipt of an invoice. The fee is currently $350.00 for non-discharging facilities with influent flow less than 0.075 MGD.

Items Requisite for Operation: This draft permit proposes terms and conditions for planning purposes and to seek public comment on the potential water quality impacts of the proposed activity. Actual operation of the sewerage system is contingent on the following items (items may occur in any order):

- Approval of sewerage system construction plans and specifications per TCA 69-3-108(i),
- Final construction inspection and submission of O &M manual per Rule 0400-40-02-.09,
- Issuance of a Certificate of Convenience and Necessity (CCN) by the Public Utility Commission,
- Utility ownership of sewerage system assets consistent with Rule 0400-40-16-.02(8). Sewerage system assets broadly consist of those units integral to the collection, treatment and disposal of both the solid and liquid component of sewage (i.e. septic tanks and pumps, collection lines, treatment system and drip irrigation area and related appurtenances), and
- Final issue of the permit.

Preliminary Engineering Report
Wastewater System Design For

1415 Sugar Loaf Road

SOP – to be assigned

3/27/2025

Prepared for:
Tennessee Department of Environmental and Conservation
Division of Ground & Water Pollution Control
401 Church Street, 6th Floor L&C Annex
Nashville, TN 37243-1534
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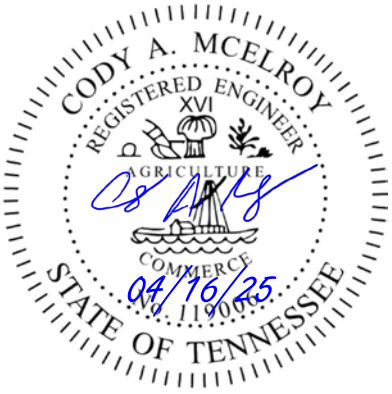

Property Owner:
Chris Mouhourtis
cor13.chris@gmail.com
Sevierville, TN

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QAQC

Ref	254-SLR-WWTS-R	Revision 1
By	CD	FEB 26 2025
Checked	DH	MAR 4 2025
Approved	CM	
Published		

PROJECT OVERVIEW

PROJECT	
Project name	1415 Sugar Loaf Road
Address	1415 Sugar Loaf Road, Sevier County, TN
Jurisdiction	Sevier County
Type	Residential
Unit type	Bedroom
Number homes	18
Number units	100
GPD per unit	100
Total GPD	10,000
COLLECTION SYSTEM	
Length collection	855FT 2" Sch. 40 PVC FM
Primary treatment	STEP tank
Size STEP tank	3x daily (3x100x6 = 1,800 GAL)
TREATMENT	
Secondary treatment	Recirculating mixed media (Orenco AX100)
Design flow per AX100 GPD	5,000
Number primary AX100	2
Number reserve AX100	2
Total treatment capacity GPD	10,000
Recirculation tank min. size	1x daily = 10000 GAL
Selected recirc. tank volume	10,000
Filter	2x Netafim Arkal 2"
Sterilization	2x Lutz Jessco 316L NEMAX UV
DISPOSAL	
Disposal method	Extra high intensity subsurface drip
Drip line specification	Geoflow
Min dosing tank volume	1/3 x recirc = 3333.3 GAL
Soil loading GPD.SF	0.25
Drip line spacing FT	2
Emitter spacing FT	2
Emitter flow rate GPH	0.61
Number drip zones	5
Average drip zone SF	8,000.00
Min. drip field area SF	40,000
Provided total drip field area SF	44,908
Total reserve drip field SF	23,700

1 Project Planning

The proposed project is a planned subdivision in Sevier County consisting of 18 lots with 17 new homes. A new 1200ft road will be constructed with a turning circle. A soil scientist performed an extra high intensity investigation and found enough suitable soils for drip dispersal. There is no public sewer within 2 miles of the site entrance. A conventional disposal system was considered and rejected due to poor soil infiltration. Potable water supply will be provided by on-site well water.

The proposed decentralized wastewater system for the project will be owned and operated by CSWR Group. The decentralized wastewater system will utilize watertight, precast concrete septic tanks with STEP system pumps and controls and PVC SCH.40 pipe collection force mains. Overall, the proposed force main length is 855FT 2" Sch. 40 PVC FM pipe. Treated final effluent by the fixed film treatment process will then be pump dispersed into the shallow soil horizon drip field system on gradual slopes as shown on the site plan.

The secondary fixed film treatment system will be a Orenco System Advantex packed bed reactor sized at 10000 GPD treatment capacity. Treated effluent will be disposed on the property by a drip irrigation system utilizing a 0.25 gpd/ft2 soil load rate. The proposed treatment location and drip field irrigation plots are shown on the attached map and in Appendix #2. Given the available soil area and soil loading rate, the total capacity of the drip field is 11227 GPD (44908 SF at 0.25 GPD.SF).

A State Operation Permit application is included with this preliminary engineering report (PER). This PER includes an analysis of alternative wastewater services considered, the treatment process considered and hydraulic loading analysis of the drip irrigation plots. Final detailed information on the STEP collection, treatment and drip designs are included with final engineering drawings and report submitted for construction approval.

Appendix #1 presents the location of property in relation to surrounding areas.

2 Existing Facilities

The following existing sewage treatment facilities are within or nearby the project area:

3 Need for project

After reviewing the design of this development and existing facilities, a new sanitary system is required for this project. The rest of this report details alternatives available and design of the selected system

CA MFR Review Exhibit 2 – Engineer Report

4 Alternatives considered

In the planning and analysis for providing sewer service for the project, DSH & Associates performed an analysis of the typical options available to provide sewer for a project of this scope. Options considered were:

1. Conventional Onsite Septic Tank Drain field
2. Connection to local POTW via conventional sewage collection sewer system
3. Decentralized wastewater collection system and treatment with Surface Water Discharge
4. Decentralized wastewater collection system and treatment with Subsurface Drip Dispersal.

Option (1) Conventional Onsite Septic Tank Drain field

This type of conventional wastewater treatment provision was evaluated and deemed unacceptable due to the lack of available land, steepness of slopes, and size of lots.

Option (2) Connection to local POTW via conventional sewage collection sewer system.

There is no POTW available to provide service to the project. The nearest sanitary system is over 2 miles away operated by the City of Sevierville who have no plan to extend their collection system or increase treatment capacity

Option (3) Decentralized wastewater collection system & treatment with Surface Water Discharge.

No surface waters are available that meet discharge requirements.

Option (4) Decentralized wastewater collection system & treatment with Sub-surface Drip Dispersal.

The STEP collection, Advantex Packed Bed Reactor treatment and Drip Dispersal option presents itself as the most logical option to provide the needed wastewater service for the project. These types of systems are considered by TDEC to be “zero discharge” of effluent to waters of the State of Tennessee. The treated effluent is applied sub-surface to soil irrigation plots within proposed project boundaries and any residual nutrients are effectively taken up by the vegetation present through transpiration. Further, the soil column in these old growth wooded irrigation plots provide additional nutrient re-use/removal and any remaining water is diffused through denitrification capable soils. Finally, a Tennessee State Operation Permit (SOP) provides for oversight, inspection, and regulation pathways for reliable and consistent performance. This SOP mandates inspection requirements coupled with monitoring requirements to be performed and reported by the operator on an ongoing basis. In addition, the protection of public health by this option has significant effect on its analysis. Therefore, this option was selected.

Cost Benefit analysis

A decentralized wastewater treatment solution has been identified as the optimum solution for this project in option 4 above. There are a few vendors and technologies available in East Tennessee and a cost

benefit analysis was used to evaluate and select the most effective solution for capital expenditure and operational costs. The collection system including STEP tanks and forced main and the final disposal system remain constant across three technologies evaluated so were not included in this analysis.

Sand Filter

A reliable cost for construction of a sand filter suitable for a similar size project was unavailable at time of report writing. Sand filters are known for high maintenance costs and unreliable operation. This option was rejected early in the design process.

Aquapoint Bioclere vs Orenco Advantex

Two quotes for secondary wastewater treatment were obtained in Q2 2023 from Aquapoint and Orenco. An Orenco Advantex system including recirculation tank, dosing tank, pumps and 8x AX100 pods was quoted at $229,990 including freight - equivalent to $5.75 per GPD. Aquapoint provided a quote for 48,000GPD treatment system using a 36/20 Bioclere system with a recirculation tank, pumps and PLC. The total quote was $505,726 including freight – equivalent to $10.53 per GPD. The Orenco system was found to be more cost effective while meeting the reliability and operational cost requirements.

5 Selection of an alternative

Life cycle cost analysis and non-monetary factors

A decentralized wastewater collection system and treatment with Sub-surface Drip Dispersal was selected for economy and the only workable solution within the timescale of the development.

6 Proposed Project

Preliminary project design

Table 1: Project summary

Project name	1415 Sugar Loaf Road
Total number buildings	18
Total number units	100
Total flow rate P1 GPD	10,000
Total flow rate P2 GPD	-
Total flow rate P2+ GPD	-

The proposed system includes:

1. **Primary Treatment & Collection** - Collection of solid wastes in a combined watertight STEP septic tank effluent collection system with a pumps and tanks located at each home. The collection system piping will be Sch. 40 PVC and the force main system from the collection tanks to the Secondary Treatment System will be Sch. 40 PVC.

2. **Secondary Treatment** - Biological degradation and treatment of the wastewater via an un-submerged, aerobic, packed bed reactor wastewater treatment process.

3. **Tertiary Filtration and Dispersal -** The highly treated effluent will be pressure dosed through a final mechanical disc filter, followed by UV disinfection, and then out to a subsurface drip dispersal field.

Review and Approval documents, prepared by Orenco are attached in Appendix #6.

The proposed number of units is shown in table 1. The design flow basis utilized is:

Table 2: Influent Flow Parameters

Source	Units	# of Units	GPD/unit	Total GPD	Total GPM
Phase 1	Bedroom	100	100	10,000	6.9
			TOTAL	**10,000**	**6.9**

Primary Settlement & Collection

Primary settlement occurs in the STEP tank located at each home. The minimum volume of the step tank is:

Tank	Daily flow GPD	Min. volume
STEP	600 GPD	3x daily (3x100x6 = 1,800 GAL)

The gravity collection system piping will be PVC SCH.40 and the force main system from the collection tanks to the wastewater treatment facility will be PVC SCH.40. The location of each home and associated STEP Collection tanks is outlined in Appendix #13 (sheet 6.0)

Residential Influent Concentrations

CA MFR Review Exhibit 2 – Engineer Report

Since the system has not been constructed, the influent wastewater flow characteristics are taken from published values as follows:

Table 3: Residential Influent Concentrations

Pollutant	Concentration, mg/l
BOD	240
TSS	270
TKN	60
TP	10
FOG	70

*Derived from: TDEC's On-site Decentralized Wastewater Treatment System Design Criteria Manual: Chapter 15.

It is expected that the on-lot septic tanks (STEP Systems), sized at a minimum 3-day HRT, will provide primary treatment of the residential wastewater. In the primary tanks of the STEP system, the raw sewage separates into three distinct zones: a scum layer, a sludge layer, and a clear layer. Heavy solids settle to the bottom to form the sludge layer, while the lighter material floats to the top to create the scum layer. Facultative and anaerobic digestion converts the organic matter to volatile acids while strict anaerobes ferment the volatile organic acids to gases (methane, carbon dioxide, etc.).

Effluent from the clear zone is then passed through an effluent filter before being transported to the secondary treatment system including the recirculation/blend tank.

Based on values that Orenco has seen on similar projects, the effluent from the STEP tanks will have approximately the following characteristics:

Table 4: Effluence from STEP tanks characteristics

Pollutant	Concentration, mg/l
BOD	150
TSS	50
FOG	25

Effluent Pumps convey the screened effluent under pressure through a network of 2 and 2 inch diameter PVC SCH.40 piping to secondary treatment system. Hydraulic calculation used to design the force main system in association with the STEP tanks is included in Appendix #9.

The collection system will consist of precast, watertight septic tanks located at each home. Effluent from each home site will be collected in concrete tanks linked in series with a simplex effluent pumping system. The effluent pumps will have an expected pump rating of 10 GPM peak and be housed in a pump vault with filtering capability. Additional on-lot components will be a 1.25" service lateral with isolation ball valve and ball check valve. See attached design drawings for location and layout. Also, operating instructions and diagrams for the STEP systems in included in Appendix #7. The collection system will use pumps at each home location. The run times for these pumps are based on a three float system as follows:

Top Float: High Water Alarm

Second Float: High flow notification

Third Float: Alarm

Therefore, as the water rises in the tank it will first engage the lowest float that turns on the primary pump. The middle float triggers an indicator light showing that the pump is not keeping up with influent flows. If the top float is engaged the pump cannot keep up and both an audible and visual alarm is activated. As the pump drops the water level in the tank, the floats are dis-engaged, which shuts off the pump. The alarm switch is automatically disengaged/shut off after water levels drop.

As noted with the BOD loading rate calculations above, the units are sized within the manufacturers design limits for BOD. However we have shown a potential expansion of the AX100s to handle 2500 gpm/unit rather than 5000 gpm/unit. The manufacturer allows 5000 gpm/unit as a maximum and has signed off on this design. The optional expansion of additional AX100s will only be required if annual sampling of BOD values identifies exceedance of permit limits.

Space for expansion of the AX100 pods is shown on all plan drawings.

Secondary Treatment

The STEP Collection system effluence will be conveyed to an Orenco Systems Advantex fixed film, packed bed reactor (PBR) treatment system. The treatment system will be located in the middle of the property (see Appendix #2). The wastewater will enter the recirculation/blend tank first and then be dosed in small doses throughout the day by a computer-controlled PLC system with telemetry to the Advantex packed bed reactors. The Advantex system is designed around a 5:1 recycle rate where wastewater is dosed onto the non-woven synthetic textile PBR material 5 times before it then travels to the drip field dose tank. The 5:1 recycle rate is controlled by a flow splitter valve located in the recirculation/blend tank. Total storage volume of the recirculation/blend tank is shown in table 7. Each group of three (3)

AX100 pods has a pair of duplex dedicated recirculation pumps connected via a distribution valve. See table 11 for selected recirculation pump specification.

Orenco, Inc. lists the Advantex pod to be capable of handling an 8 lbs/BOD/max/day load rate at 5,000 GPD for each POD for residential applications. Table 5 and 7 show the loading rate for this project and the capacity of the proposed secondary treatment system.

The total loading for this project is shown in table 2. The associated loading rate is in table 5 (based on 150 mg/L BOD). Using published data from Orenco, the AX-100 pods would have an effective max load capability shown in table 5.

Table 5: Secondary Treatment loading rate

Flow (MGD) x Concentration (mg/L) x 8.34 lbs/gal = lbs/BOD/day

TOTAL Flowrate	10,000	GPD
TOTAL Flowrate	0.01	mgd
Concentration	150	mg/l
Conversion	8.34	lbs/gal
Total Loading	**12.51**	**lbs (BOD)/day**

Orenco's review of the design specifies that the design satisfactorily complies with Orenco's design criteria to meet the follow effluent limits at a 95% confidence level:

Table 6: Final expected effluence quality

Constituent	Average (mg/L)
BOD5	10
TSS	10
Ammonia	5

It would be expected that the treated effluent from the Advantex Treatment system would correlate with these published performance values based on the above mass loadings. Further, the Orenco, Inc. design criteria for the Advantex treatment unit targets at 10/10/5 effluent standard for BOD/TSS/Ammonia using these published design guidelines (Appendix #11).

Design requirements for tank volumes as follows:

- STEP tank: 3x daily flow
- Recirculation tank: 1 x daily flow
- Dosing tank: 0.33 x daily flow

Table 7: WWTP principal tank minimum volumes

Min. volume of recirculation blend tanks	GAL	10,000
Selected recirculation tank volume	GAL	10,000
Min. volume of dosing tank	GAL	3,333
Selected dosing tank volume	GAL	4,000
Number of AX100 pods	NUM	2
TOTAL TREATMENT CAPACITY	GPD	10,000

Tertiary Filtration & Drip Dispersal including DOSING and FLUSHING

The highly treated effluent from the Advantex treatment process would ultimately be conveyed by gravity from the Orenco pods to the drip field dose tank for pressured dosing to the drip irrigation plots. The computerized control system for the treatment process will provide time based dosing of the treated effluent to the network of separate solenoid control valves in the drip area to provide uniform application of the treated wastewater. Approximately equally sized irrigation plots will utilize pressure compensating emitters hydraulically loaded at the rate shown in table 11.

The buildout design storage volume for the drip field dose tank is shown in table 8. The specified drip dose pumps are shown in table 11. These pumps will pressure dose the drip dose zones and provide pumped flow through a 2" NetaFim Arkal filter, an instantaneous read & totalizing flowmeter (Flowmotion MS2500) and then thru an ultraviolet disinfection (Lutz Jessco). The UV system is designed based on 20/20 standards and 65% transmittance. Specifications for these components are attached in Appendix #8.

The Orenco Treatment system is controlled by a computerized control panel that includes telemetry. The telemetry includes a Verizon 3G access point with associated modem. All system alarms are logged within the control panel local hard drive and alarms are transmitted to the wastewater operator via the Verizon access point to any/or all of the following: phone, pager, email, or text messaging.

This project has proposed to provide ultraviolet disinfection. The irrigation drip fields (plots) locations are shown in Appendix #13 (sheet 3.0). Based on the combination of ultraviolet disinfection, under current permitting standards, no effluent bacterial monitoring will be required.

The total number of drip zones and area is shown in table 10. Table 9 shows the minimum physical requirements of the drip field. The drip irrigation soils will be divided into near equally sized zones with pressure compensated drip tube emitters.

The drip tube will be 0.55IN. tubing with 2ft orifice spacing operating @ 0.61 gal/hr per orifice. Maximum topographic change in the field will be 2 ft on along individual line lengths. Drip tube line lengths have been designed around a maximum line length of 250 lineal feet, shallow installation in the top 6-8" of the soil and the drip tube to be on 2ft centers. Per design guideline recommendations, the Flush Velocity selected will be 2 FPS resulting in a 1.5 GPM additional flow at the distal end.

As part of the drip system design, water resources soil mapping was also done on the proposed drip irrigation plots by Certified Soils Scientist Grant Dunn (results attached Appendix #3) to identify the best location for the drip system. Copies of the soils map along with the pit descriptions are attached to this report. For the investigation, a total of ten inspection pits were excavated for soils evaluations with their locations shown on the enclosed maps.

See the attached Soils Map, pit descriptions and slope descriptions in Appendix #3.

Based on the soil type, conversion table presented in Chapter 17, these soils in the potential drip field area are broken down into 3 classifications. Table 11 shows the measured soil rating from the soil scientist report as well as the rating used in our calculations.

Table 9: Drip field requirements

Area #	Source	Units	# of Units	GPD/unit	Total GPD	Total GPM	Drip Field Size Req't (acres)	Drip Field Size ReQ't (Sq. ft.)
Phase 1	Bedroom	beds	100	100	10,000	6.9	0.92	**40,000**
							TOTAL SF	**40,000**

Table 10: Drip field provided areas

Zone	Area SF	Area AC
1	8,582	0.20
2	8,935	0.21
3	9,720	0.22
4	8,954	0.21
5	8,717	0.20
TOTAL	**44,908**	**1.03**

Total provided drip field greater than minimum required (44908>40000)

Table 11: Soil rating

Measured average soil rating gpd/ft2	0.70
Used soil rating gpd/ft2	0.25

Table 12: Pump specifications

PUMP LOCATION	SPEC	DUTY POINT	NUMBER EACH
STEP tank pump	Orenco PF1005	See Orenco HGL	One (1) in each STEP tank
Dosing pump spec	Orenco PF2010	21.9 GPM at 75 PSI	One (1) dosing pump
Flushing pump spec	Orenco PF2010	25.7 GPM at 55.9 PSI each	One (1) flushing booster
Recirc pump spec	Orenco PF5007		Two (2) per 3 AX100 pods

Project schedule

This project is expected to break ground in the third quarter of 2025. The treatment plant and collection system will be constructed late 2025 and commissioning Q1 2026

Treatment plant operator

Proposed operator	CSWR Group

State Operation Permit

Upon completion and acceptance, the sewage collection, treatment, and disposal system will be owned and operated by company as shown in table above. An SOP application accompanies this report.

Total project cost estimate and operating budget

The total cost of construction is estimated at $20,000-25,000 per home. Total operating budget is estimated at $50/mon per home

7 Conclusions and Recommendations

Considering existing facilities, costs, environmental factors and timescales. This subsurface drip disposal system with Orenco secondary treatment is recommended for this project.

8 State Operation Permit

Upon completion and acceptance, the sewage collection, treatment, and disposal system will be owned and operated by company shown in table above. An SOP application accompanies this report.

Important permit information from TDEC DWR regulations:

EXTRACT TDEC DWR CHAPTER 0400-40-05 INDIVIDUAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS

0400-40-05-.07 TERMS AND CONDITIONS OF PERMITS.

(c) Proper operation and maintenance.

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances, including but not limited to collection and conveyance systems) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Low pressure pumps, low pressure tanks, septic tank effluent pumps (STEP), STEP tanks, and septic tank effluent gravity tanks are integral to the treatment and conveyance of sewage in a low-pressure system design, and shall be owned or under control of the municipality, other body of government, public utility district, or a privately owned public

utility demonstrating lawful jurisdiction over the service area. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

EXTRACT TDEC DWR STATE OPERATING PERMITS

0400-40-06-.09 COLLECTION SYSTEMS.

(1) Collection system components of a sewerage system that are designed to collect, treat, or convey sewage to a treatment process shall be designed in accordance with accepted engineering practice as prescribed in Chapter 0400-40-02.

(2) Low pressure pumps, low pressure tanks, septic tank effluent pumps (STEP), STEP tanks, and septic tank effluent gravity (STEG) tanks are integral to the treatment and conveyance of sewage in a low-pressure system design, and shall be owned or under control of the municipality, other body of government, public utility district, or a privately owned public utility demonstrating lawful jurisdiction over the service area.

(3) Except as provided in paragraph (2) of this rule, all collection system components regulated by this chapter shall be owned by a municipality, other body of government, public utility district, or a privately owned public utility demonstrating lawful jurisdiction over the service area. In limited circumstances, a corporation with a demonstrated capacity to provide the managerial and operational resources necessary to maintain its sewerage system may be permitted to operate a collection system to support a business activity (e.g., a resort).

9 References

Rules of the Tennessee department of environment and conservation division of water resources

0400-48-01 Regulations to govern subsurface sewage disposal systems

0400-40-06 STATE OPERATING PERMITS

0400-40-05 INDIVIDUAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMITS

0400-40-16 PUBLIC SEWERAGE SYSTEMS

Guidance for municipalities and industries for the design of sewage systems and wastewater treatment plants.

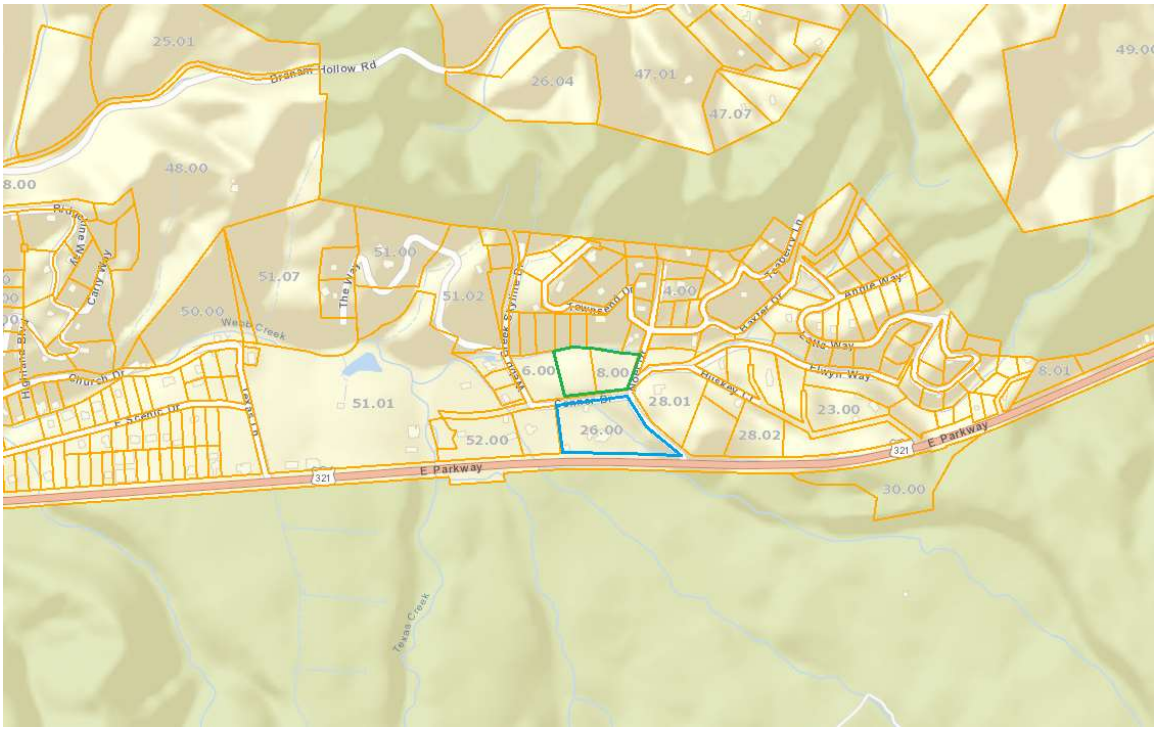
Effective Date: July 20, 2020

DWR-NPDES-SOP-G-05-WW Design Criteria Table of Contents-072020

Robert G. O'Dette, M.S., P.E

APPENDIX

Appendix #1:
Site Location Maps



Vicinity map

Parcel map

Appendix #2:
Site Layout and Contour Map

100%
RESERVE

TRACT FOR SEWER
TREATMENT FACILITY
12
5.42 AC.
236,199 SQFT

ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5

17
2.57 AC.
112,059 SQFT

18
3.02 AC.
131,726 SQFT

1
3.13 AC.
136,349 SQFT

15
1.27 AC.
55,412 SQFT

2
0.75 AC.
32,526 SQFT

11
2.33 AC.
101,573 SQFT

3
1.33 AC.
58,032 SQFT

25' ACCESS
EASEMENT

4
1.00 AC.
43,548 SQFT

5
0.92 AC.
40,260 SQFT

6
1.18 AC.
51,535 SQFT

10
2.43 AC.
105,981 SQFT

7
1.34 AC.
58,544 SQFT

8
10.34 AC.
450,603 SQFT

9
3.14 AC.
136,648 SQFT

FLOYD DEWEY L. ETAL
DEED BK: 416 PG: 482

LAFOLLETTE
PARCEL: 071 005.00
DEED BOOK 2768, PAGE 17

MTP PROCESS
1. CONTROL BUILDING:
 1.1. UV TREATMENT
 1.2. FILTER
 1.3. FLOWMETER
 1.4. CONTROL PANEL
2. RECIRCULATION TANK
3. AX100 TREATMENT PODS
4. DOSING TANK

COLLECTION SYSTEM LEGEND
- AIR RELIEF VALVE
- CHECK VALVE
- GATE VALVE
- DISCONNECT BOX
- IN-LINE CLEAN OUT
- END LINE CLEAN OUT
- FORCE MAIN 2"
- FORCE MAIN 4"
- 1.5" GRAVITY COLLECTION

0' 50' 100' 150'

DSH & ASSOCIATES

NOTES

CODY A. MCELROY
REGISTERED ENGINEER
AGRICULTURE
No. 119906
STATE OF TENNESSEE

SHEET SET GROUP: WWTP

ENGINEER
CODY MCELROY PE

DSH & ASSOCIATES, 10519 LEXINGTON DR, KNOXVILLE, TN

CLIENT
CHRIS MOUHOURTIS
1387 HEATH RD
GREENCOVE SPRINGS FL 32043

PROJECT
1415 SUGAR LOAF RD

1415 Sugar Loaf Rd, Sevier County, TN

DATE CREATED 2/20/25
DATE PRINTED 3/27/25
DATE REVISION ----
SCALE 1" = 50'
DESIGNED BY DH
DRAWN BY CD
CHECKED BY CM
PROJECT NUMBER 254

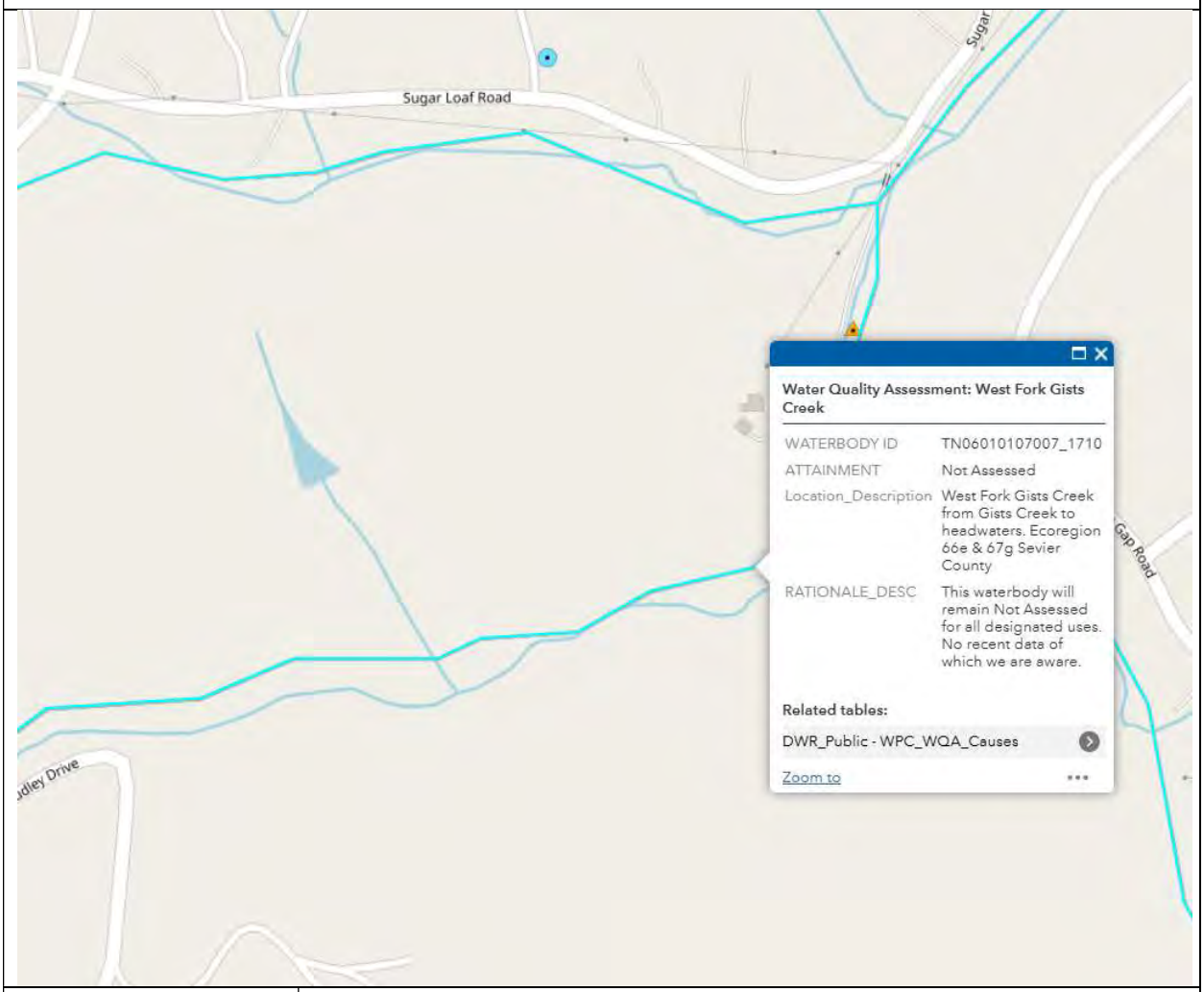
SHEET TITLE
COLLECTION SYSTEM

SHEET NUM. 7.0
REV. ----

Appendix #3:
Soil Consultant Map
Water Resources Soils Map

DIVISION OF WATER RESOURCES
WEB MAP REPORT

WEB MAP



URL	https://tdeconline.tn.gov/dwr/
DATE	February 23 2025
ADDRESS	1415 Sugar Loaf Road, Sevier County, TN
FEATURES	**ID**: TN06010107007_1710 **NAME**: WEST FORK GISTS CREEK **ATTAINMENT**: NOT ASSESSED
ARAP	No

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 1 SOP# (office use only):

Soil Series: Whitesburg Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Alluvium/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Toe Slope Longitude/Latitude (Center of Soil Area): 83°38'27"/35°50'10"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Whitesburg Fine-loamy, siliceous, active, mesic Aquic Dystric Eutrudepts

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-11	10YR 4/4			Silt Loam	Weak-1		Granular	
AB	11-15	10YR 6/4			Silt Loam	Weak-1		Granular	
Bw1	15-20	10YR 7/8			Silt Loam	Weak-1		Sub-angular Blocky	
Bw2	20-36+	10YR 7/8	10YR 4/2	22	Silty Clay Loam	Weak-1		Sub-angular Blocky	

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 2 SOP# (office use only):

Soil Series: Whitesburg Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Alluvium/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Toe Slope Longitude/Latitude (Center of Soil Area): 83°38'28"/35°50'9"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Whitesburg Fine-loamy, siliceous, active, mesic Aquic Dystric Eutrudepts

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-8	10YR 4/4			Silt Loam	Weak-1		Granular	
Bw1	8-17	10YR 6/4	10YR 7/8		Silty Clay Loam	Weak-1		Sub-angular Blocky	
Bw2	17-24	10YR 6/8	10YR 7/2	17"	Silty Clay Loam	Weak-1		Sub-angular Blocky	
Cr	24-36+								

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 3 SOP# (office use only):

Soil Series: Townley Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Residuum/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Side Slope Longitude/Latitude (Center of Soil Area): 83°38'28"/35°50'10"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Townley Fine, mixed, semiactive, thermic Typic Hapludults

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-4	10YR 3/2			Silt Loam	Weak-1		Granular	
BA	4-9	10YR 6/6			Silt Loam	Moderate-2		Granular	
Bt	9-20	7.5YR 5/8			Silty Clay Loam	Moderate-2		Sub-angular Blocky	
CBt	20-31+	7.5YR 5/8			Silty Clay	Moderate-2		Platy	
Cr	31-34+								

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 4 SOP# (office use only):

Soil Series: Townley Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Residuum/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Side slope Longitude/Latitude (Center of Soil Area): 83°38'29"/35°50'11"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Townley Fine, mixed, semiactive, thermic Typic Hapludults

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-2	10YR 3/2			Silt Loam	Weak-1		Granular	
Bt1	2-8	7.5YR 5/8			Silty Clay Loam	Moderate-2		Sub-angular Blocky	
Bt2	8-22	7.5YR 6/8			Silty Clay Loam	Moderate-2		Sub-angular Blocky	
Cr	22-36+								

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 5 SOP# (office use only):

Soil Series: Townley Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Residuum/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Side Slope Longitude/Latitude (Center of Soil Area): 83°38'28"/35°50'15"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Townley Fine, mixed, semiactive, thermic Typic Hapludults

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-4	10YR 4/3			Silt Loam	Weak-1		Granular	
Bt	4-23	7.5YR 5/8			Clay	Moderate-2		Sub-angular Blocky	
Cr	23-33+								

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 6 SOP# (office use only):

Soil Series: Litz Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Residuum/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Side Slope Longitude/Latitude (Center of Soil Area): 83°38'32"/35°50'16"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Litz Loamy-skeletal, mixed, active, mesic Ruptic-Ultic Dystrudepts

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-5	10YR 5/6			Silt Loam	Weak-1		Granular	
Bt	5-23	5YR 6/8			Silty Clay Loam	Moderate-2		Sub-angular Blocky	5% Fragments
Cr	23-36+								

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 7 SOP# (office use only):

Soil Series: Litz Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Residuum/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Ridge-crest Longitude/Latitude (Center of Soil Area): 83°38'32"/35°50'16"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Litz Loamy-skeletal, mixed, active, mesic Ruptic-Ultic Dystrudepts

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-3	10YR 3/3			Silt Loam	Weak-1		Granular	
Bt	3-12	7.5YR 4/5			Silty Clay Loam	Moderate-2		Sub-angular Blocky	15% Fragments
Cr	12-30								
R	30+								

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 8 SOP# (office use only):

Soil Series: Litz Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Residuum/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Side Slope Longitude/Latitude (Center of Soil Area): 83°38'32"/35°50'15"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Litz Loamy-skeletal, mixed, active, mesic Ruptic-Ultic Dystrudepts

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-4	10YR 3/2			Silt Loam	Weak-1		Granular	
Bt	4-22	5YR 5/8			Clay	Moderate-2		Sub-angular Blocky	15% Rock Fragments
Cr	22-38								
R	38+								

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 9 SOP# (office use only):

Soil Series: Townley Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Residuum/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Side slope Longitude/Latitude (Center of Soil Area): 83°38'29"/35°50'13"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Townley Fine, mixed, semiactive, thermic Typic Hapludults

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-3	10YR 3/3			Silt Loam	Weak-1		Granular	
BA	3-7	10YR 5/8			Silt Loam	Moderate-2		Granular	
Bt1	7-15	5YR 5/8			Silty Clay Loam	Moderate-2		Sub-angular Blocky	
Bt2	15-24	5YR 5/8			Clay	Strong-3		Sub-angular Blocky	
CBt	24-36+	7.5YR 5/8			Silty Clay	Moderate-2		Platy	

TDEC- DWR Soil Pedon Description Form

Described by: A. Grant Dunn Date: 01/25/2025

Site name & Location: Mouhourtis property County: Sevier

Stop or Pit #: 10 SOP# (office use only):

Soil Series: Townley Drainage Class: Well Drained

Soil Control Section: 20-40" Ground Water or Water Table: None

Parent Material: Residuum/Sevier shale Erosion: None

Climate: Humid Subtropical Land Cover: Forest

Geomorphic Description: Side Slope Longitude/Latitude (Center of Soil Area): 83°38'27"/35°50'11"

Physiographic Location: Ridge and Valley

Additional Notes: Slopes 5-30% Taxonomy: Townley Fine, mixed, semiactive, thermic Typic Hapludults

Soil Pedon Description

Horizon	Depths	Matrix Color	Depletions/Concentrations Redox/Mottles, etc.	Depth to Low Chroma Mottles	Soil Texture	Soil Structure			Soil Horizon Notes
						Grade	Size	Type	
A	0-6	10YR 4/3			Silt Loam	Weak-1		Granular	
BA	6-11	10YR 4/6			Silt Loam	Weak-1		Granular	
Bt1	11-17	5YR 5/8			Silty Clay Loam	Moderate-2		Sub-angular Blocky	
Bt2	17-34				Clay Loam	Moderate-2		Sub-angular Blocky	
BC	34-38+	7.5YR 6/8	10YR 7/2		Silty Clay	Moderate-2		Platy	

NORTH IS BASED ON TENNESSEE STATE GRID (4100)

TN HARN(2010.00)
Positional accuracy CM
GPS field procedure:RTK
Date of Survey: mon/dd/2024
Datum/Epoch: NAVD88 (TN HARN)
Published/Fixed-control use: Locally created for relative positioning
Control: Onsite established for relative positioning
LAT: 35.83742337° N
LONG: 83.63987937° W
Geoid Model: g2018u7 (GEOID99)
Equipment: EMLID REACH 2 Plus
Portion of survey GPS used: ALL
Relative positional Accuracy: <0.1'
GPS Scale:1.00009311
GPS Scale Point: Northing - 555,569.32
Easting - 2,668,242.56

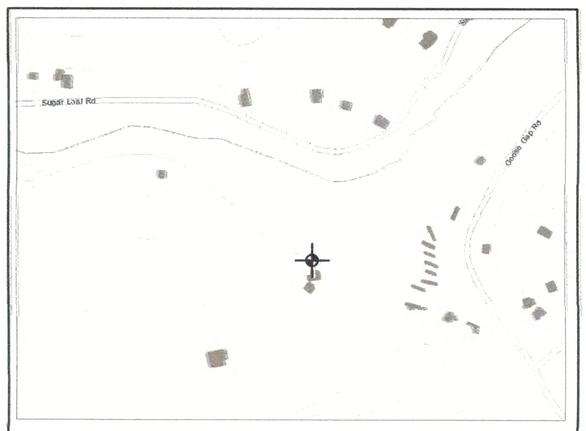
Line Table		
Line #	Length	Direction
L1	189.76'	S59°44'50"E
L2	80.83'	S19°08'20"W
L3	187.83'	S17°27'07"W
L4	113.51'	S17°59'11"W
L5	352.61'	S16°59'09"W
L6	199.92'	S14°56'56"E
L7	91.96'	S43°29'35"W
L8	115.43'	S54°53'40"W
L9	47.40'	S64°30'38"W
L10	118.29'	S71°48'31"W
L11	151.02'	S45°28'58"W
L12	73.14'	S39°59'19"W
L13	136.86'	S26°02'14"W
L14	35.63'	S08°17'21"E
L15	26.87'	S02°02'29"W
L16	60.84'	S39°41'06"E
L17	182.98'	S56°38'39"E
L18	283.03'	S55°22'54"E
L19	58.71'	S45°48'02"W
L20	75.11'	S32°44'55"W

Line Table		
Line #	Length	Direction
L21	35.10'	S28°13'20"W
L22	129.44'	S29°00'39"W
L23	66.63'	S17°16'57"W
L24	158.56'	S05°04'35"W
L25	521.86'	N60°40'04"W
L26	50.01'	N22°54'51"W
L27	46.66'	N19°49'59"W
L28	211.73'	N24°22'59"W
L29	98.04'	N16°21'23"W
L30	144.55'	N20°18'38"W
L31	113.88'	N20°25'02"W
L32	82.19'	S79°22'22"W
L33	78.77'	N32°40'06"W
L34	374.11'	N31°40'16"W
L35	140.11'	N41°07'32"W
L36	877.61'	N67°20'11"W
L37	68.93'	N53°30'50"E
L38	301.76'	N38°50'54"E
L39	99.39'	N62°48'21"E
L40	60.71'	S86°39'00"E

Line Table		
Line #	Length	Direction
L41	256.82'	N88°53'22"E
L42	153.88'	N79°40'33"E
L43	149.86'	N72°38'52"E
L44	197.61'	N33°22'27"W
L45	209.70'	N74°48'43"E
L46	206.81'	N89°06'15"E

BOUNDARY ALONG CENTERLINE OF STREAM

Line Table		
Line #	Length	Direction
L47	103.74'	S87°54'55"E
L48	46.05'	S86°22'41"E
L49	43.93'	S72°26'25"E
L50	65.49'	S78°49'19"E
L51	39.68'	N88°24'28"E
L52	67.60'	S77°22'50"E
L53	150.92'	S48°00'39"E
L54	139.35'	S71°04'45"E
L55	40.61'	N85°15'08"E
L56	57.15'	N70°46'07"E
L57	47.77'	N84°56'30"E
L58	35.23'	N55°02'34"E
L59	57.36'	N27°22'15"E
L60	52.45'	N49°25'51"E
L61	54.75'	N78°57'07"E
L62	62.94'	N61°54'36"E
L63	45.90'	N53°12'10"E



VICINITY MAP

PRUITT SHELAH KAYE COLEMAN & ROBERT PRESTON PRUITT
PARCEL: 070 153.02
DEED BOOK 6470, PAGE 61

SUGAR LOAF ROAD
℄ OF PAVEMENT

KIRCHNER DORIS ANN
PARCEL: 070 059.00
DEED BOOK 4593, PAGE 747

BOUNDARY LINE MEANDERS WITH CENTERLINE OF STREAM

±680' TO INTERSECTION OF SUGAR LOAF ROAD & THOMAS ROAD

½" REBAR NEAR ELECT BOX

41.11'

S59°48'33"E 32.80'

WAMPLER KEVIN
PARCEL: 070 060.01
DEED BOOK 6160, PAGE 448

AXEL

½" REBAR EDGE OF CREEK

S02°31'52"E 10.33'

EDGE OF CREEK

SEE NOTE #8

BOOTH MARY ELLA
PARCEL: 070 152.07
DEED BOOK 6166, PAGE 506

WEST FORK GIST CREEK

COR-TEN COMPANY LLC
PARCEL: 070 151.01
DEED BOOK 6380, PAGE 331

Cabin

½" REBAR TARWATER

½" REBAR W/CAP "CEC"

FEMA ZONE "AE"
FEMA ZONE "X"

WHITE OAK

BARBED WIRE FENCE CORNER TOP OF HILL

BARBED WIRE FENCE CORNER

FEMA ZONE "X"

FEMA ZONE "AE"

ASPHALT DRIVEWAY

SINGLE FAMILY HOME

GARAGE

SHED

SHED

METAL POST

AREA
2,544,888 SQFT
58.4 ACRE

LEWELLING JAMES RODNEY LE
JAMES R. LEWELLING ETAL REM
PARCEL: 070 061.00
DEED BOOK 3143, PAGE 383

GOOSE GAP RESERVE LLC
PARCEL: 071 005.03
DEED BOOK 6282, PAGE 67
PLAT BOOK 47, PAGE 146

½" REBAR

℄ OF CREEK

12" TREE IN FENCE ON TOP OF RIDGE

20" OAK IN BARBED WIRE FENCE

½" REBAR W/YELLOW CAP

17" OAK IN BARBED WIRE FENCE

8" OAK IN BARBED WIRE FENCE

SHED

SHED

BARN

LOYD DEWEY L. ETAL
PARCEL: 070 062.00
DEED BOOK 416, PAGE 482
WHALEY & BOLT FARM LOT 6

½" REBAR W/RED CAP

WHITE OAK W/FENCE CORNER

RAILROAD TIE IN FENCE CORNER

LAFOLLETTE J. R. & GLENDA
PARCEL: 071 005.00
DEED BOOK 2768, PAGE 17

DOUBLE OAK

10" WHITE OAK IN BARBED WIRE FENCE

CROZIER ARTHUR E. & KATHLEEN
PARCEL: 070 068.00
DEED BOOK 371, PAGE 278
WHALEY & BOLT FARM LOT 12

STAKE

½" REBAR IN WHITE OAK

½" REBAR IN OAK

½" REBAR

½" REBAR

CROZIER ARTHUR E. & KATHLEEN
PARCEL: 070 068.01
DEED BOOK 371, PAGE 278

24" BEECH

21" BEECH

28" BEECH

BREEDEN DEBRA S. BENNETT
PARCEL: 071 006.08
DEED BOOK 2400, PAGE 313
RAY SHULAR PROP LOT TR3

SAPPINGTON PAUL DEMETRUIS LEE
PARCEL: 070 069.00
DEED BOOK 6334, PAGE 187
WHALEY & BOLT FARM LOT 13

SEE NOTE #9

½"REBAR IN DECAYED STUMP

TRUDEL PIERRE H. & DAWN A. TONKINSON
PARCEL: 070 070.00
DEED BOOK 675, PAGE 496
WHALEY & BOLT FARM LOT 14

BREEDEN DEBRA S. BENNETT
RAY & BEATRICE SHULAR LE
PARCEL: 071 006.09
DEED BOOK 2400, PAGE 313
RAY SHULAR PROP LOT TR2

Chris Mouhourtis Project

Contact: Chris Mouhourtis

(904) 759-7493

Property Location

Sevier County, Tennessee

WATER POLLUTION CONTROL MAP

Soil Map Completed by:

a. Grant Dunn 1/27/25

Signature Date

Arthur Grant Dunn, Soil Consultant

With Kyle Green

I, Arthur Grant Dunn affirm that this soil map has been prepared in accordance with accepted standards and methodologies established in the NRSC Soil Survey Manual and USDA Soil Taxonomy. No other warranties are made or implied.

Soil Series	
To – Townley	5-30%
Lz – Litz	5-30%
Wh – Whitesburg	5-30%
Drain	15'
Cut Bank	25'
Soil Pit	
Nm- Not Mapped	
Ds - Disturbed	

Notes:
ANY CUTTING, FILLING, OR COMPACTING WILL VOID THIS SOIL MAP.

INSTALL DURING DRY CONDITIONS SO AS TO
NOT SMEAR THE SIDE WALLS AND BOTTOM OF TRENCHES.

DUE TO THE NATURE OF TH E GEOLOGY THESE SOILS MAY HAVE SUBSURFACE PINNACLE BED ROCK.

JOHN SCOTT STANLEY REGISTERED LAND SURVEYOR AGRICULTURE COMMERCE TENNESSEE NO. 2807

Certificate of Survey Accuracy

I hereby certify that to the best of my knowledge and belief this a true and accurate survey of the property shown heron, that this is a Category I Boundary Land Survey as defined in Title 62, Chapter 18, Tennessee Code Annotated, and that the ration of precision is greater than or equal to 1:10,000

Registered Land Surveyor _____
Tennessee License No. 2807 Date: _____

Certificate of Survey Accuracy & Catagory

I hereby certify that this is a Catagory IV as defined in Title 62, Chapter 18, Tennessee Code Annotated.

Registered Land Surveyor _____

Tennessee License No. 2807 Date: _____

- MONUMENTS (FOUND)
- MONUMENTS (SET)
- GPS POINT
- UTILITY POLE
- TREE
- MISC POINT (LOCATED IN FENCE)
- BUILDING
- TEST PIT (2'X4')
- BOUNDARY LINE
- ADJOINING LOT LINES (NOT SURVEYED)
- CENTERLINE ROAD
- CENTERLINE OF STREAM
- BARBED WIRE FENCE
- FEMA FLOOD LINE
- FEMA ZONE "AE"

GPS-SP (GPS SCALE POINT)

SCALE: 1"=150'

Feet 150 0 150 300

1:1800

Notes:

1. Deed Book
2. Zoned A-1 - Agricultural District
3. Setback per required zoning
4. Total Area: 2,544,888 SqFt / 58.4 Acres
5. Zone "X" & "AE" per FEMA Map 47155C0210E, effective date: 5/18/2009
6. This survey was done in accordance to the State of Tennessee Minimum Standards of Practice.
7. All set pins consist of ½" rebar.
8. Boundary line follow center line of West Fork Gist Creek between L47 thru L62.
9. The boundary follows the fence line. Evidence of barbwire fence is found consistently between L7 thru L44 with the exception of L25. The boundary along L25 departs from the existing fence line.

OWNERS
James Rodney Lewelling LE
James R. Lewelling ETAL REM
1415 Sugar Loaf Road
Sevierville, TN 37876

LAND SURVEYOR
John Scott Stanley
619 Glen Willow Drive
Knoxville TN, 37934
(865) 675-0175

PROJECT NUMBER: SLS2024112 | REV: - | BY: Scott Stanley
FILE NAME: SL2024112-soil.dwg | DATE: Wednesday, January 15, 2025

Copyright 2024

LOCATION & TOPOGRAPHICAL SURVEY OF SOIL TEST PITS

1415 SUGAR LOAF ROAD
SEVIERVILLE, TN 37876

DEED BOOK 3143, PAGE 383
PARCEL ID 070 061.00

TENTH CIVIL DISTRICT
SEVIER COUNTY
15 JANUARY 2025

Appendix #4:
Basic Drip field Sizing Analysis

Relationship between pump size, zone size, lateral spacing and emitter spacing

Assumptions			Project & drip FIELD calculations			Zone & flush calculations		
Loading rate	0.25	GPD.SF	Daily flow	10,000	GPD	Designed num zones	5	num
Wetted area per emitter	4.0	SF	Total min field area	40,000	SF	Num emitters per zone	2000	num
Max lateral length	250	LF	Max static head	40	FT	Min ave area zone	8,000	SF
Optimal length	250	LF	Max pump daily run time	12	Hours	Ave lateral len	250	FT
Lateral spacing	2	FT	Ave inflow	6.94	GPM	Num laterals	32	num
Emitter spacing	2	LF	Min pumping req'd	13.89	GPM	Flush flow per lateral	1.5	GPM
Emitter flow rate GPH	0.61	GPH	Total reqd emitters	10,000	num	Dosing flow	20	GPM
Emitter flow rate GPM	0.010	GPM	Pump run timer per zone	98.36	mins	Total est. flush flow	48	GPM
Max daily flow per emitter	1.0	GPD	Number of AX100 pods	2	num	Dose pump run time	8.2	Hours

										Zone min height per lat length				Custom
Pump size GPM	Min daily pump run time HOURS	Pump OK? (pump flow > inflow)	Ref	Peak Head FT	Max num of simultaneous emitters	Max zone area SF	Total GPD per zone	This project num zones	100	150	200	250	240
10	16.7	TOO SMALL	*PF10*	*200*	984	3936	984	11	39.4	26.2	19.7	15.7	16.4
20	8.3	OK	*PF20*	*230*	1968	7872	1968	6	78.7	52.5	39.4	31.5	32.8
30	5.6	OK	*PF30*	*375*	2951	11804	2951	4	118.0	78.7	59.0	47.2	49.2
50	3.3	OK	*PF50*	*270*	4919	19676	4919	3	196.8	131.2	98.4	78.7	82.0
75	2.2	OK	*PF75*	*58*	7378	29512	7378	2	295.1	196.7	147.6	118.0	123.0

Total daily inflow / pump flow

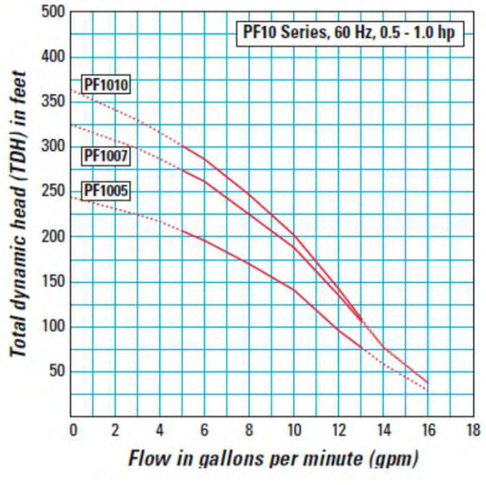
Pump flow/ emitter flow

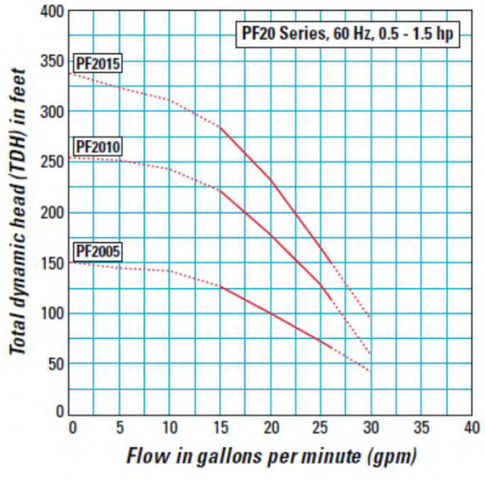
Num emitters * area each

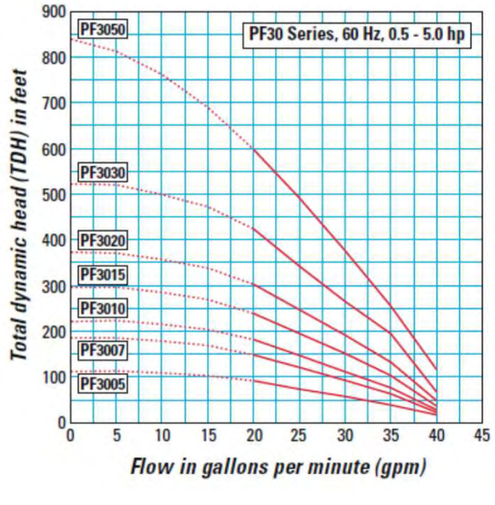
Num of emitters * flow each

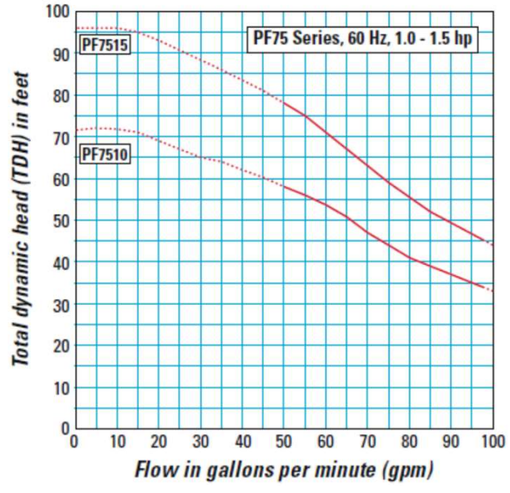
Total daily inflow / max flow per zone

Pump Curves









Appendix #5:
Pump Specifications

Orenco SYSTEMS

Technical Data Sheet

PF-Series Submersible Effluent Pumps: 1-Phase, 60-Hz, 4-inch (100-mm)

Applications

Our PF-Series 4-inch (100-mm) Submersible Effluent Pumps are designed to transport screened effluent (with low TSS counts) from septic tanks or dosing tanks. These pumps are constructed of lightweight, corrosion-resistant stainless steel and engineered plastics, and are field-serviceable and repairable with common tools. They're also CSA- and UL-certified to U.S. and Canadian safety standards for effluent pumps.

PF-Series pumps are used in a variety of applications, including pressurized drainfields, packed-bed filters, mounds, aerobic units, effluent irrigation, liquid-only (effluent) sewers, wetlands, lagoons, and more. These pumps are designed to be used with a Biotube® pump vault or after a secondary treatment system.

C US
LR80980
LR2053896

Powered by Franklin Electric

Features/Specifications

To specify this pump for your installation, require the following:

- Minimum 24-hour run-dry capability (liquid end) with no deterioration in pump life or performance*
- 1/8-inch (3-mm) bypass orifice to ensure flow recirculation for motor cooling and to prevent air bind
- Liquid-end repair kits available for better long-term cost of ownership
- TRI-SEAL™ floating impeller design on 10, 20, and 30 gpm (0.6, 1.3, and 1.9 L/sec) models; floating stack design on 50 and 75 gpm (3.2 and 4.7 L/sec) models
- Franklin Electric Super Stainless motor, rated for continuous use and frequent cycling
- Type SOOW 600-V motor cable (model PF751512 uses 14 AWG, SJOOW, 300-V cord)

** Not applicable for 5-hp (3.73 kW) models*

Standard Models

See specifications chart on page 2 for a list of standard pumps. For a complete list of available pumps, call Orenco.

Product Code Diagram

PF ☐ ☐ ☐ ☐ ☐ - ☐ - ☐

- ☐ (last): CLK = ClickTight™ compatible
- ☐ (Cord length, ft (m):‡): Blank = 10 (3); 20 = 20 (6); 30 = 30 (9); 50 = 50 (15)
- ☐ (Check valve): Blank = no internal check valve; CV = internal check valve†
- ☐ (Voltage, nameplate): 1 = 115*; 2 = 230
- ☐ (Frequency): 1 = single-phase 60 Hz
- ☐ (Horsepower (kW)): 05 = ½ hp (0.37); 07 = ¾ hp (0.56); 10 = 1 hp (0.75); 15 = 1½ hp (1.11); 20 = 2 hp (1.50); 30 = 3 hp (2.24); 50 = 5 hp (3.73)
- ☐ (Nominal flow, gpm (L/sec)): 10 = 10 (0.6); 20 = 20 (1.3); 30 = 30 (1.9); 50 = 50 (3.2); 75 = 75 (4.7)
- PF: Pump, PF Series

* ½-hp (0.37 kW) only
† Available for 10 gpm (0.6 L/sec), 1/2 hp (0.37 kW)
‡ Note: 20-ft cords are available only for pumps through 1½ hp

CA MFR Review Exhibit 2 – Engineer Report

Specifications

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Discharge size and material[1]	Length in. (mm)	Min. liquid level in. (mm)	Weight lb (kg)	Rated cycles per day	
PF100511 [9]	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300	
PF100511CV [9]	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300	
PF100512 [9]	10 (0.6)	0.50 (0.37)	1	230	240	6.3	6.3	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300	STEP
PF100712 [4, 5, 9]	10 (0.6)	0.75 (0.56)	1	230	240	8.3	8.3	1 ¼ in. GFP	25.9 (658)	17 (432)	30 (14)	300	
PF101012 [5, 6, 9]	10 (0.6)	1.00 (0.75)	1	230	240	9.6	9.6	1 ¼ in. GFP	27.9 (709)	18 (457)	33 (15)	100	
PF200511 [9]	20 (1.3)	0.50 (0.37)	1	115	120	12.3	12.5	1 ¼ in. GFP	22.3 (566)	18 (457)	25 (11)	300	
PF200512 [9]	20 (1.3)	0.50 (0.37)	1	230	240	6.4	6.5	1 ¼ in. GFP	22.5 (572)	18 (457)	26 (12)	300	
PF201012 [4, 5, 9]	20 (1.3)	1.00 (0.75)	1	230	240	10.5	10.5	1 ¼ in. GFP	28.4 (721)	20 (508)	33 (15)	100	DOSE & FLUSH
PF201512 [4, 5]	20 (1.3)	1.50 (1.11)	1	230	240	12.4	12.6	1 ¼ in. GFP	34.0 (864)	24 (610)	41 (19)	100	
PF300511 [9]	30 (1.9)	0.50 (0.37)	1	115	120	11.8	11.8	1 ¼ in. GFP	21.3 (541)	20 (508)	28 (13)	300	
PF300512 [9]	30 (1.9)	0.50 (0.37)	1	230	240	6.2	6.2	1 ¼ in. GFP	21.3 (541)	20 (508)	25 (11)	300	
PF300712 [9]	30 (1.9)	0.75 (0.56)	1	230	240	8.5	8.5	1 ¼ in. GFP	24.8 (630)	21 (533)	29 (13)	300	
PF301012 [4, 9]	30 (1.9)	1.00 (0.75)	1	230	240	10.4	10.4	1 ¼ in. GFP	27.0 (686)	22 (559)	32 (15)	100	
PF301512 [4, 5]	30 (1.9)	1.50 (1.11)	1	230	240	12.6	12.6	1 ¼ in. GFP	32.8 (833)	24 (610)	40 (18)	100	
PF302012 [5, 6, 7]	30 (1.9)	2.00 (1.49)	1	230	240	11.0	11.0	1 ¼ in. SS	35.5 (902)	26 (660)	44 (20)	100	
PF303012 [5, 6, 7, 8]	30 (1.9)	3.00 (2.23)	1	230	240	16.8	16.8	1 ¼ in. SS	44.5 (1130)	33 (838)	54 (24)	100	
PF305012 [5, 6, 7, 8]	30 (1.9)	5.00 (3.73)	1	230	240	25.6	25.8	1 ¼ in. SS	66.5 (1689)	53 (1346)	82 (37)	100	
PF500511 [9]	50 (3.2)	0.50 (0.37)	1	115	120	12.1	12.1	2 in. SS	20.3 (516)	24 (610)	27 (12)	300	
PF500512 [9]	50 (3.2)	0.50 (0.37)	1	230	240	6.2	6.2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300	
PF500712 [9]	50 (3.2)	0.75 (0.56)	1	230	240	8.5	8.5	2 in. SS	23.7 (602)	25 (635)	31 (14)	300	RECIRC
PF501012 [9]	50 (3.2)	1.00 (0.75)	1	230	240	10.1	10.1	2 in. SS	27.0 (686)	26 (660)	35 (16)	100	
PF501512 [4]	50 (3.2)	1.50 (1.11)	1	230	240	12.5	12.6	2 in. SS	32.5 (826)	30 (762)	41 (19)	100	
PF503012 [4, 5, 7, 8]	50 (3.2)	3.00 (2.23)	1	230	240	17.7	17.7	2 in. SS	43.0 (1092)	37 (940)	55 (25)	100	
PF505012 [5, 6, 7, 8]	50 (3.2)	5.00 (3.73)	1	230	240	26.2	26.4	2 in. SS	65.4 (1661)	55 (1397)	64 (29)	100	
PF751012 [9]	75 (4.7)	1.00 (0.75)	1	230	240	9.9	10.0	2 in. SS	27.0 (686)	27 (686)	34 (15)	100	
PF751512	75 (4.7)	1.50 (1.11)	1	230	240	12.1	12.3	2 in. SS	33.4 (848)	30 (762)	44 (20)	100	

1 *GFP = glass-filled polypropylene; SS = stainless steel. The 1 ¼-in. NPT GFP discharge is 2 7⁄8 in. octagonal across flats; the 1 ¼-in. NPT SS discharge is 2 1⁄8 in. octagonal across flats; and the 2-in. NPT SS discharge is 2 7⁄8 in. hexagonal across flats. Discharge is female NPT threaded, U.S. nominal size, to accommodate Orenco® discharge hose and valve assemblies. Consult your Orenco Distributor about fittings to connect hose and valve assemblies to metric-sized piping.*

2 *Minimum liquid level is for single pumps when installed in an Orenco Biotube® Pump Vault or Universal Flow Inducer. In other applications, minimum liquid level should be top of pump. Consult Orenco for more information.*

3 *Weight includes carton and 10-ft (3-m) cord.*

4 *High-pressure discharge assembly required.*

5 *Do not use cam-lock option (Q) on discharge assembly.*

6 *Custom discharge assembly required for these pumps. Contact Orenco.*

7 *Capacitor pack (sold separately or installed in a custom control panel) required for this pump. Contact Orenco.*

8 *Torque locks are available for all pumps and are supplied with 3-hp and 5-hp pumps.*

9 *ClickTight™ compatible.*

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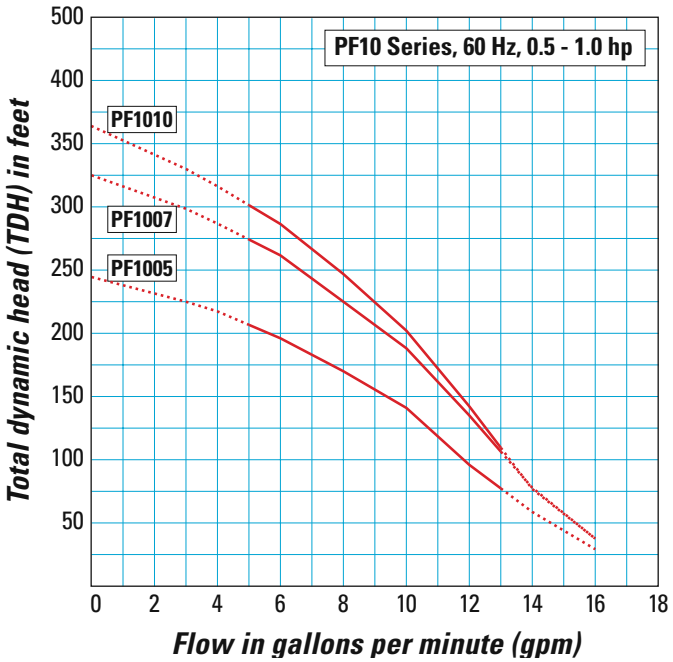
Materials of Construction

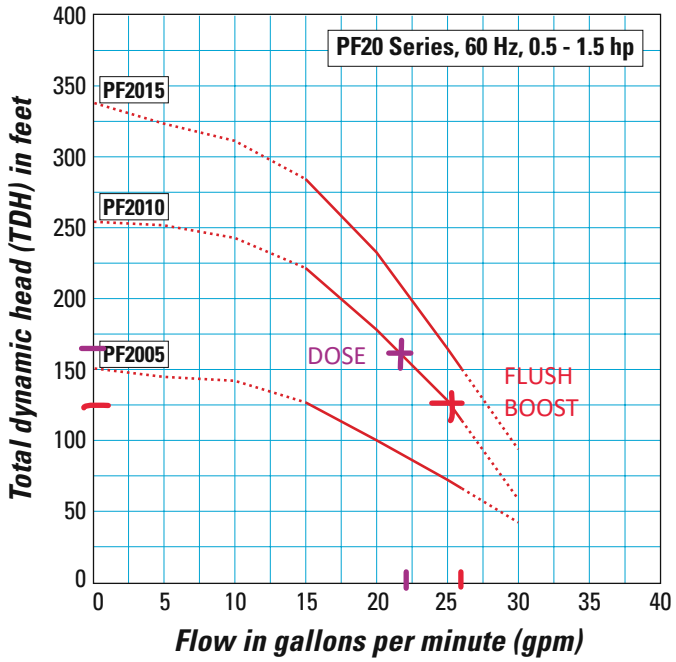
Discharge	Glass-filled polypropylene or stainless steel
Discharge bearing	Engineered thermoplastic (PEEK)
Diffusers	Glass-filled PPO (Noryl GFN3)
Impellers	Celcon® acetal copolymer on 10-, 20-, and 30-gpm models; 50-gpm impellers are Noryl GFN3
Intake screen	Polypropylene
Suction connection	Stainless steel
Drive shaft	7/16-in. hexagonal stainless steel, 300 series
Coupling	Sintered stainless steel, 300 series
Shell	Stainless steel, 300 series
Motor	Franklin motor exterior constructed of stainless steel. Motor filled with deionized water and propylene glycol for constant lubrication. Hermetically sealed motor housing ensures moisture-free windings. All thrust absorbed by Kingsbury-type thrust bearing. Rated for continuous duty. Single-phase motors are equipped with surge arrestors for added security. Single-phase motors through 1.5 hp (1.11 kW) have built-in thermal overload protection, which trips at 203-221˚ F (95-105˚ C).

Using a Pump Curve

A pump curve helps you determine the best pump for your system. Pump curves show the relationship between flow and pressure (total dynamic head or "TDH"), providing a graphical representation of a pump's optimal performance range. Pumps perform best at their nominal flow rate. These graphs show optimal pump operation ranges with a solid line and show flow rates outside of these ranges with a dashed line. For the most accurate pump specification, use Orenco's PumpSelect™ software.

Pump Curves

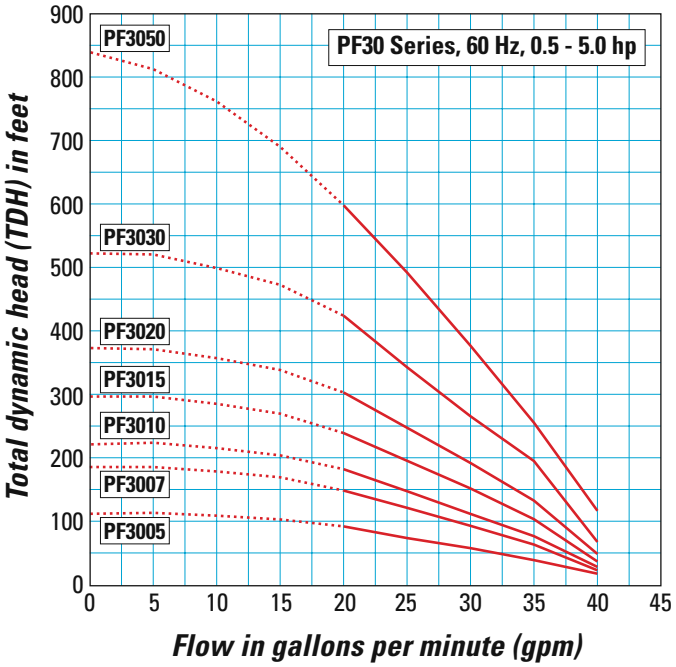


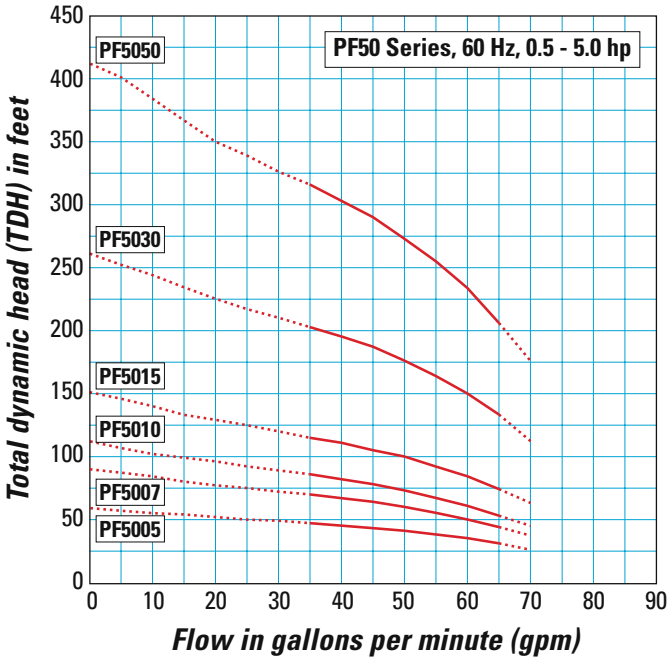


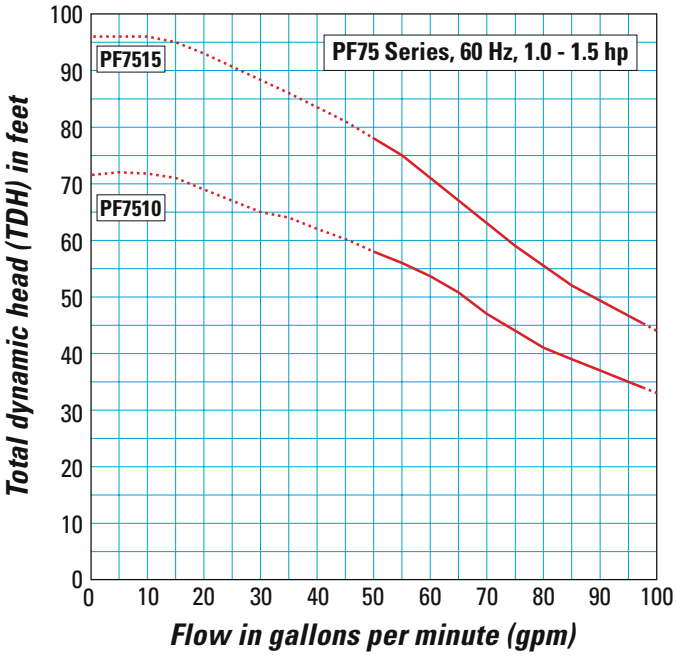
DOSING: 1x PF2010
FLUSH: 2x PF2010

CA MFR Review Exhibit 2 – Engineer Report

Pump Curves, cont.







CA MFR Review Exhibit 2 – Engineer Report

Appendix #6:
Orenco Project Review & Approval

April 15, 2025

Doug Hodge, PhD, PMP
DSH & Associates, LLC
10519 Lexington Dr.
Knoxville, TN 37932

Subject: Design Review of Sugar Loaf Road Subdivision

Dr. Doug Hodge,

Orenco Systems, Inc. ("Orenco") has received the Plans with all required fields completed (attached to this letter) and other documents that comprise the Design for the Sugar Loaf Road Subdivision Wastewater Treatment Plant. Orenco staff reviews the Design of all wastewater collection and treatment systems for commercial applications to ensure that the design is compliant with the most current version of the system's applicable design criteria published by Orenco for the specified parameters provided by the system's designer in the Plans. The findings and conclusions of my review of this Design are as follows:

Design Basis

The system has been designed for a Type 1, residential application. Influent flow has been provided by the system's designer on the attached Plans and was used in my review of the Design.

The influent flow on the Engineering Report was not extrapolated from the metered flows from the subject site, but in our experience, they are consistent with influent flows from other, similar Type 1 systems that Orenco has previously observed. As such, I have no reason to doubt the accuracy of the findings and assumptions as to the influent flow and find that it was reasonable to use it as the design basis for the system.

System Design

The proposed Design of the system consists of the following to treat wastewater for a subdivision:

Primary Treatment –	STEP Collection
Secondary Treatment –	(2) AX100 Pods
Final Disposal –	Subsurface drip dispersal field

Design Criteria

The applicable design criteria for this system, which I used to conduct the review of its Design, is revision 11.0 of document NDA-ATX-1, titled *Orenco® AdvanTex® Design Criteria, Commercial Treatment Systems*, which was published by Orenco in May, 2023. A copy of the design criteria can be downloaded from Orenco's online document library at www.orenco.com/corporate/doclibrary.cfm.

Findings

The findings of my review as to whether the Design complies with Orenco's design criteria for treating wastewater to the effluent constituent concentration below are as follows:

Standard Stage AdvanTex

Primary Treatment

Each lot has a primary tank and effluent sewer pump package. Therefore, the configuration and specifications of the primary treatment tanks in the Design satisfy Orenco's recommendation for primary tankage for this Subdivision application.

Orenco recommends the use of a pre-anoxic return tank and requires them on all projects that require significant nitrogen reduction. However, because this project is using effluent sewer, the design does not include a pre-anoxic return tank.

Recirculation Tank — Standard Stage

The Design specifies the use of a total of 10,000 U.S. gallon tankage for recirculation and blending of the AdvanTex treated effluent with primary tank effluent. Using the flow data specified, the tank is sized to be equal to 100% of the Maximum Daily Design Flow. The recirculation tank for the standard stage should be sized at a minimum of 100% Average Daily Flow or 75% Maximum Daily Flow, whichever is greater. Therefore, the specification of the recirculation-blend tank in the Design satisfies Orenco's design criteria.

Hydraulic Load — Standard Stage

The current design specifies the use of two (2) AX100 pods which contain a nominal surface area of 200 square feet of treatment media. Using the specified flow data, the hydraulic loading rate for the system calculates as follows:

Hydraulic Loading Rate (HLR) — Standard Stage				
Design Average Flow (gpd)	Design Maximum Day Flow (gpd)	Nominal Textile Area (sq. ft.)	Average HLR (gal. per day/sq. ft.)	Peak HLR (gal. per day/sq. ft.)
5,000	10,000	200	25	50

According to the AdvanTex System Loading Chart in the applicable design criteria, the standard AdvanTex treatment system (Stage 1) should not be hydraulically loaded more than 25 gpd/square foot at Design Average Flow or 50 gpd/square foot at Design Max Day Flow. Therefore, the specified type and number of AdvanTex units in the Design satisfy Orenco's design criteria to achieve the effluent quality listed in the design criteria at a 95% confidence level for this Type 1 application.

Organic Load — Standard Stage

The following influent characteristics provided on the engineering report were estimated and not derived from direct sampling. Even though the influent characteristics were not derived from direct sampling, the values provided are consistent with values we have seen in other, similar applications.

Influent (Primary Tank Effluent) Characteristics — Loading to Textile	
Average BOD_5 (mg/L)	Average TSS (mg/L)
150	50

Based on the average influent biochemical oxygen demand (BOD_5) concentration and flow data specified in the engineering report, the system will receive approximately 6.3 pounds of BOD_5 per day at Design Average Flow, and 12.6 pounds of BOD_5 per day at Maximum Day Design Flow. Using this information, the organic loading rate of the system calculates as:

Organic Loading Rate (OLR) — Standard Stage				
Average Organic Load (lbs/day)	Maximum Organic Load (lbs/day)	Nominal Treatment Area (sq. ft.)	Average OLR (lbs BOD/sq. ft./day)	Maximum OLR (lbs BOD/sq. ft./day)
6.3	12.6	200	0.03	0.06

According to the Organic Load Requirements in the applicable design criteria, an AdvanTex Treatment System should not be organically loaded more than 0.04 pounds BOD_5/square foot at Design Average Flow or 0.08 pounds BOD_5/square foot at Design Peak Flow. Therefore, the specified type and number of AdvanTex units in the Design satisfy Orenco's design criteria to achieve the effluent quality listed in the design criteria at a 95% confidence level for this Type 1, Subdivision application.

Conclusions

I have reviewed the Design of Sugar Loaf Road Subdivision wastewater treatment system and have found that the design is compliant with the most current version of the system's applicable design criteria published by Orenco for the specified parameters provided by the system's designer in the Plans.

Compliance Table — Meets Minimum Design Standards	
Stage	One
Recirc Tank Size	Yes
Hydraulic Load	Yes
Organic Load	Yes

As such, the system as designed satisfactorily complies with Orenco's design criteria to meet the following effluent limits specified in the Plans at a 95% confidence level, provided that all influent flows and constituent concentrations specified above are not exceeded:

Expected Effluent Quality	
Constituent	Average (mg/L)
BOD_5	≤ 15
TSS	≤ 15

Proper air ventilation is a critical feature of all commercial AdvanTex Treatment Systems, and as such, adequate active ventilation is required for all systems. In addition, please note that disposing of toxics or chemicals into the system is strictly prohibited. Examples of toxics include restaurant degreasers, cleansers, wax strippers for linoleum, carpet shampoo, waste products, or any other toxins. Furthermore, water softener brine discharge is prohibited from being discharged into the AdvanTex Treatment System. Failure to adhere to these policies will void Orenco's limited product warranties.

If you have any questions about my review process, findings, or conclusions, please feel free to call or e-mail me.

Sincerely,

Kirsten Fox
Systems Engineering
Orenco Water
814 Airway Avenue
Sutherlin, OR 97479
P: (800) 348-9843
kfox@orenco.com

Appendix #7:
STEP System Operating Instructions

ProSTEP™

Effluent Pumping Systems

for Onsite Wastewater Collection and Treatment

Ideal for:

- Effluent sewers
- Drainfields
- Textile filters
- Sand filters
- Peat filters
- Mounds
- Trickling filters
- Aerobic units
- Wetlands
- Lagoons
- Effluent irrigation
- Other applications

Orenco® SYSTEMS

Changing the Way the World Does Wastewater®

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PROSTEP™ Protects, Transports, Filters

Thirty years ago, Orenco Systems®, Inc. pioneered and packaged the modern filtering pump vault for onsite wastewater collection and treatment. Today, more than 185,000 of Orenco's filtering vaults — including its patented Biotube® Pump Vault — are in service all over the world. They transport and filter wastewater from watertight septic tanks and dosing tanks, protecting "downstream" lines, drainfields, and other treatment systems. The Biotube® Pump Vault's patented* Biotube filter has several times the capacity of other filters and removes about two-thirds of suspended solids, on average.

"Easy-Access" Design Aids Maintenance

The Biotube Pump Vault's "easy-access" design allows service providers to remove the Biotube filter cartridge without pulling the pump or vault. And the float assembly's quick-release float stem and adjustable float collars make it easy to remove and adjust.

Easy access design

Quality Components Outlast Others

ProSTEP™ Effluent Pumping Systems are superior in quality[5] and outlast other brands.[6] Constructed of stainless steel, thermoplastic, and fiberglass, they're corrosion-resistant and durable, reducing lifetime system costs.

Advanced Controls Available

For a modest incremental cost, advanced control panels are available . . . control panels that give peace of mind to property owners, system designers, contractors, service providers, and regulators. MVP digital programmable panels allow easy, accurate setting of multiple parameters and the use of one type of float for all functions. VeriComm® remote telemetry panels are coupled with the web-based VeriComm® Monitoring System, which verifies, monitors, records, and communicates system operation round-the-clock, while remaining invisible to the homeowner.

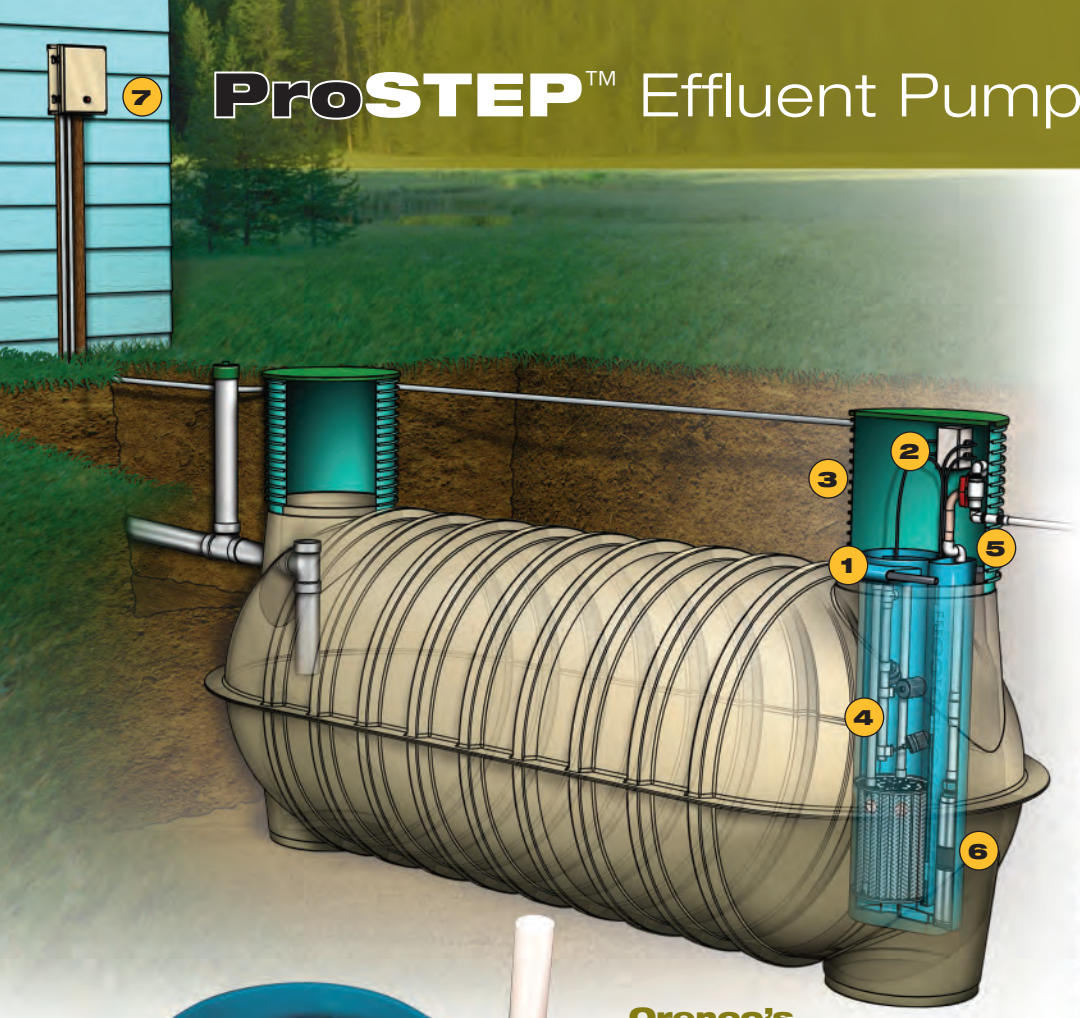
* Covered by U.S. patents 4,439,323 and 5,492,635. Foreign patents pending.

"We've had more than 500 Orenco ProSTEP Effluent Pumping Systems in operation since 1987. They're simple, dependable, and easy to maintain."

Larry Garwood
Diamond Lake Water & Sewer District
Newport, Washington

5. *Orenco Product Fact Sheet, AFL-FT-2, 07/13.*
6. *North Carolina State University Cooperative Extension. "Pump Longevity and Troubleshooting," accessed September 6, 2016, http://www.ces.ncsu.edu/plymouth/septic/BO5Bannister.pdf.*

ProSTEP™ Effluent Pumping Systems



Complete, Lightweight Package

ProSTEP™ Effluent Pumping Systems are fully integrated packages with seven compatible components. No need to shop for parts and pieces. In-tank equipment is lightweight, comes preassembled, and installs neatly into our tanks and most others, saving time and money.

Orenco's Injection-Molded Fiberglass Tanks

are designed to be 100% watertight and each is water-tested. They're also designed to withstand 4-foot (1.2-meter) burial, empty, with groundwater to grade. Available in 1000-gal and 1500-gal sizes (3800-L and 5700-L).

1 Biotube® Pump Vault

- Pump vault comes in standard and custom heights
- Handle assembly aids removal of filter cartridge
- Filter goes longer between cleanings than other brands[1]
- External flow inducer accommodates one or two pumps
- Removable float stem keeps floats in proper positions

2 Splice Box

- Two kinds available:
  - ~ Internal (see drawing)
  - ~ External (see photo)
- Advantages of the External Splice Box:
  - ~ Mounts outside riser, flush-to-ground
  - ~ Protects external wiring
  - ~ Easy to access, install, maintain
  - ~ Designed to be completely watertight; UL listed, NEMA 6p rated

1. *Orenco Product Fact Sheet, AFL-FT-2, 07/13.*

ProSTEP™ Effluent Pumping Systems

4 Float Switch Assembly

- Provides level control
- Quick-release stem
- Adjustable float collars
- Variety of floats (including mercury-free) and float arrangements

6 Effluent Pump

- Life of 25+ years with routine cleaning[2]
- Lasts 3-4 times longer than conventional effluent pumps[3]
- Minimum 24-hour run-dry capability[4]
- Lightweight — about 25 lb (11 kg)
- Easy to service in the field
- Low power costs
- Noncorroding stainless steel construction
- UL and CSA listing for wastewater applications
- A variety of models available
- Five-year limited warranty

3 Risers, Lids, and Accessories

- Allow easy access to tank
- Strong and lightweight
- Tamper-resistant
- Green and brown non-skid lids
- Photographic “Landscape Lids” also available
- Custom lid imprinting available for 24 in. (600 mm) and 30 in. (760 mm) sizes

7 Control Panel

- Engineered specifically for wastewater applications
- Uses highest quality “touch-safe” components, NEMA 4X-rated enclosures
- “Smart” digital programmable panels and telemetry panels available
- UL and UL-C listed; standard configurations available to meet requirements of NEC Class I, Division 1 or 2
- Three-year limited warranty

5 Discharge Assembly

- Flexible design eliminates “hard plumbing”
- Typically includes quick disconnect (union or cam-style), ball valve, check valve
- Available for special situations (cold weather, deep bury, etc.)
- Provides easy access

2. *Elkton, Oregon.*
3. *North Carolina State University Cooperative Extension. “Pump Longevity and Troubleshooting,” accessed September 6, 2016, http://www.ces.ncsu.edu/plymouth/septic/BO5Bannister.pdf.*
4. *Internal tests.*

Unmatched Technical Support

When you specify, purchase, install, or service Orenco products, you tap into a wide range of technical support services.

