

ATTACHMENT “A”

TECHNICAL SPECIFICATIONS

ITB 2023.14 Water & Wastewater Treatment Plant Conversion to Liquid Chlorine

1. OVERVIEW

The purpose of this project is to convert the disinfection system at the City of Milton’s water and wastewater treatment plants from chlorine gas to bulk sodium hypochlorite and to convert the de-chlorination system at the wastewater treatment plant from sulfur dioxide gas to sodium bisulfite. The Contractor shall be responsible for providing a “turnkey” project including all required Florida Department of Environmental Protection (FDEP) permitting (including permit fees), equipment supply and installation and startup services. The work must be completed within 270 days of the Contractor receiving a Notice to Proceed for the Work.

2. GENERAL

2.1. Scope

The “Work” under this Specification includes the furnishing of all engineering, permitting, labor, materials, equipment, documentation, installation, training, and startup services for the conversion of the disinfection systems from chlorine gas to sodium hypochlorite and the wastewater de-chlorination system from sulfur dioxide to sodium bisulfite at the following water (WTP), and wastewater treatment plants (WWTP):

- 1) Main WWTP, 6903 Municipal Drive, Milton, Florida 32570
- 2) Fire House WTP, 5300 Byrom Street, Milton, Florida 32570
- 3) Byrom Street WTP, 6606 Grace Street, Milton, Florida 32570
- 4) Berryhill WTP, 5662 Berryhill Road, Milton, Florida 32570
- 5) Glover Hospital WTP, 5573 Northrop Road, Milton, Florida 32570
- 6) Appaloosa WTP, 6400 Appaloosa Avenue, Milton, Florida 32570

The Work shall be done in such a manner that each plant maintains continuous disinfection (and de-chlorination at the wastewater treatment plant) through use of the existing system or the use of a temporary sodium hypochlorite or sodium bisulfite systems. All of the water plants are permitted under PWS #1570146. The Contractor shall be responsible for designing and permitting the proposed sodium hypochlorite system with the Florida Department of Environmental Protection (FDEP). This responsibility includes any responding to any requests for information (RFI), providing record drawings and all required FDEP completion paperwork to get a clearance to operate the systems. The City of Milton would sign all of the permitting forms as the authorized user and the Contractor shall sign and seal the application and the associated drawings. Once each plant is permitted by the FDEP, the Contractor would install a new sodium hypochlorite system utilizing the existing structures on the site to replace the existing chlorine gas system. Likewise, the Contractor shall utilize the existing de-chlorination facilities to install the new sodium bisulfite system at the Wastewater Treatment Plant.

Each Water Treatment Plant sodium hypochlorite system would consist of a single 165-gallon double-walled storage tank (65-gallon double-walled tank at the Byrom WTP), two diaphragm chemical feed pumps, interconnecting piping between the tank and pumps, new injection piping including installation of a saddle with injection quill using a “wet” tap, a new chlorine analyzer, a new eyewash/safety shower, and associated electrical and control wiring. The existing Chlorine Room at each site would be repurposed from chlorine gas to sodium hypochlorite.

The main Wastewater Treatment Plant sodium hypochlorite system would consist of two 2,000-gallon double-walled storage tanks, two chemical feed duplex skids each containing two peristaltic feed pumps, interconnecting piping between the tanks and feed pumps, new injection piping to the five existing points, control wiring for the existing clarifier discharge flow signal to the sodium hypochlorite pumps and associated electrical and control wiring. There is a Chlorine Building open on the west side which measures approximately 12’ X 22’ X 9’ tall. The building is raised up on a 5’ tall concrete slab for storm surge protection from a hurricane. The Contractor shall use the existing Chlorine Building for the sodium hypochlorite storage tanks and shall repurpose the two FRP sheds behind the Sulfur Dioxide Building for the sodium hypochlorite feed pump skids. The sheds shall be relocated to the concrete pad immediately east of the Chlorine Building. This will involve a minor relocation of the existing sodium hydroxide system.

The main Wastewater Treatment Plant sodium bisulfite system would consist of two 2,000-gallon double-walled storage tanks, one chemical feed duplex skid containing two peristaltic feed pumps, interconnecting piping between the tanks and feed pumps, control wiring for the existing clarifier discharge flow signal to the sodium bisulfite pumps and associated electrical and control wiring. Because sodium bisulfite can begin to crystallize at temperatures less than 46 degrees F, the tanks will have to have a recirculation pump and all of the piping must be heat traced and insulated and heat trace/heater will suffice. Additionally, the pump skid shall be enclosed with a small heater. There is an existing Sulfur Dioxide Building which measures approximately 12’ X 22’ X 10’ tall. The building is raised up on a 5’ tall concrete slab for storm surge protection from a hurricane. The Contractor shall use the existing Sulfur Dioxide Building for the sodium bisulfite storage, recirculation and feed equipment.

The City of Milton (the “Owner”) shall designate Robert Gloyd as the Owner’s Project Manager and main point of contact @ (850) 983-5461 for the following with regard to this project: (1) For technical questions after contract award; (2) Directions to the facilities; and (3) To act as the Owner’s Project Manager which includes approval authority for the required submittals, arrange for access to the site to coordinate the on-site Work, and issue final acceptance of the system.

2.2. Work Specified Herein

A. Equipment

1. Chemical Metering Skids and Accessories
2. Chemical Metering Pumps and Pump Controls
3. Safety Shower/Eyewash and & Hose Bib/Hose Rack/50’ Hose

4. Bulk Storage Tanks
5. Chlorine Analyzers
6. Piping, Pipe Supports and Valves
7. Spare Parts

B. Execution

1. Engineering and FDEP Permitting
2. Temporary Sodium Hypochlorite Disinfection System (If required)
3. Chlorine Gas System Demolition
4. Equipment, Piping, Electrical and Control Wire Installation
5. Testing
6. Documentation (Record Drawings and O&M Manuals)
7. Startup and Training Services (includes startup chemicals)

2.3. Related Work Specified Elsewhere

- A. None

2.4. Quality Assurance

- A. Acceptable Suppliers

1. All of the equipment supplied hereunder shall be as specified for standardization, spare parts and to facilitate technical support from local vendors. The sodium hypochlorite tanks of this section shall be manufactured by Assmann Corporation of America or Snyder Industries OR EQUIVALENT. The supply of the chemical metering skids shall be by Blue Planet Environmental OR EQUIVALENT. The metering pumps shall be manufactured by Ragazzini OR EQUIVALENT at the wastewater treatment plant and Lutz-Jesco OR EQUIVALENT at the water treatment plants based on Owner's preference. The ball valves shall be manufactured by Asahi OR EQUIVALENT. All other equipment shall be manufactured by the vendor specified herein OR EQUIVALENT to ensure uniformity with the other City of Milton chemical systems at their WWTP and the WTP's
2. The Contractor shall be responsible for providing all engineering, permitting, equipment, accessories, spare parts, installation labor, documentation and startup and training services required for a complete and operational chemical feed system and thus shall demonstrate satisfactory experience in providing this level of support on at

least ten other similar projects. All installation work shall be performed by a licensed plumbing or general contractor.

B. Equipment Testing

1. The chemical metering skids and feed equipment shall be assembled, and water tested by the manufacturer prior to delivery. All functionality shall be tested.
2. The tanks shall be tested for 24 hours to check for leaks on the site with either chemicals or water. If chemicals are used, the Contractor shall have a plan to change out or repair any leaking tanks.

