COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Central Regional Office, 627 Main Street, Worcester, MA 01608

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July 19, 2010

Tim Watson
Hopedale Water Department
78 Hopedale Street
Hopedale, MA 01747

Town: **Hopedale**
PWS Name: Hopedale Water Department
PWS ID #: 2138000
Program: System Modification BRPWS23C
Action: **Revised Approval**
Activity #: MassDEP Trans. # X230035

Dear Mr. Watson:

The Hopedale Water Department (HWD) operates the Mill Street Wellfield (2138000-01G), which is a tubular wellfield consisting of thirty-three 2.5-inch diameter wellpoints and the Green Street Gravel Pack Well (2138000-02G), which is supported by two back-up or replacement wells (2138000-03G and–04G). These three wells are needed to meet the original approved maximum daily withdrawal volume due to manganese fouling of the screens. A new water treatment plant permit application BRP WS 23C was approved by MassDEP on February 19, 2010 to treat the full capacity of the water withdrawn from the Mill Street Tubular well field, the Green Street gravel pack wells (GPWs) and the Green Street Bedrock wells. The treatment facility was designed to remove iron and manganese and to provide filtration and disinfection to meet the requirements of the Surface Water Treatment Rule.

The original submitted plans approved on February 19, 2010 were for the installation of a Layne Christensen pressure filtration system. A second pilot study was conducted in February 2010 using a Hungerford & Terry filtration system. Data was submitted to MassDEP in April 2010 and on May 6, 2010 MassDEP approved the use of the Hungerford & Terry filtration system contingent upon the submittal of revised plans and turbidity meters being installed at the outlet of each filter.

Revised sheets detailing changes as a result of the Hungerford & Terry system were submitted to MassDEP sated June 10, 2010. In addition, Tata and Howard engineers submitted a letter dated July 8, 2010 outlining log removal credits for Giardia, Cryptosporidium and viruses using the UV disinfection and chlorine addition at the treatment facility.

Water from the existing Mill Street tubular wellfield and Green Street gravel packed wells and from the new Green Street bedrock wells will be pumped to the new treatment facility. The water has elevated concentrations of iron and manganese and has had low to moderate microparticulate analysis (MPA) results. The treatment facility is designed to remove iron and manganese as well as provide filtration and disinfection through UV and chlorination to meet the water quality criteria in the Surface Water Treatment Rule (SWTR) and the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR).

Water from all wells will be manifolded together into a single six inch raw water line that enters the treatment facility. Water will pass through a flow meter, then have injection ports for KOH addition for pH control and chlorine addition prior to passing through a static mixer. The raw water will then flow through 3 Hungerford & Terry pressure filters designed for a flow of 417 gpm at a loading rate of 3 gpm per square foot of filter surface area. Each pressure vessel will contain 18 inches of greensand plus media and 18 inches of anthracite media that has 18 x 60 mesh size and an effective size of 0.3-0.35 mm.

After the pressure filters water will pass through two UV disinfection units, each providing a UV dose of 40mJ/cm2. MassDEP's Guidelines and Policies for Public Water Systems ("Guidelines") requires a minimum dose of 22 mJ/cm2 along with a validation test plan and validation report to provide a 4 log removal for Giardia and Cryptosporidium. MassDEP recommends installing an alarm to indicate when the UV unit does not have the proper intensity. The specifications document submitted by Tata and Howard, Inc., to MassDEP as part of your BRP WS 23C permit application, Section 11376 Ultraviolet Disinfection Equipment, MassDEP Guidelines, Section 5.4.6 Ultraviolet Disinfection, and EPA's UV Guidance Manual require that UV system be validated and approved by MassDEP prior to installation.

Following UV disinfection, the treated water can receive additional chemical addition of potassium hydroxide for pH control and chlorination for disinfection if needed. Treated water then flows through a 52,000 gallon baffled chlorine contact chamber before going out to the distribution system. If a chlorine residual of 0.2 mg/l is maintained through the clear well, a four log removal of viruses is achieved. The treatment facility provides filtration to address the filtration requirements of the SWTR, but a log removal credit for filtration is not being granted.

The pilot study on the filtration unit provided information demonstrating a 2-3 log removal for Giardia and Cryptosporidium through the Hungerford & Terry pressure filters as long as the effluent turbidity did not exceed 0.03 NTU. MassDEP will require turbidity meters be installed at the outlet of each pressure filter. Unless an automatic backwash is triggered when turbidity exceeds 0.03 NTU, a log credit removal for the pressure filters will not be granted.

Chemical feed systems are chapter 6 compliant with interlock chemical feed metering pumps and alarms. Chemical feed for pH to the raw and finished water is based off the influent flow meter and pH analyzers. The system will consist of two 905-gallon bulk storage tanks for KOH with a transfer pump to a 112-gallon day tank. The system will include 3 positive displacement

diaphragm pumps of 3 gph capacity. The system feed rates will be flow paced and controlled by the facility Programmable Logic Controller (PLC).

