TOWN OF EGREMONT
WATER DEPARTMENT

WATER TREATMENT PLANT
pH CONTROL SYSTEM

1. Operational Description:

A. The caustic feed system consists of a 30 gallon day tank, 2 metering pumps, and all necessary hose, tubing, piping, fittings and appurtenances. Sodium carbonate solution (Na_2CO_3) will be used to raise the finished water pH from the current value of approximately 6.8 to a proposed value of 7.0 to 7.2.

B. Appurtenances to be furnished include but are not limited to pump mounting shelves, calibration column, backpressure valves, multi-function valves, foot valves, diffusers, ball valves, instrumentation and controls.

C. All monitoring and control of the chemical feed system shall be via a new chemical feed pump controller (controller). Analog signals to and from the controller shall be 4-20mA. The controller shall receive a flow signal from the plants existing flow meter and provide a flow paced signal to operate the chemical feed pumps.

D. From the controller, the operator will select which metering pump is lead/standby. The controller will provide individual 4-20ma pacing signals to each pump. The individual 4-20ma pacing signals shall be capable of being scaled either up or down by the operator. The operator shall be able to turn a respective metering pump OFF, or to be controlled in AUTO.

E. The solenoid pumps will output a "pulse" signal, which will be monitored by the controller. Upon failure to detect a "pulse" report back from the metering pump called upon to start, the controller shall annunciate a respective pump failure alarm and will automatically start the standby pump in the failed pump's place. The controller will also send an alarm to the plant's main control panel (MCP).

F. Filtered water pH will be monitored from a sample line downstream from the point of chemical injection. A pH analyzer will provide local indication of the pH, and provide a 4-20ma signal to the controller. High and low setpoints programmed by the operator shall annunciate respective alarms. A high-high setpoint shall shutdown the chemical feed system. The controller will also send an alarm to the plant's main control panel (MCP). Restart of the system will require the operator to acknowledge the alarm.

2. Chemicals

A. Sodium Carbonate will be provided in powdered form and in bags. Bags shall be fully labeled to include chemical name, purity, concentration, supplier name and address.

B. Sodium, carbonate shall meet latest ANSI/AWWA and NSF 60 specifications.

3. Equipment

A. The day tank shall each be fabricated of linear polyethylene or polypropylene with the following details:

1. 30 gallons, 18" diameter x 30"high
2. The day tank shall have a flanged outlet located at the lowest possible point to allow for drainage
3. The day tank shall also have flanged overflow at the top of the sidewall of the day tank.
4. Flanges shall be 150 pound ANSI with gasket.
5. The day tank shall be equipped with two-piece cover of the same material as the tank.
6. Equipped with the recommended fittings to accommodate the tank level sensors and switches, suction and recirculation lines.
7. Tank covers shall be bolted in place with polyethylene bolts supplied by the tank manufacturer.
8. The day tank shall have two (2) 1-1/2 inch diameter PVC stilling pipes attached to the tank cover to accept the flexible suction tubing from the chemical feed pumps.
9. The day tank shall have a mount for the mixer. The mixer shall be mounted to avoid interfering with the operation of the chemical feed pumps.

B. The tank mixer shall be equipped with 4" propeller type blades and 316 stainless mixer shaft. The mixer clamp and base shall be aluminum "C" clamp type with swivel adjustment and locking device. Motor shall be 1550 rpm, 115v, 60 Hz., single phase, 1/20 HP and TEFC.

C. The metering pumps shall be microprocessor controlled, simplex, solenoid driven, mechanically actuated, diaphragm type as manufactured by Liquid Metronics Inc. Pulsafeeder, Prominet, or approved equal. The metering pumps shall have the following attributes:

1. Quantity: 2
2. Capacity: 1.0 gph @110 psi
3. Liquid end: For Na_2CO_3
4. Power requirements: 115 VAC, 60 Hz
5. Power cord: 6 foot (2 wire plus ground) with twist lock plug
6. Control: Remote start/stop (24 VDC)
   Analog (4-20ma pacing signal)
   Pulse output
7. Options (each pump): Four function valve,
   Wall-mount bracket, Foot valve

D. The chemical feed pump controller will provide for manual or automatic control of the chemical feed metering pump, and will energize/deenergize the remote electrical outlet into which the pump is connected. The control station enclosure shall be designed to insulate and house control devices in wet, dusty, and/or corrosive environments.