C. Warranty

1. The Contractor shall provide a three (3) year parts and labor warranty for all of the Work supplied hereunder from the date of commercial operation. These warranties shall be in addition to and not in lieu of any warranties provided by the manufacturer of any of the equipment itself or any subcontractors. None of these warranties include the wear parts on the chemical feed pumps (those items that compose the pump rebuild kits). Additionally, the warranty shall not apply to any equipment that is re-used.

2.5. Bid Submittals

- A. Firm Pricing to perform the work.
- B. List of proposed subcontractors and major equipment suppliers.
- C. Submit a minimum of three separate references (maximum of five) with contact names and phone numbers, where substantially similar installations for the equipment and same chemical application as specified has been in satisfactory operation for a minimum of one year for both the system installation and the permitting for the subcontractor performing the work.
- D. Submit a copy of Contractor's general contractor license and their or their subcontractor's plumbing license.
- E. Detailed description of proposed scope of supply outlining the equipment to be supplied and demonstrating Contractor's understanding of its proposed scope for work.
- F. Bar Chart showing proposed Project Schedule demonstrating the project will be completed within 270 days of a Notice to Proceed.
- G. Submit resumes outlining qualifications of key personnel who will be performing the work including as a minimum the proposed project manager and project superintendent.
- H. Any Other Relevant Information from Contractor or its Subcontractors
- I. Exceptions to the Specification

2.6. After Award Submittals

- A. The Contractor shall prepare equipment layout drawings of each facility for Owner's approval. The package shall contain AUTOCAD shop drawing and product data for the equipment provided. Additionally, it shall include detailed schematic of equipment, piping, controls, etc. The Contractor shall also provide supporting information of UL or NSF-61 certification for the equipment.
- B. Drawing Approval
 - 1. Shop drawings and equipment selection shall be approved by OWNER prior to any manufacturing of tanks, fittings, and pump skids. Approval of drawings by OWNER shall not release the Contractor of responsibility of compliance with these specifications. All proposed changes to these Specifications shall be stated in writing.
- C. O&M Manuals
 - 1. Seven hard-copy and four memory sticks of the Operating and Maintenance (O&M) manuals prepared specifically for this project shall be provided. Manuals shall include all procedures, drawings, parts lists, special tools, recommended spare parts, specific information for each chemical, operational instructions, warranty statement and subcontractor warranties, etc. required to instruct personnel unfamiliar with such equipment and to operate the system.

1.7. Service Conditions

- A. Chemical name: Sodium Hypochlorite (NaOCl)
 - a. Concentration: 12.5 Trade Percent
 - b. Specific Gravity: 1.165
 - c. Maximum Temperature: 100° F
- B. Chemical name: Sodium Bisulfite (NaHSO₃)
 - a. Concentration: 38 Percent by Weight
 - b. Specific Gravity: 1.35
 - c. Maximum Temperature: 100° F

3. EQUIPMENT

3.1. General

- A. The chemical feed pump metering systems shall be completely self-contained and designed to safely feed metered amounts of the chemicals as listed in subsection 1.7 Service Conditions. Each chemical metering skid shall include chemical metering pumps, accessories, controls and options as indicated in the Design Summary portion of this section. The chemical metering skids will be completely assembled and tested prior to delivery to the job site. All equipment

shall be of materials selected specifically for use with all chemicals as listed in subsection 1.7 Service Conditions. The manufacturer shall supply the following pump skids with Ragazzini OR EQUIVALENT peristaltic feed pumps at the Wastewater Treatment Plant:

<u>Skid Number</u>	#1	#2	#3
	Sodium Hypochlorite	Sodium Hypochlorite	Sodium Bisulfite
<u># Pumps</u>	Two	Two	Two
<u>Primary Injection Points</u>	Contact Chamber #1 and #3 Bubbler Box	Contact Chamber #1 and #3 Bubbler Box	De-Chlorination Chamber
<u>Chemical</u>	NaOCl	NaOCl	NaHSO ₃
<u>Type Pump</u>	Peristaltic	Peristaltic	Peristaltic
<u>Separate Controller/VFD</u>	Yes (NEMA 4X)	Yes (NEMA 4X)	Yes (NEMA 4X)
<u>Stroke Length</u>	N/A	N/A	N/A
<u>Stroke Rate</u>	N/A	N/A	N/A
<u>Pump Capacity (GPH)</u>	10.8 gph (60 Hz)	10.8 gph (60 Hz)	10.8 gph (60 Hz)
<u>Pump Pressure (PSI)</u>	30 psi	30 psi	30 psi
<u>Piping Material</u>	Schedule 80 PVC	Schedule 80 PVC	Schedule 80 PVC
<u>Type Valves</u>	Asahi Type 21 Ball	Asahi Type 21 Ball	Asahi Type 21 Ball
<u>Gaskets / O-rings</u>	Viton	Viton	Viton
<u>Skid Piping Outputs</u>	Two	Two	Two
<u>Weather Protection</u>	None	None	Fully Enclosed w/Removable Doors
	NEMA 4X HOA Panel (Inlet	NEMA 4X HOA Panel (Inlet	NEMA 4X HOA Panel (Inlet

<u>Options</u>	Breaker, Surge Protection for all control and electrical signals, Analog Control (4/20 ma in), Pump Run, Fault Relay, Remote ON/OFF)	Breaker, Surge Protection for all control and electrical signals, Analog Control (4/20 ma in), Pump Run, Fault Relay, Remote ON/OFF)	Breaker, Surge Protection for all control and electrical signals, Analog Control (4/20 ma in), Pump Run, Fault Relay, Remote ON/OFF)
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- B. The sodium hypochlorite and sodium bisulfite bulk storage tanks shall be manufactured by either Assmann OR EQUIVALENT, or Snyder OR EQUIVALENT tanks and designed for use with chemicals as set for in subsection 1.7 Service Conditions. The tank shall be double walled with built-in containment.
- C. All other piping and ancillary materials shall be as described below.

3.2. Chemical Metering Skids (Wastewater Treatment Plant Only)

A. Chemical Metering Skids General Description

1. The chemical metering skids shall be constructed from white PVC sheet with a minimum trade thickness of 1/2". The design of the skid shall include gussets and supports as required for all components and shall be self-supporting. All components of the chemical metering system shall be contained within the skid. The skids shall be manufactured using continuous welding technology; bolted construction is acceptable. Pedestals shall be provided to elevate the metering pumps above the skid base for the chemicals. The sodium bisulfite skid shall be fully enclosed with sliding removable doors for maintenance access.
2. The sodium bisulfite skid shall contain a small 400-Watt heater that turns on at 40 degrees Fahrenheit and turns off at 55 degrees Fahrenheit. The Contractor shall be manufactured by Xtreme OR EQUIVALENT.
3. For each metering pump the piping system shall include (1) Backpressure Valve; (1) Pressure relief Valve; (1) diaphragm protected pressure gauge; (1) flushing inlet; (1) flushing outlet; (2) Isolation valves for maintenance; (1) inlet strainer and all required piping, valves and supports. Each pump shall include isolation valves and unions for all serviceable components. The chemical supply piping shall allow for dual chemical inlets and a calibration column shall be provided and designed for use with any of the metering pumps. The discharge piping shall allow for each pump to serve two individual loads or a common load with backup. The piping shall be attached to the chemical metering skid with a non-metallic corrosion resistant support system. All support channels shall be welded to the chemical metering skid, bolted or screwed

supports are not acceptable. The straps shall be removable and reusable to allow for servicing of the system. All inlet/outlet connections, valves and pump accessories shall be clearly labeled on the skid.