Distributor Network

Orenco's products are available from about 300 different Distributor locations. Distributors stock products, provide customer service, and help with system design, product takeoffs, ordering, shipping, and more. For a list of Distributors, go to www.orenco.com.

Orenco Technical Sales and Engineering

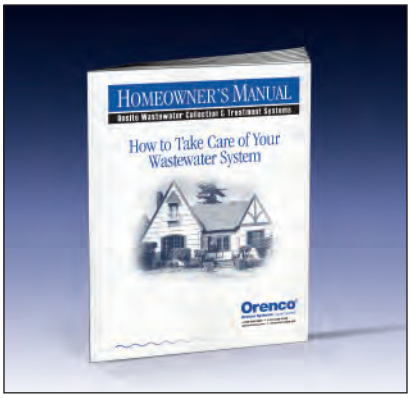
If there isn't a Distributor in your region, Orenco's Tech Sales and Engineering staff provide professional customer service, including plan reviews. When you call our toll-free number for information and assistance, you'll talk to a wastewater specialist with practical experience in effluent pumping system design, construction, and maintenance.

Design Aid Package

Our "Design Aid Package" and CD-ROM saves layout and drafting time. The CD-ROM includes more than 200 scaled AutoCAD® and PDF drawings, media gradation charts, and our General Specifications document. Most importantly, it includes our exclusive PumpSelect® software, which is designed to provide fast, accurate hydraulic calculations for sizing Orenco pumps. You can order a Design Aid Package from Orenco or you can quickly and easily download the latest version of PumpSelect from the home page of our website — orenco.com — under "Technical Resources" / "Design Tools."

Supportive Literature

Each ProSTEP™ Effluent Pumping System comes with installation and maintenance instructions. There's also a "Homeowner's Manual" for the property owner (available in English and Spanish), with do's and don'ts for preventive maintenance. Spec sheets, product sheets, and additional color brochures are also available, by request.



Web Sites

Orenco maintains two web sites

- **www.orenco.com** includes an extensive document library, allows you to submit questions, request literture, find a local distributor, and view and print product and system information round-the-clock.
- **www.vericomm.net** (coupled with our VeriComm® telemetry control panels), allows password-holders to manage alarms and monitor/control their onsite systems remotely. (See our online demo at www.vericomm.net/demo2/FlashDemo/demo.cfm; no password required.)

ProSTEP™ Effluent Pumping Systems

Orenco Systems is owned and managed by engineers who develop wastewater systems that work — systems based on sound science.

Clockwise from left:
Eric Ball, P.E., Jeff Ball, P.E., Hal Ball, P.E., (front) Terry Bounds, P.E.

Powered by
Franklin Electric

Carefully Engineered by Orenco

Your health is our priority. At Orenco Systems, we are committed to "Changing the Way the World Does Wastewater®."

Orenco Systems has been researching, designing, manufacturing, and selling leading-edge products for small-scale wastewater treatment systems since 1981. The company has become an industry leader, with about 300 employees and with more than 300 points of distribution in North and Central America, Australasia, Europe, and Africa. Our products and technologies have been installed in more than 70 countries, all over the world.

Orenco has a maintenance division and an environmental lab and employs dozens of scientists and civil, structural, agricultural, electrical, mechanical, and manufacturing engineers. Orenco's systems are based on sound scientific principles of chemistry, biology, mechanical structure, and hydraulics. As a result, our research appears in numerous publications and our engineers are regularly asked to give workshops and offer trainings.

Distributed by:

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Appendix #8:
Filter, Sterilization, PLC and Flowmeter Specifications

2" COMPACT LP DISC-KLEEN FILTER

Automatic
Self-Cleaning
Disc Filter

APPLICATIONS

- Irrigation systems with a capacity of 1 to 80 GPM requiring clean water to operate emitters
- For areas without electricity
- When automation is desirable because manual cleaning is frequent and too cumbersome
- For residential, commercial, industrial, parks, municipal and non-potable water sources

SPECIFICATIONS

- Inlet: 2" male pipe threaded
- Outlet: 2" female pipe threaded
- Flush port: 2" female pipe threaded
- Maximum operating pressure:
  Standard and low flow models: 90 psi
  High pressure model: 140 psi
- Minimum pressure for backflush: 30 psi
- Minimum flow for backflush:
  Standard flow model: 35 GPM
  Low flow model: 20 GPM
- Minimum allowable pH: 5
- Weight: 32 lbs.

MATERIALS

- Flush valves: plastic
- Seals: nitrilo rubber, EPDM
- Filter and spine: polypropylene
- Discs: polypropylene
- Clamp and screws: stainless steel

FEATURES & BENEFITS

PROVEN DISC TECHNOLOGY DEPTH FILTRATION

Provides highly effective filtering.

MADE OF NON-CORROSIVE MATERIALS

Prevents rusting and corrosion from chemicals and weather.

COMPACT PRE-ASSEMBLED UNIT FOR EASY INSTALLATION

Fits in tight spaces, saves space. Factory assembled and tested. Delivered ready for hook-up and immediate operation.

LESS BACKFLUSH TIME REQUIRED

Optimizes irrigation with a more uniform application of water.

INCLUDES BACKFLUSH CONTROLLER

AC model uses 110VAC power. DC model uses four D batteries.

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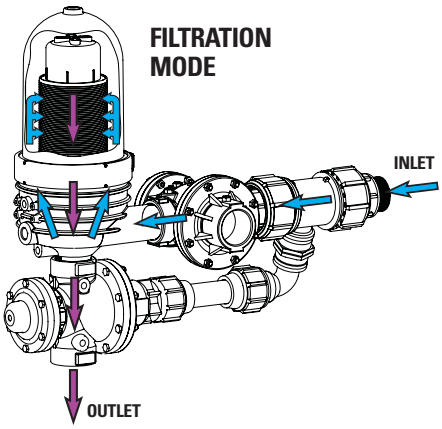
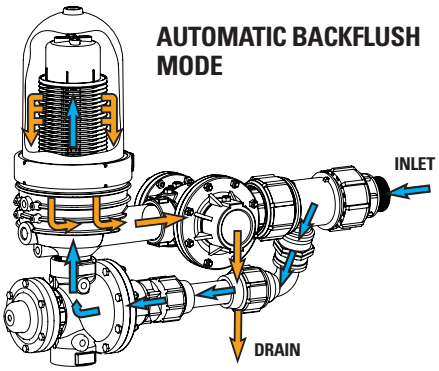




DISC FILTER TECHNOLOGY

Grooves in the disc rings criss-cross to form a network that traps debris between and on the outside of the discs.

HOW IT WORKS

As dirty water is pumped into the filter, and pressure increases, the water compresses the disc rings together tightly. The water is then forced to flow through the grooves of the disc rings, where debris is trapped, releasing only clean water to the irrigation system.

AUTOMATIC BACKFLUSH TECHNOLOGY

The discs separate and nozzles spray the discs with clean water - inside and out, removing debris.

STANDARD FLOW MODEL MAXIMUM FLOW RATE (GPM)

WATER QUALITY*	80 & 120 MESH	140 MESH
GOOD	80	70
AVERAGE	70	60
POOR	55	50
VERY POOR	35	30

LOW FLOW MODEL MAXIMUM FLOW RATE (GPM)

WATER QUALITY*	80 & 120 MESH	140 MESH
GOOD	50	40
AVERAGE	40	30
POOR	30	20
VERY POOR	20	10

*WATER QUALITY

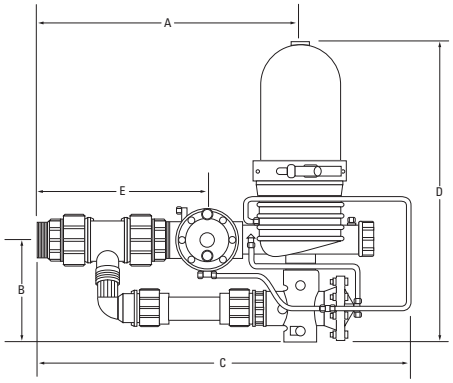
Good Water Quality: Municipal water supply or well water from a clean aquifer with no sand, iron or manganese.

Average Water Quality: Wells with small amounts of sand (< 2 ppm) or clean surface water which includes lakes, ponds, reservoirs and canals.

Poor Water Quality: Well water with sand up to 10 ppm or surface water in hot climates with increased biological growth and no chemical treatment which includes lakes, ponds, reservoirs and canals.

Very Poor Water Quality: Well water with greater than 10 ppm of sand including rivers, muddy canals, lakes and ponds with severe run off deposits and raw municipal wastewater.

Greater than 3 ppm Sand or Silt: May require a pre-filter such as a hydrocyclone.

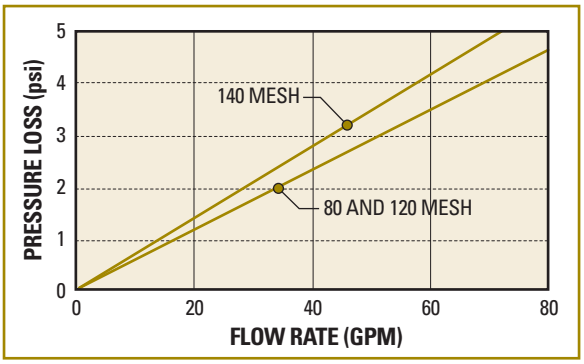


DIMENSIONS & WEIGHT

INLET/OUTLET (A)	INLET/OUTLET OFFSET (B)	LENGTH* (C)	HEIGHT (D)	DRAIN (E)	WEIGHT (LBS.)
21 1/2"	8 5/8"	30"	25"	13 17/16"	32

* Includes controller (not shown)

FLOW RATE VS. PRESSURE LOSS



ORDERING INFORMATION

DESCRIPTION	MESH	AC MODEL NUMBER	DC MODEL NUMBER
STANDARD FLOW MODEL 1-80 GPM 1-90 psi	80	DFALP200-080AC	DFALP200-080DCL
	120	DFALP200-120AC	DFALP200-120DCL
	140	DFALP200-140AC	DFALP200-140DCL
LOW FLOW MODEL 1-50 GPM 1-90 psi	80	DFALPLF200-080AC	DFALPLF200-080DCL
	120	DFALPLF200-120AC	DFALPLF200-120DCL
	140	DFALPLF200-140AC	DFALPLF200-140DCL

AC Models include installed backflush controller for 110VAC power supply.
DC Models include installed backflush controller with (4) D batteries and latching solenoids.

FLOW RATE VS. PRESSURE LOSS

FLOW RATES (GPM)	10	20	30	40	50	60	70	80
PRESSURE LOSS (psi)	0.2	0.5	1	1.4	2	3	4	5

120 mesh when filter is in a clean state.

NETAFIM™

NETAFIM USA
5470 E. Home Ave.
Fresno, CA 93727
CS 888 638 2346
www.netafimusa.com

LCDKF 1/18

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NETAFIM™
GROW MORE WITH LESS

FILTRATION

2" COMPACT LP DISC-KLEEN FILTER

OPERATION, MAINTENANCE & TROUBLESHOOTING GUIDE

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Water Quality & Maximum Flow Rates....4
Filter Operation....5
Installation....6
System Maintenance....8
Troubleshooting....11
Replacement Parts....14

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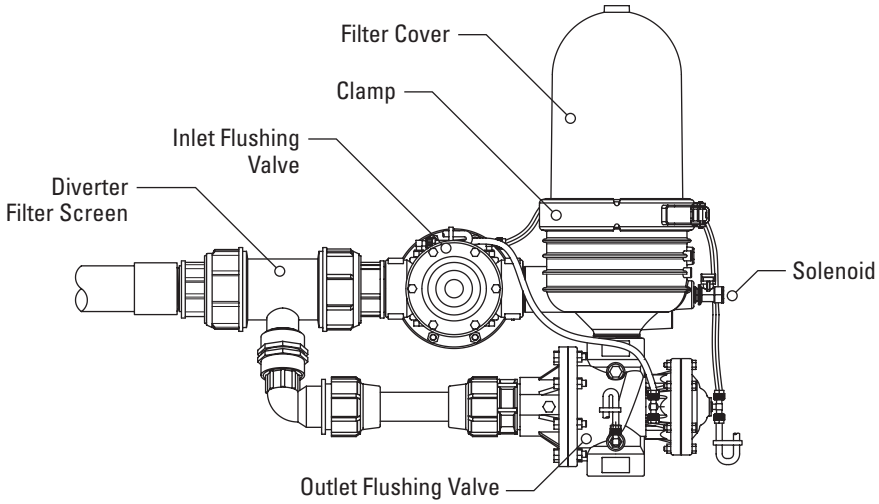
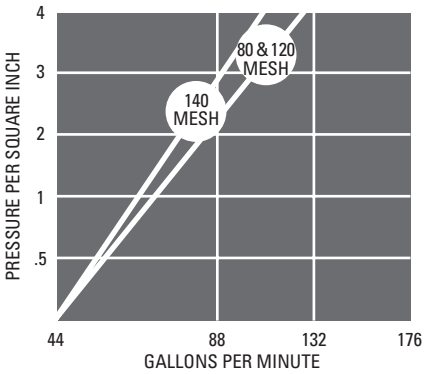
SPECIFICATIONS

- Maximum Operating Pressure: 90 psi
- Minimum Operating Pressure for Backflushing: 30 psi
- Minimum Backflush Flow:
  35 GPM for Standard Model
  20 GPM for Low Flow Model
- Maximum Operating Temperature: 158˚ F
- Minimum Allowable pH: 5
- Inlet Connection: 2” Male Pipe Thread
- Outlet Connection: 2” Female Pipe Thread
- Flush Port Connection: 2” Female Pipe Thread
- Backflush Valve: Reinforced Polyamide
- Filter Body and Cover: Polypropylene
- Filter Spine: Nylon
- Discs: Polypropylene

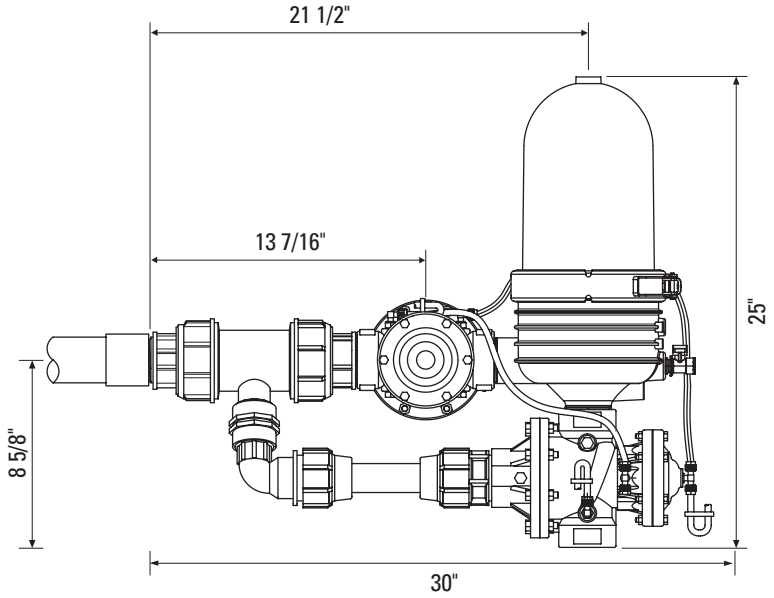


HEADLOSS



DISC COLOR

COLOR	YELLOW	RED	BLACK
MESH	80	120	140



DIMENSIONS

INLET / OUTLET	INLET / OUTLET OFFSET	OVERALL	WEIGHT
21 1/2"	8 5/8"	30" x 25"	32 lbs.

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WATER QUALITY & MAXIMUM FLOW RATES

WATER QUALITY:

- Good Water Quality: Municipal water supply or well water from a clean aquifer with no sand, iron or manganese.
- Average Water Quality: Wells with small amounts of sand (< 2 ppm) or clean surface water which includes lakes, ponds, reservoirs and canals.
- Poor Water Quality: Well water with sand up to 10 ppm or surface water in hot climates with increased biological growth and no chemical treatment which includes lakes, ponds, reservoirs and canals.
- Very Poor Water Quality: Well water with greater than 10 ppm of sand including rivers, muddy canals, lakes and ponds with severe run off deposits and raw municipal wastewater.
- Greater than 3 ppm Sand or Silt: May require a pre-filter such as a hydrocyclone.

STANDARD FLOW MODEL MAXIMUM FLOW RATE (GPM)

MESH SIZE	80	120	140
GOOD	80	80	70
AVERAGE	70	70	60
POOR	55	55	50
VERY POOR	35	35	30

LOW FLOW MODEL MAXIMUM FLOW RATE (GPM)

MESH SIZE	80	120	140
GOOD	50	50	40
AVERAGE	40	40	30
POOR	30	30	20
VERY POOR	20	20	10

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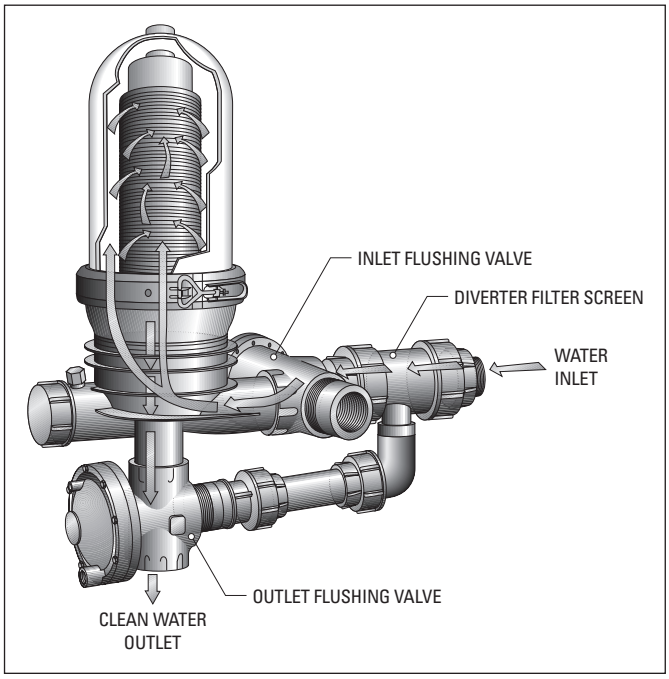
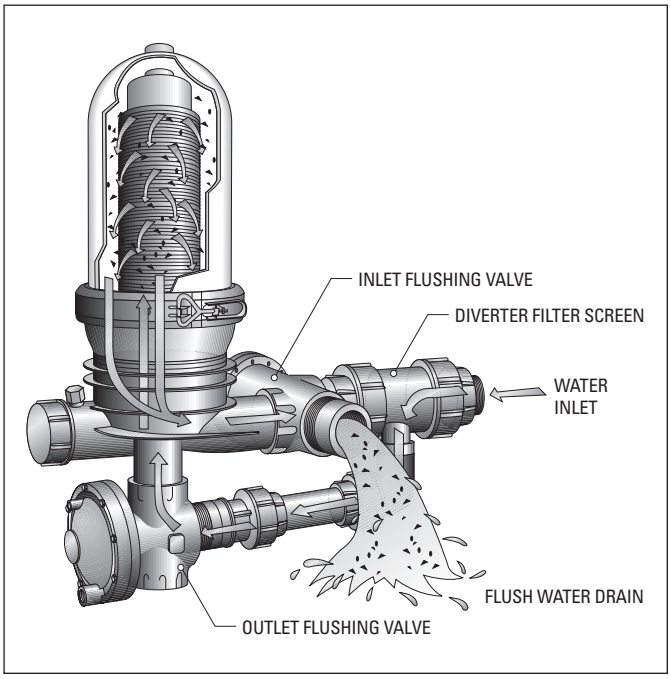
FILTER OPERATION

The discs are stacked on the spine. The discs are color-coded by micron size and are assembled according to the water filtration requirements. The spine assembly has a spring compression unit and an internal piston which are used to alternately compress and release the discs during filtration and backflush cycles. During filtration, water flows through the inlet flushing valve via the diverter filter tube and into the filter unit where it is cleaned. The filtered water then flows through the outlet flushing valve, clean for consumer use.



FILTRATION MODE



BACKFLUSHING MODE

FILTRATION MODE:

During the filtration process the filter discs are tightly compressed together by the spring and the differential pressure, forcing the water to flow through the grooves and traps of the discs.

BACKFLUSHING MODE:

Backflush commands, based on pressure differential or time settings, are sent from the controller to three separate components in the filter:

- Inlet Valve - Enters backflush mode (entrance closed, drain opens)
- Outlet Valve - Enters backflush mode (downstream closed, flush water diverter opens)
- Filter - Operational (stack of discs enters open mode)

Water flows via the diverter filter screen, through the diverter into the outlet flushing valve. It enters the main filter (which is open), where jets of water flush the grooves in the discs as the discs spin. The water carries away impurities toward the inlet valve.

At the end of the backflushing process (approximately 20 seconds), the backflush command is withdrawn, the discs are retightened and the filter returns to the filtration mode.

The inlet and outlet valves return to the filtering mode. Water flows once again into the filter, carrying with it the impurities that are collected on the diverter filter screen during backflushing.

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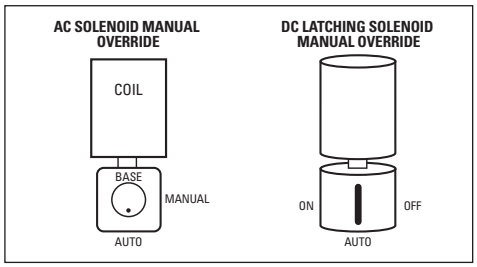
INSTALLATION

INSTALLATION STEPS:

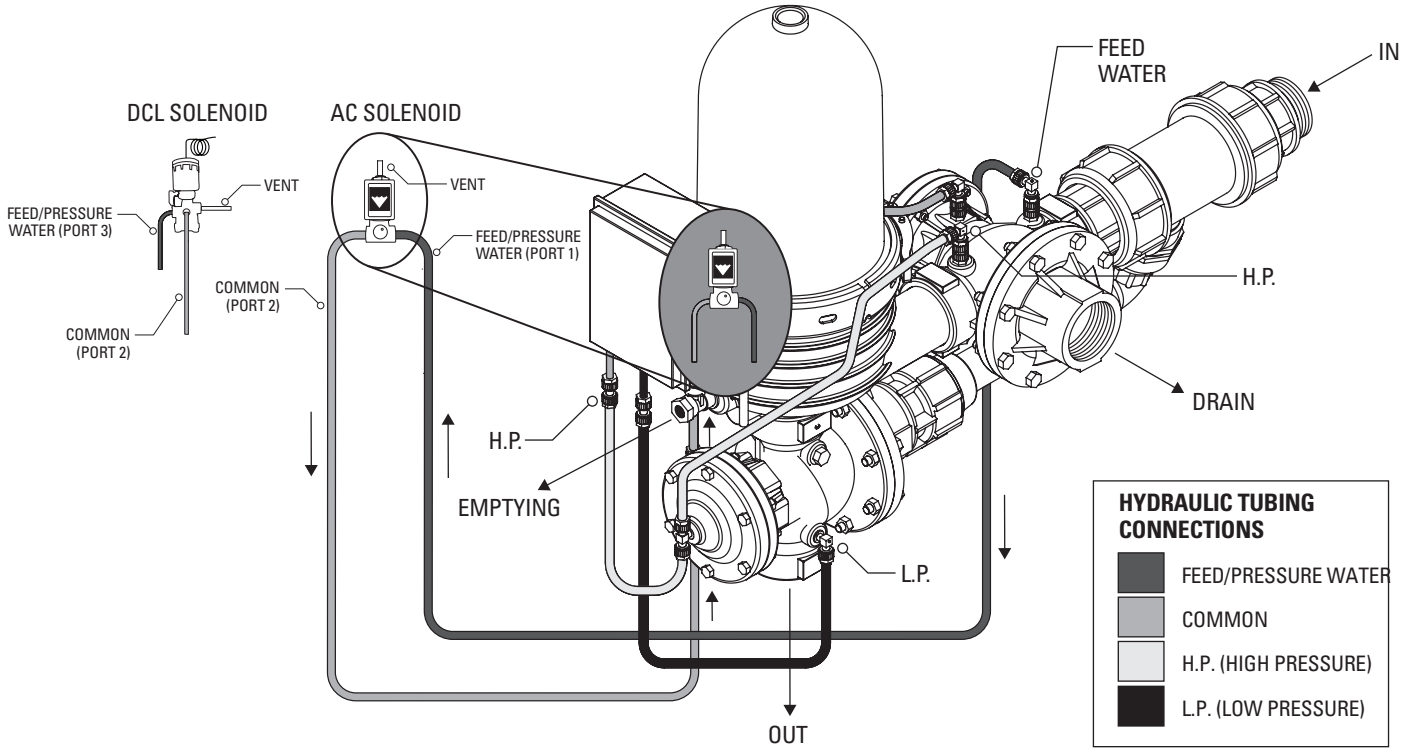
- Install the filter making sure the flow of water follows the directional arrows on the filter (inlet and outlet).
- Connect a drain line to the flush drain of the backflush valve located in the front of the filter. The drain line should be at least 2" in diameter and not be longer than 30 feet. If a longer drain line is necessary, use a 3" diameter line. The drain water must flow freely with no back-pressure to the filter.
- Check that the filter cover is closed correctly.
- See Backflush Controller Programming on Page 7.
- Check the Pressure Differential (PD) gauge and make sure it is set to 5 psi.
- For DC Latching models, verify that the manual override green lever on the solenoid is in the vertical position - AUTO. For AC models, the dot on the brass knob faces down.



- Turn on the water to the filter. When the line is pressurized, initiate a backflush by turning the manual override on the solenoid to the left 90 degrees - FLUSH. The filter will go into the backflush mode and stay in the backflush mode as long as the manual override is to the left. Return to manual override to the vertical position (AUTO) and the filter will end the backflush cycle and return to filtration mode.

IMPORTANT: There must be at least 35 GPM at 30 psi at the upstream side of the filter during backflush for the filter to flush properly. The Low Flow model requires at least 20 GPM at 30 psi during backflush.

- Check the Pressure Differential (PD) gauge to make sure it is working. For Murphy PD gauges, unscrew the hydraulic tube on the Low Pressure port (the offset port) under the PD gauge. Water will squirt out of the tube. Direct the water away from you. By disconnecting the Low Pressure tube, the PD gauge will think that the downstream pressure is 0 psi. The long needle on the gauge should move to the set (short) needle, and a backflush will be initiated. There is a 25 - 30 second pre-dwell delay from the time the 2 needles make contact until the backflush begins.
- The backflush will last for 20 seconds, end, and the filter will return to filtration mode.
- The outlet valve will shut completely during the 20 second backflush. It will reopen when the backflush is complete.



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FILTER OPERATION

BACKFLUSH CONTROLLER PROGRAMMING – DC LATCHING MODEL:

- Backflush Controller is two-station and operates two-wire latching solenoids.
- Attach the red solenoid wire to the (–) solenoid terminal marked S1. Attach the black solenoid wire to the (+) solenoid terminal marked S1.
- Select the PERIODIC FLUSH setting and set to 8 hours.
- Select the FLUSH setting and set to 20 seconds and DWELL to 0 seconds.
- Set the Pressure Differential (PD) to 5 psi.
- The PD delay is the interval from the time the PD sends a signal to start a backflush cycle and the time backflush actually starts. This delay insures that the filters are truly dirty before backflush is initiated. The PD delay is fixed at 30 seconds.
- The PERIODIC time resets itself after every cycle. To start the manual backflush, push the MANUAL START button for one second.

BACKFLUSH CONTROLLER PROGRAMMING – AC MODEL:

- Select solenoid output on the back of the circuit board by sliding the switch toward the edge of the circuit board for AC models.
- Select the PERIODIC FLUSH setting and set to 8 hours.
- Select the FLUSH setting and set to 20 seconds and DWELL to 0 seconds.
- Set the Pressure Differential (PD) Gauge to 5 psi.
- The PD delay is the interval from the time the PD sends a signal to start a backflush cycle and the time backflush actually starts. This delay insures that the filters are truly dirty before backflush is initiated. The PD delay is fixed at 30 seconds.
- When the PD is activated, display shows I/PD (Idle with PD) and PD LED is on. When three consecutive backflushes triggered by the PD are completed, the alarm output comes on and the display flashes PD ALARM. To reset alarm, press button for one second while controller is in IDLE.
- There is a three digit backflush counter on the display. To reset the count, press the COUNTER RESET button for one second while in IDLE.
- The PERIODIC time resets itself after every cycle. To start the manual backflush, push the MANUAL START button for one second.

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SYSTEM MAINTENANCE

GENERAL REQUIREMENTS AND MAINTENANCE:

- Confirm there is 30 psi of pressure upstream of the filter during backflush.
- Check that the Pressure Differential (PD) Gauge returns to 0-2 psi after a backflush.
- All vent tubes need to vent freely to atmosphere without any back pressure.
- Drain manifold requirements: 2" pipe, no longer than 30' in length without elevating.
- To minimize damage to the backflush controller, always keep the door closed and turn off the power when not using the controller for long periods of time.

SEASONAL MAINTENANCE:

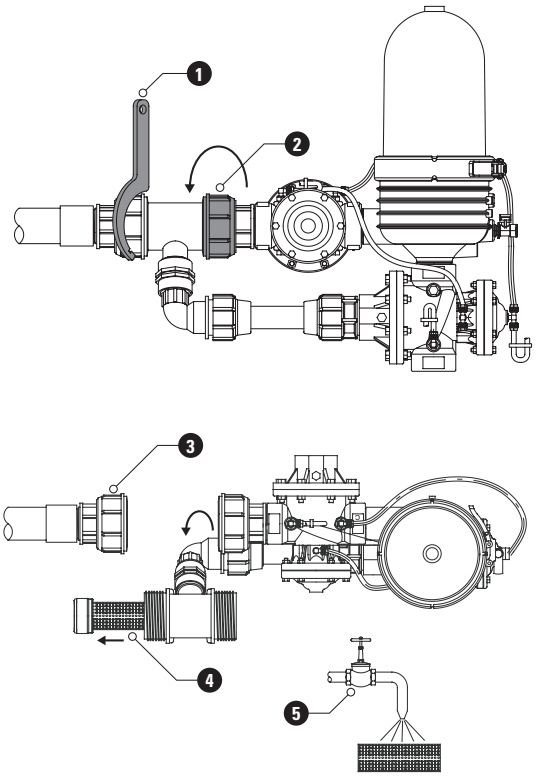
- For DC Latching Backflush Controller, replace two 9 Volt lithium batteries every two-three years, or as needed. Batteries are located inside the backflush controller.
- At the end of the irrigation season, just before shutdown, initiate a backflush with the required pressure and turn off the water. This will ensure the discs remain clean during the offseason.
- Manually clean the discs if needed – see detailed instructions on Page 9.
- Clean the finger filter - see location in diagram on Page 14.
- In order to prevent the filter from becoming damaged under freezing conditions, drain all the water from the filter and disconnect the control tubes making sure to label for correct reattachment.

MONTHLY CHECK

- ✓ INLET/OUTLET PRESSURE
- ✓ BACKFLUSH CONTROLLER
- ✓ LEAKAGE
- ✓ SOLENOID
- ✓ DOWNSTREAM PRESSURE & DRAIN

BYPASS FILTER MAINTENANCE:

- Close the inlet water after backflushing the system and make certain there is no pressure in the system.
- Use a wrench to release tightening nuts – see ❶ and ❷.
- Unscrew the nut completely – see ❸.
- Twist the bypass filter – see ❹.
- Remove the internal screen element and rinse the screen element – see ❺.
- Reassemble.
- Open the inlet valve.



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SYSTEM MAINTENANCE

DISC CLEANING INSTRUCTIONS:

NOTE: Make sure the system is not under pressure.

- Release the clamp and remove the cover (Figure 1).
- Unscrew the butterfly-nut on the filtration element (Figure 2).
- Remove the tightening cylinder (Figure 3).
- Remove the discs. For convenience, we recommend using a plastic bag (Figure 4, 5).
- Tie each disc set on a string and place them in a cleaning solution. Refer to instructions on Page 10 for recommended cleaning solutions based on water deposits.
- Thoroughly wash the discs with fresh water and then reassemble the discs on the spine (Figure 6).
- Check that the correct quantity of discs is assembled on the spine. When the discs are pressed with two hands, the top disc should be centered between the two lines molded in the plastic at the top of the nozzles (Figure 7).
- Replace the tightening cylinder and tighten the butterfly nut until it stops - do not overtighten (Figure 8, 9).
- Reassemble the filter cover and tighten the clamp (Figure 10, 11).

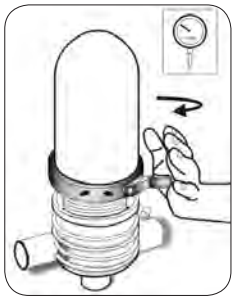
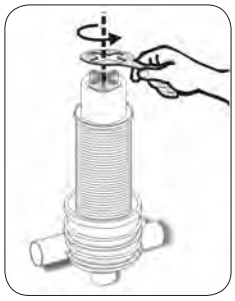


FIGURE 1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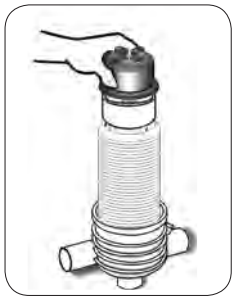
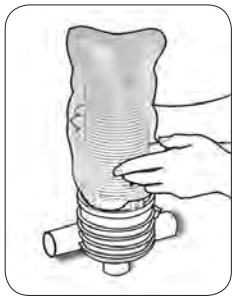


FIGURE 3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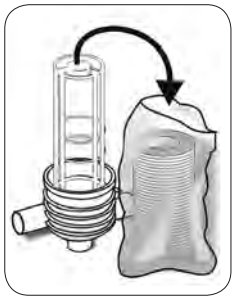
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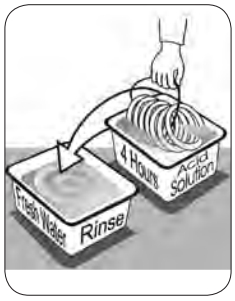

FIGURE 6

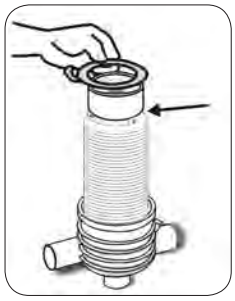
FIGURE 7

FIGURE 8

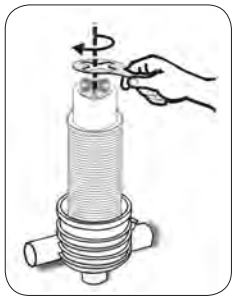
FIGURE 9

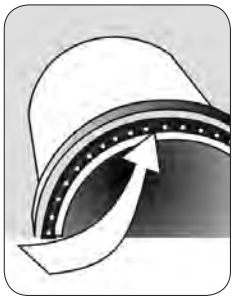
FIGURE 10

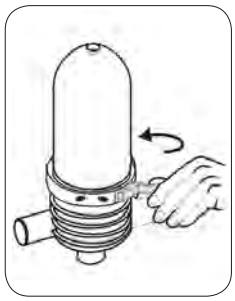
FIGURE 11

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SYSTEM MAINTENANCE

DISC CLEANING INSTRUCTIONS FOR SURFACE WATER WITH ORGANIC AND BIOLOGICAL RESIDUE:

Step 1

- Make a 10% Peroxide solution. Pour 1.8 gallons of water into a container and add .80 gallons of Hydrogen Peroxide (35%) or pour 2.1 gallons of water into the container and add .53 gallons of Hydrogen Peroxide (50%) to the water.
- Soak the discs in this solution making sure the discs are loose and have good contact on both sides with the Peroxide solution. Do not put too many discs in at one time.
- Stir the discs in the solution a few times.
- Total soaking time is 1 to 3 hours. If the solution is no longer cleaning the discs, replace it with a new mixture.
- Remove the discs and rinse well with water – there should only be a pale sedimentation on the discs.

Step 2

- After the discs have been rinsed with water, they must be soaked in a 10% Hydrochloric Acid solution to remove the organic residue.
- Make a 10% Hydrochloric Acid solution. Pour 1.8 gallons of water into a container and add .80 gallons Hydrochloric Acid (30-35%) to the water.
- Soak the discs in this solution making sure the discs are loose and have good contact on both sides with the acid solution. Do not put too many discs in at one time.
- Stir the discs in the solution a few times.
- Total soaking time is 1 to 3 hours. If the solution is no longer cleaning the discs, replace it with a new mixture.
- Remove the discs and rinse well with water – there should no longer be any residue between the grooves of the discs.
- Put the discs on the spine and spine assembly in the filter bank.
- Flush the filter bank a few times to remove all chemicals.

DISC CLEANING INSTRUCTIONS FOR WELL WATER WITH MANGANESE, IRON OR CARBONATE DEPOSITS:

Step 1

- Make a 10% Hydrochloric Acid solution. Pour 1.8 gallons of water into a container and add .80 gallons Hydrochloric Acid (30-35%) to the water.
- Soak the discs in this solution making sure the discs are loose and have good contact on both sides with the acid solution. Do not put too many discs in at one time.
- Stir the discs in the solution a few times.
- Total soaking time is 1 to 3 hours. If the solution is no longer cleaning the discs, replace it with a new mixture.
- Remove the discs and rinse well with water – there should only be a pale sedimentation on the discs.

Step 2

- After the discs have been rinsed with water, they must be soaked in a 10% Peroxide solution to remove the organic residue.
- Make a 10% Peroxide solution. Pour 1.8 gallons of water into a container and add .80 gallons of Hydrogen Peroxide (35%) or pour 2.1 gallons of water into the container and add .53 gallons of Hydrogen Peroxide (50%) to the water.
- Soak the discs in this solution making sure the discs are loose and have good contact on both sides with the Peroxide solution. Do not put too many discs in at one time.
- Stir the discs in the solution a few times.
- Total soaking time is 1 to 3 hours. If the solution is no longer cleaning the discs, replace it with a new mixture.
- Remove the discs and rinse well with water – there should no longer be any residue between the grooves of the discs.
- Put the discs on the spine and spine assembly in the filter bank.
- Flush the filter bank a few times to remove all chemicals.

Caution: When blowing out with compressed air, make sure all parts are opened.

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TROUBLESHOOTING FOR NO BACKFLUSH OPERATION:

If the filter is not backflushing, it could be one or more of the following reasons:

1. The Diverter Screen is Dirty
2. The Backflush Controller is Not Working
3. The Pressure Differential (PD) Gauge is Not Working
4. The Solenoid is Not Working
5. The Backflush Valve is Not Working Properly

1. The Diverter Screen is Dirty:

The diverter filter screen is a small cylindrical screen located near the inlet of the filter between the two large unions. This screen only filters water when the filter starts to flush.

- Initiate a backflush by turning the manual override of the DC latching solenoid 90 degrees to the left or by turning the brass knob of the AC solenoid brass base 90 degrees.
- If the filter flushes, the diverter filter screen is clean and the problem is elsewhere.
- If the filter does not flush, the diverter filter screen may be dirty.
- If this screen becomes clogged, there is no command water available to clean the discs.
- To clean the diverter filter screen:
  - Unscrew both unions completely.
  - Push the section between the unions forward.
  - Pull out the screen from its housing and clean with water pressure.
  - Return the screen to its housing. Make sure the screen is completely inserted with the o-rings in place.
  - Re-align the screen housing and tighten the unions by hand only.
- Flush the filter again via the manual override. The filter should flush and will continue to flush until the manual override is retuned to its automatic position.

2. The Backflush Controller is Not Working:

- To test the backflush controller, initiate a backflush by pressing the black button (manual override) on the front of the panel. If a backflush was initiated, then the controller panel, batteries and solenoid are good. If the backflush did not work, we need to determine which component is not working.
- For DC Latching backflush controllers, make sure the batteries are charged. Batteries should be changed every 2-3 years depending upon frequency of filter irrigation and flushing. Use two 9 volt DC Lithium Batteries only.
- For AC backflush controllers, make sure the transformer is still functioning and replace if needed.
- Check the incoming current to the controller. It should read 110 volt for AC models and 10 to 20 volts for DC models.
- Check the incoming current to the controller panel. For AC models (after the transformer), it should read 24 volts.
- Check the outgoing current from the panel. For AC models, current should be 24-27 volts. For DC models, current should be 12-14 volts.
- The controller panel can malfunction if exposed to moist or dusty conditions, rust, or lightning. If you suspect any of these causes, contact the backflush controller manufacturer for inspection and possible warranty or repair. Or call Netafim USA Technical Support at 888-638-2346 for assistance.

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TROUBLESHOOTING

TROUBLESHOOTING FOR NO BACKFLUSH OPERATION, CONTINUED

3. The Pressure Differential (PD) Gauge is Not Working:

- The PD gauge is installed just below the backflush controller and the short needle should be set to 5 psi.
- Turn the black knob of the PD gauge carefully to adjust the setting.
- The long red needle indicates the pressure differential at any given time. If the needle reads zero, then the discs are clean. As the red needle moves towards the shorter (set point) needle, then the discs are getting dirty. When the two needles touch, the backflush controller will initiate a flush cycle.
- To test the PD gauge, while the water is on, disconnect the hydraulic tube from the low pressure port of the gauge (the off center port). Water will squirt out of the tube; you can bend the tube to temporarily stop the water. The long red needle should move and touch the short needle and start a flush cycle. After the programmed delay, if the flush starts then the PD gauge is working. If there is no flush, replace the PD gauge.
- Re-connect the hydraulic tube to the PD gauge.

4. The Solenoid is Not Working:

- If the backflush controller is working, press the manual override button on the controller. The solenoid should click and send the filter into flush mode. After 20 seconds, the solenoid should click again and end the backflush.
  - If it doesn't click, replace the solenoid.
- If you are not sure the backflush controller is working, test the solenoids:
  - Remove the wires of the solenoid from the terminal of the control panel and connect them directly to the power source.
  - For DC models, touch the wires to the battery terminals.
  - For AC models, connect the solenoid wires to the outlet transformer wires.
  - If the solenoid clicks, then the solenoid is operating and the control panel is not. If the solenoid does not click, then the solenoid needs to be replaced.

5. The Backflush Valves are Not Working:

- If all other components are functioning and the filter is not flushing, the backflush valves may not be working.
- Remove the valve cover. Do not unscrew the bolts connecting the bonnet to the valve body. Rather, disconnect all hydraulic tubes to the solenoid and valve, grasp the bonnet of the valve with both hands and unscrew the entire bonnet assembly from the valve base. Lift the bonnet and stem assembly from the valve body and inspect the parts.
- Replace any faulty valve parts.

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TROUBLESHOOTING FOR CONTINUOUS BACKFLUSHING

If the filter is constantly backflushing, it could be one of the following reasons:

1. Filter Discs are Extremely Dirty or Clogged
2. Filter is Flushing With Less Than 30 psi
3. Drain Manifold is Too Long or Becomes Too Elevated
4. Defective Pressure Differential (PD) Gauge
5. Solenoid Wires May Be Connected Incorrectly

1. Filter Discs are Extremely Dirty or Clogged:

- Turn off the water and be sure there is no pressure in the system.
- Drain the filter by opening the small ball valve on the filter body.
- Open the clamp on the filter and remove the cover.
- If the discs are extremely dirty, open the butterfly nut on top of the spine and remove the discs. Clean according to the instructions on Page 9.
- Return the discs to the spine making sure the height of the discs (when compressed with your fingers) is in between the two lines indicated on the plastic at the top of the nozzles.
- Return the cap and butterfly nut and very snugly tighten the nut (do not over tighten) with the Netafim butterfly wrench.

2. Filter is Flushing With Less Than 40 psi:

- Check the upstream pressure gauge during the flush mode. If the gauge reads less than 30 psi, then the discs will not clean properly.
- Increase the pressure to a minimum of 30 psi.

3. Drain Manifold is Too Long or Becomes Too Elevated:

- The drain manifold must be a 2" diameter pipe, not longer than 30 feet and not elevating.
- If the drain manifold elevates, every 2.3 feet equals one (1) psi. Example: With a 10 foot elevation, an additional 4.4 psi must be added to the required minimum flushing pressure of 30 psi. The new required flushing pressure becomes 35 psi.

4. Defective Pressure Differential (PD) Gauge:

- If the needles of the PD gauge are stuck together all of the time, the gauge is broken and needs to be replaced.
- Test the PD gauge by following the directions in "The Pressure Differential Gauge (PD) Gauge is Not Working" section on Page 12.

5. Solenoid Wires May Be Connected Incorrectly:

- Make sure the red solenoid wire is connected to the (-) solenoid terminal marked S1. Make sure the black wire is connected to the (+) solenoid terminal marked S1.

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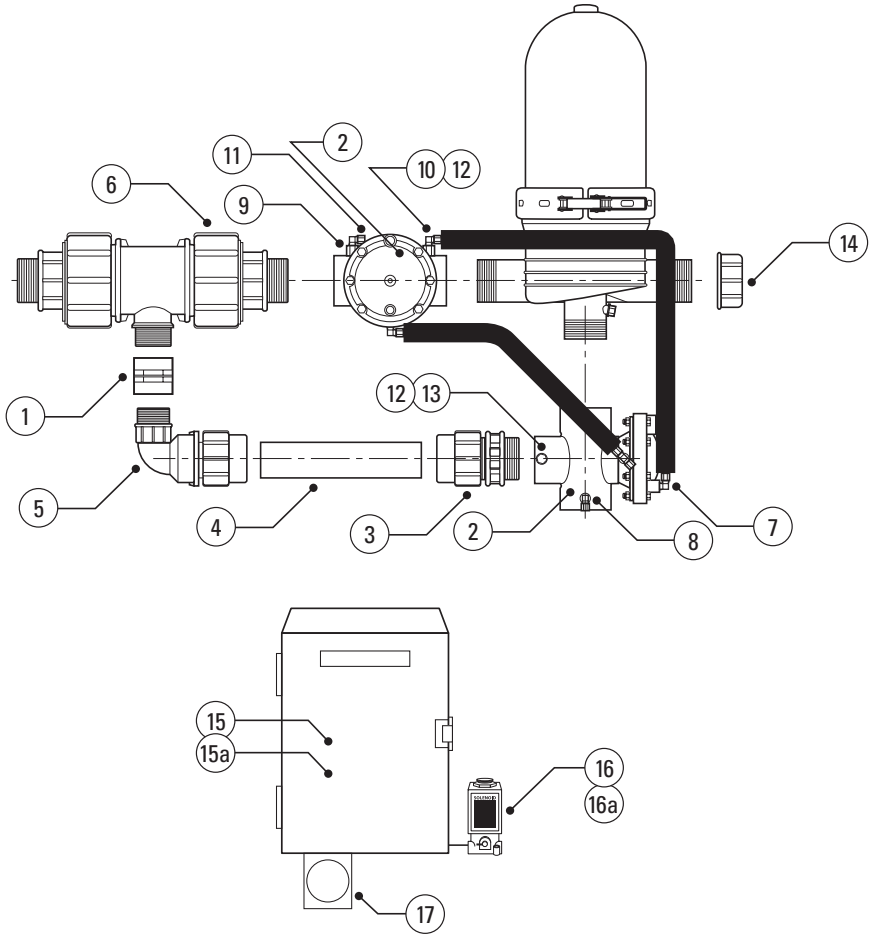
REPLACEMENT PARTS



2" COMPACT LP DISC-KLEEN FILTER PARTS

KEY	ITEM NUMBER	MODEL NUMBER	DESCRIPTION
1	75050-003500	25AP50225011	1 1/4" Coupling
2	71000-012780	61BFG2TP	2" Plastic Backflush Valve
3	75040-012100	25AP50225042	2" Male Adapter
4	70620-008405	25AP22532265	PE Pipe
5	75040-022550	25AP50223041	90° Elbow - Threaded Female
6	70620-007750	25AP18990051	Diverter Filter Screen
7	76400-004505	55P4714804-B	8mm x 1/4" x 8mm Tee (Bag 10)
8	76400-003503	55P4694804-B	1/4" x 8mm Angle Fitting (Bag 10)
9	71680-014170	61SF25P	1/4" Finger Filter
10	76400-003410	55P4694802-B	1/8" x 8mm Angle Fitting (Bag 10)
11	76400-006310	55P1220204-B	1/4" Double Nipple (Bag 10)
12	70620-005200	25AP25110103	Gauge Port Nut
13	70620-005100	25AP50060004	Gauge Port Seal
14	70620-005900	25AP332115	2" Cap
15	00105-001400	23AXF2ACDC-D	AC Backflush Controller
15a	00105-001550	23AXF2DCL-P	DC Latching Backflush Controller
16	71000-019400	61ARK12VDCL-MO	12VDC Latching Solenoid
16a	70800-003260	61BBC-024	24VAC Solenoid
17	00105-003200	23GALPD	PD Gauge

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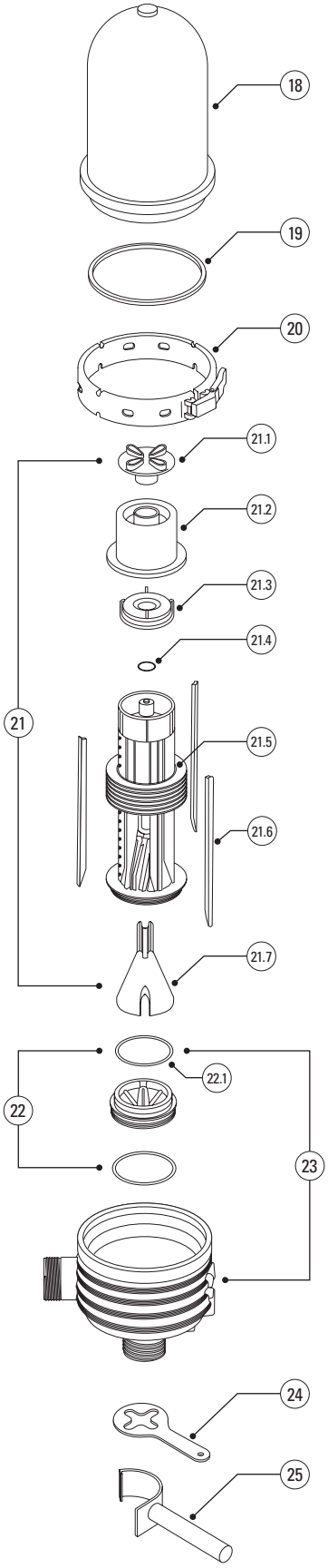
2" COMPACT LP DISC-KLEEN FILTER PARTS

KEY	ITEM NUMBER	MODEL NUMBER	DESCRIPTION
18	70620-002302	25AP25016220	Filter Cover (Grey)
19	70620-003900	25AP532140	Hydraulic Seal
20	70620-004700	25AP50420030	Clamp
21	70620-007403	25AP21991002LFS	Spine Complete Without Rings
	70620-007412	25AP21991008LC6	Spine Complete Without Rings for Low Flow
21.1	70620-006010	25AP25066224G	Green Butterly Nut
21.2	70620-007390	25AP25060226	Tightening Cylinder
21.3	70620-006452	25AP25300217N	White Piston
21.4	70620-004106	25AP50032115	O-Ring
21.5	70620-001667	25AP20221-080DK	Ring Set Only - Yellow, 80 Mesh
	70620-001670	25AP20221-120DK	Ring Set Only - Red, 120 Mesh
	70620-001675	25AP20221-140DK	Ring Set Only - Black, 140 Mesh
21.6	70620-005850	25AP50760009	Abrasion Shield (High Flow Model Only)
21.7	70620-007050	25AP50060008	Cone Membrane
22	70620-006050	25AP22340324	Complex Adapter
22.1	70620-004150	25AP50032234	O-Ring 2-234
23	70620-003286	25AP22002206	Body - threaded connection (Grey)
24	70620-007900	25AP50760028	Butterly Nut Wrench
25	70620-008000	25AP50760019	Spine Wrench



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SUBMITTAL PACKAGE

Date:

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HEMET, CA 92545

PHONE (951) 652-6811
TOLL FREE (800) 800-8804
FAX (951) 652-3078

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McCROMETER

PROJECT NOTES

Project Name: Center Hill Dam Left Bank Sanitary Waste System

Purchase Order No.:

Date: 2-7-17

Customer Name: Adams Contracting

Submitted By: Specialized Operations Services Inc

Equipment being purchased:

UM06 and Ground Rings

Included Items:

Ultra Mag sensor (UM06 or UM08 as noted above)
UltraLiner™ technology with NSF fusion bonded epoxy coating
Stainless Steel Electrodes
2-Year Warranty

Selectable Items:

Electrodes Material: 316 SS

Flanges: AWWA Flat Faced Flanges, 150 lbs

☑ Meter Mount Converter
or
☐ Remote Mounter Converter with feet of cable

Converter Power: (Check One) A/C Power ☑ D/C Power ☐

Special (Optional): ☐ Modbus Protocol RS485 Converter ☐ Hart Converter ☐ Profibus onverter

See Configu ation Sheet and drawings as follows for sizing and option details.

McCROMETER
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TEL: 951-652-6811 • 800-220-2279 • FAX: 951-652-3078
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MODEL UM06 AND UM08

ULTRA MAG® ELECTROMAGNETIC FLOW METER

150 PSI FLANGED TUBE METER, SIZES 2" thru 48"

300 PSI FLANGED TUBE METER, SIZES 2" thru 48"

Ultra Mag And SIGNAL CONVERTER

DESCRIPTION

MODELS UM06 AND UM08 FLANGED TUBE ULTRA MAG® meters are manufactured to the highest standard available for magmeters. They incorporate microprocessor technology to offer very low fl ws and broad rangeability. The flanged end tube design permits use in a wide range of applications with up to 300 PSI working pressure. Flanged ends are Class "D" fl t face flanges (150 PSI) or Class "F" raised face flanges (300 PSI). The fabricated tube is stainless steel with steel or stainless steel flanges and is lined with UltraLiner™, an NSF approved, fusion bonded epoxy material.

INSTALLATION is made similar to placing a short length of flanged end pipe in the line. The meter can be installed vertically, horizontally, or inclined on suction or discharge lines. The meter must have a full pipe of liquid for proper operation. Fluid must be grounded to the downstream flange of the sensor either via internal grounding electrodes (4 - 12") or using McCrometer 316 SS Grounding Rings. For best performance, grounding rings are recommended for all sizes. Any 90 or 45 degree elbows, valves, partially opened valves, etc. should not be placed closer than one pipe diameters upstream and zero pipe diameters downstream. All blending and chemical injection should be done early enough so the fl w media is thoroughly mixed prior to entering the measurement area.

SIGNAL CONVERTER: The signal converter is the reporting, input and output control device for the sensor. The converter allows the measurements, functional programming, control of the sensor and data recording to be communicated through the display and inputs/outputs. The microprocessor-based signal converter has a curve-fittin algorithm to improve accuracy, dual 4-20mA analog outputs, an RS485 communication port, an 8 line graphical backlit LCD display with 3-key touch programming, and a rugged enclosure that meets IP67. In addition to a menu-driven self-diagnostic test mode, the converter continually monitors the microprocessor's functionality. The converter will output rate of fl w and total volume. The converter also comes standard with password protection and many more features.

ISOLATED POWER AND SIGNAL: The power and signal between the converter and sensor are isolated and placed in separate cables giving superior resistance to electrical signal noise compared to single cable designs. An added benefit f om the dual cable design is a maximum cable length of up to 500ft.

OPTIONAL:

DC powered converter (10-35 VDC, 21 W)
Meter mounted converter
Extended warranty
Hastelloy® electrodes
ANSI or DIN flange
Quick Connect cable fitting
Special lay lengths, including ISO standard lay lengths
Converter sun shield
Modbus Protocol RS485 converter; HART® Converter; Profibus Converter (No Dual 4-20mA on HART & Profibus); Panel mount converter (Not CSA approved)

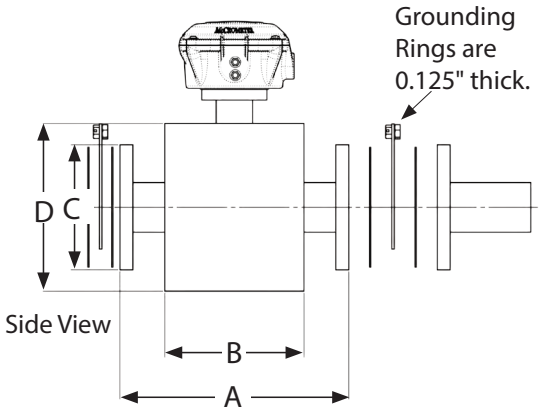
SPECIFICATIONS

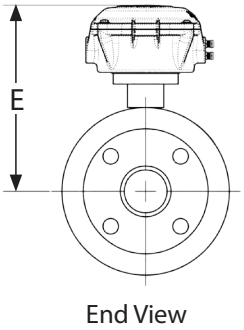
WARRANTY	2 Years
ACCURACY TESTS	5-point wet fl w calibration of every complete fl w tube with its signal converter. If desired, the tests can be witnessed by the customer. The McCrometer test facilities are traceable to the National Institute of Standards & Technology. Uncertainty relative to fl w is ±0.15%
ACCURACY	Plus or minus 0.5% of actual fl w
REPEATABILITY	±0.05% or ±.0008ft/s (±0.25mm/s), whichever is greater
HEAD LOSS	None. No obstruction in line and no moving parts
PRESSURE RANGE	150 PSI maximum working pressure (UM06) 300 PSI maximum working pressure (UM08)
TEMPERATURE RANGE	Sensor Operating: -10 to 77°C (14 to 170°F) Sensor Storage: -15 to 77°C (5 to 170° F) Electronics: Operating and storage temperature: -4˚ to 140˚ F (-20˚ to 60˚ C)
VELOCITY RANGE	.2 to 32 FPS
BI-DIRECTIONAL FLOW	Forward and reverse fl w indication and forward, reverse, net totalization are standard with all meters
CONDUCTIVITY	5 µs/cm
LINER	UltraLiner NSF approved, fusion bonded epoxy
ELECTRODES	Type 316 stainless steel, others optional
POWER SUPPLY	AC: 90-265VAC/45-66 Hz (20W/25VA) or DC: 10-35VDC (21W). AC or DC must be specified at time of ordering.
OUTPUTS	Dual 4-20mA Outputs (Not available for Profibus or HART Converters): Galvanically isolated and fully programmable for zero and full scale (0-21mA). Four separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings. • Volumetric Pulse • Hardware Alarm • Flow Rate (Frequency) • Empty Pipe • Directional Indication • Range Indication • High/Low Flow Alarms
CABLE LENGTH	Includes 20' of submersible and UV resistant cable. Additional cable up to 500' is available
EMPTY PIPE SENSING	Zero return when electrodes are uncovered
ALARMS	Programmable alarm outputs
DIGITAL TOTALIZER	Cubic Meter; Cubic Centimeter; Milliliter; Liter; Cubic Decimeter; Decaliter; Hectoliter; Cubic Inches; US Gallons; Imperial Gallons; Cubic Feet; Kilo Cubic Feet; Standard Barrel; Oil Barrel; US Kilogallon; Ten Thousands of Gallons; Imperial Kilogallon; Acre Feet; Megagallon; Imperial Megagallon; Hundred Cubic Feet, Megaliters
RATINGS	• Metering Tube: NEMA 6P/IP68 with remote converter (six foot depth continuous submersion) • Electronics enclosure: IP67
CERTIFICATIONS	• CE Certified (Converter only) • Listed by CSA to 61010-1: Certified y CSA to UL 61010-1 and CSA C22.2 No.61010-1-04 • ISO 9001:2008 certified quali y management system

CA MFR Review Exhibit 2 – Engineer Report

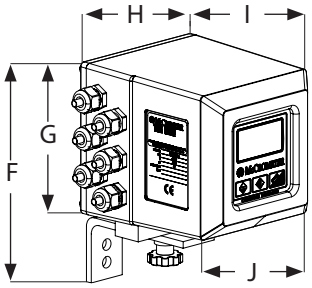
MODEL UM06 AND UM08

ELECTROMAGNETIC FLOW METER





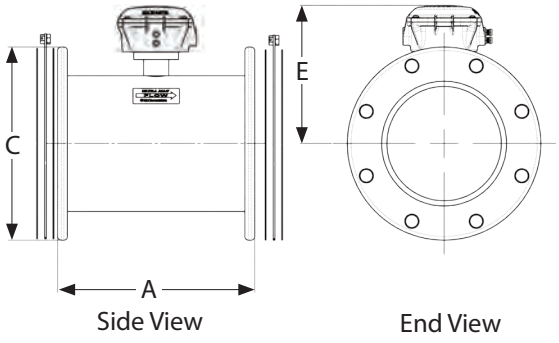
2" and 3" Models Body Style



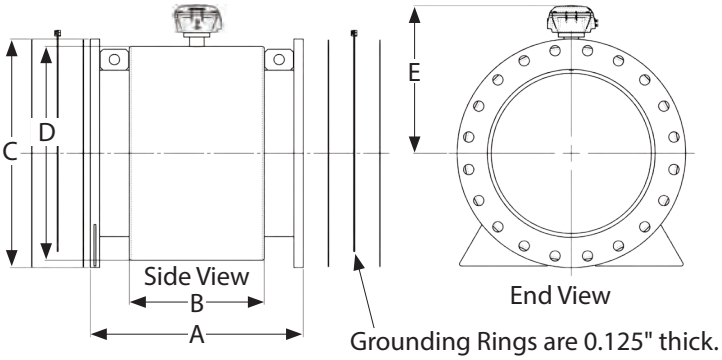
Bracket mounting holes are 0.27"

F	9.06"
G	5.75"
H	5.75"
I	6.69"
J	5.44"

Converter Dimensions



4" to 12" Models Body Style



14+" Models Body Style

Pipe Size (Nominal)	Meter Pipe ID	Flow Ranges GPM Standard .2 to 32 FPS Min - Max	DIMENSIONS (Lay Lengths)							Estimated Shipping Weight (lbs.)	
			A*		B	C		D	E		
			UM06	UM08		UM06	UM08			UM06	UM08
2"	2.117	2 - 340	11.00	11.00	6.70	6.00	6.50	7.90	9.26	93	107
3"	3.220	5 - 730	13.40	13.40	6.70	7.50	8.25	9.40	10.01	97	111
4"	3.720	8 - 1,140	13.40	13.40	n/a	9.00	10.00	n/a	8.06	78	108
6"	5.692	19 - 2,660	14.60	14.60	n/a	11.00	12.50	n/a	9.06	82	138
8"	7.692	33 - 4,870	16.10	17.25	n/a	13.50	15.00	n/a	10.06	115	195
10"	9.682	52 - 7,670	18.50	18.50	n/a	16.00	17.50	n/a	10.46	144	247
12"	11.682	74 - 11,180	19.70	19.70	n/a	19.00	20.50	n/a	12.31	193	342
14"	13.440	90 - 16,070	21.70	22.75	12.00	21.00	23.00	20.30	15.46	321	476
16"	15.440	118 - 20,900	23.60	25.25	14.20	23.50	25.50	21.10	16.21	390	645
18"	17.440	150 - 26,480	23.60	25.25	14.20	25.00	28.00	21.10	17.21	446	750
20"	19.440	185 - 32,720	25.60	28.25	16.20	27.50	30.50	24.80	18.26	588	874
24"	23.440	270 - 47,180	30.70	35.75	21.70	32.00	36.00	29.60	20.11	769	1,568
30"	29.190	420 - 73,620	35.80	41.75	26.50	38.75	43.00	35.90	23.26	1,261	2,317
36"	35.190	610 - 105,930	46.10	46.10	28.20	46.00	50.00	42.70	26.66	1,696	2,915
42"	41.190	830 - 144,370	48.05	**	32.10	52.75	**	48.35	29.99	**	**
48"	47.190	1,080 - 188,430	50.00	**	36.00	59.50	**	54.00	33.31	**	**

* Laying lengths for meters with ANSI Class 150 Flanges are equal to UM08 laying lengths

** Consult factory

Grounding And Electrical Interference

The sensor body must have electrical contact with the media. This is achieved via a grounding ring or grounding button.

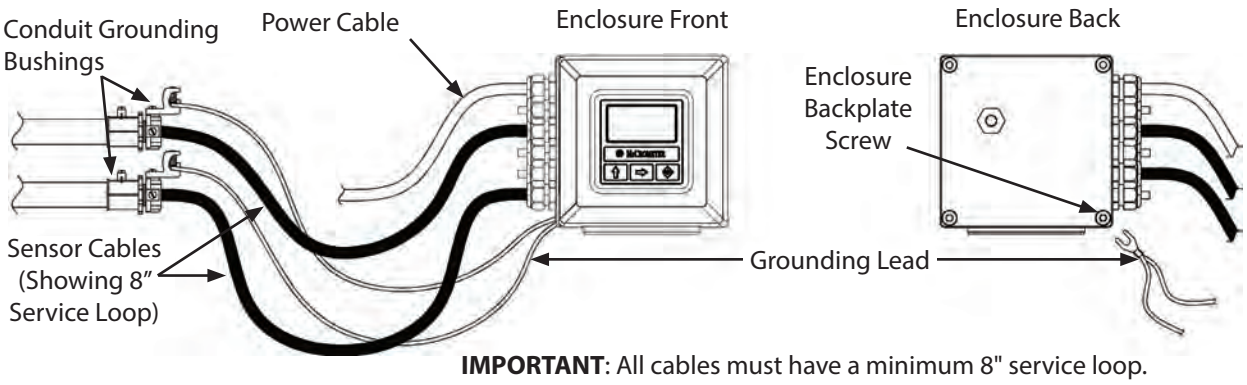
NOTE: The grounding ring is optional only on 4" through 12" models. For best performance, grounding rings are recommended for all sizes.

Always ensure that the converter and the sensor are grounded (earthed) correctly. The grounding of the sensor and converter ensures that the equipment and liquid have an equal potential. For most installations the quality of grounding by the provided cabling assures the sensor is properly grounded and additional grounding of the sensor is not required. However, in instances where this is not the case, i.e. the equipment and fluid do not have an equal potential, such as where the installation location and/or media is subjected to electrical interference, additional grounding steps may be required. Consult an electrician experienced with instrumentation installations to determine if electrical interference is present. For further information on installation environments and sensor grounding, please contact McCrometer Technical Support.

Lines With Cathodic Protection:

On meters installed on a line with cathodic protection it may be necessary to insulate the meter from the line. Consult your cathodic protection vendor for instructions.

WARNING: Do not connect any form of conduit directly to the converter enclosure. Doing so will allow moisture and potentially dangerous gasses to enter directly into the converter. Attaching any conduit to the enclosure, or altering the enclosure in any way will void the warranty.



IMPORTANT: All cables must have a minimum 8" service loop.

Cable Installation, Service Loop And Bonding To Metallic Conduit

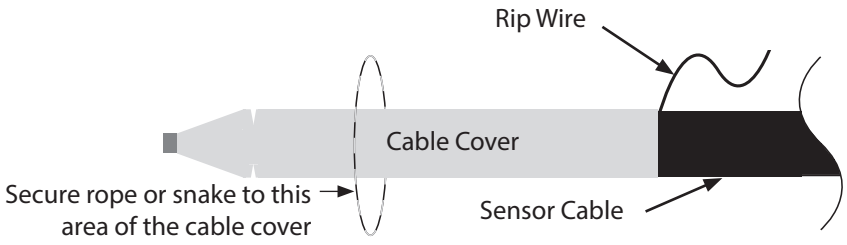
Pulling Sensor Cable Through Electrical Conduit

It is very important to protect the end of the sensor cable when pulling it through a conduit. Water can accumulate in low portions of conduit. Always use the factory supplied cable cover, or similar method, to seal the end of the cable against water when pulling the cable through conduit. *See Figure 5*. This will ensure proper operation of the meter.

Pulling The Sensor Cable:

1. Tie a rope or cable-snake securely around the middle of the cable cover.
2. Carefully pull the rope or snake until the sensor cable end clears the conduit.
3. Bring the cable end to the converter location. If necessary, secure the cable so that it does not fall back through the conduit.
4. Remove the cable cover by pulling the rip wire. The cable cover will tear off (disca d the cover).

CAUTION: Do not cut the cable cover off. Doing so may damage the sensor cable and adversely effect the calibration of the meter.



Cable Cover

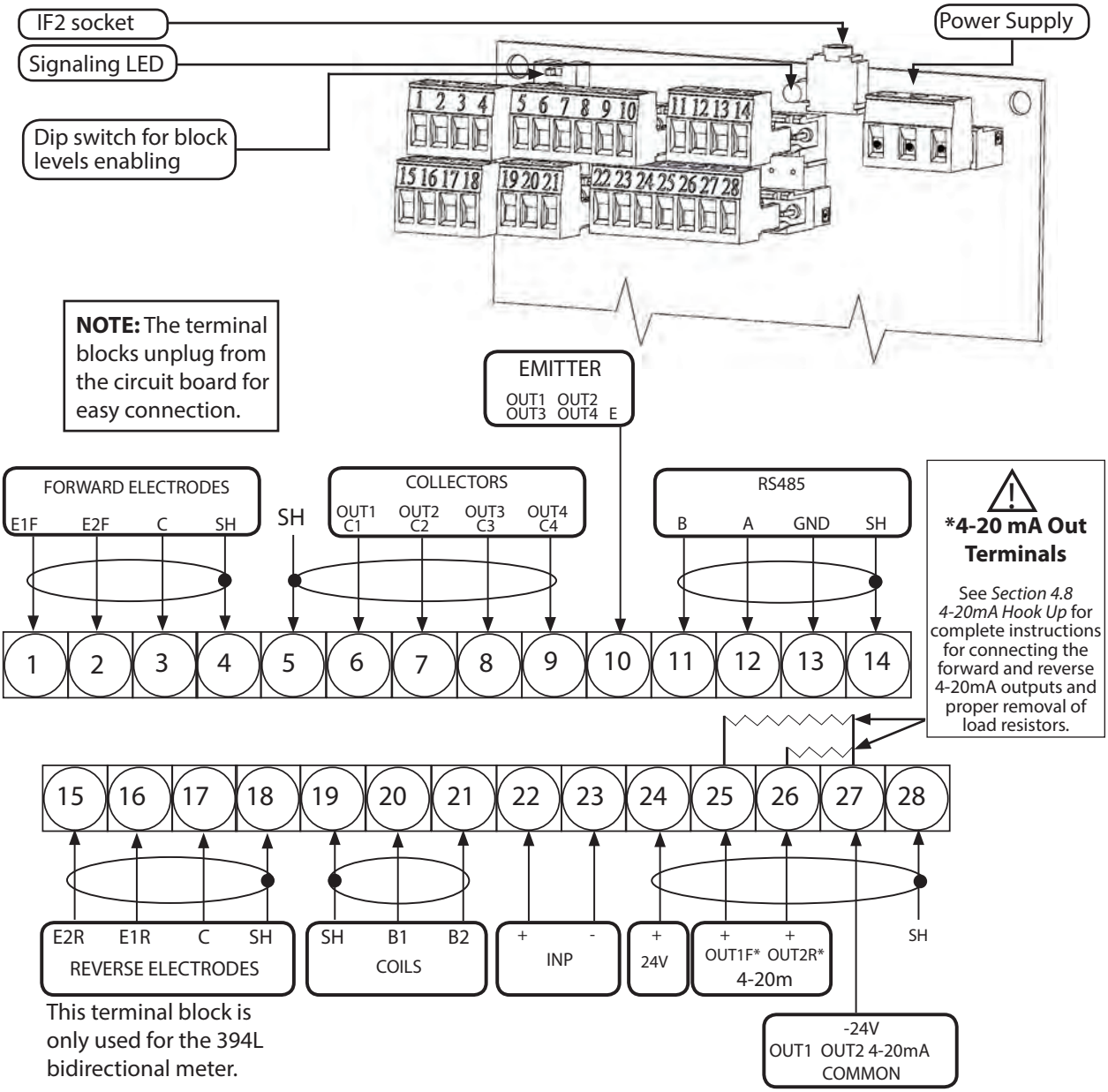
4.1 Converter Electrical Cable Connections

CAUTION - Always disconnect the power cord before attempting any electrical connections.

All electrical cables enter the converter through compression fittings loc ted on the side of the converter. Ensure that all compression glands are properly tightened and all unused fittings a e plugged so the case remains sealed.

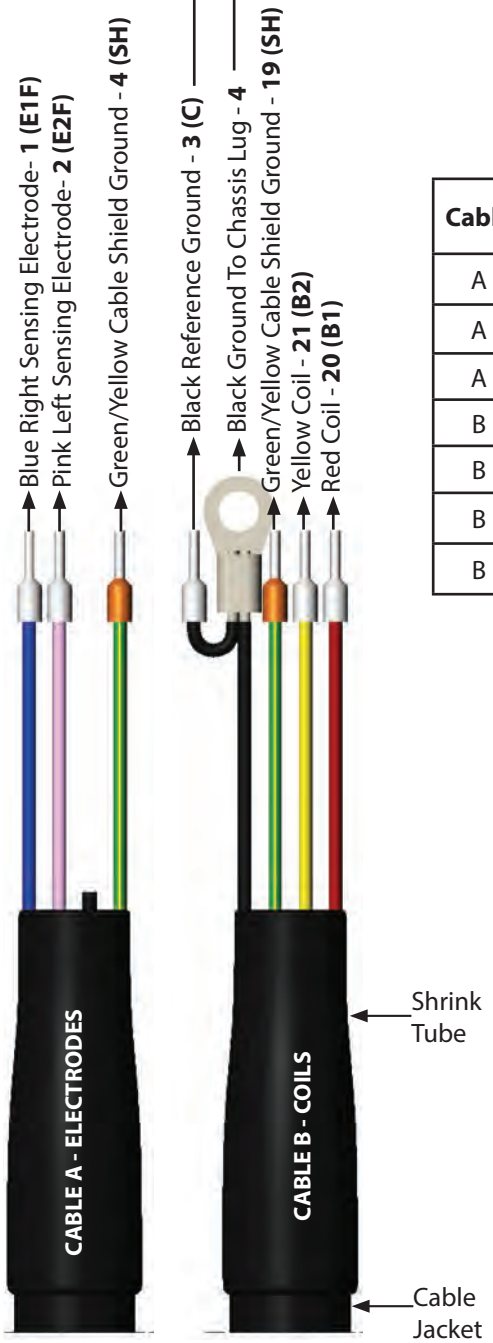
Terminal Board

All connections are made on the terminal board. To access the terminal board, loosen the four screws on the back of the converter to remove the rear cover.



Terminal Board Descriptions

***IMPORTANT:** See *Section 4.7 Converter Grounding* for instructions on attaching the chassis ground wire to the converter ground lug.



Ultra Mag And Mx Ultra Mag Body Style 1 Sensor Cable Connections

Cable	Terminal	Wire Color	Connected To
A	#1 (E1F)	Blue	Right Sensing electrodes
A	#2 (E2F)	Pink	Left Sensing Electrodes
A	#4 (SH)	Green/Yellow	Cable Shield Ground
B	Chassis Lug	Black	Ground To Chassis Lug*
B	#20 (B1)	Red	Coil
B	#21 (B2)	Yellow	Coil
B	#19 (SH)	Green Yellow	Cable Shield Ground

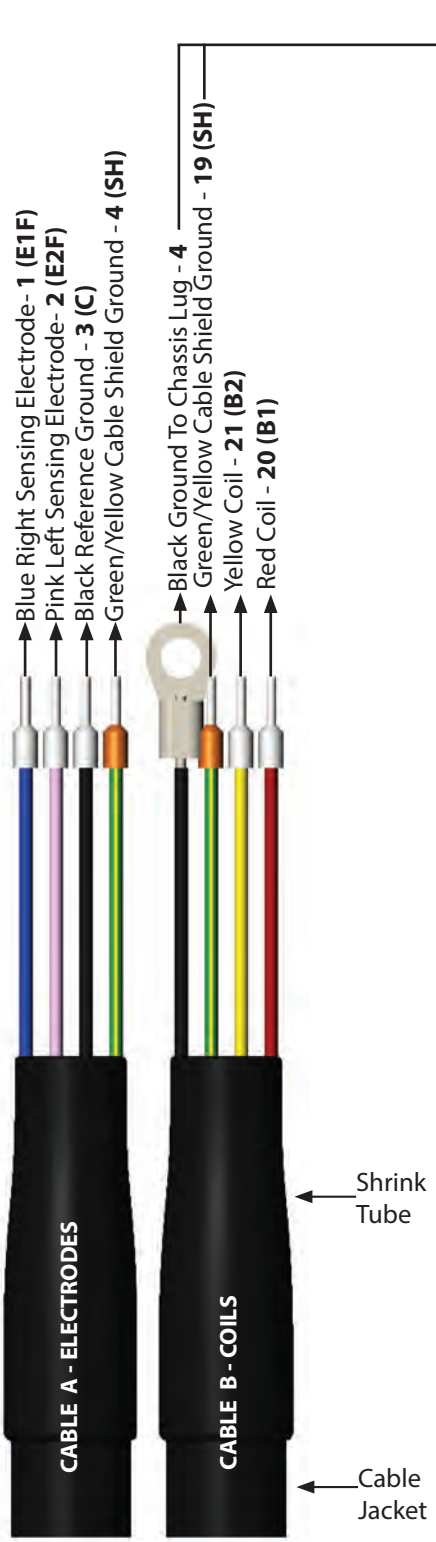
Terminal Block M1 Assignments

Ultra Mag And Mx Ultra Mag Body Style 1 - 2", 3" and 14+"

Cable Diameters:

Cable A (15035): 0.248"
Cable B (15036): 0.248"

Ultra Mag and Mx Ultra Mag Body Style 2 - 4" through 12"



Ultra Mag And Mx Ultra Mag Body Style 2 Sensor Cable Connections

***IMPORTANT:** See *Section 4.7 Converter Grounding* for instructions on attaching the chassis ground wire to the converter ground lug.

Cable	Terminal	Wire Color	Connected To
A	#1 (E1F)	Blue	Right Sensing electrodes
A	#2 (E2F)	Pink	Left Sensing Electrodes
A	#3 (C)	Black	Reference Ground
A	#4 (SH)	Green/Yellow	Cable Shield Ground
B	Chassis Lug	Black	Ground To Chassis Lug*
B	#20 (B1)	Red	Coil
B	#21 (B2)	Yellow	Coil
B	#19 (SH)	Green Yellow	Cable Shield Ground

Terminal Block M1 Assignments

Ultra Mag And Mx Ultra Mag Body Style 2 - 2 - 4" - 12"

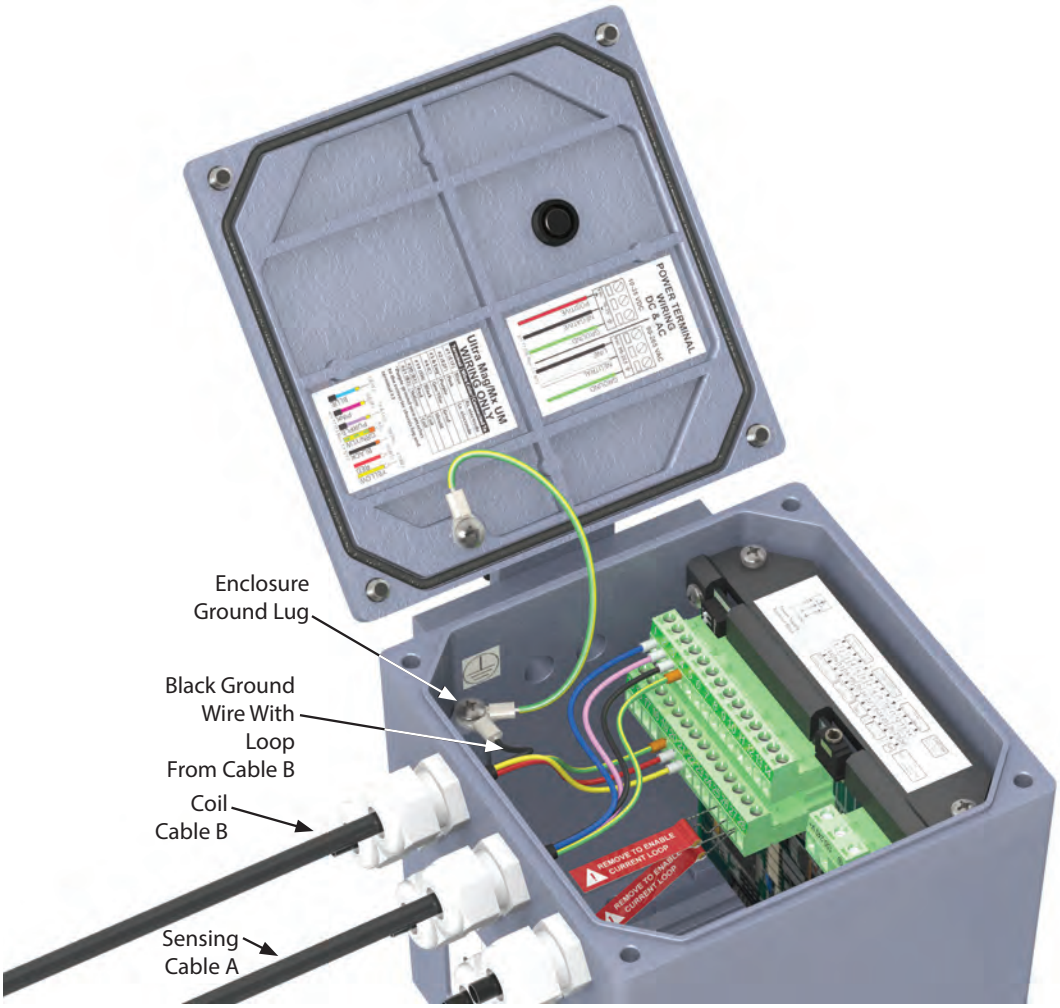
Cable Diameters:

Cable A (15035): 0.248"
Cable B (15036): 0.248"

Converter Grounding

Converter Grounding For Multi Mag 394L, 395L, And Ultra Mag Or Mx Ultra Mag Body Style 2

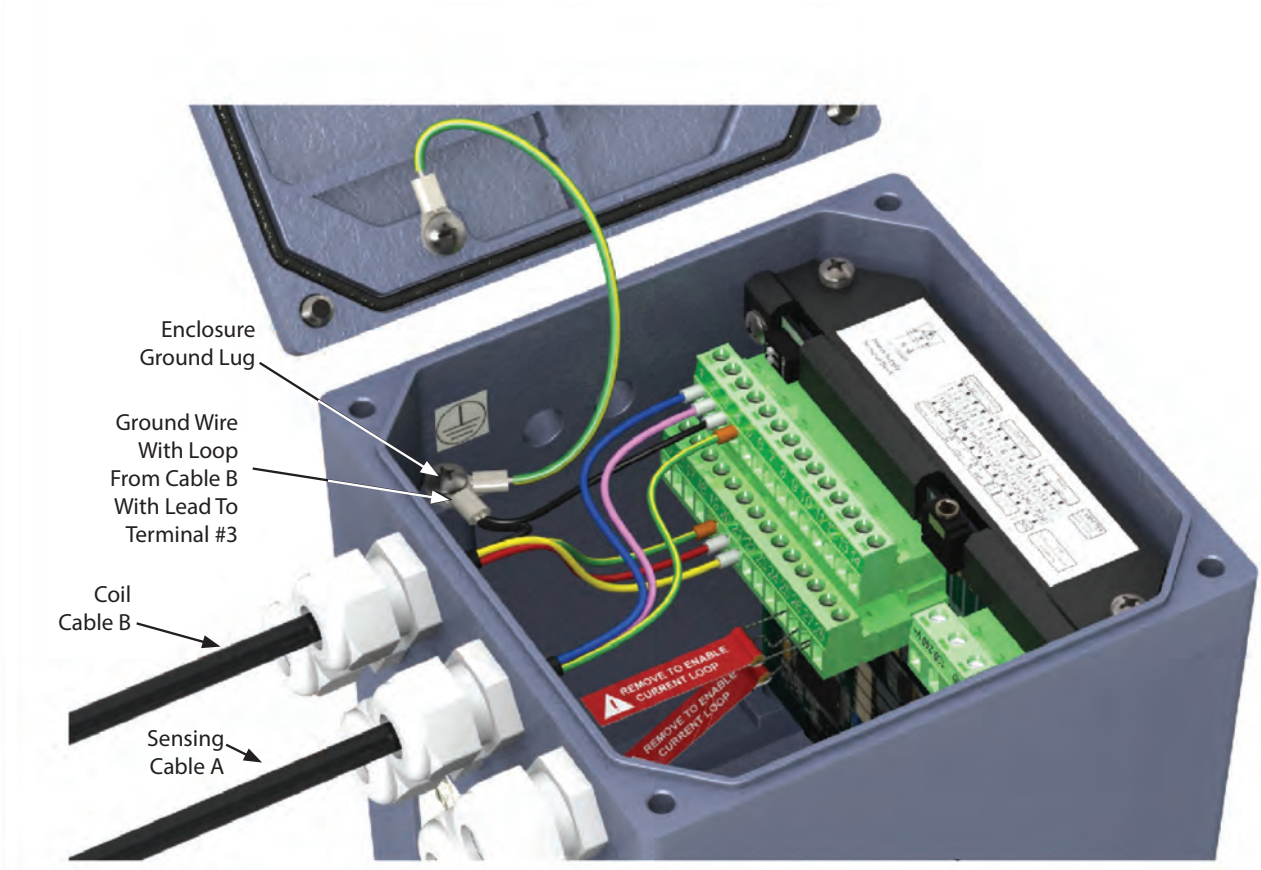
On converters attached to the 394L, 395L and Ultra Mag or the Mx Ultra Mag body style 2 fl w meters, the sensor cable has a ground wire fit ed with a loop. Attach the wire with the loop to the enclosure's ground terminal lug as shown in below.



Converter Grounding With Cable Lug For Multi Mag 394L And 395L, And Ultra Mag And Mx Ultra Mag Body Style 2

Converter Grounding For Ultra Mag or Mx Ultra Mag Body Style 1

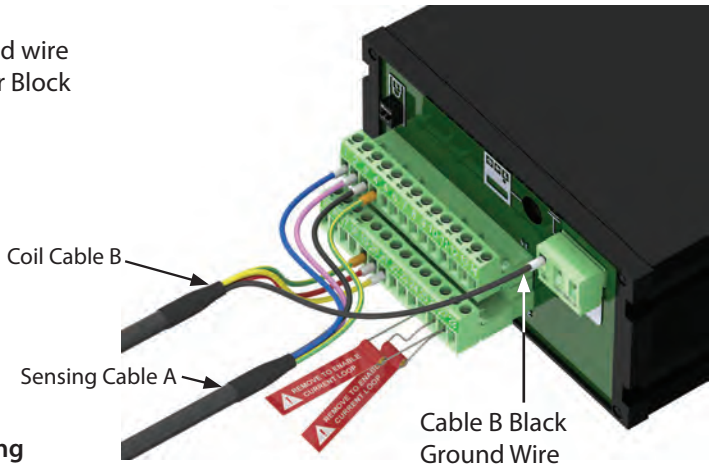
On converters attached to the Ultra Mag or the Mx Ultra Mag body style 1 fl w meters, the sensor cable has a ground wire fit ed with a loop and a terminal extension. Attach the wire to the enclosure's ground terminal lug as shown below via the wire end loop, then connect the wire extension to Terminal #3.



Converter Grounding With Cable Lug And Ground Lead For Ultra Mag and Mx Ultra Mag Body Style 1

Grounding For Panel Mount Converters

For panel mount converters, insert the Black Ground wire from Cable B into the Ground terminal in the Power Block as shown in *Figure 21*.



Panel Mount Converter Grounding

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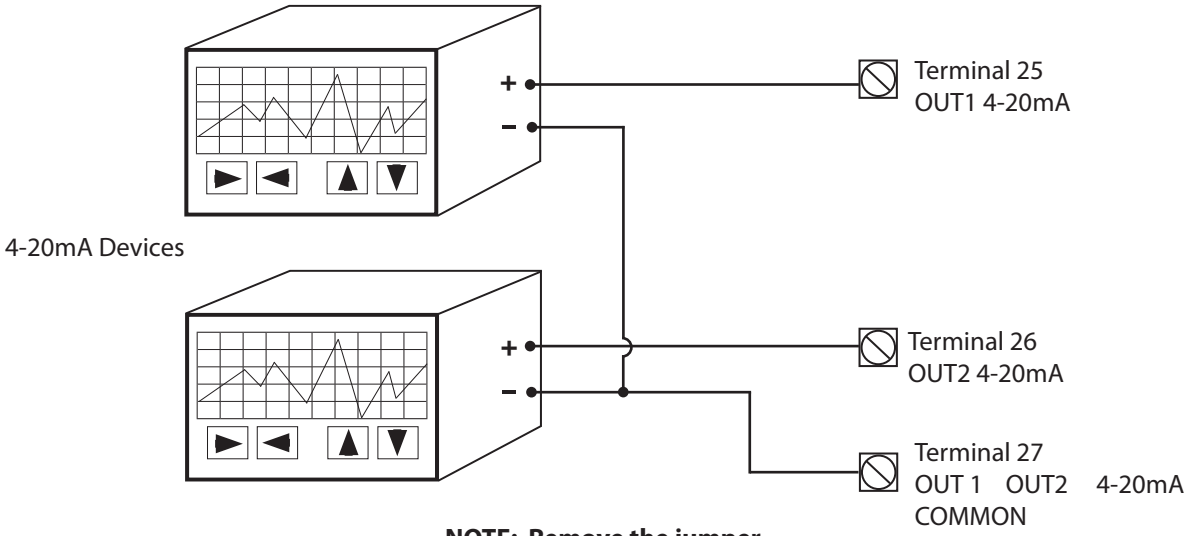
4-20mA Hook-Up

Isolated 4-20mA current loops are used to output fl w data to external devices. Maximum load impedance is 1,000Ω, and the maximum voltage without load is 27VDC. The converter has the capability to detect a loss of load on this output. To disable this function set the value "mA Val. Fault" under the ALARMS menu to zero (*See Section 8.4.6*). A graphical example of the usage of the current loop with external device is shown below:



NOTE: Remove the jumper from terminals 25 & 27 and/ or 26 & 27 before attaching 4-20mA cables. *See Figure 5*.

