

RO/DI Water Equipment

The list below details the components included in the original design and commercial proposal for the construction of the system known as WaterSurplus Asset Number 10020695. It is not intended to be an "as built" description of the Asset.

Item #	Description
1	<p><u>Feed Water Bag Filters</u></p> <ul style="list-style-type: none"> • Quantity: Two (2) housings in series • 304SS construction, non-code, flanged connections, Buna-n gaskets • Clamp closure offers quick and easy bag change-outs • 150 PSI pressure rating up to 250°F • Inlet and outlet pressure gauges, 0-100 PSI, 63mm dial, 316SST, ¼" NPT • 25 micron and 10 micron bags included • Items supplied loose for installation by others. • Feed inlet pressure regulator
2	<p><u>Activated Carbon Filter (Skid-Mounted)</u></p> <ul style="list-style-type: none"> • Quantity: One (1) • Model Number: Evoqua # PTICSSNX48X60 • Vessel Size: 48" diameter x 60" side shell • Vessel Materials of Construction: Carbon Steel, with pad flanges • Lining: 8-16 mil DFT epoxy internal lining (NSF-61 approved) • Vessel Support: Structural steel legs • Vessel Rating: 100 PSIG non-code (ASME optional) • Face Piping: Schedule 10 316LSS • Process Control Valves: Cast iron butterfly valves with SST disk, EPDM seats, pneumatic actuator (ATO/STC) • Internal Distribution Piping: Schedule 10 316LSS • Media: 48 ft3 of acid washed, coconut shell activated carbon • Support Bed: #4 quartz, ¼" x ⅛" quartz Note: Loading of media is by others. • Control Package: NEMA 4 enclosure with remote I/O. Remote HMI to include shutdown alarms, status indicators, switches & pushbuttons. • Instrumentation: 0-100 PSI, 63mm dial, 316SST, ¼" NPT, paddlewheel-type flow sensor. • Electrical Requirement (By Others): 110V-1PH-60HZ, 10 amps • Air Supply, clean, dry, oil-free (By Others): 2 scfm @ 90 PSIG • Conduit; EMT • Note: Carbon filter is sized for chlorine removal. • Note: RO unit shutdown is required during filter backwash cycle • Note: Additional carbon filter is required for the future expansion.
3	<p><u>Anti-Scalant Injection Components for 2-Pass RO System</u></p> <ul style="list-style-type: none"> • Pump Quantity: One (1) • Pump Model: Grundfos DDS series (or equal), sized for future expansion. • Pump Control: Pump dosage rate to be constant, Operation to be on/off with main -2-Pass RO system. • Pump Materials of Construction: PVDF • Chemical Tank: PE Construction, 50 gallons capacity (nominal) • Note: Containment to be provided by others. • Piping (By Others): 316LSS • Accessories: Level switch to alarm on low level, pump outlet back-pressure valve • Electrical Requirement: 110V-1PH-60HZ