4. A NEMA 4X HOA FRP Control Panel OR EQUIVALENT shall be provided for the pump skid to be mounted on the pump skid for termination of all wiring. A power outlet with weatherproof cover shall be provided for the metering pumps and accessories that require an outlet. The inside cover of the terminal box shall include a wiring diagram detailing the function of all terminals. The NEMA 4X panel OR EQUIVALENT shall include a terminal board with surge suppression for the following tie-ins to the plant's SCADA system for each pump: (1) 4/20 ma input signal; (2) Pump Run signal; (3) Fault Relay; (4) remote ON/OFF; and (5) HOA switch not in Remote. The power side of the panel shall contain an inlet 15 Amp breaker which feeds a Dehn (Model #DR M 2P 150) surge suppressor in series which will feed the aforementioned outlets and also provide power to a NEMA 4X panel for the ultrasonic level sensors. The analog wiring shall feed an EDCO (DRS-036) analog surge suppression arrestor located in the panel.
5. The chemical metering skids shall be completely assembled and tested by the manufacturer prior to delivery to the job site. Each skid shall include FRP mounting brackets.

B. Accessories

1. Calibration Columns
 - a. A clear calibration column shall be provided in the chemical supply piping of each system. The piping shall be designed for the calibration column to be used with any of the metering pumps. The top of the calibration column shall allow for connection to rigid piping for "vent" return to the nearest bulk storage tank. The Contractor shall pipe the top of the calibration column on each skid back to a common vent back to the bulk storage tank. Calibration columns may also be used as de-gassing chambers. All materials shall be compatible with chemicals as listed in the Design Summary.
2. Pulsation Dampeners
 - a. Not Applicable.
3. Diaphragm Protected Pressure Gauges
 - a. 2" liquid filled pressure gauges with isolators shall be provided for indication of system pressure in the discharge piping of each metering pump. Industrial quality all 316 Stainless Steel gauges shall be utilized. The isolators shall have housings compatible with chemicals as listed in the Design Summary with a Teflon diaphragm and suitable liquid fill. The pressure gages shall be manufactured by Terrice OR EQUIVALENT, and the gage guards shall be manufactured by Blacoh OR EQUIVALENT.

4. Back Pressure Valves

- a. Back pressure valves shall be provided in the discharge piping of each metering pump to provide a constant back pressure at the chemical metering pump discharge. The back pressure valves shall be fully adjustable from 10 – 150 psi with bodies compatible with chemicals as listed in the Design Summary, Teflon diaphragm and have no metal parts in contact with the chemical.

5. Pressure Relief Valves

- a. Pressure relief valves shall be provided in the discharge piping of each metering pump, prior to any valves, to eliminate the buildup of excess pressure in the system. The pressure relief valves shall be fully adjustable from 10 – 150 psi with bodies compatible with chemicals as listed in the Design Summary, Teflon diaphragm and have no metal parts in contact with the chemical. Output of the pressure relief valves shall return to the pump suction header.

C. Piping

1. Polyvinylchloride (PVC)

- a. This specification covers pipe and fittings for pressurized pipe systems manufactured of Rigid Poly (Vinylchloride) (PVC) material as described below. Fittings covered under this specification include heavy-duty Schedule 80 fittings molded of the material described below. Fittings covered under this specification are tees, elbows, couplings, reducer bushings, crosses, adapters, plugs, caps and flanges.
- b. All pipe and fittings shall bear the company's name or trademark, material designation, size, applicable IPS schedule, and the NSF mark as indicative of compliance with this specification.
- c. All fittings shall be injection molded of PVC fitting compound of cell classification 12454-B as described in ASTM D-1784 Standard Specification for Rigid Poly (Vinylchloride) Compounds.
- d. All material used in pipe and fittings for potable water supply shall be listed for such applications by National Sanitation Foundation Laboratories, Inc. (NSF). Workmanship shall be in accordance with good commercial practice. Fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The fittings shall be commercially uniform in color, opacity, density and other physical properties.
- e. All molded threads, internal or external, shall be "blunt start" threads. All threads shall conform to thread standard ANSI/ASME B1 .20.1 for tapered pipe threads. Threads shall measure not more than 1 1/2 threads large or small when checked

with a plug gauge or ring gauge.

- f. Dimensions and tolerances of sockets shall conform to PVC IPS Schedule 40/80 Socket Dimensions. All reducer bushings shall be designed so as to provide for a positive and sufficient grip for cementing bushings in place.
- g. Assembly shall be performed in a controlled shop environment by the skid manufacturer. All pipes shall be squarely cut on precision equipment with the ends chamfered and deburred. All socket welded connections shall follow the guidelines set by the pipe/fitting manufacturer for proper cleaning, priming and gluing procedures. A heavy bodied solvent suitable for use with all chemicals as listed in the Design Summary shall be used. All threaded connections will utilize Teflon tape, a suitable thread sealant or a combination of both. Threaded connections shall utilize stainless steel reinforcement rings where applicable to reduce the risk of cracking.

D. Valves

1. Type 21 Ball Valve

- a. All TYPE 21 Ball Valves, sizes 1/2" to 4", shall be of true union design with two-way blocking capability. All O-rings shall be viton (a.k.a. FKM) with PTFE seats for the hypochlorite and bisulfite OR EQUIVALENT. PTFE seats shall have elastomeric backing cushion of the same material as the valve seals. Stem shall have double O-rings and be of blowout-proof design. The valve handle shall double as carrier removal and/or tightening tool. ISO mounting pad shall be integrally molded to valve body for actuation. The ball valves shall have a pressure rating of 230 psi for sizes 1/2" to 3" and 150 psi for 4" at 70 ° F. Type 21 Ball Valves must carry a two-year guarantee, as manufactured by Asahi/America, Inc. OR EQUIVALENT.
- b. All ball valves used for sodium hypochlorite service shall be vented to avoid entrapment of vapors.

E. HOA Panel Operation

- 1. Each pump skid shall have a NEMA 4X FRP HOA panel manufactured by Hoffman OR EQUIVALENT. Each pump shall have an HOA switch on the NEMA 4X Control Panel for that pump skid. In the "Hand" position, the pump shall run all of the time. In the "Off" position, the pump shall not run at all. In the "Automatic" position, the pump shall only run from a closed contact run signal from the SCADA system or some other external source. The HOA panel shall contain terminal strips for all of the terminations between the feed equipment and the future SCADA RTU as follows:
 - a. Hypochlorite Pump #1 Pump Trouble (DI)
 - b. Hypochlorite Pump #1 Remote Start/Stop (DO)
 - c. Hypochlorite Pump #1 Not in Remote (DI)
 - d. Hypochlorite Pump #1 Pump Run (DI)