4-20mA Hook-Up

If the external device requires a voltage input, a precision resistor placed across the input terminals of the external device will change the current to voltage. Calculate the required resistor using Ohm's law (V = I x R). For example, a 250Ω resistor will provide an input voltage of one to fi e volts with the transmitter range being set from 4mA to 20mA. An additional 4 to 20mA loop output is available.

IMPORTANT

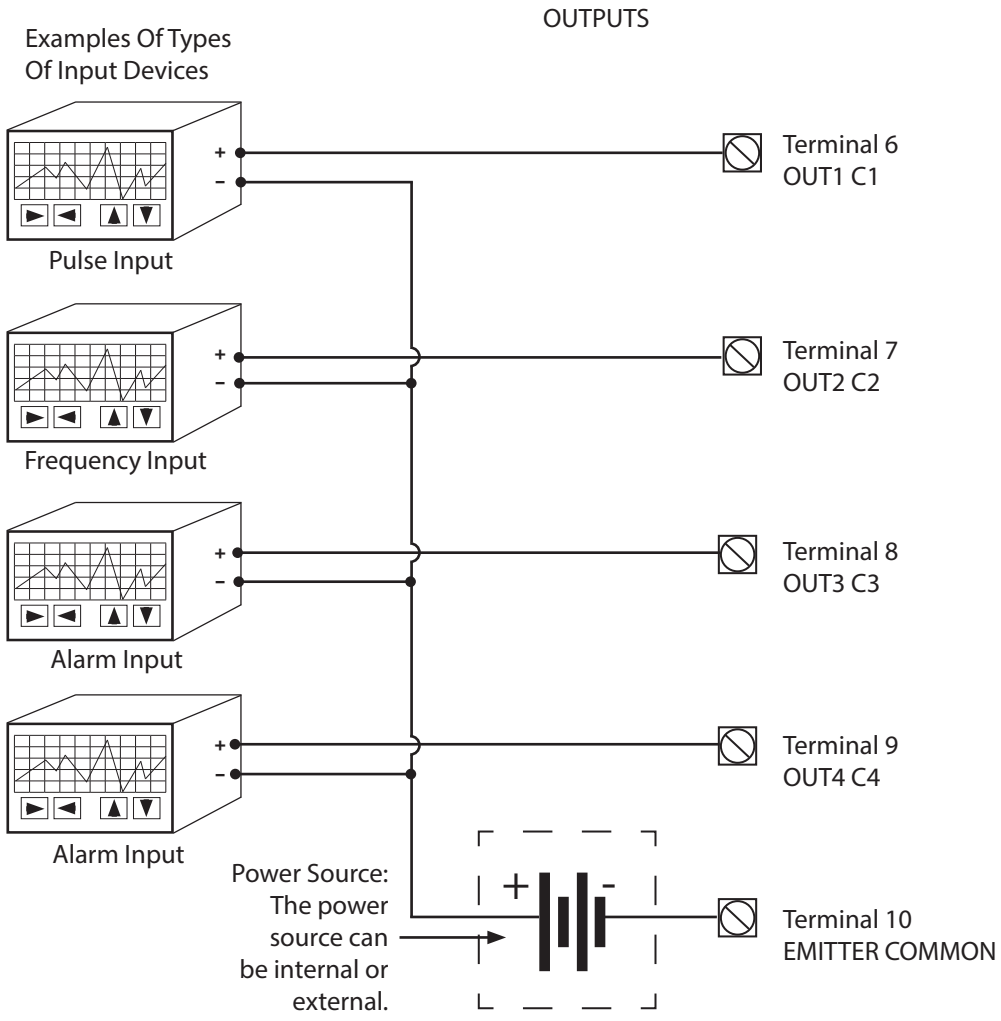
The converter powers the 4-20mA loops. Do not use external power for the 4-20mA loop as it may cause permanent damage to the converter.

Opto-Isolated Pulse Output Hook-Up

The four outputs are open collector transistor outputs used to communicate with or activate external devices when the fl w reaches a predetermined set point.

- Opto-isolated output with collector and emitter terminals flo ting and freely connectable
- Maximum switching voltage: 40 VDC
- Maximum switching current: 100mA
- Maximum saturation voltage between collector and emitter 1.2V@100mA
- Maximum switching frequency (load on the collector or emitter, RL=470Ω, VOUT=24VDC): 1250Hz
- Maximum reverse current bearable on the input during an accidental polarity reversion (VEC): 100mA
- Insulation from other secondary circuits: 500 V

A common application of outputs should be connected as follows:



IMPORTANT

Outputs are not isolated from each other. All outputs MUST use the same power source.

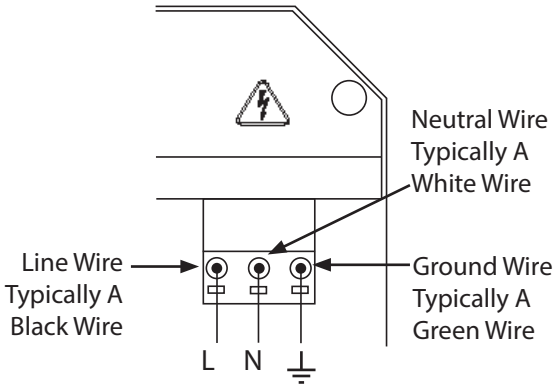
Opto-Isolated Pulse Output Diagram

Converter Power Hook-Up

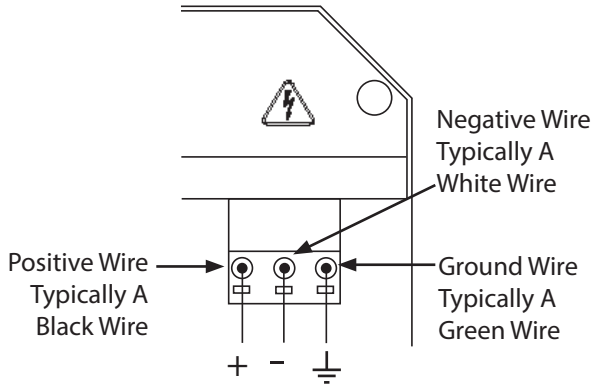
WARNING!! Hazardous supply voltage can shock, burn, or cause death.

The power supply line must be equipped with external surge protection for current overload (fuse or circuit breaker with limiting capacity not greater than 10A). It must be easily accessible for the operator and clearly identifie .

Power connection is made using the power terminal block on the upper right side of the terminal board. **NOTE**: The terminal block uplugs from the circuit board for easy connection. Connect earth ground to the protective grounding terminal before making other connections. The power supply of a standard converter is 90-265VAC, 44-66Hz at maximum 20W. DC converter is available as an option.

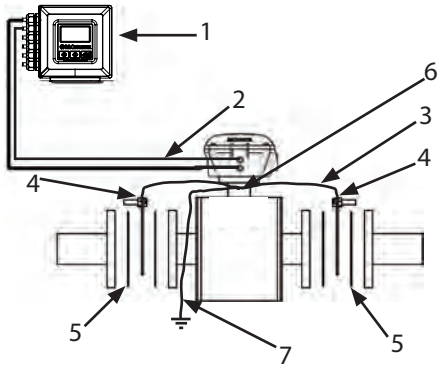


AC Power Supply Terminal Block

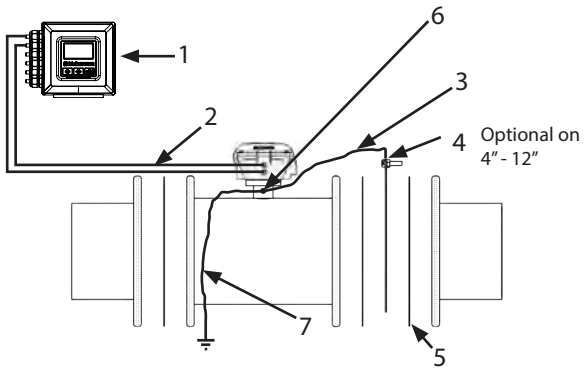


Optional DC Power Supply Terminal Block

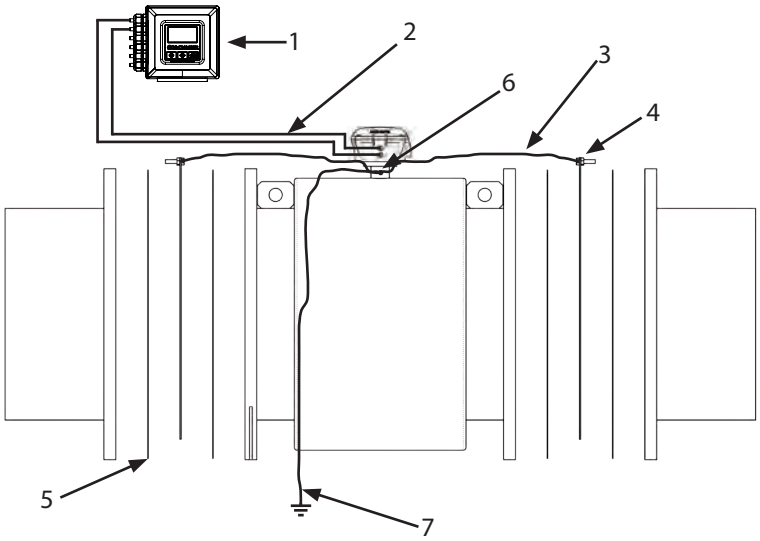
Parts List With Remote Mount Converter



2"- 3" Model



4" - 12" Model



14" And Larger Model

NO.	PART NUMBER	DESCRIPTION
1	880003032	AC Converter (Dual 4-20mA Output)
1	880003042	DC Converter (Dual 4-20mA Output)
1	880003043	AC Converter w/ Modbus RS485 Communications Protocol
2	1-1701-11	Dual Cables - Submersible
3	3-2757-‡‡	Grounding Wire Assembly
4	3-2781-*	Grounding Rings, Stainless Steel (Optional on 4"-12")
5	1-1557-*	Gaskets (Optional)
6	1-1201-10	Nut, Hex, Brass
7	15029	Earth Ground Wire

*** INSERT METER SIZE TO COMPLETE PART NUMBER - INSERT -02 FOR 2", -04 FOR 4", -06 FOR 6", ETC.**
‡‡ 2" - 6" INSERT -02; 8" - 12", INSERT -08; 14" -20", INSERT -14; 24" -30", INSERT -24; 36", INSERT -36

When ordering replacement parts, please specify: Meter Size • Meter Model • Meter Serial Number

Ultra Mag®
Sensor

ProComm
Converter

Ultra Mag models UM06 and UM08 flanged tube flow meters are manufactured to the highest standard available for mag meters.

The flanged end tube design permits use in a wide range of applications with up to 300 PSI working pressure.

The fabricated tube is stainless steel with steel or stainless steel flanges and is lined with UltraLiner™, an NSF approved, fusion bonded epoxy material.

INSTALLATION

Ultra Mag flow meter installation is similar to placing a short length of flanged end pipe in the line. The meter can be installed vertically, horizontally, or inclined on suction or discharge lines. The meter must have a full pipe of liquid for proper operation. Fluid must be grounded to the downstream flange of the sensor either via internal grounding electrodes (2 - 12") or using McCrometer 316 SS grounding rings. For best performance, grounding rings are recommended for all sizes.

The meter needs to be located a minimum distance before and after flow disturbances, such as elbows, pumps, partially opened valves, and changes in pipe diameter. The uneven flow created by these obstructions can vary with each system.

The minimum distance is measured in pipe diameters (D). To ensure accuracy locate the sensor upstream and downstream of flow disturbances as follows:

2" & 3" Wafer style meters	3D upstream / 1D downstream
4" - 48" Steel flanged meters	1D upstream / 0D downstream

All blending and chemical injection should be done early enough so the flow media is thoroughly mixed prior to entering the measurement area.

AVAILABLE ULTRA MAG FLANGED MODELS

UM06 - 150 psi

- 2" & 3": Steel wafer style
- 4" - 48": Steel AWWA Class "D" flat face flanges

UM08 - 300 psi

- 2" & 3": Steel wafer style
- 4" - 12": Steel ANSI 300 lb. Raised Face Flanges
- 14" - 36": Steel AWWA Class "F" raised face flanges

PERFORMANCE ADVANTAGES

- Flanged models need only 1 pipe diameter upstream of most flow disturbers
- No obstruction to the flow
- No moving parts to wear or break
- Maintenance free
- Worry-free accurate measurement
- Debris or solids will not clog the meter
- No head loss
- Bi-directional flow
- Empty pipe detection
- Unaffected by changes in density and viscosity
- No risk of liner delamination or separation
- Wide flow range
- Separated power and signal cables

TYPICAL APPLICATIONS

Industrial

Raw Water
Chilled Water
Cooling Water
Process Control
Effluent Wastewater

Clean Water

Well Water
Potable Water
Pump Stations
Rate-of-Flow Control
Raw Water Transmission

Wastewater

Influent
Effluent
Reclaimed
Lift Stations
Waste Activated Sludge
Return Activated Sludge

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PROCOMM CONVERTER

The signal converter is the reporting, input and output control device for the sensor. The converter allows the measurements, functional programming, control of the sensor and data recording to be communicated through the display and inputs/outputs.

The microprocessor-based signal converter has a curve-fitting algorithm to improve accuracy, dual 4-20mA analog outputs, an optional RS485 communication port, an 8 line graphical backlit LCD display with 6-key touch programming, and a rugged enclosure that meets IP67.

In addition to a menu-driven self-diagnostic test mode, the converter continually monitors the microprocessor's functionality. The converter will output rate of flow and total volume. The converter also comes standard with password protection and many more features.

ISOLATED POWER AND SIGNAL

The power and signal between the converter and sensor are isolated and placed in separate cables giving superior resistance to electrical signal noise compared to single cable designs. An added benefit from the dual cable design is a maximum cable length of up to 500ft.

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Ultra Mag Part Number Matrix

UM	_	-	_	_	_	_	_	_	_	-	_	-	_	-	_
SINGLE DIRECTION/ BIDIRECTIONAL															
150 PSI Service Pressure	06														
300 PSI Service Pressure	08														
NOMINAL LINE SIZE															
2 in			02												
3 in			03												
4 in			04												
6 in			06												
8 in			08												
10 in			10												
12 in			12												
14 in			14												
16 in			16												
18 in			18												
20 in			20												
24 in			24												
30 in			30												
36 in			36												
42 in			42												
48 in			48												
END CONNECTION OPTIONS															
AWWA Flat Face Flanges (Class D or F)				W											
ANSI Raised Face Flanges (150# or 300#)				A											
Wafer style (2" & 3" only)				F											
ELECTRODE MATERIAL OPTIONS															
S316 Stainless Steel *(Standard)*					S										
Hastelloy					H										
CONVERTER MOUNTING AND CABLE CONNECTOR OPTIONS															
Strain Relief [Remote Mount *(Standard)*						R									
Quick Connect [Remote Mount]						Q									
Meter Mount Converter						M									
Strain Relief [Remote Mount] (Potted)						P									
Quick Connect [Remote Mount] (Potted)						C									
REMOTE CABLE LENGTH OPTIONS															
25 feet *(Standard)*							025								
50 feet							050								
75 feet							075								
100 feet							100								
125 feet							125								
150 feet							150								
175 feet							175								
200 feet							200								
500 feet							500								
Custom Length Cable [User Specified]							CST								
Meter Mount Converter [No Remote Cable]							000								

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Ultra Mag Part Number Matrix (cont.)

CONVERTER POWER OPTIONS						
AC Power	A					
DC Power	D					
Battery Power [25ft remote cable max]	B					
Solar Power, Battery Backup [25ft remote cable max]	S					
CONVERTER OUTPUT OPTIONS						
Dual 4-20mA Analog, Dual Digital (Standard)		1				
Modbus + STD (Two 4-20, two Dig)		2				
Hart + STD (Two 4-20, two Dig)		3				
Datalogger/BIV + STD (Two 4-20, two Dig)		4				
Datalogger/BIV + Modbus + STD (Two 4-20, two Dig)		5				
Datalogger/BIV + Hart + STD (Two 4-20, two Dig)		6				
AMI Smart Output + STD (Two 4-20, two Dig)		7				
Datalogger/BIV + AMI Smart Output + STD (Two 4-20, two Dig)		8				
AMI Smart Output + Dig Out + Datalogger (Battery power only)		9				
Digital Out + Datalogger (Standard Battery Power only)		0				
SMART OUTPUT PROTOCOL OPTIONS *						
No AMI Outputs			-			
Sensus Protocol (6ft cable, Nicor Connector hardwired only)			SEN			
Itron 6 digit Protocol (6ft cable, Nicor Connector hardwired only)			IT6			
Itron 9 digit Protocol (6ft cable, Nicor Connector hardwired only)			IT9			
Battery Power / ATT Wireless Telemetry System (RTU, Solar Panel, 7 pin cable)			ATT			
Battery Power / Verizon Wireless Telemetry System (RTU, Solar Panel, 7 pin cable)			VZW			
NON STANDARD LENGTH OPTIONS						
McCrometer Length (Standard)				--		
Competitor Meter Replacement Length				S		
Special Length [Customer Specified]				XL		
HAZARDOUS LOCATION						
Class I , Division 2, Groups A-D, T5						HL

Smart Output protocol options require selection of converter option 7, 8, or 9.

FLOW METER SPECIFICATIONS

Pipe Sizes	
	2", 3", 4", 6", 8", 10", 12", 14", 16", 18", 20", 24", 30", 36", 42", 48"
Flow Direction Measurement	
	Forward and reverse flow indication and forward, reverse, net totalization are standard with all meters
Accuracy	
	Plus or minus 0.5% of actual flow (battery powered is ±1% of flow) **IMPORTANT NOTICE ON FLOW METER ACCURACY:** The flow meter, the cable and the electronics are factory calibrated for accuracy as a single unit. Changing the cable length with the Splice Kit changes the accuracy of the meter and invalidates the calibration certificate.
Accuracy Tests	
	5-point wet flow calibration of every complete flow tube with its signal converter. If desired, the tests can be witnessed by the customer. The McCrometer test facilities are traceable to the National Institute of Standards & Technology. Uncertainty relative to flow is ±0.15%.
Pipe Run Requirements	
2" & 3" wafer style	3D upstream / 1D downstream
4" and larger flanged	1D upstream / 0D downstream
Repeatability	
	±0.05% or ±.0008ft/s (±0.25mm/s), whichever is greater
Conductivity	
	5 µs/cm
Liner	
	UltraLiner NSF approved, fusion bonded epoxy
Electrodes	
	Type 316 stainless steel, others optional
Electrical Connections	
	• Compression gland seals • Quick-Connect
Sensor Cable Lengths	
Standard	25'/7.6 m McCrometer supplied submersible cable with each remote mount unit.
Optional	Up to 500'/152.4 m, or 25'/7.6 m max for battery powered.
Quick Connect	Available in standard cable lengths: Feet: 25, 50, 75, 100, 125, 150, 175, 200, 500 Meters: 7.6, 15.25. 22.5, 30.5, 38.1, 45.75, 53.3, 61, 152.4 Custom cable lengths at additional cost.

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FLOW METER SPECIFICATIONS (CONT.)

IP Rating

Standard model	• Quick Connect (NEMA 6P/IP68 with remote converter) • Compression gland seals (NEMA 6P/IP68 with remote converter)
HL model	• Quick Connect (IP67) • Compression gland seals (IP67)

Sensor Submersibility Depth

With standard strain relief cable	9 m (30 ft.)
With optional quick connect cable	1.8 m (6 ft.)

Head Loss

None. No obstruction in line and no moving parts

Warranty

Meter	2 year warranty
Liner	Lifetime guarantee

Pressure Range

150 PSI maximum working pressure (UM06); 300 PSI maximum working pressure (UM08)

Velocity Range

.2 to 32 FPS

Temperature Range

Sensor Operating: -10 to 60°C (14 to 140°F)
Sensor Storage: -15 to 60°C (5 to 140° F)

Certifications and Approvals

Standard Model	• ISO 9001:2015 certified quality management system • Certified by MET to UL 61010-1

HL Model	• ISO 9001:2015 certified quality management system
	• Certified by MET to UL 61010-1 and MET C22.2 No. 61010-1-04
	  • Class I, Division 2, Groups A-D, T5
	  • Class I, Zone 2, IIC T5

System Options

- Hastelloy® electrodes
- Additional sensor cable up to 475'
- Annual verification / calibration
- Stainless steel ID tag

Meter Options

- DC powered converter (10-35 VDC, 21 W)
- Meter mounted converter
- Extended warranty
- Hastelloy® electrodes
- ANSI or DIN flanges
- Special lay lengths, including ISO standard lay lengths
- Quick Connect cable fittings
- Converter sun shield
- HART® Converter
- Smart Output™ (Sensus or Itron compatible)
- Battery or battery-solar powered converter

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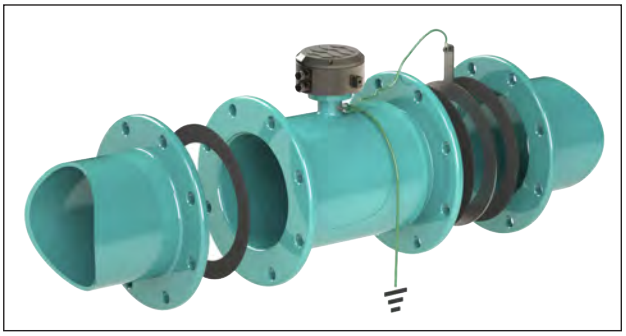
METER GROUNDING RECOMMENDATIONS

Grounding the meter body for safety according to national (NEC) or local electrical codes is recommended on ALL meter installations.

For best performance, grounding the fluid column is recommended when the meter is installed in an electrically noisy environment, such as with VFD pumps or nearby electrical systems with insufficient grounding.



Conductive or uncoated pipe - The uncoated pipe flange can be used to establish a connection to earth ground.

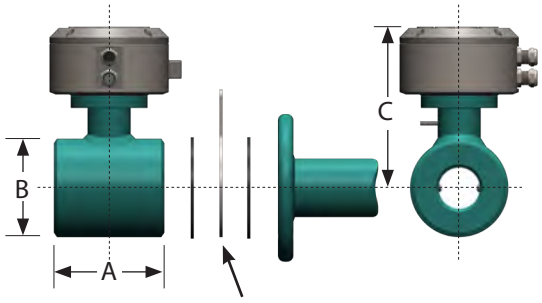
Plastic or internally coated pipe - Grounding rings can be installed to establish a connection to earth ground
See the Ultra Mag IOM Manual, Lit. # 30119-03, for more information on grounding configurations using grounding rods and grounding rings.

DIMENSIONS AND WEIGHTS

2" and 3" Models Body Style

Meter Type	Pipe Size (Nominal)	Meter Pipe ID	Flow Ranges GPM Standard .2 to 32 FPS Min - Max	DIMENSIONS (Lay Lengths)							Est. Shipping Weight (lbs.)**	
				A*		B	C		D	E		
				UM06	UM08		UM06	UM08			UM06	UM08
Use model shown below for dimensions												
Wafer style	2"	1.625	2 - 310	4.5	4.5	4.0	6.5	7.25	n/a	n/a	9.6	10.1
	3"	2.625	5 - 700	4.5	4.5	4.0	7.0	7.75	n/a	n/a	11.3	11.8

* Laying lengths for meters with ANSI Class 150 Flanges are equal to UM08 laying lengths
** For remote mount meters, add 4 lbs for ProComm converter.



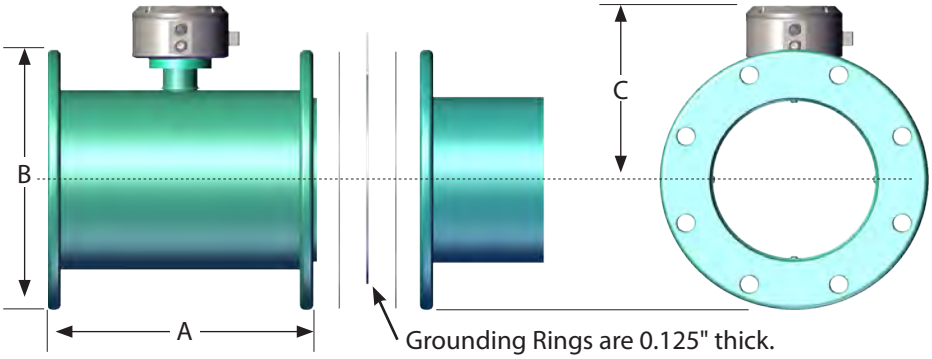
Grounding Rings are 0.125" thick.

DIMENSIONS AND WEIGHTS (CONT.)

4" to 12" Models Body Style

Pipe Size (Nominal)	Meter Pipe ID	Flow Ranges GPM Standard .2 to 32 FPS Min - Max	DIMENSIONS (Lay Lengths)					Est.Shipping Weight (lbs.)**	
			A*		B		C		
			UM06	UM08	UM06	UM08		UM06	UM08
4"	3.720	8 - 1,140	13.40	13.40	9.00	10.00	8.06	78	108
6"	5.692	19 - 2,660	14.60	14.60	11.00	12.50	9.06	82	138
8"	7.692	33 - 4,870	16.10	17.25	13.50	15.00	10.06	115	195
10"	9.682	52 - 7,670	18.50	18.50	16.00	17.50	10.46	144	247
12"	11.682	74 - 11,180	19.70	19.70	19.00	20.50	12.31	193	342

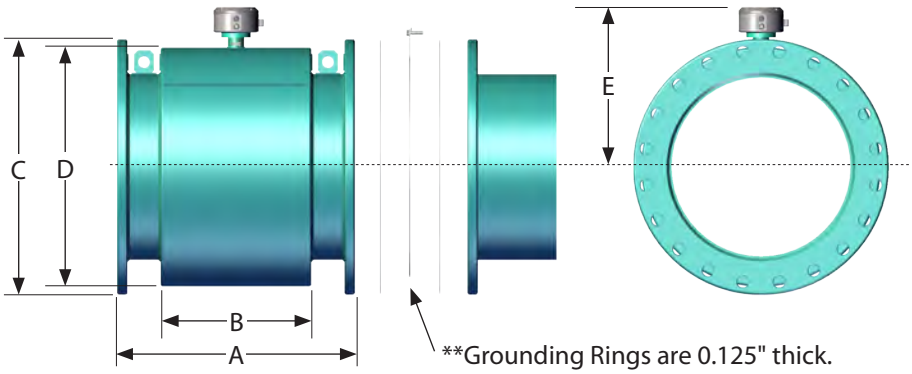
* Laying lengths for meters with ANSI Class 150 Flanges are equal to UM08 laying lengths
** For remote mount meters, add 4 lbs for ProComm converter.



14+" Models Body Style

Pipe Size (Nominal)	Meter Pipe ID	Flow Ranges GPM Standard .2 to 32 FPS Min - Max	DIMENSIONS (Lay Lengths)							Est. Shipping Weight (lbs.)**	
			A*		B	C		D	E		
			UM06	UM08		UM06	UM08			UM06	UM08
14"	13.440	90 - 16,070	21.70	22.75	12.00	21.00	23.00	20.30	15.46	321	476
16"	15.440	118 - 20,900	23.60	25.25	14.20	23.50	25.50	21.10	16.21	390	645
18"	17.440	150 - 26,480	23.60	25.25	14.20	25.00	28.00	21.10	17.21	446	750
20"	19.440	185 - 32,720	25.60	28.25	16.20	27.50	30.50	24.80	18.26	588	874
24"	23.440	270 - 47,180	30.70	35.75	21.70	32.00	36.00	29.60	20.11	769	1,568
30"	29.190	420 - 73,620	35.80	41.75	26.50	38.75	43.00	35.90	23.26	1,261	2,317
36"	35.190	610 - 105,930	46.10	46.10	28.20	46.00	50.00	42.70	26.66	1,696	2,915
42"	41.190	830 - 144,370	48.05	***	32.10	52.75	***	48.35	29.99	***	***
48"	47.190	1,080 - 188,430	50.00	***	36.00	59.50	***	54.00	33.31	***	***

* Laying lengths for meters with ANSI Class 150 Flanges are equal to UM08 laying lengths
** For remote mount meters, add 4 lbs for ProComm converter.
*** Consult factory



PROCOMM CONVERTER PART NUMBER MATRIX

PC -	_	_	___	-	___	-	___
CONVERTER MOUNTING OPTIONS							
Remote Mount	R						
Meter Mount	M						
Remote Mount, Lid Only	L						
Meter Mount, Lid Only	E						
CONVERTER POWER OPTIONS							
AC Power		A					
DC Power		D					
Battery Power [25ft/762 cm remote cable max]		B					
Solar Power, Battery Backup [25ft/762 cm remote cable max]		S					
CONVERTER OUTPUT OPTIONS							
Dual 4-20mA Analog, Dual Digital (Standard)			1				
Modbus + STD (Two 4-20, two Dig)			2				
Hart + STD (Two 4-20, two Dig)			3				
Datalogger/BIV + STD (Two 4-20, two Dig)			4				
Datalogger/BIV + Modbus + STD (Two 4-20, two Dig)			5				
Datalogger/BIV + Hart + STD (Two 4-20, two Dig)			6				
AMI Smart Output + STD (Two 4-20, two Dig)			7				
Datalogger/BIV + AMI Smart Output + STD (Two 4-20, two Dig)			8				
AMI Smart Output + Dig Out + Datalogger (Battery power only)			9				
Digital Out + Datalogger (Standard Battery Power only)			0				
SMART OUTPUT PROTOCOL OPTIONS *							
No AMI Outputs					-		
Sensus Protocol (6ft/183 cm), Nicor Connector hardwired only)					SEN		
Itron 6 digit Protocol (6ft/183 cm) cable, Nicor Connector hardwired only)					IT6		
Itron 9 digit Protocol (6ft/183 cm) cable, Nicor Connector hardwired only)					IT9		
Battery Power / ATT Wireless Telemetry System (RTU, Solar Panel, 7 pin cable)					ATT		
Battery Power / Verizon Wireless Telemetry System (RTU, Solar Panel, 7 pin cable)					VZW		
HAZARDOUS LOCATION							
Class I , Division 2, Groups A-D, T5							HL

* Smart Output protocol options require selection of converter output option 7, 8, or 9.

PROCOMM CONVERTER SPECIFICATIONS

Power Source

AC	100-240 VAC / 45-66 Hz (10 W)	Note: AC or DC must be specified at time of ordering.
DC	10-35 VDC (10 W)	

Standard Outputs

Dual 4-20mA Outputs: Galvanically isolated and fully programmable for zero and full scale (0-21mA rangeability)

Two separate digital programmable outputs: open collector transistor usable for pulse, frequency, or alarm settings.

- Volumetric Pulse
- Flow Rate (Frequency)
- Hardware Alarm
- High/Low Flow Alarms
- Empty Pipe
- Directional Indication
- Range Indication
- Maximum switching voltage: 40 VDC
- Maximum switching current: 100mA
- Maximum switching frequency: 1250 Hz
- Insulation from other secondary circuits: 500V

Optional Outputs

- Modbus
- HART
- Smart Output™ (Sensus, Itron 6, Itron 9)
- Datalogger
- Built-in verification

Galvanic Isolation

All inputs / outputs are galvanically isolated from power supply up to 500 V

Engineering Units

- Cubic Meter
- Cubic Centimeter
- Milliliter
- Liter
- Cubic Decimeter
- Decaliter
- Hectoliter
- Cubic Inches
- US Gallons
- Imperial Gallons
- Cubic Feet
- Kilo Cubic Feet
- Standard Barrel
- Oil Barrel
- US Kilogallon
- Ten Thousands of Gallons
- Imperial Kilogallon
- Acre Feet
- Megagallon
- Imperial Megagallon
- Hundred Cubic Feet
- Megaliters

Conductivity

Minimum conductivity of 5µS/cm

Electrical Connections

Connection options

- Compression gland seals for 0.24" to 0.47" diameter round cable
- Conduit option: 1/2" NPT threaded connections

IP Rating

IP67 Die cast aluminum converter (only when connected using compression gland seals)

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PROCOMM CONVERTER SPECIFICATIONS (CONT.)

Certifications and Approvals

Standard Model

- ISO 9001:2015 certified quality management system
- CE
- Certified by MET to UL 61010-1

HL Model

- ISO 9001:2015 certified quality management system
- CE
- Certified by MET to UL 61010-1 and MET C22.2 No. 61010-1-04
  - Class I, Division 2, Groups A-D, T5
  - Class I, Zone 2 IIC T5

IMPORTANT
Electrical safety certifications above do not apply to model 282L Single Point Insertion (SPI Mag) Electromagnetic Flow Meter.

IMPORTANT
Refer to certification requirements. Do not substitute components.

IMPORTANT
The ProComm converter, models PC-RA1-HL series and PC-MA1-HL series have no user serviceable parts.

Temperature Range

Operating and storage

-4° to 140° F (-20° to 60° C)

Converter Dimensions

Remote mount

- Height: 7.3" (18.5 cm)
- Width: 8.5" (21.6 cm)
- Depth: 4.3" (10.9 cm)

Meter mount

- Height: 6.9" (17.5 cm)
- Width: 7.2" (18.25 cm)
- Depth: 6.2" (15.7 cm)

Keypad and Display

Can be used to access and change set-up parameters using six membrane keys and an LCD display

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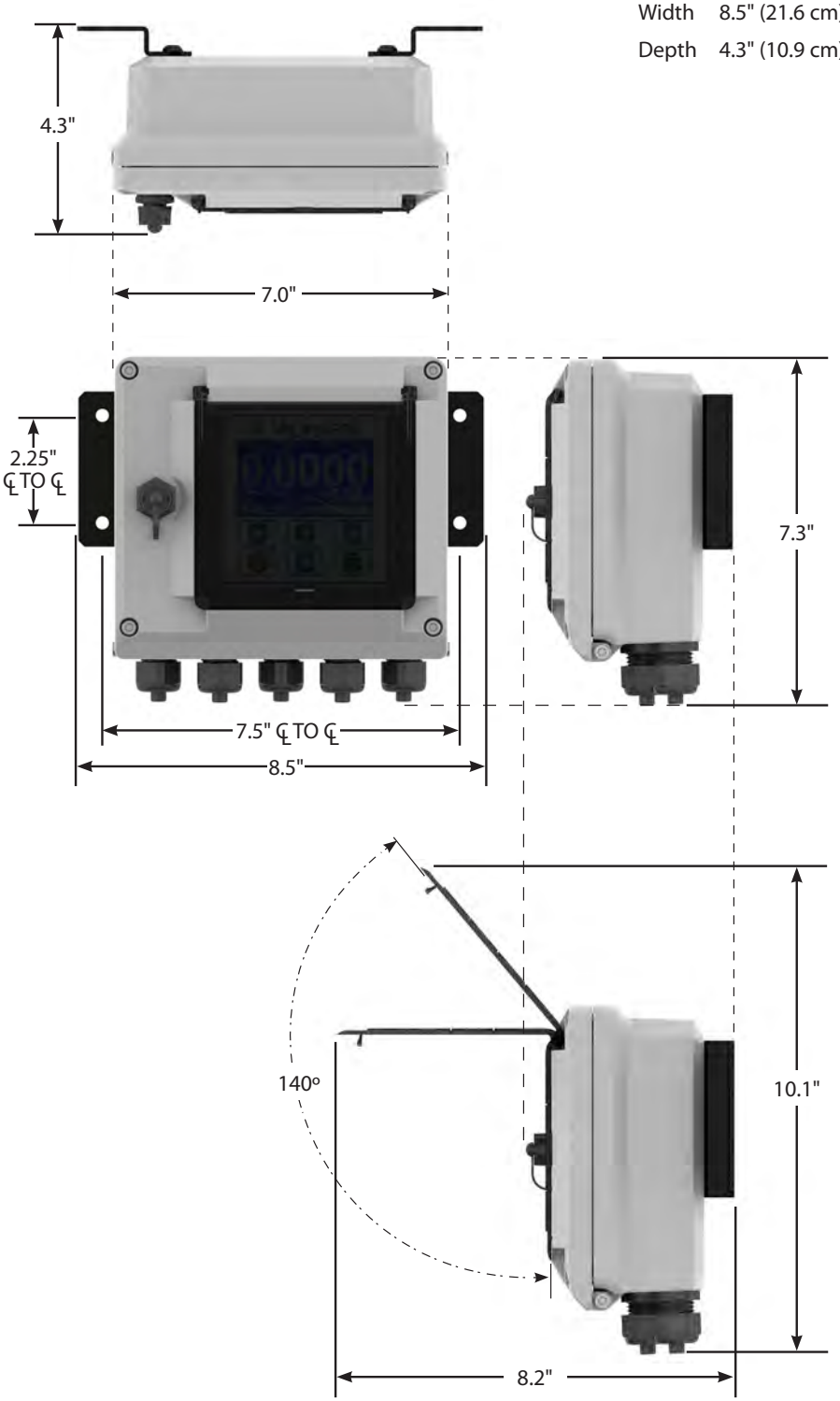
METER MOUNT CONVERTER DIMENSIONS

Height 7.3" (18.5 cm)
Width 8.5" (21.6 cm)
Depth 4.3" (10.9 cm)



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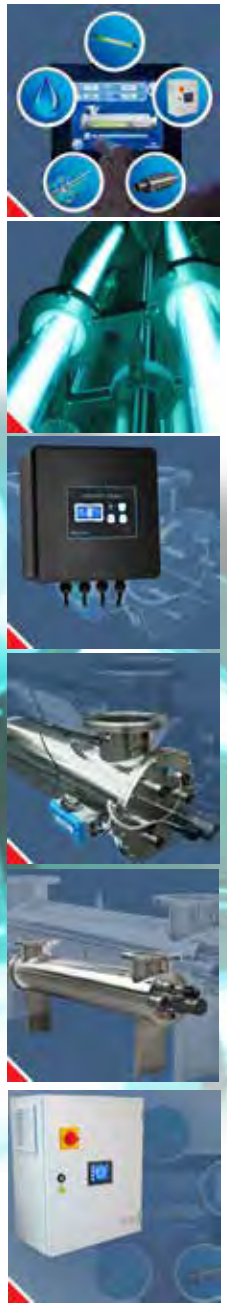
Lutz-JESCO America Corp.

A measured step forward™

Operations & Maintenance Manual

JESCO UV 405-412-440-450-480-550-80

2 LCD – LCD PLUS



Total Fluid Management | Metering Transfer Chem Feed

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1. Introduction

This manual is for the following models of LCD SERIES:

UV 405-412-440-450-480-550-80/2 LCD-LCD PLUS

Warning: This equipment requires regular maintenance to ensure the requirements of the drinking water treated and the maintenance of the improvements as stated by the manufacturer.

These operating instructions contain important information for the operation and maintenance of the equipment.

Please ensure that these operating instructions are carefully read by all relevant persons before putting into operation, to ensure the safe use of the UV system. The operating instructions are an integral part of the equipment supply.

Before putting into operation, all the conditions necessary for safe operation of the equipment must be fulfilled.

The installation, commissioning and maintenance of the equipment should only be carried out by qualified personnel.

The equipment should only be operated by authorized personnel who have been trained accordingly.

No modifications should be made to the equipment without consulting Jesco, as this could affect the safe operation of the unit. Jesco shall not be held responsible for damage resulting from unauthorized modifications.

INSTRUCTION:

The operating instructions are to be kept where they will be accessible for operating and maintenance personnel.

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2. General Principles and Safety Instructions

Information about UV irradiation:

The UV disinfection system of the LCD series has been designed specifically for destroying harmful bacteria and viruses present in your water.

The UV light emitted by special mercury vapor lamps (UV-C rays l= 254nm) is highly germicidal because it interacts with DNA and RNA at a molecular level.

The deep bio-structural disorder caused by such irradiation interferes with the ability of micro-organisms to develop and reproduce, rendering them harmless.

Generally, it is better to mount a pre-filter onto the UV sterilizer in order to remove contaminates and particles that could interfere with the ultraviolet process.

This system is necessary if a high degree of sterilization is required. In fact, the nonfiltration and removal of suspended particles in water has, as a consequence, a decrease in the sterilizer's efficiency.

If the water to be treated contains sulphydric acid or more than 0.3 p.p.m. of iron or filtrable solids, once passed through the sterilizer, it leaves a residual sediment on the quartz sleeve which must be cleaned periodically (the frequency depends on the quantity and quality of water treated).

General directions:

According to the European rules EN 60204-1 (safety of the set-up off the electrical equipment-general rules) the low tension electrical instruments (rule 2006/95/CE) must be connected to a current-tap provided with grounding.

Electrical Safety Instructions:

The lightning flash and arrowhead symbol is to alert the user to the presence of un-insulated "DANGEROUS VOLTAGE" within the enclosure. The equipment may only be opened if main supply is isolated. The main supply must not be restored as long as the equipment is open. This applies to both the electrical panel and the UV reactor vessel.

ATTENTION: Working on live equipment is prohibited.

UV Light Danger:

The light of ultra-violet lamps can cause serious burns to unprotected skin and eyes, therefore it is recommended not to connect it to the current tap without before having ensured that the UV lamp is in its housing and inserted in the PVC cover.

Pressure Danger:

The UV chamber could be under water pressure. Max working pressure is 145 psig (10 bar). UV chamber must be installed in accordance with our installation and commissioning instructions and used in accordance with operating and maintenance instructions.

ATTENTION: Ensure that system is depressurized before attempting any service or repair.

Indications for the disposal:

Please note that, according to what is outlined by D.L.25 July 2005, № 151 "Accomplishment of directives 2002/CE, 2002/96/CE and 2003/108/CE, concerning the reduction of the use of dangerous substances in electric and electronic equipment, and the disposal of waste" both mercury vapor lamps and electrical panels, when no longer in use, must be treated as special waste, and as such disposed of.

To do that, please contact specialized centers for the recycling of dangerous materials, or contact our technical department directly.

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3. Instructions for Installation and Setting at Work

General premise: The installation of the DOMESTIC SERIES disinfection units must be carried out by specialized staff, exactly following the instructions hereby provided. Moreover, it is necessary to provide some general information about electrical and water connections.

Caution: check that the UV panel is not connected to the power supply and that the tap of the water to be treated is turned off.

- Connect the delivery of the water to be treated to the special water connection
- Turn on water and check for possible leaks in any part of the unit
- Connect the plug to the current tap
- Check that the disinfected water comes out and that the LEDS on the panel on the control board, signal correct functioning

Allow the disinfected water flow down to outlet for at least 10 minutes before utilization, in order to allow possible impurities present in the unit to drain out.

NOTE: it is recommended to mount a water filter directly onto the UV sterilizer in order to remove suspended particles, potentially present in the water to be treated, which could limit the efficiency of sterilization.

CHECKS

The DOMESTIC SERIES is ready for producing disinfected water, once the connection to the water system and to the electrical grid is carried out. The unit works automatically, the electronic boards which control the signals reaching the control panel, allow the visualizing (or the sounding) of the correct functioning or of anomalies which may occur during the operation of the unit.

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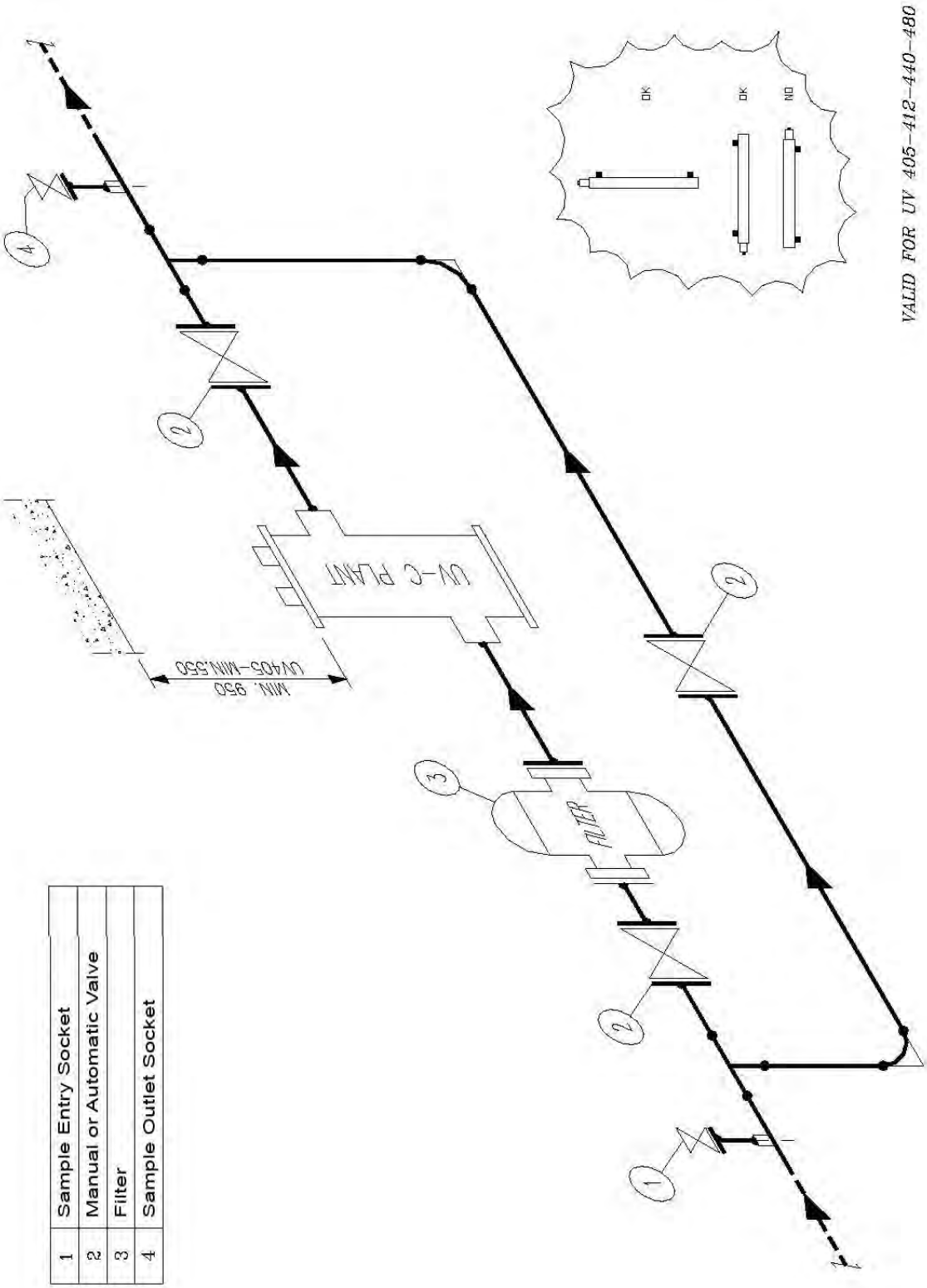
3.1 Suggested Install Scheme



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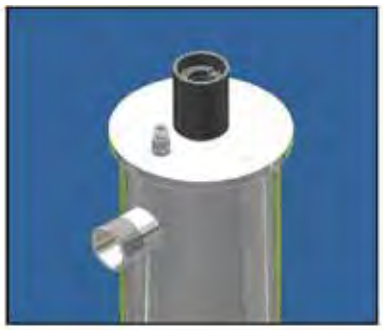
4. UV Chamber Installation

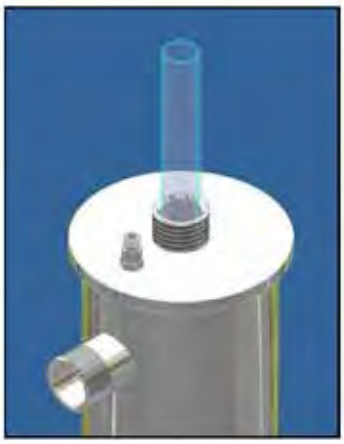
4.1 UV Chamber Assembling

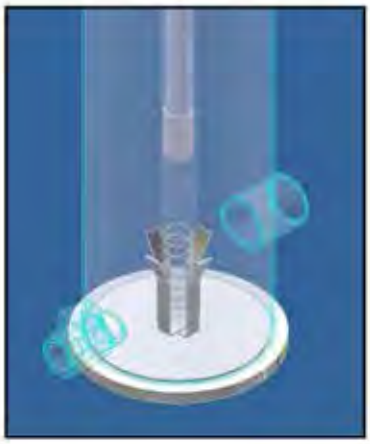
Mount the valve kit supplied with the system.

Unscrew the sleeve bolts:



Insert the quartz sleeves carefully centering the spring at the bottom plate of the UV chamber:





Insert the o-ring Ø 23x4 into the quartz sleeve:

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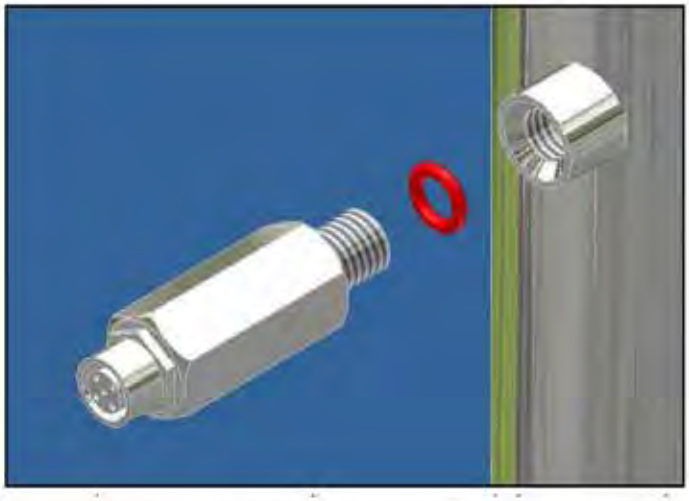
Screw the sleeve bolts and insert the lamp holder spring into the sleeve:

For the LCD PLUS UV system: Mount the o-ring (3043 type) on the probe holder and screw this one on the Ø ¼" bush welded in the middle part of the UV chamber.

Finally, connect the appropriate electrical cable:



Carry out the hydraulic test, verifying that the o-rings are watertight and that there are not water leaks outside the sleeve bolts or inside the quartz sleeves.

Insert the UVC lamp into the quartz sleeve:

Important!
Handle the lamps using gloves

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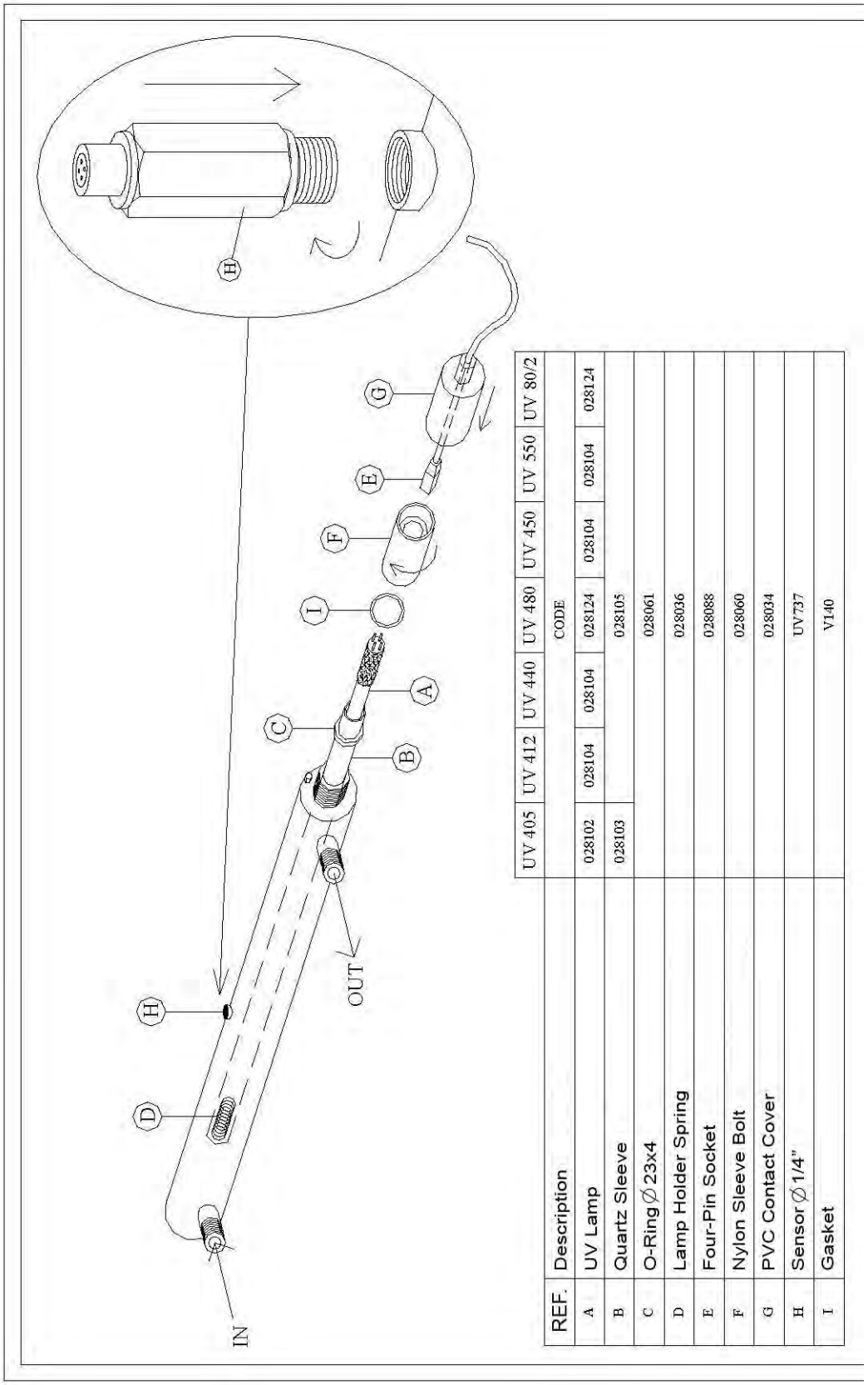
4.2 UV Chamber Detailed Drawing



REF.	Description	UV 405	UV 412	UV 440	UV 480	UV 450	UV 550	UV 80/2
		CODE						
A	UV Lamp	028102	028104	028104	028124	028104	028104	028124
B	Quartz Sleeve	028103			028105			
C	O-Ring ∅ 23x4				028061			
D	Lamp Holder Spring				028036			
E	Four-Pin Socket				028088			
F	Nylon Sleeve Bolt				028060			
G	PVC Contact Cover				028034			
H	Sensor ∅ 1/4"				UV737			
I	Gasket				V140			

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5. Electrical Panel Installation and Operation

5.1 Control Panel Description

Control Panel	LCD (PLUS)
Material and colour	Black Polypropylene
Dimensions	8 x 8 x 3 in.
Protection class	IP 55 (IP 65 on request)
Ambient temperature range	41 – 113 °F
Power supply	230 V - 50/60 Hz (115V – 50/60 Hz on request)
Lamp cable	3 ft.
Power supply cable	3 ft.
Monitor display	LCD
Hour meter	Yes for total system life
Resettable hour meter	Yes for lamp life control
Lamp function control	Yes
Alarm led	Yes
Free contact (NO - NC)	Yes – general alarm
230 V output (NO - NC)	Yes – general alarm
Remote ON/OFF contact	Yes (settable)
ON/OFF Timer	Yes (settable)
Reactor temperature measurement and alarm	Yes (°F) – settable value (shut off for high temperature) on PLUS MODELS
UV Irradiance measurement and alarm	Yes (% or W/m2 optional) – settable value on PLUS MODELS
4/20 mA output	Optional – for Irradiance and water temperature on PLUS MODELS
Audio alarm	Optional

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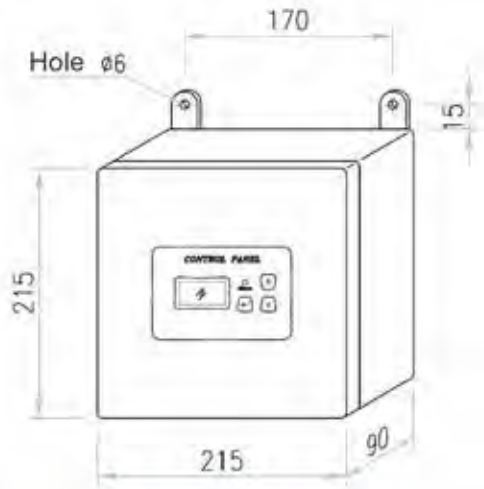
5.2 Electrical Panel Installation and Operation

The electrical panel of the LCD series is equipped with 2 fixing brackets for wall mounting. Rotating the panel cover, the user can have the cable out on the desired sides of the panel.



Connect the lamp socket to the lamp and close the contact cover cap, then connect the power supply plug to the main supply.

Once connected to the power supply the UV lamp will light up.

Do the following at the first start up and with every lamp replacement:

1) Activate the lamp life count down hour meter (see display description)

2) For the LCD PLUS system with UV sensor: operate the sensor calibration. This operation must be conducted after at least 5 minutes of lamp start, with quartz sleeve clean, with sensor measuring window clean and with steady water flow.

5.3 Switch ON / Switch OFF the lamps

Because of the small power of the electrical panel this is not equipped with power selector. Therefore, the panel is always powered but lamps can be switched ON/OFF in the following ways:

1. Holding down the OK (◄┘) button for 5 seconds (see display description)
2. Closing the remote ON/OFF contact (see electrical scheme)
3. Setting the timer (see display description)

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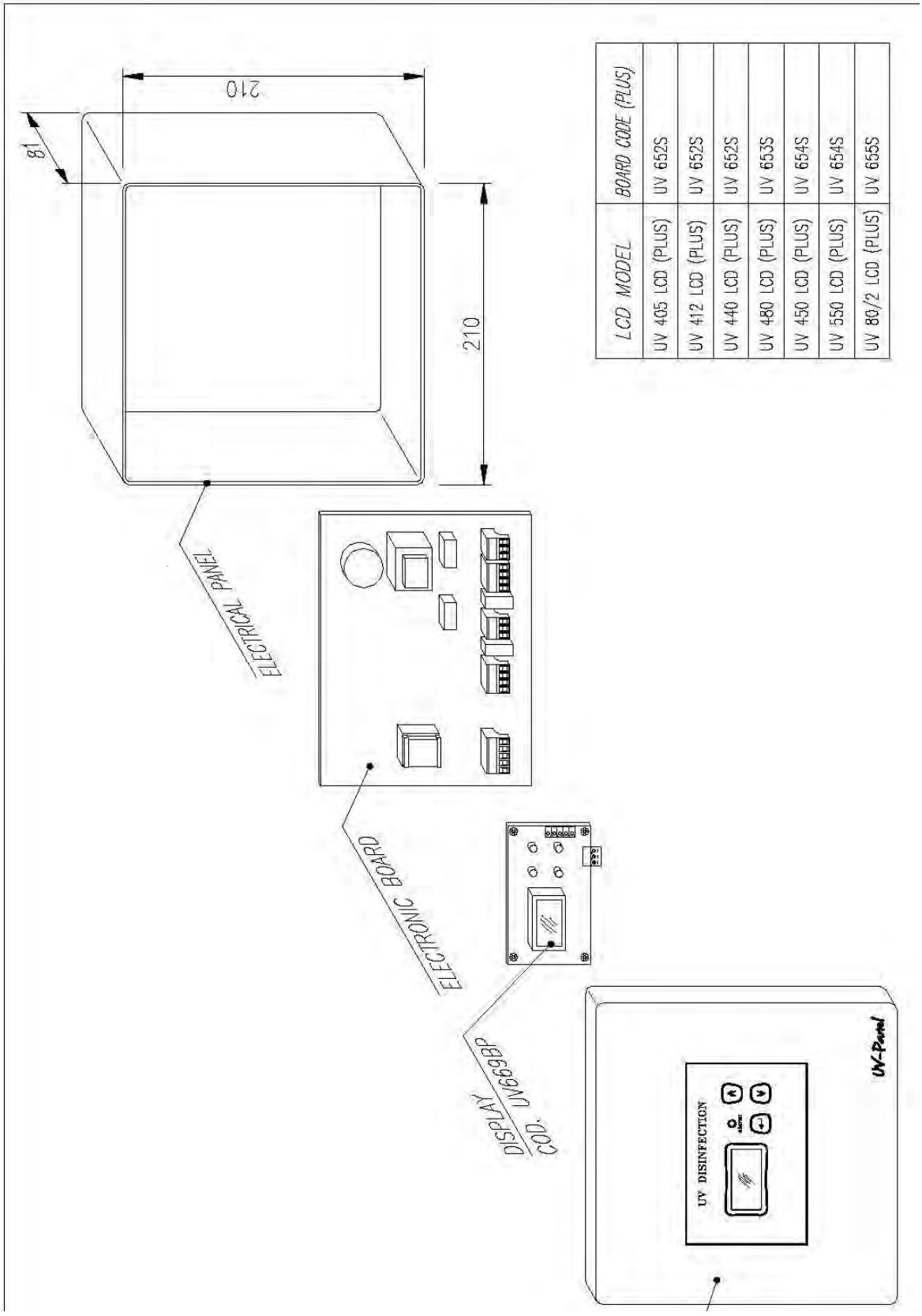
5.2 Control Panel Detailed Drawing



LCD MODEL	BOARD CODE (PLUS)
UV 405 LCD (PLUS)	UV 652S
UV 412 LCD (PLUS)	UV 652S
UV 440 LCD (PLUS)	UV 652S
UV 480 LCD (PLUS)	UV 653S
UV 450 LCD (PLUS)	UV 654S
UV 550 LCD (PLUS)	UV 654S
UV 80/2 LCD (PLUS)	UV 655S

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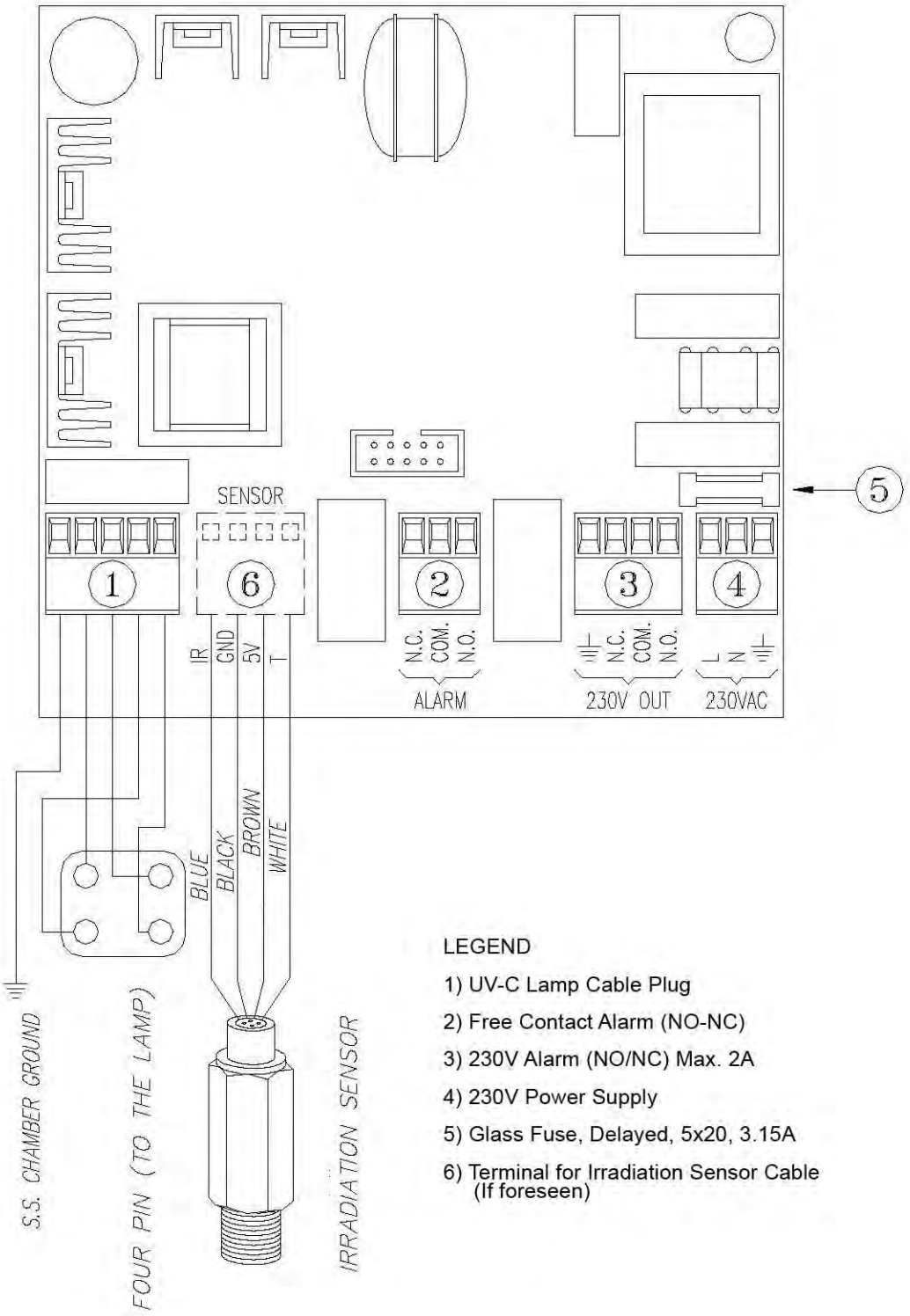
6. LCD Electrical Board Description

6.1 Single-lamp LCD Electrical Board Description (UV 405, 412, 440, 480)



LEGEND

1) UV-C Lamp Cable Plug
2) Free Contact Alarm (NO-NC)
3) 230V Alarm (NO/NC) Max. 2A
4) 230V Power Supply
5) Glass Fuse, Delayed, 5x20, 3.15A
6) Terminal for Irradiation Sensor Cable (If foreseen)

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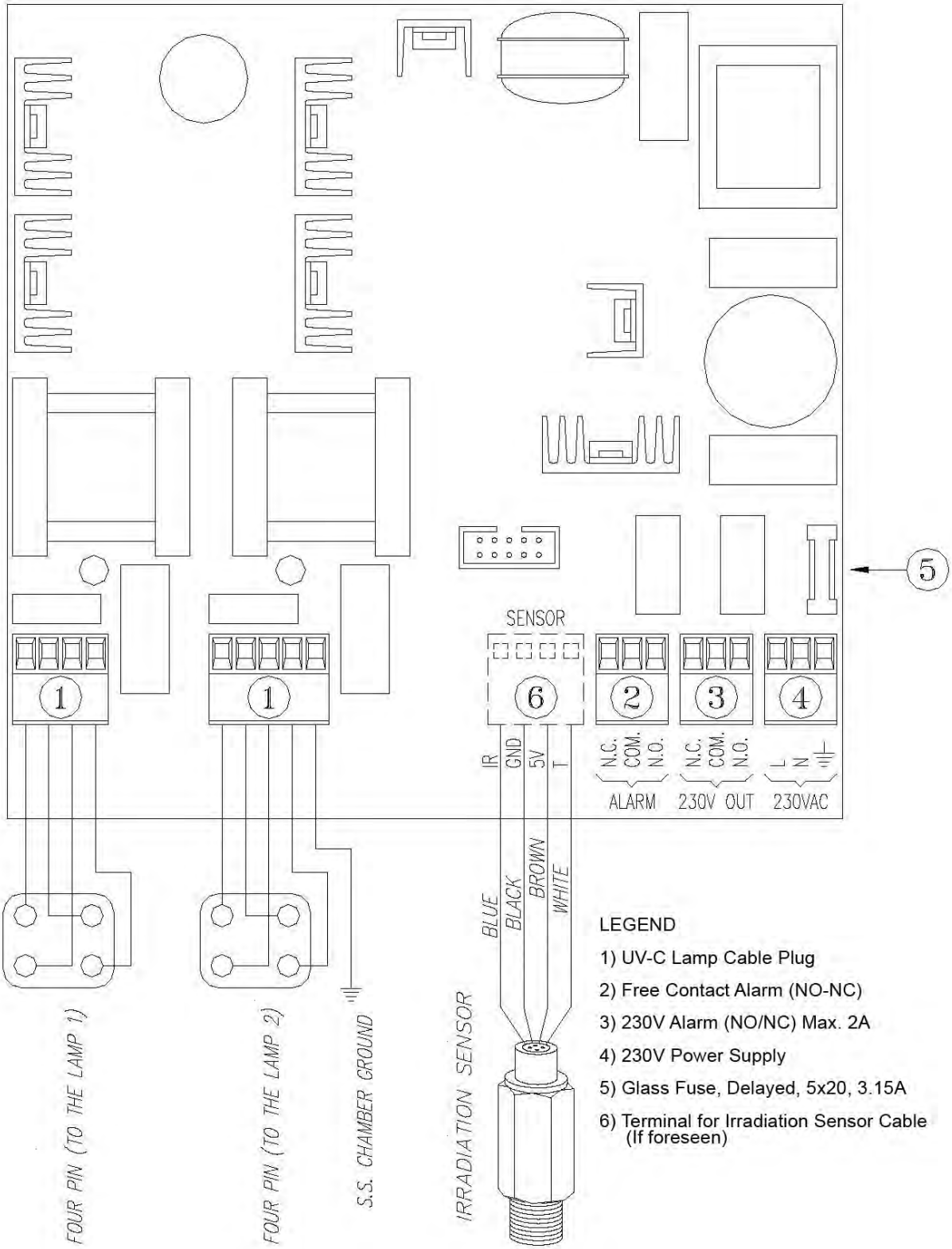
6.2 Two-Lamp LCD Electrical Board Description (UV 450, 550, 80/2)



LEGEND

1) UV-C Lamp Cable Plug
2) Free Contact Alarm (NO-NC)
3) 230V Alarm (NO/NC) Max. 2A
4) 230V Power Supply
5) Glass Fuse, Delayed, 5x20, 3.15A
6) Terminal for Irradiation Sensor Cable (If foreseen)

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6.3 LCD Display Board Description

The standard and optional terminal connections to the display board are as follows:

- It is possible to connect the sensor cable (usually this is connected on the main board).
- It is possible to connect the REMOTE ON/OFF contact, this is powered with 5Vdc that if closed to the RMT contact shuts of the lamps. The user can set the working of the remote ON/OFF contact by the display between N/O and N/C. The factory setting is N/O because it let the system working with nothing connected to the remote ON/OFF terminal.
- In case of LCD PLUS systems with optional 4/20 mA output then it's possible to connect to the 4/20 mA terminal. This signal is available for the water temperature and the UV irradiance.

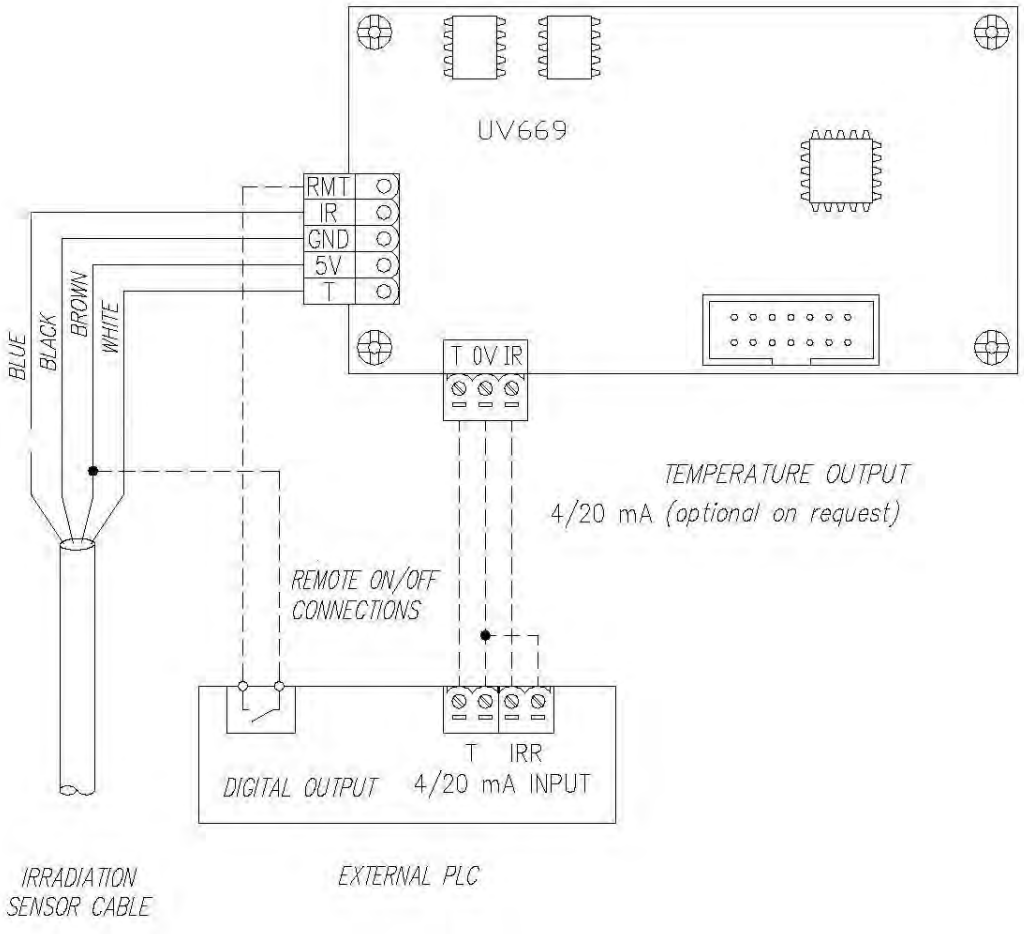
The temperature signal has the following correspondence:

4mA = 32 °F (0°C)
20 mA = 212 °F (100 °C)

The irradiance signal has the following correspondence:

4mA = 0%
20 mA = Settable value on the display (factory setting 20 mA= 100%)

Important
The 4/20 mA output signal can work with a max load of 150 ohm



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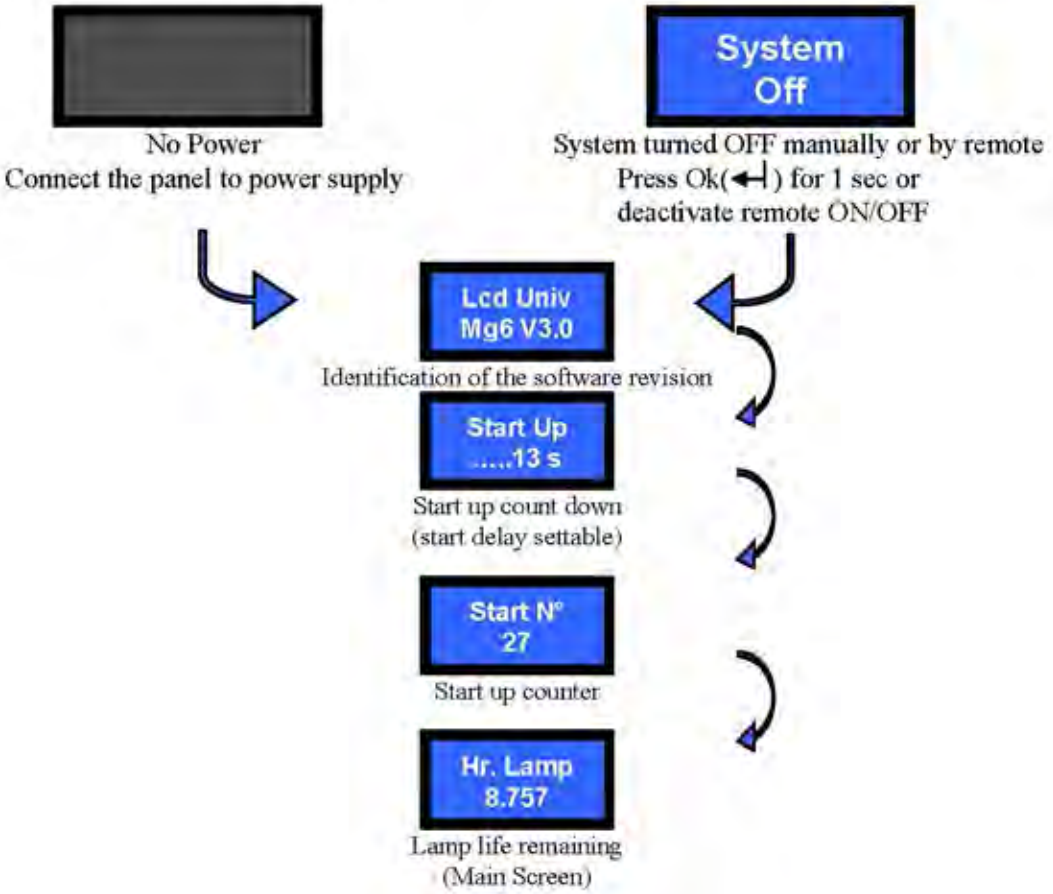
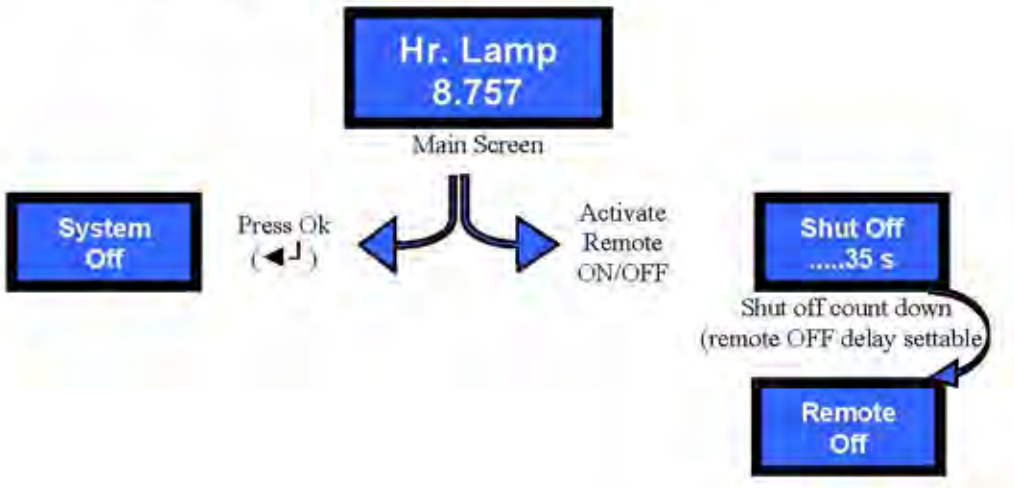
7. Display Information (Troubleshooting)

LCD DISPLAY MESSAGES – Start up:



LCD DISPLAY MESSAGES – Shut Off:



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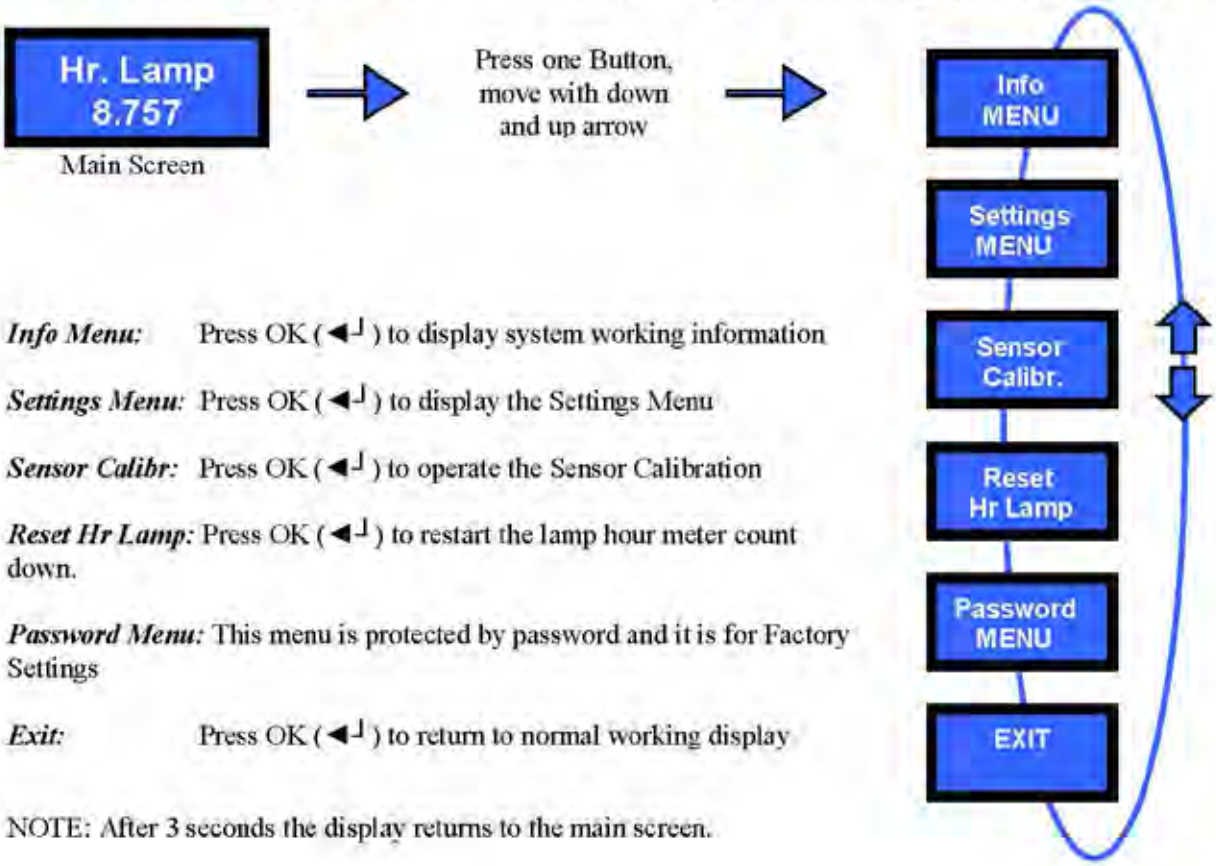
LCD DISPLAY MESSAGES – Main MENU:

The main MENU describes the main functions of the control Panel
To enter the main menus push one of the 3 buttons. Move trough the menus using up and down arrow buttons.



Info Menu: Press OK (◄┘) to display system working information

Settings Menu: Press OK (◄┘) to display the Settings Menu

Sensor Calibr: Press OK (◄┘) to operate the Sensor Calibration

Reset Hr Lamp: Press OK (◄┘) to restart the lamp hour meter count down.

Password Menu: This menu is protected by password and it is for Factory Settings

Exit: Press OK (◄┘) to return to normal working display

NOTE: After 3 seconds the display returns to the main screen.

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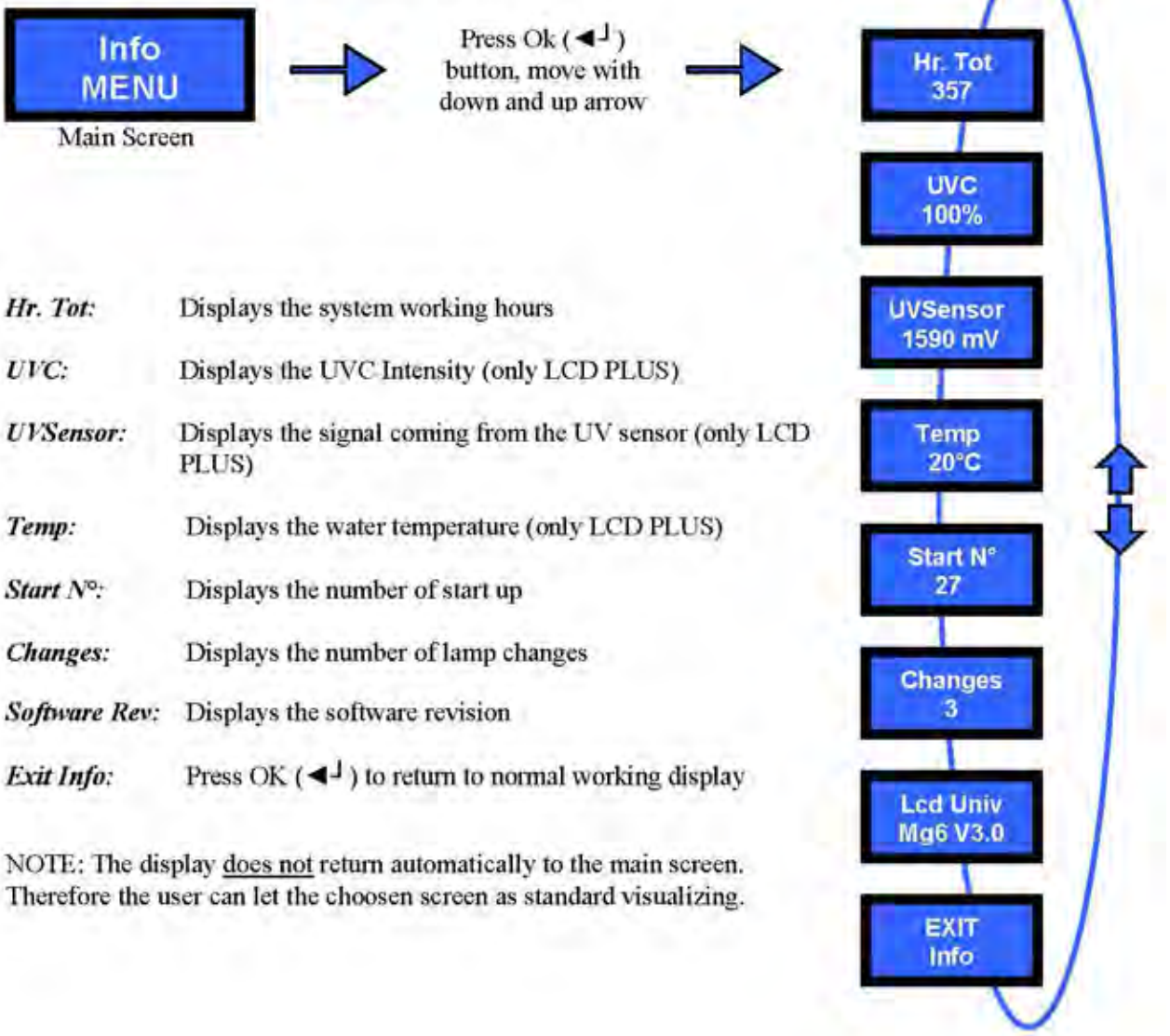
LCD DISPLAY MESSAGES – Info MENU:



Hr. Tot: Displays the system working hours

UVC: Displays the UVC Intensity (only LCD PLUS)

UVSensor: Displays the signal coming from the UV sensor (only LCD PLUS)

Temp: Displays the water temperature (only LCD PLUS)

Start N°: Displays the number of start up

Changes: Displays the number of lamp changes

Software Rev: Displays the software revision

Exit Info: Press OK (◄┘) to return to normal working display

NOTE: The display does not return automatically to the main screen. Therefore the user can let the choosen screen as standard visualizing.