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	<ul style="list-style-type: none"> Items supplied loose for installation by others.
4	<p><u>2-Pass RO Unit (Skid-mounted)</u></p> <ul style="list-style-type: none"> Quantity: One (1) Model Number: M284R040SX Product: 48-60 GPM (designed for 96-115 GPM future expansion) Inlet Automatic Feed Valve: Butterfly type, with EPDM, pneumatic actuator, fail-to-close Feed Inlet Piping: Schedule 10 316LSS RO Prefilter Housing: 12R x 4H, 3" flange connections (sized for future expansion) Housing Materials of Construction: 304LSST, passivated Housing Rating: 100 PSIG, non-code RO Filter Cartridge Rating: 5.0 micron (nominal) x 40" long Cartridge Filter Material: PP, DOE Feed Inlet Flow Sensor: Signet 2537 Pump Inlet Pressure Switch: United Electric 10 series or equal 1st Pass RO Booster Pump: Grundfos #CRNE45-6 (sized for future expansion) Pump Type: Vertical, centrifugal Materials of Construction: 316SST internal wetted parts Design Flow & Pressure: 186 GPM @ 270 PSIG (future peak) Motor: 50 HP TEFC, 3500 RPM, high efficiency, 460V-3PH-60HZ. VFD: Grundfos CUE series, located in power enclosure. Speed control of VFD is by remote flow sensor. Pump Discharge Pressure Switch: United Electric 10 series or equal High Pressure Piping: 316LSST 1st Pass Membranes: (16) Hydranautics CPA5-LD Array: 2-1-1 (initial), 4-2-1 (future) Total 1st Pass RO Pressure Vessels: (7) 8" diameter x 4M FRP, side entry, 450 PSIG ASME Note: Vessels for future expansion are included. Three (3) vessels are empty during initial design, these vessels will be filled during future expansion. 2nd Pass RO Booster Pump: Grundfos #CRNE 32-8 (sized for future expansion) Pump Type: Vertical, centrifugal Materials of Construction: 316SST internal wetted parts Design Flow & Pressure: 129 GPM @ 270 PSIG (future peak) Motor: 40 HP TEFC, 3500 RPM, high efficiency, 460V-3PH-60HZ. VFD: Grundfos CUE series, located in power enclosure. Speed control of VFD is by remote flow sensor. High Pressure Piping: 316LSST 1st Pass Membranes: (12) Hydranautics ESPA2 MAX Array: 1-1-1 (initial), 2-1-1 (future) Total 2nd Pass RO Pressure Vessels: (4) 8" diameter x 4M FRP, side entry, 450 PSIG ASME Note: Vessel for future expansion is included. One (1) vessel is empty during initial design, this vessel will be filled during future expansion. Reject Flow Sensors: Signet 2537 or equal Reject Control Valve: Manual 316SST globe valve Reject Auto Flush Valve: Actuated ball valve, 316SST, fail-to-close Conductivity Sensors: Signet 2850 or equal Product Piping: Schedule 10 316LSS Control Panel: RO system is controlled by the Main System Control Panel (MCP) mounted to the 2-Pass RO skid, See MCP description below in Section 1.2. Indication: Feed flow, Feed conductivity, 1st pass product conductivity, 1st pass concentrate flow rate, 2nd pass product flow rate, 2nd pass concentrate flow rate, 2nd pass conductivity

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	<ul style="list-style-type: none"> • Miscellaneous: Pump discharge pressure relief valve, pneumatic-actuated product divert butterfly valves, product 316SS pressure relief valve • Conduit: EMT • Frame: Welded structural carbon steel, painted
5	<p><u>Concentrate Collection Tank and Accessories (Supplied Loose)</u></p> <ul style="list-style-type: none"> • Quantity: One (1) • 680-gallon capacity, flat bottom • PE construction with FDA-approved liner • SS threaded bulkhead adaptors, goose neck vent • Indoor seismic restraint hardware for anchoring of tank. • Level transmitter
6	<p><u>Concentrate Transfer Pump (Supplied Loose)</u></p> <ul style="list-style-type: none"> • Quantity- One (1) • Model: Grundfos CRNE10-4 • Motor: 3 HP TEFC, 3500 RPM, high efficiency, 460V-3PH-60HZ. With integral VFD. VFD includes local speed control of motors, built-in PI controller, stop/start input. Speed control of VFD is by integral pressure sensor • With motor disconnect enclosure • Items supplied loose for installation by others.
7	<p><u>Anti-Scalant Injection Components for Brine Recovery RO System</u></p> <ul style="list-style-type: none"> • Pump Quantity: One (1) • Pump Model: Grundfos DDS series (or equal) • Pump Control: Pump dosage rate to be constant, Operation to be on/off with main -2-Pass RO system. • Pump Materials of Construction: PVDF • Chemical Tank: PE Construction, 50 gallons capacity (nominal) • Note: Containment to be provided by others. • Piping (By Others): 316LSS • Accessories: Level switch to alarm on low level, pump outlet back-pressure valve • Electrical Requirement: 110V-1PH-60HZ • Items supplied loose for installation by others.
8	<p><u>Brine Recovery Reverse Osmosis System- Sized for Future Expansion (Skid-Mounted)</u></p> <ul style="list-style-type: none"> • Quantity: One (1) • Model Number: M83R006S • Product Flow: 12 GPM (initial), 24 GPM (future) • Inlet Automatic Feed Valve: Butterfly type, with EPDM, pneumatic actuator, fail-to-close • Feed Inlet Piping: Schedule 10 316LSS • RO Prefilter Housing: 4R x 3H 304SS • RO Filter Cartridge Rating: 5.0 micron (nominal) • Pump Inlet Pressure Switch: United Electric, SPDT, 4-50 PSIG, ¼" NPT • RO Booster Pump: Grundfos #CRNE 10-14 • Motor: 30 HP TEFC, 3500 RPM, high efficiency, 460V-3PH-60HZ. • VFD: Allen Bradley PowerFlex 753 with HIM mounted on the front of the enclosure. Speed control of VFD is by remote flow sensor. • Pump Type: Vertical, centrifugal • Materials of Construction: 304SS • RO Membranes: (6) Dow Filmtec BW30-400/34i • Array: 1:1 • Pressure Vessels: 8" diameter x 3M FRP, side entry, 300 PSIG ASME