1. Enclosure shall be rated NEMA Type 4X and shall be constructed of Polycarbonate material.
2. Power shall be 115VAC.
3. Each control station shall include but not be limited to the following:
    a. Hand-Off-Auto Selector Switch with spring return from the Hand position.
    b. LED "On" Status Indicator.
    c. Emergency Stop Pushbutton push to activate and twist to release.
    d. Panel mount alarm device for providing visual and audible indication.
    e. Front panel mount 3 to 60 minute analog timer, operator adjustable from the front dial.
    f. "On" status contact to provide indication to MCP
    g. "In AUTO" contact to provide switch position indication to MCP
    h. 115VAC and dry contact output to energize metering pump outlet.
    i. Fuse holder and 10 amp fuse. Fuse shall be accessible from the outside without opening the enclosure.

5. Control shall be as follows:
    a. With the 3 position selector switch turned momentarily to the HAND (manual) position the control station will energize the pump outlet and the following will occur:
    b. An audible and visual indication (red flashing LED) shall annunciate on the control station while the pump is running in the HAND.
    c. The adjustable timer at the control station is started. At the end of the timing cycle the metering pump outlet will be de-energized and the audible and visual indication will be turned off.
6. With the 3 position selector switch in the AUTO position the metering pump outlet will be energized upon receipt of a start signal from an external remote PLC, SCADA, Flow Switch, or other interlock device. The start signal shall be a normally open dry contact that upon closure shall cause the pump to start.

7. The E-Stop pushbutton on the control station will provide for emergency stop of the metering pump in either the HAND or AUTO mode of operation. A green LED "On" status indicator light shall indicate that the metering pump outlet is energized
8. Pump Controller shall be Model #XPCS by CTI Dynamix, LLC, or equal.

9. Chemical feed Pump Accessories
   a. Backpressure valves at all chemical injector locations shall be PVC and hypalon-coated. Backpressure valves shall be factory set to 50 psig.
   b. One wall-mounted calibration column for furnished with a ½-inch Tru-union ball valve at the column base and sufficient length of tubing to connect to the suction port of each pump head. Calibration column shall be sized to provide a minimum of 1-minute capacity at the maximum metering pump setting, but shall be no smaller than 250 ml.

10. Corporation Stop and Nozzle Assembly:
   a. Corporation stops and nozzle assemblies for the Na_2CO_3 injector and the pH analyzer. The assembly shall consist of a polypropylene nozzle, bronze corporation cock, PVC check and isolation valves, and vinyl covered stainless steel cable.
   b. Injector assemblies for ½-inch chemical lines shall be ¾-inch corporation size, and 1-inch corporation size for ¾-inch chemical lines.
   c. The assembly is to be of a design to allow removal of the injection nozzle from the pipeline without shutting down the pipeline.

F. pH Monitoring

1. The analyzer shall consist of a direct measuring sensor, a constant head flowcell, an electronic monitor housed in a NEMA 4X enclosure with clear hinged window for wall mounting, and interconnecting cable. The analyzers shall be Hach Model SC200 or approved equal.
2. The measuring sensor shall be a direct measuring polarographic sensor utilizing a special polymeric membrane to isolate the sensing electrodes from the sample and eliminate the potential for electrode contamination. The sensor assembly shall contain a precision RTD temperature sensor to continuously measure sample temperature to allow temperature compensation of the measured parameter.
3. The sensor shall be mounted in a clear wall-mounted flowcell assembly allowing inspection of the sensor without disassembly. The sensor shall slide into the side of the flowcell, utilizing double

O-rings to prevent sample leakage. Flow to the sensor shall be regulated automatically through a constant head overflow arrangement. Hose bibbs for sample inlet and drain shall be supplied as part of the flowcell.

4. Furnish one spare sensor and at least 10 spare membranes, electrolyte, and a spare parts kit that includes all O-rings and special hardware.