- e. Hypochlorite Pump #1 Analog Output (AO) – This can be used to control the pump feed rate
- f. Hypochlorite Pump #2 Pump Trouble (DI)
- g. Hypochlorite Pump #2 Remote Start/Stop (DO)
- h. Hypochlorite Pump #2 Not in Remote (DI)
- i. Hypochlorite Pump #2 Pump Run (DI)
- j. Hypochlorite Pump #2 Analog Output (AO) – This can be used to control the pump feed rate
- k. Hypochlorite Pump #3 Pump Trouble (DI)
- l. Hypochlorite Pump #3 Remote Start/Stop (DO)
- m. Hypochlorite Pump #3 Not in Remote (DI)
- n. Hypochlorite Pump #3 Pump Run (DI)
- o. Hypochlorite Pump #3 Analog Output (AO) – This can be used to control the pump feed rate
- p. Hypochlorite Pump #4 Pump Trouble (DI)
- q. Hypochlorite Pump #4 Remote Start/Stop (DO)
- r. Hypochlorite Pump #4 Not in Remote (DI)
- s. Hypochlorite Pump #4 Pump Run (DI)
- t. Hypochlorite Pump #4 Analog Output (AO) – This can be used to control the pump feed rate
- u. Bisulfite Pump #1 Pump Trouble (DI)
- v. Bisulfite Pump #1 Remote Start/Stop (DO)
- w. Bisulfite Pump #1 Not in Remote (DI)
- x. Bisulfite Pump #1 Pump Run (DI)
- y. Bisulfite Pump #1 Analog Output (AO) – This can be used to control the pump feed rate
- z. Bisulfite Pump #2 Pump Trouble (DI)
- aa. Bisulfite Pump #2 Remote Start/Stop (DO)
- bb. Bisulfite Pump #2 Not in Remote (DI)
- cc. Hypochlorite Pump #2 Pump Run (DI)
- dd. Hypochlorite Pump #2 Analog Output (AO) – This can be used to control the pump feed rate

3.3. Chemical Metering Pumps

A. Mechanically Actuated Diaphragm Pumps (Water Treatment Plants Only)

1. The chemical metering pump(s) shall be motor-driven, reciprocating, solenoid-driven, mechanically actuated dosing diaphragm type manufactured by Lutz-Jesco OR EQUIVALENT. For standardization and maintenance purposes, the Contractor shall supply the MAGDOS LD4 rated for 0.9 gph@232 psi. The pump shall include a built-in brushless DC motor, lubricated gear reducer and cam-and-spring drive mounted in a non-metallic glass reinforced housing.
2. The chemical metering pump manufacturer shall provide a two-year warranty on the pump drive and one year warranty on the pump liquid end, including diaphragm and

O-rings.

3. The pump shall be fully tested to meet rated flow and pressure by the manufacturer.
4. The power supply shall be 120 VAC, 60 Hz, Single phase.
5. The liquid end shall be physically separated from the drive unit by back plate with weep hole creating an air gap. The diaphragm shall be nylon-reinforced EPDM with PTFE-faced fluid contact surface.
6. The liquid end, suction and discharge valves and valve balls shall be compatible with chemicals as listed in the Design Summary.

B. Peristaltic Pumps (Wastewater Treatment Plants Only)

1. The chemical metering pump(s) shall be motor driven, mechanically actuated peristaltic type dosing pump. The pump shall include a ½ HP inverter duty motor, oil-lubricated gear reducer and mounted in a carbon steel housing, coated with a chemical resistant two-part epoxy finish. The chemical metering pump manufacturer shall provide a two-year warranty on the pump and associated gearbox. The pump manufacturer shall be Ragazzini OR EQUIVALENT, and the Contractor shall supply model S-10 rated for 10.8 gph @30 psi with a 29.7 rpm gearbox.
2. The pump shall be fully tested to meet rated flow and pressure by the manufacturer.
3. The peristaltic tubing shall be compatible with chemicals as listed in the Design Summary. The peristaltic tubing shall not be immersed in an oil solution and instead simply be greased.
4. The pump shall use an SS316 roller assembly to compress the peristaltic pump hose. Shoe assemblies or oil filled rotor housings are not acceptable.
5. The hose end connectors shall be titanium male adapter which accepts Schedule 80 PVC NPT female fittings.
6. The metering pump shall include a ½ HP inverter duty motor with a 1000 to 1 turn-down ratio supplied by the pump manufacturer. The motor shall be powered by a Leeson, Lenz or KB OR EQUIVALENT variable frequency drive (VFD). The VFD shall be sized to the motor. The VFD shall be fully enclosed inside a NEMA 4X plastic housing. Each VFD shall be fully capable of operating at a 90 to 1 turndown ratio.
7. The power supply shall be 120 VAC, 60 Hz, Single phase to the VFD.

3.4. Bulk Storage Tanks

A. Scope of Work

1. This subsection covers the supply of four upright, double wall, flat bottom high density high density linear polyethylene resin (e.g., HDLPE) 2,000-gallon bulk storage tanks for storage of sodium hypochlorite and sodium bisulfite at the wastewater treatment plant and one 165-gallon HDLPE double-walled tank at each of the water treatment plants (65-gallon at the Byron WTP). The assembly consists of one cylindrical inner primary tank and one blended form outer secondary tank. Each tank shall be a molded in one-piece seamless construction by rotational molding. The tanks shall be designed for above-ground, vertical installation and capable of containing chemicals at atmospheric pressure. The assembly shall be designed to prevent rainwater from entering the containment tank. The design shall allow direct primary tank base retention for up to seismic zone 4 conditions per UBC code requirements. The containment tank shall be designed to hold a minimum of 115% of the normal fill capacity of the primary tank. Included in this Specification are requirements for material properties, design, construction, dimensions, tolerances, workmanship, and appearance.
2. Like items of materials, equipment shall be the end products of one manufacturer in order to provide standardization for appearance, operation, maintenance, spare parts, and manufacturer's service.

B. Applicable Documents

1. Where reference is made to one of the below standards, the revision in effect at the time of the bid opening shall apply:
 - a. American National Standards Institute (ANSI)
 1. ANSI B16.5 – Pipe Flanges and Flanged Fittings.
 - b. American Society of Testing Materials (ASTM)
 1. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
 2. ASTM D746 – Brittleness Temperature of Plastics and Elastomers by Impact.
 3. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 4. ASTM D883 – Standard Definitions of Terms Relating to Plastics.
 5. ASTM D1505 – Density of Plastics by the Density-Gradient Technique.
 6. ASTM D1525 – Vicat Softening Temperature of Plastics.
 7. ASTM D1693 – ESCR Spec. Thickness .125" F50 – 10% Igepal.
 8. ASTM D1998 – Standard Specification for Polyethylene Upright Storage Tank: Section 11.3: Low Temperature Impact Test and Section 11.4: Oxylene-Insoluble Fraction (Gel Test).

C. Materials

1. Plastic
 - a. The tanks shall be molded from high density linear polyethylene.
2. Fillers and Pigments

- b. The plastic shall not contain any fillers. All plastic shall contain a minimum of 0.25 percent U.V. stabilizer and maximum of 0.60 percent. Pigments may be added as desired by the OWNER or as designated by the manufacturer, not to exceed 0.5 percent of dry blended or 2 percent if melt compound of the total weight of the tank.