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	<ul style="list-style-type: none"> • Control Panel: NEMA 12 enclosure with remote I/O for simple communication to the main PLC & HMI located in the MCP. The Brine Recovery RO system is controlled by the Main System Control Panel (MCP) mounted to the 2-Pass RO skid, See MCP description below in Section 1.2. • Shutdown alarms: Low quality product, Low feed pressure, Low feed flow, Low reject flow, High product flow, High pump discharge pressure, High feed water temperature, Emergency stop, VFD fault • Conductivity and Flow monitor: Signet 8900 Series (or equal) Multi-parameter Monitor • Conductivity sensors: Signet 2850 Series 9or equal) • Reject Flow Sensor: Signet 2536 (or equal) • Reject Control Valve: Manual 316SST globe valve • Reject Auto Flush Valve: Actuated ball valve, 316SST, fail-to-close • Product Piping: Schedule 10 316LSS • Miscellaneous: Pump discharge pressure relief valve, pneumatic-actuated product divert ball valves (supplied loose), product SS pressure relief valve (supplied loose) • Conduit: EMT • Frame: Welded structural carbon steel, painted
9	<p><u>Rental Makeup Mixed-Bed DI Units</u></p> <ul style="list-style-type: none"> • Quantity: Two (2) units in parallel • Materials of Construction: 316SS • Manufacturer: Evoqua Water Technologies • Vessel Dimensions: 42" diameter by 48" straight side, dome bottom and top • Rating: 100 PSI non-code • Hose Connections: 3" lined hose assemblies, 100 PSIG • Unit Capacity: 42ft3 each • Resin: Evoqua High-quality certified mixed-bed exchange resin for pure water applications. • Note: Evoqua to supply initial resin for system start-up, subsequent resin exchanges to be supplied per a separate service contract with Evoqua. • Process Piping and Valves (By Others): 316SS
10	<p><u>Makeup Cartridge Filter (Supplied Loose)</u></p> <ul style="list-style-type: none"> • Quantity: One (1) • Materials of Construction: 316SST, electropolished • Manufacturer: Pall (or equal) • Model: 24MEGA2+3F • Rating: 150 psi non-code • Connections: Flanged • Filter Cartridges: 1.0 micron absolute x 20" LG • Process Piping and Valves (By others): 316SS • Items supplied loose for installation by others.
11	<p><u>DI Water Storage Tank and Accessories (Supplied Loose)</u></p> <ul style="list-style-type: none"> • Size: 72" diameter x 120" straight side, cone bottom, cone top • Capacity: 2,000 gallons (nominal) • Fittings: 316SS flanges • 316SS product contact surfaces, 304SS non-product contact • BUILD TO SATISFY ASME SECTION VIII DIVISION 1 • Operating temperature: 120F Max • Operating pressure: 30psi • Test pressure: 39psi • External pressure: 3psi