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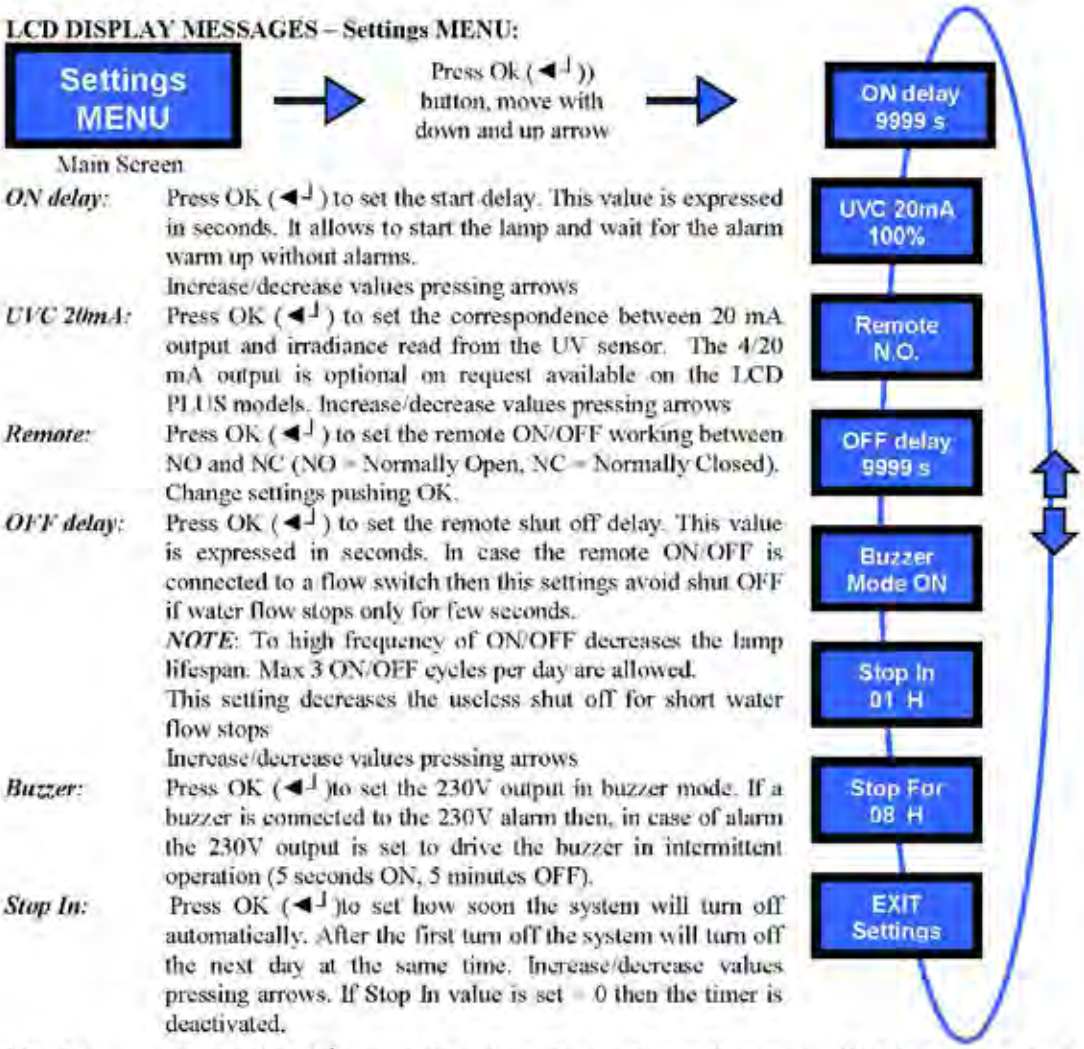
LCD DISPLAY MESSAGES – Settings MENU:



ON delay: Press OK (◄┘) to set the start delay. This value is expressed in seconds. It allows to start the lamp and wait for the alarm warm up without alarms.
Increase/decrease values pressing arrows

UVC 20mA: Press OK (◄┘) to set the correspondence between 20 mA output and irradiance read from the UV sensor. The 4/20 mA output is optional on request available on the LCD PLUS models. Increase/decrease values pressing arrows

Remote: Press OK (◄┘) to set the remote ON/OFF working between NO and NC (NO = Normally Open, NC = Normally Closed). Change settings pushing OK.

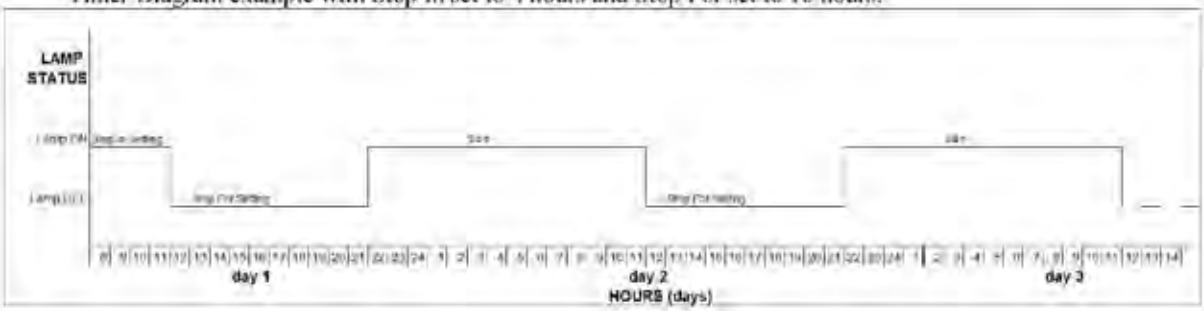
OFF delay: Press OK (◄┘) to set the remote shut off delay. This value is expressed in seconds. In case the remote ON/OFF is connected to a flow switch then this settings avoid shut OFF if water flow stops only for few seconds.
NOTE: To high frequency of ON/OFF decreases the lamp lifespan. Max 3 ON/OFF cycles per day are allowed.
This setting decreases the useless shut off for short water flow stops
Increase/decrease values pressing arrows

Buzzer: Press OK (◄┘)to set the 230V output in buzzer mode. If a buzzer is connected to the 230V alarm then, in case of alarm the 230V output is set to drive the buzzer in intermittent operation (5 seconds ON, 5 minutes OFF).

Stop In: Press OK (◄┘)to set how soon the system will turn off automatically. After the first turn off the system will turn off the next day at the same time. Increase/decrease values pressing arrows. If Stop In value is set = 0 then the timer is deactivated.

Stop For: Press OK (◄┘)to set how long the system will remain off before automatic restart. Increase/decrease values pressing arrows. If Stop In value is set = 0 then the timer is deactivated.

Timer Diagram example with Stop In set to 4 hours and Stop For set to 10 hours:



Exit: Press OK (◄┘) to return to normal working display

NOTE: After 3 seconds the display returns to the main screen.

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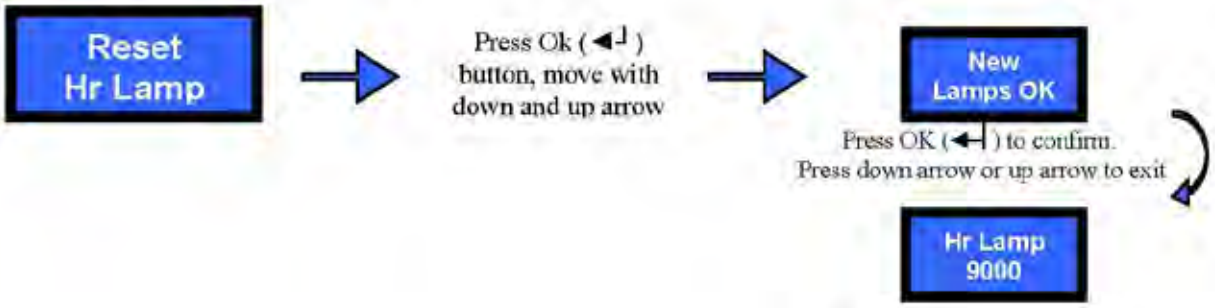
LCD DISPLAY MESSAGES – Sensor Calibr. (Only PLUS version):

This operation must be done at the first start up and on every lamp replacement, with quartz sleeves and sensor measuring window clean. Wait 5 minutes from the lamp start before operating the sensor calibration.

LCD DISPLAY MESSAGES –Reset Hr Lamp.:

This operation starts the count down of the lamp life hour meter. This operation must be done at the first lamp start and on every lamp replacement



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LCD DISPLAY MESSAGES – Alarms/troubleshooting:

In case of any alarm the red LED is flashing.

List of alarms:

Indicates the lamp failure. If the system has 2 lamps the failed lamp is identified. Check:

- Connection to the lamp
- If lamp has failed
- If lamp starter has failed.

Indicates that the count-down hour meter of lamps life comes to zero. In such case replace the lamps and restart lamp hour.

Only for Plus

Indicates low irradiation. Check:

- If lamp life has expired
- If quartz sleeves are dirty
- If sensor windows is dirty
- If water quality has changed

Indicates high temperature in the UV chamber. This may happen when either there is no flow or there is air in the UV chamber. In such cases the system switches off.
Reset the alarm: Push OK(◄┘) for 5 sec to put the system in standby then press OK (◄┘) again to restart the UV system.
NOTE: In case of high temperature the panel turns off the lamp and this remains off even if temperature drops below the threshold level. This is necessary in case of no flow to avoid this cycling:
Lamp ON→ High Temperature→lamp turned off→Temperautre lower then threshold→ lamp started again→ High Temperature→….
This can destroy the UV lamp, in case the user can accept this risk then ask the factory for setting change instructions.

LCD DISPLAY MESSAGES – Other Problems:

Display OFF in case of no electrical feeding or burned fuses

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8. Maintenance

The UV System of DOMESTIC SERIES has been designed and realized by Jesco with simple and functional principles which make the checking procedures and the periodical servicing particularly easy.

The main points which characterize the standard servicing are the following: check quarterly the quartz sleeves, which contain the UV lamps, in order to ensure maximum disinfection for cleaning.

Maintenance work may only be carried out by personnel who have been trained and authorized for this work by the owner and/or user. The owner and/or user must ensure that the maintenance personnel are familiar with the safety measures and regulations, and that they also comply with them; in addition to having read and understood the operating instructions.

Only original replacement parts from the supplier must be used.

The following are the recommended service intervals for replacement parts:

UV lamp change - once per 9000 hours
UV quartz sleeve clean - frequency depends on the quality of the water
O-ring for quartz sleeve-once per year

Procedure for UV lamp replacement (9000 h max.)

1) Disconnect the electrical box from the electrical power supply
2) Lift the cover slightly by turning, carefully loosening the electrical 4-pins connection and extract the lamp from the quartz sleeve
3) Remove the lamp from the packing, handling it carefully by its ends or by using gloves
4) Insert the new lamp into the quartz sleeve of the sterilizer
5) Connect the lamp to the electrical connection and replace the cover
6) Connect the equipment

Important!

For lamp replacement, it is not necessary to stop the water flow and drain the UV chamber.

Procedure for quartz sleeve cleaning

1) Disconnect the electrical box from the electrical grid and turn off water
2) Remove the lamp, following the lamp replacement instructions.
3) Depressurize and drain the UV system
4) Unscrew the sleeve-bolt and extract the quartz sleeve with care
5) Clean the quartz sleeve by wiping it with a cloth soaked with an acid solution such as vinegar or lemon
6) Reassemble the sleeve being sure to center the guide-spring fixed on the bottom, put the o-ring on the quartz sleeve, then tighten the sleeve-bolt; place the o-ring in the seat of the sleeve-bolt, insert the sleeve inside it, till it leans, then screw on the S/S chamber
7) Turn on water checking for possible leaks
8) Remount lamp, electrical connection and cover
9) Turn on the UV system

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9. Warranty Conditions

JESCO works in compliance with ISO 9001-2008 quality procedures and subjects all equipment to accurate checks and tests.

JESCO products are guaranteed only within the limits of technical specifications and request and/or of the certificates and/or of the specific checks as agreed, for 24 months from the delivery date or 30 days from the purchase date, provided that defects are reported immediately.

The stainless steel chamber is covered by a 5-year warranty only if used with compatible liquids and correctly installed.

In no case is the integral replacement of the product foreseen and any responsibility of JESCO is excluded for delays in the delivery of the goods to the customer, for claims of third parties against the customer, for losses of goods, costs (installation, servicing and maintenance, transport, and etc.) and damages of the customer due to the defect.

Moreover, the product repaired or tampered with by non-authorized third parties, and the product on which an intervention has been made for defect or for convenience tests, is excluded from the warranty.

Repairs are normally carried out in the JESCO facility or in authorized after-sales service centers approved by JESCO.

The warranty does not cover:

1. Accidental breakages due to transport.
2. Breakages due to the use of equipment not in compliance with what is indicated on the use and maintenance manual or due to carelessness.
3. Breakages to the connection to a power grid fed with a tension different than the foreseen one (±10% of the nominal value as fixed by CEI rules)

DO NOT TAMPER WITH THE ADHESIVE IDENTIFICATION LABELS

The adhesive label with the QC (Quality Control) number must remain intact and legible; such number allows to enter the data bank of tests and to find the values obtained in the electrical test of the equipment.

The adhesive label with the S/N (Serial Number) number must remain intact and legible; such number allows to enter the data bank of tests and to find the values obtained in the hydraulic test of the equipment.

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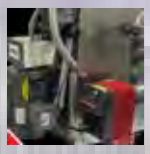
Accessories

Chemical Feed Systems

Measuring and Control Technology



Transfer Pumps

Metering Pumps

February 2016

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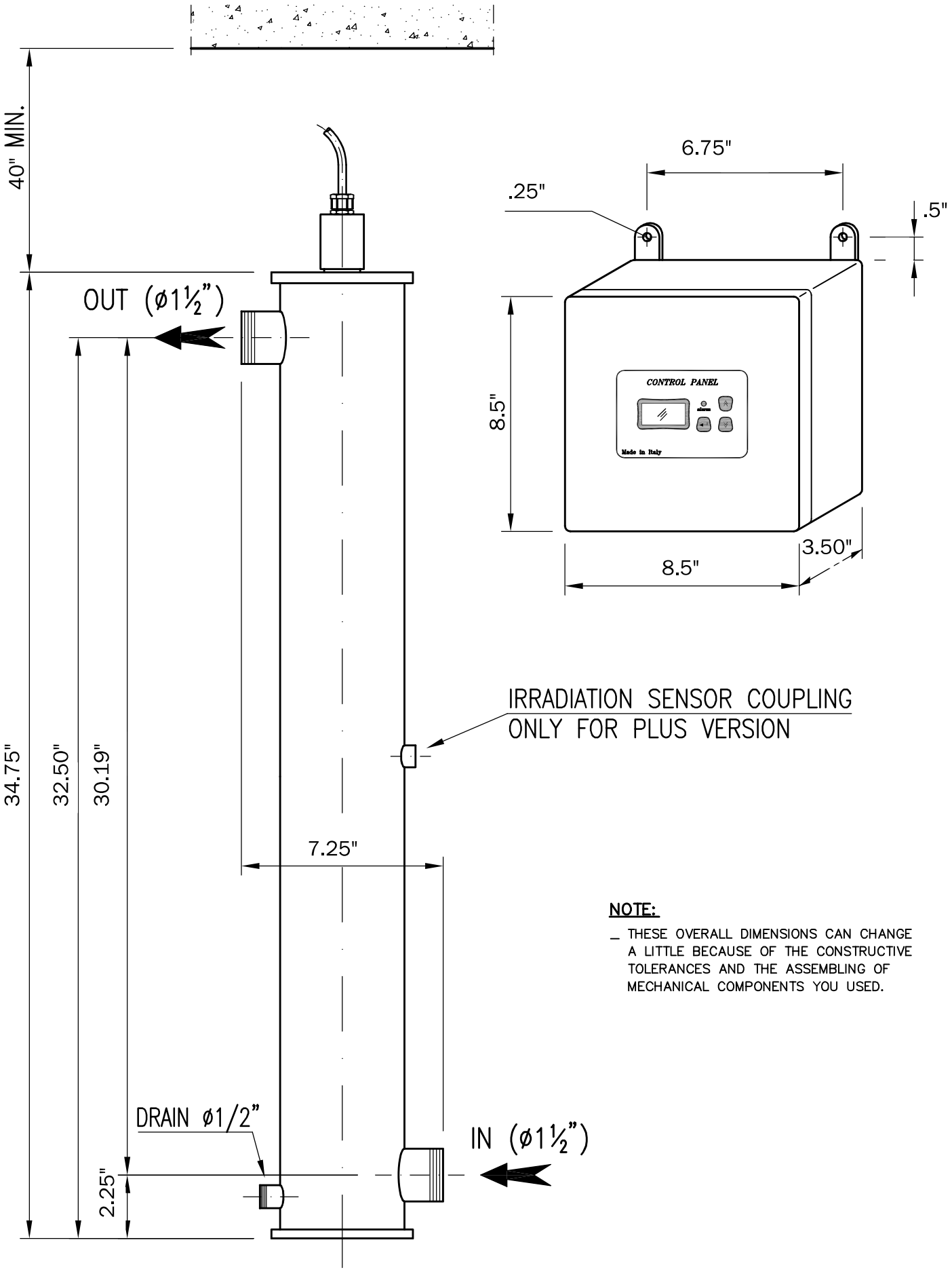
E-Mail: mail@jescoamerica.com
Internet: www.lutzjescoamerica.com
Toll Free:
1-800-554-2762



NOTE:

_ THESE OVERALL DIMENSIONS CAN CHANGE A LITTLE BECAUSE OF THE CONSTRUCTIVE TOLERANCES AND THE ASSEMBLING OF MECHANICAL COMPONENTS YOU USED.

					CODICE
A	FIRST ISSUE	30/10/14	SCHENONE	MAZZONE	
REVISIONE	DESCRIZIONE	DATA	DISEGNATO	VERIFICATO	

TITOLO: **UV-C DISINFECTION UV 80/2 LCD MODEL LAY-OUT**

Disegnato	UFFICIO TECNICO	Foglio	01
Data	21/07/14	Segue	/
Scala	/	Totale Fg.	01

Luiz-JESCO America Corp

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1.4.7 Event Notification Using Mailboxes

The ATRTU-TCOM system can be configured to notify external systems when specific events have occurred. The external system to be notified is referred to as a “mailbox”. The events that trigger a notification are defined by the control program. When a mailbox is defined, the type of mailbox is also specified.

Supported mailbox types include:

- Phone
- Pager
- Modem
- Email
- Text

The primary objective of the event notification is to inform support personnel that something in the system may require operator attention. Actual message content is limited by the technology hosting the destination mailbox. Depending on the technology, the event notification may be a call showing up on caller ID or a pager, or include an actual message.

Mailbox Technology	Destination Address Format	Notification Type and/or message	Dependencies
Phone/Pager	Phone number	Caller ID. No message.	Requires installed phone line. Must be enabled, configured, and connected.
Email	Email address	Email with limited message.	Requires network connection using either Ethernet or cellular network. Must be enabled, configured, and connected.
SMS Text	Phone number	Text with limited message.	Requires optional cellular module Must be enabled, configured, and connected.

Table 4: Mailbox Types, Event Notification, and Messages

Successful event notification requirements include:

- One or more mailbox types are defined by the control program and associated with an event.
- The mailbox is enabled.
- All components required to communicate between the ATRTU-TCOM system and an external device are connected and functioning.
- The mailbox must be configured with valid information. If it’s a phone, pager, or SMS text mailbox, the target phone number must be valid. If it’s an email address, URL, or IP address, it must be valid.

CA MFR Review Exhibit 2 – Engineer Report

2 Web Server

The ATRTU-TCOM controller hosts a web site that can be used to monitor and adjust various system settings. Hosting a web site increases the range of devices and operating systems that can be used to interact with the ATRTU-TCOM system to virtually any device that has a web browser, a network connection, and can access a web site.

Examples include, but are not limited to, Android smart phones, iPhones, iPads, Windows© laptops and PC's, Mac© laptops and PC's, Amazon Kindle Fire©, etc.

The range of features supported by the web site is primarily intended to facilitate remote monitoring and adjustment from a wide range of mobile devices therefore making it simpler for support personnel to access the systems on the go.

The web site includes support for:

- Logon mechanisms requiring credentials and access permission controls.
- Remote monitoring and adjustment of system settings.
- View logs and download select logs.
- View and modify notification mailbox settings.
- Adjust date and time settings.

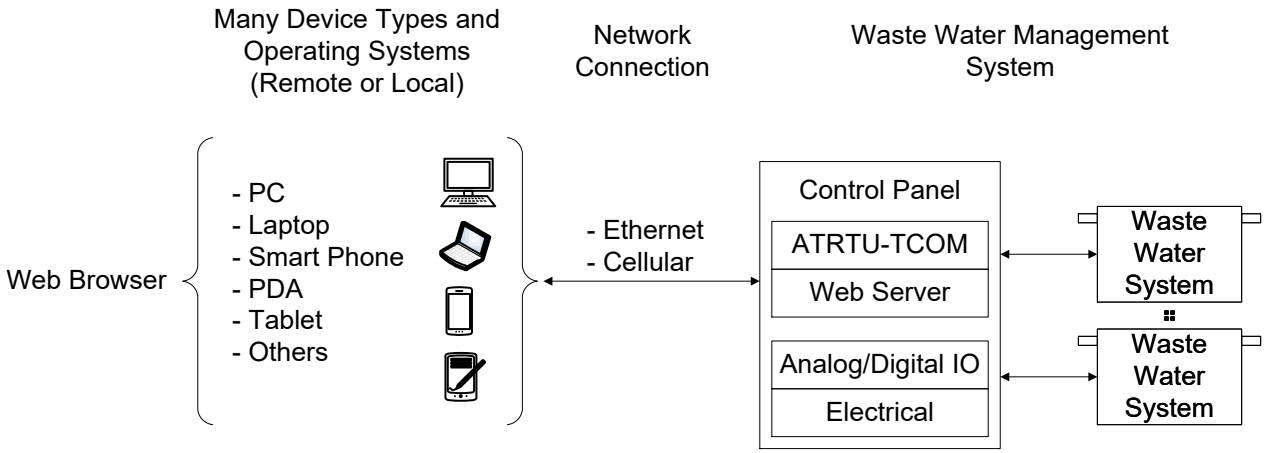

Figure 2: Web Server Overview

2.1 Device and Browser Support

Due to rapidly evolving technology, evolving standards, and the vast range of devices, browsers, and operating systems, Orenco Controls cannot guarantee compatibility with every combination of browser and device. However, if an incompatibility is encountered it can typically be resolved by updating the web browser on the user's system.

Supported browsers include (not limited to):

- Google Chrome:
  - Version: 58.0.3029.83, on Android mobile phone.
  - Version: 54.0.2840.99 (64 bit), Windows© 10.
  - Version: 58.0.3029.110 (64 bit), Windows© 7

- Microsoft Edge:
  - Version: 38.14393.1066.0 Windows© 10

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- Firefox:
  - Version: 50.0.2 Windows© 10

- Safari:
  - Version 5.1.7 Windows© 10
  - iPhone, Mac iOS
  - Version: 5.1.10, Mac OS X 10.6.8
  - Version: 10.1.1, Mac OS 10.12.5

- Internet Explorer:
  - Version 11.0.9600.18638, Windows© 7
  - Version: 11.447.14393.0, Windows© 10

- Silk: Kindle Fire

2.2 Web Server Connection Requirements

Connection to the web site requires a functioning network connection between the user's device and the ATRTU-TCOM.

On the ATRTU-TCOM side of the link, the network connection must use either:

1) The hardwired Ethernet interface directly on the main controller board.
2) The internal cellular modem module.

The internal cellular modem module plugs into a connector on the main controller circuit board within the ATRTU-TCOM system. Current ATRTU-TCOM systems include a hardwired 10/100 base-T Ethernet interface. The internal cellular modem module is an optional device that may or may not be installed depending on the target site and how it is configured.

For the web server to be used, at least one of the network interfaces must be enabled, properly configured, and have a valid network connection. See section 3.2 "TCOM Viewer Communication Interfaces" on page 47 for more information.

To successfully access the web server:

1) The ATRTU-TCOM system must be connected to either a private or public network.

2) The ATRTU-TCOM network subsystem must be enabled and configured with a valid IP address and HTTP port number.

3) The client device must be connected to either a private or public network which can be hardwired, wireless, or a mixture of both.

4) If the client device and the ATRTU-TCOM system are connected to separate networks, there must be a connection between the networks and access controls must be set by the network administrators to allow communication between the two subsystems (i.e., VPN's, firewalls, router settings, etc.).

5) The client user must know the IP address and HTTP port number that has been assigned to the ATRTU-TCOM system. This is typically determined by the network administrator of the installation site.

6) The client user must have a valid username and password that can be authenticated by the ATRTU-TCOM system.

7) The client browser must have JavaScript enabled.

8) The client browser must have popup's enabled.

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2.3 Connecting a Web Browser to the Web Server

To logon on to the web server:

1) Open the web browser on the client device.
2) In the navigation field enter:

   http://<IP address or hostname>:<port number>

   For example, assuming the IP address is 192.168.0.10 and the port number is 2080, the user would enter the following into the URL bar of their browser:

   http://192.168.0.10:2080

   Note: The IP address above is for example only. The correct address and port number are determined by the local network administrator.

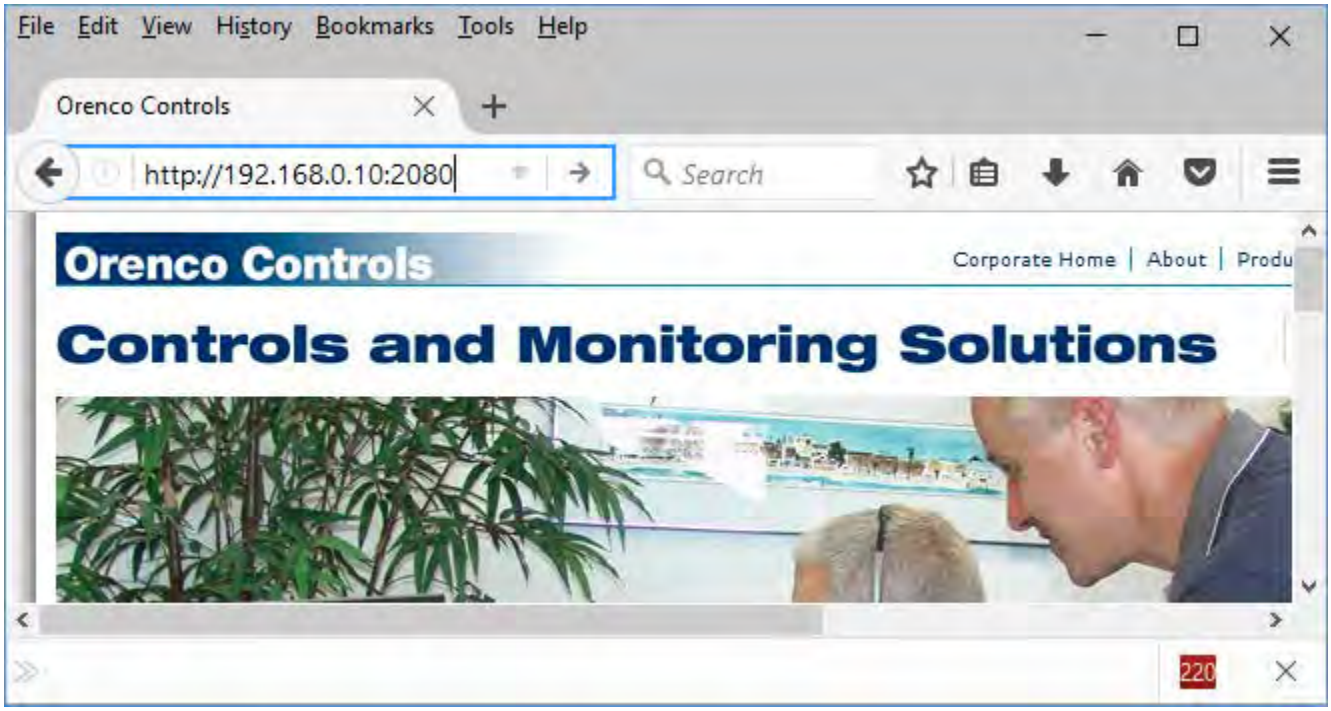

Figure 3: Example Browser Connection to the Web Server

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Appendix #9:

Orenco Hydraulic Grade Line Analysis for the collection system

Evaluation of an Orenco® Prelos Liquid-Only Sewer™ System

Project Name
Sugar Loaf Road Subdivision
Sevier County, TN

Prepared for
Cody McElroy, PE
DSH & Associates

Prepared by
Kirsten Fox
Systems Engineer

Date
April 15, 2025

Prelos™ The Next Step In Sewer Evolution

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Introduction

Small communities are often confronted with major costs to repair or replace wastewater treatment plants or failing septic systems. Traditional technologies such as conventional gravity sewers and activated sludge treatment facilities are generally unaffordable for small communities. Because of their low density and small user base, small communities are unable to afford the high per capita construction costs, and they are unable to pay for the wastewater professionals needed to operate, manage, and update such complex facilities.

This report contains information related to a Prelos liquid-only sewer (LOS) collection system. LOS systems use small diameter, typically 2”- 4”, pipe that follows the contour of the land, to significantly reduce construction costs.

Unlike conventional approaches, such as gravity or grinder systems, LOS systems provide a modular solution that can be incrementally installed, resulting in lower up-front capital costs that do not unfairly burden initial users.

With an Orenco Prelos Sewer, raw sewage flows from the building to a watertight underground processor, where primary treatment occurs via settling and natural biological processes. Solids remain in the processor, decreasing in volume, which reduces biosolids treatment costs. Filtered liquid effluent is then discharged (by high-head pump or gravity) through small-diameter service lines to small-diameter collection lines. These service and collection lines are shallowly buried and follow the contour of the land. The entire system is watertight, reducing costs from infiltration. No expensive manholes or lift station are required and energy consumption is minimal.

The specified collection system is an Orenco Prelos Liquid-only Sewer, a technology that the company has been optimizing for more than 25 years. It is the only sewer technology that provides primary treatment.

Figure 1. Typical Prelos Processor™

General Comments:

The line sizes indicated on the graphs have been chosen based upon the use of Orenco's standard pump, Model PF1005, which will achieve 5-9 gpm at 150 ft of TDH, depending upon whether the 1/4" flow control orifice disk is used. This pump should be adequate for all connections in this system, although this determination should be made after the final site analysis is completed.

Individual Prelos processors that have a liquid level that remains 2 feet or more above the HGL should work with an effluent filter (no pump is required), while systems that fall below the HGL will require pumping. The HGL will fluctuate with the number of pumps running concurrently, so systems that fall within this range will alternately be above and below the HGL. Any pumping system above the static grade line (typically the highest point within the system) will require anti-siphon valves on their pumping discharge assemblies. The service line between the processor and the main line should be laid at a constant grade to eliminate high points where gasses may collect.

Figure 2. Typical Prelos Sewer System

The following are critical components that ensure a successful liquid-only sewer system design. They are not included in this analysis, but we recommend that they are incorporated in the design when needed:

I. Properly sized and watertight interceptor tanks with effluent filters or screened pumps and control panels
II. Service connection assemblies (ball valve and check valve) just off the main lines for all service lines
III. Isolation valves and check valves at main line intersections
IV. Proper cleanout accessibility, including launching ports and catching methods for "pigging" the main lines (especially for construction debris). The exact location and number of automatic air release valve (AARV) assemblies should be analyzed in the field and specified as needed. Manual air release valves could be installed at questionable locations and replaced later with automatic valves if necessary.

Pump Information

The line sizes indicated on the graphs have been chosen based upon the use of Orenco's standard liquid-only sewer pump, Model PF1005, which will achieve 5-9 gpm at 150 ft of TDH, depending upon whether the 1/4" flow control orifice disk is used. This pump should be adequate for all connections in this system, although this determination should be made after the final site analysis is completed. Pump information can be seen below.

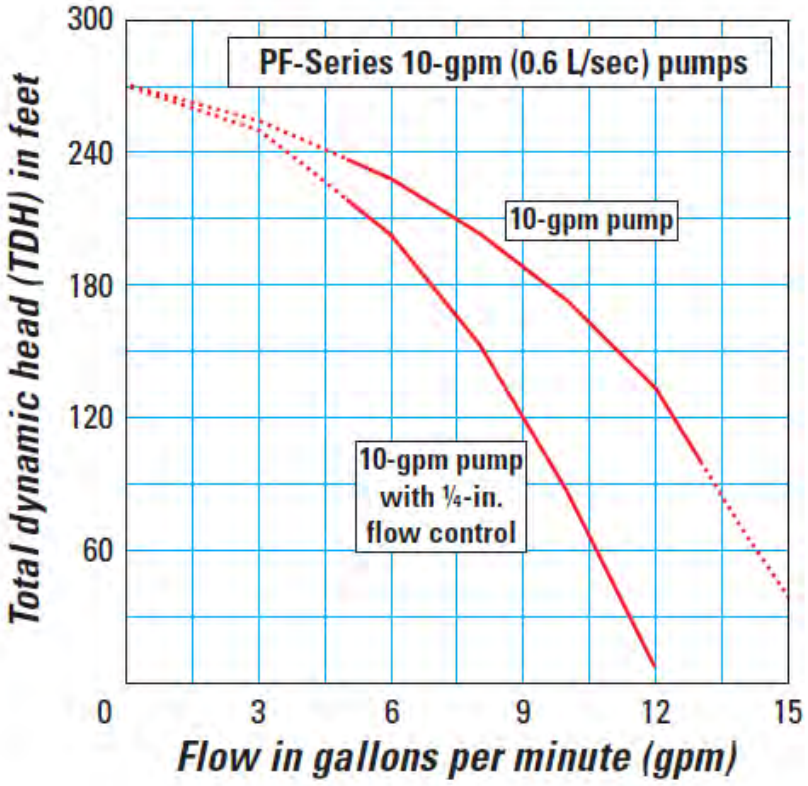


Figure 3. Pump Performance Curve

Design Parameters and Hydraulic Model

The purpose of this analysis is to determine the delivery method (pump or gravity) and line size necessary for a successful Prelos collection system.

Orenco Systems, Inc. ("Orenco") has received the proposed layout from the designer, flow parameters based on internal assumptions (see below) and elevations for the Chatham County project. A preliminary hydraulic grade line (HGL) was produced to analyze the proposed liquid-only sewer to determine effluent line diameters and pumps/ packages required. Once final discharge locations have been established and the project is further along in the design, a more final HGL can be provided. Please review the enclosed results to ensure the assumptions and conclusions are accurate.

Design Assumptions

Inputs

The information in Table 1 are the inputs used in the design:

Table 1.

Total Sites	18
Flow/Bedroom	100 gpd
Pipe Class/Sch.	SCH. 40 PVC
C Value	150

Flow Rate

A population density found in Table 1 above has been used in all calculations. Flow rates for each line were determined using the following equation and are called out in the Table below:

$$Q = \left(\frac{PC}{6}\right) EDU + B$$

Where:

Q = peak flow in gpm.
PC = population density per EDU
EDU = the number of dwelling units
B = Constant 15 that can be omitted if the collection system has more than 50 connections.

Head Loss

The friction head loss calculations were done using the material and Hazen-Williams coefficient outlined in Table 1 above.

$$h_L = \frac{10.557 \cdot L}{d^{4.87}} \left(\frac{Q_P}{C}\right)^{1.85}$$

Where:

h_L = Head loss due to pipe friction, ft
L = Forcemain line length, ft
d = Inside diameter of pipe, in
Q_P = Peak flow rate through forcemain, gpm
C = Hazen-Williams coefficient, unitless (120-150 depending on material used)

Velocity

Since effluent sewers convey effluent and not solid waste, minimum velocities are not required like that of a gravity sewer system. However, many regulatory agencies may require velocity calculations to be included in a design. Velocities were calculated using the following equation:

$$V = \frac{(0.4085)(Q_{gpm})}{d^2}$$

Where:

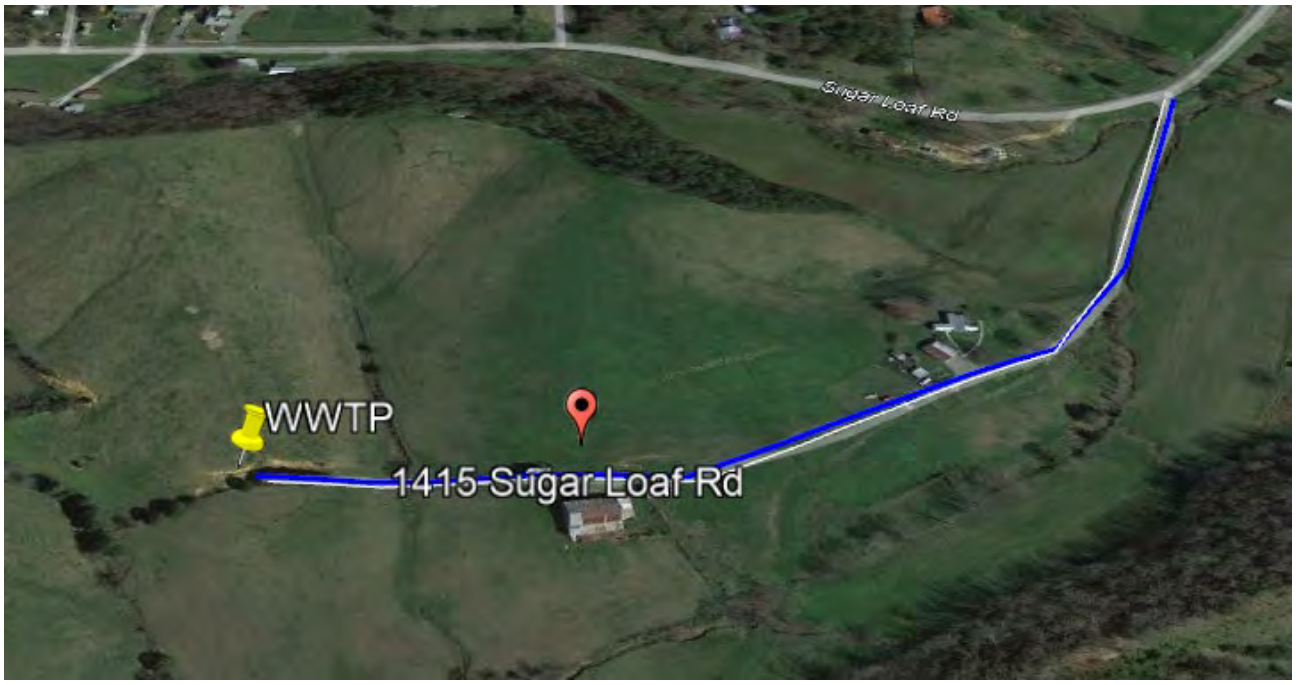
V = Velocity in pipe, ft/s
d = Inside diameter of pipe, in
Q = Flow rate through pipe, gpm

End of Line Flow Velocity

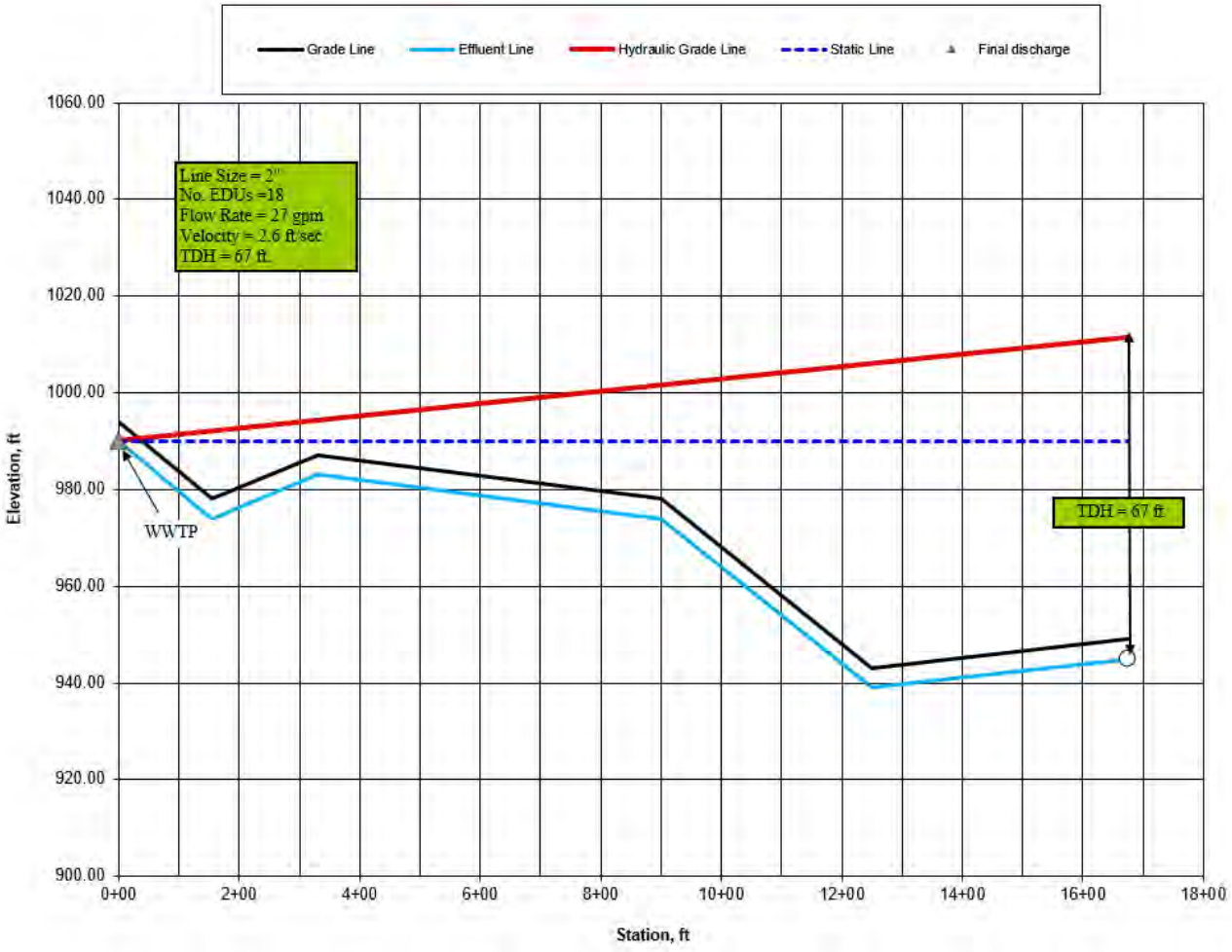
Orenco has standardized on 2-inch lines for minimum branch line sizing. When the Model PF1005 pump operates within a range of < 185 TDH it is able to maintain the minimum 9 gpm that is necessary to achieve 1 ft/s flow velocity.

Analysis Results

Site Map



Force Main 1


Grade Line
Effluent Line
Hydraulic Grade Line
Static Line
Final discharge
Line Size = 2"
No. EDUs =18
Flow Rate = 27 gpm
Velocity = 2.6 ft/sec
TDH = 67 ft
WWTP
TDH = 67 ft
Elevation, ft
Station, ft
1060.00
1040.00
1020.00
1000.00
980.00
960.00
940.00
920.00
900.00
0+00
2+00
4+00
6+00
8+00
10+00
12+00
14+00
16+00
18+00

Appendix #10:
Drip line specification

QUICK REFERENCE GUIDE

Drip Tubing

Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
WaterflowPRO® Classic Drip Tubing						
WFCL-16-4-24	G-WFCL-16-4-24	Classic drip tubing, 24" cylindrical emitter spacing, ~1.0 gph, O.D. 16mm, Geoshield and Rootguard	In stock		500 ft	20.0 lbs.
WFCL-16-4-12	G-WFCL-16-4-12	Classic drip tubing, 12" cylindrical emitter spacing, ~1.0 gph, O.D. 16mm, Geoshield and Rootguard	On demand		500 ft	22.0 lbs.
WaterflowPRO® PC Drip Tubing						
WFPC-16-2-24	G-WFPC-16-2-24	PC drip tubing, 24" cylindrical emitter spacing, ~0.6 gph, O.D. 16mm, Geoshield and Rootguard	In stock		500 ft	20.0 lbs.
WFPC-16-2-12	G-WFPC-16-2-12	PC drip tubing, 12" cylindrical emitter spacing, ~0.6 gph, O.D. 16mm, Geoshield and Rootguard	In stock		500 ft	21.0 lbs.
WFPC-16-4-24	G-WFPC-16-4-24	PC drip tubing, 24" cylindrical emitter spacing, ~0.9 gph, O.D. 16mm, Geoshield and Rootguard	In stock		500 ft	20.0 lbs.
WFPC-16-4-12	G-WFPC-16-4-12	PC drip tubing, 12" cylindrical emitter spacing, ~0.9 gph, O.D. 16mm, Geoshield and Rootguard	In stock		500 ft	21.0 lbs.
WaterflowPRO® Blank Tubing						
WFPLAIN	G-WF-PLAIN	Blank tubing, O.D. 16mm, GeoShield, 100ft	In stock		100ft.	4.0 lbs.
WaterflowECO® PC Drip Tubing						
	G-WFPC-17-1.6-24-ECO	Drip tubing PC 24" flat emitter spacing, ~0.4 gph, O.D. 17mm, Geoshield	On demand			
	G-WFPC-17-2-24-ECO	Drip tubing PC 24" flat emitter spacing, ~0.6 gph, O.D. 17mm, Geoshield	In stock			
	G-WFPC-17-4-24-ECO	Drip tubing PC 24" flat emitter spacing, ~1.0 gph, O.D. 17mm, Geoshield	On demand		500 ft	20 lbs.

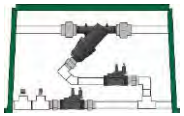
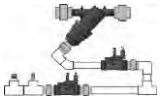
Notes:

1. Nominal length of coils = 500ft, unless otherwise specified.

2. Custom drip tubing configurations and emitter spacings produced on demand, M.O.Q.: 132,000 ft. Please contact Geoflow.

QUICK REFERENCE GUIDE

Pre-assembled Residential Headworks

	Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
DripFilterECO® - Pre-assembled Residential Headworks with Vortex Filters							
	WHWS-V-1F-A	G-WHWS-V1FA	Guts and box - 1" Vortex Filter, Up to 10 gpm, auto	Discontinued		1	36
	WHWS-V-1F-M	G-WHWS-V1FM	Guts and box - 1" Vortex Filter, Up to 10 gpm, manual	Discontinued		1	36
	WHWS-V-1.5F-A	G-WHWS-V15FA	Guts and box - 1.5" Vortex Filter, Up to 20 gpm, auto	Discontinued		1	47
	WHWS-V-1.5F-M	G-WHWS-V15FM	Guts and box - 1.5" Vortex Filter, Up to 20 gpm, manual	Discontinued		1	43
	WHWS-V-2F-A	G-WHWS-V2FA	Guts and box - 2" Vortex Filter, Up to 45 gpm, auto	Discontinued		1	47
	WHWS-V-2F-M	G-WHWS-V2FM	Guts and box - 2" Vortex Filter, Up to 45 gpm, manual	Discontinued		1	43
DripFilterECO® - Guts Only Vortex Filter							
	WHWS-GUT-V-1F-A	G-WHWSGUT-V1FA	DripFilterECO - 1" Vortex Filter. Up to 10gpm, Automatic flush	On demand		1	8
		G-WHWSGUT-V1FA-FLEX	DripFilterECO - 1" flex manifold replacement	On demand			
	WHWS-GUT-V-1F-M	G-WHWSGUT-V1FM	DripFilterECO - 1" Vortex Filter. Up to 10gpm, Manual flush	On demand		1	7
	WHWS-GUT-V-15F-A	G-WHWSGUT-V15FA	DripFilterECO - 1.5" Vortex Filter. Up to 20gpm, Automatic flush	On demand		1	16
	WHWS-GUT-V-15F-M	G-WHWSGUT-V15FM	DripFilterECO - 1.5" Vortex Filter. Up to 20gpm, Manual flush	On demand		1	12
	WHWS-GUT-V-2F-A	G-WHWSGUT-V2FA	DripFilterECO - 2" Vortex Filter. Up to 20gpm, Automatic flush	On demand		1	16
	WHWS-GUT-V-2F-M	G-WHWSGUT-V2FM	DripFilterECO - 2" Vortex Filter. Up to 20gpm, Manual flush	On demand		1	12
Headworks Box Only							
		G-WHWSBOX-A	14"x19"x12" purple box for accessories	On demand			
	WHWS-BOX-S	G-WHWSBOX-S	13"x24"x15" headworks box drilled for 3/4" and 1" guts	In stock			
	WHWS-BOX-L	G-WHWSBOX-L	17"x30"x15" headworks box drilled for 1.5" and 2" guts	In stock			
	WHWS-BOX-L18	G-WHWSBOX-L-18	17"x30"x18" headworks box for 2x1.5" BioDisc guts	On demand			
	WHWS-RISER-S	G-WHWSRISER-S	13"x24"x6" riser for 3/4" and 1" guts	On demand			
		G-WHWSRISER-L	17"x30"x6" riser for 1.5" and 2" guts	On demand			
		G-WHWSLID-S	Headworks lid for 3/4" and 1" guts, 13"x24"	On demand			
		G-WHWSLID-L	Headworks lid for 1.5" and 2" guts, 17"x30"	On demand			
Pre-assembled Headworks - Vortex Filters with Digital Display flow meter			Large fiberglass box and flow meter included				
	WHWU-V-1F-A-DDS	G-WHWU-V-1F-A-DDS	Ultra headworks - 1" Vortex Filter max 10 gpm, 1" Digital flow meter	Discontinued			42
	WHWU-V-15F-A-DDS	G-WHWU-V-15F-A-DDS	Ultra headworks - 1.5" Vortex Filter max 20 gpm, 1" Digital flow meter	Discontinued			45
	WHWU-V-2F-A-DDS	G-WHWU-V-2F-A-DDS	Ultra headworks - 2" Vortex Filter max 20 gpm, 1.5" Digital flow meter	Discontinued			45
DripFilterECO® Pre-assembled Headworks - For Riser							
	WHWRS-D-150A	G-WHWRS-D150A	Vertical in-tank headworks, for 1.5" BioDisc filter, plumbed for easy disconnect from riser, max 23 gpm, manual flush, riser not included	On demand			7
	WHWRS-D-150M	G-WHWRS-D150M	Vertical in-tank headworks, for 1.5" BioDisc filter, plumbed for easy disconnect from riser, max 23 gpm, auto flush, riser not included	On demand			7
DripFilterECO® Pre-assembled Headworks - HDPE Basin							
	Q-PDS-MS-1.5-DF-AUT	G-DFE-RBB2618-AW-150BD-1-100SV-1	DripFilterECO headworks in 26x18 HDPE basin with lid, auto washdown, 1.5" BioDisc filter, Up to 20 gpm, 1" auto	In Stock			
	Q-PDS-MS-1.5-DF-MAN	G-DFE-RBB2618-MW-150BD-1-100MV-1	DripFilterECO headworks in 26x18 HDPE basin with lid, manual washdown, 1.5" BioDisc filter, Up to 20 gpm, 1" manual	In Stock			

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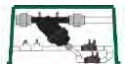
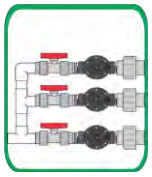
QUICK REFERENCE GUIDE

Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
Pre-assembled Residential Headworks						
DripFilterECO® BioDisc Headworks with guts and box						
						
WHWS-D-15F-A	G-WHWS-D-15F-A	Guts and box - 1.5" BioDisc Filter, Up to 20 gpm, auto	To be discontinued	Q-PDS-MS-1.5-DF-AUT		39
	G-WHWS-D-15F-A-FM	Guts only 1.5", BioDisc filter, Up to 20 gpm, auto washdown, 1" flow meter	To be discontinued			
WHWS-D-15F-M	G-WHWS-D-15F-M	Guts and box - 1.5" BioDisc Filter, Up to 20 gpm, 1" manual	To be discontinued	Q-PDS-MS-1.5-DF-MAN		39
WHWS-D-15F-ACT	G-WHWS-D-15F-ACT	Guts and box - 1.5" BioDisc Filter, Up to 20 gpm, 1" solenoid filter flush, 1" actuated ball field flush	Discontinued			42
WHWS-D-15F-A2	G-WHWS-D-15F-A2	Guts and box - 2x1.5" BioDisc Filter, Up to 30 gpm, 1" auto	Discontinued			49
DripFilterECO® Guts Only - BioDisc						
WHWS-GUT-D-15F-A	G-WHWSGUT-D-15FA	DripFilterECO guts only - 1.5" BioDisc Filter, Up to 20 gpm, 1" auto	In stock			8
WHWS-GUT-D-15F-M	G-WHWSGUT-D-15FM	DripFilterECO guts only - 1.5" BioDisc Filter, Up to 20 gpm, 1" manual	In stock			8
	G-WHWSGUT-D-15ACT	DripFilterECO guts only - 1.5", BioDisc filter, solenoid filter flush, Up to 20 gpm, 1" field-actuated ball flush	On demand			
	G-WHWSGUT-D-15ACT2	DripFilterECO guts only - 1.5", BioDisc filter, Up to 20 gpm, auto washdown, 2 actuated ball valves flush+field	On demand			
WHWS-GUT-D-15F-A2	G-WHWSGUT-D-15FA2	DripFilterECO guts only - 2 x 1.5" BioDisc filters, Up to 30 gpm, auto washdown	On demand			
WHWS-GUT-D-15F-ACT	G-WHWSGUT-D-15F-ACT	DripFilterECO guts only - 1.5" BioDisc Filter, Up to 20 gpm, 1" auto washdown, 1" actuated ball field flush	On demand			11
WHWS-D-200-A	G-WHWSGUT-D-200A	DripFilterECO guts only - 2" BioDisc Filter, 1" auto washdown	Discontinued			30
WHWS-D-200-M	G-WHWSGUT-D-200M	DripFilterECO guts only - 2" BioDisc Filter, 1" manual washdown	Discontinued			25
WHWVDB-200M-2	G-WHWBDB-200 M2	DripFilterECO guts only - 2 x 2" BioDisc, battery manifold	Discontinued			120
Commercial Headworks						
DripFilterPRO® Commercial Auto Washdown Headworks (Jumbo)		*Consult with your sales representative to quote your reqired configuration*				
	G-DFP-AW-200BD-1	Geoflow DripFilterPRO Headworks, auto washdown, Up to 50 gpm: One Biodisc 2" filter rack (3 filters total) with Geoshield + 3 Replacement filter cartridges	On demand			
	G-DFP-AW-200BD-2	Geoflow DripFilterPRO Headworks, auto washdown, Up to 100 gpm: Two Biodisc 2" filter rack (6 filters total) with Geoshield + 6 Replacement filter cartridges	On demand			
	G-DFP-AW-200BD-1-200SV-1	Geoflow DripFilterPRO Headworks, auto washdown, Up to 50 gpm: One Biodisc 2" filter rack (3 filters total) with Geoshield + 3 Replacement filter cartridges, One 2" zone valve rack (4 zones total)	On demand			
	G-DFP-200SV-1	Geoflow DripFilterPRO Headworks: One 2" zone valve racks (4 zones total)	On demand			
	G-DFP-200SV-2	Geoflow DripFilterPRO Headworks: Two 2" zone valve racks (8 zones total)	On demand			
	G-DFP-200SV-3	Geoflow DripFilterPRO Headworks: Three 2" zone valve racks (12 zones total)	On demand			
	G-DFP-200SV-4	Geoflow DripFilterPRO Headworks: Four 2" zone valve racks (16 zones total)	On demand			
Zone Boxes						
Zone Boxes						
						
WHZONE-100-2	G-WHZONE-100-2	2 Zone Assembly, 1" solenoids, 13x24x15, 5 to 25 gpm	On demand			46
WHZONE-100-3	G-WHZONE-100-3	3 Zone Assembly, 1" solenoids, 13x24x15, 5 to 25 gpm	On demand			46
WHZONE-100-4	G-WHZONE-100-4	4 Zone Assembly, 1" solenoids, 13x24x15, 5 to 25 gpm	On demand			46
WHZONE-150-2	G-WHZONE-150-2	2 Zone Assembly, 1.5" solenoids, 17x30x15, 25 to 90 gpm	On demand			46
WHZONE-150-3	G-WHZONE-150-3	3 Zone Assembly, 1.5" solenoids, 17x30x15, 25 to 90 gpm	On demand			46
WHZONE-150-4	G-WHZONE-150-4	4 Zone Assembly, 1.5" solenoids, 17x30x15, 25 to 90 gpm	On demand			46
WHZONE-200-2	G-WHZONE-200-2	2 Zone Assembly, 2" solenoids, 17x30x15, 25 to 90 gpm	On demand			46
WHZONE-200-3	G-WHZONE-200-3	3 Zone Assembly, 2" solenoids, 17x30x15, 25 to 90 gpm	On demand			46
WHZONE-200-4	G-WHZONE-200-4	4 Zone Assembly, 2" solenoids, 17x30x15, 25 to 90 gpm	On demand			46

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QUICK REFERENCE GUIDE

Control Panels

Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
Standard PLC Control Panels						
GEO1-SIM-AUT	G-GEO1-SIM-AUT	1 zone, 115/230VAC, simplex, 1P, 2HP max, auto filter/field	On demand	G-GEO1-SIM-AUT-B		10
	G-GEO1-SIM-AUT-B	1 zone, 115/230VAC, simplex, 1P, 2HP max, auto filter/field	In Stock			18
GEO1-SIM-MAN	G-GEO1-SIM-MAN	1 zone, 115/230VAC, simplex, 1P, 2HP max, manual filter/field	On demand	G-GEO1-SIM-MAN-B		16
	G-GEO1-SIM-MAN-B	1 zone, 115/230VAC, simplex, 1P, 2HP max, manual filter/field	In Stock			16
GEO1-DUP-AUT	G-GEO1-DUP-AUT	1 zone, 115/230VAC, duplex, 1P, 2HP max, auto filter/field	On demand	G-GEO1-DUP-AUT-B		18
	G-GEO1-DUP-AUT-B	1 zone, 115/230VAC, duplex, 1P, 2HP max, auto filter/field	In Stock			18
GEO1-DUP-MAN	G-GEO1-DUP-MAN	1 zone, 115/230VAC, duplex, 1P, 2HP max, manual filter/field	On demand	G-GEO1-DUP-MAN-B		18
	G-GEO1-DUP-MAN-B	1 zone, 115/230VAC, duplex, 1P, 2HP max, manual filter/field	In Stock			18
GEO4-SIM-AUT	G-GEO4-SIM-AUT	1 to 4 zone, 115/230VAC, simplex, 1P, 2HP max, auto filter/field	On demand	G-GEO4-SIM-AUT-B		18
	G-GEO4-SIM-AUT-B	1 to 4 zone individual run time, 115/230VAC, simplex, 1P, 2HP max, auto filter/field	In Stock			18
GEO4-DUP-AUT	G-GEO4-DUP-AUT	1 to 4 zone, 115/230VAC, duplex, 1P, 2HP max, auto filter/field	On demand	G-GEO4-DUP-AUT-B		23
	G-GEO4-DUP-AUT-B	1 to 4 zone individual run time, 115/230VAC, duplex, 1P, 2HP max, auto filter/field	In Stock			23
GEO8-SIM-AUT	G-GEO8-SIM-AUT	1 to 8 zone, 115/230VAC, simplex, 1P, 2HP max, auto filter/field	On demand	G-GEO8-SIM-AUT-B		30
	G-GEO8-SIM-AUT-B	1 to 8 zone individual run time, 115/230VAC, simplex, 1P, 2HP max, auto filter/field	In Stock			30
GEO8-DUP-AUT	G-GEO8-DUP-AUT	1 to 8 zone, 115/230VAC, duplex, 1P, 2HP max, auto filter/field	On demand	G-GEO8-DUP-AUT-B		30
	G-GEO8-DUP-AUT-B	1 to 8 zone individual run time, 115/230VAC, duplex, 1P, 2HP max, auto filter/field *Note: 04/23 revision; individual adjustable timers per zone, new terminal block configuration, new HOA switch switch configuration.*	In Stock			30
G-GEO12-DUP-DUAL-AUT	G-GEO12-DUP-DUAL-AUT	12 zone individual run time, 115/230VAC, dual duplex, 1P, 1HP to 2HP max, auto	On demand			
G-GEO12-DUP-DOUBLE-AUT	G-GEO12-DUP-DOUBLE-AUT	12 zone individual run time, 115/230VAC, double duplex (2 on/2 off), 1P, 1HP to 2HP max, auto	On demand			
G-GEO12-DUP-AUT	G-GEO12-DUP-AUT	12 zone individual run time, 115/230VAC, duplex, 1P, 1HP to 2HP max, auto	On demand			
WiFi PLC Control Panels						
GEOPS1 SIM AUT	G-GEOPS1-SIM-AUT	1 zone, WiFi, 115/230VAC, simplex, 1P, 2HP max, auto	Discontinued			15
GEOPS1 SIM MAN	G-GEOPS1-SIM-MAN	1 zone, WiFi, 115/230VAC, simplex, 1P, 2HP max, manual	Discontinued			15
GEOPS1 DUP AUT	G-GEOPS1-DUP-AUT	1 zone, WiFi, 115/230VAC, duplex, 1P, 2HP max, auto	Discontinued			18
GEOPS1 DUP MAN	G-GEOPS1-DUP-MAN	1 zone, WiFi, 115/230VAC, duplex, 1P, 2HP max, auto	Discontinued			18
GEOPS4 SIM AUT	G-GEOPS4-SIM-AUT	1 to 4 zone, WiFi, 115/230VAC, simplex, 1P, 2HP max, auto	Discontinued			21
GEOPS6 SIM MAN	G-GEOPS6-DUP-AUT	1 to 6 zone, WiFi, 115/230VAC, duplex, 1P, 2HP max, auto	Discontinued			25
Controller for Backwash Filter Batteries						
GEOB6D-DUP	G-GEOB6DDUP	PLC backwash panel for 1 to 6 zones, 115/230VAC, duplex, 1P, 3HP max, auto	Discontinued			28
GEOB8D-DUP	G-GEOB8-PR-DDUP	PLC backwash panel for 8 zones, 115/230VAC, duplex, 1P, 3HP max, auto	Discontinued			32

QUICK REFERENCE GUIDE

Flowmeters

Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
Totalizer Flow Meter - MultiJet						
FM MJP075	G-FM-MJP075	0.75" MultiJet Flow Meter Plastic body, Totalizer 0.25-20 gpm/150 psi/+-1.5%	In Stock			2
FM MJP100	G-FM-MJP100	1" MultiJet Flow Meter Plastic body, Totalizer 0.75-50 gpm/150 psi/+-1.5%	In Stock			3
FM MJP150	G-FM-MJP150	1.5" MultiJet Flow Meter Plastic body, Totalizer 1.5-100 gpm/150 psi/+-1.5%	In Stock			5
FM MJPRS	G-FM-MJPRS	Single 2-wire reedswitch for FM MJP Flow Meters	In Stock			5
Totalizer and Flow Rate						
	G-FM-PLS-100	1" FPT PVC turbine with pulse output, 5-50 gpm	Discontinued			1.5
	G-FM-PLS-150	1.5" FPT PVC turbine with pulse output, 10-100 gpm	Discontinued			1.7
	G-FM-PLS-200	2" FPT PVC turbine with pulse output, 20-200gpm	Discontinued			2
FM-DDS-050	G-FM-DDS-050	1/2" FPT Digital Flow Meter with Local Display, 1.2-10gpm	In Stock			0.9
FM-DDS-075	G-FM-DDS-075	3/4" FPT Digital Flow Meter with Local Display, 2-20gpm	In Stock			0.9
FM-DDS-100	G-FM-DDS-100	1" FPT Digital Flow Meter with Local Display, 5-50gpm	In Stock			1
FM-DDS-150	G-FM-DDS-150	1.5" FPT Digital Flow Meter with Local Display, 10-100gpm	In Stock			1.5
FM-DDS-200	G-FM-DDS-200	2" FPT Digital Flow Meter with Local Display, 20-200gpm	On demand			1.7
Flow Meter - Electromagnetic Commercial Flow Meter						
FM-MAGM-100	G-FMMAGM100	1" flanged mag meter with pulse output, 2.3 to 110 gpm	On demand			0.9
FM-MAGM-200	G-FMMAGM200	2" flanged mag meter with pulse output, 6 to 300 gpm	On demand			0.9
FM-MAGM-300	G-FMMAGM300	3" flanged mag meter with pulse output, 14 to 670 gpm	On demand			1
	G-FMMAGM-RDL	DL76W remote data logger w/DC3 serial cable and SW software	On demand			
	G-FMMPC42	115 - 24v power supply wall	On demand			

Filters and Parts

BioDisc Filters						
APBIODISC-150	G-APBIODISC-150	1.5" BioDisc filter with Geoshield	In Stock			3
	G-APBIODISC-200A	2" BioDisc filter with Geoshield	Discontinued			
BioDisc Replacement Parts						
APBIODISCART-150	G-APBIODISCART-150	1.5" BioDisc cartridge with Geoshield	In Stock			1
APBIODISCART-200-A	G-APBIODISCART-200A	2" BioDisc cartridge with Geoshield, auto	In Stock			7
APBIODISCART-200-M	G-APBIODISCART-200M	2" BioDisc cartridge with Geoshield, manual	In Stock			
	G-APBIODISCART-200M-SHORTY	2" BioDisc cartridge, short profile	In Stock			
APBIODISC-150-OR	G-APBIODISC-150-OR	O-ring for 1.5" BioDisc filter body	In Stock			0.1
APBIODISC-200-OR02	G-APBIODISC-200-OR	O-ring for 2" BioDisc filter body	In Stock			0.1
	G-APBIODISC-200-ORO2-Round	O-ring for 2" BioDisc filter body, Round Profile Ref: Parts blowup no. 19	In Stock			
	G-APBIODISC-200-ORO2-Square	O-ring for 2" BioDisc filter body, Square Profile Ref: Parts blowup no. 19	In Stock			
	G-AP-WRENCH	1.5" BioDisc filter wrench	In Stock			0.5
Vortex Filters						
AP4E-1F	G-AP4E-1F	1" MPT Vortex Filter, 6" body, 10 gpm max, drilled and tapped with schrader	To Be Discontinued			0.8
AP4E-1.5F	G-AP4E-1.5F-3H	1.5" MPT Filter (3) hole, 20 gpm max drilled and tapped with schrader	To Be Discontinued			6
AP4E-2F	G-AP4E-2F-4H	2" MPT Filter, (4) hole, 20 gpm max drilled and tapped with schrader	Discontinued			7

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Filters and Parts

Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
Votrtex Filters Replacement Parts						
	G-APSCR 75F/1F-5-100M	1" short or .75" replacement screen - 100 mesh, blue short screen 5" length	In Stock			0.1
	G-APSCR 75F/1F-5-150M	1" short or .75" replacement screen - 150 mesh, black short screen 5" length	In Stock			
	G-APSCR-1F-100M-6	1" mpt filter replacement screen - 100 mesh, blue long screen 6" length	In Stock			
	G-APSCR-1F-150M-6	1" mpt filter replacement screen - 150 mesh, black long screen 6" length	In Stock			
	G-APSCR-1F-200M-6	1" replacement screen - 200 mesh 6" long filter	On demand			0.1
	G-APSCR-15/2F-100M	1.5" or 2" replacement screen - 100 Mesh	In Stock			
	G-APSCR-15/2F-150M	1.5" or 2" replacement screen - 150 Mesh	In Stock			0.7
APSCR .75F/1F-5	G-AP-PLT-.75F	Replacement plate for 3/4" filter	On demand			0.1
APSCR 1F-6	G-AP-PLT-1F	Replacement plate for 1" filter	In Stock			0.1
APSCR 1.5/2F	G-AP-PLT-1.5F-2H	Replacement spinplate 1.5"- 2 holes	On demand			
APPLT 75F	G-AP-PLT-1.5F-3H	Replacement spinplate 1.5"- 3 holes	On demand			
APPLT 1F	G-AP-PLT-1.5F-4H	Replacement spinplate 1.5"- 4 holes	On demand			0.2
APPLT 1.5F-3	G-AP-PLT-2F-3H	Replacement spinplate 2"- 3 holes	On demand			
APPLT 2F-4	G-AP-PLT-2F-4H	Replacement spinplate 2"- 4 holes	On demand			0.2
	G-AP-OR-75F1F	O-Ring for 3/4"+1" Vortex Filter	In Stock			0.1
	G-AP-OR-15F2F	O-Ring for 1.5"+2" Vortex Filter	In Stock			0.1
	G-AP-DEBRIS-1F	3/4" or 1" debris basin	In Stock			0.4

Pressure Filters

Sim/Tech Pressure Filters						
	STF-100	pressure filter job ready 2", stainless steel screen, 1/16" holes	In Stock		2	
	STF-100A2	pressure filter field assemble 2", stainless steel screen, 1/16" holes	In Stock		2	
	STF-100A2/U	pressure filter 2", with attatched union, but without tailpiece, stainless steel screen, 1/16" holes	In Stock		2	
	STF-100A2-1/8	pressure filter field assemble 2", stainless steel screen, 1/8" holes	In Stock		2	
	STF-100A3	pressure filter custom model 3", stainless steel screen, 1/16" holes	In Stock		2	
	STF-100A3-1/8	pressure filter custom model 3" , stainless steel screen, 1/8" screen	In Stock		2	
	STF-100A4	pressure filter custom model 4", stainless steel screen, 1/16" holes	In Stock		1	
	STF-100P/100	pressure filter job ready 2", plastic screen, with 100 micron sock (2 extra socks included)	In Stock		2	
	STF-100P/150190	pressure filter job ready 2", plastic screen, with 150-190 micron sock (6 extra socks included)	In Stock		2	
	STF-100P/600	pressure filter job ready 2", plastic screen, with 600 micron sock (6 extra socks included)	In Stock		2	
	STF-100P2/100	pressure filter field assemble 2", plastic screen, with 100 micron sock (2 extra socks included)	In Stock		2	
	STF-100P2/150190	pressure filter field assemble 2", plastic screen, with 150-190 micron sock (6 extra socks included)	In Stock		2	
	STF-100P2/600	pressure filter field assemble 2", plastic screen, with 600 micron sock (6 extra socks included)	In Stock		2	
	STF-100P3/100	pressure filter field assemble 3", plastic screen, with 100 micron sock (2 extra socks included)	In Stock		2	
	STF-100P3/150190	pressure filter field assemble 3", plastic screen, with 150-190 micron sock (6 extra socks included)	In Stock		2	
	STF-100P3/600	pressure filter field assemble 3", plastic screen, with 600 micron sock (6 extra socks included)	In Stock		2	
	STF-100P4/100	pressure filter field assemble 4", plastic screen, with 100 micron sock (2 extra socks included)	In Stock		1	
	STF-100P4/150190	pressure filter field assemble 4", plastic screen, with 150-190 micron sock (6 extra socks included)	In Stock		1	
	STF-100P4/600	pressure filter field assemble 4", plastic screen, with 600 micron sock (6 extra socks included)	In Stock		1	

QUICK REFERENCE GUIDE

Air Vent and Vacuum Breakers

Valves and Pressure Regulators

Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
Air Vents						
	G-APVBK-075M	3/4" MPT Kinetic Vent and Vacuum Relief Valve with mushroom vent	Low stock			
	G-APVBK-075L	3/4" MPT Kinetic Vent and Vacuum Relief Valve with 3/8" BSPT elbow vent	Low stock			
	G-APVBK100M	1" MPT Kinetic Vent and Vacuum Relief Valve with mushroom vent	In Stock			0.3
	G-APVBK100L	1" MPT Kinetic Vent and Vacuum Relief Valve with 3/8" BSPT elbow vent	In Stock			0.3
	G-APVBK-200C	Kinetic Air Vent / Vacuum Release Valve, 2" (1" threaded outlet)	On demand			
	G-APVBK-1	1" MPT kinetic air/vacuum relief valve	Discontinued	G-APVBK100M		0.3
	G-APVBK-1.5	1.5" MPT kinetic air/vacuum relief valve	Low stock			
	G-APVBK-2	2" MPT kinetic air/vacuum relief valve	Low stock	G-APVBK-200C		2.5
	G-ARV-05	1/2" Air relief valve	In Stock			
	G-ARV100	1" MPT continuous airvent/vacuum relief valve	In Stock			2.5
	G-ARV200	2" MPT continuous airvent/vacuum relief valve	On demand			2.5
Air Vent Box						
	G-AVBOX6	STF-112	valve box, 7" round, marked sewer	In Stock		1.5
	G-AVBOX10	STF-113	valve box, 10" round, marked sewer	In Stock		
	G-AVBOX10					2.5
Solenoid Valves						
	G-SVLVB-075	3/4" NPT Solenoid Valve 24V, normally closed flow ctr stem, man override	On demand			
	SVLVB-100	G-SVLVB-100	1" Solenoid valve. 24VAC, FPT, NC	On demand		0.8
	SVLVB-100X	G-SVLVB-100X	1" Solenoid valve, 24VAC, FPT, NC, External plumbing	In Stock		1
		G-SVLVB-100NO	1" NPT Solenoid Valve 24V, 3-way, normally open	On demand		
	SVLVB-150	G-SVLVB-150	1.5" Solenoid valve. 24VAC, FPT, NC	On demand		2.4
	SVLVB-150X	G-SVLVB-150X	1.5" Solenoid valve, 24VAC, FPT, NC, External plumbing	In Stock		2.6
		G-SVLVB-150NO	1.5" NPT Solenoid Valve 24V, 2-way, normally open	On demand		
	SVLVB-200	G-SVLVB-200	2" Solenoid valve. 24VAC, FPT, NC, External Plumbing	In Stock		3.4
		G-SVLVB-200NO	2" NO FPT solenoid valve 24V AC, S400 solenoid vent plumbed to downstream	On demand		
	SVLVB-300	G-SVLVB-300	3" Solenoid valve. 24VAC, FPT, NC, External Plumbing.	On demand		4.4
		G-SVLVB-300NO	3" NO solenoid valve, 24V FPT, S390Sol Vent plumbed to downstream	On demand		
		G-SVLVB-400	4" solenoid valve, 24V normally closed, flange flow ctr stem, man override	On demand		
Actuated Valves						
	BVLVACT-10SS	G-BVLVACT-100SS	1" Ball Valve - SS, 9-24V AC/DC-2 wire, nc. autospring return	In Stock		3
	BVLVACT-100	G-BVLVACT100	1" slip motorized ball valve with 120VAC. Indicator light	To be discontinued		2.5
	BVLVACT-150	G-BVLVACT150	1.5" slip motorized ball valve with 120VAC. Indicator light	To be discontinued		3
	BVLVACT-200	G-BVLVACT200	2" slip motorized ball valve with 120VAC. Indicator light	To be discontinued		4
Hydrotek Valves						
	HT-4402	G-HT-4402	2 zone Hydrotek valve 1.25" x 1.25", 25-75psi, min10gpm	In Stock		1.5
	HT-4403	G-HT-4403	3 zone Hydrotek valve 1.25" x 1.25", 25-75psi, min10gpm	In Stock		1.5
	HT-4404	G-HT-4404	4 zone Hydrotek valve 1.25" x 1.25", 25-75psi, min10gpm	In Stock		1.5
	HT-4602	G-HT-4602	2 zone Hydrotek valve 1.25" x 1", 25-75psi, min10gpm	In Stock		1.5
	HT-4603	G-HT-4603	3 zone Hydrotek valve 1.25" x 1", 25-75psi, min10gpm	In Stock		1.5
	HT-4604	G-HT-4604	4 zone Hydrotek valve 1.25" x 1", 25-75psi, min10gpm	In Stock		1.5
	HT-4605	G-HT-4605	5 zone Hydrotek valve 1.25" x 1", 25-75psi, min10gpm	In Stock		1.5
	HT-4606	G-HT-4606	6 zone Hydrotek valve 1.25" x 1", 25-75psi, min10gpm	In Stock		1.5

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Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
Pre-assembled Diverter Valves						
	Q-PDS-DV-4-4-2-AP	Indexing distribution valve assembly, 2 zone, 25-75 psi, 10-40 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-4-4-3-AP	Indexing distribution valve assembly, 3 zone, 25-75 psi, 10-40 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-4-4-4-AP	Indexing distribution valve assembly, 4 zone, 25-75 psi, 10-40 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-4-6-5-AP	Indexing distribution valve assembly, 5 zone, 25-75 psi, 10-30 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-4-6-6-AP	Indexing distribution valve assembly, 6 zone, 25-75 psi, 10-30 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-4-2-AP	Indexing distribution valve assembly, 2 zone, 25-150 psi, 25-100 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-4-3-AP	Indexing distribution valve assembly, 3 zone, 25-150 psi, 25-100 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-4-4-AP	Indexing distribution valve assembly, 4 zone, 25-150 psi, 25-100 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-6-5-AP	Indexing distribution valve assembly, 5 zone, 25-150 psi, 25-100 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-6-6-AP	Indexing distribution valve assembly, 6 zone, 25-150 psi, 25-100 gpm in D26"xH18" basin	In Stock			
	Q-PDS-DV-4-4-2-AP-L	Indexing distribution valve assembly, 2 zone, 25-150 psi, 25-100 gpm low flow (white stem) in D26"xH18" basin	In Stock			
	Q-PDS-DV-4-4-3-AP-L	Indexing distribution valve assembly, 3 zone, 25-150 psi, 25-100 gpm low flow (white stem) in D26"xH18" basin	In Stock			
	Q-PDS-DV-4-4-4-AP-L	Indexing distribution valve assembly, 4 zone, 25-150 psi, 25-100 gpmlow flow (white stem) in D26"xH18" basin	In Stock			
	Q-PDS-DV-4-6-5-AP-L	Indexing distribution valve assembly, 5 zone, 25-150 psi, 25-100 gpm low flow (white stem) in D26"xH18" basin	In Stock			
	Q-PDS-DV-4-6-6-AP-L	Indexing distribution valve assembly, 6 zone, 25-150 psi, 25-100 gpm low flow (white stem) in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-4-2-AP-L	Indexing distribution valve assembly, 2 zone, 25-150 psi, 25-100 gpm low flow (white stem) in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-4-3-AP-L	Indexing distribution valve assembly, 3 zone, 25-150 psi, 25-100 gpm low flow (white stem) in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-4-4-AP-L	Indexing distribution valve assembly, 4 zone, 25-150 psi, 25-100 gpm low flow (white stem) in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-6-5-AP-L	Indexing distribution valve assembly, 5 zone, 25-150 psi, 25-100 gpm low flow (white stem) in D26"xH18" basin	In Stock			
	Q-PDS-DV-6-6-6-AP-L	Indexing distribution valve assembly, 6 zone, 25-150 psi, 25-100 gpm low flow (white stem) in D26"xH18" basin	In Stock			
Ball Check Valve						
	CV-B-100	G-CV-B-100	1" True Union ball check PVC/Viton, Slip and FPT	In Stock		1
	CV-B-150	G-CV-B-150	1.5" True Union ball check PVC/Viton, Slip and FPT	In Stock		2.2
	CV-B-200	G-CV-B-200	2" True Union ball check PVC/Viton, Slip and FPT	In Stock		3
Spring Check Valve	KBT600					
	CV-S-100	G-CV-S-100	1" Spring check valve. Slip x Slip. Requires 2psi to open	In Stock		0.5
	CV-S-150	G-CV-S-150	1.5" Spring check valve. Slip x Slip. Requires 2psi to open	In Stock		0.7
	CV-S-200	G-CV-S-200	2" Spring check valve. Slip x Slip. Requires 2psi to open	On demand		1
Pressure Regulators						
	PMR20-LF	G-PMR20-LF	20 psi regulator.1/8-8 gpm 3/4" FIPT	On demand		0.3
	PMR20-MF	G-PMR20-MF	20 psi regulator.2-20 gpm 1" FIPT	In Stock		0.4
	PMR20-HF	G-PMR20-HF	20 psi regulator.10-32 gpm 1.25" FIPT	In Stock		0.6
	PMR20-UF	G-PMR20-UF	20 psi regulator. 20-100 gpm 2" FIPT	In Stock		2.5
	PMR30-LF	G-PMR30-LF	30 psi regulator.1/8-8 gpm 3/4" FIPT	On demand		0.3
	PMR30-MF	G-PMR30-MF	30 psi regulator.2-20 gpm 1" FIPT	In Stock		0.4
	PMR30-HF	G-PMR30-HF	30 psi regulator.10-32 gpm 1.25" FIPT	In Stock		0.6
	PMR30-UF	G-PMR30-UF	30 psi regulator.20-100 gpm 2" FIPT	In Stock		2.5
	PMR40-LF	G-PMR40-LF	40 psi regulator.1/8-8 gpm 3/4" FIPT	On demand		0.3
	PMR40-MF	G-PMR40-MF	40 psi regulator.2-20 gpm 1" FIPT	In Stock		0.4
	PMR40-HF	G-PMR40-HF	40 psi regulator.10-32 gpm 1.25" FIPT	In Stock		0.6
	PMR40-UF	G-PMR40-UF	40 psi regulator.20-90 gpm 2" FIPT	In Stock		2.5
	PMR50-MF	G-PMR50-MF	50 psi regulator.2-20 gpm 1" FIPT	In Stock		0.4
	PMR50-HF	G-PMR50-HF	50 psi regulator.10-32 gpm 1.25" FIPT	In Stock		0.6
	PMR50-UF	G-PMR50-UF	50 psi regulator.20-90 gpm 2" FIPT	In Stock		2.5

QUICK REFERENCE GUIDE

Fittings

	Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
Lockslip fittings							
	LTSLIP-600	G-LTSLIP-600	Hose - 1/2” socket (3/4” spigot) for Wasteflow PRO (50/bag)	In stock		50	1.7
	LTMPT-600	G-LTMPT-600-1/2	Male Adapter hose - 1/2"M Thread for Wasteflow PRO (50/bag)	In stock		50	
		G-LTMPT-600-3/4	Male Adapter hose - 3/4"M Thread for Wasteflow PRO (50/bag)	In stock		50	
	LTTEE-600	G-LTTEE-600	Hose - Hose Tee coupling for Wasteflow PRO (25/bag)	In stock		25	1.5
	LTEL-600	G-LTEL-600	Swivel Elbow adapter Hose - 3/4" F Hose for Wasteflow PRO (50/bag)	In stock		50	2.1
	LTC-600	G-LTC-600	Hose - Hose coupling for Wasteflow PRO (50/bag)	In stock		50	2.3
		G-LTSLIP-700	Hose - 1/2” socket (3/4” spigot) works best with WaterflowECO® (50/bag)	In stock		50	
		G-LTMPT-700-1/2	Male Adapter hose - 1/2"M Thread works best with WaterflowECO® (50/bag)	In stock		50	
		G-LTMPT-700-3/4	Male Adapter hose - 3/4"M Thread works best with WaterflowECO® (50/bag)	In stock		50	
		G-LTTEE-700	Hose - Hose Tee coupling works best with WaterflowECO® (50/bag)	In stock		25	
		G-LTEL-700	Hose Elbow adapter Hose - 3/4" F Hose works best with WaterflowECO® (50/bag)	In stock		50	
		G-LTC-700	Hose - Hose coupling works best with WaterflowECO® (50/bag)	In stock		50	
Lockslip loops & risers			G-Use IPS#2795 or equivalent to glue Flex to 1/2" PVC fittings	In stock			
	LTFLEXR-18	G-LTFLEX-R-18-1	18” flex PVC riser with 1 lockslip adapters. For risers	In stock		1	0.6
	LTFLEXL-36	G-LTFLEX-L-36	36” flex PVC w/2 lockslip adapters. For loops or risers	In stock		1	1.2
	LTFLEXCOIL100	G-LTFLEX-COIL-100	100 ft. flexible PVC Coil. 1/2 in diameter.	In stock		100ft	21
	WFPLAIN	G-WF-PLAIN	Blank 16mm, 100 ft roll with GeoShield	In stock		100ft.	4.0 lbs.
Compression and Barbed Fittings							
	CA600	G-CA-600	Adapter 1/2” slip. Fits 16mm WaterflowPRO® line	On demand		100	0.4
	BC600	G-BC-600	Barbed coupling 1/2" insert Fits 16mm WaterflowPRO® line, 100/bag	On demand		100	1.3
Saddle Tees							
	SADDLET15	G-SADDLET15	1.5” Black PVC to 1/2” slip or 3/4” socket”	In stock		50	4
	SADDLET20	G-SADDLET20	2” White PVC to 1/2” slip or 3/4” socket”	In stock		50	4
	SADDLET25	G-SADDLET25	2.5” Grey PVC to 1/2” slip or 3/4” socket”	In stock		50	4
	SADDLET30	G-SADDLET30	3” Brown PVC to 1/2” slip or 3/4” socket”	On demand		50	4

QUICK REFERENCE GUIDE

Accessories

	Previous Part Number	Part Number	Description	Stock	Recommended Replacement	M.O.Q.	Weight
Pressure Gauges							
		G-PG-25-LM	Pressure gauge 1/4" NPT. Lower mount	In Stock		1	0.7
		G-PG-LEAD	18" gauge hose with 1/4" FPT, self clamping air chuck	To be discontinued		1	1
		G-PG-LEAD-42	42" gauge hose with 1/4" FPT, self clamping air chuck	In Stock			
Unions							
	UNION075S	G-UNION-075-S	3/4" Union - Slip	On demand		1	0.4
	UNION075ST	G-UNION-075-ST	3/4" Union - FPT x Slip	In stock		1	0.4
	UNION100S	G-UNION-100-S	1" Union - Slip	On demand		1	0.4
	UNION100ST	G-UNION-100-ST	1" Union - FPT x Slip	In stock		1	0.4
	UNION150S	G-UNION-150-S	1.5" Union - Slip	On demand		1	0.5
	UNION150ST	G-UNION-150-ST	1.5" Union - FPT x Slip	In stock		1	0.5
	UNION200S	G-UNION-200-S	2" Union - Slip	On demand		1	0.8
	UNION200ST	G-UNION-200-ST	2" Union - FPT x Slip	On demand		1	0.8
Quick Disconnect							
	EZP150	G-EZP150	EZ-Pull quick disconnect, 1 1/2" fpt	On demand			0.5
	EZP200	G-EZP200	EZ-Pull quick disconnect, 2" fpt	On demand			1
Grommets							
		Q-PDS-GT-.50-40	1/2" SCH 40 Grommet (250 per box)	In Stock		30	
		Q-PDS-GT-1.00-40	1" SCH 40 Grommet (300 per box)	In Stock		20	
		Q-PDS-GT-1.25-40	1.25" SCH 40 Grommet (250 per box)	In Stock		20	
		Q-PDS-GT-1.50-40	1.5" SCH 40 Grommet (200 per box)	In Stock		20	
		Q-PDS-GT-2.00-40	2" SCH 40 Grommet (125 per box)	In Stock		15	
		Q-PDS-GT-3.00-40	3" SCH 40 Grommet (144 per box)	In Stock		10	
		Q-PDS-GT-4.00-40	4" SCH 40 Grommet (80 per box)	In Stock		5	
		Q-PDS-GT-4.00-35	4" SDR 35 Grommet (80 per box)	In Stock		5	

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WaterflowPRO®
Drip Tubing

Technical Specifications

Why Choose WaterflowPRO?

- 16mm diameter tubing with PC or Classic emitter
- Patented nano-Rootguard® band PROtects against root intrusion
- Patented Geoshield® antimicrobial lining prevents biofilm build-up inside tubing
- Constant performance in all climates
- Optimal for use on severe slopes and long runs
- Provides maximum water distribution uniformity in tough topographical areas
- High quality resins assure durable performance and long life
- Warranty against defects in materials or workmanship
- Emitter spacing available in 12" or 24"

Ordering Information

Part Number	G-WFCL-16-4-24	G-WFPC-16-2-12	G-WFPC-16-4-12	G-WFPC-16-2-24	G-WFPC-16-4-24
Emitter type	Classic	PC	PC	PC	PC
Emitter spacing, in	24	12	12	24	24
Emitter flow rate, nominal GPH	1.3 @ 20 psi	0.6	0.9	0.6	0.9
Coil length, ft	500	500	500	500	500

Parameter	Specification
Prevents root intrusion	Yes
Antimicrobial lining	Yes
Tubing diameter, nominal	16 mm
Wall thickness, nominal	1.10 mm
Emitter style	Cylindrical
Pressure, min	7 psi
Pressure, max	60 psi
Pressure range, optimal	20 to 50 psi
Tubing warranty	20 years
Rootguard warranty	10 years

Classic Emitter

PC Emitter

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Geoflow WaterflowPRO

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WaterflowPRO®

Maximum length of a lateral flushing at 2 fps

1.48 gpm per lateral required to achieve 2 fps

Inlet Pressure	PC Emitter Flow Rate, 12” Spacing		PC Emitter Flow Rate, 24” Spacing	
PSI	0.6 GPH	0.9 GPH	0.6 GPH	0.9 GPH
10	32'	30'	54'	52'
20	98'	84'	170'	170'
30	141'	118'	248'	248'
40	176'	144'	310'	312'
50	205'	166'	364'	364'
60	230'	183'	410'	410'

Maximum length of a lateral flushing at 1.5 fps

1.11 gpm per lateral required to achieve 1.5 fps

Inlet Pressure	PC Emitter Flow Rate, 12” Spacing		PC Emitter Flow Rate, 24” Spacing	
PSI	0.6 GPH	0.9 GPH	0.6 GPH	0.9 GPH
10	47'	42'	80'	72'
20	125'	103'	220'	182'
30	172'	139'	306'	250'
40	208'	166'	374'	300'
50	238'	188'	430'	342'
60	264'	208'	478'	378'

Maximum length of a lateral flushing at 1 fps

0.74 gpm per lateral required to achieve 1 fps

Inlet Pressure	PC Emitter Flow Rate, 12” Spacing		PC Emitter Flow Rate, 24” Spacing	
PSI	0.6 GPH	0.9 GPH	0.6 GPH	0.9 GPH
10	70'	59'	122'	102'
20	157'	125'	280'	226'
30	207'	162'	374'	294'
40	244'	190'	444'	346'
50	275'	212'	502'	388'
60	302'	232'	552'	426'

Maximum length of a lateral flushing at 0.5 fps

0.37 gpm per lateral required to achieve 0.5 fps

Inlet Pressure	PC Emitter Flow Rate, 12” Spacing		PC Emitter Flow Rate, 24” Spacing	
PSI	0.6 GPH	0.9 GPH	0.6 GPH	0.9 GPH
10	102'	81'	182'	144'
20	193'	149'	352'	272'
30	244'	186'	448'	344'
40	283'	214'	520'	396'
50	315'	237'	580'	438'
60	342'	257'	630'	476'

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Appendix #11:
Orenco O&M manual

AdvanTex® Type 1 Systems Supplement
Targeting 45mg/L BOD_5 and 45mg/L TSS

Introduction

This design criteria supplement addresses AdvanTex Type 1 treatment systems that require a final effluent quality of 45mg/L of BOD_5 and 45mg/L of TSS. It is intended as a guide in adapting loading rates for systems where the effluent limits for treated wastewater do not require the high treatment levels (10mg/L BOD_5 and 10mg/L TSS) that can be achieved by AdvanTex treatment systems.