D. High Density Linear Polyethylene Tanks Design Requirements

- a. The approximate dimensions of the tank shall be 102” in diameter and 103” tall at the WWTP and 35” in diameter and 66” tall at the WTP’s.
- b. The high-density linear polyethylene tanks shall be manufactured by Assmann Corporation of America or Snyder Industries OR EQUIVALENT. Unless otherwise indicated, the plastics terminology used in this standard shall be in accordance with the design, manufacturing, and testing requirements found in ASTM D1998.
- c. The high-density linear polyethylene tanks shall be constructed by the rotational molding process.
- d. The high-density linear polyethylene tanks shall be capable of storing the above specified chemicals at temperatures up to 130 degrees F.
- e. The nominal properties of the material are as follows based on molded parts:

Property	ASTM Specification	Value
Density	D1505	.940 to .945 g/cc
ESCR Spec. Thickness .125”F50 10% Igepal	D1693	>1,000 hours
Tensile Strength Ultimate 2 in/min	D638 Type IV Spec	2,600 psi
Elongation at Break 2 in/min.	D638	400 percent
Vicat Softening Temperature	D1525	240 degrees F
Brittleness Temperature	D746	-130 degrees F
Flexural Modulus	D790	100,000 to 110,000 psi

E. Containment Systems General Description

1. Tanks shall consist of a linear polyethylene primary tank with a secondary containment tank. The primary tank shall be vertical, cylindrical, flat bottom, dome top, and seamless in construction. The secondary containment tank, outer tank, shall be a linear polyethylene, open top, vertical, cylindrical, flat bottom, and seamless in construction.
2. The tank diameter shall be measured externally. Tolerance on the outside diameter including out of roundness shall be plus or minus two percent. Measurement shall be taken in a horizontal position. The knuckle radius at bottom to wall shall be a minimum of one inch.
3. The minimum wall thickness shall be ¼ inch in all places (or see above).
4. All edges cut out, such as entrance manway, shall be trimmed to have smooth edges.

F. Accessories

1. Manways

- a. The man-way opening shall be a minimum of 24" at the WWTP and 7" at the WTP's. The manways shall be threaded construction. The Man-way cover shall be polyethylene, nylon or a compatible plastic material and shall be threaded to the top of the tank.

2. Top Fittings

- b. 2" Fill Line Connection at the WWTP and 1" fill connection at the WTP's with shop design drawing to be submitted by Contractor for approval which allows for tank vertical expansion and contraction without damaging piping. All pipe and fittings shall be constructed of Schedule 80 PVC. All Gaskets shall be a minimum of 1/4" thickness and constructed of 60-70 durometer Viton.
- c. 3" Bulkhead Fitting for Tank Vent (WWTP) and 2" Bulkhead Fitting for Tank vent at WTP's. All fittings shall be constructed of Schedule 80 PVC. All Gaskets shall be a minimum of 1/4" thickness and constructed of 60-70 durometer Viton. Vent piping may be Schedule 40 PVC since it does not get any chemical exposure.

3. Side Wall Fittings

- a. (WTP): The bulk storage tanks shall be supplied with a 1" double-flanged titanium fitting on the sidewall approximately 6" from the bottom of the tank. The flanged fitting shall have encapsulated titanium bolts. All pipe and fittings shall be constructed of Schedule 80 PVC. All Gaskets shall be a minimum of 1/4" thickness and constructed of 60-70 durometer Viton.
- b. (WWTP): The bulk storage tanks shall be supplied with a 2" double-flanged Schedule 80 PVC fitting approximately 8" from the bottom of the tank. The flanged fitting shall have encapsulated titanium bolts. All pipe and fittings shall be constructed of Schedule 80 PVC. All Gaskets shall be a minimum of 1/4" thickness and constructed of 60-70 durometer Viton.

4. Tie-Down Systems

- a. Contractor shall supply SS316 cabling and galvanized feet hardware tank restraint system for each tank at the WWTP only since the tanks are outside. The tank restraint system shall be rated for up to 150 mph winds in accordance with the local building code requirements for the City of Milton.

5. Cage Ladder

- a. None

6. Level Controller

- a. None

G. Shipping

1. Flange faces shall be protected from damage. All openings are to be covered to prevent the entrance of dirt and debris.
2. Nozzles or other fittings shall not be used for lifting. Man-way may be used for lifting only if recommended by manufacturer and only according to procedures submitted by manufacturer. Handling of tank when filled is not recommended.
3. Manufacturer's instructions shall be provided for unloading and installation of tanks.

H. Shop Testing

1. The tank manufacturer shall have quality control procedures adequate to ensure that all fabrications comply with these Specifications. Quality control shall include in process inspections as well as a final inspection by the manufacturer and written record of these inspections. The objective of manufacturer's quality control and inspection procedure shall be to have the tank comply with the Specifications and Drawings at the time of the first inspection, thus eliminating any need for rework by the manufacturer or a second inspection by the Owner.
2. Inspection records shall be made for each tank. Inspection records shall be available to the Owner. Upon request, manufacturer shall send a copy of his inspection records to the Owner for review prior to inspection by the Owner.
3. Final acceptance by the Owner may be contingent upon satisfactory inspection upon arrival, the delivery and installation at the job site.
4. The tank manufacturer shall perform the tests described below prior to shipping. Test samples shall be taken from the cut out areas of where fittings are inserted in each tank. The Owner or representative shall have the option of witnessing these factory tests.

- a. Impact Test: ASTM 1998-Section 11.3 shall be used for this test. Sample shall not shatter at 120-foot pounds with sample at minus 20 degrees F for a ½ inch wall thickness. For a wall thickness less than ½ inch, the sample shall not shatter at 100-foot pounds and minus 20 degrees F.
- b. Hydrostatic Test: Each tank shall be filled with water and checked for leaks no less than one hour after filling.
- c. Wall Thickness: Each tank shall have an actual wall thickness measurement taken at every 90 degrees, at each one-foot elevation, up to three feet from the bottom of the tank.

I. Installation

1. Install the high-density linear polyethylene tanks in accordance with the Drawings and the manufacturer's instructions.
2. All fitting connections must be installed with flexible type connections as per the Manufacturer's recommendations.
3. Make all pipe connections to tanks as shown on the Drawings.
4. Following the field test, tanks and support members shall be anchored in their final position according to the manufacturer's recommendations.

J. Field Testing

1. After installation, each tank connecting pipes, and valving shall be field tested by filling with water or chemicals. The tank and fittings shall hold this liquid without loss, evidence of weeping or capillary action for a period of 24 hours prior to acceptance. The Owner may also inspect each tank for defects, damage, and conformance with the Specifications.
2. After testing, the tanks shall be thoroughly cleaned and dried (not required for sodium hypochlorite and sodium bisulfite).
3. Should any defects become evident during inspection, testing, or within the guarantee period, the Contractor shall repair or replace the defective tank or fitting as approved by the Owner.

3.5. Miscellaneous Equipment

A. Chemical Feed Piping

1. The Contractor shall furnish and install all chemical feed piping between the tank and the pump skid and between the pump skid and the injection point including all valves, ball check valves and pipe supports. All valves shall be the ASAHI valves OR EQUIVALENT described previously. All piping and socket welding shall be as described previously. All pipe supports shall be SS316 strut, FRP uni-strut with PVC clips or PVC clicks on minimum

of 48" centers. All piping shall be Schedule 80 PVC unless otherwise noted. Contractor shall install flexible PVC piping on the discharge of the sodium hypochlorite bulk storage tank to allow for expansion and contraction of the tanks upon filling and emptying.

