

Virginia Department of Health
Office of Environmental Health Services
Technical Services – Wastewater Engineering

To: Marcia Degen, Ph.D., P.E. – Technical Services Manager, OEHS
 From: Stephen Elgin, P.E. – Technical Services Engineer
 Date: July 15, 2021
 RE: Clearstream Wastewater Systems, Inc.
 Cc: Lance Gregory – OEHS

Approval of Clearstream DA Treatment Units for TL-3 General Approval _

Clearstream Wastewater Systems, Inc. (Clearstream) has completed their GMP 2016-03 testing in accordance with their August 15, 2019, Manufacturer Agreement; Memorandum of Understanding and Agreement. TL-3 General Approval is requested for the following models:

| Model | Design Flow, gallons per day |
|---|------------------------------|
| 500DA, 500DAST, 500DAC, 500DASC | 500 |
| 600DA, 600DAC, 600DAT, 600DAC2, 600DAC3 | 600 |
| 800DA, 800DAC2 | 800 |
| 1000DA | 1000 |

Data from a total of 21 units were submitted. The submitted data set contains a mix of composite samples and grab samples; although the Gulf Coast Testing cover letter incorrectly indicates that all samples were grab samples. The spreadsheet correctly indicates that fifteen locations were grab-sampled and six locations were sampled by 24-hour composite samplers. The data for those six locations is being used for Maryland as well as Virginia; and, Maryland requires composite samples.

Per Attachment A in the Memorandum of Understanding and Agreement Clearstream was granted a variance to allow for influent sampling at each site for only one quarter, instead of requiring influent sampling for four quarters. Accordingly, the test data excel spreadsheet shows influent sample results for only the first quarter. However, the tables at the end of the Gulf Coast Testing report include extra influent sample results for the second and third quarters.

Four sampling events were conducted on each treatment unit. All units have data from all 4 quarters.

The submittal was reviewed to determine if the test data supported the request to list the Clearstream treatment units as TL-3 compliant under GMP 2016-03 and 12VAC5-613-70. The results of the statistical analyses are provided in the table below.

| | | |
|----------------------------|------------------------|------------|
| | BOD₅ | TSS |
| Count (N) = | 21 | 21 |
| Degrees of Freedom (N-1) = | 20 | 20 |
| Mean = | 2.08 | 1.97 |
| Std Dev = | 0.08 | 0.12 |
| Std Err = | 0.02 | 0.03 |
| Upper 99% T (1-tailed) = | 2.53 | 2.53 |
| Upper 99% T Conf Int = | 2.13 | 2.03 |
| Upper 99% T Conf Int = | 8.4 | 7.6 |
| | Native Values | |
| | Log-Transformed Values | |

Clearstream has completed the testing in accordance with GMP 2016-03 and 12VAC5-613-70. A statistical analysis of the data indicate compliance with the TL-3 standard. The Clearstream Model DA units, as listed above, are recommended for TL-3 General Approval.

In the Clearstream DA wastewater treatment unit, there are four basic zones or compartments. Settled wastewater first enters the aeration chamber of the process tank. A conical shaped clarifier is located internal to the process tank to provide for separation of the solids from the mixed liquor. The mixed liquor passes into the bottom of the clarifier by hydraulic displacement as wastewater enters the aeration chamber. Solids settled from the wastewater are drawn back into the aeration chamber from the bottom of the cone by a “hydraulic roll”. Unlike other Clearstream units, an airlift assembly, controlled by a timer and solenoid switch, borrows air from the aerator to divert a small continuous return of water from the clarifier back to the pretreatment tank for 7 hours each day to provide denitrification. Discharge of the final clarified effluent occurs through a submerged tee assembly.