Sizing criteria and loading rates for standard AdvanTex treatment systems are found in *AdvanTex Commercial Treatment Systems Design Criteria*, NDA-ATX-1. These are based on secondary treatment effluent standards with BOD_5 and TSS targets equal to or less than 10mg/L and a 25gpd/ft^2 average loading rate. The design criteria recognizes seven application type categories for wastewater treatment. Application Type 1 describes domestic residential strength wastewater; Application Types 2-7 are defined as higher strength applications. The wastewater strength characteristics of Application Type 1 are summarized here in Table 1.

The higher loading rates provided here in the alternative system sizing criteria are for systems that conform to Application Type 1 only; do not use them for other application types. The higher loading rates provided here may not be appropriate for systems that have nitrogen or other nutrient-limited effluent requirements. Contact Orenco when evaluating these scenarios.

Table 1. Typical Residential Wastewater Strength Concentrations Before and After Primary Treatment

Constituent	Raw sewage, mg/L	Primary-treated effluent, mg/L
BOD_5	450	150
TSS	503	40
TKN	70.4	65
NH_3-N	41.2	39
NO_3-N	0	0
TP	17.3	16
G&O	164	15

Primary Tankage

In systems designed for the higher loading rates used with the alternative system sizing criteria, the minimum volume for primary tankage can be reduced from two days of hydraulic retention time (HRT) to 1.6 days of HRT based on the design maximum daily flow rate (Q_m). The recommended primary tankage configuration is 1.0 × Q_m HRT for primary solids reduction, followed by 0.6 × Q_m HRT for the anoxic stage, accomplished through recycle flow from the recirculation tank. For systems designed using average daily flow (Q_a), this results in 2.0 × Q_a HRT for primary solids reduction plus 1.2 × Q_a HRT for the anoxic stage.

- Q_m = Design maximum daily flow as described in the AdvanTex Commercial Design Criteria
- Q_a = Design average daily flow as described in the AdvanTex Commercial Design Criteria

A two-compartment tank is recommended for systems using alternative sizing criteria. Effluent filters are required on the outlet of primary tanks prior to entering the recirculation tank for AdvanTex treatment systems. Reducing the HRT for primary tankage may increase the required cleaning frequency for the effluent filter. Reducing the HRT will decrease digestion of solids and decrease the intervals between tank pumping. These changes in maintenance requirements for the primary tanks should be considered when determining the primary tank volume.

Recirculation Tank Sizing

When using an external recirculation tank for either AdvanTex AX100 or AX20 projects, a minimum recirculation volume of 1.0 Q_a is required. AdvanTex AX-Max™ systems include an integral recirculation system that does not require an external recirculation tank.

AdvanTex Loading Rates

Loading rates for hydraulic and organic loading on the textile treatment media may be doubled from standard rates to high loading rates, if the final effluent quality target is at least 45mg/L for BOD_5 and 45mg/L for TSS. Using the alternative sizing criteria, hydraulic loading can be increased as follows:

- Design average hydraulic loading rate: 25 to 50gpd/ft^2 (1 to 2m^3/m^2/day)
- Design maximum hydraulic loading rate: 50 to 100gpd/ft^2 (2 to 4m^3/m^2/day

All product and performance assertions are based on proper design, installation, operation, and maintenance according to Orenco's current published documentation.

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Figure 1 shows anticipated effluent quality for BOD_5, based on the design average hydraulic loading rate onto the textile media. For actual loading rates above 50gpd/ft² (2m³/m²/day) the curve indicates performance is reduced. Because of this, Orenco recommends against loading rates based on average flows above 50gpd/ft² (2m³/m²/day) or based on maximum daily flows above 100gpd/ft² (4m³/m²/day), even when effluent limit requirements allow for higher than 45mg/L BOD_5.

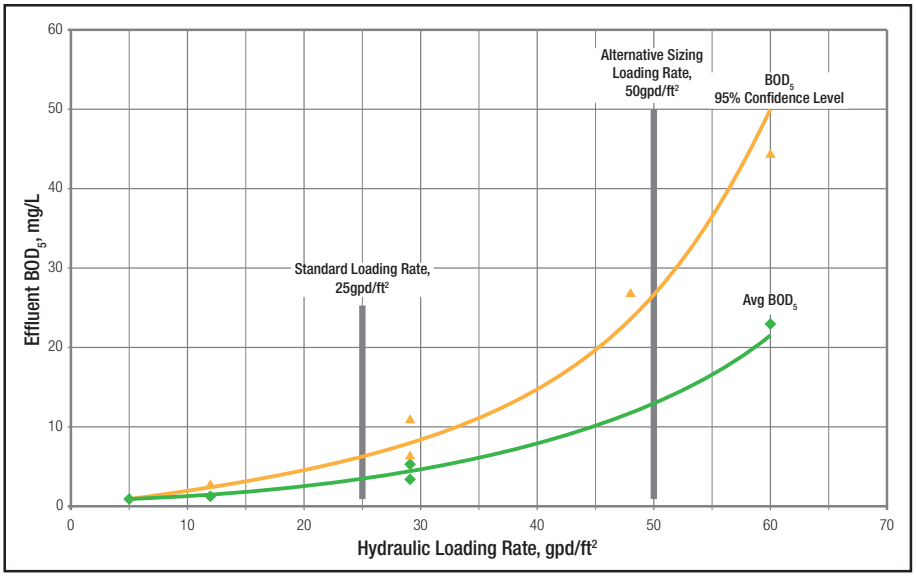

Figure 1. Anticipated Performance of AdvanTex Systems in Type 1 Applications

Figure 1 also includes curves indicating both the anticipated average BOD_5, as well as the anticipated value at a 95% confidence limit, based on several performance evaluations on systems with an influent BOD_5 concentration of 150mg/L (Type 1 Applications). The anticipated average performance predicts high quality effluent, even at the higher loading rates. The 95% confidence limit curve shows the anticipated treated effluent concentration in the range of 30mg/L and average effluent BOD_5 in the range of 13mg/L, which should maintain confidence for systems with a "not to exceed" value of 45mg/L.

Organic mass loading may also be increased from standard AdvanTex loading rates as follows:

- Design average mass loading rate: From 0.04 to 0.08lbs BOD_5/ft²/day (0.2 to 0.4kg BOD_5/m²/day)
- Design maximum mass loading rate: From 0.08 to 0.16lbs BOD_5/ft²/day (0.4 to 0.8kg BOD_5/m²/day)

Standard nitrogen loading rates should be followed for all systems with nitrogen performance limits. Orenco does not recommend increased loading rates for systems needing to meet low nitrogen concentrations. Higher loading rates on the textile media have the potential to limit nitrification reduction, as BOD concentrations on the media will tend to be at higher concentrations. Contact Orenco for more information if needed.

Operational Implications

Reducing the size of the treatment system media will result in an increased maintenance schedule, compared to a typical AdvanTex treatment system. For systems designed with the alternative system sizing criteria:

- The targeted interval for pumping solids from the primary tankage is two years, and the recommended cycle for monitoring and measuring solids accumulation in the primary tankage is six months.
- The effluent filter installed at the outlet of the primary tank will require more frequent cleaning, with a monthly check for the first year, and the frequency adjusted thereafter based on observations made.
- The laterals and nozzles in the AdvanTex treatment unit may need more frequent cleaning.
- Biosolids accumulation within the recirculation tank and on the textile media requires monitoring and cleaning, as necessary.
- Recirculation tank biosolids can be pumped back into primary tankage as frequently as every 12 months (or less, in some cases), depending on system-specific biosolids accumulation rates in the recirculation tank and on the AdvanTex textile sheets.
- Monthly observations should be performed during the system's first year of operation to determine appropriate maintenance adjustments.

Additional operations and maintenance information can be found in *Commercial AdvanTex O&M Manual*, AIM-OM-ATX-3.

Summary

AdvanTex wastewater treatment systems designed in accordance with Orenco's design criteria, including the higher loading rate option as described within this document, provide reliable wastewater treatment that compares very favorably to that of other wastewater treatment technologies. The power costs, operational and maintenance requirements, and overall life-cycle costs for AdvanTex are low, and the treatment process is robust and reliable.

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AdvanTex® O&M MANUAL

Start-Up and Maintenance of AdvanTex® AX100 & AX20 Commercial Wastewater Treatment Systems

COMMERCIAL O&M MANUAL

Orenco®
800-348-9843 • 541-459-4449
www.orenco.com
www.vericomm.net

Introduction

About Orenco

Since 1981, Orenco Systems®, Inc. has researched, designed, and manufactured leading-edge onsite and decentralized wastewater treatment technologies. We are one of the nation's leading manufacturers and suppliers of equipment for the collection and treatment of wastewater. At Orenco, we specialize in the manufacture of complete treatment systems for residential, commercial and community applications. Wastewater collection and treatment is our only job. When you purchase an Orenco system, you can be confident you have chosen the best equipment available.

Assistance

In addition to providing quality equipment, Orenco prides itself on its outstanding customer service and technical assistance. Should you have any questions regarding your system, components, instructions, or this O&M Manual, please contact us for assistance. Please include the name and location of your project or system with any correspondence, so we can quickly respond to your request.

When Your Equipment Arrives

Inspect your order for completeness and inspect each component for shipping damage. Check to be sure that the instructions and items supplied comply with your state and local regulations. Carefully read and follow all instructions. Be aware that improper system or component installation may void warranties.

All product and performance assertions are based on proper design, installation, operation, and maintenance according to Orenco's current published documentation.

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AdvanTex® O&M MANUAL
COMMERCIAL TREATMENT SYSTEMS

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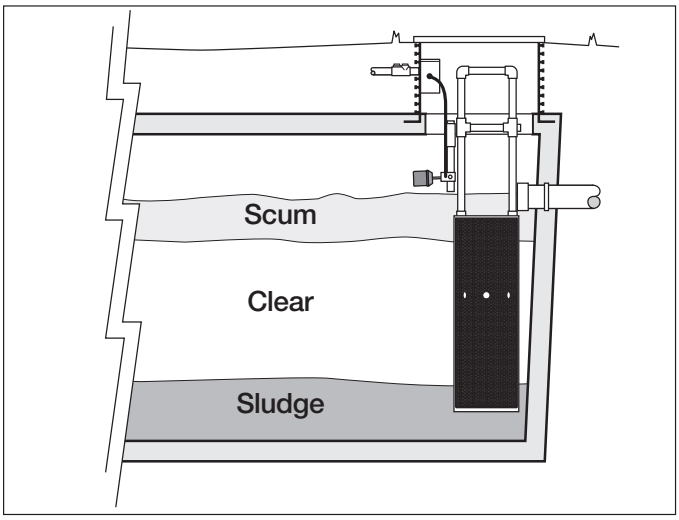
About the AdvanTex Treatment System

Primary Tank

The primary tank provides passive primary wastewater treatment. There can be one or more primary tanks in parallel or series, depending on the size of the system. In certain applications, the primary tank may be preceded by a grease interceptor tank.



The primary tank is an enclosed, watertight receptacle designed to collect wastewater; segregate settleable and floatable solids (sludge and scum); accumulate, consolidate, and store solids; digest organic matter; and discharge treated effluent. BOD (biochemical oxygen demand) removals of greater than 65% and TSS (total suspended solids) removals of greater than 70% are easily accomplished. In the primary tank, wastewater separates into three distinct layers: a floating scum layer, a bottom sludge layer, and a clear zone in between, which is relatively free of large solids. An effluent filter or pump vault allows liquid effluent from the clear zone to be transported to the recirculation/blend or recirculation/blend and anoxic tank.

Anoxic Tank (if applicable)

The anoxic (low oxygen) tank enhances the denitrification of AdvanTex® filtrate. It is sized based on the design flow of the system. In systems that use an anoxic tank, it is generally located between the primary tank, flow splitter basin, and recirculation/blend tank in the treatment train.

The anoxic tank provides the ideal environment for carbonaceous microbes that reduce nitrates to nitrogen gas (denitrification) from AdvanTex filtrate returning from the flow splitter basin. The harmless nitrogen gas is released freely back into the atmosphere.

Recirculation/Blend Tank

The recirculation/blend tank reduces the strength of the effluent being applied to the AdvanTex filter. It is sized at 80 to 100% of the design flow. It is located after the primary treatment tank and before the AdvanTex textile filter.

The reduction in effluent strength is achieved by mixing treated filtrate from the AdvanTex filter with primary treated effluent at the recirc valve, located at the inlet of the recirculation/blend tank. A timer-controlled pump at the outlet end of the tank then sends the blended effluent to the AdvanTex filter.

AdvanTex® Textile Filter

The AdvanTex textile filter pod provides secondary wastewater treatment. There can be one or more AdvanTex pods, depending on the size of the system.

The filter is a sturdy, watertight fiberglass basin filled with an engineered textile material. The textile media has a very large surface area and void volume (for free flow of oxygen). Wastewater percolates both through and between the textile media. A visible biological film normally develops on the filter media within a few days of system start-up. Within the filter, aerobic conditions exist that are ideal for microbes that convert ammonia to nitrate (nitrification). BOD and TSS reductions occur almost immediately. Nitrification may take four to six weeks, depending on ambient temperature.

After percolating through the filter media, the effluent gravity-flows to the recirculating valve. On systems designed for enhanced nitrogen removal, the effluent first flows to a flow splitter basin where a percentage of the effluent is diverted to the inlet side of a primary tank or anoxic tank. The remainder flows to the recirc valve, where it is directed either into the recirculation/blend tank or discharged.

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Start-up & Operation

Introduction

This section covers the start-up of an AdvanTex®-AX100 Treatment System in a commercial application. The formal start-up of an AdvanTex Treatment System should only be performed by trained personnel. As a trained member of the team performing the system start-up, you play a critical role in the operation of the system. The decisions made at the time of the start-up will determine the long-term maintenance needs of the system. Regulators, manufacturers, dealers, property owners, neighbors, and service providers all rely on a thorough start-up.

Before you start your system, please read this entire manual, as well as the engineering plans, and contact your Dealer if you have any questions. You'll save yourself time and money, and you'll reduce the potential for follow-up work. For information specific to your system, refer to your detailed engineering plans.

We recommend following the flow path through the treatment train, if possible, when performing the system start-up, beginning at the building outlets and ending at the final discharge point. By following this start-up sequence, the treatment train can be effectively inspected for proper operation and each step in the process can be given systematic attention.

Roles and Responsibilities

Prior to start-up, the Orenco Representative or AdvanTex Dealer will contact the Designer, Installer, and Service Provider to coordinate a start-up date. The date will be based on a status report provided by the Orenco Representative and the availability of all parties. The status report will include, but will not be limited to, verification of leak testing performed by the Installer, installation of all equipment, and the availability of power, phone line, and water at the site.

- The **AdvanTex Dealer** is expected to be on site and is either performing the start-up or acting as a coordinator and general resource during the installation and start-up of the system.
- The **Designer** is required at the site during start-up to answer questions concerning site-specific issues not covered in the plans, timer settings, and float settings.
- The **Installer** is required at the site during start-up to address any installation issues that arise.
- The **Service Provider** is required at the site during start-up to become familiar with the system, receive training on control panel and treatment system operation, and to learn correct sampling techniques for the system.

Safety Precautions

Before starting up, maintaining, or servicing any wastewater treatment system, observe the following precautions for the safety and health of all service personnel working with or around wastewater, effluent, and its associated equipment:

- Wear proper clothing that covers all parts of the body that will be exposed to wastewater or effluent.
- Wear personal protection equipment (PPE) such as rubber gloves and eye protection when handling or touching any equipment components that come in contact with wastewater or effluent.
- Turn off system power at the service entrance panel and set the circuit breakers in the panel to their "OFF" positions before removing any system components. If the control panel or service entrance panel is not within eyesight of the pumping system, use Lock Out/Tag Out tags to ensure safety.
- Avoid driving over any part of the wastewater treatment system unless it's been equipped to withstand vehicle traffic. If the system is subject to possible traffic, put a barricade up to protect the system.
- Do not enter any tank access. Any work performed on the tank should be done from the outside. Gases and/or oxygen depletion in the tank can be fatal.
- Secure all tank access lids properly to the riser after all work is complete.
- Practice proper personal hygiene at all times.

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Start-up & Operation (continued)

Recommended Tools and Equipment – Start-up

The following items are recommended for a smooth and successful start-up:

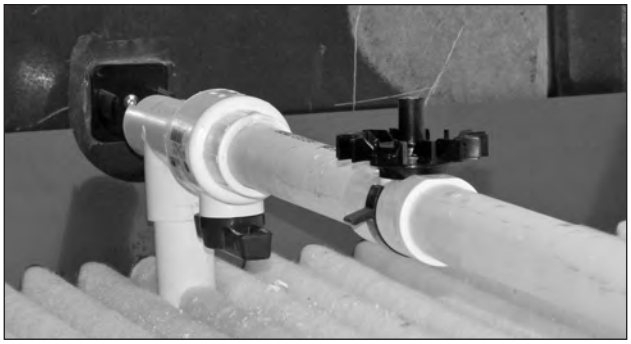
- A tool kit containing common tools and these additional items:
  - A cordless power drill with 1/2" nut driver and 3/16" hex-head bit
  - Voltmeter
  - Small electronics screwdrivers
  - Wire strippers/cutters
  - Cable ties
  - Tape measure
  - Adjustable pliers
- A laptop computer with Hyperterminal (PC) or ZTERM (MAC), to interface with the control panel if the control panel doesn't have a touch screen.
- A copy of the layout and a start-up checklist for the person performing the system start-up.
- Appropriate personal protection equipment (PPE) for each person involved in the start-up.

Pre-start-up Inspection

- **Site drainage:** Verify that all riser lids, external splice box lids, and AX pod lids are level and above grade.

- **Serviceability:** Verify that there is a minimum of two feet of space between AX pods. Check for a useable water source within hose distance of the system.
- **System layout:** Verify that the component layout in the plans or the system diagram matches the installed system and note any differences between the plans and the installed system.
- **Landscaping:** Check for landscape features that may cause long-term maintenance issues:
  - Trees planted on top of tanks
  - Trees that could shed snow onto critical components, such as control panels
  - Risers, external splice boxes, and pods covered in bark or other landscaping materials
- **Circuit breakers:** Open the control panel and verify that all of the circuit breakers are off.

- **System access:** Remove lid bolts and open all lids.
- **AX100:** Verify that the lid bolt boxes and pressure gauges have been removed from the AX pods. If not, remove them at this time. Verify that the lateral inlet valves in the pods are open and the spray nozzle turbines are pointed up, as shown below.



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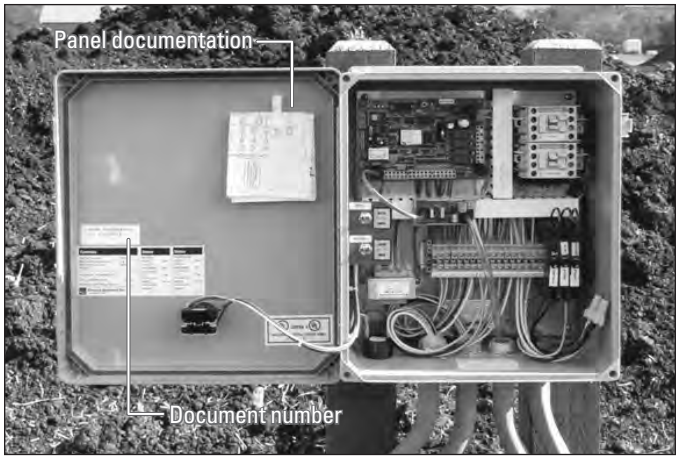
Inspection Points

Inspection Points – Control Panels

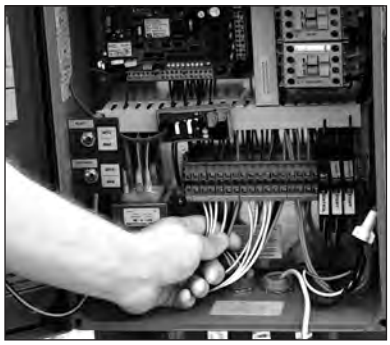


The system may have multiple control panels. Identify if there are control panels on the section of the system that you are about to start-up.

If the tank or basin has associated controls, perform the following start-up steps:

1. **Panel documentation:** Locate the panel-wiring diagram inside the panel and verify the document matches the document number found on the inside of the front panel door. If you can't find the wiring diagram, contact Orenco at (800) 348-9843 or (541) 459-4449 to have a copy e-mailed or faxed to you.

2. **Wiring installation:** Verify all of the main breakers are in the "OFF" position. Inspect the wire terminations in the panel by giving a light tug to all of the float wires, pump wires, pump power lines, and main power lines in the panel. If a wire comes loose, reattach the wire correctly.



WARNING: *Failure to identify a loose wire may cause intermittent failures, inconsistent panel operation and over-current conditions on the pumps.*

3. **Conduit seal installation:** Check for conduit seals on all conduit connections to the control panel.

WARNING: *Failing to seal the conduit may allow corrosive gasses to corrode major components. Orenco recommends conduit seals for all connections to the control panel to assure proper system operation and component longevity.*

4. **Power supply voltage:** Make sure the panel breakers are switched off, and check the power supply voltage at the panel.
   - On 120 V panels, measure voltage between L1 and ground. The voltage should be within ten percent of nominal.
   - On 230 V panels, measure the voltage between L1 and ground, and between L2 and ground. The voltage of each leg should be approximately 115 volts. Measure the voltage between L1 and L2. The voltage should be within ten percent of nominal.
   - On 208 V, 230 V, and 460 V 3-phase panels, measure the voltage between L1 & L2, L2 & L3, and L3 & L1. The voltage between each leg should be 208, 230 or 460 volts, respectively. If there is a voltage difference between line legs, it is an indication that the power source may be undersized. The voltage between each leg and ground on 208 volts should be approximately 120 volts. The voltage between each leg and ground on 460 volts should be approximately 277 volts. (Due to the variability in the ways 230 V, 3-phase power can be wired, there is not a standard test method.)

5. **Neutral and ground voltage:** Check for any voltage difference between each neutral (N) wire in the panel and ground. If there is a difference in voltage, use the wiring diagram to track down the source of the difference and correct it.

6. **Controls circuit:** Connect the controls circuit if it is not already connected. The controls circuit is now ready to be turned on. Do not turn on the pump circuit at this time.

WARNING: *Turning the pump circuit on at this time can damage the panel or the pump if the pumps and floats are miswired or if there isn't sufficient liquid in the tank.*

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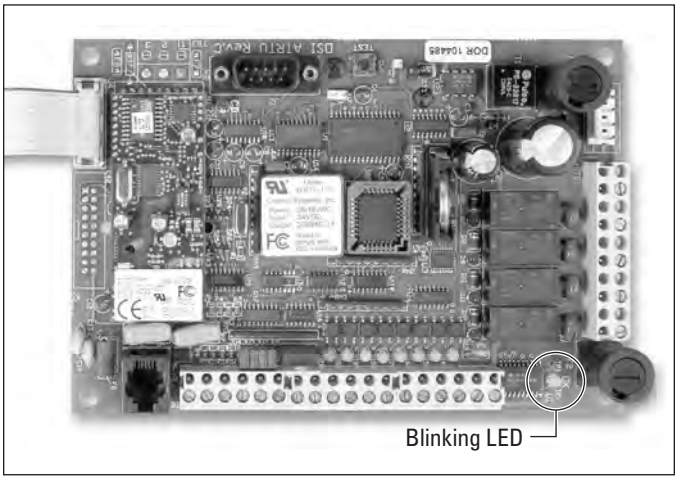
Inspection Points (continued)

7. **Panel operation:** Verify that the panel is powered up.
   - On TCOM and VCOM panels, an LED will light up indicating the board is operational. If the blinking light does not turn on, refer to the wiring diagram and verify the connections on the control circuit were properly terminated.



   - On MVP, Simplex, and Duplex panels, turn on the control circuit, then toggle the pump "AUTO-OFF-MAN" switch to "MAN." The motor contactor will visibly and audibly engage at this point. If the motor contactor does not engage and there are no alarm conditions, refer to the wiring diagram and verify the connections on the control circuit were properly terminated.

     NOTE: *For VCOM-equipped systems, place VCOM in test mode at this point.*

Inspection Points – Tanks and Basins

Not all tanks and basins have associated components as described below. Check the system plans to identify if there are associated components — such as splice boxes, floats, filters, or pump vaults — on each section of the system as you start it up.

1. **Tank:** Confirm with the installer that all tanks have passed watertightness testing. Verify the inlet and outlet of the tank and riser are properly installed.
2. **Basin:** Verify the inlet and outlet of the basin are properly installed and the effluent flows through in the correct direction.
3. **Riser:** Inspect the riser attachment and rubber grommets for a watertight seal.
4. **Splice box:** Inspect the splice box for correct wiring and the use of waterproof splice nuts. If there is water in the splice box, use a baster or sponge to remove the water.

WARNING: Failure to use waterproof wire nuts can cause intermittent or permanent float failure.

5. **Effluent filter and float:** Verify the effluent filter cartridge and float assembly are easy to remove for service and maintenance. The ability to easily remove these components is essential and depends upon careful installation in accordance with the instructions provided in Appendix B. Set components on a plastic tarp or plastic sheeting when they are out of the tank.
   a. Detach the float assembly from the housing, remove it from the tank, and lay it aside. Verify there is enough slack in the cord for easy removal.
   b. Pull the effluent filter cartridge out of the housing, and remove it from the tank. There should be ample clearance to allow unhindered removal of the cartridge from the housing and tank.
   c. Slide the filter housing out of the slide rail and remove the housing from the tank. (Slide rail models only.)
   d. Raise the high-level alarm float to simulate a high-level condition. Verify that the high-level signal is on by the audible alarm or the high-level alarm input LED on the circuit board in the panel.

      NOTE: *The audible alarm is delayed for 2 hours in TCOM control panels.*

   e. When the floats and filter cartridge are out of the tank, verify the handles are long enough for easy access. If they are not, adjust them to the necessary length.
   f. Reinstall the cartridge into the effluent filter housing and install the float assembly.

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Inspection Points (continued)

6. **Biotube® pump vault filter and floats:** Verify the pump vault filter cartridge and float assembly are easy to remove for service and maintenance. The ability to easily remove these components is essential and depends upon careful installation in accordance with the instructions provided in Appendix B. Set components on a plastic tarp or sheeting when they are out of the tank.

   a. Detach the float assembly from the housing, remove it from the tank, and lay it aside. Verify there is enough slack in the cord for easy removal.

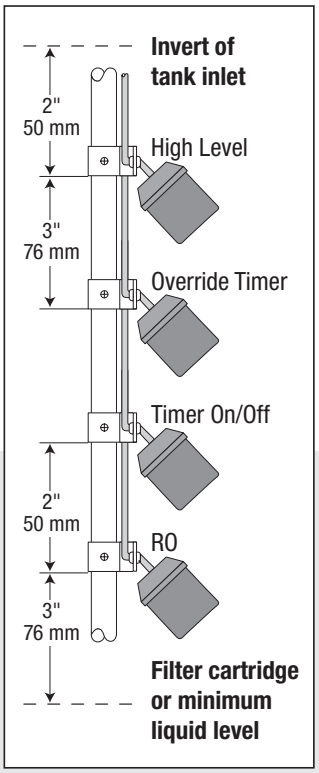
   b. Pull the filter cartridge out of the pump vault and remove the filter cartridge from the tank. There should be ample clearance to allow unhindered removal of the cartridge.

   c. Test the floats, starting with the lowest float on the assembly. Raise each float to the "up" position and verify that the signal is on for the correct float by the audible alarm and the alarm input LED on the circuit board in the panel. If your panel does not have alarm input LEDs, check voltage coming into the panel from the float you believe is activated.

   NOTE: *The audible alarm is delayed for 2 hours in TCOM control panels.*

   d. Check the float settings provided in the plans against the actual float settings. If the plans don't provide float settings and the engineer or system designer is unable to provide settings, set the floats based on the following rules:

- Demand Dose:
  - "Redundant Off" (RO) float is set 3 inches (76 mm) above the filter cartridge or the minimum liquid level of the pump, whichever is higher.
  - "Pump Off" float is set 2 inches (50 mm) above the "RO" float.
  - To calculate the "Pump On" float distance from the "Pump Off" float, divide the desired dose volume by the gallons per in. or liters per mm of the tank. Place the "Pump On" float that many inches above the "Pump Off" float.
  - "High Level" or "High Level/Lag Pump Enable" float is set at 2 inches (50 mm) below the invert of the tank inlet.
- Timed Dose:
  - "RO" float is set 3 inches (76 mm) above the filter cartridge.
  - "Timer On/Off" float is set 2 inches (50 mm) above the "RO" float.
  - "Override Timer" float is set 3 inches (76 mm) below "High Level" float.
  - "High Level" or "High Level/Lag Pump Enable" float is set at 2 inches (50 mm) below the invert of the tank inlet.



WARNING: *Pumps have a 30-second minimum run time. We recommend a drawdown differential of at least 30 seconds between the "Pump Off" float and "RO" float or the pumps may continue to run, resulting in a false low-level alarm.*

NOTE: *If you use the general float settings, you may need to return at a later time and adjust float settings after the system is in operation.*

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Inspection Points (continued)

e. When the floats and filter cartridge are out of the tank, verify the handles are long enough for easy access. If they are not, adjust them to the necessary length.

f. Reinstall the cartridge in the pump vault. Leave the float assembly out of the tank or basin for use during pump run testing.

7. **Effluent pump:** Verify the pump is easy to remove for service and maintenance and that the pump flow rate and voltage are correct. The ability to easily remove the pump is essential and depends upon careful installation in accordance with the instructions provided in Appendix B. Set components on a plastic tarp or plastic sheeting when they are out of the tank.

a. Switch the pump breaker(s) in the control panel to the "OFF" position.

b. Verify the ball valve and cam-lock fitting or union on the discharge assembly is within 24 inches (610 mm) of the top of the riser.

c. Close the ball valve on the discharge assembly if there is one and disconnect the discharge assembly at the union or cam-lock fitting.

d. Verify there is enough slack in the pump cord for easy removal.

e. Pull the pump out of the vault by the discharge assembly and remove the pump from the tank.

WARNING: *Lifting or lowering the pump by the cord can damage the pump and cord.*

f. Check the voltage and phase values on the pump nameplate. Write them down in the start-up report. If there are pump motor stickers on the inside of the control panel door, check to see if they match the pump nameplate.

WARNING: *If the pump does not match the panel voltage and phase requirements, do not turn on the pump breakers.*

g. Reinstall the pump if the pump matches the panel voltage and phase requirements.

h. Reconnect the discharge assembly at the union or cam-lock fitting and open the discharge assembly ball valve.

i. Switch the pump breaker(s) in the control panel to the "ON" position when finished.

Inspection Points – Pumps

When the panel has been inspected and powered up, the float inputs have been tested, and all pump voltage and phase information has been verified, the pump(s) can be powered up and tested.

1. **Manual pump operation:**

a. Switch the pump breaker(s) in the control panel to the "ON" position.

b. Measure the static voltage of the pump(s) and enter the value(s) on the start-up checklist.

c. Toggle the pump "AUTO-OFF-MAN" switch to "MAN." The motor contactor will visibly and audibly engage at this point. If the motor contactor does not engage, check for an "RO" alarm condition. If there is no alarm condition, refer to the wiring diagram and verify the connections on the control circuit were properly terminated.

WARNING: *There is no motor protection in TCOM panels and panels without "RO" alarms. Before running a pump, always verify that there is sufficient liquid in the tank or basin.*

NOTE: *Refer to the "General Operating Instructions" section of the VCOM control panel documents to perform the "Manual Test" if you are starting up a pump controlled by a VCOM panel.*

d. Verify pump motor operation by checking the discharge plumbing assembly for vibration.

– No vibration in the discharge plumbing assembly indicates a pump wiring issue. Check the pump voltage and pump wiring terminations in the panel and in the splice box. Wires may be incorrectly terminated or wire insulation may be causing faulty contact between the wire and terminal lug.

– Vibration in the discharge plumbing assembly with low or no flow from the pump indicates closed valves or line breakages. On duplex pumping systems with two discharge plumbing assemblies connected together to a single line, verify that there are check valves on both pumps and that they are operating correctly. On three-phase systems, verify L1, L2 and L3 are wired correctly. A quick way to identify if the pump is wired correctly is to watch for clockwise torsion in the discharge plumbing assembly when the pump is first turned on.

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Inspection Points (continued)

e. Measure and compare the dynamic (running) voltage of the pumps to the measured static (resting) voltage. Voltage drops indicate connection problems in the splice box or wiring that is too small for the pump.

f. Use an ammeter to measure the pump amperage. Make sure the amperage is within the range specified in the table below or listed on the pump nameplate. For non-Orenco pumps, consult the manufacturer's literature.

NOTE: *On TCOM panels with a current sensor option, pump amperage should match the value listed in the panel. If it does not match, inspect the three-position switch on the current sensor for the correct scaling factor.*

g. Set the high and low amperage ranges based on the reading.

Pump Amperage Chart

Pump Model	Low Amp Reading	High Amp Reading
PF100511	11.9	12.6
PF100512	6.0	6.4
PF10053200	3.5	3.9
PF100552	3.6	3.8
PF100712	7.8	8.4
PF10073200	4.9	5.2
PF100752	5.8	6.2
PF101012	9.0	9.8
PF10103200	5.1	5.6
PF101552	9.4	11.4
PF102012	10.0	12.2
PF102032	6.4	7.6
PF10203200	7.5	8.7
PF200511	11.0	12.5
PF200512	5.8	6.5
PF200532	2.5	2.9
PF20053200	3.3	3.8
PF201012	9.6	10.5
PF300511	10.7	11.8
PF20103200	5.0	5.9
PF20153200	6.0	7.2
PF201512	10.5	12.6
PF300512	5.6	6.2
PF30053200	3.3	3.7
PF300552	3.5	4.2
PF300712	7.4	8.6
PF300752	5.5	6.1
PF30073200	4.1	4.9
PF301012	9.3	10.4
PF301052	6.4	7.4
PF30103200	4.9	5.8
PF301512	10.1	12.6
PF30153200	5.5	6.9
PF301534	2.3	2.8
PF301552	8.1	9.3
PF302012	7.4	11.0
PF30203200	7.7	9.3
PF303012	12.6	16.8
PF303032	8.2	10.1
PF305012	20.1	25.8
PF305032	14.0	16.6

Pump Model	Low Amp Reading	High Amp Reading
PF30503200	15.4	18.6
PF500511	10.5	12.1
PF500512	5.4	6.2
PF500532	2.6	3.0
PF50053200	3.2	3.7
PF500534	1.3	1.5
PF500552	3.3	3.9
PF500712	7.3	8.5
PF500732	3.1	3.9
PF50073200	3.9	4.9
PF500734	1.4	1.8
PF501012	8.8	10.1
PF50103200	4.6	5.7
PF501034	1.8	2.2
PF501512	9.6	12.6
PF50153200	5.4	7.0
PF501552	8.0	9.1
PF503012	12.6	17.7
PF503032	8	10.4
PF50303200	10.1	13.1
PF503034	4.2	5.3
PF505012	17.3	26.4
PF505032	13.1	16.5
PF751512	11.4	12.3
P200511	12.6	13.8
P200512	6.1	7.1
P201512	11.2	12.2
P300512	5.8	6.5
P300712	7.4	8.3
P301012	9.1	10.3
P500511	11.2	12.7
P500512	5.8	6.5
P50053200	3.4	3.8
P500712	7.7	8.8
P50073200	3.8	4.8
P501012	9.4	11.2
P501512	10.6	13.1
P50153200	6.0	7.6
PEF3311	6.9	7.8

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Inspection Points (continued)

2. **Drawdown test:** Perform a drawdown test to set the pump flow rate in the control panel.
   a. Measure and record the distance from the top of the tank to the liquid level in the tank.
   b. Toggle the pump "AUTO-OFF-MAN" switch to the "MAN" position for sixty seconds.
   c. Toggle the pump "AUTO-OFF-MAN" switch to the "OFF" position; then measure and compare the difference in elevations. The difference in elevation in inches or millimeters, multiplied by the gallons per inch or liters per millimeter of the tank or basin will provide the correct flow rate in gallons per minute (gpm) or liters per minute (L/min). Follow the instructions provided with the control panel for entering the measured pump flow rate.

   NOTE: *This method will not work on recirculation/blend tanks if the flow is returning to the tank through the recirc valve or for dose tanks with transport lines that drain back.*
3. **Automatic pump operation:** Test the system using the floats to drive pump operation.
   - Demand dose:
     a. Toggle the "AUTO-OFF-MAN" switch to the "AUTO" position.
     b. Unclip the float assembly and remove it from the tank if it is not out already.
     c. Verify the automatic operation of the pumps by incrementally lifting the floats to simulate normal raising and lowering of the tank liquid level. The pumps should cycle on when you lift them and cycle off when you release them. On duplex systems, the pumps should alternate between lead and lag pumps and cycle off when the floats are dropped.

     NOTE: *An "On/Off" float works differently than a pair of "On" and "Off" floats. Verify the type of floats in your system before testing.*
     d. Lower the float assembly into the tank and clip the float assembly into the float bracket.
   - Timed dose:
     a. Toggle the "AUTO-OFF-MAN" switch to the "AUTO" position.
     b. Record the timer settings, then reduce the timer settings to 0.5 minutes "OFF," 0.5 minutes "ON," and 1.0 minutes "OVR OFF."
     c. Let the pump run through several cycles to confirm that the timers are operating correctly.
     d. Change the timer settings back to the settings specified by the engineer.

Inspection Points – System Timer Settings

1. **Recirc Timer Settings:** The method for calculating Recirculation/Blend Tank timer settings is provided below. Newer AX100 panels have the ability to adjust the timer setting based on actual flow data. See the instructions included with the control panel for setting information.
   - Pump On Time = 1.5 Minutes

     NOTE: *The standard Pump On Time for AX100 units is 1.5 minutes. Your system's needs may differ. Consult your site plans, engineer/designer, or Orenco for more details.*
   - Pump Off time = (1440 ÷ Cycles per Day) - Pump On Time

     Calculate Cycles per Day using the equation below:

$$\frac{\text{(Average Daily Flow)} \times \text{(Recirc Ratio)}}{\text{(Pump Flow Rate)} \times \text{(Pumps per Dose)} \times \text{(Pump On Time)}}$$

     NOTES:
     - *1440 is the number of available minutes in a 24-hour period.*
     - *The standard Recirc Ratio for AX100 units is 4 but it can range from 2 to 6, depending on the needs of the system.*
     - *The Pump Flow Rate is 48 gallons per minute (3 L/sec) when nozzle pressure measures 3.0 psi (20.6 kPa).*
2. **Discharge Timer Settings (Timed Dose Systems) :** The timer settings for the system are calculated based on the actual and expected flow. Equations are provided below.
   a. Identify Dose Volume
   - Dose Volume = Number of gallons desired per dose
     or
   - Dose Volume = (Number of Orifices) × (Loading Rate per Orifice)

   b. Identify Doses per Day
   - Number of doses per day = (Design Flow) ÷ (Dose Volume)

   c. Identify Time Interval Between Starts, in hours
   - Time Interval Between Starts = (Hours per Day) ÷ (Doses per Day)

   d. Identify Time On, in minutes
   - Time On = (Dose Volume) ÷ (Measured Pump gpm)

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Inspection Points (continued)

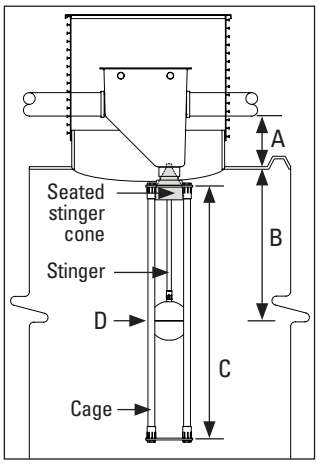
Inspection Points – Recirculation/ Blend Tank

Complete all of the inspections and checks described in the "Inspection Points – Tanks and Basins" section of this manual and then verify that the inspection points below are as follows:

1. **Recirc valve:** Verify the recirc valve is set so that the maximum water level in the tank matches the maximum liquid level as specified by the engineer. If the maximum liquid level is not on the plans, a general rule is to set it at 80% of the tank depth for straight-walled tanks or 80% of tank volume for curve-walled tanks.

2. **Stinger length:** Adjust the length of the recirc valve stinger based on installation instructions.

   a. Calculate the necessary stinger length adjustment using the equation (A+B)-16" or (A+B)-406 mm, where A is the distance from the MM valve invert to the top of the tank and B is the distance from the top of the tank to the 100% discharge level. If the stinger needs to be lengthened to near or beyond the length of the cage, the cage will also need lengthening.



   b. Stinger Adjustment Dimensions:

   - A = Distance from invert of MM valve to top of tank
   - B = Distance from top of tank to the liquid level where 100% bypass is desired, typically 80% of the tank's volume
   - C = Standard cage length: MM4 49 inches (1245 mm), fits stingers up to 36 inches (914 mm); MM6 57 inches (1448 mm), fits stingers up to 40 inches (1016 mm)
   - D = Middle of ball (at the 100% discharge level)

   NOTE: *There should be a minimum of 9 inches (229 mm) from the normal liquid level to the "RO" float.*

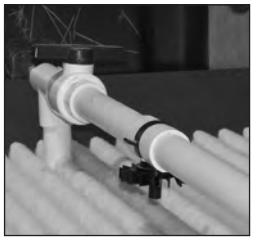
Inspection Points – AdvanTex® Filter Pods

Your system may include AX100 filter pods (shown) or AX20 filter pods. For AX20 inspection points, see the residential *Installation Manual* and residential *AdvanTex O&M Manual,* provided in Appendix B.

1. **Installation inspection:** Verify the AX100 pod has been properly installed. Improper installation is usually indicated by the conditions listed below:

   - Sidewall bowing — Check for any sidewall bowing in the pod. The bowing may cause excessive spacing between media sheets. If the spacing between the media sheets exceeds ½-inch (13 mm), cut the fiberglass rods for the correct media sheet spacing.
   - Lid misalignment — Lid bolts will only go into the holes if the lid is lifted slightly and the bolts are partially inserted prior to closing the lid.

2. **Manifolds and Laterals:** Flush the manifolds and laterals. See the *AX100 Treatment Systems Installation Manual* and *Field Maintenance Report Form* in Appendix B for more information.
   For proper operation after flushing the manifolds and laterals, turn the ball valves to their correct positions and turn the spray nozzle turbines to point down.



3. **System Pressure:** Verify the pressure gauge is set to zero. If it is not, open the seal at the top and let the pressure equalize with atmosphere. Install the pressure gauge, turn on the recirc pumps, and set to 3.0 psi (20.6 kPa).

   NOTE: *On systems plumbed in parallel, adjust the pressure in all three pods at the same time to 3.0 psi (20.6 kPa) using the gate valve on the pod manifold.*

4. **Pod drainage:** Verify that the pod drains easily. If the pod does not drain, check to see if the shipping plug has been removed from the pod outlet.

5. **Lid bolt installation:** When you have finished inspecting all pods, remove the pressure gauge and secure the lids on the pods with the included lid bolts.

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Inspection Points (continued)

Inspection Points – Vent Fan Assembly

A current sensor monitors the vent fan operation. If the fan fails, this sensor will open and activate an alarm. Some vent fan assemblies are equipped with optional heater units for reliable performance in cold weather. Check your system plans to determine if your vent fan assembly includes a heater.

1. **Current sensor operation:** To test the current sensor, switch off the power to the fan and verify the visual alarm on the control panel is activated.

   NOTE: *TCOM control panels have a 12-hour delay in the audible alarm for the current sensor.*

2. **Optional heater unit:** There are two types of heater unit controls available for vent fan assemblies: a single set-point style and a multiple set-point style. If your system is equipped with an optional heater unit, check your system plans to determine the type of heater included in the vent fan assembly.
   - Single set point — Locate the heater inside the vent fan assembly enclosure, remove the heater cover in the vent fan assembly, and set the thermostat to 43° F (6° C).
   - Multiple set points — In the control panel, set the "Heater On" point at 35° F (1.6 °C), "Heater Off" point to 45°F (7.2 °C), "Fan On" point to 35°F (1.6 °C), and "Fan Off" point to 25°F (-3.8 °C).

Inspection Points – Distribution Valve

To verify that the distribution valve is operational, the valve must be hydraulically loaded with the conditions under which it will operate. Use the system plans to find the location of all distribution valves in the system.

1. **Verify liquid level:** Make sure that the tank or basin that you are pumping from has sufficient liquid to perform the test.

   WARNING: *There is no motor protection in TCOM panels and panels without "RO" alarms. Before running a pump, always verify that there is sufficient liquid in the tank or basin.*

2. **Turn on pump:** Toggle the "AUTO-OFF-MAN" switch for the pump that pressurizes the distribution valve to "MAN."

3. **Leak inspection:** Once the distribution valve is pressurized, inspect the unions on the distribution valve for leaks. Tighten any unions that are leaking.

4. **Operation inspection:** Open and close the ball valve to test the operation of the distribution valve.
   - When the valve is closed and opened, the flow should transition from one leg of the valve to another. Observe the clear section of the leg to verify this transition. There may be flow in more than one leg, but there should only be full flow in one leg at any time.
   - When the ball valve is fully closed, the system will fully pressurize (deadhead condition). Incorrectly installed connections in the line may separate and require reinstallation before testing can be completed.
   - If the distribution valve does not rotate correctly, open the distribution valve and inspect for debris or breakage. If the problem is not a mechanical issue, review the plans for potential installation issues, including elevation.

Housekeeping

1. Verify that all control panels are turned on and all "AUTO-OFF-MAN" switches are toggled to "AUTO."
2. Close all control panels.
3. Close and bolt down all tank access lids and riser lids.

   WARNING: *AN UNBOLTED RISER LID OR OPEN TANK IS A SAFETY HAZARD! Tank and riser access lids must be properly secured at all times. If bolts are lost or damaged, contact Orenco immediately for replacements.*

4. Police the area for debris and tools.

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Maintenance

Tools, Equipment, and Spare Parts List

Many of the recommended maintenance and troubleshooting procedures require specialized tools, equipment, and spare parts. Refer to the residential *AdvanTex O&M Manual*, provided in Appendix B, for a list of items to have on hand.

Record Keeping

Maintain a written log describing all activities relating to the AdvanTex system. This information is very valuable for analysis and trouble shooting if problems should occur. A *Field Service Report Form* and a *Field Maintenance Report Form* are provided in Appendix B for your convenience.

Maintenance Equipment

Safety and Hygiene

- Bleach/water solution
- Eye protection
- Hand cleanser
- Paper towels
- Plastic tarp
- Protective clothing
- Rags
- Rubber gloves
- Trash bags

Routine Inspection and Maintenance

- Biotube® filter cradle (OM-BIOTUBECRADLE)
- Beakers or bottles
- Calculator
- Channel lock pliers
- Dissolved oxygen (DO) meter or colorimetric ampoules
- 3/16" hex head drill bit
- Drill
- Electrical tester (voltage and amperage)
- Extension cord
- Extra lid bolts
- Laptop with null modem cable (TCOM & VCOM only)
- Hook for raising floats to test them
- pH meter or pH test strips
- Pressure gauge
- Sample bottles
- Sludge and scum measuring device (e.g. Nasco Sludge Judge®) for sludge and Orenco SMUG for scum
- Tape measure
- Telephone for testing dial tone – (TCOM & VCOM only)
- Test strips for nitrate, ammonia, alkalinity
- Turbidity meter
- Watch or stopwatch

Repairs

- Adhesive
- Backflow prevention device
- Extension cord
- Flashlight with spare batteries/bulb
- Float switches
- Hacksaw with spare blades
- Hammer
- Hand tools
- Heat gun (torch)
- Hole saw (vari-bits: 3/4" and 1-3/8")
- Hose with nozzle
- Inspection mirror (e.g. Prototek™ “Mirror on a Stick”)
- PVC cement and primer
- PVC fittings
- PVC pipe
- Screwdriver set
- Shovel Snake (building sewer)
- Spare parts for downstream components
- Waterproof wire nuts
- Wire stripping/crimping tool (10 to 22 AWG)
- Wrench (24" or 600 mm pipe wrench)
- Wrench (lid bolt)

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Maintenance (continued)

Preventive Maintenance

As with any engineered system, such as a car or heat pump, your wastewater treatment system will work better and last longer if it is regularly maintained by a qualified service provider. The service provider should be present during installation, so he or she is familiar with the system, especially those service lines, conduits, and connections that get buried.

Your system will work better and last longer if you learn what not to put into the treatment system. There should be no disposal of toxics or chemicals into the system, such as restaurant degreasers, cleansers, wax strippers for linoleum, carpet shampoo and its waste products, and other toxics. As a general rule, nothing should go into any wastewater treatment system that hasn't been ingested, other than toilet tissue, mild detergents, and wash water. Every system user and qualified service provider should be familiar with the basic guidelines below:

- No septic additives
- No flammable or toxic products
- No excessive use of household cleaners or chlorine bleach
- No pool or spa products
- No disposing of pharmaceuticals
- No pesticides, herbicides, or agricultural chemicals or fertilizers
- No RV waste (unless the system is specifically designed and engineered to treat such waste)
- No surface runoff and storm water
- No excessive amounts of fats, oils and grease (FOG)
- No food byproducts
- No cigarette butts
- No paper towels, newspapers, sanitary napkins, diapers, disposable wipes, floss, gum or candy wrappers, etc.
- No chlorides or water softener backwash

Preventive maintenance should start with facility user and/or homeowner education. Orenco Systems®, Inc. can provide a manual of Do's and Don'ts to distribute upon request. To request multiple copies of this manual, contact Orenco Systems, Inc. at 1-800-348-9843.

With preventive maintenance and periodic inspections, the wastewater treatment system will function for decades.

Scheduled Maintenance

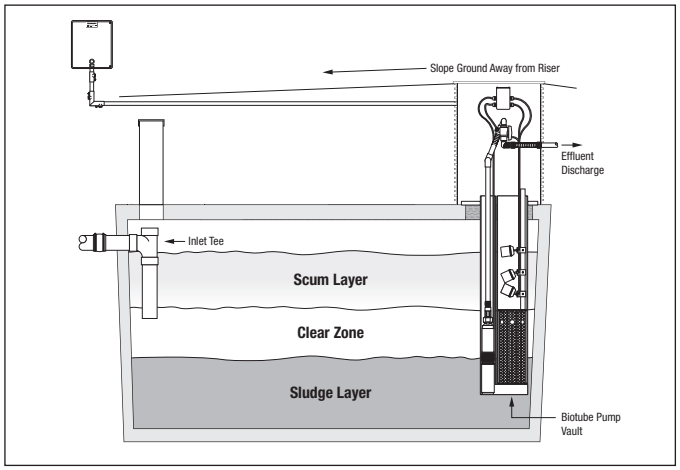
Scheduled maintenance should be performed in the time frames described in this section. A chart showing scheduled maintenance activities and times is included at the end of this section, for your convenience.

Monthly Maintenance

Once a month, during the first year of operation, make a visual inspection of the liquid levels in the septic, recirculation/blend, and dosing tanks. The liquid level should never be lower than the "Redundant Off" float. If liquid leaks out of the tank, the scum layer can drop to the level of the perimeter holes in the pump vaults and cause the screen to plug. A watertight tank is important and any leakage must be corrected.

During the first year of operation, check the Biotube® filter in the septic tank every month and clean when necessary. Follow the applicable instructions found in Appendix B for cleaning Biotube filters.

Once a month, during the first year of operation, the Biotube Pump



Vaults should be examined to determine if cleaning of the Biotube filter is necessary. If the liquid level inside the vault is discernibly different from the level outside the pump vault while the pump is running, cleaning is required. Remove the filter cartridge and clean it following the applicable instructions in Appendix B.

Once a month, read the hour meters and event counters for the recirculating/blend and dosing tank's pumps. Each pump should run approximately the same number of hours and turn on approximately the same number of times as their operating counterpart. If the run times or cycle times differ significantly between pumps, determine the cause of the discrepancy and take corrective measures.

If there is a distributing valve, manually cycle the valve through every outlet to confirm proper operation.

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Maintenance (continued)

Quarterly Maintenance

Testing for Biochemical Oxygen Demand (BOD_5); Total Suspended Solids (TSS); Fats, Oils, and Grease (FOG); Ammonia (NH_3); Nitrate (NO_3); and pH should be done according to regulatory requirements. If testing is not required by the regulatory jurisdiction, samples should be taken quarterly for the first year to establish a baseline. Subsequent testing after the first year may be reduced based on the establishment of this baseline. Regular samples will provide valuable information for ongoing maintenance and troubleshooting. Effluent testing procedures may be found in the residential *AdvanTex O&M Manual* in Appendix B. All results obtained should be reported to the appropriate people, including Orenco's Engineered Systems Department.

For the first year only, check voltages and amperages of all pumps and record them on the *Field Maintenance Report Form* provided in Appendix B. Refer to the start-up voltages and amperages recorded in the "Start-up & Operation" section of this document. If the voltage drop or the amperage exceeds National Electric Code (NEC) requirements (see chart provided in "Inspection Points —Pumps" section of this document), have an electrician verify the service line and check the pump windings. If there is no discernible difference in voltage or amperage, this procedure may be performed annually.

Semi-Annual Maintenance

Inspect the spray of the nozzles in the AdvanTex pods. Look for reduced or uneven spray patterns as well as clogged spray nozzles or biological growth on the spray nozzles. Observe and measure the residual pressure. Refer back to the Start-up & Operation section for initial measurements of residual pressure. If the observed residual pressure exceeds the initial residual pressure (3 psi) more than 15-20%, it can be assumed that some of the nozzles are plugged and the laterals require flushing. To flush the laterals, open the ball valves at the end of one lateral. At the control panel, toggle the "AUTO-OFF-MAN" switch to "MAN" and let the pump run to flush any material from the lateral. Repeat for each lateral until all of the laterals have been flushed. Recheck the residual pressure to ensure the laterals have been sufficiently cleared.

If there is still a significant difference in initial and current residual pressure, use an Orenco AX lateral cleaning brush or a high-pressure washer to clean the laterals.

To clean out the spray nozzles, turning the laterals so the spray nozzle turbines are pointed up and then hosing each turbine off. For excessive buildup in the spray nozzles, remove the nozzles and replace them with clean nozzles. Soak the plugged nozzle in TSP or any other approved cleaning agent for 30 minutes. When a spray nozzle is clear, you can see the spray nozzle turbine spin freely and the spray distribute evenly across the textile media. If the nozzles are substantially plugged after six months, then it may be prudent to inspect the residual pressure every three months and adjust scheduled testing and flushing of the laterals accordingly.

Visually inspect the recirculating valve and verify that the liquid level in the tank is within the normal range. Consult the design plans for proper operating level. If the liquid level is low, the ball mechanism could be jammed in the seated position. Remove, disassemble, and inspect. If the liquid level is high, the valve may require cleaning because it is not making a tight seal when seated. Remove, disassemble, and inspect.

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Maintenance (continued)

Annual Maintenance

Measure the scum and sludge accumulation in all tanks annually. Record scum and sludge measurements on a *Field Maintenance Report Form*.

1. **Measuring the scum layer:** Using a scum utility measuring gauge or similar tool, measure the thickness of the scum layer. With this measurement, determine if the distance from the bottom of the scum layer at the liquid's lowest normal level to the bottom of the outlet tee or to the top of the inlet holes for the pump vault is 3 inches (76 mm) or less. If so, it's time to pump out the contents from the tank (scum, sludge, and liquid) completely. After removing the septage contents from the tank, refill it with water to its normal operating level.

2. **Measuring the sludge layer:** Using a Sludge Judge® or similar tool, measure the thickness of the sludge layer. With this measurement, determine if the distance from the top surface of the sludge to the bottom of the outlet tee or inlet holes for the pump vault (PVU) is 6 inches (152 mm) or less. If so, again, it's time to pump out the contents from the tank (scum, sludge, and liquid) completely. If the tank is fitted with a pump vault or effluent filter discharge assembly, take the measurement from the top surface of the sludge layer to the bottom of the vault's inlet ports. After removing the septage from the tank, refill it with water to its normal operating level.

NOTE: *Turn the laterals in the AdvanTex® treatment unit 180 degrees (so the spray nozzle turbines face up) prior to flushing to prevent nozzle clogging while material is being pushed along the lateral to the flushing valve.*

Once a year, send copies of the complete activity log to the appropriate person. This information is very valuable for analysis and troubleshooting if problems should occur.

Check voltages and amperages of all pumps and record them on a *Field Maintenance Report Form*. Refer to the start-up voltages and amperages recorded in the "Start-up & Operation" section of this document. If the voltage drop or amperage exceeds NEC requirements, have an electrician verify the service line and check pump windings.

The pumping system should be inspected annually to ensure it is operating properly. Unscrew the stainless steel bolts that fasten the fiberglass lid over the pumping equipment. Remove the fiberglass lid for an inspection that includes these steps:

a. Verify there are no obvious holes or leaks in the riser or around the perimeter of the riser connection to the tank. Wetness or watermarks may be an indication of weeping.

b. Inspect the splice box to ensure it is free of water. Ensure the lid and connections are secure.

c. Verify the floats are in good condition and properly secured to the float tree. Verify the float cords are neatly wrapped inside the riser so that they cannot interfere with the operation of the floats.

d. Verify float operation. Refer to the float tests in the "Start-up & Operation" section of this document.

All TCOM control panels contain a lithium battery for backup. For good measure, we recommend you replace the battery every two years. Refer to "Battery Replacement" in the *Custom TCOM Control Panels and HyperTerminal Access Manual,* provided in Appendix F.

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Maintenance (continued)

Scheduled Maintenance Reference Chart

NOTE: *All designer specifications and local regulatory requirements should be followed. This table provides Orenco's minimum recommended guidelines.*

Scheduled Maintenance Reference Chart		Recommended Activity Period					
		Monthly	Quarterly	Semi-annually	Annually	Biannually	
Activity	Visual Inspection of Tank Liquid Levels	•[1]	•				
	Check Biotube® Effluent Filters; Clean as Required	•[1]	•				
	Check Biotube® Pump Vault Filters; Clean as Required	•[1]	•				
	Record Elapsed Time Meters and Event Counters for All Pumps	•					
	Confirm Proper Operation of Automatic Distributing Valve (if applicable)	•					
	Sample Influent and Effluent Quality Parameters[2]		•[1]	•			
	Confirm and Record Pump Voltages and Amperages		•[1]		•		
	Inspect Distribution of Effluent in AdvanTex Pods; Clean as Required			•			
	Measure Inlet or Residual Pressures to AdvanTex Pods; Clean as Required			•			
	Inspect Recirculating Valve			•			
	Record Scum and Sludge Accumulation in Tanks				•		
	Flush Distribution Laterals in AdvanTex Pods				•		
	Inspect Pumping System Components; Clean as Required				•		
	Replace Lithium Battery in TCOM Control Panel (if applicable)					•	

[1] *This maintenance schedule is only required during the first year of system operation.*

[2] *Recommended guidelines only. Sampling should be scheduled according to regulatory requirements.*

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Maintenance (continued)

Corrective Maintenance

An alarm is triggered when the liquid in the tank reaches a level that is either higher or lower than it should be, under normal operating conditions.

When responding to an alarm, first discern the type of alarm being activated. If it is due to pump failure, test each pump manually and locate the failed pump. To replace the pump, see the "Removing & Replacing Inoperative Pumps" section of this document. Remove the access riser lid and visually inspect the liquid level. If a high liquid level or low liquid level has caused the alarm, follow the appropriate procedures below.

High Liquid Level Alarm

1. Determine if the high water alarm is from higher than expected usage (i.e., special event, etc.). If there is a long-term increase in flows, then timer settings need to be adjusted accordingly.

2. When a high liquid level condition exists, the source of the problem is likely to be one of the following:

   a. Poor valve seal – Consult the design plans for proper operating level and visually inspect the recirculating valve to verify the liquid level in the tank is within the normal range. If the liquid level is high, the valve may require cleaning because it is not making a tight seal when seated. Remove, disassemble, and inspect.

   b. Control panel breakers tripped – Check the circuit breakers, switches, and fuses in the system control panel. If separate breakers in the main panel were used for the pumps and controls, also check these breakers. If a breaker is found to be tripped, reset the breaker. If the breaker trips immediately, check the wiring for a short or bad breaker. If the breaker or breakers don't trip again, then the problem has probably been found or has corrected itself. Test the automatic function of the system as shown in the "Start-up & Operation" section of this manual to verify proper operation.

   c. Faulty floats – If, after checking the circuit breakers, fuses, and switches, the pump still does not operate, toggle the "AUTO-OFF-MAN" switch to "MAN." If the pump engages, the problem is likely to be in the float system. (If the motor contactor engages but the pump doesn't run, go to step g, "Water in splice box or loose wires.") Pump the tank down to a level below the "Override Timer On/Off" float. Cycle the pump to simulate the timer on and off periods so the effluent is dosed to different zones of the AdvanTex® system. Toggle the "AUTO-OFF-MAN" switch to "AUTO." Do not leave a pump in the "MAN" position unattended. If you do, the pump can continue to operate without liquid, possibly drawing solids into the filter and causing potential failures. Isolate the float switches and check to ensure all floats are operating properly. If a float is found to be faulty, refer to the "Removing & Replacing Inoperative Floats" section in this document.

   IMPORTANT! *Before doing any work on either the wiring to the level control floats and pump or inside the pump control panel, switch off the power to the system at the service entrance panel and set the circuit breakers in the panel to their "OFF" positions.*

   d. Pump clogged or not clean – Check the pump for discharge flow. Close the ball valve, disconnect the union in the discharge plumbing assembly and turn the union so it is facing down. Engage the pump and visually inspect the approximate flow rate being discharged. If you are unsure of the discharge rate, measure the time it takes to fill a five-gallon bucket with the discharge. Check this value against the appropriate pump curve. If the flow rate is insufficient, the pump may need to be cleaned. Refer to the *Pump Repair Manual* provided in Appendix D.

   e. Valves closed – If the pump operates in the proper flow range, check all downstream valves to ensure that they are in the open position. If the valves are all open, test the discharge pressure of the pump. For proper pump testing methods, refer to the *Pump Repair Manual* provided in Appendix D.

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Maintenance (continued)

f. Pump failure or bad electrical connection – Check the panel to verify the motor contactor engages. If it engages but the pump doesn't operate, then it is either a pump failure or a bad electrical connection.

g. Water in splice box or loose wires – Remove the access riser lid and the stainless steel screws from the splice box lid, being careful not to drop the screws into the tank. If the splice box was submerged, or if there is a crack in the conduit, there may be water in the splice box. If this is the case, remove the water with a baster, sponge, or other appropriate method. Carefully check the splices to ensure they are intact and remain watertight. If all splices are found to be watertight, replace the splice box lid. In the control panel, carefully tug on each wire going to the splice box. Correct any wires that are loose. Reactivate and retest the system.

h. Leaks in tank or system – If the system operates but can't keep up with the flow, check the system for watertightness. A leaking tank can infiltrate enough water to overcome the pump. Also check for leaking fixtures in the facility or home, though it is unlikely a leaky fixture could provide enough liquid to overcome the pump.

Low Liquid Level Alarm

1. Determine the actual flows in the system. If the flows are considerably less than the timer is set for, then adjust the timer settings to match current flows. If a low level exists in the drainfield pump basin, then ensure the minimum run time is appropriately set.

2. When a low liquid level condition exists, the source of the problem is likely to be one of the following:

   a. Ball valve mechanism jammed – Visually inspect the recirculating valve and verify the liquid level in the tank is within the normal range. Consult the design plans for proper operating level. If low, the ball mechanism could be jammed in the seated position. Remove, disassemble, and inspect.

   b. Tank siphoning – Inspect the liquid level in the tank. If the liquid level is below the "Redundant Off/Low Level Alarm" float, then it is likely that the problem is either a leaky tank or siphoning. Siphoning typically occurs when the system is pumping downhill. A system will not necessarily siphon every time it operates. It is dependent on the system design. A siphoning system can be retrofitted with an anti-siphon valve. Most siphoning problems will manifest in the first months of operation.

   c. Tank leaks – If the hydraulics of the system do not allow for siphoning, it is likely that the tank is leaking. Fill the tank to a normal operating level and return to inspect the tank at a later time. If the liquid level is below the normal operating level, the tank is leaking and needs to be repaired or replaced.

   d. Clogged pump vault cartridge – If the pump vault cartridge is clogged, the pump may be high cycling, causing the liquid level in the vault to drop faster than the liquid level in the tank. Remove the filter cartridge and clean it in accordance with the instructions provided in Appendix B.

Removing & Replacing Inoperative Floats

IMPORTANT! *Before doing any work on either the wiring to the level control floats and pump or inside the control panel, switch off the power to the system at the service entrance panel and set the circuit breakers in the panel to their "OFF" positions.*

1. Remove the float assembly from the vault. There is no need to move the settings of the floats to remove and replace a float. After noting the tether length, snap the inoperative float out of the holding collar.

2. Remove the stainless steel screws from the splice box lid, being careful not to drop the screws into the tank. If the splice box was submerged, or if there is a crack in the conduit, there may be water in the splice box. If this is the case, remove water with a baster, sponge, or other appropriate method. Loosen the cord grip at the splice box and identify the appropriate splice for the float. Cut out the splice and, if using a watertight wire nut for the common wires, remove the appropriate common wire.

3. Remove the inoperative float and replace it with a new one. Push the float cable through the watertight cord grip into the electrical splice box. Leave an adequate length of electrical cord coiled inside the riser to allow for easy removal of the float assembly. Do not remove the colored markers or the paper tags from the float cords, and do not try to thread the markers and tag through the cord grip. Tighten the cord grip by hand, then test the tightness of the cord grip by tugging on the cord. A cord is secure when the cord grip is tight enough to prevent slippage. An adequate length of cord should be left within the splice box to allow for future disconnecting and re-splicing.

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Maintenance (continued)

4. Splice the float wires to the wires from the control panel following the wiring schematics provided in Appendix F. Attach the common wire with the other commons using the waterproof wire nut. It may be necessary to replace this wire nut with a new watertight wire nut. Always use watertight wire nuts or heat shrink splice kits for all connections!

5. Replace the float in the collar, using the same tether length, and return the assembly to the pump vault.

6. Reconnect power and test the unit per the instructions provided in the "Start-up & Operation" section of this manual.

Removing & Replacing Inoperative Pumps

IMPORTANT! *Before doing any work on either the wiring to the level control floats and pump or inside the control panel, switch off the power to the system at the service entrance panel and set the circuit breakers in the panel to their "OFF" positions.*

1. Close the ball valve on the discharge plumbing assembly, disconnect the union, and carefully remove the pump and attached plumbing from the tank. Disconnect the pump from the discharge plumbing assembly.

2. Remove the stainless steel screws from the splice box lid, being careful not to drop the screws into the tank. If the splice box was submerged, or if there is a crack in the conduit, there may be water in the splice box. If this is the case, remove the water with a baster, sponge, or other appropriate method. Loosen the cord grip at the splice box and identify the appropriate splice for the pump. Cut out the splices and label the wires.

3. Remove the inoperative pump and replace it with a new one of the same type. Push the pump cable through the watertight cord grip into the electrical splice box. Leave an adequate length of electrical cord coiled inside the riser to allow for easy removal of the pump. Tighten the cord grip by hand, not by tool; then test the tightness of the cord grip by tugging on the cord. A cable is secure when the cord grip is tight enough to prevent slippage. An adequate length of cord should be left within the splice box to allow for easy removal for future disconnecting and re-splicing.

4. Splice the pump wires to the appropriate wires from the control panel following the wiring schematics provided in Appendix F. Always use watertight wire nuts or heat shrink splice kits for all connections!

5. Reattach the discharge plumbing assembly and carefully lower the pump into the flow inducer alongside the Biotube® pump vault. Be careful not to lower the pump by the cable or to pinch the cable when lowering it into the flow inducer. Reconnect the union and open the ball valve.

6. Reconnect power and test the unit per the instructions provided in the "Start-up & Operation" section of this manual.

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Notes

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Notes (continued)

AdvanTex Treatment Systems are listed to NSF/ANSI Standards 40 and 245 for Class I Systems.

Australian Standard

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Appendix #12:
PUMP VAULT

Orenco SYSTEMS

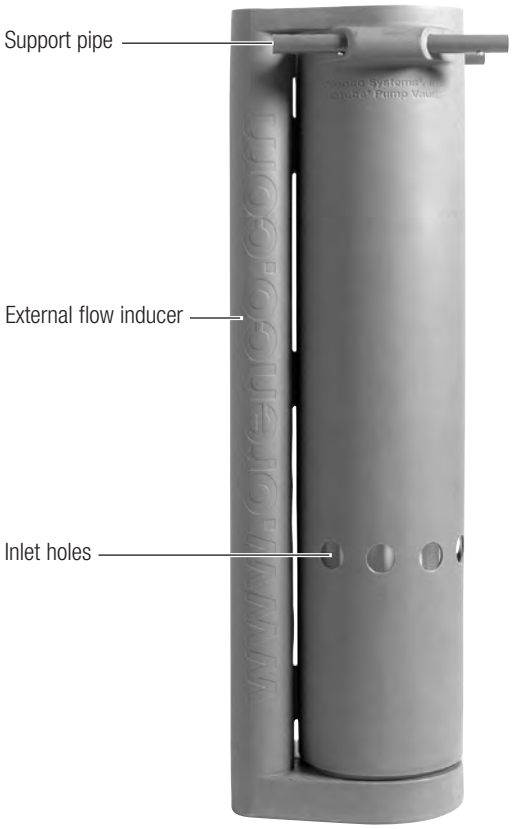
Technical Data Sheet

Universal Biotube® Pump Vaults

For use with Orenco® 4-inch (100-mm) Submersible Effluent Pumps

Applications

Orenco Biotube® Pump Vaults are used to filter effluent that is pumped from septic tanks or separate dosing tanks in STEP systems and onsite wastewater treatment systems. They remove two-thirds of suspended solids, on average. Pump vaults house a Biotube effluent filter and one or two Orenco high-head effluent pumps and can be used in single-compartment septic tanks with flows up to 40 gpm (2.5 L/sec). When flows are greater than 40 gpm (2.5 L/sec), a double-compartment septic tank or separate dosing tank is recommended.



Side view

General

The Orenco Biotube Pump Vault includes a molded polyethylene housing with an internal Biotube filter cartridge constructed of polypropylene and PVC. Schedule 80 PVC support pipes are included to suspend the vault in a tank opening. "Earless" 68-inch (1727-mm) vaults, which rest on the bottom of the tank instead of on support pipes, are also available. The filter cartridge can be removed without pulling the pump or the vault. Effluent enters through inlet holes around the perimeter of the Biotube vault and flows through the Biotubes to the external flow inducer. The external flow inducer accommodates one or two pumps. Orenco Biotube Pump Vaults are covered by U.S. patents #4,439,323 and 5,492,635.

Standard Models

PVU48-1818, PVU57-1819, PVU68-2419, PVU84-2419, PVU95-3625

Product Code Diagram

PVU ☐ ☐ - ☐ ☐ - ☐

- Support pipe length:
  Blank = standard, for 24" (600 mm) riser
  L = long, for 30" (750 mm) riser
  NB = no support pipe bracket (earless)
- Inlet hole height, standard:
  13" (330 mm)
  18" (457 mm)
  19" (482 mm)
  25" (635 mm)
- Cartridge height, standard:
  18" (457 mm)
  24" (610 mm)
  36" (914 mm)
- Vault height:*
  48" (1219 mm)
  57" (1448 mm)
  68" (1727 mm)
  72" (1829 mm)
  84" (2134 mm)
  95" (2413 mm)
  or custom specification
- Biotube® filter mesh:
  Blank = 1/8" (3.2 mm) mesh
  P = 1/16" (1.6 mm) mesh
- Universal Pump Vault

* Custom heights from 42" to 135" available

Tank Access and Riser Diameters

Diameter, in. (mm)	PVU with simplex pump	PVU with duplex pumps
Tank access, minimum	19 (483)	19 (483)
Tank access, recommended	20 (508)	20 (508)
Riser, minimum	24 (600)	30 (750)

Materials of Construction

Support pipe	Schedule 80 PVC
Biotube® vault	Polyethylene
Biotube filter cartridge	Polypropylene/PVC
Float stem	Schedule 40 PVC
Drain valve ball	Polypropylene

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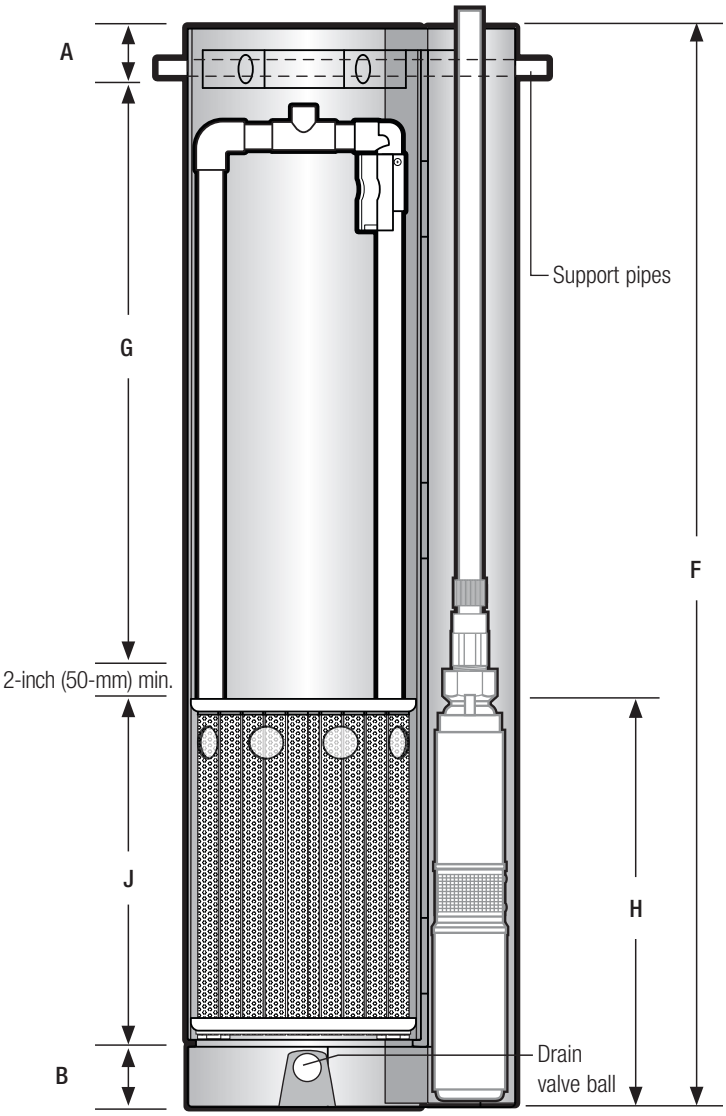
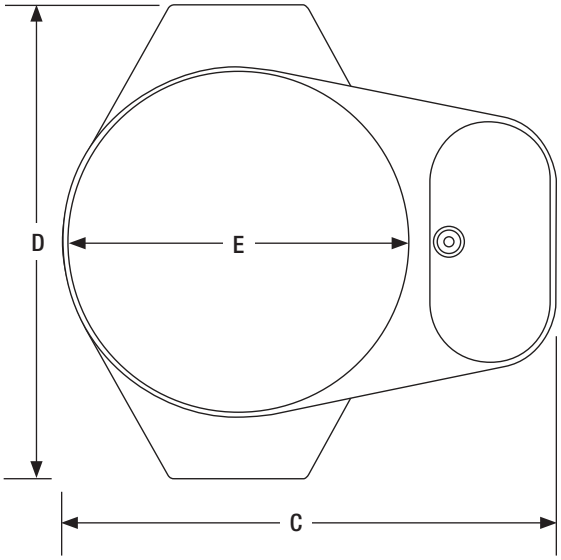


Side view cutaway



Top view

Dimensions

A, in. (mm)	3 (76)
B, in. (mm)	4 (102)
C, in. (mm)	17.3 (439)
D, in. (mm)	16.6 (422)
E, in. (mm)	12 (305)

Specifications

Model	PVU48-1818	PVU57-1819	PVU68-2419	PVU84-2419	PVU95-3625
F, vault height, in. (mm)	48 (1219)	57 (1448)	68 (1727)	84 (1727)	95 (2413)
G, lowest float setting point, in. (mm)	21 (533)	29 (737)	35 (889)	51 (1295)	50 (1270)
H, inlet hole height, in. (mm)*	18 (457)	19 (483)	19 in. (483)	19 (482)	25 (635)
J, Biotube® cartridge height, in. (mm)	18 (457)	18 (457)	24 (610)	24 (610)	36 (914)
Biotube mesh opening, in. (mm)	0.125 (3)	0.125 (3)	0.125 (3)	0.125 (3)	0.125 (3)
Filter flow area, ft^2 (m^2)	4.4 (0.4)	4.4 (0.4)	5.9 (0.5)	5.9 (0.5)	9.0 (0.84)
Filter surface area, ft^2 (m^2)	14.5 (1.35)	14.5 (1.35)	19.7 (1.83)	19.7 (1.83)	30 (2.79)
Maximum flow rate, gpm (L/sec)	140 (8.8)	140 (8.8)	140 (8.8)	140 (8.8)	140 (8.8)

** May vary depending on the configuration of the tank.*

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CA MFR Review Exhibit 2 – Engineer Report

Appendix #13:
Tank specification

Fiberglass Tank SOLUTIONS

Information Chart
Single Wall Underground Storage Tanks

Tank Diameter (Ft.)	Nominal Capacity (Gal.)	Actual Capacity (Gal.)	St. Wall Length (Ft./ In.)	Overall Length (Ft./ In.)	SW Shell Weight (LBS)	DW Shell Weight (LBS)	Strap Qty
4 Ft. (48" ID) (52" OD)	600	610	5'-8"	7'-2"	412	725	2
	1,000	1,010	9'-11"	11'-5"	528	957	2
	1,500	1,542	15'-7"	17'-1"	590	1,051	2
	2,000	2,075	21'-3"	22'-8"	847	1,504	4
	2,500	2,608	26'-11"	28'-4"	1,130	2,001	4
	3,000	3,007	31'-2"	32'-7"	1,387	2,455	4
	3,500	3,540	36'-10"	38'-3"	1,565	2,780	6
	4,000	4,073	42'-6"	43'-11"	1,822	3,234	6
5 Ft. (60" ID) (65" OD)	1,500	1,608	9'-11"	11'-8"	819	1,012	2
	2,000	2,024	12' - 9"	14'-6"	992	1,192	2
	2,500	2,648	17'-0"	18'-9"	1,274	1,484	2
	3,000	3,065	19'-10"	21'-7"	1,447	1,663	2
	3,500	3,689	24'-1"	25'-10"	1,784	2,031	4
	4,000	4,105	26'-11"	28'-8"	1,957	2,211	4
	4,500	4,521	29'-9"	31'-6"	2,130	2,391	4
	5,000	5,145	34'-0"	35'-9"	2,367	2,637	4
	5,500	5,562	36'-10"	38'-7"	2,540	2,817	6
	6,000	6,186	41'-1"	42'-10"	2,877	3,185	6
	6,500	6,602	43'-11"	45'-8"	3,050	3,365	6
	7,000	7,018	46'-9"	48'-6"	3,223	3,544	6
	7,500	7,642	51'-0"	52'-9"	3,505	3,836	6
	8,000	8,059	53'-10"	55'-7"	3,678	4,016	8
6 Ft. (72" ID) (77" OD)	1,500	1,759	7'-1"	9'-2"	807	1,060	2
	2,000	2,059	8'-6"	10'-7"	938	1,195	2
	2,500	2,588	11'-0"	13'-1"	981	1,209	2
	3,000	3,257	14'-2"	16'-3"	1,128	1,390	2
	4,000	4,156	18'-5"	20'-6"	1,354	1,623	2
	5,000	5,055	22'-8"	24'-9"	1,692	1,972	4
	6,000	6,253	28'-4"	30'-5"	2,096	2,411	4
	7,000	7,152	32'-7"	34'-8"	2,566	2,894	4
	8,000	8,051	36'-10"	38'-11"	2,850	3,188	6
	9,000	9,250	42'-6"	44'-7"	3,189	3,537	6
	10,000	10,149	46'-9"	48'-10"	3,723	4,110	6
8 Ft. (96" ID) (101" OD)	3,000	2,876	6'-0"	8'-9"	1,245	1,955	2
	4,000	4,380	10'-0"	12'-9"	1,678	2,620	2
	5,000	5,132	12'-0"	14'-9"	1,895	2,952	2
	6,000	5,884	14'-0"	16'-9"	2,112	3,284	2
	7,000	7,388	18'-0"	20'-9"	2,632	4,053	4
	8,000	8,140	20'-0"	22'-9"	2,849	4,385	4
	9,000	8,892	22'-0"	24'-9"	3,065	4,718	4

1x dose

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Fiberglass Tank SOLUTIONS

Information Chart
Single Wall Underground Storage Tanks

Tank Diameter (Ft.)	Nominal Capacity (Gal.)	Actual Capacity (Gal.)	St. Wall Length (Ft./ In.)	Overall Length (Ft./ In.)	SW Shell Weight (LBS)	DW Shell Weight (LBS)	Strap Qty
8 Ft. (96" ID) (101" OD)	10,000	10,396	26'-0"	28'-9"	3,499	5,383	4
	11,000	11,148	28'-0"	30'-9"	3,716	5,715	4
	12,000	11,900	30'-0"	32'-9"	3,932	6,047	4
	13,000	13,404	34'-0"	36'-9"	4,366	6,712	6
	14,000	14,156	36'-0"	38'-9"	4,583	7,044	6
	15,000	14,908	38'-0"	40'-9"	4,799	7,377	6
	16,000	16,412	42'-0"	44'-9"	5,320	8,146	6
	17,000	17,164	44'-0"	46'-9"	5,536	8,478	6
	18,000	17,917	46'-0"	48'-9"	5,753	8,810	8
	19,000	19,421	50'-0"	52'-9"	6,187	9,475	8
	20,000	20,173	52'-0"	54'-9"	6,403	9,807	8
	22,000	22,429	58'-0"	60'-9"	7,126	10,096	8
10 Ft. (120" ID) (125" OD)	7,000	7,087	10'-0"	14'-7"	2,672	4,586	4
	8,000	8,262	12'-0"	16'-7"	3,162	3,719	4
	9,000	9,437	14'-0"	18'-7"	3,487	4,066	4
	10,000	10,612	16'-0"	20'-7"	3,841	4,419	4
	11,000	11,787	18'-0"	22'-7"	4,194	5,423	4
	12,000	12,962	20'-0"	24'-7"	4,547	5,848	4
	13,000	12,962	20'-0"	24'-7"	4,547	5,848	4
	14,000	14,137	22'-0"	26'-7"	4,900	6,274	4
	15,000	15,312	24'-0"	28'-7"	5,254	6,699	4
	18,000	18,837	30'-0"	34'-7"	6,313	7,976	6
	20,000	20,012	32'-0"	36'-7"	6,667	8,402	6
	22,000	22,362	36'-0"	40'-7"	7,373	9,253	8
	25,000	25,887	42'-0"	46'-7"	8,541	10,659	8
	30,000	30,587	50'-0"	54'-7"	9,954	12,361	10
	35,000	35,288	58'-0"	62'-7"	11,368	14,063	12
	40,000	39,988	66'-0"	70'-7"	12,889	15,896	14
	50,000	50,563	84'-0"	88'-7"	16,177	17,254	16
12 Ft. (144" ID) (149" OD)	20,000	20,140	19'-6"	26'-1"	11,557	14,377	8
	25,000	25,216	25'-6"	32'-1"	14,233	17,574	8
	30,000	30,292	31'-6"	38'-1"	16,910	20,771	10
	35,000	35,368	37'-6"	44'-1"	19,586	23,881	12
	40,000	40,444	43'-6"	50'-1"	22,263	27,078	12
	45,000	45,521	49'-6"	56'-1"	24,939	30,274	14
	50,000	50,597	55'-6"	62'-1"	27,615	33,471	18
	55,000	55,673	61'-6"	68'-1"	30,292	36,630	20
	60,000	60,749	67'-6"	74'-1"	32,968	39,808	20

1x recirc

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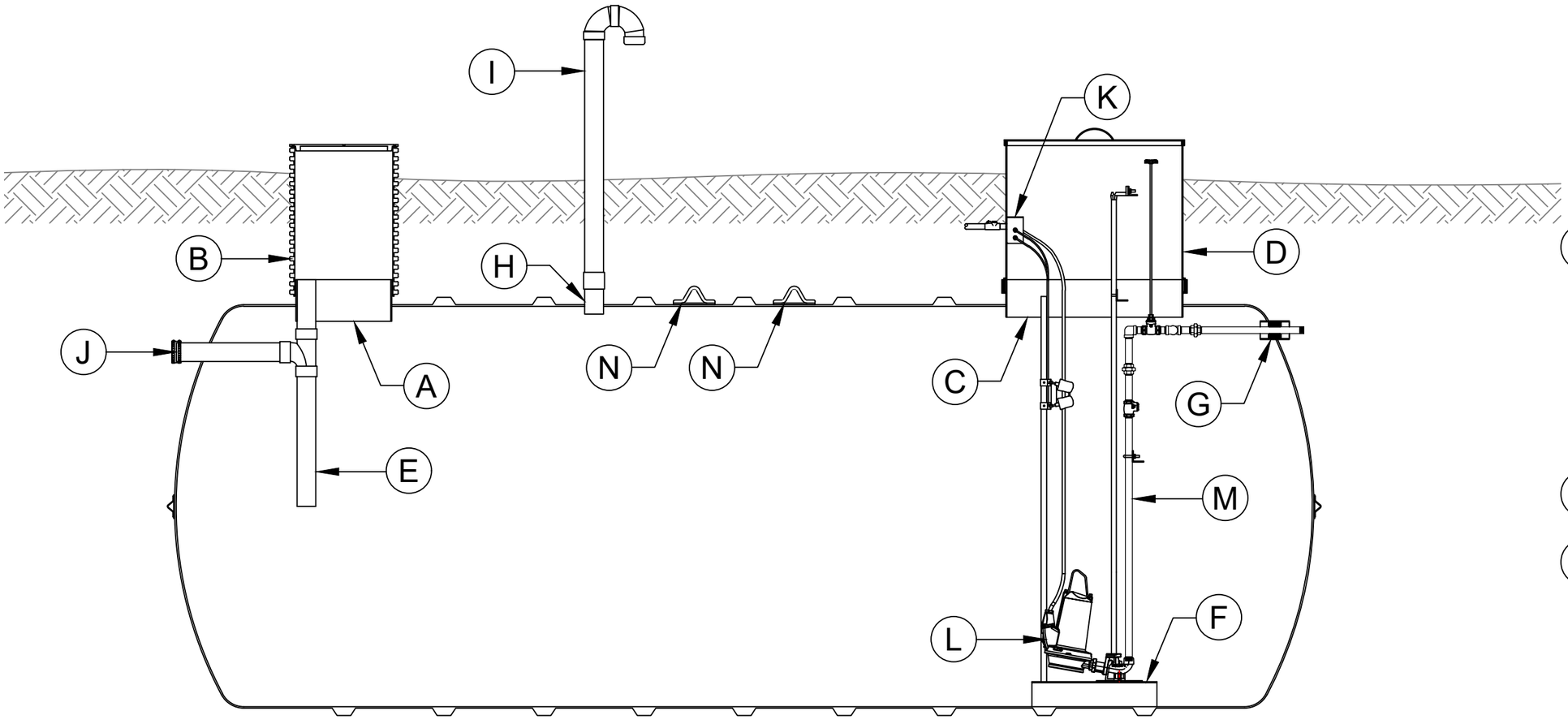
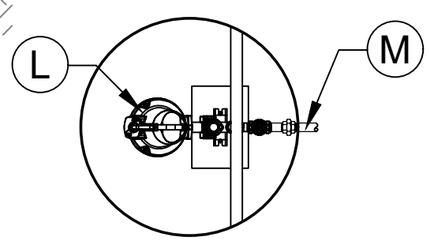
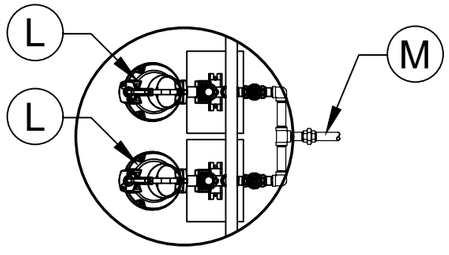
1x 4,000 GAL DOSE TANK





SIMPLEX DISCHARGE



DUPLEX DISCHARGE

DOSING TANK

NOTE: * CUSTOMER SUPPLIED ITEM

BILL OF MATERIALS

ITEM	DESCRIPTION
A	Ø24" ACCESS OPENING
B	Ø24" PVC RISER W/ BOLT ON LID
C	Ø42" ACCESS OPENING W/ EPOXY SOCKET
D	Ø42" FRP RISER W/ LID
E	4" PVC SCH40 INLET PIPE W/ SANITARY TEE ASSEMBLY
F	30" X 30" FRP PUMP PLATFORM
G	4" FRP SLEEVE W/ LINK SEALS

ITEM	DESCRIPTION
H	4" PVC SCH40 PIPE STUB
I	4" PVC SCH40 GOOSENECK VENT ASSEMBLY
J	4" SS SHIELDED FLEXIBLE COUPLING
K*	PVC SPLICE BOX W/ CORD GRIPS
L*	BASE MOUNT SUBMERSIBLE PUMP W/ FLOATS
M	1 1/2" SS316 HORIZONTAL DISCHARGE PIPE ASSEMBLY
N	STEEL LIFTING LUGS

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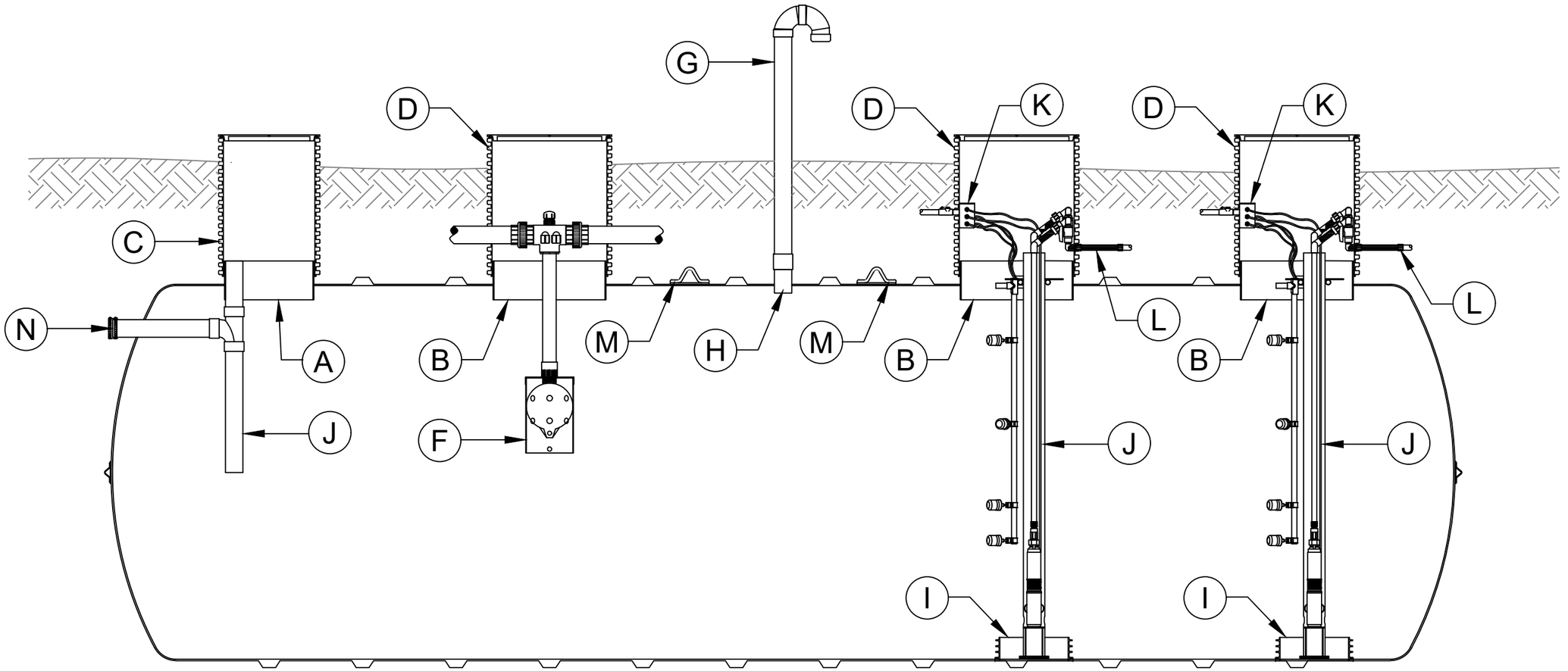
DRAWN BY: JACK

DATE: 5/17/2021

1x 10,000 GAL RECIRC W. 1x SPLITTER



SINGLE COMPARTMENT RECIRC TANK W/ TWO FLOW INDUCER TOWERS

NOTE: * CUSTOMER SUPPLIED ITEM

BILL OF MATERIALS

ITEM	DESCRIPTION
A	Ø24" ACCESS OPENING
B	Ø30" ACCESS OPENINGS
C	Ø24" PVC RISER W/ BOLT ON LID
D	Ø30" PVC RISER W/ BOLT ON LID
E	4" PVC SCH40 INLET PIPE W/ SANITARY TEE ASSEMBLY
F*	RECIRCULATION SPLITTER VAVLE
G	4" PVC SCH40 GOOSENECK VENT ASSEMBLY

ITEM	DESCRIPTION
H	4" PVC SCH40 PIPE STUB
I	Ø18" VAULT BASIN
J*	FLOW INDUCER TOWER W/ SUBMERSIBLE EFFLUENT PUMP
K*	PVC SPLICE BOX W/ CORD GRIPS
L*	EFFLUENT DISCHARGE LINE
M	STEEL LIFTING LUGS
N	4" SS SHIELDED FLEXIBLE COUPLING

Fiberglass Tank SOLUTIONS

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DRAWN BY: JACK
DATE: 5/17/2021

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MFG: 147 Opportunity Rd.,
Camdenton, MO 65020

Appendix #14:
Design sheets

From: Larry Quattlebaum
To: Daniel Pleasant
Cc: Chris Carroll
Subject: [EXTERNAL] Quarterly Reports
Date: Wednesday, January 15, 2025 5:01:56 PM
Attachments: image001.jpg
image002.png
image003.png

This Message Is From an External Sender
This message came from outside your organization.
Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security

Mr Pleasant,

I wanted you to know that we may be late on the Quarterly reports for Arrington, Hideaway and Hardeman facilities. The main reason being is that the individual that was doing those Reports, Dana Douglas left the company and he had not filled out any data at all. We have been diligently searching through our highpoint system and other data systems to get flows and samples. I have reached out to waypoint to get their results for October and November. This is not normal for us and we sincerely apologize . I am personally setting these reports up to give access to several operations persons so this will not happen like this again. This has been a great lesson for us all. I will do my best to have the report in by close of business tomorrow. Again I apologize for this inconvenience .Please feel free to contact me by phone at 615-607-7899

Sincerely,

CWS-Logo-Process copy (1).jpg

LARRY QUATTLEBAUM
Project Manager

larry.quattlebaum@clearwatersolutions.com
www.clearwatersolutions.com

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

August 30, 2021

Mr. Bruce Meyer, Operations Manager
e-copy: bruce@cartwrightcreek.com
6545 Cox Road
College Grove, TN 37046

Subject: **NPDES Permit No. TN0027278**
Cartwright Creek, LLC
Franklin, Williamson County, Tennessee

Dear Mr. Meyer:

In accordance with the provisions of the Tennessee Water Quality Control Act, Tennessee Code Annotated (T.C.A.), Sections 69-3-101 through 69-3-120, the Division of Water Resources hereby issues the enclosed NPDES Permit. The continuance and/or reissuance of this NPDES Permit is contingent upon your meeting the conditions and requirements as stated therein.