2. The end of each injection point at the Water Treatment Plants shall have a Schedule 120 PVC retractable teflon-lined quill assembly with a SS316 safety chain going through a 1" SS316 valve on a new saddle. Just prior to the quill, the Contractor shall install two ½" isolation ball valves and a ½" diaphragm check valve.

B. Eyewash/Safety Shower (Water Treatment Plants Only)

1. The Contractor shall furnish and install a Guardian Model 1902 combination safety shower and eyewash OR EQUIVALENT at the new sodium hypochlorite facility for each WTP. Additionally, the supply line shall contain a "T" for a hose bib with an aluminum hose rack and a 25' heavy duty hose if there is not a hose in the room.

C. Chlorine Analyzers (Water Treatment Plants Only)

1. The Contractor shall furnish and install a Hydro Instruments free chlorine analyzer which measures from 0 – 5 ppm with pH and temperature monitoring capabilities (Model RPH-260). The analyzer shall have a 4/20 ma output and a high and low level alarm. Flow cell shall be an "open channel" design to eliminate velocity variations. A pressure reducing valve will not be accepted. Chlorine probe shall be of amperometric design that does not require reagents.

3.6. Spare Parts

A. Spare Parts

Provide the following spare parts to Owner upon delivery and installation of the equipment. Spare parts shall include all parts required for (2) years of normal maintenance of all components of the chemical metering system. All parts shall be in one box labeled with the Project Information:

- a. (1) Maintenance kit for each chemical metering pump supplied to the WTP's. Maintenance kits shall include but not be limited to diaphragm, check valve seats, gaskets and o-rings.
- b. (1) Spare peristaltic hose for each chemical metering pump supplied to the WWTP.
- c. (3) Tubes of grease for the peristaltic tubes.
- d. (12) Spare ½" diaphragm for backpressure valve/pressure relief valves.
- e. (5) Spare diaphragms for ½" Plastomatic diaphragm check valves.

4. EXECUTION

4.1. WWTP Installation

- A. (Description of WWTP Operations) The City of Milton Wastewater Treatment Plant (WWTP) is a carousel type of treatment that has a separate equalization tank and anoxic tank. The plant has disc filters and two dual contact basins. They typically use only one of the four channels at a time and only uses two channels in parallel during a high flow event. The plant is permitted for 2.5 MGD. The plant currently has an average daily flow rate of 1.7 MGD and flows can peak at 2.2 MGD on days when it rains. The highest flows seen have been 3.0 – 3.5 MGD in the past. The effluent gravity flows from the clarifiers to the filters before going to an inlet box which feeds two dual contact chambers. The contact chambers outfall to a common box for sampling and then to another structure where it can go to reject (on-site 3-million-gallon tank), on-site re-use, or to the Blackwater River (the effluent is de-chlorinated just before it goes over the weir) to some cascades which helps put back dissolved oxygen. The effluent travels 150-200 yards prior to discharge to the Blackwater River.

The facility feeds chlorine gas in a water solution from one-ton cylinders to one of two points: (1) Bubbler Box (a.k.a. splitter box) between the filters and contact chambers; or (2) At the beginning of each contact chamber. The chlorine gas is flow-paced using the flow going to the filters from the clarifiers. The WWTP feeds on average about 125 ppd of chlorine gas. The chlorine feed rate can reach 200 ppd during peak flows from rain events. The facility also feeds sulfur dioxide gas in a water solution from one-ton cylinders to the De-Chlorination Chamber. The plant typically feeds about 110 ppd of sulfur dioxide gas in a water solution and feed rates can reach 180 ppd during peak flows from rain events. The finished water pH is typically around 7.0 and the permit minimum limit is 6.5. This is achieved by feeding lime at the WTP's and caustic as the WWTP. There is an operational eyewash / safety shower on the north side of the Chlorine Building and an eyewash on the inside south wall of the Sulfur Dioxide Building. The plant has a Hyrdo pH and chlorine analyzer that measures the effluent from the contact chamber. The main WWTP is staffed 16 hours per day.

- B. (Overview of New Sodium Hypochlorite System) There is an existing Chlorine Building open to the west at the WWTP which measures approximately 12' X 22' X 9' tall. The building is raised up on a 5' tall concrete slab for storm surge protection from a hurricane. The Contractor shall use the existing Chlorine Building for the sodium hypochlorite storage and chemical feed equipment. As part of the demolition, the Contractor shall remove the overhead crane and beam and electrical feed back to the disconnect. Additionally, the Contractor shall remove all of the chlorine gas feed equipment on the south inside wall. On the slab, the Contractor shall furnish and install two 2,000-gallon double-walled tanks with a built-in outer tank for containment. The Contractor shall furnish and install two duplex Blue Planet OR EQUIVALENT pump skids containing two Ragazzini OR EQUIVALENT peristaltic pumps each on the east side of the Chlorine Building inside a repurposed FRP Building. The FRP Building is currently not being used and is located on the east side of the Sulfur Dioxide Building. The FRP Building would be relocated to the east side of the Chlorine Building and the existing caustic system location would be modified to as required to create room for the relocation. One pump would be dedicated to each of the contact chambers. The pump discharges shall be cross-connected

such that any pump can feed any injection point including the bubbler box. As part of the work, the Contractor shall run the plumbing between the storage tank and the feed pumps. The Contractor shall also run five new ½" Schedule 80 PVC lines from the existing feed pump discharge manifold to the five existing injection points. The Contractor shall take the existing flow signal from measured on the clarifier outlet and re-use it for the sodium hypochlorite pumps.

- C. (Overview of New Sodium Bisulfite System) There is an existing Sulfur Dioxide Building open on the west side at the WWTP which measures approximately 12' X 22' X 10' tall. The building is raised up on a 5' tall concrete slab for storm surge protection from a hurricane. The Contractor shall use the existing Sulfur Dioxide Building for the sodium bisulfite storage. On the slab, the Contractor shall furnish and install two 2,000-gallon double-walled tanks with a built-in outer tank for containment. Because sodium bisulfite can begin to crystallize at temperatures less than 46 degrees F, the tanks shall have to have a recirculation pump and the piping must be heat traced and insulated. Additionally, the pump skid must be enclosed with a small heater. The annulus space between the inner and outer tanks will function as an insulator on the tanks so as long as the bisulfite is recirculated the tanks do not need to be insulated. The Contractor shall furnish and install one Blue Planet Environmental duplex OR EQUIVALENT enclosed pump skid containing two Ragazzini OR EQUIVALENT peristaltic pumps. One pump would be dedicated to the de-chlorination chamber, and one would be a backup. As part of the work, the Contractor shall run the plumbing between the storage tank and the feed pumps which would be heat traced and insulated also. The Contractor shall run one new ½" Schedule 80 PVC line from the feed pump discharge manifold to the existing injection point. The Contractor shall take the existing flow signal measured on the clarifier outlet and re-use it for the sodium bisulfite pumps.
- D. (Transition/Demolition) The Contractor shall perform all work in such a manner to maintain continuous disinfection during the construction. First, the Contractor shall setup and install a temporary sodium hypochlorite and sodium bisulfite system and make them fully operational. Once these systems are operational, the Contractor shall remove all of the chlorine gas and sulfur dioxide gas equipment and set it aside for salvage by the Owner. Additionally, the Contractor shall remove the existing and overhead beam and crane and set it aside for salvage by the Owner. As part of the transition for each chemical and the setup of temporary systems, the Contractor shall be responsible for providing the first 4,000 gallons of sodium bisulfite and the first 4,000 gallons of sodium hypochlorite.
- E. (Tank Installation) The Contractor shall install the new bulk sodium hypochlorite storage tanks on the new concrete pad. The Contractor shall install a 1" isolation valve at the bottom fitting on the chemical storage tanks and connect it to a 1" flexible PVC piping which would be tied to a 1" isolation ball valve. This valve will connect to 1" feed piping which will run to a common header to supply the pump skid(s). Tank level readings shall be available visually on the outside of the tanks via a Schedule 40 clear PVC sight glass. The sight glass shall have a ½" isolation ball valve. The Contractor shall install a measuring strip behind the sightglass for measuring the precise amount of use. The Contractor shall also supply a ¾" hose with a ¾" valved end to fill 2.5-gallon jugs with sodium hypochlorite to aid in cleaning around the plant. Each tank shall have a 3" PVC vent tied to a 4" header which shall be run out of the building.

