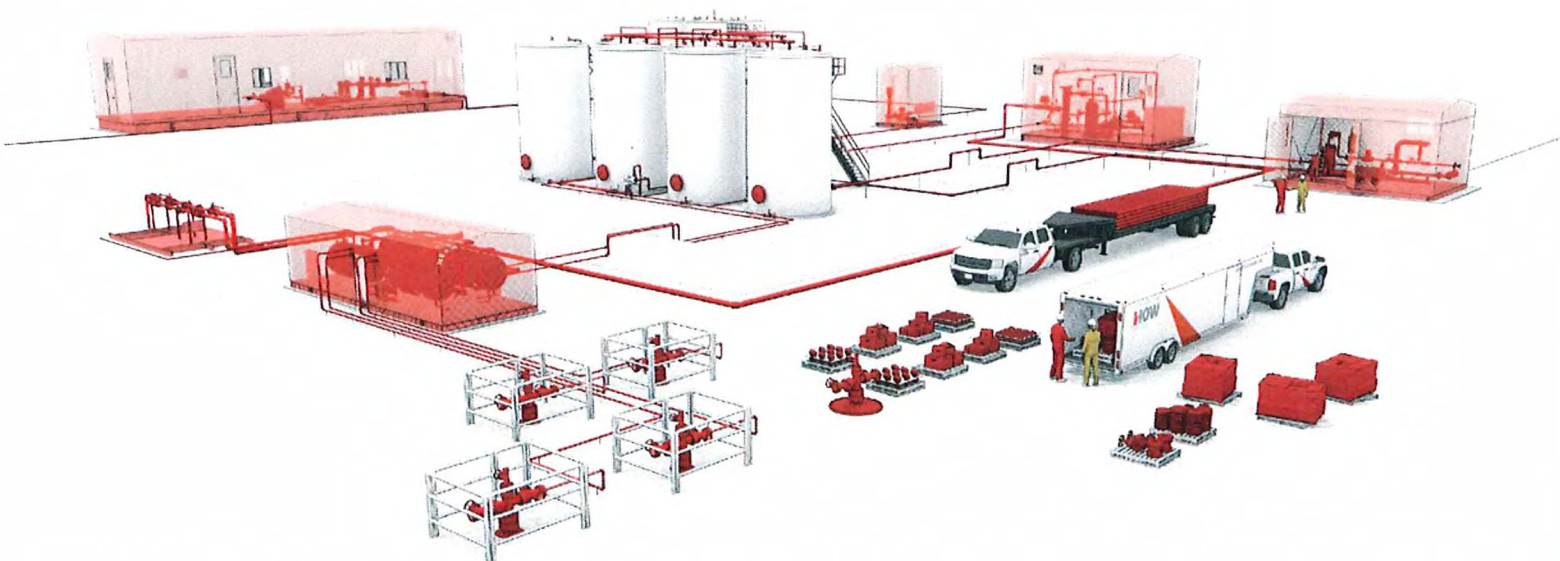




PROCESS
SOLUTIONS



Marathon Oil Company
40,000 BPD Salt Water Disposal
Proposal Number: EP-0014151
April 4, 2024



Power Service Headquarters: 5625 Chapman Pl., Casper, Wyoming 82604

PowerServiceInc.com | 1.800.743.4774

Casper, WY (HQ) | Green River, WY | Denver, CO | Frederick, CO | Salt Lake City, UT | Billings, MT | Dickinson, ND
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EP-0014151

Power Service, Inc. is pleased to provide pricing to fabricate the following *40,000 BPD Salt Water Disposal* as required by Marathon Oil and described below.