Please be advised that a petition for permit appeal may be filed, pursuant to T.C.A. Section 69-3-105, subsection (i), by the permit applicant or by any aggrieved person who participated in the public comment period or gave testimony at a formal public hearing whose appeal is based upon any of the issues that were provided to the commissioner in writing during the public comment period or in testimony at a formal public hearing on the permit application.

Additionally, for those permits for which the department gives public notice of a draft permit, any permit applicant or aggrieved person may base a permit appeal on any material change to conditions in the final permit from those in the draft, unless the material change has been subject to additional opportunity for public comment.

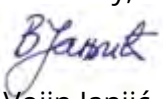
Any petition for permit appeal under this subsection (i) shall be filed with the Technical Secretary of the Water Quality, Oil and Gas Board within thirty (30) days after public notice of the commissioner's decision to issue or deny the permit. A copy of the filing should also be sent to TDEC's Office of General Counsel.

TDEC has activated a new email address to accept appeals electronically. If you wish to file an appeal, you may do so by emailing the appeal and any attachments to TDEC.Appeals@tn.gov. If

you file an appeal electronically, you do not have to send a paper copy. If you have questions about your electronic filing, you can call (615) 532-0131. Electronic filing is encouraged, but not required.

If you have questions, please contact the Nashville Environmental Field Office at 1-888-891-TDEC; or, at this office, please contact Mr. Wade Murphy at (615) 532-0666 or by E-mail at *Wade.Murphy@tn.gov*.

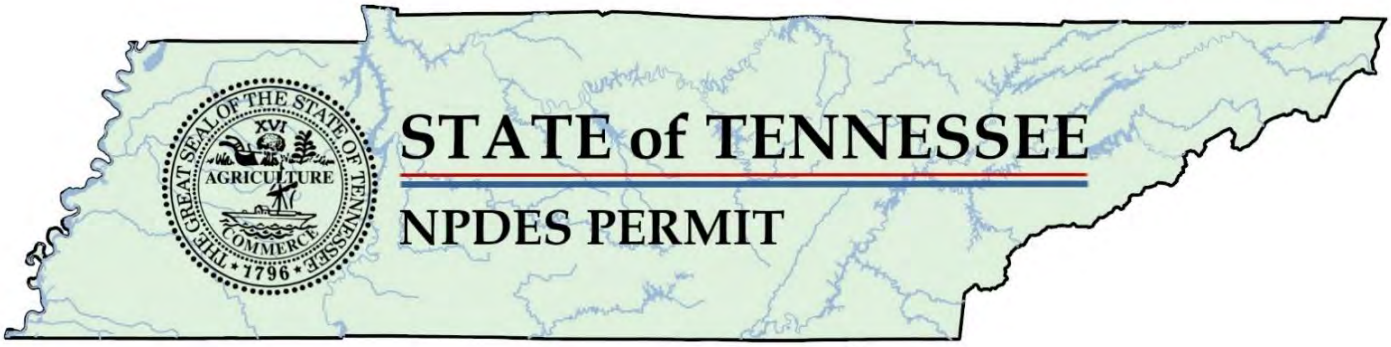
Sincerely,



Vojin Janjić
Manager, Water-Based Systems

Enclosure

cc: Mr. Delmar Reed, Plant Operator, , dreed19612@gmail.com
EFO-Nashville-DWR, jenny.strobel@tn.gov
DWR-C&E Unit, cassie.savage@tn.gov
Tennessee Public Utilities Commission, patsy.fulton@tn.gov
NPDES Permit Section, EPA Region IV, r4npdespermits@epa.gov
Permit File



Authorization to Discharge Under the National Pollutant Discharge Elimination System (NPDES) Permit Number TN0027278

Issued by

Department of Environment and Conservation
Division of Water Resources
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

Under authority of the Tennessee Water Quality Control Act of 1977 (T.C.A. 69-3-101 et seq.) and the delegation of authority from the United States Environmental Protection Agency under the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 U.S.C. 1251, et seq.)

Discharger:	**Cartwright Creek, LLC** **Grassland STP**
is authorized to:	treated domestic wastewater from Outfall 001
from a facility located at:	River Rest Subdivision, Franklin, Williamson County, Tennessee
to receiving waters named:	Harpeth River at mile 68.8

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on:	**December 01, 2021**
This permit shall expire on:	**November 30, 2026**
Issuance date:	**August 30, 2021**

for Jennifer Dodd
Director

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WDM
TN0027278.DOC

PART 1

1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1.1. NUMERIC AND NARRATIVE EFFLUENT LIMITATIONS

1.1.1. Numeric Limitations

Cartwright Creek, LLC is authorized to discharge treated municipal wastewater from Outfall 001 to Harpeth River at mile 68.8 from a treatment facility with a design capacity of 0.25 MGD. Discharge from Outfall 001 shall be limited and monitored by the permittee as specified below:

Description : External Outfall, Number : 001, Monitoring : Effluent Gross, Season : All Year, Limit Set Status : Active							
Code	Parameter	Qualifier	Value	Unit	Sample Type	Monitoring Frequency	Statistical Base
00300	Oxygen, dissolved (DO)	>=	6.0	mg/L	Grab	Five Per Week	Instantaneous Minimum
00400	pH	>=	6.0	SU	Grab	Five Per Week	Minimum
00400	pH	<=	9.0	SU	Grab	Five Per Week	Maximum
00530	Total Suspended Solids (TSS)	<=	30	mg/L	Composite	Three Per Week	Monthly Average
00530	Total Suspended Solids (TSS)	<=	40	mg/L	Composite	Three Per Week	Weekly Average
00530	Total Suspended Solids (TSS)	<=	45	mg/L	Composite	Three Per Week	Daily Maximum
00530	Total Suspended Solids (TSS)	<=	63	lb/d	Composite	Three Per Week	Monthly Average
00530	Total Suspended Solids (TSS)	<=	83	lb/d	Composite	Three Per Week	Weekly Average
00545	Settleable Solids	<=	1.0	mL/L	Grab	Five Per Week	Daily Maximum
00600	Nitrogen, total (as N)	Report	-	mg/L	Composite	Twice Per Month	Monthly Average
00600	Nitrogen, total (as N)	Report	-	mg/L	Composite	Twice Per Month	Daily Maximum
00600	Nitrogen, total (as N)	Report	-	lb/d	Composite	Twice Per Month	Monthly Average
00600	Nitrogen, total (as N)	Report	-	lb/d	Composite	Twice Per Month	Daily Maximum
00600	Nitrogen, total (as N)	<=	15	lb/d	Calculated	Monthly	Annual Average
00665	Phosphorus, total (as P)	Report	-	mg/L	Composite	Twice Per Month	Monthly Average

00665	Phosphorus, total (as P)	Report	-	mg/L	Composite	Twice Per Month	Daily Maximum
00665	Phosphorus, total (as P)	Report	-	lb/d	Composite	Twice Per Month	Monthly Average
00665	Phosphorus, total (as P)	Report	-	lb/d	Composite	Twice Per Month	Daily Maximum
00665	Phosphorus, total (as P)	<=	5.0	lb/d	Calculated	Monthly	Annual Average
50050	Flow	Report	-	MGD	Continuous	Daily	Monthly Average
50050	Flow	Report	-	MGD	Continuous	Daily	Daily Maximum
50060	Chlorine, total residual (TRC)	<=	0.16	mg/L	Grab	Fiver Per Week	Monthly Average
50060	Chlorine, total residual (TRC)	<=	0.28	mg/L	Grab	Five Per Week	Daily Maximum
51040	E. coli	<=	126	#/100mL	Grab	Three Per Week	Monthly Geometric Mean
51040	E. coli	<=	941	#/100mL	Grab	Three Per Week	Daily Maximum

Description : External Outfall, Number : 001, Monitoring : Effluent Gross, Season : Summer, Limit Set Status : Active

Code	Parameter	Qualifier	Value	Unit	Sample Type	Monitoring Frequency	Statistical Base
00610	Nitrogen, Ammonia total (as N)	<=	2	mg/L	Composite	Three Per Week	Monthly Average
00610	Nitrogen, Ammonia total (as N)	<=	3	mg/L	Composite	Three Per Week	Weekly Average
00610	Nitrogen, Ammonia total (as N)	<=	4	mg/L	Composite	Three Per Week	Daily Maximum
00610	Nitrogen, Ammonia total (as N)	<=	4	lb/d	Composite	Three Per Week	Monthly Average
00610	Nitrogen, Ammonia total (as N)	<=	6	lb/d	Composite	Three Per Week	Weekly Average
80082	CBOD, 5-day, 20 C	<=	5	mg/L	Composite	Three Per Week	Monthly Average
80082	CBOD, 5-day, 20 C	<=	7.5	mg/L	Composite	Three Per Week	Weekly Average
80082	CBOD, 5-day, 20 C	<=	10	mg/L	Composite	Three Per Week	Daily Maximum
80082	CBOD, 5-day, 20 C	<=	10	lb/d	Composite	Three Per Week	Monthly Average
80082	CBOD, 5-day, 20 C	<=	15	lb/d	Composite	Three Per Week	Weekly Average

Description : External Outfall, Number : 001, Monitoring : Effluent Gross, Season : Winter, Limit Set Status : Active							
Code	**Parameter**	**Qualifier**	**Value**	**Unit**	**Sample Type**	**Monitoring Frequency**	**Statistical Base**
00610	Nitrogen, Ammonia total (as N)	<=	5	mg/L	Composite	Three Per Week	Monthly Average
00610	Nitrogen, Ammonia total (as N)	<=	7.5	mg/L	Composite	Three Per Week	Weekly Average
00610	Nitrogen, Ammonia total (as N)	<=	10	mg/L	Composite	Three Per Week	Daily Maximum
00610	Nitrogen, Ammonia total (as N)	<=	10	lb/d	Composite	Three Per Week	Monthly Average
00610	Nitrogen, Ammonia total (as N)	<=	16	lb/d	Composite	Three Per Week	Weekly Average
80082	CBOD, 5-day, 20 C	<=	10	mg/L	Composite	Three Per Week	Monthly Average
80082	CBOD, 5-day, 20 C	<=	15	mg/L	Composite	Three Per Week	Weekly Average
80082	CBOD, 5-day, 20 C	<=	20	mg/L	Composite	Three Per Week	Daily Maximum
80082	CBOD, 5-day, 20 C	<=	21	lb/d	Composite	Three Per Week	Monthly Average
80082	CBOD, 5-day, 20 C	<=	31	lb/d	Composite	Three Per Week	Weekly Average
Description : External Outfall, Number : 001, Monitoring : Percent Removal, Season : All Year, Limit Set Status : Active							
Code	**Parameter**	**Qualifier**	**Value**	**Unit**	**Sample Type**	**Monitoring Frequency**	**Statistical Base**
80358	CBOD, 5-day, 20 C, % removal	>=	85	%	Calculated	Three Per Week	Monthly Average
80358	CBOD, 5-day, 20 C, % removal	>=	40	%	Calculated	Three Per Week	Daily Minimum
81011	TSS, % removal	>=	85	%	Calculated	Three Per Week	Monthly Average
81011	TSS, % removal	>=	40	%	Calculated	Three Per Week	Daily Minimum
Description : Influent Structure, Number : INF1, Monitoring : Raw Sewage Influent, Season : All Year, Limit Set Status : Active							
Code	**Parameter**	**Qualifier**	**Value**	**Unit**	**Sample Type**	**Monitoring Frequency**	**Statistical Base**
00530	Total Suspended Solids (TSS)	Report	-	mg/L	Composite	Three Per Week	Monthly Average
00530	Total Suspended Solids (TSS)	Report	-	mg/L	Composite	Three Per Week	Daily Maximum
50050	Flow	Report	-	MGD	Continuous	Daily	Monthly Average
50050	Flow	Report	-	MGD	Continuous	Daily	Daily Maximum

80082	CBOD, 5-day, 20 C	Report	-	mg/L	Composite	Three Per Week	Monthly Average
80082	CBOD, 5-day, 20 C	Report	-	mg/L	Composite	Three Per Week	Daily Maximum

General MyTDEC Forms Report Requirements*	
Bypass of Treatment Facility	See Section 1.3.5.1. and 2.3.5.
Anticipated Bypass of Treatment Facility	See Section 1.3.5.1. and 2.3.5.
Five-day Follow-up Noncompliance Report	See Sections 1.3.5.1. and 2.3.1.a.
Scheduled Reporting	See Section 2.3.1.b.

* Each event shall be reported via MyTDEC Forms.

Notes:

The permittee shall achieve 85 % removal of $CBOD_5$ and TSS on a monthly average basis. The permittee shall report all instances of releases, overflows and/or bypasses. See **Part 2.3.2(a)** for the definition of overflow and **Part 1.3.5** for reporting requirements.

Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the permit.

Unless elsewhere specified, summer months are May through October; winter months are November through April.

See **Part 1.2.3** for test procedures.

See below for percent removal calculations.

The permittee may collect more samples than specified as the monitoring frequency in the permit. Samples may not be collected at intervals of less than 12 hours. For the purpose of determining the geometric mean, individual samples having an *E. coli* group concentration of less than 1 per 100 mL shall be considered as having a concentration of 1 per 100 mL. In addition, the concentration of the *E. coli* group in any individual sample shall not exceed a specified maximum amount.

Total residual chlorine (TRC) monitoring shall be applicable when chlorine, bromine, or any other oxidants are added. The acceptable methods for analysis of TRC are any methods specified in Title 40 CFR § 136 as amended, so long as the requirements of Tennessee Rule 0400-40-03-.05(8) are met. The method detection limit (MDL) for TRC shall not exceed 0.05 mg/l unless the permittee demonstrates that its MDL is higher. The permittee shall retain the documentation that justifies the MDL and have it available for review upon request. In cases where the permit limit is less that the MDL, the reporting of TRC at less than the MDL shall be interpreted to constitute compliance with the permit.

or $CBOD_5$ and TSS, the treatment facility shall demonstrate a minimum of 85% removal efficiency on a monthly average basis. This is calculated by determining an average of all daily influent concentrations and comparing this to an average of all daily effluent concentrations. The formula for this calculation is as follows:

$$\left(1 - \frac{average\ of\ daily\ effluent\ concentrations}{average\ of\ daily\ influent\ concentrations}\right) * 100\% = \%\ removal$$

This treatment facility will also demonstrate 40% daily minimum removal of $CBOD_5$ and TSS based on each daily composite sample. The formula for this calculation is as follows:

$$\left(1 - \frac{daily\ effluent\ concentration}{daily\ influent\ concentration}\right) * 100\% = \%\ removal$$

Each daily load is calculated by multiplying the day's sample concentration (mg/L) by the effluent flow rate (MGD) for the day the sample was collected and the conversion factor 8.34 lbs/gal.

$$Load = \left(\begin{matrix}Effluent\\Concentration\end{matrix}\right) * \left(\begin{matrix}Effluent\ flow\ for\ the\ day\ the\\day\ the\ sample\ was\ collected\end{matrix}\right) * (8.34)$$

The average pound per day is the mathematical average where the sum of all the calculated loads during the current month and previous 11 months is divided by the number of calculated loads.

$$Average\ Pounds\ per\ Day = \left(\begin{matrix}Sum\ of\ All\ Loads\ in\ \frac{lbs}{day}\ During\ the\\Current\ Month\ and\ the\ Previous\ 11\ Months\\\hline Total\ Number\ of\ Loads\ Calculated\ During\\the\ Current\ Month\ and\ Previous\ 11\ Months\end{matrix}\right)$$

1.1.2. Collection System Requirements

Cartwright Creek, LLC is authorized to operate a sewage collection system. Operation and discharges from the collection system shall be limited and monitored by the permittee as specified below:

Code	Monitoring	Parameter	Qualifier	Value	Unit	Sample Type	Monitoring Frequency	Statistical Base
51925	Dry Weather	SSO, Dry Weather	<=	0	occur/mo	Occurrences	Continuous	Monthly Total
51926	Wet Weather	SSO, Wet Weather	<=	0	occur/mo	Occurrences	Continuous	Monthly Total

Report via NetDMR. See sections **1.3.1.** and **1.3.5.2.**

Collection System MyTDEC Forms Report Requirements*	
Sanitary Sewer Overflow (SSO, Dry Weather)	See Section 1.3.5.1.
Sanitary Sewer Overflow (SSO, Wet Weather)	See Section 1.3.5.1.
Release (Dry Weather)	See Section 1.3.5.1.
Release (Wet Weather)	See Section 1.3.5.1.

Five-day Follow-up Noncompliance Report	See Sections 1.3.5.1. and 2.3.1.

* Each event shall be reported via MyTDEC Forms.

1.1.3. Narrative Conditions

The authorized discharge shall not:

- Result in distinctly visible solids, scum, foam, oily slick, or the formation of slimes, bottom deposits, or sludge banks of such size or character as may be detrimental to fish and aquatic life.
- Result in total suspended solids, turbidity, or color in such amounts or character that will result in any objectionable appearance to the receiving water, considering the nature and location of the water.
- Contain pollutants in quantities that will be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream.

Sludge or any other material removed by any treatment works must be disposed of in a manner that prevents its entrance into or pollution of any surface or subsurface waters. Additionally, the disposal of such sludge or other material must be in compliance with the Tennessee Solid Waste Disposal Act, Tennessee Code Annotated (Tenn. Code Ann.) §68-31-101 et seq. and the Tennessee Hazardous Waste Management Act, Tenn. Code Ann. §68-46-101 et. seq.

1.2. MONITORING PROCEDURES

1.2.1. Representative Sampling

Samples and measurements taken in compliance with the monitoring requirements specified herein shall be representative of the volume and nature of the monitored discharge and shall be taken after treatment and prior to mixing with uncontaminated stormwater runoff or the receiving stream. Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed and calibrated by a qualified source at least once every 12 months[1], and maintained to ensure that the accuracy of the measurements is consistent with accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of plus or minus 10% from the true discharge rates throughout the range of expected discharge volumes.

[1] The Division expects for permittees to meet EPA's guidance on proper operation and maintenance of flow measurement devices, as stated in the NPDES Compliance Inspection Manual.

Composite samples must be proportioned by flow at the time of sampling. Aliquots may be collected manually or automatically. The sample aliquots must be maintained at ≤ 6°C during the compositing period, or as otherwise specified in 40 CFR §136 or in the method.

Samples and measurements taken in compliance with the monitoring requirements specified above shall be representative of the volume and nature of the monitored discharge, and shall be taken at the following location(s):

Influent samples must be collected prior to mixing with any other wastewater being returned to the head of the plant, such as sludge return. Those systems with more than one influent line must collect samples from each and proportion the results by the flow from each line.

Effluent samples must be representative of the wastewater being discharged and collected prior to mixing with any other discharge or the receiving stream. This can be a different point for different parameters but must be after all treatment for that parameter or all expected changes. Specifically:

a) The chlorine residual must be measured after the chlorine contact chamber and any dechlorination. It may be to the advantage of the permittee to measure at the end of any long outfall lines.

b) Samples for *E. coli* can be collected at any point between completion of disinfection and the actual discharge.

c) The dissolved oxygen (DO) can drop in the outfall line; therefore, DO measurements are required at the discharge end of outfall lines greater than one mile long. Systems with outfall lines less than one mile may measure dissolved oxygen as the wastewater leaves the treatment facility. For systems with dechlorination, DO must be measured after this step and as close to the end of the outfall line as possible.

d) Total suspended solids (TSS) and settleable solids can be collected at any point after the final clarifier.

e) Biomonitoring tests (if required) shall be conducted on final effluent.

1.2.2. Sampling Frequency

The permittee should report “No Discharge” on Discharge Monitoring Reports (DMRs) only if a permitted outfall does not discharge at any time during the

monitoring period. If the outfall discharges effluent at any time during the monitoring period, the permittee must provide at least one sampling result from the effluent of that outfall.

If the required monitoring frequency is once per month or 1/month, the monitoring period is one month. If the discharge occurs during only one day in that period, the permittee must sample on that day and report the results of analyses accordingly.

1.2.3. Test Procedures

a) Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304 (h) of the Clean Water Act (the "Act"), as amended, under which such procedures may be required.

b) Unless otherwise noted in the permit, all pollutant parameters shall be determined using sufficiently sensitive methods in Title 40 CFR § 136, as amended, and promulgated pursuant to Section 304 (h) of the Act. The chosen methods must be sufficiently sensitive as required in state rule 0400-40-03-.05(8).

c) If the ML for all methods available in accordance with 40 CFR § 136 are above the stated permit limit or applicable water quality criteria for that parameter, then the method with the lowest ML shall be used.

d) Where the analytical results are below the method detection limit (MDL), the permittee shall report the actual laboratory MDL and ML values. See **Section 1.3.6.** for instructions regarding reporting less than detection.

e) When there is no analytical method that has been approved under 40 CFR §136 or required under 40 CFR chapter I, subchapter N or O, and a specific method is not otherwise required by the Director, the permittee may use any suitable method but shall provide a description of the method. When selecting a suitable method, factors such as a method's precision, accuracy, or resolution must be considered when assessing the performance of the method.

1.2.4. Recording of Results

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

i. The date, exact place, and time of sampling or measurements;

ii. The individual(s) who performed the sampling or measurements;
iii. The date analyses were performed;
iv. The individual(s) who performed the analyses;
v. The laboratory where the analyses were performed;
vi. The analytical techniques or methods used; and
vii. The results of such analyses.

1.2.5. Records Retention

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

1.3. REPORTING

1.3.1. Monitoring Results

Monitoring results shall be recorded monthly and submitted monthly on Discharge Monitoring Reports (DMRs) using EPA's NetDMR website. The first DMR is due on the 15th of the month following permit effectiveness. Subsequent DMRs shall be submitted through NetDMR no later than 15 days after the completion of the reporting period. In compliance with the Federal NPDES Electronic Reporting Rule, DMRs may not be submitted via email under any circumstances.

Discharge Monitoring Reports and any other information or report must be signed and certified by a responsible corporate officer as defined in Tennessee Rules, Chapter 0400-40-05-.07(2)(i), a general partner or proprietor, a principal municipal executive officer or ranking elected official, or his or her duly authorized representative. Such authorization must be submitted in writing and must explain the duties and responsibilities of the authorized representative.

In the event that electronic reporting is unavailable, the permittee shall comply with reporting conditions provided in **Section 1.7**.

1.3.2. Additional Monitoring by Permittee

If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR § 136, or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or other reporting form specified by the Commissioner. Such increased frequency shall also be indicated.

1.3.3. Falsifying Results and/or Reports

Knowingly making any false statement on any report required by this permit or falsifying any result may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Water Pollution Control Act, as amended, and in § 69-3-115 of the Tennessee Water Quality Control Act.

1.3.4. Monthly Report of Operation

Monthly Operational Reports (MORs) shall be submitted by the 15th day of the month following data collection. Reports shall be submitted by one of the following methods, presented below in order of preference:

1) Using MyTDEC Forms, if available.

2) Submitting both a signed and certified copy in pdf format, uploaded as an attachment to NetDMR, *and* a copy of the native format spreadsheet file emailed to DWRWW.Report@tn.gov and TDEC.Nashville.EFO@tn.gov.

3) Submitting signed and certified forms to the EFO at the following address:

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
Nashville Environmental Field Office
711 R.S. Gass Boulevard
Nashville, Tennessee 37216

1.3.5. Overflow, Release, and Bypass Reporting

1.3.5.1. Event Report Requirements

For the purpose of this section, "events" are known as instances of sanitary sewer overflows, releases, upsets, and bypasses. These events shall be reported through MyTDEC Forms according to the following conditions:

a) Events that are not a threat to human health and the environment shall be reported using MyTDEC Forms no later than 15 days following the completion of the DMR reporting period.

b) Events that could cause a threat to human health or the environment, as defined in **Section 2.3.1.a**., shall be reported using MyTDEC Forms no later than 5 days after becoming aware of the non-compliance.

In both cases, the event report must contain the following:

i. Start date;
ii. Estimated duration in hours;
iii. Estimated volume in gallons;
iv. Type of event;
v. Type of structure (e.g., manhole);
vi. Types of human health and environmental impacts~~;~~
vii. Location (i.e., latitude and longitude);
viii. The name of receiving water (if applicable);
ix. Description of the cause;
x. The steps being taken to correct, reduce, eliminate, and prevent recurrence of the noncompliance; and
xi. The next downstream pump/lift station using the permittee's naming conventions.

In the event that MyTDEC Forms is not functioning, the permittee shall comply with reporting conditions provided in **Section 1.7**.

1.3.5.2. DMR Report Requirements

On the DMR, the permittee must separately report:

i. The total number of sanitary sewer overflows for the reporting month; and
ii. The total number of dry-weather sanitary sewer overflows for the reporting month.

On the DMR, sanitary sewer overflows are coded "SSO, Dry Weather" and "SSO, Wet Weather". Each discrete location of a sanitary sewer overflow shall be reported as a separate value.

1.3.6. Reporting Less Than Detection; Reporting Significant Figures

For the purpose of evaluating compliance with the permit limits established herein, where certain limits are below the minimum level (ML) of 40 CFR § 136 approved analytical methods, compliance will be demonstrated when a non-detect result is obtained using the most sensitive method available. The results of non-detect analyses, in this case, shall be reported as Below Detection Limit (BDL) or "NODI = B" in NetDMR. Reporting examples are provided below.

Reporting Example 1: If the permit limit is 0.02 mg/L with a method detection limit (MDL) of 0.05 mg/L and no detection is shown, the permittee must report "BDL" or "NODI = B" on DMRs in NetDMR. Whenever "BDL" or "NODI = B" is

reported, the actual MDL must be reported in the DMR comments or in an attachment submitted in NetDMR.

Reporting Example 2: If the permit limit is 0.02 mg/L with an MDL of 0.05 mg/L and detection is shown, the actual detected value must be reported.

Reporting Example 3: If the permit limit is 0.02 mg/L with an MDL of 0.01 mg/L and no detection is shown, the permittee must report less than MDL (<0.01 mg/L in this case).

In instances where an average must be calculated with a mix of numerical and BDL results, the permittee shall calculate the average using the MDL value for BDL results.

Reported results are to correspond to the number of significant figures (decimal places) set forth in the permit conditions. The permittee shall round values, if allowed by the method of sample analysis, using a uniform rounding convention adopted by the permittee.

1.3.7. Outlier Data

Outlier data include analytical results that are probably false. The validity of results is based on operational knowledge and a properly implemented quality assurance program. False results may include laboratory artifacts, potential sample tampering, broken or suspect sample containers, sample contamination or similar demonstrated quality control flaw.

Outlier data are identified through a properly implemented quality assurance program, and according to ASTM standards (e.g. Grubbs Test, 'h' and 'k' statistics). Furthermore, outliers should be verified, corrected, or removed based on further inquiries into the matter. If an outlier was verified (through repeated testing and/or analysis), it should remain in the preliminary data set. If an outlier resulted from a transcription or similar clerical error, it should be corrected and subsequently reported.

Therefore, only if an outlier was associated with problems in the collection or analysis of the samples and as such does not conform with the Guidelines Establishing Test Procedures for the Analysis of Pollutants (40 CFR §136), can it be removed from the data set and not reported on DMRs. Otherwise, all results (including monitoring of pollutants more frequently than required at the location(s) designated, using approved analytical methods as specified in the permit) should be included in the calculation and reporting of the values required

in the DMR form. The permittee should use the "comment" section in NetDMR to explain any potential outliers or dubious results.

1.4. COMPLIANCE WITH SECTION 208

The limits and conditions in this permit shall require compliance with an area-wide waste treatment plan (208 Water Quality Management Plan) where such approved plan is applicable.

1.5. REOPENER CLAUSE

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D), 307(a)(2), and 405(d)(2)(D) of the Clean Water Act, as amended, if the effluent standard, limitation, or sludge disposal requirement so issued or approved:

a) Contains different conditions or is otherwise more stringent than any condition in the permit; or

b) Controls any pollutant or disposal method not addressed in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of the Act then applicable.

This permit may be modified during its term, per public notice procedures, to include terms and conditions imposed by a total maximum daily load (TMDL) allocation, approved by the EPA to replace the 2004 dissolved oxygen TMDL

1.6. SCHEDULE OF COMPLIANCE

Full compliance and operational levels shall be attained from the effective date of this permit.

1.7. ELECTRONIC REPORTING

This permit requires the submission of forms developed by the Director in order for a person to comply with certain requirements, including, but not limited to, making reports, submitting monitoring results, and applying for permits. The Director may make these forms available electronically and, if submitted electronically, then that electronic submission shall comply with the requirements of Chapter 0400-01-40. Electronic submission is required when available unless waived by the Commissioner in accordance with 40 C.F.R. § 127.15.

In the event of large-scale emergencies and/or prolonged electronic reporting system outages, an episodic electronic reporting waiver may be granted by the Commissioner in accordance with 40 CFR § 127.15. A request for a deadline extension or episodic electronic reporting waiver should be submitted to DWRWater.Compliance@tn.gov, in compliance with the Federal NPDES Electronic Reporting Rule.

If an episodic electronic reporting waiver is granted, reports with wet-ink original signatures shall be mailed to the following address:

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
COMPLIANCE & ENFORCEMENT UNIT
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

For purposes of determining compliance with this permit, data provided to the Division electronically is legally equivalent to data submitted on signed and certified forms. A copy must be retained for the permittee's files.

PART 2

2. GENERAL PERMIT REQUIREMENTS

2.1. GENERAL PROVISIONS

2.1.1. Duty to Comply

The permittee shall comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Water Quality Control Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

2.1.2. Duty to Reapply

The permittee is not authorized to discharge after the expiration date of this permit. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information and forms as are required to the Division Director no later than 180 days prior to the expiration date. Such forms shall be properly signed and certified.

2.1.3. Proper Operation and Maintenance

a) The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory and process controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. Backup continuous pH and flow monitoring equipment are not required.

b) Dilution water shall not be added to comply with effluent requirements to achieve BCT, BPT, BAT, or other technology based effluent limitations such as those established in Tennessee Rule 0400-40-05-.09.

2.1.4. Duty to Provide Information

The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

2.1.5. Right of Entry

The permittee shall allow the Director, the Regional Administrator of the U.S. Environmental Protection Agency, or their authorized representatives, upon the presentation of credentials, to:

a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records shall be kept under the conditions of this permit;

b) Have access to and copy, at reasonable times, any records that shall be kept under the conditions of this permit;

c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d) Sample or monitor at reasonable times for the purposes of assuring permit compliance or as otherwise authorized by the Director.

2.1.6. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Water Pollution Control Act, as amended, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the Division's offices or via the Department's dataviewer webpage. As required by the Federal Act, effluent data shall not be considered confidential.

2.1.7. Treatment Facility Failure (Industrial Sources)

The permittee, in order to maintain compliance with this permit, shall control production, all discharges, or both, upon reduction, loss, or failure of the treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in such situations as the reduction, loss, or failure of the primary source of power.

2.1.8. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state, or local laws or regulations.

2.1.9. Severability

The provisions of this permit are severable. If any provision of this permit due to any circumstance is held invalid, then the application of such provision to other circumstances and to the remainder of this permit shall not be affected thereby.

2.1.10. Other Information

If the permittee becomes aware of failure to submit any relevant facts in a permit application, or of submission of incorrect information in a permit application or in any report to the Director, then the permittee shall promptly submit such facts or information.

2.2. CHANGES AFFECTING THE PERMIT

2.2.1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only 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 as defined in Rule 0400-40-05-.02;

b) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit nor to notification requirements under 40 CFR § 122.42(a)(1); or

c) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices.

2.2.2. Permit Modification, Revocation, or Termination

a) This permit may be modified, revoked and reissued, or terminated for cause as described in 40 CFR § 122.62 and § 122.64, Federal Register, Volume 49, No. 188 (Wednesday, September 26, 1984), as amended. Causes for such permit action include but are not limited to the following:

i. Violation of any terms or conditions of the permit;
ii. Obtaining a permit by misrepresentation or failure to disclose fully all relevant facts; and
iii. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.

b) The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.

c) If any applicable effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established for any toxic pollutant under Section 307(a) of the Federal Water Pollution Control Act, as amended, the Director shall modify or revoke and reissue the permit to conform to the prohibition or to the effluent standard, providing that the effluent standard is more stringent than the limitation in the permit for the toxic pollutant. The permittee shall comply with these effluent standards or prohibitions within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified or revoked and reissued to incorporate the requirement.

d) The filing of a request by the permittee for a modification, revocation, reissuance, termination, or notification of planned changes or anticipated noncompliance does not halt any permit condition.

2.2.3. Change of Ownership

Except as provided in Tennessee Rule Chapter 0400-40-05-.06(5)(a) or (b), this permit may be transferred to another party (provided there are neither modifications to the facility or its operations, nor any other changes which might affect permit limits and conditions contained in the permit) by the permittee if:

a) The permittee notifies the Director of the proposed transfer at least 30 days in advance of the proposed transfer date;

b) The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage, and liability between them; and

c) The permittee shall provide the following information to the Director in their formal notice of intent to transfer ownership:

i. The permit number of the subject permit;
ii. The effective date of the proposed transfer;
iii. The name, address, and contact information of the transferor;
iv. The name, address, and contact information of the transferee;

v. The names of the responsible parties for both the transferor and transferee;
vi. A statement that the transferee assumes responsibility for the subject permit;
vii. A statement that the transferor relinquishes responsibility for the subject permit;
viii. The signatures of the responsible parties for both the transferor and transferee pursuant to the signatory requirements of subparagraph (i) of Rule 0400-40-05-.07(2); and
ix. A statement regarding any proposed modifications to the facility, its operations, or any other changes, which might affect the permit, limits and conditions contained in the permit.

2.2.4. Change of Mailing Address

The permittee shall promptly provide to the Director written notice of any change of mailing address. In the absence of such notice, the original address of the permittee will be assumed to be correct.

2.3. NONCOMPLIANCE

2.3.1. Reporting of Noncompliance

a) 24-hour Reporting:

In the case of any noncompliance which could cause a threat to public drinking supplies or any other discharge which could constitute a threat to human health or the environment, the required notice of non-compliance shall be provided to the Division of Water Resources in the appropriate EFO within 24 hours from the time the permittee becomes aware of the circumstances. The EFO should be contacted for names and phone numbers of the environmental response team.

A written submission must be provided via MyTDEC Forms within five days of the time the permittee becomes aware of the circumstances unless the Director on a case-by-case basis waives this requirement. The permittee shall provide the Director with the following information:

i. A description of the discharge and cause of noncompliance;
ii. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and
iii. The steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

b) Scheduled Reporting:

For instances of noncompliance which do not cause a threat to public drinking supplies, or any other discharge which could constitute a threat to human health or the environment, the permittee shall report the noncompliance on the DMR. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

2.3.2. Overflows and Releases

a) Sanitary sewer overflows, including dry-weather overflows, are prohibited.

b) The permittee shall operate the collection, transmission, and treatment system so as to avoid sanitary sewer overflows and releases due to improper operation or maintenance. A "release" may be due to improper operation or maintenance of the collection system or may be due to other cause(s). Releases caused by improper operation or maintenance of the permittee's collection, transmission, and treatment system are prohibited.

c) The permittee shall take all reasonable steps to minimize any adverse impact associated with overflows and releases.

d) No new or additional flows shall be added upstream of any point in the collection, transmission, or treatment system that experiences greater than 5 sanitary sewer overflows and/or releases per year[2] or would otherwise overload any portion of the system. Unless there is specific enforcement action to the contrary, the permittee is relieved of this requirement after:

1) An authorized representative of the Commissioner of the Department of Environment and Conservation has approved an engineering report and construction plans and specifications prepared in accordance with accepted engineering practices for correction of the problem;
2) The correction work is underway; and
3) The cumulative, peak-design flows potentially added from new connections and line extensions upstream of any chronic overflow or release point are less than or proportional to the amount of inflow and infiltration removal documented upstream from that point.

[2] This includes dry weather overflows, wet weather overflows, dry weather releases and wet weather releases.

The inflow and infiltration reduction must be measured by the permittee using practices that are customary in the environmental engineering field and reported in an attachment to the permittee's DMR and uploaded to NetDMR. The data measurement period shall be sufficient to account for seasonal rainfall patterns and seasonal groundwater table elevations.

e) In the event that chronic sanitary sewer overflows or releases have occurred from a single point in the collection system for reasons that may not warrant the self-imposed moratorium of the actions identified in this paragraph, the permittee may request a meeting with Division EFO staff to petition for a waiver based on mitigating evidence.

f) Unpermitted discharges from the collection or treatment system of industrial facilities are prohibited.

2.3.3. Upset

a) "*Upset*" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations due to factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b) An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i. An upset occurred and that the permittee can identify the cause(s) of the upset;
ii. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;
iii. The permittee submitted information required under "Reporting of Noncompliance" within 24 hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and
iv. The permittee complied with any remedial measures required under "Adverse Impact".

2.3.4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. 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.

2.3.5. Bypass

a) "*Bypass*" means the intentional diversion of waste streams from any portion of a treatment facility. "*Severe property damage*" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which 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.

b) Bypasses are prohibited unless all the following conditions are met:

   i. The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;
   ii. There are no feasible alternatives to 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 back-up 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 preventative maintenance; and
   iii. For anticipated bypass, the permittee submits prior notice, if possible at least ten days before the date of the bypass, or for unanticipated bypass, the permittee submits notice of an unanticipated bypass within 24 hours from the time that the permittee becomes aware of the bypass.

c) Bypasses that do not cause effluent limitations to be exceeded may be allowed only if the bypass is necessary for essential maintenance to assure efficient operation and are not subject to the reporting requirements of part b) iii. above.

2.3.6. Washout

a) For domestic wastewater plants only, a "*washout*" shall be defined as loss of Mixed Liquor Suspended Solids (MLSS) of 30.00% or more. This refers to the MLSS in the aeration basin(s) only. This does not include MLSS decreases due to solids wasting to the sludge disposal system. A washout can be caused by improper operation or from peak flows due to inflow and infiltration.

b) A washout is prohibited. If a washout occurs the permittee must report the incident to the Division in the appropriate EFO within 24 hours by telephone. A written submission must be provided within five days. The washout must be noted on that month's DMR. Each day of a washout is a separate violation.

2.4. LIABILITIES

2.4.1. Civil and Criminal Liability

Except as provided in permit conditions for "*Bypass*" (**Section 2.3.5**), "*Overflows and Releases*" (**Section 2.3.2**), and "*Upset*" (**Section 2.3.3**), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including, but not limited to, fish kills and losses of aquatic life and/or wildlife as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards will not be created.

2.4.2. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or the Federal Water Pollution Control Act, as amended.

PART 3

3. PERMIT SPECIFIC REQUIREMENTS

3.1. CERTIFIED OPERATOR

The waste treatment facilities shall be operated under the supervision of a certified wastewater treatment operator, and the collection system shall be operated under the supervision of a certified collection system operator in accordance with the Water Environmental Health Act of 1984.

3.2. POTW PRETREATMENT PROGRAM GENERAL PROVISIONS

As an update of information previously submitted to the Division, the permittee will undertake the following activity:

a) The permittee shall submit the results of an Industrial Waste Survey (IWS) in accordance with Rule 0400-40-14-.08-(6)(b)1, including any industrial users (IU) covered under Section 301(i)(2) of the Act. As much information as possible must be obtained relative to the character and volume of pollutants contributed to the POTW by the IUs. This information will be submitted to the Division of Water Resources, Pretreatment Section within one hundred twenty (120) days of the effective date of this permit, unless such a survey has been submitted within 3 years of the effective date. Development of a pretreatment program may be required after completion of the industrial user review. All requirements and conditions of the pretreatment program are enforceable through the NPDES permit.

b) The permittee shall enforce Rule 0400-40-14-.05, "prohibited discharges". Pollutants introduced into the POTW by a non-domestic source shall not cause pass through or interference as defined in Rule 0400-40-14-.03. These general prohibitions and the specific prohibitions in this section apply to all non-domestic sources introducing pollutants into the POTW whether the source is subject to other National Pretreatment Standards or any state or local pretreatment requirements.

Specific prohibitions: Under no circumstances shall the permittee allow introduction of the following wastes into the POTW:

i. Pollutants which create a fire or explosion hazard in the POTW, including, but not limited to, wastestreams with a closed cup flashpoint

of less than 140°F or 60°C using the test methods specified in 40 CFR § 261.21

ii. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with pH lower than 5.0 unless the system is specifically designed to accommodate such discharges;

iii. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in interference;

iv. Any pollutant, including oxygen-demanding pollutants (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW;

v. Heat in amounts which will inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW Treatment Plant exceeds 40°C (104°F) unless the Division, upon request of the POTW, approves alternate temperature limits;

vi. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

vii. Pollutants which result in the presence of toxic gases, vapors or fumes within the POTW in a quantity that may cause acute worker health and safety problems; or

viii. Any trucked or hauled pollutants, except at discharge points designated by the POTW.

c) The permittee shall notify the Division of any of the following changes in user discharge to the system no later than 30 days prior to change of discharge:

i. New introductions into such works of pollutants from any source which would be a new source as defined in Section 306 of the Act if such source were discharging pollutants;

ii. New introductions of pollutants into such works from a source which would be subject to Section 301 of the "Federal Water Quality Act as Amended" if it were discharging such pollutants; or

iii. A substantial change in volume or character of pollutants being introduced into such works by a source already discharging pollutants into such works at the time this permit is issued.

This notice will include information on the quantity and quality of the wastewater introduced by the new source into the POTW, and on any anticipated impact on the effluent discharged from such works. If this discharge necessitates a revision of the current NPDES permit or pass-through guidelines, discharge by this source is prohibited until the Tennessee Division of Water Resources gives final authorization.

i. Compliance with categorical and local standards, and review of industrial compliance, which includes a summary of the compliance status for all permitted industries. Also included is information on the number and type of major violations of pretreatment regulations, and the actions taken by the POTW to obtain compliance. The effluent from all significant industrial users must be analyzed for the appropriate pollutants at least once every 12 months;

ii. A list of industries in significant non-compliance as published in local newspapers in accordance with the requirements set forth in Rule 0400-40-14-.08(6)(b)8;

iii. A description of all substantive changes made to the permittee's pretreatment program. Any such changes shall receive prior approval. Substantive changes include, but are not limited to, any change in any ordinance, major modification in the program's administrative structure, local limits, or a change in the method of funding the program; and

iv. A summary of the permittee's industrial user inspections, which includes information on the number and type of industry inspected. All significant industrial users must be inspected at least once every twelve months.

3.3. BIOSOLIDS MANAGEMENT PRACTICES

All sludge and/or biosolids use or disposal must comply with 40 CFR § 503 *et seq*. Biosolids shall be sampled and analyzed at a frequency dependent on the amount used annually.

Any facility that land applies non-exceptional quality biosolids must obtain an appropriate permit from the Division in accordance with Chapter 0400-40-15.

a) Reopener: If an applicable "acceptable management practice" or numerical limitation for pollutants in sewage sludge promulgated under Section 405(d)(2) of the Clean Water Act, as amended by the Water Quality Act of 1987, is more stringent than the sludge pollutant limit or acceptable management practice in this permit, or controls a pollutant not limited in this permit, this permit shall be promptly modified or revoked and reissued to conform to the requirements promulgated under Section 405(d)(2). The permittee shall comply with the limitations by no later than the compliance deadline specified in the applicable regulations as required by Section 405(d)(2) of the Clean Water Act.

b) Notice of change in sludge disposal practice: The permittee shall give prior notice to the Director of any change planned in the permittee's sludge disposal practice. The current method of sludge disposal is to a municipal solid waste landfill (or co-composting facility). This method of disposal is controlled by the rules of the Tennessee Division of Solid Waste Management (DSWM) and Federal Regulations at 40 CFR § 258.

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF SOLID WASTE MANAGEMENT
Nashville Environmental Field Office
711 R.S. Gass Boulevard
Nashville, Tennessee 37216
(615)687-7000

If the permittee anticipates changing its disposal practices to either land application or surface disposal, the Division of Water Resources shall be notified prior to the change. A copy of any results of pollutant analyses required by the Tennessee Division of Solid Waste Management (DSWM) and/or 40 CFR § 258 shall be submitted to the Division of Water Resources.

3.4. PLACEMENT OF SIGNS

Within 60 days of the effective date of this permit, the permittee shall place and maintain a sign at each outfall and any overflow/release point in the collection system or the nearest publicly accessible location. For the purposes of this requirement, any point that has had a total of 5 or more overflows plus releases in the previous 12 months must be so posted. The sign(s) should be clearly visible to the public from the bank and the receiving stream. The *minimum* sign size should be two feet by two feet (2' x 2') with one-inch (1") letters. The sign should be made of durable material and have a white background with black letters.

The sign(s) are to provide notice to the public as to the nature of the discharge and, in the case of the permitted outfalls, that the discharge is regulated by the Tennessee Department of Environment and Conservation, Division of Water Resources. The following are given as examples of the minimal amount of information that must be included on the signs:

NPDES Permitted Municipal/Sanitary Outfall:

TREATED MUNICIPAL/SANITARY WASTEWATER
Cartwright Creek, LLC
Grassland STP
(615) 714-7868
NPDES Permit NO. TN0027278
TENNESSEE DIVISION OF WATER RESOURCES
1-888-891-8332 ENVIRONMENTAL FIELD OFFICE - Nashville

Unpermitted release/overflow point:

UNTREATED WASTEWATER DISCHARGE POINT
Cartwright Creek, LLC
Grassland STP
(615) 714-7868
NPDES Permit No. TN0027278
TENNESSEE DIVISION OF WATER RESOURCES
1-888-891-8332 ENVIRONMENTAL FIELD OFFICE - Nashville

The permittee may request the removal of signs for unpermitted release/overflows points only. This request should be sent to Division EFO staff detailing the work that has been completed to rectify the cause(s) contributing to overflows and releases at that location. In no case will approval to remove the signs be granted if either an overflow or release has occurred at that location in the previous 12 months.

PART 4

4. DEFINITIONS AND ACRONYMS

4.1. DEFINITIONS

For the purposes of this permit, ***annually*** is defined as a monitoring frequency of once every 12 months beginning with the effective date of this permit, so long as the following set of measurements for a given 12 month period are made approximately 12 months subsequent to that time.

Biosolids are treated sewage sludge that have contaminant concentrations less than or equal to the contaminant concentrations listed in Table 1 of subparagraph (3)(b) of Rule 0400-40-15-.02, meet any one of the ten vector attraction reduction options listed in part (4)(b)1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 of Rule 0400-40-15-.04, and meet either one of the six pathogen reduction alternatives for Class A listed in part (3)(a)3, 4, 5, 6, 7, or 8, or one of the three pathogen reduction alternatives for Class B listed in part (3)(b)2, 3, or 4 of Rule 0400- 40-15-.04.

A ***bypass*** is defined as the intentional diversion of waste streams from any portion of a treatment facility.

A ***calendar day*** is defined as the 24-hour period from midnight to midnight or any other 24-hour period that reasonably approximates the midnight to midnight time period.

A ***composite sample*** is a combination of not less than 8 influent or effluent portions, of at least 100 mL, collected over a 24-hour period. Under certain circumstances a lesser time period may be allowed, but in no case less than 8 hours.

The ***daily maximum amount*** is a limitation, measured in units of weight per time (*e.g.* pounds per day), on the total amount of any pollutant in the discharge during any calendar day.

The ***daily maximum concentration*** is a limitation on the average concentration in units of mass per volume (*e.g.* milligrams per liter) of the discharge during any calendar day. When a proportional-to-flow composite sampling device is used, the daily concentration is the concentration of that 24-hour composite; when other sampling means are used, the daily concentration is the arithmetic mean of the concentrations of equal volume samples collected during any calendar day or sampling period.

Degradation means the alteration of the properties of waters by the addition of pollutants, withdrawal of water, or removal of habitat, except those alterations of a short duration.

De Minimis is degradation of a small magnitude, as provided in this paragraph:

(a) Discharges and withdrawals:
   1. Subject to the limitation in part 3 of this subparagraph, a single discharge other than those from new domestic wastewater sources will be considered de minimis if it uses less than five percent of the available assimilative capacity for the substance being discharged.
   2. Subject to the limitation in part 3 of this subparagraph, a single water withdrawal will be considered de minimis if it removes less than five percent of the 7Q10 flow of the stream.
   3. If more than one activity described in part 1 or 2 of this subparagraph has been authorized in a segment and the total of the authorized and proposed impacts uses no more than 10% of the assimilative capacity, or 7Q10 low flow, they are presumed to be de minimis. Where the total of the authorized and proposed impacts uses 10% of the assimilative capacity, or 7Q10 low flow, additional degradation may only be treated as de minimis if the Division finds on a scientific basis that the additional degradation has an insignificant effect on the resource.

(b) Habitat alterations authorized by an Aquatic Resource Alteration Permit (ARAP) are de minimis if the Division finds that the impacts, individually and cumulatively, are offset by impact minimization and/or in-system mitigation, provided however, in Outstanding National Resource Waters (ONRWs) the mitigation must occur within the ONRW.

Discharge or ***discharge of a pollutant*** refers to the addition of pollutants to waters from a source.

A ***dry weather overflow*** is a type of sanitary sewer overflow and is defined as one day or any portion of a day in which unpermitted discharge of wastewater from the collection, or treatment system other than through the permitted outfall occurs and is not directly related to a rainfall event. Discharges from more than one point within a 24-hour period shall be counted as separate overflows.

An ***ecoregion*** is a relatively homogeneous area defined by similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables.

The ***geometric mean*** of any set of values is the n^{th} root of the product of the individual values where "n" is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For the purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

A ***grab sample*** is a single influent or effluent sample collected at a particular time.

The ***instantaneous maximum concentration*** is a limitation on the maximum concentration, in units of mass per volume (*e.g.* milligrams per liter), of any pollutant contained in the wastewater discharge determined from a grab sample taken from the discharge at any point in time.

The ***instantaneous minimum concentration*** is the minimum allowable concentration, in units of mass per volume (*e.g.* milligrams per liter), of a pollutant parameter contained in the wastewater discharge determined from a grab sample taken from the discharge at any point in time.

The ***monthly average amount*** is the arithmetic mean of all the measured daily discharges by weight during the calendar month when the measurements were made.

The ***monthly average concentration***, a limitation on the discharge concentration in units of mass per volume, of any pollutant, other than bacteria, is the arithmetic mean of all the composite or grab samples collected in a one calendar-month period.

A ***one-week period*** (or ***calendar-week***) is defined as the period from Sunday through Saturday. For weekly average reporting purposes, a calendar week that contains a change of month shall be considered part of the latter month.

Pollutant means sewage, industrial wastes, or other wastes.

A ***quarter*** is defined as any one of the following three-month periods: January 1 through March 31, April 1 through June 30, July 1 through September 30, and/or October 1 through December 31.

A ***rainfall event*** is defined as any occurrence of rain preceded by 10 hours without precipitation that results in an accumulation of 0.01 inches or more. Instances of rainfall occurring within 10 hours of each other will be considered a single rainfall event.

A ***rationale*** (or ***fact sheet***) is a document that is prepared when drafting an NPDES permit or permit action. It provides the technical, regulatory and administrative basis for an agency's permit decision.

A ***reference site*** means the least impacted waters within an ecoregion that have been monitored to establish a baseline to which alterations of other waters can be compared.

A ***reference condition*** is a parameter-specific set of data from regional reference sites that establish the statistical range of values for that particular substance at least-impacted streams.

A ***release*** is the flow of sewage from any portion of the collection, transmission, or treatment system owned or operated by the permittee other than through permitted outfalls that does not add pollutants to waters. In addition, a release includes a backup into a building or private property that is caused by blockages, flow conditions, or other malfunctions originating in the collection and transmission system owned or operated by the permittee. A "release" does not include backups into a building or private property caused by blockages or other malfunctions originating in a private lateral.

A ***sanitary sewer overflow (SSO)*** is defined as an unpermitted discharge of wastewater from the collection, transmission, or treatment system other than through the permitted outfall.

The term ***semi-annually,*** for the purposes of this permit, means the same as once every 6 months. Measurements of the limited effluent parameters may be made any time during a 6 month period beginning from the effective date of this permit, so long as the second set of measurements for a given 12 month period are made approximately 6 months subsequent to that time, if feasible.

Sewage means water-carried waste or discharges from human beings or animals, from residences, public or private buildings, or industrial establishments, or boats, together with such other wastes and ground, surface, storm, or other water as may be present.

Severe property damage, when used to consider the allowance of a bypass, means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which 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.

Sewerage system means the conduits, sewers, and all devices and appurtenances by means of which sewage and other waste is collected, pumped, treated, or disposed.

Sludge or ***sewage sludge*** is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works.

A ***subecoregion*** is a smaller, more homogenous area that has been delineated within an ecoregion.

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

The term ***washout*** is applicable to domestic wastewater activated sludge plants and is defined as loss of mixed liquor suspended solids (MLSS) of 30.00% or more from the aeration basin(s).

Waters means any and all water, public or private, on or beneath the surface of the ground, which are contained within, flow through, or border upon Tennessee or any portion thereof, except those bodies of water confined to and retained within the limits of private property in single ownership which do not combine or effect a junction with natural surface or underground waters.

The ***weekly average amount*** is the sum of all the measured daily discharges by weight divided by the number of days during the calendar week when the measurements were made.

The ***weekly average concentration*** is the highest arithmetic mean of all the composite samples collected in a one-week period in a month.

4.2. ACRONYMS AND ABBREVIATIONS

1Q10 – 1-day minimum, 10-year recurrence interval
30Q5 – 30-day minimum, 5-year recurrence interval
7Q10 – 7-day minimum, 10-year recurrence interval
BAT – best available technology economically achievable
BCT – best conventional pollutant control technology
BDL – below detection limit
BOD_5 – five-day biochemical oxygen demand
BPT – best practicable control technology currently available
$CBOD_5$ – five-day carbonaceous biochemical oxygen demand
CEI – compliance evaluation inspection
CFR – code of federal regulations
CFS – cubic feet per second
CFU – colony forming units
CIU – categorical industrial user
CSO – combined sewer overflow
DMR – discharge monitoring report
D.O. – dissolved oxygen
E. coli – *Escherichia coli*
EPA – Environmental Protection Agency
EFO – environmental field office
GPM – gallons per minute
IC_{25} – inhibition concentration causing 25% reduction in survival, reproduction, and growth of the test organisms
IU – industrial user
IWS – industrial waste survey
LB (lb) – pound
LC_{50} – acute test causing 50% lethality
MDL – method detection limit
MGD – million gallons per day
mg/L – milligrams per liter
ML – minimum level of quantification
mL – milliliter
MLSS – mixed liquor suspended solids
MOR – monthly operating report
NODI – no discharge code in NetDMR
NPDES – national pollutant discharge elimination system
PL – permit limit
POTW – publicly owned treatment works

SAR – semi-annual report [pretreatment program]
SIU – significant industrial user
SSO – sanitary sewer overflow
STP – sewage treatment plant
TBEL – technology-based effluent limit
TCA – Tennessee code annotated
TDEC – Tennessee Department of Environment and Conservation
TIE/TRE – toxicity identification evaluation/toxicity reduction evaluation
TMDL – total maximum daily load
TRC – total residual chlorine
TSS – total suspended solids
WQBEL – water quality-based effluent limit

4.3. RESOURCES, HYPERLINKS, AND WEB PAGES

Clean Water Act NPDES Electronic Reporting (eReporting) Information
https://www.epa.gov/compliance/npdes-ereporting

Electronic Code of Federal Regulations (eCFR), Title 40 (40 CFR § 1 through § 1099)
https://www.ecfr.gov/cgi-bin/text-idx?SID=75202eb5d09974cab585afeea981220b&mc=true&tpl=/ecfrbrowse/Title40/40chaptI.tpl

Electronic Reporting (NetDMR) Waiver Request
https://www.tn.gov/content/dam/tn/environment/water/documents/wr_ereporting_waiver.pdf

Low Flow Statistics Tools: A How-To Handbook for NPDES Permit Writers (EPA)
https://www.epa.gov/sites/production/files/2018-11/documents/low_flow_stats_tools_handbook.pdf

Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (EPA)
https://www.epa.gov/sites/production/files/2015-08/documents/acute-freshwater-and-marine-wet-manual_2002.pdf

NetDMR Login
https://cdxnodengn.epa.gov/net-netdmr/

NetDMR, MyTDEC Forms, & Electronic Reporting Information
https://www.tn.gov/environment/program-areas/wr-water-resources/netdmr-and-electronic-reporting.html

NPDES Compliance Inspection Manual (EPA)
https://www.epa.gov/sites/production/files/2017-01/documents/npdesinspect.pdf

NPDES Electronic Reporting Rule
https://www.federalregister.gov/documents/2015/10/22/2015-24954/national-pollutant-discharge-elimination-system-npdes-electronic-reporting-rule

Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys (QSSOP)
https://www.tn.gov/content/dam/tn/environment/water/documents/DWR-PAS-P-01-Quality_System_SOP_for_Macroinvertebrate_Stream_Surveys-081117.pdf

Rules of the TN Department of Environment and Conservation, Chapter 0400-40
https://publications.tnsosfiles.com/rules/0400/0400-40/0400-40.htm

Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (EPA)
https://www.epa.gov/sites/production/files/2015-08/documents/short-term-chronic-freshwater-wet-manual_2002.pdf

TDEC Water Quality Rules, Reports, and Publications
https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html

Technical Support Document for Water Quality-based Toxics Control (EPA)
https://www3.epa.gov/npdes/pubs/owm0264.pdf

Tennessee Nutrient Reduction Framework
https://www.tn.gov/content/dam/tn/environment/water/tmdl-program/wr-ws_tennessee-draft-nutrient-reduction-framework_030315.pdf

Tennessee Plant Optimization Program (TNPOP)
https://www.tn.gov/environment/program-areas/wr-water-resources/tn-plant-optimization-programs/tnpop.html

Tennessee Water Resources Data and Map Viewers
https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-resources-data-map-viewers.html

USGS StreamStats
https://www.usgs.gov/mission-areas/water-resources/science/streamstats-streamflow-statistics-and-spatial-analysis-tools?qt-science_center_objects=0#qt-science_center_objects

USGS SWToolbox
https://www.usgs.gov/software/swtoolbox-software-information

ADDENDUM TO RATIONALE AT PERMIT ISSUE

Cartwright Creek, LLC
Grassland STP
NPDES Permit No. TN0027278
Date: 8/30/2021
Permit Writer: Wade Murphy

On August 3, 2021, Bruce Meyer sent comment on the draft permit rationale on behalf of Cartwright Creek, LLC. The permittee wished to affirm success of the inflow and infiltration work on the collection system referenced in the "Previous Permit Term Review" in Section 5.0 of the rationale on R-3 and R-4. The Division is happy to relay the clarification because successful inflow and infiltration rehabilitation is noteworthy.

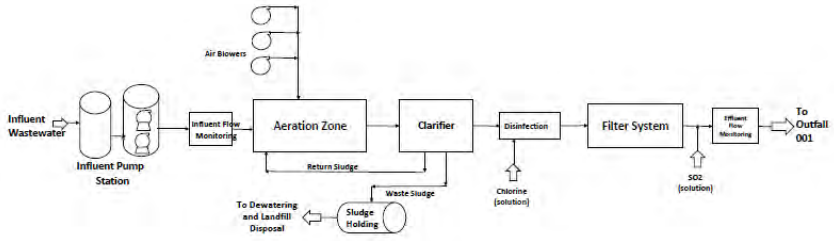
Mr. Meyers relayed that the influent flows decreased in 2020 and 2021, and the influent concentrations increased because Cartwright Creek repaired parts of the collection system in 2019 and 2020. The repairs were completed in a service area identified through engineering studies as having by far the highest I&I. In-line flow monitoring conducted after the repairs showed that the average dry weather flow substantially decreased. The reduction in flow has helped the performance of the treatment system. The repair work mentioned in the rationale dated July 28, 2021, was completed and impactful.

RATIONALE

Cartwright Creek, LLC
Grassland STP
NPDES Permit No. TN0027278
Date: 7/28/2021
Permit Writer: Wade Murphy

1. R

Permittee Name:	**Cartwright Creek, LLC**
Project Name:	**Grassland STP**
Location:	River Rest Subdivision, Franklin, Williamson County, Tennessee
Contact:	Mr. Bruce Meyer - Operations Manager (615) 714-7868 bruce@cartwrightcreek.com
Design Flow Rate:	0.25 MGD
Percentage Industrial Flow:	Zero %
Certified Operator Grades:	STP: III; CS: I; Date Rated: 04/01/99
Treatment Description:	Extended aeration activated sludge, tertiary filtration and treated effluent chlorination/dechlorination



Cartwright Creek, LLC - Grasslands Wastewater Treatment Facility
Process Flow

2. RECEIVING STREAM INFORMATION

Receiving Waterbody:	**Harpeth River at mile 68.8**
Watershed Group:	Harpeth
Hydrocode:	05130204
Low Flow:	7Q10 = 3.4 MGD (5.27 CFS)
Low Flow Reference:	USGS Streamstats, Version 4.3.8

Stream Designated Uses:

Domestic Water Supply	*Industrial*	*Fish & Aquatic Life*	*Recreation*
	X	**X**	**X**
Livestock & Wildlife	*Irrigation*	*Navigation*	*Trout*
X	**X**		

Low flows on unregulated streams are estimated using guidance from the EPA document *Low Flow Statistics Tools: A How-To Handbook for NPDES Permit Writers*. When sufficient and representative USGS gage data is available, USGS SWToolbox is used to analyze the flow data and calculate 7Q10 and 30Q5 values. Using these low flow values at the gage, the permit writer then determines the flow at the point of discharge using the following equation:

$$Q_{outfall} = Q_{gage} \times \frac{A_{outfall}}{A_{gage}}$$

Where:

$Q_{outfall}$ = Low flow statistic at outfall location
Q_{gage} = Low flow statistic at gage location
$A_{outfall}$ = Area draining to outfall
A_{gage} = Area draining to gage

In the absence of sufficient gage data, the Division relies on USGS Streamstats to calculate low flows statistics. In this permit, no sufficient gage data is available to characterize the receiving stream. Thus, USGS Streamstats was used to delineate the critical low flow at the point of discharge. Appendix 3 shows the Streamstats output used for this estimation.

3. CURRENT PERMIT STATUS

Permit Type:	Municipal
Classification:	Minor
Issuance Date:	31-DEC-19
Expiration Date:	30-NOV-21
Effective Date:	01-FEB-20

4. NEW PERMIT LIMITATIONS AND COMPLIANCE SCHEDULE SUMMARY

a) The units for *E. coli* have been standardized to number per 100 mL (#/100 mL). Previously, the Division used either MPN/100 mL or CFU/100 mL. The identification of one of these two units indirectly created a requirement for a specific type of testing methodology. By utilizing #/100 mL unit, permittees are provided the flexibility to select the 40 CFR § 136 method that is most suitable for their operations. The limit value (number) will remain the same as the limit units are functionally equivalent.

Language throughout the permit has been updated to reflect the eReporting phase 2 requirements in 40 CFR § 127. This includes (but is not limited to) detailing specific data elements that are required to be reported for overflows, releases and bypasses as well as pretreatment program information.

This permit includes a monthly average limit on total residual chlorine derived from the applicable water quality criterion. The monthly average limit protects against chronic exposure to chlorine. See **Section 6.5**.

b) Compliance Schedule Summary

Description of Report to be Submitted	Reference Section in Permit
Monthly Discharge Monitoring Reports	1.3.1.
Monthly Operational Reports	1.3.4.
Bypass and Overflow and Release Report	1.3.5.1.

c) For comparison, this rationale contains a table depicting the previous permit limits and effluent monitoring requirements in Appendix 1.

5. PREVIOUS PERMIT TERM REVIEW

A review of the permittee's Discharge Monitoring Reports (DMRs) from September 2017 through June 2021 reveals that the permittee generally met permit requirements with occasional violations of various $CBOD_5$ limits and TSS percent removal requirements. There have been no violations reported for the past 12 months. For the reporting period, the permittee reported only two sanitary sewer overflows due to causes not related to wet weather. The summary also reflects variable influent concentrations of both $CBOD_5$ and TSS with very weak influent (<100 mg/L) at times. However, the data appears to show a trend toward less weak

influent in 2020 and 2021. A summary of data reported on DMRs during the previous permit term is located in Appendix 2.

During the previous permit term, Division personnel from the Nashville Environmental Field Office performed a Compliance Sampling Inspection (CSI) of the permittee's facility. The CSI was performed by Virginia Lawrence and Lilia Sewell on May 20-23, 2019. The permittee was found to be out of compliance in part due to the deteriorated state of the treatment system which has outlived its useful life. The resulting Notice of Violation dated July 17, 2019, describes no screening at the headworks, no bottom rake on the primary clarifier, a collapsed digestor wall, severe corrosion of metal components including metal walkways, and use of surface injection of chlorine.

The permittee's response dated August 15, 2019, admitted the 50-year old facility needs to be replaced but attributed effluent violations to the impact of inflow and infiltration on treatment rather than on the condition of the facility. The letter detailed plans for some collection system rehabilitation work scheduled for 2019 and 2020.

6. PROPOSED EFFLUENT LIMITS AND RATIONALE

PARAMETERS	MONTHLY AVERAGE CONCENTRATION (MG/L)	MONTHLY AVERAGE AMOUNT (LB/DAY)	WEEKLY AVERAGE CONCENTRATION (MG/L)	WEEKLY AVERAGE AMOUNT (LB/DAY)	DAILY MAXIMUM CONCENTRATION (MG/L)	DAILY MINIMUM PERCENT REMOVAL	RATIONALE
$CBOD_5$ (summer)	5	10	7.5	15	10	40	D.O. protection, Refer to 6.1 below
$CBOD_5$ (winter)	10	21	15	31	20	40	D.O. protection, Refer to 6.1 below
NH_3-N (summer)	2	4	3	6	4	—	D.O. protection, Refer to 6.4 below
NH_3-N (winter)	5	10	7.5	16	10	—	D.O. protection, Refer to 6.4 below
Total Suspended Solids	30	63	40	83	45	40	Rule 0400-40-05-.09
Dissolved Oxygen	6.0 (daily minimum) instantaneous	—	—	—	—	—	D.O. protection, Refer to 6.1 below
Total Chlorine Residual	0.16	—	—	—	0.28	—	Refer to 6.5 below
Total Nitrogen	Report	Report	—	—	Report	Report (lb/d)	Refer to 6.6 below
	15 lb/d as a 12-month rolling average, calculated monthly						Refer to 7.7 below
Total Phosphorus	Report	Report	—	—	Report	Report (lb/d)	Refer to 6.6 below
	5.0 lb/d as a 12-month rolling average, calculated monthly						Refer to 7.7 below
E. coli (#/100mL)	126/100 mL	—	—	—	941/100 mL	—	Rule 0400-40-03-.03, Refer to 6.7 below
Settleable Solids (mL/L)		—	—	—	1.0	—	Rule 0400-40-05-.09
pH (standard units)	6.0 -9.0	—	—	—	—	—	Rule 0400-40-03-.03
Flow (MGD):							
Influent	Report	—	—	—	Report	—	Used to quantify pollutant load
Effluent	Report	—	—	—	Report	—	Used to quantify pollutant load

	Monthly Total		Refer to 6.11 below
Dry Weather	Overflows	0	Refer to 6.11 below
Wet Weather	Overflows	0	Refer to 6.11 below

Note: Weekly limitations on $CBOD_5$ and TSS concentrations are given as required per 40 CFR 133.102(a)(2) or 133.102(a)(4)(2) & 133.102 (b)(2) respectively; daily $CBOD_5$ and TSS limitations are authorized by T.C.A. 0400-40-05-.09; monthly and weekly mass loads are limited per 40 CFR 122.45(f) and based on the design flow as per 40 CFR 122.45(b); monthly average percent removal rates for $CBOD_5$ and TSS are required per 40 CFR 133.102(a)(3) or 133.102(a)(4)(iii) and 133.102 (b)(3) respectively. A minimum 40% daily removal rate is required as equivalent to a daily mass load limitation.

6.1. CONVENTIONAL PARAMETERS

6.1.1. $CBOD_5$ and Dissolved Oxygen

Biochemical oxygen demand, or BOD, is a measure of the oxygen used when biological processes break down organic pollutants in wastewater. The amount of oxygen used is more specifically referred to as the five-day biochemical oxygen demand, or BOD_5. This parameter is used in the wastewater industry to measure both the strength of wastewater and the performance of wastewater treatment processes.

Limits on the oxygen demand remaining in the treated wastewater is often necessary to prevent pollutants in the wastewater from driving oxygen in the receiving stream down below the levels necessary to support fish and aquatic life. Additionally, the breakdown of ammonia into other forms of nitrogen also requires oxygen and therefore exerts an oxygen demand on receiving wastewaters.

EPA completed extensive computer modeling for developing its 2004 total maximum daily load (TMDL) for addressing organic enrichment and low dissolved oxygen conditions within the receiving stream. The TMDL incorporated the previously established CBOD5, ammonia and dissolved oxygen limits for this facility. In order to consistently achieve an instream dissolved oxygen concentration at or above the required minimum of 5.0 mg/l, the TMDL also imposed an average annual total nitrogen mass loading of < 15 lb/day for the permittee's Outfall 001 discharge. All of these limits are retained in this permit.

6.1.2. Total Suspended Solids (TSS)

Total Suspended Solids is a general indicator of the quality of a wastewater and will be limited in this permit. The technology-based TSS limit for conventional treatment plants is provided in Tennessee Rule 0400-40-05-.09(1)(a).

TSS - Conventional Secondary Treatment Plants			
Monthly Average	*Weekly Average*	*Daily Maximum*	*Monthly Average*
30 mg/L	40 mg/L	45 mg/L	85 % Removal

6.1.3. Percent Removal

The treatment facility is required to remove 85 % of the $CBOD_5$ and TSS that enter the facility on a monthly basis. This is part of the minimum requirement for all municipal treatment facilities contained in Code of Federal Regulations (CFR) 40 § 133.102. The reasons stated by the EPA for these requirements are to achieve these two basic objectives:

i. To encourage municipalities to correct excessive inflow and infiltration (I/I) problems in their sanitary sewer systems; and
ii. To help prevent intentional dilution of the influent wastewater as a means of meeting permit limits.

The treatment facility is required to remove 40 % of the $CBOD_5$ and TSS that enter the facility on a daily basis. This percent removal will be calculated three times per week and recorded on the Monthly Operation Report. The number of excursions (days when $CBOD_5$ and/or TSS removal is less than 40%) will be reported on the Discharge Monitoring Report.

6.1.4. Settleable Solids

The settleable solids limit of 1.0 ml/L is a technology-based limit established in Rule 0400-40-05-.09.

6.2. FLOW

Monitoring of flow quantifies the load of pollutants to the stream. Flow shall be reported in million gallons per day (MGD) and monitored at the time of sample collection.

6.3. PH

According to the State of Tennessee Water Quality Standards [Chapter 0400-40-03-.03(3) (b)], the pH for the protection of Fish and Aquatic Life shall not fluctuate more than 1.0 unit over a period of 24 hours and shall not be outside the following ranges: 6.0 – 9.0 standard units (SU) in wadeable streams and 6.5 – 9.0 SU in larger rivers, lakes, reservoirs, and wetlands. Considering that the receiving stream will provide some buffering capacity, effluent limitation for pH will be retained in a range 6.0 to 9.0. The sample type will be grab.

6.4. AMMONIA (NH_3-N)

To assess ammonia toxicity impacts, the state utilizes Tennessee Rules, Chapter 0400-40-03-.03-3(3)(j), dated September 11, 2019, to derive allowable instream protection values protective of chronic and acute exposures to a

continuous discharge. A mass balance equation with the treatment facility, stream flows, and these allowable values determines the monthly average and daily maximum permit limits.

The temperature used in calculations is determined based on measured ambient instream temperature or is estimated according to Tennessee's Three Grand Divisions as follows: East (winter 15°C, summer 25°C), Middle (winter 17°C, summer 27°C), and West (winter 20°C, summer 30°C). A pH value of 8 is used because ambient monitoring shows ambient pH is sometimes as high as 8, and because this assumption is more conservative.

Using temperature and pH values, the criterion continuous concentration (CCC) and criterion maximum concentration (CMC) values are calculated using the following equations:

$$CCC = 0.8876 * \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) * \left(2.126 * 10^{0.028*(20-MAX(T,7))}\right)$$

and

$$CMC = MIN\left\{\begin{array}{c}\left(\frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}\right), \\ \left(0.7249 * \left(\frac{0.0114}{1+10^{7.204-pH}} + \frac{1.6181}{1+10^{pH-7.204}}\right) * \left(23.12 * 10^{0.036*(20-T)}\right)\right)\end{array}\right\}$$

The determined CCC and CMC values are then used in the mass balance equation as follows:

$$CCC = \frac{Q_S C_S + Q_{STP} C_{STP}}{Q_S + Q_{STP}} \quad \text{or} \quad C_{STP} = \frac{CCC(Q_S + Q_{STP}) - (Q_S C_S)}{Q_{STP}}$$

where:

CCC	=	Criteria continuous concentration (mg/L)
Q_S	=	7Q10 flow of receiving stream (MGD)
Q_{STP}	=	Design flow of STP (MGD)
C_S	=	Assumed/Measured instream NH_3 (mg/L)
C_{STP}	=	Allowable STP discharge of NH_3 (mg/L)

See below for calculations:

Ammonia as Nitrogen Calculations

The State utilizes the Water Quality Criteria and the EPA document, EPA Ambient Water Quality Criteria for Ammonia (https://www.epa.gov/wqc/aquatic-life-criteria-ammonia). A mass balance with plant and stream flows and this allowable value determines the monthly average permit limit. Seasonal limits may also be allowed due to ambient temperature variations between the summer and winter seasons.

East TN- 25°C, 15°C
Middle TN- 27°C, 17°C
West TN- 30°C, 20°C

A pH value of 8 (instead of historically used 7.5) was chosen for two reasons: 1.) ambient monitoring in west TN showed that a pH often exceeds 7.5, and is up to 8 sometimes 2.) this assumption is more conservative.

	Winter		Summer
Temp (°C)=	17	Temp (°C)=	27
pH=	8	pH=	8
MAX Expression	17.0000	MAX Expression	27.0000

$$CCC = 0.8876 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) x\left(2.126 \times 10^{0.028\times(20-MAX(T,7))}\right)$$

Winter CCC=	**0.94**	Summer CCC=	**0.49**

CCC - Continuous Chronic Criterion Allowable instream NH3 concentration [mg/l]

$$CCC = \frac{\text{(Critical Low Flow [MGD] * Background Ammonia [mg/L]) + (Design Flow [MGD] * } \textbf{Effluent Concentration} \text{ [mg/L])}}{\text{(Critical Low Flow [MGD] + (Design Flow [MGD])}}$$

where:	3.4	Critical Low Flow [MGD] (7Q10 value)
	0.1	Background Ammonia Concentration [mg/L]
	0.25	WWTP Design Flow or long-term average flow [MGD]

Therefore, the Allowable **Effluent Concentrations** and corresponding **Amounts** in winter and summer are:

Winter			Summer	
12.41	Concentration [mg/L]		**5.864**	Concentration [mg/L]
25.9	Amount [lb/day]		**12.2**	Amount [lb/day]

The calculated acute and chronic toxicity values above are compared to ammonia limits previously imposed to prevent ammonia toxicity or calculated to protect ambient dissolved oxygen levels. The permit imposes the most stringent values in the analysis. The analysis compares the calculated chronic ammonia value (CCC) with a monthly average limit previously imposed to protect dissolved oxygen or to prevent toxicity. The analysis compares the calculated acute ammonia value (CMC) with the previously imposed daily maximum value to protect dissolved oxygen or to prevent toxicity. Generally, water quality models have predicted the monthly average ammonia limit to protect dissolved oxygen. The Division has historically developed a companion daily maximum value to protect dissolved oxygen by multiplying the monthly average limit by two. Empirical data supports the factor of two developed in consideration of the natural variation in biological pollutant removal and the design basis for treatment unit sizing.

Because the NH_3-N concentration limits calculated to protect dissolved oxygen are more restrictive than the toxicity limits calculated above, the monthly average limits for NH_3-N (2 mg/L summer, 5 mg/L winter) are applied to the permit.

6.5. CHLORINATION

The total residual chlorine (TRC) limit is derived using the mass balance formula and the EPA acute instream protection value of 0.019 mg/L for fish and aquatic life. Applying this formula yields the following calculation for the TRC daily maximum limit:

$$\frac{0.019\ (Qd + Qs)}{Qd} = Limit\ (mg/L) = \frac{0.019(0.25 + 3.4)}{0.25} = 0.2774\,mg/L \approx 0.28\,mg/L$$

Where:

0.019 mg/L	=	acute instream protection value
3.4	=	Qs – 7Q10 flow of receiving stream (MGD)
0.25	=	Qd – design flow of STP (MGD)

Similarly, the chronic instream protection value of 0.011 mg/L for fish and aquatic life is applied to the mass balance formula to determine the monthly average limit for TRC. Previous permits do not contain rationale for omitting this limit and may have utilized the belief that chlorine's reactivity with other compounds will ensure it does not remain in solution long enough to result in chronic exposure to fish and aquatic life. The best way to reflect chronic exposure to chlorine in harmful quantities is not occurring is reporting successful operation of the de-chlorination technology in compliance with the monthly average limit. This added limit does not entail additional sampling but rather calculation of a monthly average value based on the sampling results in consideration of the method detection level of the test method.

$$\frac{0.011\ (Qd + Qs)}{Qd} = Limit\ (mg/L) = \frac{0.011(0.25 + 3.4)}{0.25} = 0.1606\,mg/L \approx 0.16\,mg/L$$

6.6. TOTAL NITROGEN AND TOTAL PHOSPHORUS

Nutrients are naturally occurring and essential components of healthy aquatic systems. Excessive amounts of nutrients, however, can impact water quality. The enrichment of a waterbody with nutrients, called eutrophication, can result in dense, rapidly multiplying growths, or blooms, of algal species and other nuisance aquatic plants. These have potential for negatively impacting the habitat for fish and aquatic life and degrading the water quality for drinking water supply and recreation uses. These impacts can present both locally from an individual activity and much further downstream from the cumulative impact of multiple activities. The Division has therefore developed and begun to implement a strategy to accomplish long-term nutrient reduction in Tennessee waters. The strategy, referred to as the Tennessee Nutrient Reduction Framework (NRF), contains

proposed rationale and the methodology for implementing the strategy within a watershed area. Consequently, the Framework considers impacts from both point and non-point sources of nutrients and recommends possible reduction goals for both point and non-point sources. The NRF approach to nutrient reduction is intended to utilize an adaptive management approach in consideration of the facts presenting within a watershed and reevaluation of the effectiveness of progress being made. Regular reassessments of goals and action plans will be conducted by reviewing monitoring data, modeling results and other measures of success. As additional data becomes available (such as WWTP effluent characterization and instream water quality data), model results can be re-evaluated.

Therefore, for purposes of implementing this strategy, the Division is imposing a minimum of quarterly effluent characterization for total nitrogen and total phosphorus on all discharges of treated domestic wastewater. This permit retains the twice monthly monitoring and nutrient limits from the previous permit. See Section 7.7 below for additional detail.

In coordination with the NRF and in recognition that meeting nutrient limits may require changes in plant operations, the Division has created the Tennessee Plant Optimization Program (TNPOP), which is a free program created to provide technical assistance and other resources to participating wastewater treatment plants. TNPOP can help wastewater treatment plants optimize energy use and nutrient removal, which can result in cost and energy savings. Interested facilities should visit the Division's TNPOP website for a program description, frequently asked questions, and information on how to apply.

6.7. *E. COLI*

Disinfection of wastewater is required to protect the receiving stream from pathogenic microorganisms. *E. coli* is used as an indicator organism as a measure of the bacteriological health of a receiving stream and the effectiveness of disinfection. Both the geometric mean and daily maximum are limited for *E. coli* in accordance with Rule 0400-40-03-.03. The *E. coli* daily maximum limit of 487 colony forming units per 100 mL applies to lakes and exceptional Tennessee waters. A maximum daily limit of 941 colony forming units per 100 mL applies to all other recreational waters. The units for *E. coli* have been standardized to #/100 mL, which is functionally equivalent to colony forming units.

6.8. BIOMONITORING

The Division evaluates all dischargers for reasonable potential to exceed the narrative water quality criterion "no toxics in toxic amounts". The Division has

determined that for municipal facilities with stream dilutions of less than 500 to 1, any of the following conditions may demonstrate reasonable potential to exceed this criterion:

i. Toxicity is suspected or demonstrated;
ii. A pretreatment program is required; or
iii. The design capacity of the facility is greater than 1.0 MGD.

This facility does not meet any of these criteria.

6.9. COLLECTION SYSTEM

For the purposes of demonstrating proper operation of the collection, transmission and treatment system, the permit treats releases separately from overflows and bypass. State regulations at 0400-40-05-.07(2) establish "standard conditions". These standard conditions include 0400-40-05-.07(2)(n) that sets forth specific language prohibiting sanitary sewer overflows (defined in the regulations as a "discharge") and standard conditions in 0400-40-05-.07(2)(l) and (m) pertaining to bypass. While the regulations prohibit sanitary sewer overflow (*i.e.*, discharges that reach or are likely to reach receiving waters) it does not prohibit "releases" that do not reach or are not likely to reach receiving waters. However, releases that do not reach receiving waters may be indicative of other problems, such as improper operation and maintenance of the sewer system. Whether another violation occurs or whether, for example, there is an unavoidable accident (see, e.g., § 69-3-114(a)), will involve case-specific evaluations. Regardless, the permit assures, without waiving rights to pursue other violations associated with a release, as applicable, that the permittee would, at a minimum be reporting and responding to releases. Any release potentially warrants permittee mitigation of human health risks via direct or indirect contact and may demonstrate a hydraulic problem in the system that warrants permittee consideration as part of proper operation and maintenance of the system.

Proper operation and maintenance of the collection system may include, but is not limited to:

1. A comprehensive collection system map showing all drainage areas, manholes, pump stations (number and size of pumps), flow meters, chronic overflow and release locations, miles of collection system, material and diameter of construction, and other relevant system elements.
2. Rainfall data at location(s) using method(s) representative of precipitation within the collection system area.

3. Flow meters at locations in the collection system that would enable drainage area analysis and prioritization based on the amount of inflow and infiltration (I/I) observed.
4. A collection system hydraulic model that predicts I/I problems in response to rainfall events and the effects of new conditions.

When determining if a location experiences chronic sanitary sewer overflows or releases, the term "event(s)" includes dry weather overflows, wet weather overflows, dry weather releases and wet weather releases.