The end of each of the common vent line shall have a 24-mesh bug screen. Each tank shall have a 2" Schedule 80 PVC fill connection tied to a common header with an isolation valve on the end for each tank. All piping, fittings and valves shall be as previously described (i.e., Schedule 80 PVC, Spears fittings only and Asahi Type 21 valves). The tanks shall be installed in compliance with the manufacturer's directions. The tanks shall have galvanized feet for restraints with SS316 cables rated for 150 mph winds. The galvanized feet shall be attached to the concrete pad using minimum of 5/8" SS316 bolts embedded 4.5" into the concrete pad using Hilti RE150 epoxy.

- F. (Pump Skid Installation) The sodium bisulfite pump skid shall be installed on the concrete floor adjacent to the bulk storage tanks. The sodium hypochlorite pump skids shall be installed in an FRP Building on the east side of the Chlorine Building. The FRP Building shall be relocated from its existing location on the east side of the Sulfur Dioxide Building. The final equipment layout for each system is subject to Owner's approval. The Contractor shall pre-wire the internal electrical wiring from the NEMA 4X panel on each of the pump skids to the VFD's and then the feed pumps themselves. The Contractor shall run a 1" Schedule 80 PVC line from the top of the calibration column and tie into a 2" stack vent off of the feed piping and run the common line back to the top of the closest bulk storage tank. The pump skid shall be installed in compliance with the manufacturer's instructions.
- G. (Injection Piping) With respect to the sodium hypochlorite system, the Contractor shall run the permanent 1/2" carrier chlorination lines out of the pump skid to the five injection points inside 2" containment piping. The carrier piping shall be 1/2" teflon tubing inside the containment piping and 1/2" Schedule 80 PVC outside the containment piping. The end of each 2" containment pipe shall terminate inside a NEMA 4X panel to prevent leakage and serve as a transition point from tubing to hard piping for the carrier piping. All below ground piping shall be inside a containment pipe and each end shall have a leak detection device consisting of a manual valve on the NEMA 4X panel. The end of the injection points shall have drop down to a 1/2" isolation ball valve followed by a 1/2" needle valve followed by a union with a removable pipe into the injection point. All valves, piping and pipe supports shall be as previously specified. The injection piping shall be run in a common ditch and the ditch shall contain locator tape. All above ground piping located outside the sodium hypochlorite pad shall be painted yellow in accordance with FDEP directives. The Contractor shall re-use the existing sulfur dioxide piping for the sodium bisulfite injection piping.
- H. [Electrical] The Contractor shall provide 120 VAC electrical service to the HOA NEMA 4X panel for each of the chemical skids from existing 120 VAC electrical circuits used for the chlorine gas and sulfur dioxide. All wiring shall be in conduit in accordance with National Electric Code (NEC) standards.
- I. [Controls] The Contractor shall run the existing flow signal supplying the chlorinators and sulfonators to the NEMA 4X HOA panels for the pump skids. The Contractor shall repurpose the analog signals to SCADA for the chlorine gas detector and scale to be used for the feed pump speed feedback (which gives the rate of feed). The Contractor shall install a 4/20 ma switch on the HOA panel depending upon which feed pump is running. The Contractor shall repurpose the analog signals to SCADA for the sulfur dioxide gas detector and scale to be used for the feed pump speed feedback for the two sodium bisulfite feed pumps.

- J. [Piping Instructions] The use of threaded connections shall be minimized for all piping work and all piping connections shall be socket welded (if at all possible). The Contractor shall bevel each socket weld with at least a 45-degree bevel and completely debur the bevel before applying the primer and glue. Only EZ Weldon Primer OR EQUIVALENT and CPVC 724 OR EQUIVALENT glue shall be used for socket welding except for those tie-in connections where sufficient cure time is not available to maintain continuous disinfection or to the flexible PVC connection in which case EZ Weldon PVC 725 Wet and Dry glue OR EQUIVALENT may be used.

4.2. WTP Installation

- A. (Description of WTP Operations) The City of Milton has five water treatment plants that all pump into the same distribution system. The plants are permitted as follows:

- Fire House WTP (1.296 MGD)
- Byrom Street WTP (1.150 MGD)
- Berryhill WTP (0.864 MGD)
- Glover - Hospital WTP (1.440 MGD)
- Appaloosa WTP (1.150 MGD)

Each plant has a single well pump rated between 600 – 950 gpm. Each plant typically feeds around 2 – 5 ppd of chlorine gas. The average daily flow for the system is about 1.8 MGD. In addition to feeding chlorine gas in a water solution for disinfection, each plant adds lime slurry to the finished water to raise the pH up to a 7.4. The distribution system has five elevated storage tanks. Four of the tanks are co-located with the WTP's (Byrom, Berryhill (2) and Appaloosa).

- B. [Overview of the new Sodium Hypochlorite System] There is an existing building at each water plant site with a Chlorine Room. The Contractor shall use the existing Chlorine Room for the sodium hypochlorite storage and feed pumps. The Contractor shall furnish and install one Assmann OR EQUIVALENT 165-gallon double-walled tank with a built-in outer tank for containment at each site (except at the Byrom WTP which shall use a 65-gallon double-walled tank). In addition to the storage tank, the Contractor shall furnish and install two Jesco feed pumps OR EQUIVALENT on a welded PVC shelf over the top of the tank. Each tank shall have a sight-glass for checking the tank level. The Contractor shall run the plumbing between the storage tank and the feed pumps. The Contractor shall also run a new ½" Schedule 80 PVC line from the feed pump discharge manifold to the existing injection point on the discharge of each well pump. This work involves installing an injection quill. The Contractor shall install a Hydra chlorine analyzer at each site including the sample line and a drain piping. The Firehouse and Hospital sites shall use a floor drain, the Byrom site a French drain and the Berryhill and Appaloosa sites an existing drain for the well pump blowoff when it first starts up. The Contractor shall furnish and install an eyewash/safety shower at each site including the potable water supply to the safety shower. Any outside piping shall be wrapped with insulation to prevent freezing. The Contractor shall be careful to use the water supply line for the safety shower that is tapped significantly downstream of the chlorine injection and not the water supply piping for the chlorine water booster pump.
- C. (Transition/Demolition) The Contractor shall perform all work in such a manner to maintain

continuous disinfection during the changeover construction at the Appaloosa WTP. The Contractor shall setup either a temporary chlorine gas or sodium hypochlorite disinfection system at the Appaloosa WTP. The Contractor can coordinate with the Owner to perform a 24-outage at the other WTP's. As part of the Work, the Contractor shall remove the chlorine gas equipment and set it aside for the Owner's use. As part of the transition for each chemical and the setup of any temporary systems, the Contractor shall be responsible for providing the first 165 gallons of sodium hypochlorite at each site (65 gallons at the Byrom WTP).