Conditions of Service

Fluid: *Produced Water, 1.2 S.G.*

Flow: *40,000 BPD (20,000 per Pump)*

Discharge Pressure: *1,500 PSIG Max*

1.1 Item 1 – Salt Water Disposal Scope of Supply:

- (1) **Inlet MOV:** Balon Model 8F-F13N-RF, 8" 150# RF Flanged, Full Port, Carbon Steel Body, 316 Stainless Steel Ball & Stem, NACE w/ Rotark IQT2000 Electric Actuator, FM CL 1, Div. 1, -40 Low Temp, 120V/1/60, Built in Data Logger, 60-240 Sec. Stroke Time, 24VDC Internal Control Voltage, (4) Programmable Relays, Fail Last, Manual Override, Local Controls & Display, Mounting Hardware, Assembled & Tested.
- (2) **Isolation Ball Valves:** Balon Model 8F-F13N-RF, 8" 150# RF Flanged, Full Port, Carbon Steel Body, 316 Stainless Steel Ball & Stem, NACE, w/ Gear Operator. Ball valves will be mounted on the inlet of each basket strainer.
- (2) **Basket Strainers:** Titan Model BS85-SS, 8" 150# RF Flanged, Stainless Steel Body, with ¼" perf. 304SS straining element, 1-1/2" bottom drain, w/ drain ball valve, Murphy 0-30 PSI Differential Pressure Indicator, and needle valves. Basket strainers will be mounted on the suction side of each charge pump.
- (2) **Charge Pumps:** Flowserve Durco Mark 3 ANSI Centrifugal Pump Model 2K6x4-10RV, featuring 316 SS Casing and Reverse Vane Impeller, ISC2 single mechanical seal, Car vs. SilCar, 6" 150# FF suction and a 4" 150# FF discharge flange connections. Pump will be mounted on a steel base plate and will be coupled to a Baldor 30 HP, 1800 RPM, TEFC, Class 1, Division 2, 460V/3/60Hz electric motor. Pump and motor will be coupled together with a spacer type coupling and covered by an OSHA compliant coupling guard. ***Note: Each charge pump is sized for 583 GPM @ 50 PSI. NPSHr is 3.6 ft.**
- (2) **Discharge Check Valves:** Balon Model 6L-150, 6" 150# Wafer Style, Long Pattern Swing, Carbon Steel Body, 316 Stainless Steel Disc, Carbon Steel Seat, NACE. Check valves will be mounted on the discharge side of each charge pump.
- (2) **Discharge Ball Valves:** Balon Model 6F-F13N-RF, 6" 150# RF Flanged, Carbon Steel Body, 316 Stainless Steel Ball & Stem, NACE, w/ Gear Operator. Ball valves will be mounted on the discharge side of each charge pump.
- (2) **Isolation Ball Valves:** Balon Model 6F-F13N-RF, 6" 150# RF Flanged, Carbon Steel Body, 316 Stainless Steel Ball & Stem, NACE, w/ Gear Operator. Ball valves will be mounted on the inlet of each filter vessel.
- (2) **Filter Vessel Actuated Inlet Ball Valves:** Balon Model 6F-F13N-RF, 6" 150# RF Flanged, Carbon Steel Body, 316 Stainless Steel Ball & Stem, NACE, w/ Rotork Model IQT1000 Electric Shutdown Battery Actuator, CSAus CL. 1 Div. 1, -40F Low Temp, 120V/1/60, Lithium Ion Shutdown Battery for Fail Position, Built in Data Logger, 30-120 Sec. Stroke Time, 24VDC Internal Control Voltage, (4) Programmable Relays, Manual Override, Local Controls & Display, Machined Drive Bushing, Mounting Hardware, Assembled and Tested. Actuated ball valves will be mounted on the inlet of each filter vessel.

(2) Filter Vessels: FiltraFine Model 8MSB2-316-8FDA-NC150, 8-Bag:

- 316 SS Construction
- 150 PSIG Pressure Rating
- 8" RF Flange Connections
- 1" NPT Drain Connection
- 1" NPT vent, 1/4" NPT gauge (2)
- Manual Handwheel Crank Lid Lift/ Swing Davit
- *Note: NOT ASME Code Stamped

(2) Filter Vessel Outlet Ball Valves: Balon Model 6F-F13N-RF, 6" 150# RF Flanged, Carbon Steel Body, 316 Stainless Steel Ball & Stem, NACE, w/ Gear Operator. Ball valves will be mounted on the outlet of each filter vessel.