7. OTHER PERMIT REQUIREMENTS AND CONDITIONS

7.1. CERTIFIED WASTEWATER TREATMENT OPERATOR

The waste treatment facilities shall be operated under the supervision of a Grade III certified wastewater treatment operator in accordance with the Water Environmental Health Act of 1984. Operator grades are under jurisdiction of the Water and Wastewater Operators Certification Board. This NPDES permit is under jurisdiction of the Tennessee Board of Water Quality, Oil and Gas. Operator grades are rated and recommended by the Division of Water Resources pursuant to Rule 0400-49-01 and are included in this fact sheet for reference. The grades are intentionally not specified in the permit so that the operation certification board can authorize changes in grade without conflicting with this permit.

7.2. COLLECTION SYSTEM CERTIFIED OPERATOR

The collection system shall be operated under the supervision of a Grade I certified collection system operator in accordance with the Water Environmental Health Act of 1984.

7.3. PRETREATMENT PROGRAM

The Cartwright Creek, LLC has received an exemption from development of a pretreatment program due to the lack of any significant industrial users.

The permittee submitted an updated Industrial User Survey to the Division dated April 20, 2020. The survey is in the permittee's electronic file record.

7.4. BIOSOLIDS MANAGEMENT PRACTICES

The Clean Water Act (CWA) requires that any NPDES permit issued to a publicly owned treatment works or any other treatment works treating domestic sewage shall comply with 40 CFR § 503, the federal regulation governing the use and

disposal of sewage sludge. It is important to note that "biosolids" are sewage sludge that have been treated to a level so that they can be land applied.

The language in **section 3.3.** of the permit, relative to biosolids management, a CWA requirement, allows the "permitting authority" under 40 CFR § 503.9(p) to be able to enforce the provisions of § 503. The "permitting authority" relative to Part 503 is either a state that has been delegated biosolids management authority or the applicable EPA Region; for Tennessee it is EPA Region 4.

Tennessee regulates the land application of non-exceptional quality biosolids under state rules, Chapter 0400-40-15. The state rules became effective on June 30, 2013. Under these state rules, all facilities that land apply non-exceptional quality biosolids must obtain a biosolids permit from the division. The land application of non-exceptional quality biosolids under state rules is regulated through either a general permit or by an individual permit. Questions about the division's biosolids regulations and permitting program should be directed to the State Biosolids Coordinator at:

Division of Water Resources
State Biosolids Coordinator
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102
615-532-0625

7.5. PERMIT TERM

In order to meet the target reissuance date for the Harpeth watershed and following the directives for the Watershed Management Program initiated in January 1996, the permit will be issued to expire in 2026.

7.6. ELECTRONIC REPORTING

The NPDES Electronic Reporting Rule (eRule), which became effective on December 21, 2016, replaces most paper-based reporting requirements with electronic reporting requirements. NetDMR allows NPDES permittees to submit DMRs electronically to EPA through a secure internet application and has been approved by Tennessee as the official electronic reporting tool for DMRs.

Monitoring results shall be recorded monthly and submitted monthly using Discharge Monitoring Reports (DMRs) based on the effluent limits in **section 1.1** of the permit. DMRs and DMR attachments, including laboratory data and overflow reports, shall be submitted electronically in NetDMR or other electronic reporting tool approved by the State, no later than the 15th of the month following

the end of the monitoring period. All NPDES program reports must be signed and certified by a responsible official or a duly authorized representative, as defined in 40 CFR § 122.22.

According to 40 CFR § 127.15, states have the flexibility to grant temporary or episodic waivers from electronic reporting to NPDES permittees who are unable to meet the electronic reporting requirements. To obtain an electronic reporting waiver, an electronic reporting waiver request must be submitted by email to DWRwater.compliance@tn.gov or by mail to the following address:

Division of Water Resources
Compliance and Enforcement Unit – NetDMR Waivers
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, TN 37243-1102

For contact and training information about NetDMR electronic reporting, visit the Division's website here.

The permit language has been modified to accommodate the implementation of the MyTDEC Forms electronic reporting tool. For more information, visit EPA's website on eReporting requirements.

7.7. ANTIDEGRADATION STATEMENT / WATER QUALITY STATUS

Tennessee's Antidegradation Statement is found in the Rules of the Tennessee Department of Environment and Conservation, Chapter 0400-40-03-.06. It is the purpose of Tennessee's standards to fully protect existing uses of all surface waters as established under the Act.

Stream determinations for this permit action are associated with the waterbody segment identified by the Division as segment ID# TN05130204009_3000.

The Division has made a water quality assessment of the receiving waters associated with the subject discharge(s) and has found the receiving stream to be neither an exceptional nor outstanding national resource water. Additionally, the division assesses this water as not having quality to support(s) designated uses due to low dissolved oxygen and elevated phosphorus attributed to municipal point source discharges and the discharges from urbanized high-density areas.

Total Maximum Daily Loads (TMDLs) have been developed and approved for this waterbody segment on the following parameters and dates:

Parameter:
Dissolved Oxygen

TMDL Approval Date:
September 2004

The proposed terms and conditions of this permit comply with the wasteload allocations of these TMDLs.

In summary, this permit imposes in Part 1.1 of permit the nitrogen load (15 lb/d) established in the 2004 EPA TMDL to protect ambient dissolved oxygen along with a reopener clause in Part 1.5 of the permit to allow for including conditions consistent with the revised TMDL being developed by Tennessee with the assistance of EPA and cooperation of permittees and local environmental groups. This permit retains a phosphorus load limit to cap the discharges of phosphorus at their current levels in support of the anti-degradation provision of state water quality standards. The division developed the phosphorus limit in the previous permit based on the 2-year average phosphorus load from the facility as an average of the monthly averages. The 5.0 lb/d limit is equivalent to a concentration of 2.4 mg/L at the design flow rate of 0.25 MGD. Both limits are set as annual (12-month) rolling averages consistent with the division's draft, statewide nutrient reduction framework. The facility is reporting the following total nitrogen and phosphorus in its effluent:

Mo/Year	Total N	Total P
02/29/2020	17.99	4.31
03/31/2020	17.14	4.39
04/30/2020	16.43	4.06
05/31/2020	16.56	3.96
06/30/2020	18.09	4.04
07/31/2020	17.94	4.14
08/31/2020	17.08	4.22
09/30/2020	16.91	4.45
10/31/2020	16.03	4.57
11/30/2020	14.51	4.47
12/31/2020	13.02	3
01/31/2021	13.04	3.14
02/28/2021	14.18	3.26
03/31/2021	14.21	3.38
04/30/2021	13.89	3.42
05/31/2021	13.6	3.45
06/30/2021	13.06	3.37
Eff. Limit:	15	5

APPENDIX 1 –
PREVIOUS PERMIT LIMITS

PARAMETERS	MONTHLY AVERAGE CONCENTRATION (MG/L)	MONTHLY AVERAGE AMOUNT (LB/DAY)	WEEKLY AVERAGE CONCENTRATION (MG/L)	WEEKLY AVERAGE AMOUNT (LB/DAY)	DAILY MAXIMUM CONCENTRATION (MG/L)	DAILY MINIMUM PERCENT REMOVAL	MEASUREMENT FREQUENCY
$CBOD_5$ (May 1- Oct. 31)	5	10	7.5	15	10	40	3/week
$CBOD_5$ (Nov. 1- April 30)	10	21	15	31	20	40	3/week
NH_3-N (May 1- Oct. 31)	2	4	3	6	4	—	3/week
NH_3-N (Nov. 1- April 30)	5	10	7.5	16	10	—	3/week
Total Suspended Solids	30	63	40	83	45		3/week
Dissolved Oxygen (mg/L)	6.0 (daily minimum) instantaneous	—	—	—	—	—	5/week
Total Chlorine Residual (mg/L)	—	—	—	—	0.28 (daily maximum)	—	5/week
Total Nitrogen	Report	Report	—	—	Report	Report (lb/d)	2/month
Total Nitrogen	15 lb/d as a 12-month rolling average, calculated monthly						1/month
Total Phosphorus	Report	Report	—	—	Report	Report (lb/d)	2/month
Total Phosphorus	5.0 lb/d as a 12-month rolling average, calculated monthly						1/month
E. coli (MPN/100ml)	126/100 ml	—	—	—	941/100 ml	—	3/week
Settleable Solids (ml/l)		—	—	—	1.0 (daily maximum)	—	5/week
pH (standard units)	6.0-9.0	—	—	—	—	—	5/week
Flow (MGD):							
Influent	Report	—	—	—	Report	—	7/week
Effluent	Report	—	—	—	Report	—	7/week
Sanitary Sewer Overflows, Total Occurrences, gal/mo., Cum total	Report						continuous
Dry Weather Overflows, Total Occurrences, gal/mo., Cum total	Report						continuous
Wet Weather Releases, Total Occurrences, gal/mo	Report						Continuous
Dry Weather Releases, Total Occurrences, gal/mo	Report						Continuous
Bypass of Treatment, Total Occurrences	Report						continuous

APPENDIX 2 – DMR SUMMARY

	Flow (MGD)		Biochemical Oxygen Demand				Suspended Solids				Effluent (mg/l)									Overflow and Bypass
			Influent	Effluent (mg/l)		%	Influent	Effluent (mg/l)		%	Settleable	pH		Cl_2	Ammonia		D.O.	E. coli		
	Monthly Average	Daily Max	(mg/l)	Monthly Average	Daily Max	Removal	(mg/l)	Monthly Average	Daily Max	Removal	Solids (ml/l)	(std. units) Min	Max	Daily Max	Monthly Average	Daily Max	Daily Min	Monthly Average	Daily Max	
Limits	Report	Report	Report			85	Report			85	1.0	6.0	9.0				6.0	126	941	
Summer				5	10			30	45					0.28	2.0	4.0				
Winter				10	20			30	45					0.28	5.0	10.0				
Average	0.376	0.788	106	5	17	93	80.6	4	8	93	0.2	7.2	7.6	0.11	0.5	1.7	6.8	15	76	
Maximum	1.035	1.664	251.4	25	170	99	169.3	10	20	98	1.0	7.4	7.9	0.24	2.1	7.4	7.5	35	161	
Minimum	0.130	0.181	37.3	2	2	51	8.9	2	3	74	0.1	6.8	7.4	0.04	0.1	0.1	6.0	2	4	
+ = Exceedence				5	11	5				3						1				2

Date																				
Sep/17	0.365	1.495	61	2	2	95.9	63.8	4	7	93.8	1.0	7.3	7.6	0.07	1.20	4.10 +	6.3	12.1	88	
Oct/17	0.297	0.668	62.4	2.1	2	96.4	65.6	4	12	93.5	0.1	7.3	7.7	0.06	0.64	3.60	6.6	18.1	101	
Nov/17	0.464	1.619	47.2	2.5	5	94.1	41.4	4	8	89.9	0.1	7.3	7.7	0.06	0.40	1.90	7.1	14.4	109	
Dec/17	0.541	1.567	53.2	25 +	100 +	50.8 +	65.9	10	13	84.8 +	0.2	7.2	7.6	0.11	0.65	1.60	6.9	14.1	91	
Jan/18	0.390	0.532	69.9	5	37 +	89.3	78.4	7	12	90.8	0.1	7.0	7.7	0.08	0.25	0.75	7.0	18.1	85	
Feb/18	1.035	1.664	47	19 +	170 +	76.4 +	33.6	9	11	73.9 +	0.1	7.1	7.6	0.10	0.11	0.36	6.8	34.5	87	
Mar/18	0.654	1.603	64.3	8	24 +	86.3	55.9	8	11	86.1	0.1	7.2	7.7	0.09	0.20	1.30	6.7	17.3	58	
Apr/18	0.651	1.084	40.9	17 +	88 +	54.6 +	52.1	8	16	85.3	0.1	7.3	7.6	0.12	0.37	1.50	6.8	20.2	110	
May/18	0.356	1.260	53.6	13 +	42 +	63.9 +	46.9	3	5	92.9	0.1	7.1	7.6	0.12	0.75	1.80	6.3	8.4	78	
Jun/18	0.260	0.601	122.3	20 +	53 +	82.5 +	62.9	2	4	96.8	0.1	7.1	7.6	0.04	0.47	1.30	6.4	19.8	48	
Jul/18	0.171	0.294	87.3	5	16 +	93.8	74.5	4	8	94.7	0.1	7.2	7.6	0.15	0.23	0.73	6.9	15.1	85	
Aug/18	0.162	0.307	173.4	2	5	98.4	118.4	4	7	97	0.1	6.8	7.6	0.21	0.31	0.96	6.5	17.8	89	
Sep/18	0.215	0.628	120.6	2	3	97.5	95.5	4	10	95.9	0.2	7.1	7.7	0.14	0.20	0.44	6.4	22.4	60	
Oct/18	0.361	0.622	72.3	2	4	96.8	63.6	3	6	95.1	0.4	7.3	7.8	0.07	0.22	1.07	7.2	28.6	101	
Nov/18	0.493	0.783	77.6	4	22 +	92.4	55.1	3	3	95.3	0.1	7.3	7.6	0.17	0.73	2.22	6.7	18.5	84	
Dec/18	0.610	0.843	67.7	5	16	91.5	39.1	5	11	86.6	0.6	7.3	7.5	0.19	0.75	1.69	7.5	30.1	148	
Jan/19	0.799	1.529	43.6	3	5	91.5	31.6	6	15	80.9 +	0.8	7.1	7.5	0.20	0.73	1.67	7.5	35.2	154	
Feb/19	0.754	1.083	37.3	3	7	90.8	39.3	4	11	89.2	0.4	7.1	7.5	0.06	0.44	1.65	7.2	23.6	137	
Mar/19	0.557	0.970	78.8	3	5	96	57.2	4	7	93.2	0.3	7.1	7.6	0.11	0.59	1.84	7.1	23.6	161	1
Apr/19	0.626	1.551	76.6	3	6	92.3	60.7	5	14	91.3	0.5	7.2	7.6	0.11	0.96	2.70	6.9	35	127	
May/19	0.273	0.408	144.7	3	8	97.8	132.7	3	6	97.9	0.1	7.2	7.6	0.05	1.01	1.95	6.8	17.2	50	
Jun/19	0.289	0.509	136	3	5	97.9	95.3	4	10	96	0.1	7.3	7.7	0.06	0.54	1.78	6.4	22.4	133	
Jul/19	0.265	0.560	131.6	2	3	98.1	113.9	3	5	97.4	0.1	7.4	7.8	0.12	0.34	0.81	7.2	9.7	61	
Aug/19	0.301	0.794	117.4	2	3	97.9	78.7	3	4	96.6	0.1	7.3	7.7	0.24	0.48	1.72	6.7	15.2	55	
Sep/19	0.130	0.181	179.5	4	8	97.5	127.2	4	6	96.8	0.1	7.1	7.6	0.12	0.66	1.30	6.1	7.8	91	
Oct/19	0.300	0.722	128.1	3	9	97	90.9	3	6	96.5	0.1	7.0	7.7	0.12	0.33	1.09	6.1	10.4	117	
Nov/19	0.577	1.164	86.3	3	6	96.3	83.5	3	4	96.3	0.1	7.3	7.7	0.05	0.16	0.38	6.9	18.1	111	
Dec/19	0.393	0.823	80.2	6	39 +	93.1	68.9	4	6	94.7	0.1	7.2	7.9	0.14	0.32	1.07	7.1	13.6	66	
Jan/20	0.429	0.747	89.1	3	5	97	72.5	4	5	95.1	0.1	7.3	7.7	0.11	0.11	0.13	7.1	7.7	28	
Feb/20	0.415	0.839	116.6	3	7	97	92.9	5	12	94.7	0.1	7.3	7.7	0.15	0.22	0.57	6.8	9.9	48	
Mar/20	0.323	0.672	126.2	4	6	96.6	76.2	6	9	90.3	0.1	7.4	7.7	0.13	0.14	0.31	7.4	13.6	59	
Apr/20	0.288	0.676	110.2	3	9	96.9	73.9	6	12	89.4	0.2	7.3	7.7	0.14	0.23	0.40	7.0	19	46	1
May/20	0.160	0.270	130	5	15 +	95	8.88	3	5	96.7	0.1	7.1	7.4	0.11	0.64	1.22	6.4	12.3	104	
Jun/20	0.146	0.233	165.7	3	6	98.1	131.5	3	3	98	0.1	7.0	7.5	0.08	0.67	1.63	6.1	4.1	5.4	
Jul/20	0.155	0.312	251.4	3	7	98.1	124	3	3	97.7	0.1	6.9	7.6	0.15	0.42	0.85	6.1	7.9	78	
Aug/20	0.223	0.510	131.6	2	4	98.3	106.7	3	5	97.5	0.1	7.4	7.8	0.08	0.21	0.34	6.5	9.9	4.3	
Sep/20	0.280	0.656	127.8	2	2	98	120	3	4	97.5	0.1	7.4	7.7	0.09	0.31	0.72	6.8	12.4	56	
Oct/20	0.237	0.371	129.6	2	5	98.1	102.5	3	5	96.9	0.1	7.4	7.7	0.10	0.55	2.75	6.4	6.6	54	
Nov/20	0.197	0.297	182.9	2	2	98.5	84.7	3	3	96.7	0.1	7.4	7.6	0.08	1.25	7.40	7.1	2.6	8.5	
Dec/20	0.311	0.479	101.6	2	4	97.6	85.7	3	5	96.6	0.1	7.3	7.6	0.12	0.40	1.05	7.4	6	24	
Jan/21	0.316	0.663	137.8	3	7	97.6	88.8	3	3	96.7	0.1	7.3	7.7	0.09	0.38	1.56	7.4	5	34	
Feb/21	0.342	0.635	99.7	3	6	96.7	76.3	4	8	94.5	0.1	7.3	7.6	0.12	0.87	4.90	7.4	7	24	
Mar/21	0.483	1.177	81.1	3	5	94.5	63.3	6	13	88.5	0.1	7.1	7.7	0.11	0.41	1.19	6.8	14.1	87	
Apr/21	0.275	0.780	197.8	3	8	98.5	169.3	4	20	97.4	0.1	7.1	7.6	0.13	2.11	4.65	6.6	4.9	75	
May/21	0.246	0.629	112.2	2	2	98	121.1	3	3	97.6	0.1	7.3	7.5	0.08	1.18	3.37	6.0	4.6	44	
Jun/21	0.187	0.446	135.4	2	3	98.4	115.2	3	9	97.1	0.1	7.4	7.6	0.09	0.81	1.64	6.2	2.4	11	

APPENDIX 3 –
RECEIVING STREAM LOW FLOW DETERMINATION

StreamStats Report

Region ID:	TN
Workspace ID:	TN20191025193127666000
Clicked Point (Latitude, Longitude):	36.01038, -86.89598
Time:	2019-10-25 14:31:44 -0500

Low-Flow Statistics Parameters[Low Flow Central and East Regions 2009 5159]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	350.73	square miles	1.3	14441
RECESS	Recession Index	40	days per log cycle	32	175
CLIMFAC2YR	Tennessee Climate Factor 2 Year	2.334	dimensionless	2.056	2.46
SOILPERM	Average Soil Permeability	1.499	inches per hour	0.45	9.72
PERMGTE2IN	Percent permeability gte 2 in per hr	44.727	percent	2	100

Low-Flow Statistics Flow Report[Low Flow Central and East Regions 2009 5159]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SEp
7 Day 10 Year Low Flow	5.27	ft^3/s	89
30 Day 5 Year Low Flow	10.9	ft^3/s	70.2

Low-Flow Statistics Citations

Law, G.S., Tasker, G.D., and Ladd, D.E.,2009, Streamflow-characteristic estimation methods for unregulated streams of Tennessee: U.S. Geological Survey Scientific Investigations Report 2009–5159, 212 p., 1 pl.

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

IN THE MATTER OF:	)	**DIVISION OF WATER RESOURCES**
	)	
	)	
LIMESTONE WATER UTILITY OPERATING COMPANY, LLC,	)	
	)	
	)	
RESPONDENT.	)	**CASE NO. WPC22-0086**

CONSENT ORDER AND ASSESSMENT

This Consent Order and Assessment is entered into between the Department of Environment and Conservation ("Department") and Limestone Water Utility Operating Company, LLC ("Respondent"), for the purpose of resolving the issues set forth herein. The parties stipulate and agree as follows:

PARTIES

I.

The Commissioner is responsible for administering and enforcing the Water Quality Control Act, Tenn. Code Ann. §§ 69-3-101 to -148 ("Act"). The Commissioner may delegate to the Director any of the powers, duties, and responsibilities of the Commissioner under the Act, Tenn. Code Ann. § 69-3-107(13), and has delegated such authorities to Jennifer Dodd.

II.

The Respondent owns and operates the Grasslands sewage treatment plant ("Plant") and the associated collection system in Williamson County, Tennessee. The Respondent is duly registered with the Secretary of State to conduct business in Tennessee. Process may be served on the Respondent through its Registered Agent, C T Corporation System, 300 Montvue Rd, Knoxville, Tennessee 37919.

JURISDICTION

III.

Whenever the Commissioner has reason to believe that a violation of the Act has occurred, is occurring, or is about to occur, the Commissioner may issue a complaint to the violator and the Commissioner may order corrective action be taken. Tenn. Code Ann. § 69-3-109(a). Further, the Commissioner has authority to assess civil penalties against any violator of the Act, Tenn. Code Ann. § 69-3-115, and has authority to assess damages incurred by the State resulting from the violation, Tenn. Code Ann. § 69-3-116. The Board of Water Quality, Oil and Gas ("Board") has promulgated rules governing general water quality criteria and use classifications for surface waters. Tenn. Comp. R. & Regs. Chapters 0400-40-03 and 0400-40-04.

IV.

The Respondent is a "person" under the Act. Tenn. Code Ann. § 69-3-103.

V.

Harpeth River and its tributaries constitute "waters" of the state and "streams." Tenn. Code Ann. §§ 69-3-103 (41) and (45). Harpeth River has been classified by the Board for the following uses: domestic water supply, industrial water supply, fish and aquatic life, recreation, irrigation, and livestock watering and wildlife. Harpeth River in Williamson County, Tennessee is included on the 2020 303(d) list of impaired streams due to elevated levels of total phosphorus and low concentrations of dissolved oxygen.

VI.

Any person engaged in or planning to engage in the discharge of sewage, industrial wastes, or other wastes into waters, or to a location from which it is likely that the discharged substance will move into waters, must obtain and comply with a permit from the Department. Tenn. Code

Ann. § 69-3-108. Each permit requires a set of effluent limitations to indicate adequate operation or performance of treatment units used and to appropriately limit those harmful parameters present in the wastewater. Tenn. Comp. R. & Regs. 0400-40-05-.08. The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the conditions of the permit. Tenn. Comp. R. & Regs. 0400-40-05-.07. It is unlawful for any person to violate the conditions of a discharge permit issued by the Department. Tenn. Code Ann. §§ 69-3-108(b) and -114(b).

FACTS

VII.

On August 30, 2021, the Division issued National Pollutant Discharge Elimination System (NPDES) permit TN0027278 ("Permit") to Cartwright Creek, LLC. The Permit became effective December 1, 2021, and expires November 30, 2026. A minor modification transferred the Permit to the Respondent on January 1, 2022. The Permit authorizes the discharge of treated domestic wastewater from Outfall 001 to Harpeth River at mile 68.8 in accordance with all effluent limitations and monitoring requirements set forth.

VIII.

On May 17, 2022, Division staff conducted a Compliance Evaluation Inspection (CEI) of the Plant. Staff noted discrepancies in the operational monitoring data submitted for February, March, and April, 2022, and determined that information was not transferred accurately from laboratory bench sheets to Monthly Operation Reports (MORs) to Discharge Monitoring Reports (DMRs). Staff noted several other instances of reporting, transcription, and calculation errors, and that a Standard Operating Procedure (SOP) was not available on site for review.

During inspection of the treatment processes, staff noted significant corrosion of the above ground units, such that the structural integrity of the treatment unit walls and equipment was questionable. During an interview with Division staff, the operator stated that an inflow and infiltration ("I/I") project completed in 2019 and 2020 had improved I/I issues during the summer months, but not during winter months when rainfall was heaviest.

Staff observed that no influent screening mechanism existed. Inorganic material was removed by hand and disposed of in a dumpster, which was periodically hauled off site, and an "island" of inorganic solids remained in the aeration basin. Staff observed that the interior walls surrounding the digestor unit were rusted to the point where the unit was inoperable; digester function had been replaced by a polyethylene tank which held solids until they were trucked from the Plant. Staff noted that the clarifier was in poor condition: algae had accumulated on the weirs; no skimmer arm was present; grit, grease, pin floc, and debris floated on the clarifier surface.

Staff observed that chlorination and dechlorination processes were conducted in what was previously the above ground, "tertiary filtration" unit of the Plant. Staff observed grit and grease floating in the basin. In the interview, the operator stated that the internal components of this unit were removed years ago. Staff noted that the operator used chlorine gas for disinfection of effluent, manually adjusting chlorine dosing based on flow and the results of chlorine residual testing. The operator achieved dechlorination by similar manual dosing adjustments of sulfur dioxide gas.

During review of the laboratory and lab processes, staff observed that the temperature of the *E. coli* incubator was not within the correct range. Staff observed that the bottle containing distilled water was discolored and was contaminated with mold. Staff also observed dead insects in the pH storage solution cup. The cap on the meter used to measure dissolved oxygen (DO) was scratched, and no extra caps were available on site. A comparator, necessary for comparing *E. coli*

test results to distinguish threshold positive results from negative results, was not available on site. Staff found food and drink items next to lab samples in the same refrigerator.

IX.

On June 8, 2022, the Division issued a Notice of Violation (NOV) to the Respondent detailing the violations noted during the inspection of May 17, 2022. The NOV advised the Respondent that operation and maintenance of the facility must improve, and instructed the Respondent to:

- review MORs and DMRs for February, March, and April 2022, and make appropriate corrections;
- develop an SOP and keep it at the facility;
- change pH storage solution on a regular basis;
- change or thoroughly clean distilled water containers;
- keep a spare cap for the DO meter on site;
- purchase an IDEXX Quanti-Tray comparator;
- purchase a separate refrigerator for storage of lab samples;
- adjust the *E. coli* incubator to the proper temperature;
- on lab bench sheets, include the analysis method number, or reference the current edition of Standard Methods for Water and Wastewater Analyses.

The NOV further instructed the Respondent to submit a plan of action detailing the corrective actions necessary to address the violations and conditions noted to the Division by July 15, 2022.

X.

From January 2022 through July 15, 2022, the Plant incorrectly reported the following tests on its DMRs, resulting in non-receipt violations:

Parameter	Monitoring Period	Number of Test Values Incorrectly Reported
Carbonaceous BOD, 5-day	February 2022	2
	March 2022	4
	April 2022	3
E. coli	February 2022	2
Nitrogen, Ammonia Total	February 2022	2
	March 2022	4
	April 2022	3
Settleable Solids	February 2022	1
	March 2022	1
	April 2022	1
Chlorine, Total Residual	March 2022	1
	April 2022	1
Phosphorus, Total	March 2022	2
Suspended Solids, Total	April 2022	2
Total Violations		**29**

The Respondent submitted corrections for all these violations on June 21, 2022, following receipt of the NOV.

XI.

From January 2022 through July 15, 2022, the Plant reported the following effluent limitation exceedances on its Discharge Monitoring Reports:

Parameter	Effluent Exceedances
Carbonaceous BOD, 5-day	4
Chlorine, Total Residual	1
Nitrogen, Ammonia Total	5
Total	**10**

VIOLATIONS

XII.

By failing to properly operate and maintain the treatment facility (missing screening structures, digester, clarifier, tertiary filtration unit), failing to properly maintain laboratory

equipment, and manually adjusting chlorine dosing, the Respondent has violated the Permit, which states in relevant part:

Section 2.1.3 a

> The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory and process controls and appropriate quality assurance procedures.

XIII.

By discharging pollutants to waters of the state in excess of permitted effluent limitations, and by failing to properly report the results of required monitoring, the Respondent has violated the Act:

Tenn. Code Ann. § 69-3-108(b):

> It is unlawful for any person, other than a person who discharges into a publicly owned treatment works or a person who is a domestic discharger into a privately owned treatment works, to carry out any of the following activities, except in accordance with the conditions of a valid permit:
>
> (3) The increase in volume or strength of any wastes in excess of the permissive discharges specified under any existing permit;

Tenn. Code Ann. § 69-3-114(b):

> In addition, it is unlawful for any person to act in a manner or degree that is violative of any provision of this part or of any rule, regulation, or standard of water quality promulgated by the Board of any permits or orders issued pursuant to this part; or fail or refuse to file an application for a permit as required in § 69-3-108; or to refuse to furnish, or to falsify any records, information, plans, specifications, or other data required by the Board or the Commissioner under this part.

ORDER AND ASSESSMENT

XIV.

Pursuant to sections 69-3-109, -115, and -116 of the Act, the Director orders, and the Respondent agrees, as follows:

For all payments submitted, please include reference to case number **WPC22-0086**.

1. The Respondent is assessed a **total civil penalty of $63,264.00. The Respondent shall pay $10,544.00 to the Division as an upfront allocation of this penalty on or before the thirty-first day following the effective date of this Order.** The remaining $52,720.00 shall only become due if the Respondent fails to comply with Items 2-6, listed below:
2. On or before the ninetieth day following the effective date of this Order, the Respondent shall develop and submit to the Division for approval an SOP for the monitoring of operational parameters at the Plant. The SOP shall include processes for the collection of samples, recording of sample data, maintenance of monitoring records, maintenance of laboratory stores and equipment, and appropriate quality assurance/quality control practices, according to EPA-approved procedures. The approved SOP shall be kept on the Plant premises available for review. If the Respondent fails to comply with this Item, the Respondent shall pay $ 231.00 to the Division for each day the SOP is late, not to exceed a total of $6,930.00.
3. On or before the ninetieth day following the effective date of this Order, the Respondent shall submit to the Division a corrective action plan / engineering report (CAP/ER) describing all steps necessary to address the degraded conditions of treatment structures, laboratory conditions, observations noted in section VIII above, and the effluent limitation exceedances listed in section XI. The CAP/ER shall include a schedule with a specific date of completion for each action. Any changes or modifications to the CAP/ER requested by the Division shall be submitted by the Respondent within 30 days following the request. Final completion of all actions in the CAP/ER shall not exceed three years from Division approval. If the Respondent fails to comply with this Item, the Respondent shall pay $232.00 to the Division for each day the CAP/ER is late, not to exceed a total of $6,960.00.

4. Upon Division approval of the CAP/ER, each milestone date of the project schedule shall become an enforceable component of this Order. For each calendar quarter – ending March 31, June 30, September 30, and December 31 – the Respondent shall write a concise progress report detailing the actions taken to that point. The Respondent shall submit each report to the Division not later than the fifteenth business day of the month following the end of the previous quarter. If the Respondent fails to comply with this Item, the Respondent shall pay $575.00 for each quarterly report that is late, not to exceed a total of $6,900.00.
5. Within 180 days following completion of all measures in the CAP/ER, the Respondent shall submit a Final Report to the Division for approval. The Final Report shall describe the completion of each scheduled action and shall include a detailed study evaluating the success of the CAP/ER in achieving substantial compliance with the Permit. If the Respondent fails to comply with this Item, the Respondent shall pay $231.00 for each day that the Final Report is late, not to exceed a total of $6,930.00.
6. For one year following completion of the CAP/ER, the Respondent shall maintain substantial compliance with the Permit. If the Respondent fails to comply with this Item, as evidenced by effluent violations on the Discharge Monitoring Reports, the Respondent shall pay $5,000.00 per effluent violation, not to exceed a total of $25,000.00.

All payments shall be made payable to the "Treasurer, State of Tennessee" and sent to the Division of Fiscal Services - Consolidated Fees Section, Tennessee Department of Environment and Conservation, 10th Floor Snodgrass Bldg., 312 Rosa Parks Avenue, Nashville, Tennessee

37243. The case number, **WPC22-0086**, should be written on all correspondence regarding this matter.

This Order shall be considered closed one year after Division receipt of the Final Report, so long as the Respondent has complied with all Order requirements, all penalties owed have been paid, and the Respondent is in substantial compliance with the Act.

The Effective Date of this Order shall be the date it is signed by Jennifer Dodd, Director of the Division of Water Resources. The Department may, for good cause shown, extend the compliance dates contained within this Order. To be eligible for this time extension, the Respondent shall submit a written request to be received in advance of the compliance date. The written request must include sufficient detail to justify such an extension and include at a minimum the anticipated length of the delay, the precise cause or causes of the delay, and all preventative measures taken to minimize the delay. Any such extension by the Department will be in writing. Should the Respondent fail to meet the requirement by the extended date, any associated civil penalty shall become due 30 days thereafter.

Failure to comply with any of the requirements of this Order could lead to further enforcement actions, which may include additional civil penalties, assessment of damages, and/or recovery costs.

DEPARTMENT'S RESERVATION OF RIGHTS

In entering into this Consent Order, the Department does not implicitly or expressly waive any provision of the Act or the regulations promulgated thereunder or the authority to assess costs, civil penalties, and/or damages incurred by the State against the Respondent. The Department expressly reserves all rights it has at law and in equity to order further corrective action, assess civil penalties and/or damages, and to pursue further enforcement action including, but not limited

to, monetary and injunctive relief. Compliance with this Order will be considered as a mitigating factor in determining the need for future enforcement action(s).

WAIVER OF RIGHT TO APPEAL

The Respondent understands that it has the right to appeal this Order pursuant to sections 69-3-109, -115, and -116 of the Act. By signing below, the Respondent knowingly and voluntarily waives any right it may have to appeal this Order.

RESPONDENT'S RESERVATION OF RIGHTS

The Respondent does not admit or deny the factual allegations or the alleged violations of law contained in this Order. The Respondent reserves its rights to contest the factual allegations and alleged violations contained in this Order in any proceeding other than a proceeding brought by the Department to enforce the terms of this Order.

AUTHORITY TO SIGN

The undersigned representatives of the Department and the Respondent represent and warrant that they are fully authorized and competent to execute this Consent Order and Agreement on behalf of the entity for which they are signing.

Agreed to by Limestone Water Utility Operating Company, LLC, as evidenced by the signature below, and issued by the Director of the Division of Water Resources, on this 13th day of February, 2023.

Jennifer Dodd (Feb 13, 2023 13:33 CST)

Jennifer Dodd, Director
Division of Water Resources
Department of Environment and Conservation

(Representative) Josiah Cox
Limestone Water Utility Operating Company, LLC

Reviewed by:

Samantha Buller-Young

Samantha Buller-Young
BPR # 040466
Assistant General Counsel
Department of Environment & Conservation
Knoxville Environmental Field Office
3711 Middlebrook Pike
Knoxville, TN 37921
p. (865)-440-8303
Samantha.Buller-Young@tn.gov

67866159.v1

Reviewed by:

Katherine Barnes

Katherine Barnes
BPR # 032456
Butler Snow LLP
150 3rd Avenue South, Suite1600
Nashville, TN 37201
D: (615) 651-6797
Katherine.Barnes@butlersnow.com

From: Dana Douglas
To: Christina Wingett
Cc: Jo Anna Brown
Subject: [EXTERNAL] Hideaway BOD Exceedance
Date: Monday, November 18, 2024 5:51:58 PM
Attachments: C2_signature_cwslogoprocesscopy_0b085280-d203-40db-a914-a790a7838017.jpg
C2_signature_facebook_32x32_196f4353-9a68-4fbb-ba82-4d7a1b35c123.png
C2_signature_linkedin_32x32_3c76a089-da45-461d-afc4-e9b19ac0d0fd.png

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Christina, it appears the monthly BOD limit was exceeded for the month of November 2024. The results are 55 mg/L. We have been having trouble with the Cambrian unit maintaining continuous operations and have been in contact with Cambrian support, they intend to have tech support both on site and remote Thursday and Friday of this week to troubleshoot the system and return to normal operations.

If you have any questions, please reach out.

DD

DANA DOUGLAS
STATE DIRECTOR
615-856-9159

dana.douglas@clearwatersolutions.com
www.clearwatersolutions.com

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

IN THE MATTER OF:	)	**DIVISION OF WATER RESOURCES**
	)	
DEPARTMENT OF ENVIRONMENT AND CONSERVATION,	)	
Petitioner,	)	
	)	**CASE NUMBER DWS24-0053**
v.	)	
	)	
LIMESTONE WATER UTLITY OPERATING COMPANY, LLC,	)	
Respondent.	)	

SETTLEMENT AGREEMENT AND ORDER

Director's Order No. DWS24-0053 ("Order") was issued to Limestone Water Utility Operating Company, LLC ("Respondent"). The Respondent filed a timely appeal. Pursuant to sections 4-5-105 and 68-221-714 of the Tennessee Code Annotated, the Commissioner and the Respondent have reached a settlement. To implement this settlement: (1) the Commissioner has agreed and by entering into this Settlement Agreement and Order does hereby also dismiss the Order; and (2) the Respondent has agreed and by entering into this Settlement Agreement and Order does also hereby waive its right to a contested case hearing before the Board in this matter and withdraws its appeal of the Order. This Settlement Agreement and Order resolves and supersedes the Order. The Parties stipulate and agree to the following:

PARTIES

I.

David W. Salyers, P.E., is the duly appointed Commissioner of the Department. The Commissioner is responsible for administering the Water Quality Control Act, Tenn. Code Ann. §§ 69-3-101 to -148 (hereinafter the "Act").

II.

The Respondent owns, operates and/or controls a community public water system existing in Hardeman County, Tennessee. The System's Public Water System Identification (PWSID) number is TN0000797. Process may be served on the Respondent through its registered agent, C T Corporation, at 300 Montvue Road, Knoxville, Tennessee 37919

JURISDICTION

III.

Whenever the Commissioner has reason to believe that a violation of the Act has occurred, is occurring, or is about to occur, the Commissioner may order corrective action be taken. Tenn. Code Ann. §§ 68-221-705 and 68-221-712. Further, the Commissioner has authority to assess civil penalties against any violator of the Act. Tenn. Code Ann. §§ 68-221-705 and 68-221-713. The Commissioner also has authority to assess damages incurred by the State resulting from the violation. Tenn. Code Ann. § 68-221-713. The Board of Water Quality, Oil, and Gas has promulgated rules governing operation of public water systems. Tenn. Comp. R. & Regs. Chapter 0400-45-01. The Commissioner may delegate to the Director any of the powers, duties, and responsibilities of the Commissioner under the Act, Tenn. Code Ann. § 68-221-705(12), and has delegated such authority to April Grippo.

IV.

The Respondent is a "person" under the Act. Tenn. Code Ann. § 68-221-703(17). The Respondent is a "supplier of water" under the Act, because it owns, operates, and/or controls a "public water system." Tenn. Code Ann. §§ 68-221-703(22) and 68-221-703(19). The System is a "community water system." Tenn. Comp. R. & Regs. 0400-45-01-.04(11).

FACTS

V.

The Respondent obtains its water from one well that is classified as not under the direct influence of surface water, commonly referred to as "true groundwater." The Respondent serves 105 connections and a population of approximately 308 persons.

VI.

The System has historically been served by one well, which is a violation of Rule 0400-45-01-.17(13) for systems serving more than 50 connections. The Division issued NOVs and Director's Orders DWS10-0013 and DWS17-0052 against the previous owner—Candlewood Lakes Property Owners Water Works, LLC—for this violation. Candlewood Lakes Property Owners Water Works, LLC did not ever resolve the violation.

In the fall of 2020, the Division became aware that the Respondent was going to purchase the System. In a letter dated December 23, 2020, the Division notified the Respondent of the outstanding violation and the requirement to install a backup well. On or about May 11, 2023, the Respondent purchased the System from Candlewood Lakes Property Owners Water Works, LLC. The Respondent informed the Division about the purchase in a letter dated May 11, 2023.

Division personnel performed a sanitary survey on the System on March 12, 2024, and issued a letter to the Respondent on March 20, 2024, which notified the Respondent that the System was still in violation for not having a duplicate well.

VII.

The Division incurred $24.80 in damages while investigating this violation.

VIOLATIONS

VIII.

By failing to install a duplicate well since its acquisition of the System in May 2023, the Respondent violated Rule 0400-45-01-.17(13), which states:

> (13) All community water systems serving 50 connections or more shall install duplicate pumps for the raw water, finished water, and distribution pumping stations. A water system will not be required to have duplicate pumps in a distribution pumping station under the following conditions: limited number of service connections, availability of replacement pumps, maintaining adequate flows and pressures without the pumping station, and for emergency use only. All community public water systems using ground water supplies and having more than 50 service connections must have duplicate wells and/or duplicate pumps in a spring supply unless fed by gravity flow.

ORDER AND ASSESSMENT

IX.

Pursuant to the authority vested by sections 68-221-712 and -713 of the Act, the Department and Respondent agree to the below Settlement Agreement and Order:

(1) **The Respondent shall pay $24.80 in damages to the Division on or before the thirty-first day after the Effective Date of this Settlement Agreement and Order.**

(2) The Respondent is assessed a total civil penalty of $22,668.00. **The Respondent shall pay $4,534.00, which is the upfront portion of the total civil penalty, on or before the thirty-first day after the Effective Date of this Settlement Agreement and Order.** The Respondent shall pay the remaining $18,134.00 only if the Respondent fails to comply with the following corrective action items.

(3) Within 30 days of the Effective Date of this Settlement Agreement and Order, the Respondent shall engage the services of a certified professional engineer to design the installation of the duplicate well and infrastructure and provide a copy of the contract to the Division. The Respondent shall pay a penalty of $1,000.00 for the failure to timely submit a copy of the contract to the Division to the Division addresses listed above.

(4) Within 60 days of the Effective Date of this Settlement Agreement and Order, the Respondent shall submit to the Division design plans for the installation of the duplicate well and necessary infrastructure. The required fees for plans review shall be submitted to the Drinking Water Unit. The Respondent shall pay a penalty of $1,000.00 for the failure to timely submit the design plans.

(5) Within 90 days of the Effective Date of this Settlement Agreement and Order, the Respondent shall have obtained the services of driller holding a Tennessee license for the drilling of the well and pump installation and submit a copy of the contract to the Division. The Respondent shall pay a penalty of $4,000.00 for the failure to timely submit a copy of the contract.

(6) Within 545 days of Effective Date of this Settlement Agreement and Order, the Respondent shall have installed the well and infrastructure, shall have connected it to the

distribution system, and shall notify the Division of the completion of the well and infrastructure. The Respondent shall pay a penalty of $12,134.00 for the failure to timely submit documentation of the well installation and connection to the distribution system.

All payments shall be made payable to the "Treasurer, State of Tennessee," with the case number, DWS24-0053, written in the check memo line. Such payments shall be sent to:

Treasurer, State of Tennessee
Department of Environment and Conservation
Division of Fiscal Services - Consolidated Fees Section
Davy Crockett Tower, 6th Floor
500 James Robertson Parkway,
Nashville, Tennessee 37243

The Effective Date of this Settlement Agreement and Order shall be the date it is signed by April Grippo, Director of the Division of Water Resources. The Director of the Division may, for good cause shown, extend the compliance dates contained within this Settlement Agreement and Order. To be eligible for this time extension, the Respondent shall submit a written request to be received in advance of the compliance date. The written request must include sufficient detail to justify such an extension and include at a minimum the anticipated length of the delay, the precise cause or causes of the delay, and all preventive measures taken to minimize the delay. Any such extension by the division will be in writing. Should the Respondent fail to meet the requirement by the extended date, any associated Civil Penalty shall become due 30 days thereafter.

Failure to comply with any of the requirements of this Settlement Agreement and Order could lead to further enforcement actions which may include additional civil penalties, assessment of damages and/or recovery of costs.

X

The Parties agree the foregoing Settlement Agreement and Order is a fair and reasonable resolution of this case.

DEPARTMENT'S RESERVATION OF RIGHTS

XI.

In entering this Settlement Agreement and Order, the Department does not implicitly or expressly waive any provision of the Act or the regulations promulgated thereunder or the authority to assess costs, civil penalties, and/or damages incurred by the State against the Respondent. The Department expressly reserves all rights it has at law and in equity to order further corrective action, assess civil penalties and/or damages, and to pursue further enforcement action including, but not limited to, monetary and injunctive relief. Compliance with this order will be considered as a mitigating factor in determining the need for future enforcement action(s).

AUTHORITY TO SIGN

XII.

The undersigned representatives of the Department and the Respondent hereby represent and warrant that they are fully authorized and competent to execute this Consent Order and Agreement on behalf of the entity for which they are signing.

Agreed to by Limestone Water Utility Operating Company, LLC, as evidenced by the signature below, and executed by the Director of the Division of Water Resources, on this 5th day of February, 2025.

April Grippo (Feb 5, 2025 12:36 CST)

April Grippo, Director, Division of Water Resources
Tennessee Department of Environment and Conservation

Michael Duncan, Vice President
Limestone Water Utility Operating Company, LLC

Reviewed by:

Samantha Buller-Young (Feb 5, 2025 13:28 EST)

Samantha Buller-Young
BPR # 040466
Assistant Counsel
Department of Environment & Conservation
Knoxville Environmental Field Office
3711 Middlebrook Pike
Knoxville, TN 37921
(865) 440-8303
Samantha.Buller-Young@tn.gov

Reviewed by:

Gary Rikard (Jan 24, 2025 09:24 CST)

Gary Rikard
BPR # 028614
Attorney
Butler Snow
Ridgeland Office
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Ridgeland, Mississippi 39157
Gary.Rikard@butlersnow.com

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Resources
JACKSON ENVIRONMENTAL FIELD OFFICE
1625 Hollywood Drive
JACKSON, TENNESSEE 38305
PHONE (731) 512-1300 STATEWIDE 1-888-891-8332 FAX (731) 661-6283

March 27, 2025 Certified Mail #: 9589 0710 5270 0389 7537 47

Jo Anna Brown, Vice President
Limestone Water Utility Operating Company, LLC
e-copy: JoAnna@cswrgroup.com
1630 Des Peres Rd., Suite 140
Des Peres, MO 63131

Re: Notice of Violation/Compliance Evaluation Inspection
State Operating Permit No. SOP-94011
Shiloh Falls Sprayfield
Counce, Hardin County, Tennessee

Dear Mrs. Jo Anna Brown:

On March 5, 2025, as representatives of the Tennessee Department of Environment and Conservation, Jackson Environmental Field Office, Brad Smith and Libby Williams conducted a compliance evaluation inspection (CEI) of the Shiloh Falls Wastewater Treatment System and Sprayfield to evaluate compliance of your State Operating Permit (SOP). The Division thanks Mark Rodgers and Chad Keeton for their time and assistance.

I. Permit

This permit allows the operation of a wastewater collection system, lagoons, UV disinfection, and fenced spray irrigation system located at latitude 35.030556 and longitude -88.229187 in Hardin County. The design capacity of the system is 0.055 MGD, and is land applied to an estimated 3.3 acres of suitable soil. This system serves approximately 400 connections in the Limestone Water Utility Operating Company service area of Pickwick Dam/Counce.

II. Facility Site Review, Self-Compliance Program, Operation & Maintenance, and Sanitary Sewer Overflows

Shiloh Falls operates a 3-cell facultative lagoon system with a post pressure filtration and UV disinfection settling pond. The media within the sand filter was replaced in August 2024. A new facility for the UV disinfection system and the pressure filter has been installed. There is a total of 24 spray heads at the sprayfield site and signage was properly displayed at the surrounding area. The division recommends keeping back up parts available in case of emergency situations, such as UV disinfection bulbs, back up motor for effluent pump, spare spray nozzles, etc. There are 13 total lift stations in the system, with 2 having been taken out of service. The operator in charge, Mark Rodgers, holds a BNS license and Mr. Chad Keeton holds a grade 2 Collections license.

III. Flow Measurement

Effluent flow to the sprayfield is measured by a turbine type water meter.

IV. Laboratory

All monitoring parameters required by the SOP are being subcontracted to Waypoint Analytical in Jackson, TN. The subcontract laboratory was not evaluated as part of this inspection.

V. Additional Comments and Recommendations

A sludge judge test was performed in May of 2024 and found that sludge levels did not warrant any further action. Limestone Water Utility Operating Company is working with Ascend Engineering to convert the existing sprayfield system to a drip field with additional surrounding acreage in order to try to remedy the current overburdened system.

VII. Violations

On February 6, 2025, Mr. Rudy Collins with the Division of Water Resources, Jackson Environmental Field Office, received a call from a complainant regarding the Shiloh Falls spray field located in Counce, TN. The complaint stated that the nearby stream, Houston Branch, had an odor to it and the Shiloh Falls spray field discharge was running off. Mr. Collins observed the spray irrigation system operating with runoff being visible at three points (see attached photos) on the southwest side of the sprayfield. The runoff appeared clear and did not have a noticeable odor with previous rainfall events having occurred. The sprayfield was turned off that afternoon per Division request.

Ms. Tammy Miller and Ms. Libby Williams met with Shiloh Falls operators, Mark Rodgers, Chad Keeton and Lynn Starrett, on the morning of February 7, 2025. During the investigation, the lower southwest sprayfield was noted to be saturated, and areas of possible runoff were noted. The upper southeast side of the sprayfield was found to be less saturated with no visible signs of runoff. The division was made aware that the lagoon levels were critically high on February 6, 2025, and spraying was necessary to lower the lagoon level, despite the wet conditions due to previous rainfall. When viewed on February 7, 2025, the lagoon level was still high and heavy rain was forecasted for the following weekend. The division advised to spray only on the upper, less saturated southeast side of the sprayfield to lower the lagoon levels and suspend spraying on the lower, southwest side until wet conditions subside.

Please be advised that the discharge of treated wastewater into waters of the state or to locations where it is likely to move to Waters of the State is a violation of your state operating permit. Per your Sate Operating Permit – 94011: **"Instances of surface saturation, ponding or pooling within the land application area as a result of system operation are prohibited. Instances of surface saturation, ponding or pooling shall be promptly investigated and noted on the Monthly Operations Report. Surface saturation, ponding or pooling resulting in the discharge of treated wastewater into Waters of the State or to locations where it is likely to move to Waters of the State shall be immediately reported to the local Environmental Field Office, unless the discharge is separately authorized by a NPDES permit."**

VII. Required Action

On November 19, 2022, plans were approved by the division to convert from a spray field system to an eight-zone drip system in effort to alleviate various permit violations and bring the system into substantial compliance. To date, construction to a drip system has not been initiated. **Please respond, in writing, by April 20, 2025,** with a corrective action plan to operate and maintain the lagoon and spray field to avoid overspraying. Please include future plans for the drip field additions with time frames for completion.

VIII. Conclusion

Compliance with your SOP helps ensure there will be no unpermitted discharge of wastewater to any surface stream or other location where it is likely to enter surface waters. On behalf of the Division, I want to thank you and your staff for your efforts to ensure permit compliance and to protect state water quality. If you have any questions regarding this letter or required response, please contact Ms. Libby Williams at (731) 695-4581 or via email at Libby.Williams@tn.gov.

Sincerely,

Gregory S Overstreet

Gregory S Overstreet
Environmental Program Manager
TDEC-Division of Water Resources

Jackson Environmental Field Office

Enclosure: Photolog

Copy: Mark Rodgers, Mark.Rodgers@clearwatersolutions.com
Chad Keeton, Chad.Keeton@clearwatersolutions.com
Lynn Starrett, Lynn.Starrett@clearwatersolutions.com
Waterlog

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
JACKSON ENVIRONMENTAL FIELD OFFICE
1625 HOLLYWOOD DRIVE JACKSON, TENNESSEE 38305-4316
PHONE (731) 512-1300 STATEWIDE 1-888-891-8332 FAX (731) 661-6283

PHOTOLOG

DATE: 2/6/2025 and 2/7/2025

Site: Shiloh Falls Spray Field SOP-94011

Personnel Present on 2/6/2025: Rudy Collins (TDEC)

Personnel Present on 2/7/2025: Tammy Miller (TDEC), Libby Williams (TDEC), Mark Rodgers (Operator), Chad Keeton(Collections), Lynn Starrett (Manager)

Subject: Spray field run-off complaint

Picture 1

Date of Photo:2/6/2025 Photo taken by: Rudy Collins. Location/Site Name: Shiloh Falls. TDEC Personnel Present: Rudy Collins. Remarks: Pooling and runoff of the sprayfield.

Picture 2

Date of Photo:2/6/2025 Photo taken by: Rudy Collins. Location/Site Name: Shiloh Falls. TDEC Personnel Present: Rudy Collins. Remarks: Runoff from spray field at southwest fence line.

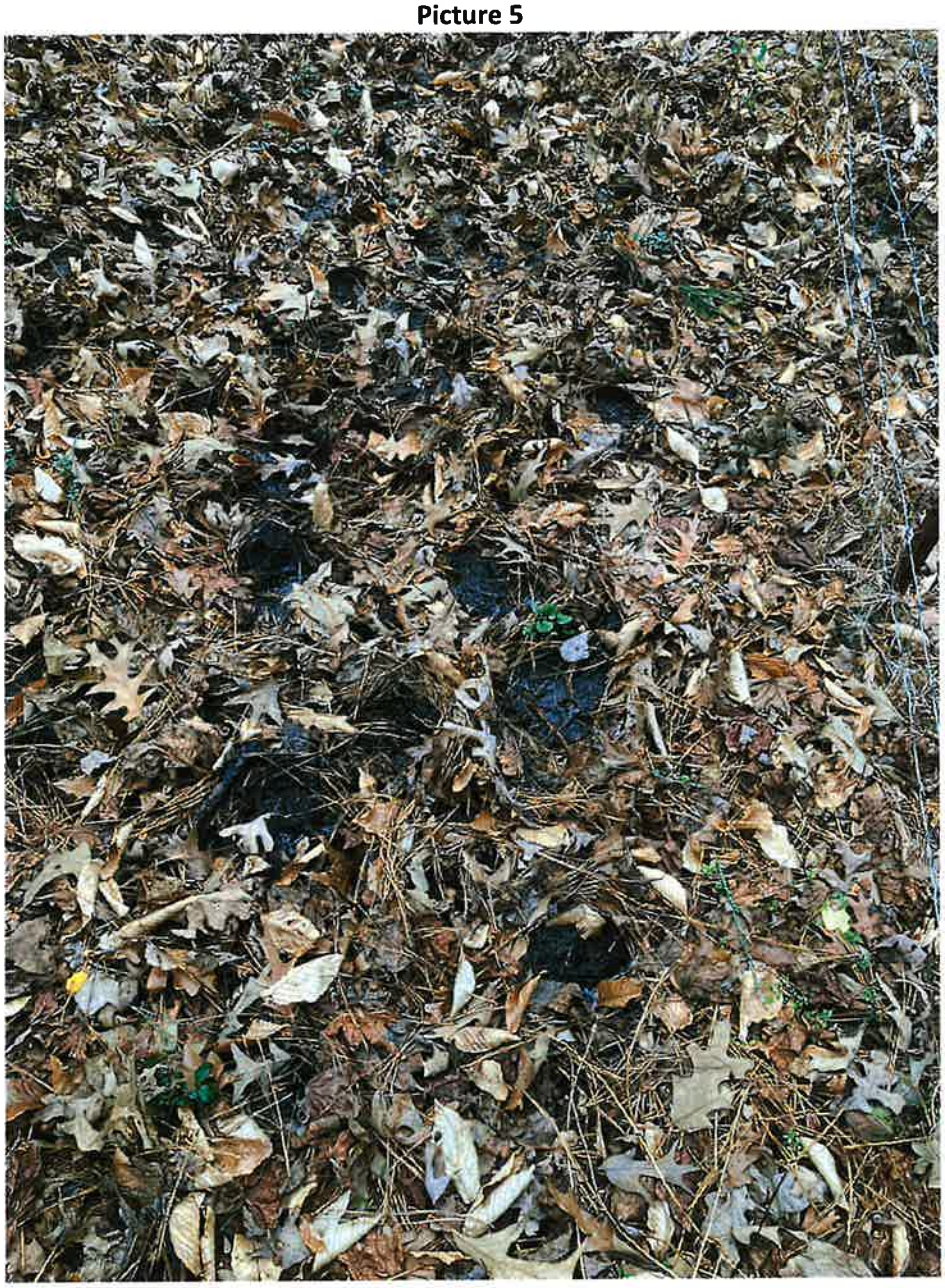
Picture 3

Date of Photo:2/6/2025 Photo taken by: Rudy Collins. Location/Site Name: Shiloh Falls. TDEC Personnel Present: Rudy Collins. Remarks: Runoff at fence line of southwest corner to nearby creek.

Picture 4

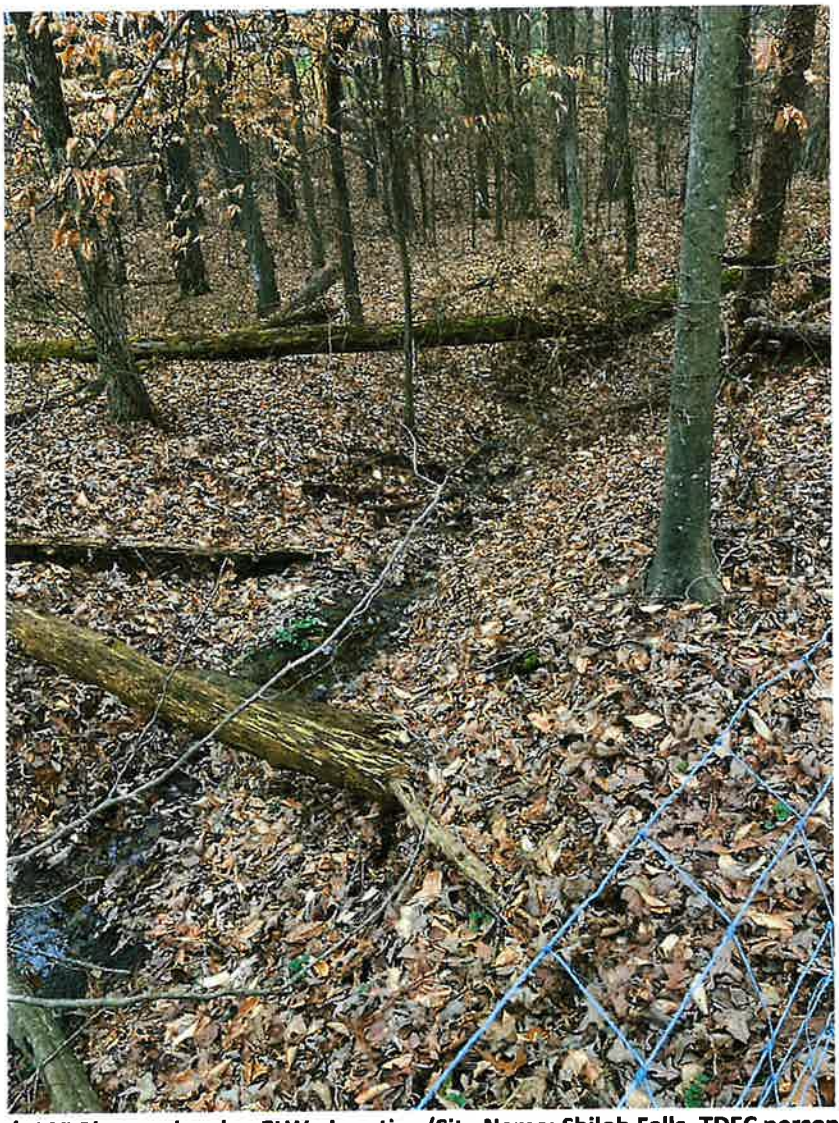
Date of Photo:2/7/2025 Photo taken by: ELW. Location/Site Name: Shiloh Falls. TDEC personnel Present: ELW, TLM. Remarks: Soft, muddy area, possible run off site towards the creek (past the fence)

Picture 5



Date of Photo:2/7/2025 Photo taken by: ELW. Location/Site Name: Shiloh Falls. TDEC personnel Present: ELW, TLM. Remarks: Oversaturated, muddy area along the fence line, possible run off site.

Picture 6



Date of Photo:2/7/2025 Photo taken by: ELW. Location/Site Name: Shiloh Falls. TDEC personnel Present: ELW, TLM. Remarks: The creek past the fence, low/no flow (day after the complaint)

Picture 7

Date of Photo:2/7/2025 Photo taken by: ELW. Location/Site Name: Shiloh Falls. TDEC personnel Present: ELW, TLM. Remarks: Lagoon levels high

Picture 8

Date of Photo:2/7/2025 Photo taken by: ELW. Location/Site Name: Shiloh Falls. TDEC personnel Present: ELW, TLM. Remarks: Lagoon levels high

LIMESTONE WATER
Utility Operating Company
A CSWR Managed Utility

April 15, 2025

Ms. Libby Williams
TDEC - Division of Water Resources
Jackson Environmental Field
Office 1625 Hollywood Drive
Jackson, Tennessee 38305

RE: Shiloh Falls WWTP
SOP No. SOP-94011
Counce, Hardin County, TN

Dear Ms. Williams,

This letter is submitted in response to your March 27th, 2025 Notice of Violation and Compliance Evaluation Inspection (CEI) regarding the Shiloh Falls Wastewater Treatment System and Sprayfield. We appreciate the time and guidance provided by your staff during the recent inspections and subsequent communications.

Please find below our detailed response and proposed corrective action plan:

1. **Drip Field Expansion and System Conversion**
   Limestone Water Utility Operating Company, LLC is actively engaged with CDG Engineering to finalize a revised design for the expansion of the drip dispersal field. The plan includes converting the current sprayfield system to a subsurface drip system to mitigate oversaturation and runoff issues. The prior drip field design, approved in 2022, has expired, and per your direction, a new design is in development.

2. **Design Capacity & Acreage**
   The updated engineering proposal increases the drip field application area from the current 5.7 acres specified in the permit to 7.16 acres, allowing for improved effluent dispersal and compliance.

3. **Communication with TDEC Engineering**
   After a discussion with TDEC Engineering on a separate facility, CDG Engineering discovered that the previous calculations for Shiloh Falls had deficiencies that warranted a rework of plans. TDEC Engineering was informed of the issue and are awaiting a new submittal for review.

LIMESTONE WATER
Utility Operating Company
A CSWR Managed Utility

4. **Topographic Survey and Site Preparation**
   A topographic survey is being pursued to verify land suitability and finalize field layout. Quotes for material access, clearing of vegetation, and other site preparation are underway.

5. **Timeline for Compliance**
   We anticipate a deadline of June 1st 2025 to submit final design plans to TDEC for approval. Upon approval, we estimate a one-year timeline to fully implement and commission the expanded drip field system.

6. **Interim Operational Measures**
   While awaiting construction, the following interim actions are being taken to avoid further violations:

   - Effluent will only be sprayed on the areas that remain unsaturated during significant rain events.
   - The southwest portion of the sprayfield, identified as oversaturated, remains offline during high rain events.
   - Continued monitoring of lagoon levels and weather forecasts to prevent the need for emergency spraying.
   - Monthly reporting will include detailed site observations per SOP guidelines.

7. **Request for Guidance on Interim Operation**
   We respectfully request written guidance from the Division on any additional interim corrective actions or temporary operational authorizations to ensure continued compliance while awaiting project completion.

We appreciate your consideration of this corrective action plan and remain committed to resolving these compliance matters responsibly and promptly. Please do not hesitate to contact me via email at JJJOHNSON@CSWRGROUP.COM should you require additional documentation or clarification.

Sincerely,

Joe Johnson

Joe Johnson
CSWR – EHS Compliance Coordinator

LIMESTONE WATER
Utility Operating Company
A CSWR Managed Utility

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
JACKSON ENVIRONMENTAL FIELD OFFICE
1625 HOLLYWOOD DRIVE
JACKSON, TENNESSEE 38305-4316
PHONE (731) 512-1300 STATEWIDE 1-888-891-8332 FAX (431) 661-6283

April 21, 2025

Mr. Joe Johnson
Limestone Water Utility Operating Co.
1630 Des Peres Road Suite 140
Des Peres, MO 63131

RE: **Corrective Action Plan**
Shiloh Falls Utilities, Inc.
State Operating Permit No. SOP- 94011
Counce, Hardin County, Tennessee

Dear Mr. Johnson:

The Division acknowledges receipt of the Corrective Action Plan (CAP) following the Notice of Violation and Compliance Evaluation Inspection of the above referenced facility. The plan has been reviewed and become part of the record. Thank you for submitting the CAP in a timely manner and for working towards a solution to correct the issues of oversaturation and runoff observed during the complaint investigation. In addition to the requirements listed in the CAP, please notify the Jackson Environmental Field Office within 24 hours if runoff from the site is observed or there is evidence of runoff from the site. Thank you for your continued efforts to ensure compliance with your State Operating Permit.

If you have any questions regarding this letter, please contact me at (731) 695-4581 or via email at Libby.Williams@tn.gov.

Sincerely,

Libby Williams, Environmental Scientist
TDEC-Division of Water Resources
Jackson Environmental Field Office

State of Tennessee
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

July 3, 2025

Mr. Arthur Faiello
e-copy: arthur@cwsrgroup.com
1630 Des Peres Road Suite 140
Des Peres, MO 63131

Subject: **Final Construction Inspection Laurel Creek**
WPN: 22.0282R2 under Permit No. SOP-22008
Sevierville, Sevier County, Tennessee

Dear Mr. Faiello:

On Tuesday, July 1, 2025, representatives with the Division of Water Resources conducted a final construction and start up inspection of the Laurel Creek wastewater treatment plant and land application site. The Division would like to thank site personnel for their courtesy, willingness to work with the Division, and timely responses to Division requests.

The treatment and disposal system consists of a .005 MGD Orenco Advantex AX-100 (1-pod) treatment facility with UV disinfection and land application across one acre (two drip zones).

Inspection of these facilities and this summary shall not be construed as creating a presumption of correct operation or as warranting by the commissioner that the approved facilities will reach the designed goals.

The following observations should not impede commissioning of the facility; however, they should be addressed as soon as possible:

1. It was noted that the wastewater plant was rotated approximately 90 degrees from the site plan on file.

As-builts documenting the change should be sent to DWR.Engineering@tn.gov. Further questions regarding permitting can be directed to Brad Harris, PE at *brad.harris@tn.gov*, for engineering, contact Tim Hill, PE at *timothy.hill@tn.gov*.

Sincerely,

Angela Jones

Angela Jones, P.E.
Manager, Engineering Services Unit

cc: Dr. Doug Hodge, DSH& Associates, hodge.dsh@gmail.com
Ms. Shari Winburn, Field Office Manager, TDEC Division of Water Resources, shari.winburn@tn.gov

Wade Murphy

From: Logan Dickinson <logan.dickinson@gmcnetwork.com>
Sent: Wednesday, July 23, 2025 3:47 PM
To: Wade Murphy
Subject: [EXTERNAL] RE: Application for Limestone Grasslands; TN0027278; Williamson County
Attachments: Grassland NPDES Permit Application_signed.pdf

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Wade,

Thanks for this update. Yes, let me know any comments you have about the de minimis argument once you're able.

See my notes ***below***.

In addition to your notes below, you asked about the I&I… Based on discussion with the owner, we've changed the I&I section slightly as the previous owner did the reduction project prior to Limestone's acquisition.

Thanks,

Logan Dickinson
Project Manager, Engineering

From: Wade Murphy <Wade.Murphy@tn.gov>
Sent: Wednesday, July 16, 2025 3:49 PM
To: Logan Dickinson <logan.dickinson@gmcnetwork.com>
Subject: Application for Limestone Grasslands; TN0027278; Williamson County

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Good afternoon, Logan. I've reviewed the revised application this afternoon and I have some needs and questions. I'll list them here and then we can discuss them.

- Mr. Freeman will need to sign and date the form on numbered Page 12 (Page 17 of 41 of the pdf).***[LD] See attached signed application.***
- The form needs to complete all fields except when the instructions say to "skip to #". Don't leave us to guess the answers. This is mostly as simple as checking yes and no boxes.***[LD] Gladly! Although I'm not***

seeing what boxes we've missed. We missed some in the first application related to solids handling but I updated them. Let me know and I'll address.

- Now the process flow diagram shows that the average daily flow is 0.23 for all units and peak flows are 0.60 and 0.45. So, is the design not increasing the average flow to 0.45 MGD?***[LD] Correct the ADF is 0.23. It was shown incorrectly in the PFD in the initial application but we have corrected the table in this updated PFD and the Engineering Report. The design is 0.45 MGD but per Note 1 under the table on the PFD sheet, the headworks equipment is sized for 0.6 MGD to handle a combination of peak and returned flows. Let me know if this doesn't answer your question.***
- I will still need Engineering Services acceptance of the engineering before I can officially deem the application complete.***[LD] Noted.***

I will need some time to complete my analysis of the de minimis argument, but I anticipate that I can easily conclude de minimis with Franklin adding flow upstream of Limestone's location.

Thanks.

TN Department of Environment Conservation
Wade Murphy, E.I.
Davy Crockett Tower, 9th Fl
500 James Robertson Pkwy
Nashville, TN 37243
(615) 532-0666
wade.murphy@tn.gov

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

Form 2A NPDES

EPA

U.S. Environmental Protection Agency
Application for NPDES Permit to Discharge Wastewater

NEW AND EXISTING PUBLICLY OWNED TREATMENT WORKS

SECTION 1. BASIC APPLICATION INFORMATION FOR ALL APPLICANTS (40 CFR 122.21(J)(1) AND (9))

Facility Information

1.1 Facility name
Grassland STP

Mailing address (street or P.O. box)
1006 Treatment Plant Rd

City or town	State	ZIP code
Franklin	TN	37069

Contact name (first and last)	Title	Phone number	Email address
Lynn Starrett	State Director	(731) 316-5646	lynn.starrett@clearwatersolut

Location address (street, route number, or other specific identifier) ☑ Same as mailing address

City or town	State	ZIP code

1.2 Is this application for a facility that has yet to commence discharge?

☐ Yes ➔ See instructions on data submission requirements for new dischargers. ☑ No

Applicant Information

1.3 Is applicant different from entity listed under Item 1.1 above?

☑ Yes ☐ No ➔ SKIP to Item 1.4.

Applicant name
Central States Water Resources

Applicant address (street or P.O. box)
1630 Des Peres Rd, Suite 140

City or town	State	ZIP code
Des Peres	MO	63131

Contact name (first and last)	Title	Phone number	Email address
Jake Freeman	Director, Engineering	(314) 550-1167	jfreeman@cswrgroup.com

1.4 Is the applicant the facility's owner, operator, or both? (Check only one response.)

☑ Owner ☐ Operator ☐ Both

1.5 To which entity should the NPDES permitting authority send correspondence? (Check only one response.)

☐ Facility ☑ Applicant ☐ Facility and applicant (they are one and the same)

Existing Environmental Permits

1.6 Indicate below any existing environmental permits. (Check all that apply and print or type the corresponding permit number for each.)

Existing Environmental Permits		
☑ NPDES (discharges to surface water) TN0027278	☐ RCRA (hazardous waste)	☐ UIC (underground injection control)
☐ PSD (air emissions)	☐ Nonattainment program (CAA)	☐ NESHAPs (CAA)
☐ Ocean dumping (MPRSA)	☐ Dredge or fill (CWA Section 404)	☐ Other (specify)

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

Collection System and Population Served

1.7 Provide the collection system information requested below for the treatment works.

Municipality Served	Population Served	Collection System Type (indicate percentage)	Ownership Status
Grasslands Area, Unincorporated	1250	100 % separate sanitary sewer ____ % combined storm and sanitary sewer ☐ Unknown	☑ Own ☐ Maintain ☐ Own ☐ Maintain ☐ Own ☐ Maintain
		____ % separate sanitary sewer ____ % combined storm and sanitary sewer ☐ Unknown	☐ Own ☐ Maintain ☐ Own ☐ Maintain ☐ Own ☐ Maintain
		____ % separate sanitary sewer ____ % combined storm and sanitary sewer ☐ Unknown	☐ Own ☐ Maintain ☐ Own ☐ Maintain ☐ Own ☐ Maintain
		____ % separate sanitary sewer ____ % combined storm and sanitary sewer ☐ Unknown	☐ Own ☐ Maintain ☐ Own ☐ Maintain ☐ Own ☐ Maintain
Total Population Served	1250		

Total percentage of each type of sewer line (in miles)	Separate Sanitary Sewer System	Combined Storm and Sanitary Sewer
	100 %	%

Indian Country

1.8 Is the treatment works located in Indian Country?

☐ Yes ☑ No

1.9 Does the facility discharge to a receiving water that flows through Indian Country?

☐ Yes ☑ No

Design and Actual Flow Rates

1.10 Provide design *and* actual flow rates in the designated spaces.

Design Flow Rate
0.45 mgd

Annual Average Flow Rates (Actual)		
Two Years Ago	Last Year	This Year
0.24 mgd	0.24 mgd	0.27 mgd

Maximum Daily Flow Rates (Actual)		
Two Years Ago	Last Year	This Year
0.85 mgd	0.90 mgd	0.66 mgd

Discharge Points by Type

1.11 Provide the total number of effluent discharge points to waters of the United States by type.

Total Number of Effluent Discharge Points by Type				
Treated Effluent	Untreated Effluent	Combined Sewer Overflows	Bypasses	Constructed Emergency Overflows
1				

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

Outfalls and Other Discharge or Disposal Methods

Outfalls Other Than to Waters of the United States

1.12 Does the POTW discharge wastewater to basins, ponds, or other surface impoundments that do not have outlets for discharge to waters of the United States?

☐ Yes ☑ No ➔ SKIP to Item 1.14.

1.13 Provide the location of each surface impoundment and associated discharge information in the table below.

Surface Impoundment Location and Discharge Data

Location	Average Daily Volume Discharged to Surface Impoundment	Continuous or Intermittent (check one)
	gpd	☐ Continuous ☐ Intermittent
	gpd	☐ Continuous ☐ Intermittent
	gpd	☐ Continuous ☐ Intermittent

1.14 Is wastewater applied to land?

☐ Yes ☑ No ➔ SKIP to Item 1.16.

1.15 Provide the land application site and discharge data requested below.

Land Application Site and Discharge Data

Location	Size	Average Daily Volume Applied	Continuous or Intermittent (check one)
	acres	gpd	☐ Continuous ☐ Intermittent
	acres	gpd	☐ Continuous ☐ Intermittent
	acres	gpd	☐ Continuous ☐ Intermittent

1.16 Is effluent transported to another facility for treatment prior to discharge?

☑ Yes ☐ No ➔ SKIP to Item 1.21.

1.17 Describe the means by which the effluent is transported (e.g., tank truck, pipe).

Tank truck

1.18 Is the effluent transported by a party other than the applicant?

☑ Yes ☐ No ➔ SKIP to Item 1.20.

1.19 Provide information on the transporter below.

Transporter Data

Entity name Anglin Septic Tank Service	Mailing address (street or P.O. box) 5095 Kedron Road	
City or town Columbia	State TN	ZIP code 38401
Contact name (first and last) Jack Gray	Title	
Phone number (615) 794-1776	Email address sales@anglinseptic.com	

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

Outfalls and Other Discharge or Disposal Methods Continued

1.20 In the table below, indicate the name, address, contact information, NPDES number, and average daily flow rate of the receiving facility.

Receiving Facility Data			
Facility name Columbia WWTP		Mailing address (street or P.O. box) 1244 Treatment Plant Road	
City or town Columbia		State TN	ZIP code 38401
Contact name (first and last) Hal Haywood		Title	
Phone number (931) 560-1025		Email address hhaywood@columbiatn.gov	
NPDES number of receiving facility (if any) ☐ None TN0056103		Average daily flow rate	7 mgd

1.21 Is the wastewater disposed of in a manner other than those already mentioned in Items 1.14 through 1.21 that do not have outlets to waters of the United States (e.g., underground percolation, underground injection)?

☐ Yes ☑ No ➔ SKIP to Item 1.23.

1.22 Provide information in the table below on these other disposal methods.

Information on Other Disposal Methods				
Disposal Method Description	Location of Disposal Site	Size of Disposal Site	Annual Average Daily Discharge Volume	Continuous or Intermittent (check one)
		acres	gpd	☐ Continuous ☐ Intermittent
		acres	gpd	☐ Continuous ☐ Intermittent
		acres	gpd	☐ Continuous ☐ Intermittent

Variance Requests

1.23 Do you intend to request or renew one or more of the variances authorized at 40 CFR 122.21(n)? (Check all that apply. Consult with your NPDES permitting authority to determine what information needs to be submitted and when.)

☐ Discharges into marine waters (CWA Section 301(h))
☐ Water quality related effluent limitation (CWA Section 302(b)(2))
☑ Not applicable

Contractor Information

1.24 Are any operational or maintenance aspects (related to wastewater treatment and effluent quality) of the treatment works the responsibility of a contractor?

☑ Yes ☐ No ➔SKIP to Section 2.

1.25 Provide location and contact information for each contractor in addition to a description of the contractor's operational and maintenance responsibilities.

Contractor Information			
	Contractor 1	Contractor 2	Contractor 3
Contractor name (company name)	Bar Environmental	G&C Supply	Clearwater Solutions
Mailing address (street or P.O. box)	100 Winner's Circle, Suite 420	1106 State Route 77, PO Box 45	117 Welborn Street
City, state, and ZIP code	Brentwood, TN 37027	Atwood, TN 38220	Greenville, SC, 29601
Contact name (first and last)	Joe Sanford	Travis McCormick	Lynn Starrett
Phone number	(615) 496-4433	(781) 788-6081	(731) 316-5646
Email address	jsanford@bar-enviro.com	tmccormick@gcsupplyco.com	lynn.starrett@clearwatersoluti
Operational and maintenance responsibilities of contractor	Emergency services, pump repair/ replacement, and line repair	Emergency Services	Operation and Maintenance

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

SECTION 2. ADDITIONAL INFORMATION (40 CFR 122.21(J)(1) AND (2))

Design Flow

Outfalls to Waters of the United States

2.1 Does the treatment works have a design flow greater than or equal to 0.1 mgd?

☑ Yes ☐ No ➔ SKIP to Section 3.

Inflow and Infiltration

2.2 Provide the treatment works' current average daily volume of inflow and infiltration.

Average Daily Volume of Inflow and Infiltration
0.33 gpd

Indicate the steps the facility is taking to minimize inflow and infiltration.

An improvements project was initiated in 2019 for a 2.5-mile segment of the collection system, where I&I was a known issue. Completed in 2021, the rehab project resulted in a 26.5% reduction in Average Monthly Flow (AMF). Due to the observed impact of the 2019 project on flows to Grassland STP, CSWR plans to continue improving the collection system

Topographic Map

2.3 Have you attached a topographic map to this application that contains all the required information? (See instructions for specific requirements.)

☑ Yes

Flow Diagram

2.4 Have you attached a process flow diagram or schematic to this application that contains all the required information? (See instructions for specific requirements.)

☑ Yes

Scheduled Improvements and Schedules of Implementation

2.5 Are improvements to the facility scheduled?

☑ Yes ☐ No ➔ SKIP to Section 3.

Briefly list and describe the scheduled improvements.

1. Headworks - Addition of rotary drum screens and vortex grit removal
2. Biological Nutrient Removal - Addition of 3-basin aerobic granulated sludge (AGS) process
3. Filtration - Addition of a disc filter
4. Disinfection - Addition of UV disinfection and removal of chlorine contact chamber

2.6 Provide scheduled or actual dates of completion for improvements.

Scheduled or Actual Dates of Completion for Improvements

Scheduled Improvement (from above)	Affected Outfalls (list outfall number)	Begin Construction (MM/DD/YYYY)	End Construction (MM/DD/YYYY)	Begin Discharge (MM/DD/YYYY)	Attainment of Operational Level (MM/DD/YYYY)
1.	1	01/01/2026	07/14/2027	06/14/2027	07/14/2027
2.	1	01/01/2026	07/14/2027	06/14/2027	07/14/2027
3.	1	01/01/2026	07/14/2027	06/14/2027	**07/14/2027**
4.	1	01/01/2026	07/14/2027	06/14/2027	07/14/2027

2.7 Have appropriate permits/clearances concerning other federal/state requirements been obtained? Briefly explain your response.

☐ Yes ☐ No ☑ None required or applicable

Explanation:

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

SECTION 3. INFORMATION ON EFFLUENT DISCHARGES (40 CFR 122.21(J)(3) TO (5))

Description of Outfalls

3.1 Provide the following information for each outfall. (Attach additional sheets if you have more than three outfalls.)

	Outfall Number 01	Outfall Number _____	Outfall Number _____
State	Tennessee		
County	Williamson		
City or town	Unincorporated		
Distance from shore	10 ft.	ft.	ft.
Depth below surface	Varies ft.	ft.	ft.
Average daily flow rate	0.45 mgd	mgd	mgd
Latitude	36° 00' 37.7" N		
Longitude	86° 53' 45.0 W		

Seasonal or Periodic Discharge Data

3.2 Do any of the outfalls described under Item 3.1 have seasonal or periodic discharges?

☐ Yes ☑ No ➔ SKIP to Item 3.4.

3.3 If so, provide the following information for each applicable outfall.

	Outfall Number _____	Outfall Number _____	Outfall Number _____
Number of times per year discharge occurs			
Average duration of each discharge (specify units)			
Average flow of each discharge	mgd	mgd	mgd
Months in which discharge occurs			

Diffuser Type

3.4 Are any of the outfalls listed under Item 3.1 equipped with a diffuser?

☐ Yes ☑ No ➔ SKIP to Item 3.6.

3.5 Briefly describe the diffuser type at each applicable outfall.

	Outfall Number _____	Outfall Number _____	Outfall Number _____

Waters of the U.S.

3.6 Does the treatment works discharge or plan to discharge wastewater to waters of the United States from one or more discharge points?

☑ Yes ☐ No ➔ SKIP to Section 6.

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

Receiving Water Description

3.7 Provide the receiving water and related information (if known) for each outfall.

	Outfall Number 01	Outfall Number _____	Outfall Number _____
Receiving water name	Harpeth River		
Name of watershed, river, or stream system	Harpeth River Watershed		
Natural Resources Conservation Service 14-digit watershed code	Unknown		
Name of state management/river basin	Cumberland		
U.S. Geological Survey 8-digit hydrologic cataloging unit code	05130204		
Critical low flow (acute)	10.87 cfs	cfs	cfs
Critical low flow (chronic)	4.28 cfs	cfs	cfs
Total hardness at critical low flow	Unknown mg/L of $CaCO_3$	mg/L of $CaCO_3$	mg/L of $CaCO_3$

Treatment Description

3.8 Provide the following information describing the treatment provided for discharges from each outfall.

	Outfall Number 001	Outfall Number _____	Outfall Number _____
Highest Level of Treatment (check all that apply per outfall)	☐ Primary ☐ Equivalent to secondary ☑ Secondary ☐ Advanced ☐ Other (specify) _____	☐ Primary ☐ Equivalent to secondary ☐ Secondary ☐ Advanced ☐ Other (specify) _____	☐ Primary ☐ Equivalent to secondary ☐ Secondary ☐ Advanced ☐ Other (specify) _____
Design Removal Rates by Outfall			
BOD_5 or $CBOD_5$	98 %	%	%
TSS	97 %	%	%
Phosphorus	☐ Not applicable 83 %	☐ Not applicable %	☐ Not applicable %
Nitrogen	☑ Not applicable %	☐ Not applicable %	☐ Not applicable %
Other (specify) _____	☑ Not applicable %	☐ Not applicable %	☐ Not applicable %

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

Treatment Description Continued

3.9 Describe the type of disinfection used for the effluent from each outfall in the table below. If disinfection varies by season, describe in the table below.

	Outfall Number 001	Outfall Number _____	Outfall Number _____
Disinfection type	UV		
Seasons used	All		
Dechlorination used?	☑ Not applicable ☐ Yes ☐ No	☐ Not applicable ☐ Yes ☐ No	☐ Not applicable ☐ Yes ☐ No

Effluent Testing Data

3.10 Have you completed monitoring for all Table A parameters and attached the results to the application package?

☑ Yes

3.11 Have you conducted any WET tests during the 4.5 years prior to the date of the application on any of the facility's discharges or on any receiving water near the discharge points?

☐ Yes ☑ No ➔ SKIP to Item 3.13.

3.12 Indicate the number of acute and chronic WET tests conducted since the last permit reissuance of the facility's discharges by outfall number or of the receiving water near the discharge points.

	Outfall Number _____		Outfall Number _____		Outfall Number _____	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Number of tests of discharge water						
Number of tests of receiving water						

3.13 Does the treatment works have a design flow greater than or equal to 0.1 mgd?

☑ Yes ☐ No ➔ SKIP to Item 3.16.

3.14 Does the POTW use chlorine for disinfection, use chlorine elsewhere in the treatment process, or otherwise have reasonable potential to discharge chlorine in its effluent?

☐ Yes ➔ Complete Table B, including chlorine. ☑ No ➔ Complete Table B, omitting chlorine.

3.15 Have you completed monitoring for all applicable Table B pollutants and attached the results to this application package?

☑ Yes

3.16 Does one or more of the following conditions apply?

- The facility has a design flow greater than or equal to 1 mgd.
- The POTW has an approved pretreatment program or is required to develop such a program.
- The NPDES permitting authority has informed the POTW that it must sample for the parameters in Table C, must sample other additional parameters (Table D), or submit the results of WET tests for acute or chronic toxicity for each of its discharge outfalls (Table E).

☐ Yes ➔ Complete Tables C, D, and E as applicable. ☑ No ➔ SKIP to Section 4.

3.17 Have you completed monitoring for all Table C pollutants and attached the results to this application package?

☐ Yes

3.18 Have you completed monitoring for all Table D pollutants required by your NPDES permitting authority and attached the results to this application package?

☐ Yes ☐ No additional sampling required by NPDES permitting authority.

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

Effluent Testing Data Continued

3.19 Has the POTW conducted either (1) minimum of four quarterly WET tests for one year preceding this permit application or (2) at least four annual WET tests in the past 4.5 years?

☐ Yes ☐ No ➔ Complete tests and Table E and SKIP to Item 3.26.

3.20 Have you previously submitted the results of the above tests to your NPDES permitting authority?

☐ Yes ☐ No ➔ Provide results in Table E and SKIP to Item 3.26.

3.21 Indicate the dates the data were submitted to your NPDES permitting authority and provide a summary of the results.

Date(s) Submitted (MM/DD/YYYY)	Summary of Results

3.22 Regardless of how you provided your WET testing data to the NPDES permitting authority, did any of the tests result in toxicity?

☐ Yes ☐ No ➔ SKIP to Item 3.26.

3.23 Describe the cause(s) of the toxicity:

3.24 Has the treatment works conducted a toxicity reduction evaluation?

☐ Yes ☐ No ➔ SKIP to Item 3.26.

3.25 Provide details of any toxicity reduction evaluations conducted.

3.26 Have you completed Table E for all applicable outfalls and attached the results to the application package?

☐ Yes ☐ Not applicable because previously submitted information to the NPDES permitting authority.

SECTION 4. INDUSTRIAL DISCHARGES AND HAZARDOUS WASTES (40 CFR 122.21(J)(6) AND (7))

Industrial Discharges and Hazardous Wastes

4.1 Does the POTW receive discharges from SIUs or NSCIUs? (See instructions for definitions of SIUs and NSCIUs.)

☐ Yes ☑ No ➔ SKIP to Item 4.7.

4.2 Indicate the number of SIUs and NSCIUs that discharge to the POTW.

Number of SIUs	Number of NSCIUs

4.3 Does the POTW have an approved pretreatment program?

☐ Yes ☐ No

4.4 Have you submitted either of the following to the NPDES permitting authority that contains information substantially identical to that required in Table F: (1) a pretreatment program annual report submitted within one year of the application or (2) a pretreatment program?

☐ Yes ☐ No ➔ SKIP to Item 4.6.

4.5 Identify the title and date of the annual report or pretreatment program referenced in Item 4.4. SKIP to Item 4.7.

4.6 Have you completed and attached Table F to this application package?

☐ Yes

EPA Identification Number	NPDES Permit Number	Facility Name	OMB No. 2040-0004 Expires 07/31/2026
	TN0027278	Grassland STP	

Industrial Discharges and Hazardous Wastes Continued

4.7 Does the POTW receive, or has it been notified that it will receive, by truck, rail, or dedicated pipe, any wastes that are regulated as RCRA hazardous wastes pursuant to 40 CFR 261?

☐ Yes ☑ No ➔ SKIP to Item 4.9.

4.8 If yes, provide the following information:

Hazardous Waste Number	Waste Transport Method (check all that apply)	Annual Amount of Waste Received	Units
	☐ Truck ☐ Rail ☐ Dedicated pipe ☐ Other (specify) _____		
	☐ Truck ☐ Rail ☐ Dedicated pipe ☐ Other (specify) _____		
	☐ Truck ☐ Rail ☐ Dedicated pipe ☐ Other (specify) _____		

4.9 Does the POTW receive, or has it been notified that it will receive, wastewaters that originate from remedial activities, including those undertaken pursuant to CERCLA and Sections 3004(7) or 3008(h) of RCRA?

☐ Yes ☑ No ➔ SKIP to Section 5.

4.10 Does the POTW receive (or expect to receive) less than 15 kilograms per month of non-acute hazardous wastes as specified in 40 CFR 261.30(d) and 261.33(e)?

☐ Yes ➔ SKIP to Section 5. ☐ No

4.11 Have you reported the following information in an attachment to this application: identification and description of the site(s) or facility(ies) at which the wastewater originates; the identities of the wastewater's hazardous constituents; and the extent of treatment, if any, the wastewater receives or will receive before entering the POTW?