- D. (Tank Installation) The Contractor shall install the new bulk sodium hypochlorite storage tank inside the existing Chlorine Room at each site. The Contractor shall install a 1" isolation valve at the bottom fitting on the tank and connect it to a 1" section of flexible PVC piping which would be tied to a 1" isolation ball valve. This valve will connect to 1" feed piping which will run to a common header to supply the two feed pumps. The inlet header shall have a calibration column and a Y-strainer. The top of the calibration column shall be piped back to the top of the chemical storage tank. Tank level readings shall be available visually on the outside of the tanks via a Schedule 40 clear PVC sight glass on a ½" isolation ball valve. The Contractor shall install a measuring strip behind the sight-glass for measuring the precise amount of use. Each tank shall have a 2" PVC vent which shall be run of the Chlorine Room to the outside by core drilling the existing wall. The end of each of the vents shall have a 24-mesh bug screen. Each tank shall have a 1" Schedule 80 PVC fill connection with an isolation valve on the end for each tank. All piping, fittings and valves shall be as previously described (i.e., Schedule 80 PVC, Spears fittings OR EQUIVALENT, and Asahi Type 21 valves OR EQUIVALENT). The tanks shall be installed in compliance with the manufacturer's directions.
- E. (Feed Pump Installation) The sodium hypochlorite feed pumps shall be installed on a welded PVC shelf adjacent to or over the top of the storage tank. The final layout is subject to Owner's approval. Each WTP shall have a NEMA 4X HOA panel adjacent to the feed pumps. The pumps would plug into an outlet on the HOA panel. In the "AUTO" switch position, the feed pump would come on and off with the well pumps. In the "HAND" position, the feed pump would run continuously (for testing for example). In the "OFF" position, the feed pump would not turn on. The HOA panel would contain surge suppression for the feed pumps (as previously described in this Specification). The feed pump discharge header shall contain a pressure gauge on a ½" isolation ball valve (see previous description in the Specification) which is used to check for calcification at the injection point. The outlet for the chlorine water booster pumps shall be re-routed to the new HOA panel to make the new feed pump outlet turn on and off with the well pump.
- F. (Injection Piping) The Contractor shall run the permanent ½" carrier chlorination lines from the pump skid discharge header to a new injection point on the well pump discharge that is downstream of the existing turbine flowmeter. Any below ground piping shall be double-walled with a ½" carrier pipe inside a 2" containment pipe (see previous requirements in the Specification for the double-walled piping). The Berryhill WTP is the only WTP where piping actually leaves the Building and must be run below ground. All valves, piping and pipe supports shall be as previously specified. The end of the injection piping shall go through this valve and consist of a retractable Schedule PVC 120 teflon-lined quill with a SS316 safety chain. Just prior to the injection quill, the Contractor shall install two ½" isolation ball valves and a ½"

diaphragm check valve. All above ground outdoor piping shall be painted yellow in accordance with FDEP directives.

- G. [Electrical] The Contractor shall provide 120 VAC electrical service to the NEMA 4X panel for each of the sodium hypochlorite feed pumps from the existing electrical supply to the chlorine gas system. All wiring shall be in conduit in accordance with National Electric Code (NEC) standards.
- H. [Potable Water Piping] The Contractor shall supply a 1" line from the nearest potable water supply to the new sodium hypochlorite system to supply a combination eyewash/safety shower. The location of the eyewash/safety shower is subject to Owner's approval at each site. The combination safety shower and eyewash shall be a Guardian Model 1902 OR EQUIVALENT and shall be furnished and supplied by the Contractor. All potable water piping shall be painted blue. The Contractor shall supply a hose bib with a hose rack and 25' of hose for those WTP's that do not have one.
- I. [Controls] The Contractor shall re-use the existing power supply to the chlorine water booster pumps that turns on and off with the well pump at each site for the relays in its HOA panel.
- J. [Chlorine Analyzer] The Contractor shall furnish and install a Hydro Instruments Model RPH-260 free chlorine analyzer at each WTP. The power to each analyzer should be run from behind the surge suppression unit. The Contractor's installation shall include tapping the water supply far enough downstream of the injection point to pull a thoroughly mixed sample for the analyzer if none is available already at the site along with installation of appropriate drain piping as previously described for the sample runoff. To comply with FDEP regulations, the Contractor shall hookup the high and low chlorine residual alarms from the chlorine analyzer to the existing SCADA panel (i.e., Mission Panel) and reprogram same. For those sites that are not using both of their analog signals, the Contractor shall hookup the 4/20 ma output from the analyzer to the Mission panel as well and reprogram same. The Berryhill WTP is the only WTP using both of their SCADA analog inputs.
- K. [Piping Instructions] The use of threaded connections shall be minimized for all piping work and all piping connections shall be socket welded if at all possible. The Contractor shall bevel each socket weld with at least a 45-degree bevel and completely debur the bevel before applying the primer and glue. Only EZ Weldon Primer OR EQUIVALENT and CPVC 724 glue OR EQUIVALENT shall be used for socket welding except for those tie-in connections where sufficient cure time is not available to maintain continuous disinfection or to the flexible PVC connection in which case EZ Weldon PVC 725 Wet and Dry glue OR EQUIVALENT may be used.

4.3. Schedule

- A. All work shall be completed within 270 days of being given a Notice to Proceed.

4.4. Manufacturer's Services

- A. The manufacturer shall provide the following services as specified.
 - 1. Engineering/FDEP Permitting Services – The Contractor shall be responsible for all

engineering and Florida Department of Environmental Protection (FDEP) permitting activities for the proposed sodium hypochlorite system. Additionally, the Contractor shall provide record drawings of the completed system in AUTOCAD and all required O&M manuals. The Contractor shall be responsible for putting together the FDEP Minor Modification Permit application as well as completing and certifying the FDEP Completion forms for the project. This effort includes, but is not limited to, interaction with Owner to prepare the required forms, correspondence and all required communications with the FDEP to obtain approval on the permit application, preparation and submission of the FDEP Clearance paperwork, record and as-built drawings and O&M manuals.

2. Start-Up Services - Provide up to one 8-hour working day of mechanical start-up services for each site.
3. Startup Chemicals – As previously highlighted in the Specification, the Contractor shall be responsible for providing sodium hypochlorite and sodium bisulfite in the amount equal to the quantity of all tanks being supplied to facilitate the transition and for delivery to any temporary systems.
4. Operator Training Services - Provide one 8-hour working day to instruct operating personnel on the operation and maintenance of the system at each site.
5. O&M Manuals – Seven hard and four thumb drive copies of Operating and Maintenance (O&M) manuals prepared specifically for this project shall be provided. Manuals shall include all procedures, drawings, parts lists, etc. required to instruct personnel unfamiliar with such equipment. Operation and maintenance manuals shall be prepared in accordance with all specifications of this project.

*****END OF SPECIFICATION*****