A chlorine gas feed system will be installed within the filtration facility with raw and finished water injection. The system will consist of 2 dual 150 # scales, 4 vacuum/gas rate regulators, 3 automatic gas control valves, 2 chlorine injectors and 2 water supply solenoid valve assemblies. The facility will also be equipped with an emergency chlorine gas mechanical scrubber unit.

The pressure filters will be backwashed when triggered by a pressure differential in the filter, by a preset amount of water or time through the PLC or manually by the system operator. Backwash water will be supplied from the clearwell and will discharge to one of two backwash holding tanks. Decanted water is recycled back through the treatment facility and settled residuals will be pumped to the sewer. Standby power for the facility will be supplied by a natural gas fired generator to be installed on site.

MassDEP has reviewed the design plans and the July 8, 2010 letter and hereby approves of the proposed design of the Green Street Water Treatment Facility using the Hungerford & Terry pressure filtration system.

The activities at this Public Water System shall be performed in compliance with all other applicable local, state and federal laws and regulations. This approval does not relieve the owner or operator of this Public Water System from complying with all other applicable local, state and federal requirements, licenses and permits. Below is a list of permit conditions from the previous permit and new conditions that must be complied with.

Specific Permit Conditions

1. System Alarms - All system alarms are to be sent through the system SCADA to a location monitored continuously. High and low alarms for pH and chlorine must be interlocked with the station power controls to shut down the well and filter plant in the event of an alarm condition. The Applicant is reminded that alarms related to critical plant operations require on site operator response and must be manually reset.

2. Chemical Feed Power Switch – Chemical feed power switches must be configured to assure that the switches cannot be left unattended in the hand operated/manual position. Chemical feed is based off the influent flow meter.

3. Turbidity Meters – Turbidity meters shall be installed at the outlet of each pressure filter. The turbidity readings shall be wired to the SCADA system and monitored.

4. Chemical Feed Chapter 6 Compliance - The applicant is reminded that the revisions to Chapter 6 of Guidelines and Policies for Public Water Systems (Guidelines) revised in May of 2009 apply to all critical chemical feed systems either existing or proposed. The applicable chemical feed systems must comply with these requirements.

Greene Street gravel packed wells already have sampling ports. The two new bedrock wells, #2 and #3, shall have smooth nose ports installed in the well connection vault (Sheet C-9) where the two lines each have a flow meter and connect into a single influent water line. In addition, a raw water smooth nose sampling port shall be installed on the raw water line as it enters the treatment facility building. A sampling port already exists on the raw water line after the chlorine addition and pH control.

6. Clear Well Overflow/Vent – The clear well overflow/vent line shall have both a vent line with a screen and an overflow line with a screen that discharges to the atmosphere with at least a one foot drop to the ground.

7. Clear Well Hatch – The clear well hatch in the storage room shall be elevated several inches about the ground surface to prevent spillage from entering the tank.

8. UV Unit Intensity Alarm – The UV unit shall have an alarm connected to the intensity meter to indicate when the UV unit is not achieving proper intensity and disinfection.

9. UV Disinfection System – In accordance with your Specifications Document (Section 11376 UV Disinfection Equipment) and MassDEP Guidelines (Section 5.4.6 UV Disinfection), the public water systems utilizing UV Reactors shall meet EPA's UV dose requirements, and perform validation testing as summarized in Section 5.4.6.3 of MassDEP Guidelines and detailed in EPA UV Guidance Manual document.

10. Construction Certification - The Applicant shall submit to MassDEP, prior to the final inspection of the project, a copy of the Engineer's certification letter/report on the construction of the water treatment project, and its compliance with MassDEP's regulations, guidance and policies. The Engineer's report shall also include a final set of as-built plans, and show any changes from the submitted and approved plans and reports.

11. Operation and Maintenance Manual - The Applicant shall submit to MassDEP for review and approval, an Operation and Maintenance (O&M) Manual, at least 30 days prior to the final inspection of the Green Street Treatment Facility.

12. Sampling Schedule –A revised sampling schedule will be generated for your Public Water System after the final inspection of your treatment system has been conducted. The applicant is reminded that a Massachusetts certified laboratory must conduct all required analyses.

13. Final Inspection - MassDEP must be notified upon completion of the construction of the project, so that MassDEP personnel may conduct the final inspection of the facility. Please allow at least ten (10) working days for MassDEP personnel to conduct the final

inspection. MassDEP's written approval must be obtained prior to placing the Green Street Filtration Facility in service.

Thank you, and if you have any questions concerning this matter, please contact Margo Webber of the Drinking Water Program at 508-767-2738. Feel free to contact me as well at 508-767-2827.

Sincerely,

Marielle Stone
Section Chief
Drinking Water Protection

Cc: Drinking Water Program, BRP, MassDEP-Boston
Drinking Water Program Files, BRP, MassDEP-CERO
DWP Correspondence Folder, BRP, MassDEP-CERO
Paula Caron, DWP-WQTS, BRP, MassDEP-CERO
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Hopedale Board of Health

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Y:\DWP Archive\Cero\Hopedale 2138000 System Modification WS23C 2010-07-19