☐ Yes

SECTION 5. COMBINED SEWER OVERFLOWS (40 CFR 122.21(J)(8))

CSO Map and Diagram

5.1 Does the treatment works have a combined sewer system?

☐ Yes ☑ No ➔ SKIP to Section 6.

5.2 Have you attached a CSO system map to this application? (See instructions for map requirements.)

☐ Yes

5.3 Have you attached a CSO system diagram to this application? (See instructions for diagram requirements.)

☐ Yes

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CSO Outfall Description

5.4 For each CSO outfall, provide the following information. (Attach additional sheets as necessary.)

	CSO Outfall Number ____	CSO Outfall Number _____	CSO Outfall Number _____
City or town			
State and ZIP code			
County			
Latitude			
Longitude			
Distance from shore	ft.	ft.	ft.
Depth below surface	ft.	ft.	ft.

CSO Monitoring

5.5 Did the POTW monitor any of the following items in the past year for its CSO outfalls?

	CSO Outfall Number ____	CSO Outfall Number _____	CSO Outfall Number _____
Rainfall	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
CSO flow volume	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
CSO pollutant concentrations	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Receiving water quality	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
CSO frequency	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Number of storm events	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

CSO Events in Past Year

5.6 Provide the following information for each of your CSO outfalls.

	CSO Outfall Number ____	CSO Outfall Number ____	CSO Outfall Number ____
Number of CSO events in the past year	events	events	events
Average duration per event	hours ☐ Actual or ☐ Estimated	hours ☐ Actual or ☐ Estimated	hours ☐ Actual or ☐ Estimated
Average volume per event	million gallons ☐ Actual or ☐ Estimated	million gallons ☐ Actual or ☐ Estimated	million gallons ☐ Actual or ☐ Estimated
Minimum rainfall causing a CSO event in last year	inches of rainfall ☐ Actual or ☐ Estimated	inches of rainfall ☐ Actual or ☐ Estimated	inches of rainfall ☐ Actual or ☐ Estimated

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CSO Receiving Waters

5.7 Provide the information in the table below for each of your CSO outfalls.

	CSO Outfall Number ____	CSO Outfall Number ____	CSO Outfall Number ____
Receiving water name			
Name of watershed/ stream system			
Natural Resources Conservation Service 14-digit watershed code (if known)	☐ Unknown	☐ Unknown	☐ Unknown
Name of state management/river basin			
U.S. Geological Survey 8-Digit Hydrologic Unit Code (if known)	☐ Unknown	☐ Unknown	☐ Unknown
Description of known water quality impacts on receiving stream by CSO (see instructions for examples)			

SECTION 6. CHECKLIST AND CERTIFICATION STATEMENT (40 CFR 122.22(A) AND (D))

Checklist and Certification Statement

6.1 In Column 1 below, mark the sections of Form 2A that you have completed and are submitting with your application. For each section, specify in Column 2 any attachments that you are enclosing to alert the permitting authority. Note that not all applicants are required to provide attachments.

Column 1	Column 2	
☑ Section 1: Basic Application Information for All Applicants	☐ w/ variance request(s)	☐ w/ additional attachments
☑ Section 2: Additional Information	☑ w/ topographic map ☐ w/ additional attachments	☑ w/ process flow diagram
☑ Section 3: Information on Effluent Discharges	☑ w/ Table A ☑ w/ Table B ☐ w/ Table C	☐ w/ Table D ☐ w/ Table E ☐ w/ additional attachments
☐ Section 4: Industrial Discharges and Hazardous Wastes	☐ w/ SIU and NSCIU attachments ☐ w/ additional attachments	☐ w/ Table F
☐ Section 5: Combined Sewer Overflows	☐ w/ CSO map ☐ w/ CSO system diagram	☐ w/ additional attachments
☑ Section 6: Checklist and Certification Statement	☐ w/ attachments	

6.2 Provide the following certification. (See instructions to determine the appropriate person to sign the application.)

Certification Statement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly 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.

Name (print or type first and last name)	Official title
Jacob Freeman	Engineering Director
Signature	**Date signed**
	07/23/2025

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TABLE A. EFFLUENT PARAMETERS FOR ALL POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge			Analytical Method[1]	ML or MDL (include units)
	Value	Units	Value	Units	Number of Samples		
Biochemical oxygen demand ☐ BOD_5 or ☑ $CBOD_5$ (report one)	15.4	mg/L	2.85	mg/L	154	SM 5210 B-2011	2 mg/L ☑ ML ☐ MDL
Fecal coliform	73	mg/L	31.3	mg/L	3	SM 9223b	³N/100 mL ☑ ML ☐ MDL
Design flow rate	0.676	MGD	0.248	MGD	365		
pH (minimum)	6.94	Units					
pH (maximum)	7.77	Units					
Temperature (winter)	20.3	°C	15.2	°C	127		
Temperature (summer)	24.4	°C	20.7	°C	109		
Total suspended solids (TSS)	12.2	mg/L	3.32	mg/L	153	SM 254 D-2011	2.5 ☑ ML ☐ MDL

[1] Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR Chapter I, Subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE B. EFFLUENT PARAMETERS FOR ALL POTWS WITH A FLOW EQUAL TO OR GREATER THAN 0.1 MGD

Pollutant	Maximum Daily Discharge		Average Daily Discharge			Analytical Method[1]	ML or MDL (include units)
	Value	Units	Value	Units	Number of Samples		
Ammonia (as N)	7.40	mg/L	0.492	mg/L	155	350.1, Rv.2 (1993)	0.100mg/L ☑ ML ☐ MDL
Chlorine (total residual, TRC)[2]	0.150	mg/L	0.033	mg/L	259	4500-CL	0.1 mg/L ☑ ML ☐ MDL
Dissolved oxygen	9.4	mg/L	7.45	mg/L	258	4500-O	.0.5 mg/L ☑ ML ☐ MDL
Nitrate/nitrite	10.2	mg/L	6.51	mg/L	25	353.2, Rv.2 (1993)	0.250 ☑ ML ☐ MDL
Kjeldahl nitrogen	2.68	mg/L	1.796	mg/L	24	351.2, Rv.2 (1993)	0.20 mg/L ☑ ML ☐ MDL
Oil and grease	5	mg/L	5	mg/L	4	EPA 1664B	5.0 mg/L ☑ ML ☐ MDL
Phosphorus	2.64	mg/L	1.775	mg/L	25	200.7, Rv.4 (1994)	0.8 mg/L ☑ ML ☐ MDL
Total dissolved solids	296	mg/L	282.5	mg/L	4	SM 2540 C-2011	10 mg/L ☑ ML ☐ MDL

[1] Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR Chapter I, Subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

[2] Facilities that do not use chlorine for disinfection, do not use chlorine elsewhere in the treatment process, and have no reasonable potential to discharge chlorine in their effluent are not required to report data for chlorine.

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge			Analytical Method[1]	ML or MDL (include units)
	Value	Units	Value	Units	Number of Samples		
Metals, Cyanide, and Total Phenols							
Hardness (as $CaCO_3$)							☐ ML ☐ MDL
Antimony, total recoverable							☐ ML ☐ MDL
Arsenic, total recoverable							☐ ML ☐ MDL
Beryllium, total recoverable							☐ ML ☐ MDL
Cadmium, total recoverable							☐ ML ☐ MDL
Chromium, total recoverable							☐ ML ☐ MDL
Copper, total recoverable							☐ ML ☐ MDL
Lead, total recoverable							☐ ML ☐ MDL
Mercury, total recoverable							☐ ML ☐ MDL
Nickel, total recoverable							☐ ML ☐ MDL
Selenium, total recoverable							☐ ML ☐ MDL
Silver, total recoverable							☐ ML ☐ MDL
Thallium, total recoverable							☐ ML ☐ MDL
Zinc, total recoverable							☐ ML ☐ MDL
Cyanide							☐ ML ☐ MDL
Total phenolic compounds							☐ ML ☐ MDL
Volatile Organic Compounds							
Acrolein							☐ ML ☐ MDL
Acrylonitrile							☐ ML ☐ MDL
Benzene							☐ ML ☐ MDL
Bromoform							☐ ML ☐ MDL

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge			Analytical Method[1]	ML or MDL (include units)
	Value	Units	Value	Units	Number of Samples		
Carbon tetrachloride							☐ ML ☐ MDL
Chlorobenzene							☐ ML ☐ MDL
Chlorodibromomethane							☐ ML ☐ MDL
Chloroethane							☐ ML ☐ MDL
2-chloroethylvinyl ether							☐ ML ☐ MDL
Chloroform							☐ ML ☐ MDL
Dichlorobromomethane							☐ ML ☐ MDL
1,1-dichloroethane							☐ ML ☐ MDL
1,2-dichloroethane							☐ ML ☐ MDL
trans-1,2-dichloroethylene							☐ ML ☐ MDL
1,1-dichloroethylene							☐ ML ☐ MDL
1,2-dichloropropane							☐ ML ☐ MDL
1,3-dichloropropylene							☐ ML ☐ MDL
Ethylbenzene							☐ ML ☐ MDL
Methyl bromide							☐ ML ☐ MDL
Methyl chloride							☐ ML ☐ MDL
Methylene chloride							☐ ML ☐ MDL
1,1,2,2-tetrachloroethane							☐ ML ☐ MDL
Tetrachloroethylene							☐ ML ☐ MDL
Toluene							☐ ML ☐ MDL
1,1,1-trichloroethane							☐ ML ☐ MDL
1,1,2-trichloroethane							☐ ML ☐ MDL

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge			Analytical Method[1]	ML or MDL (include units)
	Value	Units	Value	Units	Number of Samples		
Trichloroethylene							☐ ML ☐ MDL
Vinyl chloride							☐ ML ☐ MDL
Acid-Extractable Compounds							
p-chloro-m-cresol							☐ ML ☐ MDL
2-chlorophenol							☐ ML ☐ MDL
2,4-dichlorophenol							☐ ML ☐ MDL
2,4-dimethylphenol							☐ ML ☐ MDL
4,6-dinitro-o-cresol							☐ ML ☐ MDL
2,4-dinitrophenol							☐ ML ☐ MDL
2-nitrophenol							☐ ML ☐ MDL
4-nitrophenol							☐ ML ☐ MDL
Pentachlorophenol							☐ ML ☐ MDL
Phenol							☐ ML ☐ MDL
2,4,6-trichlorophenol							☐ ML ☐ MDL
Base-Neutral Compounds							
Acenaphthene							☐ ML ☐ MDL
Acenaphthylene							☐ ML ☐ MDL
Anthracene							☐ ML ☐ MDL
Benzidine							☐ ML ☐ MDL
Benzo(a)anthracene							☐ ML ☐ MDL
Benzo(a)pyrene							☐ ML ☐ MDL
3,4-benzofluoranthene							☐ ML ☐ MDL

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge			Analytical Method[1]	ML or MDL (include units)
	Value	Units	Value	Units	Number of Samples		
Benzo(ghi)perylene							☐ ML ☐ MDL
Benzo(k)fluoranthene							☐ ML ☐ MDL
Bis (2-chloroethoxy) methane							☐ ML ☐ MDL
Bis (2-chloroethyl) ether							☐ ML ☐ MDL
Bis (2-chloroisopropyl) ether							☐ ML ☐ MDL
Bis (2-ethylhexyl) phthalate							☐ ML ☐ MDL
4-bromophenyl phenyl ether							☐ ML ☐ MDL
Butyl benzyl phthalate							☐ ML ☐ MDL
2-chloronaphthalene							☐ ML ☐ MDL
4-chlorophenyl phenyl ether							☐ ML ☐ MDL
Chrysene							☐ ML ☐ MDL
di-n-butyl phthalate							☐ ML ☐ MDL
di-n-octyl phthalate							☐ ML ☐ MDL
Dibenzo(a,h)anthracene							☐ ML ☐ MDL
1,2-dichlorobenzene							☐ ML ☐ MDL
1,3-dichlorobenzene							☐ ML ☐ MDL
1,4-dichlorobenzene							☐ ML ☐ MDL
3,3-dichlorobenzidine							☐ ML ☐ MDL
Diethyl phthalate							☐ ML ☐ MDL
Dimethyl phthalate							☐ ML ☐ MDL
2,4-dinitrotoluene							☐ ML ☐ MDL
2,6-dinitrotoluene							☐ ML ☐ MDL

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TABLE C. EFFLUENT PARAMETERS FOR SELECTED POTWS

Pollutant	Maximum Daily Discharge		Average Daily Discharge			Analytical Method[1]	ML or MDL (include units)
	Value	Units	Value	Units	Number of Samples		
1,2-diphenylhydrazine							☐ ML ☐ MDL
Fluoranthene							☐ ML ☐ MDL
Fluorene							☐ ML ☐ MDL
Hexachlorobenzene							☐ ML ☐ MDL
Hexachlorobutadiene							☐ ML ☐ MDL
Hexachlorocyclo-pentadiene							☐ ML ☐ MDL
Hexachloroethane							☐ ML ☐ MDL
Indeno(1,2,3-cd)pyrene							☐ ML ☐ MDL
Isophorone							☐ ML ☐ MDL
Naphthalene							☐ ML ☐ MDL
Nitrobenzene							☐ ML ☐ MDL
N-nitrosodi-n-propylamine							☐ ML ☐ MDL
N-nitrosodimethylamine							☐ ML ☐ MDL
N-nitrosodiphenylamine							☐ ML ☐ MDL
Phenanthrene							☐ ML ☐ MDL
Pyrene							☐ ML ☐ MDL
1,2,4-trichlorobenzene							☐ ML ☐ MDL

[1] Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR Chapter I, Subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE D. ADDITIONAL POLLUTANTS AS REQUIRED BY NPDES PERMITTING AUTHORITY

Pollutant (list)	Maximum Daily Discharge		Average Daily Discharge			Analytical Method[1]	ML or MDL (include units)
	Value	Units	Value	Units	Number of Samples		
☐ No additional sampling is required by NPDES permitting authority.							
							☐ ML ☐ MDL
							☐ ML ☐ MDL
							☐ ML ☐ MDL
							☐ ML ☐ MDL
							☐ ML ☐ MDL
							☐ ML ☐ MDL
							☐ ML ☐ MDL
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							☐ ML ☐ MDL
							☐ ML ☐ MDL
							☐ ML ☐ MDL
							☐ ML ☐ MDL
							☐ ML ☐ MDL

[1] Sampling shall be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136 for the analysis of pollutants or pollutant parameters or required under 40 CFR Chapter I, Subchapter N or O. See instructions and 40 CFR 122.21(e)(3).

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TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

	Test Number _____	Test Number _____	Test Number _____
Test Information			
Test species			
Age at initiation of test			
Outfall number			
Date sample collected			
Date test started			
Duration			
Toxicity Test Methods			
Test method number			
Manual title			
Edition number and year of publication			
Page number(s)			
Sample Type			
Check one:	☐ Grab ☐ 24-hour composite	☐ Grab ☐ 24-hour composite	☐ Grab ☐ 24-hour composite
Sample Location			
Check one:	☐ Before disinfection ☐ After disinfection ☐ After dechlorination	☐ Before disinfection ☐ After disinfection ☐ After dechlorination	☐ Before disinfection ☐ After disinfection ☐ After dechlorination
Point in Treatment Process			
Describe the point in the treatment process at which the sample was collected for each test.			
Toxicity Type			
Indicate for each test whether the test was performed to assess acute or chronic toxicity, or both. (Check one response.)	☐ Acute ☐ Chronic ☐ Both	☐ Acute ☐ Chronic ☐ Both	☐ Acute ☐ Chronic ☐ Both

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TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

	Test Number _____	Test Number _____	Test Number _____
Test Type			
Indicate the type of test performed. (Check one response.)	☐ Static ☐ Static-renewal ☐ Flow-through	☐ Static ☐ Static-renewal ☐ Flow-through	☐ Static ☐ Static-renewal ☐ Flow-through
Source of Dilution Water			
Indicate the source of dilution water. (Check one response.)	☐ Laboratory water ☐ Receiving water	☐ Laboratory water ☐ Receiving water	☐ Laboratory water ☐ Receiving water
If laboratory water, specify type.			
If receiving water, specify source.			
Type of Dilution Water			
Indicate the type of dilution water. If salt water, specify "natural" or type of artificial sea salts or brine used.	☐ Fresh water ☐ Salt water (specify)	☐ Fresh water ☐ Salt water (specify)	☐ Fresh water ☐ Salt water (specify)
Percentage Effluent Used			
Specify the percentage effluent used for all concentrations in the test series.			

Parameters Tested						
Check the parameters tested.	☐ pH ☐ Salinity ☐ Temperature	☐ Ammonia ☐ Dissolved oxygen	☐ pH ☐ Salinity ☐ Temperature	☐ Ammonia ☐ Dissolved oxygen	☐ pH ☐ Salinity ☐ Temperature	☐ Ammonia ☐ Dissolved oxygen

Acute Test Results			
Percent survival in 100% effluent	%	%	%
LC_{50}			
95% confidence interval	%	%	%
Control percent survival	%	%	%

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TABLE E. EFFLUENT MONITORING FOR WHOLE EFFLUENT TOXICITY

The table provides response space for one whole effluent toxicity sample. Copy the table to report additional test results.

	Test Number _____		Test Number _____		Test Number _____	
Acute Test Results Continued						
Other (describe)						
Chronic Test Results						
NOEC	%		%		%	
IC_{25}	%		%		%	
Control percent survival	%		%		%	
Other (describe)						
Quality Control/Quality Assurance						
Is reference toxicant data available?	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No
Was reference toxicant test within acceptable bounds?	☐ Yes	☐ No	☐ Yes	☐ No	☐ Yes	☐ No
What date was reference toxicant test run (MM/DD/YYYY)?						
Other (describe)						

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TABLE F. INDUSTRIAL DISCHARGE INFORMATION

Response space is provided for three SIUs. Copy the table to report information for additional SIUs.

	SIU ____	SIU ____	SIU ____
Name of SIU			
Mailing address (street or P.O. box)			
City, state, and ZIP code			
Describe all industrial processes that affect or contribute to the discharge.			
List the principal products and raw materials that affect or contribute to the SIU's discharge.			
Indicate the average daily volume of wastewater discharged by the SIU.	gpd	gpd	gpd
How much of the average daily volume is attributable to process flow?	gpd	gpd	gpd
How much of the average daily volume is attributable to non-process flow?	gpd	gpd	gpd
Is the SIU subject to local limits?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
Is the SIU subject to categorical standards?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

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TABLE F. INDUSTRIAL DISCHARGE INFORMATION

Response space is provided for three SIUs. Copy the table to report information for additional SIUs.

	SIU ____	SIU ____	SIU ____
Under what categories and subcategories is the SIU subject?			
Has the POTW experienced problems (e.g., upsets, pass-through interferences) in the past 4.5 years that are attributable to the SIU?	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
If yes, describe.			

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DESIGN CAPACITY (MGD)	INFLUENT PARSHALL FLUME	ROTARY DRUM SCREENS	GRIT REMOVAL	EQUALIZATION BASIN	AGS BASINS	POST EQUALIZATION BASIN	CLOTH MEDIA DISC FILTER	UV DISINFECTION	EFFLUENT PARSHALL FLUME	SLUDGE THICKENING TANK	SLUDGE HOLDING TANK
AVERAGE DAILY FLOW (ADF)	0.23	0.23	0.23	0.185 MG VOLUME	0.23	0.073 MG VOLUME	0.23	0.23	0.23	0.002 MG VOLUME	0.032 MG VOLUME
MAXIMUM MONTHLY FLOW (MMF)	0.60	0.60	0.60		0.45		0.45	0.45	0.45		
PEAK HOURLY FLOW (PHF)	1.35	1.80	1.80		1.35		1.35	1.35	1.35		

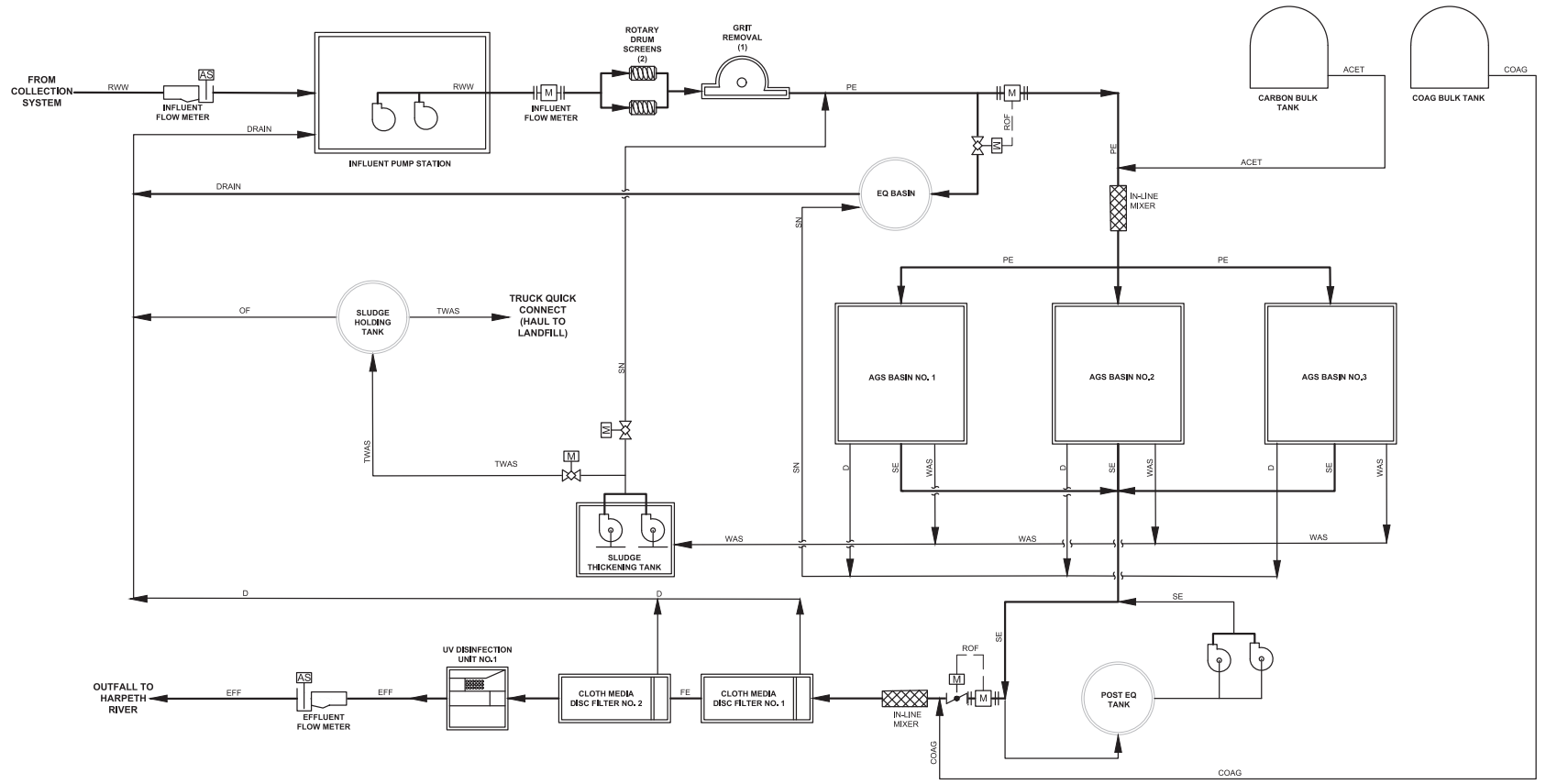
1. ROTARY DRUM SCREENS & GRIT REMOVAL HAVE A GREATER CAPACITY DUE TO TREATING A COMBINATION OF PEAK AND RETURNED FLOWS
2. FOLLOWING EQUALIZATION, EXCESS FLOWS ARE SHAVED AND THE PEAK HOURLY FLOW IS REGULATED TO 1.35 MGD

PROCESS FLOW DIAGRAM NOTES:

1. EQUIPMENT ARRANGEMENTS ARE BASED ON THE EQUIPMENT BASIS OF DESIGN IN THE SPECIFICATIONS. CHANGES TO THE LISTED BASIS OF DESIGN RESULTING IN DIFFERENCES OF THE SHOWN ARRANGEMENT SHALL BE THE CONTRACTORS RESPONSIBILITY. NO PAYMENT WILL BE ISSUED TO THE CONTRACTOR FOR MODIFICATIONS.
2. THE CONFIGURATION SHOWN ON THE PROCESS FLOW SCHEMATIC SHALL NOT BE USED FOR CONSTRUCTION BECAUSE THE LAYOUT IN THE PROCESS FLOW DIAGRAM IS NOT TO SCALE AND IS NOT REPRESENTATIVE OF THE ACTUAL FIELD LAYOUT.

FLOW LINES

- NEW PRIMARY FLOW PATH
- NEW SECONDARY FLOW PATH
- FUTURE FLOW PATH
- AS — AUTOMATIC SAMPLER



GMC

3310 West End Avenue
Suite 420
Nashville, TN 37203
T 615.333.7200

1" 0" 6" 1"

ISSUE	DATE
30% Submittal	07.24.2024
60% Submittal	11.01.2024
90% Submittal	03.26.2025
100% Submittal	05.23.2025

Project Manager:	LD
Engineer:	LD
Designer:	GS/KD
Drawn By:	LS

GRASSLAND STP
IMPROVEMENTS
Central States Water Resources
FRANKLIN, TENNESSEE

CNAS230028

NOT - RELEASED FOR CONSTRUCTION

PROCESS FLOW DIAGRAM

G-007

DRAWING FILE: C:\Users\lamith\DOCACDbsdGMC\Grassland STP Improvements\CAD Files\CAD Files\DWG\02 Sheets\01 General\G-007 Process Flow Diagram.dwg
PLOTTED: May 22, 2025 - 9:38am

This drawing is and shall remain the property of Goodwyn, Mills and Cawood, Inc. (GMC) and Goodwyn Mills Cawood LLC (GMC). Unauthorized use of any kind including use on other projects is prohibited. In the event that a conflict arises between the sealed drawings and the electronic files, the sealed drawings will go

CA MFR Review Exhibit 4 - Complaints & Enforcement

North
Currey Ingram Academy
Murray Ln
Sneed Rd W
Vaughn Rd
Harpeth River
River Direction
One mile radius
Outfall 001
36 00' 37.7" N
86 53' 45.0" W
Grassland Treatment Facility
Park
Grassland STP
1006 Treatment Plant Rd, Franklin, TN
Imagery ©2021 Google, Map data ©2021 2000 ft
Google

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Resources
Nashville Environmental Field Office
711 R.S. Gass Blvd.
Nashville, Tennessee 37216
Phone 615-687-7000 Statewide 1-888-891-8332 Fax 615-687-7078

July 25, 2025

Mr. Josiah Cox | President
e-copy: jcox@cswrgroup.com
Central States Water Resources (CSWR)
1630 Des Peres Road, Suite 140
Des Peres, MO 63131

RE: Complaint Investigation & Notice of Violation
Grasslands STP
NPDES Permit # TN0027278
Williamson County

Dear Mr. Cox,

On Thursday, July 24, 2025, Mr. Daniel Pleasant with the Division of Water Resources (Division) conducted a site investigation regarding multiple complaints regarding odors and apparent sewage entering Cartwright Creek (Creek) located approximately 1/8th mile north of the Grasslands sewage treatment plant (STP). Mr. Pleasant arrived in the affected area at approximately 4:24 PM where he subsequently found an active sanitary sewer overflow (SSO) entering the Creek at approximate coordinates 36.012852°, -86.894820°. The water's color, turbidity, odor, and debris were indicative of an SSO and were confirmed as such from a submerged manhole at approximate coordinates 36.012060°, -86.895073°, actively overflowing during his site investigation.

While on site, Mr. Pleasant documented the presence of sanitary sludge, scum, and debris that had collected throughout the wet weather conveyance (WWC) and outcroppings downstream of the manhole. When disturbed, the solids and scum readily suspended in the water in a manner consistent with sludge and distinct from mud, silt, or algae blooms, and had a strong sewage odor.

Mr. Pleasant informed CSWR's emergency department via cell phone at 6:09 PM of the overflow and provided the aforementioned locations to the dispatcher. Mr. Pleasant then informed Clear Water Solution's area supervisor, Mr. Kenneth Rollins, of the same information at approximately 6:16 PM. Mr. Rollins informed Mr. Pleasant he was enroute to the facility after receiving similar information from a customer who notified CSWR earlier that afternoon. Mr. Pleasant informed Mr. Rollins that, given the impacted

Creek and trails commonly used by the public, accessways and the Creek should be cordoned off with caution tape and signage informing persons of the hazards associated with untreated sanitary sewage. Mr. Pleasant also informed Mr. Rollins that the impacted areas must be cleaned and disinfected where applicable, i.e. disinfection products cannot enter waterways. On July 25, 2025, Mr. Pleasant left a voicemail for Mr. Rollins and provided an email to him, along with DWR, Williamson County Emergency Management Agency (WCEMA), CSWR, and CWS staff, about the aforementioned protections for public health should be installed immediately and requiring the facility to begin testing for *E. coli*, at a minimum, once per day in the impacted area of the Creek. The email further explains that a control sample for *E. coli* must also be taken at a defensible location upstream of the polluted sections of the Creek to determine background *E. coli* levels.

NPDES Permit section *2.3.2. Overflows and Releases* states:

> *(a) "Sanitary sewer overflows, including dry-weather overflows, are prohibited.*
> *(b) "The permittee shall operate the collection, transmission, and treatment system so as to avoid sanitary sewer overflows and releases due to improper operation or maintenance…*
> (c) *"The permittee shall take all reasonable steps to minimize any adverse impact associated with overflows and releases."*

NPDES Permit section 2.3.4. *Adverse Impact* states:

> *"The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. 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."*

This letter serves as a **Notice of Violation** for violating the conditions of the permit and creating a condition of pollution to the Waters of the State, which are violations of the *Tennessee Water Quality Control Act*.

Action Items and Recommendations

- Immediately cordon off all reasonable approaches and access the public may encounter areas containing sanitary sewage; this includes the affected sections of Cartwright Creek.
- Remove any debris associated with the documented SSO from the WWC and Creek. If complete removal is not possible, abatement will be considered provided the rationale is approved by the Division.
- Determine the cause of the overflow and provide a corrective action plan to prevent similar events from occurring.
- Begin daily sampling for *E. coli* as previously described in this letter and retain laboratory results for review.

It is requested a written response be provided to this office by **August 1, 2025,** detailing specific actions with completion dates taken to address these concerns. The response letter can be submitted by email to Mr. Daniel Pleasant's email address below.

The Division will appreciate your immediate attention to this letter, its requirements, and efforts made to ensure permit compliance and protect the health of the Public and our State's Waterways. This document will not be physically mailed but emailed instead. If you have any questions or concerns, please contact Mr. Daniel Pleasant at 615-970-1222 or daniel.pleasant@tn.gov.

Sincerely,

Michael Murphy
Program Coordinator
Division of Water Resources

e-copy: Tim Jennette, Division of Water Resources, tim.jennette@tn.gov
Chris Rhodes, Division of Water Resources, chris.rhodes@tn.gov
Joshua Walter, WCEMA, joshua.walter@williamsoncounty-tn.gov
Kenneth Rollins, CWS, kenneth.rollins@clearwatersol.com
Lynn Starrett, CWS, lynn.starrett@clearwatersolutions.com
Jo Anna Brown, CSWR, env.comp@cswrgroup.com

From:	Daniel Pleasant
To:	Lynn Starrett; env.comp@cswrgroup.com
Cc:	Kenneth Rollins; MichaelP Murphy; Tim Jennette; Joshua Walter
Subject:	Re: Sanitary Sewer Overflow Investigation 7-25-2025 TN0027278 - Grasslands STP
Date:	Friday, July 25, 2025 12:12:00 PM
Attachments:	image001.png IMG_5804.JPG IMG_5780.JPG IMG_5838.JPG
Importance:	High

Good afternoon Ms. Starrett & Ms. Brown,

On July 24th, 2025, I conducted a site investigation regarding complaints filed with the Division of Water Resources (Division) earlier this month regarding odors surrounding the facility and nearby Cartwright Creek, located approximately 1/8th of a mile north of the treatment facility. Attached are photos documenting a sanitary sewer overflow I observed entering Cartwright Creek, of which I documented the entire wet-weather conveyance from Cartwright Creek to an active sewer overflow being a submerged manhole (3rd photo). Cartwright Creek and several trails with public access and activity have been impacted by this overflow. I informed Mr. Rollins of my findings at approximately 6:15 pm local time yesterday. I advised that caution tape and signage informing the public of the health hazards should be posted immediately at all approaches, which includes the Creek since it is used for public recreation. These informational barriers must be in place until normal conditions in the area return to normal levels.

The facility must begin sampling for *E. coli*, at a minimum, once per day within the impacted areas of Cartwright Creek until conditions return to normal. *E. coli* sample(s) should also be taken at a defensible location, upstream from the impacted areas within Cartwright Creek, to provide a control sample, which will determine normal conditions. Please contact me at your earliest convenience to acknowledge these instructions. I am requesting a read receipt for this notification.

My Regards,

TN Department of Environment & Conservation

Daniel Pleasant | Environmental Scientist
Division of Water Resources
Nashville Field Office
711 R.S. Gass Blvd

Nashville TN 37216
Phone 615-970-1222
Daniel.Pleasant@tn.gov

Tell us how we're doing! Please take a few minutes to complete the TDEC Customer Service Survey
https://www.tn.gov/environment/about-tdec/contact-tdec-customer-service-form.html

Electronic 40 Code of Federal Regulations Part 136 Table I & II: This document outlines the approved methods for wastewater analysis and proper sample holding times.
Fleming Training Center: This site is an excellent resource for documents and information on how to sign up for operator training.
TN Public Data Viewer: View public data on different permit types.

SW
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270
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330
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280°W (T) LAT: 36.012726 LON: -86.894903 ±13ft ▲ 581ft
Daniel Pleasant | TDEC DWR
Thursday Jul 24, 2025
16:26:28 CDT

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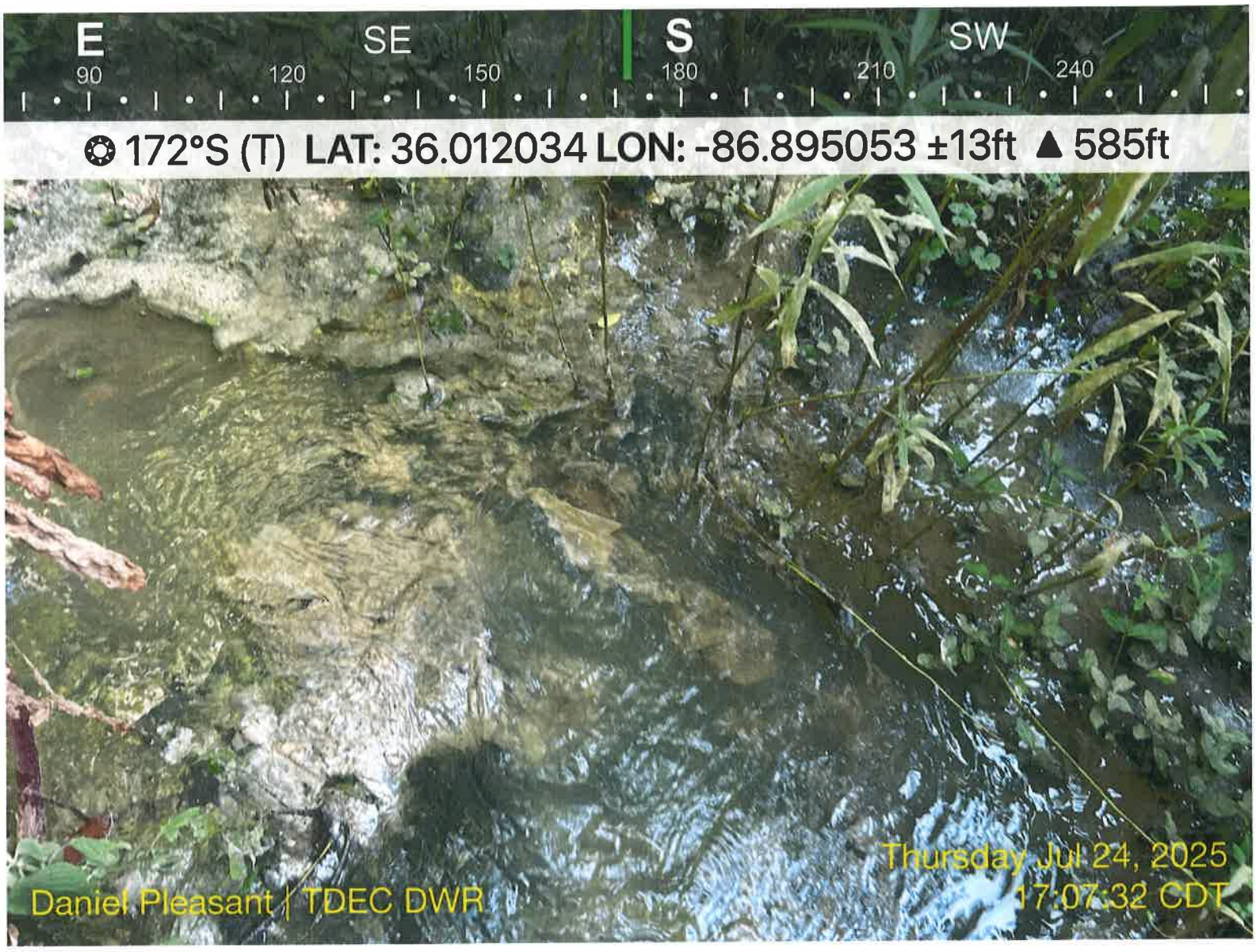
Daniel Pleasant | TDEC DWR
Thursday Jul 24, 2025
16:26:28 CDT


E
SE
S
SW
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180
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240
172°S (T) LAT: 36.012034 LON: -86.895053 ±13ft ▲585ft
Daniel Pleasant | TDEC DWR
Thursday Jul 24, 2025
17:07:32 CDT

LIMESTONE WATER
Utility Operating Company
A CSWR Managed Utility

July 29, 2025

TDEC - Division of Water Resources
Nashville Field Office
711 R.S. Gass Blvd
Nashville, Tennessee 37216

RE: Limestone Water UOC – Grassland STP
Permit No. – TN0027278
Franklin, Williamson County, TN

To the Tennessee Division of Water Resources,

This letter is submitted in response to the Sanitary Sewer Overflow (SSO) violation reported by the Division of Water Resources on Thursday, July 24, 2025, and will outline the corrective actions taken by Limestone along with the additional measures required to remediate this incident.

A representative of the Division conducted a site investigation on July 24, 2025, in response to complaints filed on July 10, 2025, regarding odors being emitted from the treatment facility and the surrounding area. It was discovered that a collection system overflow was active and flowing down to Cartwright Creek. Several trails with public access were observed to be affected due to the overflow. The Division notified Clearwater Solutions, Limestone's contract operator for the affected area, at approximately 6:15 pm local time on July 24, 2025.

Once notified by the Division, the Clearwater Solutions team responded immediately. In fact, when Limestone contacted Clearwater Solutions its technicians were already enroute to the site in response to a call received from one of Limestone's customers. Once onsite, Clearwater Solutions discovered a line blockage caused by grease deposits and an accumulation of disposable wipes. The line was cleared on July 25, 2025, to ensure proper flow was returned to the system

Due to the contaminated area being available for public access, the Division advised that the area be corded off with caution tape and that informative warning signage be placed to ensure public safety. Limestone's team complied with the Division's request on the morning of July 25, 2025, as can been seen in the attachments below. The Division representative also required an *E. coli* analysis to be conducted within the impacted area of the receiving stream (along with an upstream control) once per day until normal conditions are restored. Daily testing of the site is continuing.

LIMESTONE WATER
Utility Operating Company
A CSWR Managed Utility

After the line was returned to operational on July 25, 2025, remediation began. Those efforts are documented as follows,

- Commencing on July 25, 2025, operations crews used pumps and hoses to agitate waterways and extracted the debris and concentrated spillage. Debris has been placed into containment bins and disposed of as a Class I solid waste as per **TN Rule 0400-11-01-.04(2).** Those activities are ongoing.
- Commencing on July 25, 2025, all contaminated areas in the woods, where overflow reached the creek, have been shoveled, treated with lime, and covered with straw to prevent the lime from dispersing. Crews will remove any straw visible from the walking trails by August 8. However, straw at the primary overflow site will remain in place through at least August 15 to help with lime stabilization and bacterial neutralization. This area will be cleaned and restored afterward, with a berm installed around the manhole.

After an inspection by Limestone, it has been determined that the efforts made have restored the area to a safe and aesthetic condition. This inspection revealed that there are no longer any detectable odors or visible signs of discharge present.

We value our customers and the communities we serve. We appreciate them reaching out to TDEC, and we appreciate TDEC promptly alerting us. Our aim is to proactively prevent such occurrences, even at aging facilities, and to respond quickly to resolve any issues when they do occur. Further, we look forward to the approval of the pending facilities' proposed replacement so that we may proceed expeditiously with the necessary capital improvements.

We appreciate your understanding of this matter. Limestone Water UOC remains committed to resolving these compliance matters responsibly and promptly. Please do not hesitate to contact me via email at JJOHNSON@CSWRGROUP.COM should you require additional documentation or clarification.

Sincerely,

Joe Johnson

Joe Johnson
CSWR – EHS Compliance Coordinator

CAUTION

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
JACKSON ENVIRONMENTAL FIELD OFFICE
1625 HOLLYWOOD DRIVE
JACKSON, TENNESSEE 38305-4316
PHONE (731) 512-1300 STATEWIDE 1-888-891-8332 FAX (431) 661-6283

August 1, 2025 Certified Mail # 9589 0710 5270 0389 7571 58

Jo Anna Brown, Vice President
Limestone Water Utility Operating Company, LLC
e-copy: JoAnna@cswrgroup.com
1630 Des Peres Rd., Suite 140
Des Peres, MO 63131

RE: Notice of Compliance Review Meeting (CRM)
Shiloh Falls Utilities, Inc.
State Operating Permit No. SOP- 94011
Counce, Hardin County, Tennessee

Dear Mrs. Brown:

A Notice of Violation (NOV) was issued to Limestone Water Utility Operating Company, LLC on March 27, 2025, for violations of the State Operating Permit (SOP) for the Shiloh Falls Sprayfield. The NOV required the submittal of a Corrective Action Plan (CAP) to address the violations noted in the NOV. A CAP was submitted to the Jackson Environmental Field Office as required on April 17, 2025.

On April 21, 2025, the Division acknowledged and approved the submitted CAP. The approved CAP included a June 1, 2025, timeline to submit final design of the proposed conversion to a drip irrigation system. To date final design plans have not been submitted to the Division as proposed and agreed to in the submitted CAP.

As a result of the failure to follow the CAP that Limestone Water Utility proposed and submitted to address the ongoing violations at the Shiloh Falls Sprayfield, a Compliance Review Meeting (CRM) has been scheduled for August 21, 2025, at 1:00pm in the Jackson Environmental Field Office located at 1625 Hollywood Drive, Jackson, TN 38305 to discuss the violations and required actions. The Division will not have an attorney present. However, if you wish to bring your attorney, please let us know in advance so that we can

arrange for one of our attorneys to be present. If you are unable to attend this meeting on the scheduled date, please contact Ms. Libby Williams to reschedule. She may be reached at 731-695-4581 or via email at Libby.Williams@tn.gov.

Sincerely,

Gregory S Overstreet

Gregory S Overstreet
Environmental Program Manager
TDEC-Division of Water Resources
Jackson Environmental Field Office

CC: Mr. Joe Johnson, JJohnson@cswrgroup.com
Mr. Josiah Cox, jcox@cswrgroup.com

CA MFR Review Exhibit 4 -Complaints & Enforcement

PERMIT NUMBER	PERMIT FEATURE TYPE DESCRIPTION	PERMIT FEATURE ID	YEAR	MONTH	DATE	RAINFALL (0.1 inch)	INFLUENT FLOW (MGD)	EFFLUENT FLOW (MGD)	HOURS BYPASSED	$CBOD_5$ INFLUENT (mg/L)	$CBOD_5$ EFFLUENT (mg/L)	$CBOD_5$ EFFLUENT (POUNDS)	$CBOD_5$ PERCENT REMOVAL	$CBOD_5$ EFFLUENT WEEKLY AVERAGE (mg/L)	$CBOD_5$ EFFLUENT WEEKLY AVERAGE (POUNDS)	Ammonia N EFFLUENT (mg/L)	Ammonia N EFFLUENT (POUNDS)	Ammonia EFFLUENT WEEKLY AVERAGE (mg/L)	Ammonia EFFLUENT WEEKLY AVERAGE (POUNDS)	TSS INFLUENT (mg/L)	TSS EFFLUENT (mg/L)	TSS EFFLUENT (POUNDS)	TSS PERCENT REMOVAL	TSS EFFLUENT WEEKLY AVERAGE (mg/L)	TSS EFFLUENT WEEKLY AVERAGE (POUNDS)	DO EFFLUENT (mg/L)	pH EFFLUENT (S. U.)	Less Than (<) Settleable Solids	Settleable Solids EFFLUENT (ml/L)	Less Than (<) E.coli	EFFLUENT E.COLI	Less Than (<) TRC	EFFLUENT TOTAL CHLORINE RESIDUAL (mg/L)	Total Nitrogen EFFLUENT (mg/L)	Total Nitrogen EFFLUENT (POUNDS)	Total Phosphorus EFFLUENT (mg/L)	Total Phosphorus EFFLUENT (POUNDS)
TN0027278	External Outfall	001	2025	July	1	0.00	0.056	0.110		50.0	3.0	2.8	94.0			0.322	0.295			126.0	4.0	3.7	96.8			7.5	7.7	<	0.1		49.5		0.02				
TN0027278	External Outfall	001	2025	July	2	0.30	0.071	0.122		39.0	3.0	3.1	92.3			1.060	1.079			92.0	4.0	4.1	95.7			6.2	7.3	<	0.1		36.8		0.09				
TN0027278	External Outfall	001	2025	July	3	0.00	0.033	0.071																		6.9	7.7	<	0.1				0.13				
TN0027278	External Outfall	001	2025	July	4	0.00	0.024	0.083																		7.4	7.4	<	0.1				0.08				
TN0027278	External Outfall	001	2025	July	5	0.00	0.013	0.080																												
TN0027278	External Outfall	001	2025	July	6	0.00	0.008	0.105																												
TN0027278	External Outfall	001	2025	July	7	0.00	0.031	0.080																		6.7	7.4	<	0.1		47.4		0.17				
TN0027278	External Outfall	001	2025	July	8	0.60	0.015	0.093																		6.1	7.4	<	0.1		3.0		0.08				
TN0027278	External Outfall	001	2025	July	9	0.00	0.043	0.129		84.0	7.0	7.5	91.7			2.680	2.874			804.0	8.0	8.6	99.0			7.6	7.4	<	0.1		4.0		0.16	4.1	4.4	1.1	1.1
TN0027278	External Outfall	001	2025	July	10	0.53	0.034	0.103		123.0	**13.0**	11.2	89.4			3.630	3.118			197.0	7.0	6.0	96.4			6.1	7.5		0.1		19.9		0.10				
TN0027278	External Outfall	001	2025	July	11	0.00	0.040	0.107		107.0	9.0	8.0	91.6			**10.200**	9.102			209.0	9.0	8.0	95.7			7.3	7.5	<	0.1		17.1		0.13				
TN0027278	External Outfall	001	2025	July	12	0.00	0.032	0.130																												
TN0027278	External Outfall	001	2025	July	13	0.00	0.044	0.129																												
TN0027278	External Outfall	001	2025	July	14	0.30	0.012	0.125		202.0	**15.0**	15.6	92.6			**14.900**	15.533			168.0	22.0	22.9	86.9			6.7	7.5	<	0.1		49.5		0.14				
TN0027278	External Outfall	001	2025	July	15	0.00	0.044	0.125		44.0	**19.0**	19.8	56.8			2.920	3.044			84.0	32.0	33.4	61.9			7.1	7.3	<	0.1		20.2		0.13				
TN0027278	External Outfall	001	2025	July	16	0.00	0.056	0.104		189.0	**11.0**	9.5	94.2			**17.800**	15.439			160.0	16.0	13.9	90.0			7.2	7.3	<	0.1		87.8		0.16				
TN0027278	External Outfall	001	2025	July	17	0.00	0.039	0.122																		7.4	7.6	<	0.1				0.17				
TN0027278	External Outfall	001	2025	July	18	0.00	0.051	0.093																		6.7	7.6	<	0.1				0.15				
TN0027278	External Outfall	001	2025	July	19	1.60	0.054	0.099																												
TN0027278	External Outfall	001	2025	July	20	0.00	0.024	0.027																												
TN0027278	External Outfall	001	2025	July	21	0.02	0.038	0.037		61.0	**12.0**	3.7	80.3			**18.500**	5.678			54.0	28.0	8.6	48.1			7.2	7.4	<	0.1		28.9		0.11				
TN0027278	External Outfall	001	2025	July	22	0.25	0.012	0.052		39.0	**12.0**	5.2	69.2			**14.200**	6.135			28.0	18.0	7.8	**35.7**			7.3	7.4	<	0.1		15.2		0.14				
TN0027278	External Outfall	001	2025	July	23	0.00	0.018	0.042		119.0	5.0	1.7	95.8			**11.000**	3.816			82.0	9.0	3.1	89.0			7.3	7.3	<	0.1		17.8		0.13				
TN0027278	External Outfall	001	2025	July	24	0.00	0.040	0.061																		7.3	7.5	<	0.1				0.20				
TN0027278	External Outfall	001	2025	July	25	0.00	0.044	0.060																		7.4	7.3	<	0.1				0.19				
TN0027278	External Outfall	001	2025	July	26	0.00	0.021	0.184																												
TN0027278	External Outfall	001	2025	July	27	0.00	0.029	0.173																												
TN0027278	External Outfall	001	2025	July	28	0.00	0.052	0.160																		7.3	7.2	<	0.1		11.5		0.07	17.3	23.1	3.3	4.4
TN0027278	External Outfall	001	2025	July	29	0.00	0.051	0.180		145.0	**20.0**	30.0	86.2			**13.900**	20.843			180.0	24.0	36.0	86.7			6.9	7.3	<	0.1		49.5		0.17				
TN0027278	External Outfall	001	2025	July	30	0.20	0.043	0.149		269.0	**15.0**	18.6	94.4			**18.000**	22.308			505.0	24.0	29.7	95.2			6.6	7.2	<	1.0		49.5		0.16				
TN0027278	External Outfall	001	2025	July	31	0.00	0.050	0.158		93.0	**17.0**	22.4	81.7			**6.180**	8.133			108.0	25.0	32.9	76.9			6.1	7.2	<	0.1				0.05				
					TOTAL	3.80	1.119	3.291	0.0			159.1					117.399					218.7													27.5		5.6
					AVERAGE		0.036	0.106		111.7	11.5	11.4	89.7			9.664	8.386			199.8	16.4	15.6	91.8			7.0			0.1		23.2		0.13	10.7	13.7	2.2	2.8
					MAXIMUM	1.60	0.071	0.184	0.0	269.0	20.0	30.0	95.8	0.0	0.0	18.500	22.308	0.000	0.000	804.0	32.0	36.0	99.0	0.0	0.0	7.6	7.7		1.0		87.8		0.20	17.3	23.1	3.3	4.4
					MINIMUM		0.008	0.027		39.0	3.0	1.7	56.8			0.322	0.295			28.0	4.0	3.1	35.7			6.1	7.2		0.1		3.0		0.05	4.1	4.4	1.1	1.1
					PERMIT LIMIT DAILY MAX						10.0	9999.0				4.000	9999.000				45.0	9999.0					9.0		1.0		487.0		0.28	9999.0	9999.0	9999.0	9999.0
					PERMIT LIMIT DAILY MIN								40.0										40.0			6.0	6.0										
					PERMIT LIMIT MONTHLY WKLY/AVG						5.0	10.0	85.0	7.5	15.0	2.000	4.000	3.000	6.000		30.0	63.0	85.0	45.0	83.0	0.0					126.0		0.16	9999.0	15.0	9999.0	5.0

*E. Coli geomean is shown in the Average row

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly 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.

Larry Quattlebaum
Signature

4
Grade

3156
Certification #

Grasslands STP
Plant

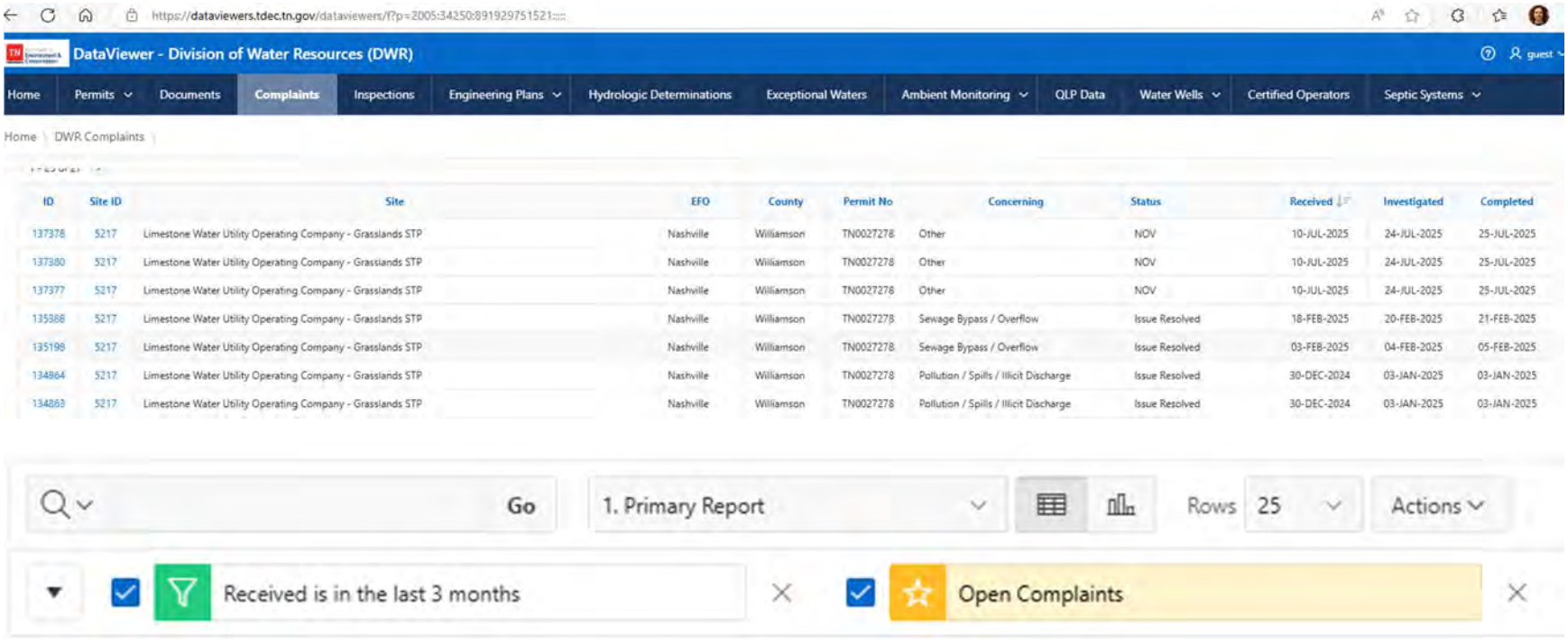
Williamson
County

Notes:

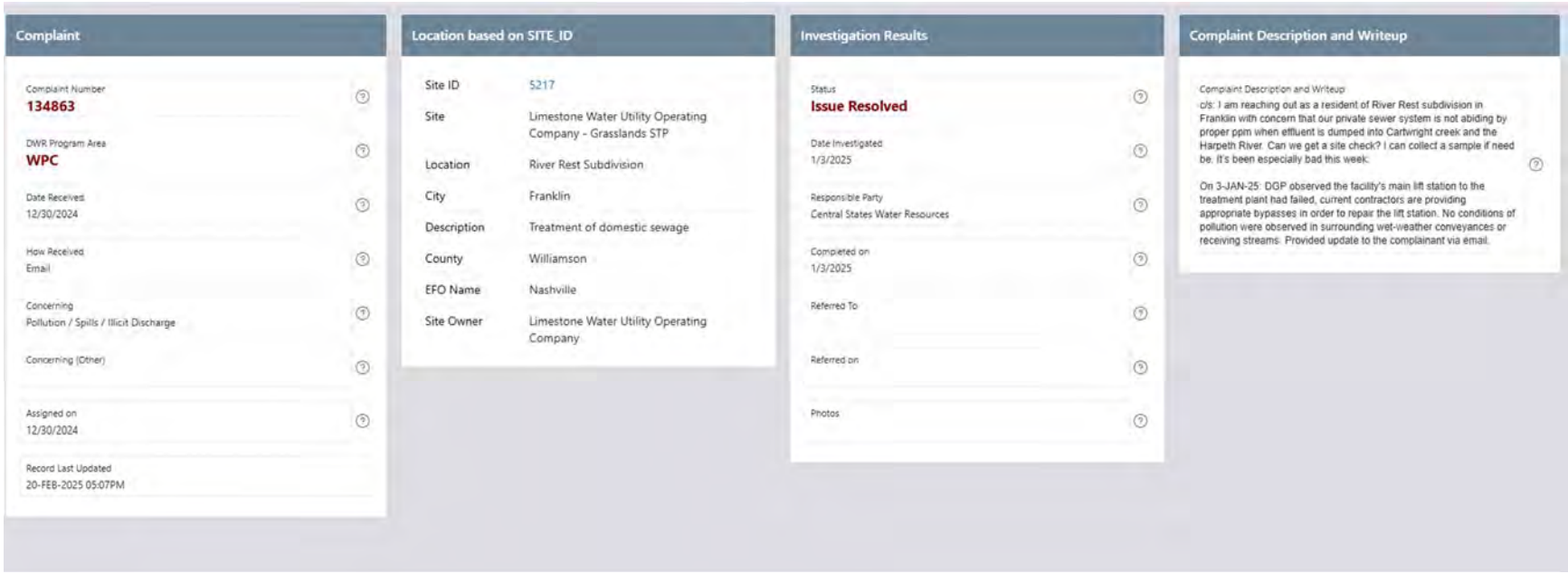
TDEC Dataviewer for DWR Complaints about Limestone (checked on 7/30/2025). -

Clear out two filters that limits to “received in the last three months & “open complaints” & search “Limestone”

Link: https://dataviewers.tdec.tn.gov/dataviewers/f?p=2005:34250:891929751521:::::



Complaint # #134863– 12/30/2024



Complaint

Complaint Number
134863

DWR Program Area
WPC

Date Received
12/30/2024

How Received
Email

Concerning
Pollution / Spills / Illicit Discharge

Concerning (Other)

Assigned on
12/30/2024

Record Last Updated
20-FEB-2025 05:07PM

Location based on SITE_ID

Site ID	5217
Site	Limestone Water Utility Operating Company - Grasslands STP
Location	River Rest Subdivision
City	Franklin
Description	Treatment of domestic sewage
County	Williamson
EFO Name	Nashville
Site Owner	Limestone Water Utility Operating Company

Investigation Results

Status
Issue Resolved

Date Investigated
1/3/2025

Responsible Party
Central States Water Resources

Completed on
1/3/2025

Referred To

Referred on

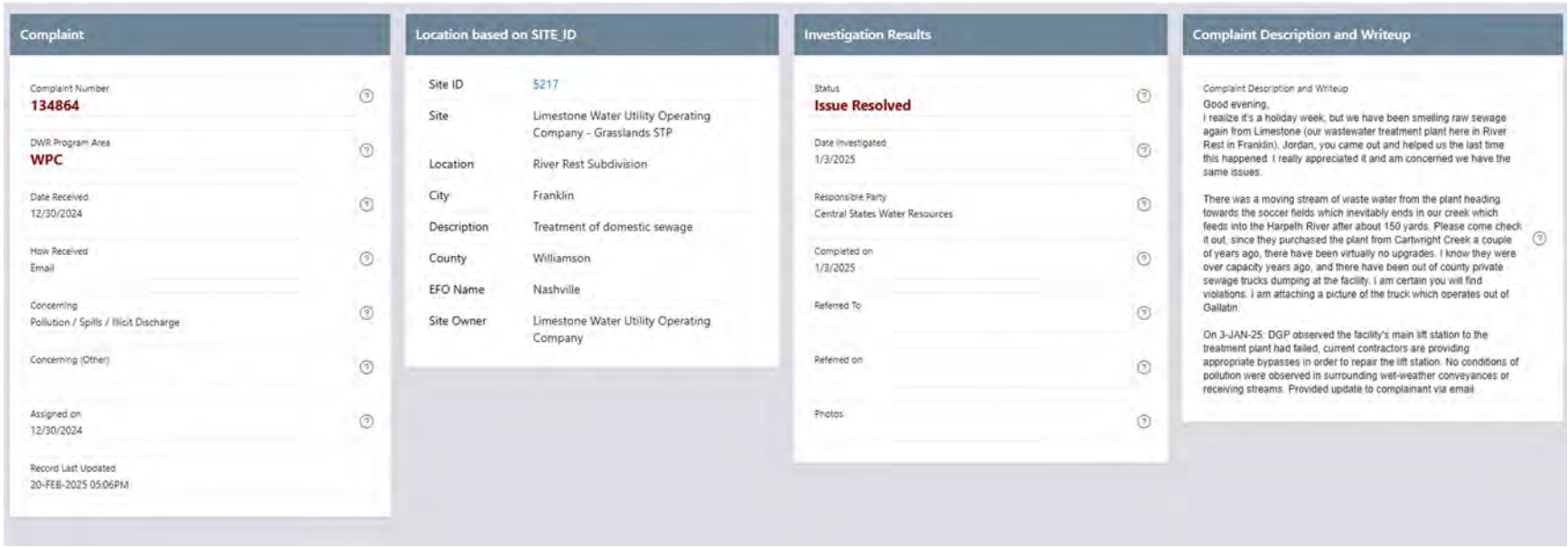
Photos

Complaint Description and Writeup

Complaint Description and Writeup
c/s: I am reaching out as a resident of River Rest subdivision in Franklin with concern that our private sewer system is not abiding by proper ppm when effluent is dumped into Cartwright creek and the Harpeth River. Can we get a site check? I can collect a sample if need be. It's been especially bad this week.

On 3-JAN-25: DGP observed the facility's main lift station to the treatment plant had failed, current contractors are providing appropriate bypasses in order to repair the lift station. No conditions of pollution were observed in surrounding wet-weather conveyances or receiving streams. Provided update to the complainant via email.

Complaint # #134864– 12/30/2024



Complaint

Complaint Number
134864

DWR Program Area
WPC

Date Received
12/30/2024

How Received
Email

Concerning
Pollution / Spills / Illicit Discharge

Concerning (Other)

Assigned on
12/30/2024

Record Last Updated
20-FEB-2025 05:06PM

Location based on SITE_ID

Site ID	5217
Site	Limestone Water Utility Operating Company - Grasslands STP
Location	River Rest Subdivision
City	Franklin
Description	Treatment of domestic sewage
County	Williamson
EFO Name	Nashville
Site Owner	Limestone Water Utility Operating Company

Investigation Results

Status
Issue Resolved

Date Investigated
1/3/2025

Responsible Party
Central States Water Resources

Completed on
1/3/2025

Referred To

Refered on

Photos

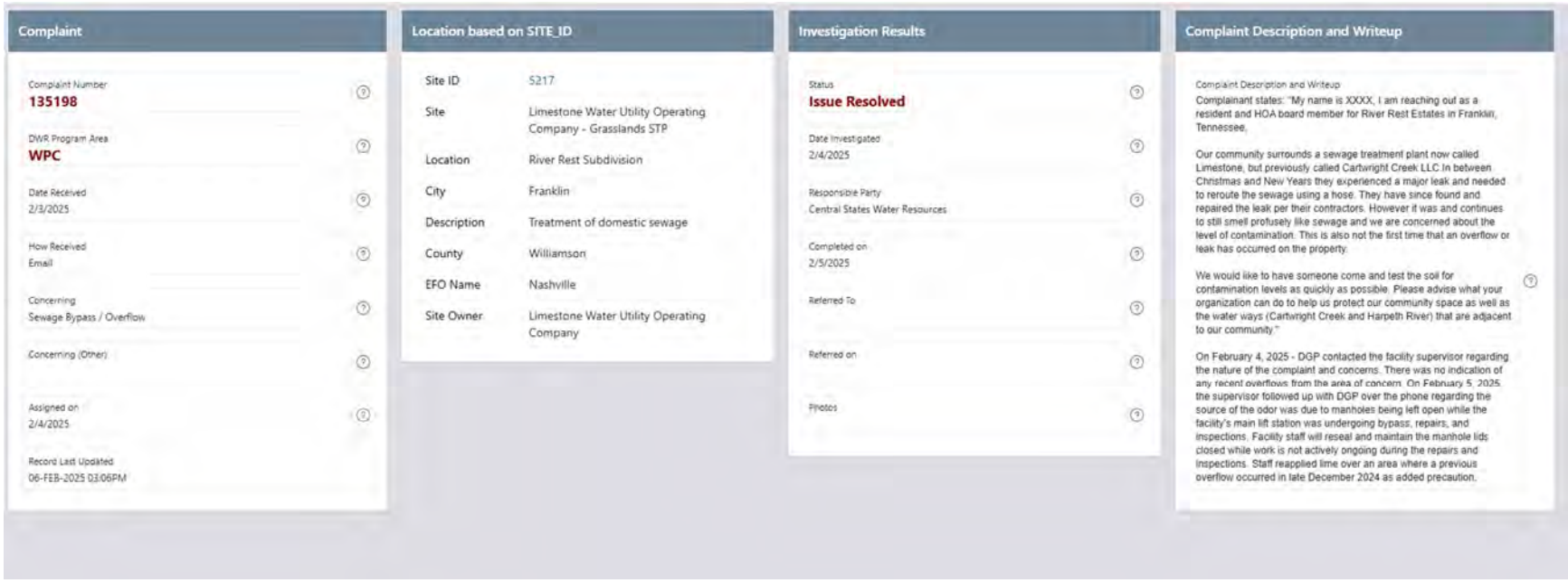
Complaint Description and Writeup

Complaint Description and Writeup
Good evening,
I realize it's a holiday week, but we have been smelling raw sewage again from Limestone (our wastewater treatment plant here in River Rest in Franklin). Jordan, you came out and helped us the last time this happened. I really appreciated it and am concerned we have the same issues.

There was a moving stream of waste water from the plant heading towards the soccer fields which inevitably ends in our creek which feeds into the Harpeth River after about 150 yards. Please come check it out, since they purchased the plant from Cartwright Creek a couple of years ago, there have been virtually no upgrades. I know they were over capacity years ago, and there have been out of county private sewage trucks dumping at the facility. I am certain you will find violations. I am attaching a picture of the truck which operates out of Gallatin.

On 3-JAN-25: DGP observed the facility's main lift station to the treatment plant had failed, current contractors are providing appropriate bypasses in order to repair the lift station. No conditions of pollution were observed in surrounding wet-weather conveyances or receiving streams. Provided update to complainant via email.

Complaint #135198 – 2/3/2025



Complaint

Complaint Number
135198

DWR Program Area
WPC

Date Received
2/3/2025

How Received
Email

Concerning
Sewage Bypass / Overflow

Concerning (Other)

Assigned on
2/4/2025

Record Last Updated
06-FEB-2025 03:06PM

Location based on SITE_ID

Site ID	5217
Site	Limestone Water Utility Operating Company - Grasslands STP
Location	River Rest Subdivision
City	Franklin
Description	Treatment of domestic sewage
County	Williamson
EFO Name	Nashville
Site Owner	Limestone Water Utility Operating Company

Investigation Results

Status
Issue Resolved

Date Investigated
2/4/2025

Responsible Party
Central States Water Resources

Completed on
2/5/2025

Referred To

Referred on

Photos

Complaint Description and Writeup

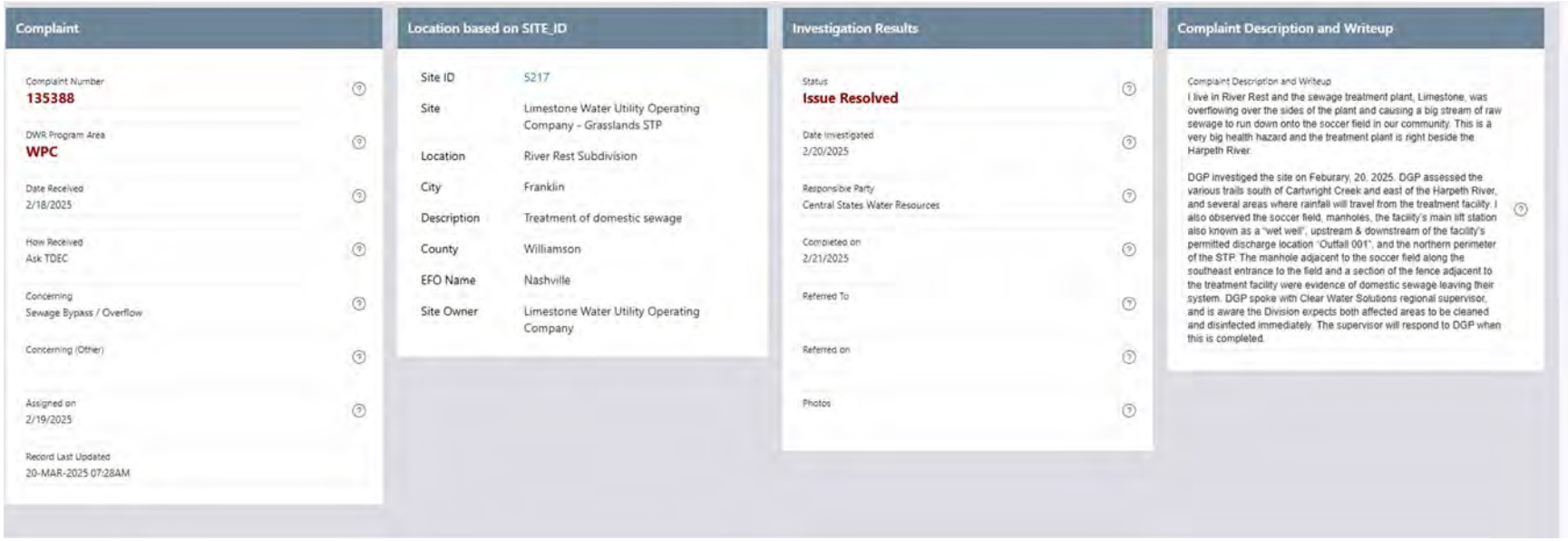
Complaint Description and Writeup
Complainant states: "My name is XXXX, I am reaching out as a resident and HOA board member for River Rest Estates in Franklin, Tennessee.

Our community surrounds a sewage treatment plant now called Limestone, but previously called Cartwright Creek LLC In between Christmas and New Years they experienced a major leak and needed to reroute the sewage using a hose. They have since found and repaired the leak per their contractors. However it was and continues to still smell profusely like sewage and we are concerned about the level of contamination. This is also not the first time that an overflow or leak has occurred on the property.

We would like to have someone come and test the soil for contamination levels as quickly as possible. Please advise what your organization can do to help us protect our community space as well as the water ways (Cartwright Creek and Harpeth River) that are adjacent to our community."

On February 4, 2025 - DGP contacted the facility supervisor regarding the nature of the complaint and concerns. There was no indication of any recent overflows from the area of concern. On February 5, 2025 the supervisor followed up with DGP over the phone regarding the source of the odor was due to manholes being left open while the facility's main lift station was undergoing bypass, repairs, and inspections. Facility staff will reseal and maintain the manhole lids closed while work is not actively ongoing during the repairs and inspections. Staff reapplied lime over an area where a previous overflow occurred in late December 2024 as added precaution.

Complaint #135388 – 2/18/2025



Complaint

Complaint Number
135388

DWR Program Area
WPC

Date Received
2/18/2025

How Received
Ask TDEC

Concerning
Sewage Bypass / Overflow

Concerning (Other)

Assigned on
2/19/2025

Record Last Updated
20-MAR-2025 07:28AM

Location based on SITE_ID

Site ID	5217
Site	Limestone Water Utility Operating Company - Grasslands STP
Location	River Rest Subdivision
City	Franklin
Description	Treatment of domestic sewage
County	Williamson
EFO Name	Nashville
Site Owner	Limestone Water Utility Operating Company

Investigation Results

Status
Issue Resolved

Date Investigated
2/20/2025

Responsible Party
Central States Water Resources

Completed on
2/21/2025

Referred To

Referred on

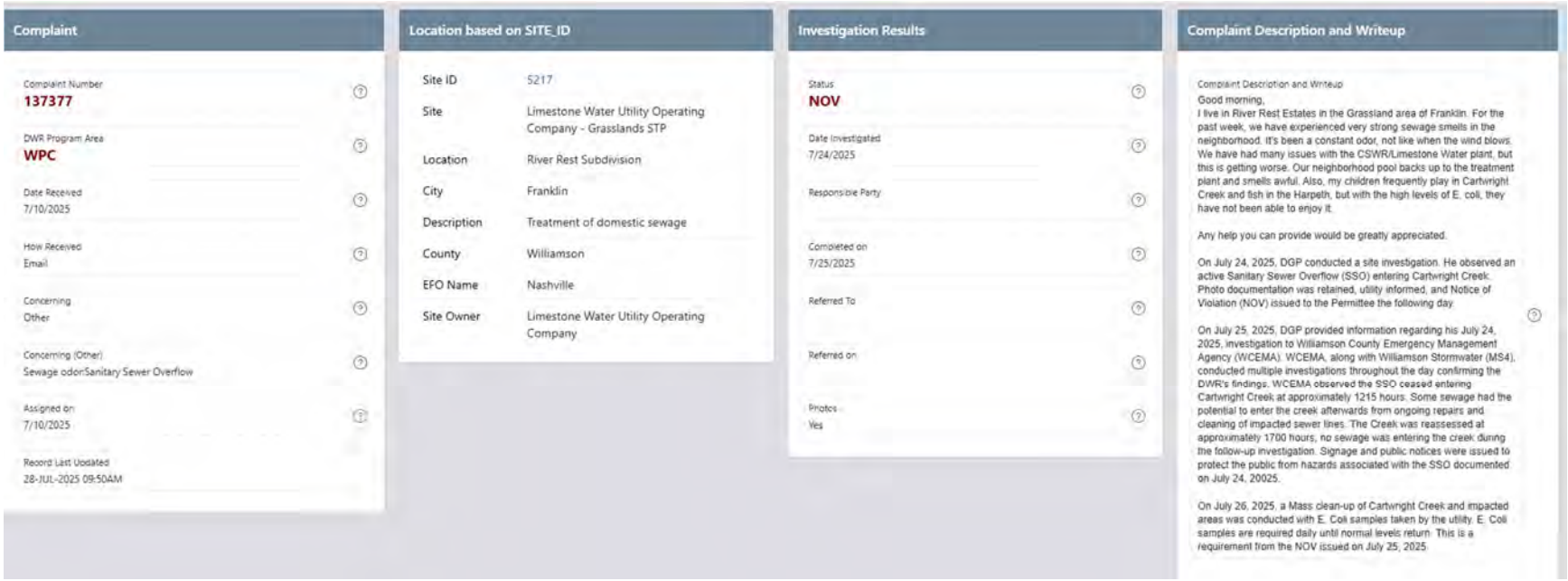
Photos

Complaint Description and Writeup

Complaint Description and Writeup
I live in River Rest and the sewage treatment plant, Limestone, was overflowing over the sides of the plant and causing a big stream of raw sewage to run down onto the soccer field in our community. This is a very big health hazard and the treatment plant is right beside the Harpeth River.

DGP investiged the site on Feburary, 20, 2025. DGP assessed the various trails south of Cartwright Creek and east of the Harpeth River, and several areas where rainfall will travel from the treatment facility. I also observed the soccer field, manholes, the facility's main lift station also known as a "wet well", upstream & downstream of the facility's permitted discharge location "Outfall 001", and the northern perimeter of the STP. The manhole adjacent to the soccer field along the southeast entrance to the field and a section of the fence adjacent to the treatment facility were evidence of domestic sewage leaving their system. DGP spoke with Clear Water Solutions regional supervisor, and is aware the Division expects both affected areas to be cleaned and disinfected immediately. The supervisor will respond to DGP when this is completed.

Complaint #137377 – 7/10/2025



Complaint

Complaint Number
137377

DWR Program Area
WPC

Date Received
7/10/2025

How Received
Email

Concerning
Other

Concerning (Other)
Sewage odor:Sanitary Sewer Overflow

Assigned on
7/10/2025

Record Last Updated
28-JUL-2025 09:50AM

Location based on SITE_ID

Site ID	5217
Site	Limestone Water Utility Operating Company - Grasslands STP
Location	River Rest Subdivision
City	Franklin
Description	Treatment of domestic sewage
County	Williamson
EFO Name	Nashville
Site Owner	Limestone Water Utility Operating Company

Investigation Results

Status
NOV

Date Investigated
7/24/2025

Responsible Party

Completed on
7/25/2025

Referred To

Referred on

Photos
Yes

Complaint Description and Writeup

Complaint Description and Writeup
Good morning,
I live in River Rest Estates in the Grassland area of Franklin. For the past week, we have experienced very strong sewage smells in the neighborhood. It's been a constant odor, not like when the wind blows. We have had many issues with the CSWR/Limestone Water plant, but this is getting worse. Our neighborhood pool backs up to the treatment plant and smells awful. Also, my children frequently play in Cartwright Creek and fish in the Harpeth, but with the high levels of E. coli, they have not been able to enjoy it.

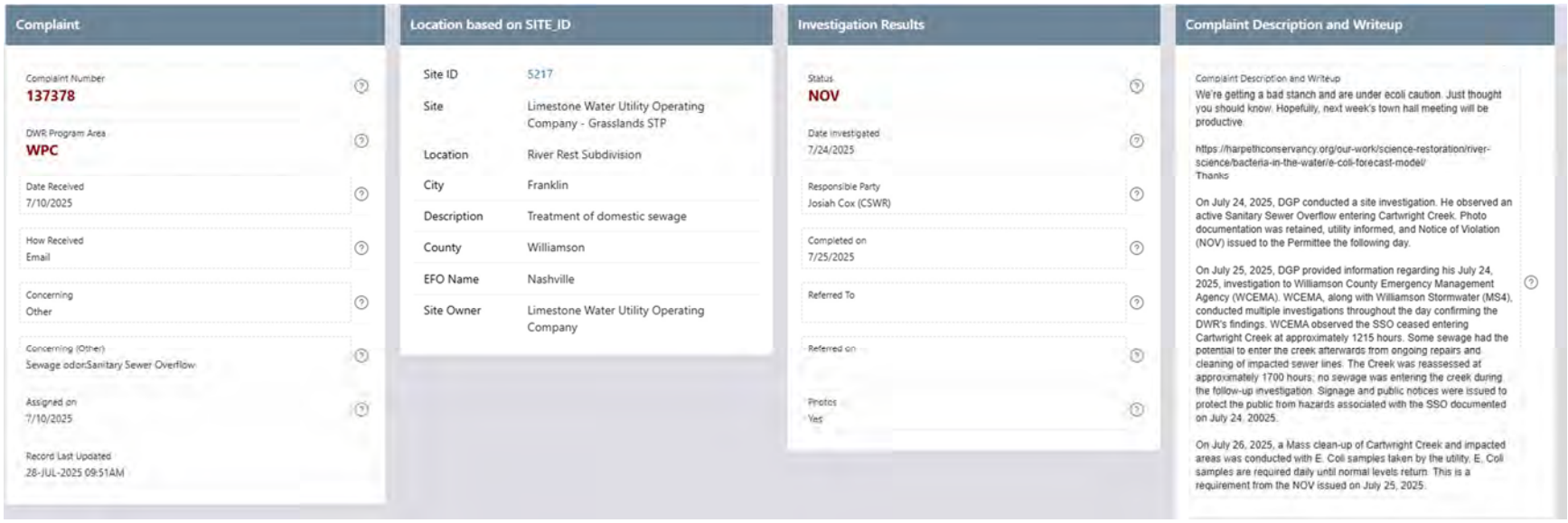
Any help you can provide would be greatly appreciated.

On July 24, 2025, DGP conducted a site investigation. He observed an active Sanitary Sewer Overflow (SSO) entering Cartwright Creek. Photo documentation was retained, utility informed, and Notice of Violation (NOV) issued to the Permittee the following day.

On July 25, 2025, DGP provided information regarding his July 24, 2025, investigation to Williamson County Emergency Management Agency (WCEMA). WCEMA, along with Williamson Stormwater (MS4), conducted multiple investigations throughout the day confirming the DWR's findings. WCEMA observed the SSO ceased entering Cartwright Creek at approximately 1215 hours. Some sewage had the potential to enter the creek afterwards from ongoing repairs and cleaning of impacted sewer lines. The Creek was reassessed at approximately 1700 hours, no sewage was entering the creek during the follow-up investigation. Signage and public notices were issued to protect the public from hazards associated with the SSO documented on July 24, 20025.

On July 26, 2025, a Mass clean-up of Cartwright Creek and impacted areas was conducted with E. Coli samples taken by the utility. E. Coli samples are required daily until normal levels return. This is a requirement from the NOV issued on July 25, 2025.

Complaint #137378 – 7/10/2025



Complaint

Complaint Number
137378

DWR Program Area
WPC

Date Received
7/10/2025

How Received
Email

Concerning
Other

Concerning (Other)
Sewage odor;Sanitary Sewer Overflow

Assigned on
7/10/2025

Record Last Updated
28-JUL-2025 09:51AM

Location based on SITE_ID

Site ID	5217
Site	Limestone Water Utility Operating Company - Grasslands STP
Location	River Rest Subdivision
City	Franklin
Description	Treatment of domestic sewage
County	Williamson
EFO Name	Nashville
Site Owner	Limestone Water Utility Operating Company

Investigation Results

Status
NOV

Date Investigated
7/24/2025

Responsible Party
Josiah Cox (CSWR)

Completed on
7/25/2025

Referred To

Referred on

Photos
Yes

Complaint Description and Writeup

Complaint Description and Writeup
We're getting a bad stanch and are under ecoli caution. Just thought you should know. Hopefully, next week's town hall meeting will be productive.

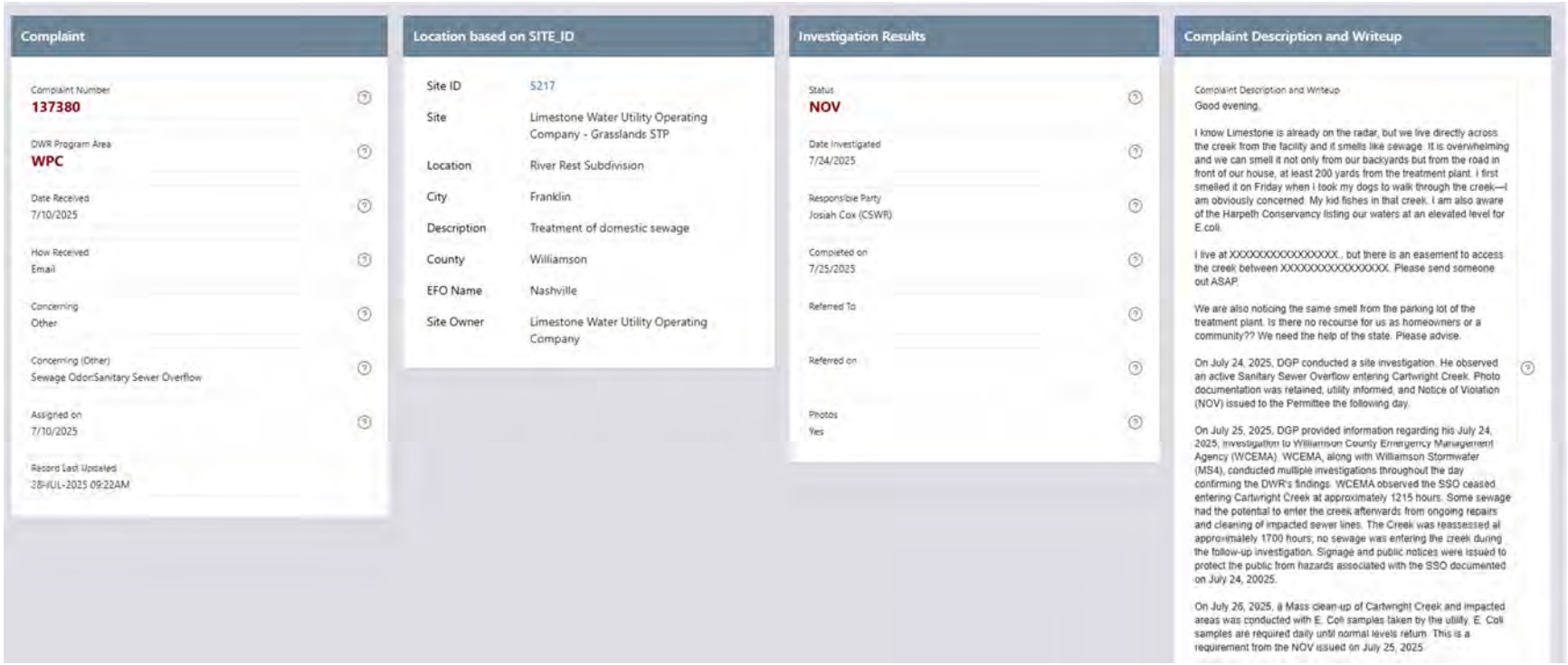
https://harpethconservancy.org/our-work/science-restoration/river-science/bacteria-in-the-water/e-coli-forecast-model/
Thanks

On July 24, 2025, DGP conducted a site investigation. He observed an active Sanitary Sewer Overflow entering Cartwright Creek. Photo documentation was retained, utility informed, and Notice of Violation (NOV) issued to the Permittee the following day.

On July 25, 2025, DGP provided information regarding his July 24, 2025, investigation to Williamson County Emergency Management Agency (WCEMA). WCEMA, along with Williamson Stormwater (MS4), conducted multiple investigations throughout the day confirming the DWR's findings. WCEMA observed the SSO ceased entering Cartwright Creek at approximately 1215 hours. Some sewage had the potential to enter the creek afterwards from ongoing repairs and cleaning of impacted sewer lines. The Creek was reassessed at approximately 1700 hours; no sewage was entering the creek during the follow-up investigation. Signage and public notices were issued to protect the public from hazards associated with the SSO documented on July 24, 20025.

On July 26, 2025, a Mass clean-up of Cartwright Creek and impacted areas was conducted with E. Coli samples taken by the utility. E. Coli samples are required daily until normal levels return. This is a requirement from the NOV issued on July 25, 2025.

Complaint #137380 – 7/10/2025



Complaint

Complaint Number
137380

DWR Program Area
WPC

Date Received
7/10/2025

How Received
Email

Concerning
Other

Concerning (Other)
Sewage Odor:Sanitary Sewer Overflow

Assigned on
7/10/2025

Record Last Updated
28-JUL-2025 09:22AM

Location based on SITE_ID

Site ID	5217
Site	Limestone Water Utility Operating Company - Grasslands STP
Location	River Rest Subdivision
City	Franklin
Description	Treatment of domestic sewage
County	Williamson
EFO Name	Nashville
Site Owner	Limestone Water Utility Operating Company

Investigation Results

Status
NOV

Date Investigated
7/24/2025

Responsible Party
Josiah Cox (CSWR)

Completed on
7/25/2025

Referred To

Referred on

Photos
Yes

Complaint Description and Writeup

Complaint Description and Writeup
Good evening,

I know Limestone is already on the radar, but we live directly across the creek from the facility and it smells like sewage. It is overwhelming and we can smell it not only from our backyards but from the road in front of our house, at least 200 yards from the treatment plant. I first smelled it on Friday when I took my dogs to walk through the creek—I am obviously concerned. My kid fishes in that creek. I am also aware of the Harpeth Conservancy listing our waters at an elevated level for E.coli.

I live at XXXXXXXXXXXXXXX., but there is an easement to access the creek between XXXXXXXXXXXXXXX. Please send someone out ASAP.

We are also noticing the same smell from the parking lot of the treatment plant. Is there no recourse for us as homeowners or a community?? We need the help of the state. Please advise.

On July 24, 2025, DGP conducted a site investigation. He observed an active Sanitary Sewer Overflow entering Cartwright Creek. Photo documentation was retained, utility informed, and Notice of Violation (NOV) issued to the Permittee the following day.

On July 25, 2025, DGP provided information regarding his July 24, 2025, investigation to Williamson County Emergency Management Agency (WCEMA). WCEMA, along with Williamson Stormwater (MS4), conducted multiple investigations throughout the day confirming the DWR's findings. WCEMA observed the SSO ceased entering Cartwright Creek at approximately 1215 hours. Some sewage had the potential to enter the creek afterwards from ongoing repairs and cleaning of impacted sewer lines. The Creek was reassessed at approximately 1700 hours; no sewage was entering the creek during the follow-up investigation. Signage and public notices were issued to protect the public from hazards associated with the SSO documented on July 24, 20025.

On July 26, 2025, a Mass clean-up of Cartwright Creek and impacted areas was conducted with E. Coli samples taken by the utility. E. Coli samples are required daily until normal levels return. This is a requirement from the NOV issued on July 25, 2025.