

ETV Canada Verified



WATER CLEAN™ 3001F-ORP WASTEWATER TREATMENT SYSTEM

Technology Fact Sheet for Great Lakes Clean Water Limited Partnership

Performance Claim

The WATER CLEAN™ 3001F-ORP wastewater treatment system is for domestic residential use. The WATER CLEAN™ 3001F-ORP is a transportable batch processing unit employing advanced ozone oxidation. The system was tested at a hydraulic capacity of 1,920 L/day. The system (at influent temperature ranging between 7.2-10.5 °C, pH in the range 7.02-7.27, with an average biochemical oxygen demand (BODs) of 154 mg/L, total suspended solids (TSS) of 171 mg/L, total phosphorus (TP) of 2.94 mg/L, and geometric mean of Escherichia coli (E. Coli) of 750,000 cfu/100 ml) was capable of reducing carbonaceous biochemical oxygen demand (CBODs) to less than 25 mg/L, TSS to less than 7 mg/L, TP to less than 1.75 mg/L, and E.Coli to less than 2 cfu/100 ml with 95% confidence, for a 40 litre batch in a processing time of 30 minutes with a total mean oxidation/reduction potential (ORP) of 892mV and a total standard deviation of ± 16 mV.

In the absence of an accepted test protocol, the system was tested in compliance with a Test Plan/Program developed by Great Lakes and reviewed by ETV Canada. Testing was completed under the supervision of the District of Muskoka, at the Gravenhurst Sewage Treatment Plant between March 16, 2009 and March 27, 2009. Results are based on analyses carried out by SGS Lakefield Research Limited of forty samples taken from the actual plant influent and with the WATER CLEAN™ operating under typical conditions over an eleven day period. All five working days of the week were included to demonstrate the effects of variable operating conditions. The system was operated in automatic mode with no shutdowns and startups during the test day period. Eight cycles (fill, process, and discharge) were run each test day without stopping the system.

Performance Conditions

Testing of the WATER CLEAN™ system was conducted at the District of Muskoka's Gravenhurst Sewage Treatment Plant located in Gravenhurst, Ontario. During testing the unit was exposed to operating/environmental conditions that the unit would encounter during normal use and operation. Testing was conducted over five days from 9 am to 1 pm. The Technology has been tested for only the specific parameters stated in the performance claim. The operating conditions associated with the testing conducted at the Gravenhurst Waste Water Treatment Plant are as follows:

- Flow rate range of 1,920 L/day;
- Average BODs of 154 mg/L;
- Average TSS of 171 mg/L;
- Average TP of 2.94 mg/L;
- Geometric mean of Ecoli of 750,000 cfu/100 ml;
- pH ranging from pH 7.02 to pH 7.27;
- Temperature range of 7.2-10.5 degrees Celsius; and
- A residence fixed time of 30 minutes¹.

¹ For this test, a fixed residence time of 30 minutes was selected resulting in a variable finishing ORP (892 ± 16 mV). Variable influent processed for a fixed time will result in a variable finishing ORP while variable influent processed for a targeted finishing ORP will result in variable processing time.

Environmental Technology Verification

Technology Application

The WATER CLEAN™ 3001-F-ORP is a wastewater treatment system for domestic residential use. The system can be used in conjunction with an existing septic system or a new pumping chamber and a pressure trench. The system can treat wastewater for blue water recirculation in sanitary fixtures, and for domestic irrigation. The targeted ORP will depend on the end use of the effluent. Treatment for irrigation and recirculation require disinfection, deodorization, and clarification with a targeted finishing ORP of more than 825 mV. Treatment for direct discharge requires disinfection and denitrification thus a higher ORP greater than 900 mV is required.

Technology Description

The WATER CLEAN™ 3001-F-ORP wastewater treatment system is based on the well established principles of advanced oxidation using a batch reactor under closed loop conditions. The system equipment includes a compressor, oxygen concentrator, ozone generator, two ozone injectors, two flash mixers and an extended treatment line which consists of a restrictor/diffuser/degasser, a reactor tank, an off-gas arrangement and a diverter valve, all controlled by a system controller. The power needed for the system equipment is at 120VAC, 20A with typical daily consumption of 10kWh. The concentrated air is then conveyed to the ozone generator where ozone is generated. From the generator, ozone is then injected to a batch mixing tank where it is flash mixed with the wastewater. The off gases from the ozone are then sent to an offgas and destruct unit. The offgas and destruct device has two components - a gas/liquid separator and an ozone destruct unit. The gas/liquid separator is mounted on the top of the reactor tank over the centre of the vortex therein. This prevents the escape of liquid and allows only gas to be released. The ozone destruct unit is a low flow catalytic type and is mounted on the offgas line. The gas liquid separator is used on all systems. An ozone destruct unit is used where the offgas can not be recycled. The effluent is passed through a filter unit and then discharged to a suitable media.

Verification

The verification was conducted by AMEC Geomatrix Limited as the Verification Entity (VE) using ETV Canada's General Verification Protocol (February, 2007). The verification was based on information supplied by Great Lakes Clean Water Limited Partnership, and the laboratory analysis conducted by SGS Lakefield Research Limited, Ontario.

What is the ETV Program?

The Canadian Environmental Technology Verification (ETV) Program is delivered by ETV Canada under a license agreement from Environment Canada. The Canadian ETV Program is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

For more information on WATER CLEAN™ 3001-F-ORP please contact:

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