Item #	Description
	<ul style="list-style-type: none"> • Temperature min/max: -20° to 120°F • Interior finish: Clean and passivated interior, #2B Exterior finish: #4 • Supports: Schedule 40 304SS pipe legs • Accessories: Filter & vacuum breaker, vent valve, pressure transducers • Interconnecting Piping & Valves (By Others): 316LSS
12	<p><u>Ozone Generation System (skid-mounted)</u></p> <ul style="list-style-type: none"> • Pacific Ozone Model R-SGA430203, Ozone/Oxygen System 90g/h (4.8lbs./day), Air-Cooled, Auto Start/Stop, Auto/manual V08 controller, O3 enable on/off, Remote on/off input, Remote 4-20mA input. • 480V, 3Ø, 50/60Hz, 25 a required • Compressed Air Requirement: Oil free and to meet standards listed, ISO 8573-1, Quality Class 1.4.2, 0.01 micron Particulate Filtration, 38° F (3°C) Dew Point, 0.08 ppm (0.1mg/m3) Hydrocarbon Filtration. No liquid water must be allowed to enter the Ozone Generator • 316SS Product Contact Surfaces • PVDF Injector • (1) Ozone recirculation pump, Ampco 5HP, SS • Integrated off-gas destruct • Backflow prevention • UL Stainless Steel Control Panel, with Allen Bradley Micro 850 with PanelView 800 graphic, with Ethernet • (2) Rosemount DO3 analyzers with (4) sensors, model 1056 (or equal) • (1) ATI Ambient O3 analyzer with sensor, alarms at 0.1ppm (OSHA time weighted 8hr exposure limit) and alarms and disables ozone production at 0.28ppm (just under the 0.3ppm OSHA 15 minute time weighted exposure limit) until the operator takes some corrective action (reset).
13	<p><u>Distribution Pumps (Skid-mounted)</u></p> <ul style="list-style-type: none"> • Quantity: Two (2) • Manufacturer: Grundfos • Model: CRNE32-4-2 • Rating: 190 GPM @ 90 PSI • Pump Wetted Material: 316LSS, viton • Process Connections: Flanged • Motor: 15 HP, TEFC, 3500 RPM, premium efficiency • With integral Grundfos VFD, includes local speed control of motors, built-in PI controller, stop/start input. Speed control of VFD is by remote pressure transmitter. • Electrical Requirement: 460V-3PH-60HZ • Valves: Bray butterfly type, viton • 0-160 PSI pressure gauges with 316LSS isolation plug valve • Dissolved ozone analyzer sensor to connect to Rosemount DO3 analyzer • Skid Piping: Schedule 10 316LSS • Conduit: EMT • Frame: Welded structural carbon steel, painted
14	<p><u>Ozone Destruct UV Sterilizers (Skid-mounted)</u></p> <ul style="list-style-type: none"> • Quantity: Two (2) • Model: Aquafine Optima HX06DDL • Each sized for non-detectable outlet concentrate with 400ppb O3 feed. • Connection: 6" Flanged, ANSI inlet/outlet • Integral UV monitoring system with Std. detector, 4-20ma outlet • Material of Construction: 316SST, EP internal finish, with viton seats

Item #	Description
	<ul style="list-style-type: none"> • Dissolved ozone analyzer sensor to connect to Rosemount DO3 analyzer • Accessories: Pressure gauges with 2 ½" dial, 316SS, FDA approved, glycerine filled • Skid Piping: Schedule 10 316LSS • Electrical Requirement: 120V-1PH-60HZ • Conduit: EMT • Frame: Welded structural carbon steel, painted
16	<p><u>Final Filters (Skid-mounted)</u></p> <ul style="list-style-type: none"> • Quantity: Two (2) • Manufacturer: Pall (or equal) • Model: 48MEGA4+3F • Materials of Construction: 316SST, electropolished • Rating: 150 psi non-code • Connections: Flanged • Filter Cartridges: 0.2 micron absolute x 40" LG • Process Piping: Schedule 10 316LSS • Conductivity & Temperature Sensor: Thornton M800 sensor, with tri-clamp connection • Outlet Pressure Transmitter IFM Efector, 316LSS, NPT connection, 4-20mA output • Frame: Welded structural carbon steel, painted • Effluent Flow Transmitter: Rosemount Vortex 8800D (or equivalent), 316SS flanges connections

1.2 Control System

The control system consists of a PLC mounted in a NEMA steel enclosure with adequate remote I/O and software to provide complete automated control of the water treatment system. The following items form the backbone of the controls system provided:

Qty.	Description
1	Main System Control Panel to coordinate operation of all equipment. Panel to be mounted on the RO skid.
1	Allen Bradley CompactLogix PLC
1	Allen Bradley PanelView Human Machine Interface (HMI).
1 lot	Digital and analog I/O (Input/Output) modules.
1	24 VDC power supply.
1 lot	Solenoid valves for control air distribution.