4. Start Up and Handling

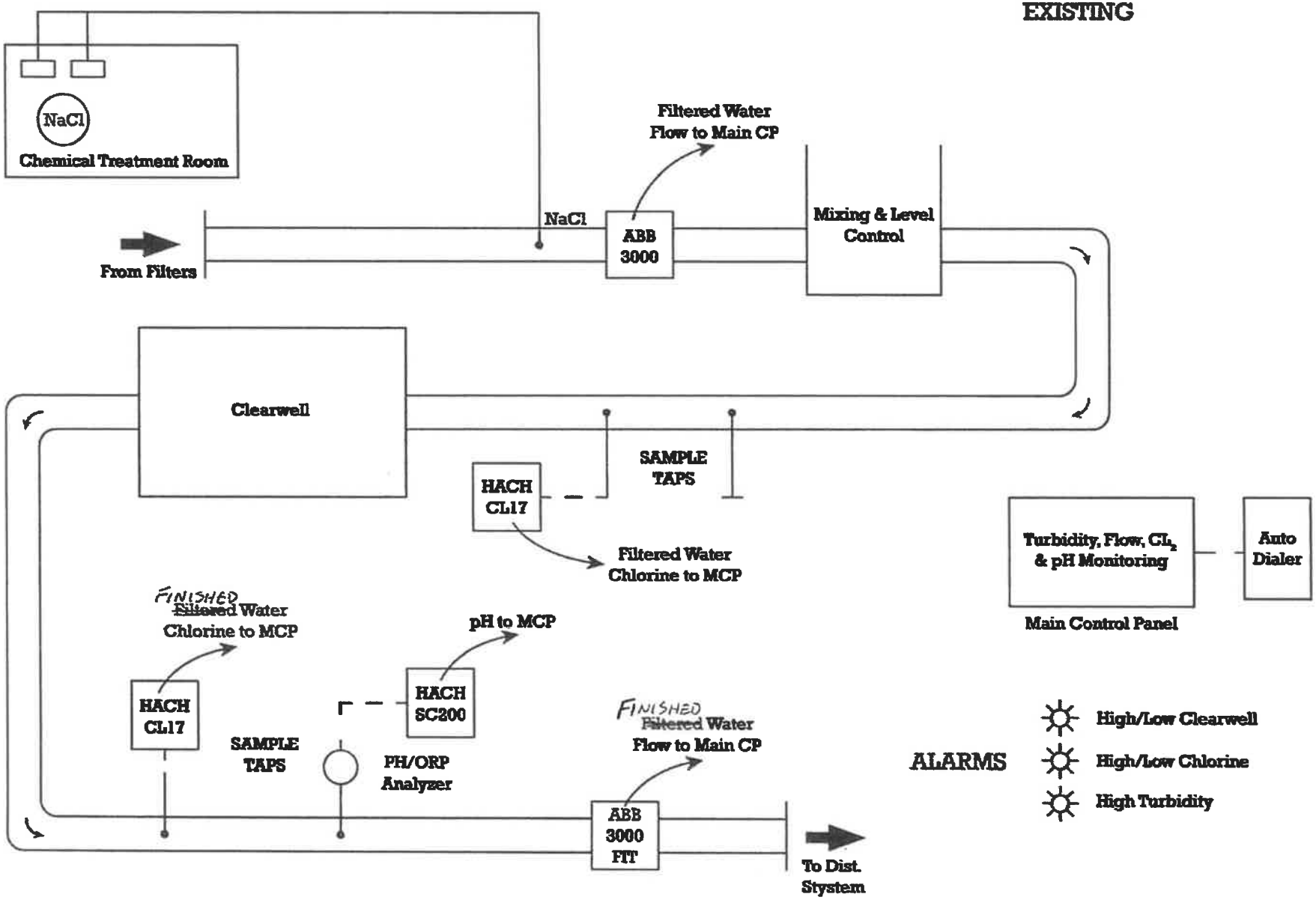
A. Mix sodium carbonate with water to a 5% solution by weight (approximately 2 lbs per 5 gallons).

B. Set initial chemical feed pump to 50% capacity. Adjust the feed rate to result in a pH increase of 0.5 units.

C. Store chemicals in accordance with Material Safety Data Sheets (MSDS) provided with the chemical.

D. Wear protective clothing, including gloves and eyewear, in accordance with MSDS.

EGREMONT WTP SCHEMATIC
EXISTING



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