(1) Density Meter: Micromotion Fork Density Meter, FDM11E720BAC3A12EZZZ:

- Sensor Calibration Range And Performance: Standard - Accuracy $\pm 0.001\text{g/cc}$ ($\pm 1\text{ kg/m}^3$) over Density Range 0.6-1.25g/cc (600-1250kg/m³) - Viscosity limit 500cP, (Standard line length = 75mm)
- Stem Length: 0 mm: no stem extension and with standard spigot
Materials Of Wetted Parts Including Process Connection: Alloy C22, standard finish tines
- Process Connections: 2-inch CL150 ASME B16.5 Raised face
- Sensor Calibration Type: 2-inch schedule 40 boundary (Viscosity limits = 200cSt (T piece), 1000cSt (782791 Flow Through Chamber))
- Transmitter Housing Option: Integral Aluminum Alloy
- Transmitter Output Options: Integral transmitter, Channel B = mA output, Channel A = mA + HART, Channel C = RS485 Modbus
- Display Option: No display
- Approvals: CSA (US and Canada): Class I, Div. 1
- Application Configuration: Line Density (4mA = 500kg/m³, 20mA = 1500kg/m³) : (Process temperature = -40 C to +140 C)
Language (Manual and Software): English installation manual and English configuration manual
- Future Option 1: Reserved for future use
- Conduit Connections: Standard 1/2-inch NPT fittings (no adapters)

(2) Isolation Ball Valves: Balon Model 8F-F13N-RF, 8" 150# RF Flanged, Full Port, Carbon Steel Body, 316 Stainless Steel Ball & Stem, NACE w/ Gear Operator. Ball valves will be mounted on the inlet side of each injection pump.

(2) Injection Pumps: Schlumberger REDA 862 Series M520-A, 31-Stg, Stainless Steel Head and Base (Ni-Resist Impellers and Diffusers), Carbon Steel Pump Housing, High Strength Monel Pump Shaft, ARZ-TT Bearings, HSN Elastomers (or equal), 2-Bearing Thrust Chamber (with Oil Cooler), Std. Paint, Flood/Splash Lube, Sight Indicator, Temp Indicator, Stand Tube, Labyrinth Oil Seals, SS Shaft, Provisions/Port for Oil Temp Monitoring Device. 8"150# RFWN 316 SS Suction/ 4" 1500# RF 316 SS Discharge, John Crane Mechanical Seal, Non-Cartridge, Shaft, 1.50 HSN, Type 2, Extended. **ABB Baldor** 800HP, 460V/3/60, NXR5810, TEFC, Ball Bearing, 3600RPM, CL. 1 Div. 2 Electric Motor, Winding RTD's, Space Heater, IP 55, Insulated NDE Bearing, CW Rotation.

(1) Bypass Line to Include the Following:

- (1) Balon Model 4F-F13N-RF, 4" 150# RF Flanged, FP, CS/SS/NACE Ball Valve
- (1) Aceco Check Valve 4" 6000# Model 624 Check Valve, Carbon Steel Body, Stainless Steel Internals, S/160 Butt-Weld Ends.
- (1) Balon Model 4F-T93SN-RF, 4" 900# RF Flanged, FP, Trunnion, CS/SS/NACE Ball Valve
- (1) Lot: S/40 & S/160 CS Piping, Flanges and Fittings

(2) Ball/Check Combo Valves: Aceco ACE224/624-STD-3S4S, 4" 6000#, Full Port, Floating Ball Valve, Carbon Steel Body, 17-4PH Stainless Steel Internals, w/ S/160 Weld End Connections. Combo valves will be mounted on discharge side of each injection pump.

(1) Flow Control Valve: Cyclonic 6" Class 1500, Flangeless Wafer In-Line Choke Valve, 1-piece Body w/ Slip-in Retainer, 17-4 H1150 SS Stem & Driver, Per NACE MR0175, Tungsten Carbide / Cobalt Discs #D9S2-120P, (3.56" OD, Slot Drive, 120/64" Equiv. Orifice, 270 degrees Full Open to Full Closed Stem Rotation) w/ 'P' Discharge Port, ASME RF Flange Compatible Ends, 316 SS Body, Field Lubricated High Pressure HNBR PolyPak Stem Seals & Peroxide Cured Nitrile Seals, Delrin Bearings & Sleeves, Severe Service Tungsten Carbide Lined 17-4 H900 SS Wear Sleeve, w/ Valcon Model LADCWX1500 Electric Actuator, 115/230AC, 1500 in-lbs Torque Output, NEMA 4/4X/7&9, 4-20mA Input/Output, On/Off Positioner Board, Fail Last, (2) Auxiliary Switches, w/ Mounting Hardware, Assembled and Tested.

(1) Discharge ESD Valve: Balon Model 6F-T63CN-RF, 6" 600# RF Flanged, Gear Operated Trunnion, Bolted Body Construction, Carbon Steel Body, Carbon Steel Ball & Stem, NACE Trim, API 641, Fire Safe Design, w/ Rotork Model RCI280-SRHM-100/M4504 Remote Control Electric Actuator, Spring Fail Closed (CW) for Open/Closed Operation, 120V, Class 1, Div. 1 Group D Rated Components, (2) Limit Switches, -5F Temp, Manual Override, 75-100 Sec Stroke Time, w/ Mounting Hardware, Assembled & Tested.

(1) LOT Relief Valves and Piping to Include the Following:

- (2) Mercer 91-97F21P34L1 Relief Valves, 2" 1500# x 3" 300#, SS Body, "F" Orf, Set @ 2,200 PSIG
- (2) Balon Model 2F-F93N-RF, 2" 900# RF Flanged, FP, CS/SS/NACE Ball Valves
- (2) 2" 1500# RF, CS Bleed Rings w/ (1) ½" Tap
- (2) Balon 3L-150, 3" 150# RF, Wafer, LP Swing, CS/SS/NACE Check Valves
- (2) Balon Model 3F-F13N-RF, 3" 150# RF Flanged, FP, CS/SS/NACE Ball Valves
- (1) Mercer 91-86K24P99L1 Relief Valve, 3" 900# x 4" 150#, SS Body, "K" Orf, Set @ 1,480 PSIG
- (1) Balon Model 4F-F63N-RF, 4" 600# RF Flanged, FP, CS/SS/NACE Ball Valve
- (1) 3" 900# RF, CS Bleed Ring w/ (1) ½" Tap
- (1) Balon Model 6F-F13N-RF, 6" 150# RF Flanged, FP, CS/SS/NACE Ball Valve
- (1) Lot: S/40 & S/80 CS Piping, Flanges and Fittings

(1) LOT: Piping, Valves and Fittings:

- CS SA106B, SMLS, S/40 (Suction) & S/160 (Discharge) Piping
- CS SA105, 150# ANSI S/40 Flanges and Fittings on Suction side of each Injection Pump
- CS SA105, 600#/900#/1500# ANSI S/160 Flanges and Fittings on Discharge side of each Injection Pump
- (2) 4"x0.5" LM LF SS/SS 0-100 PSIG Pressure Indicators
- (1) LOT: Studs, Threaded, Needle Valves and Piping Drain Valves.
- Pipe stands to be constructed and located to provide best support for pipe and piping components.
- ASME B31.3 Specifications
- NDE: 10% X-ray
- Hydrotest: 1.5x MAWP, 30-min. hold

- (1) **Main Skid:** to have floor dimensions of 18'W x 80'L. The skid will be of a 4-main runner oil-field skid design with 14" I-Beam and cross-members. Skid will be covered entirely with ¼" diamond deck plate and includes containment lip around perimeter. Included will be a raised 18'W x 23'L with 24" I-Beam seal welded skid, attached on one end of the main skid for the MCC Electrical Room. Skid will have integrated full-length sump drain pan system running in middle of with 2" interconnecting piping, with 1-1/2" 150# RF sump outlet connection and (1) Zoeller MX161 sump pump w/ ½ HP, 3600 RPM, XP electric motor. Skid will be painted Carlsbad Canyon Tan with an SSPC-SP7 brush blast, alkyd primer and alkyd topcoat. Skid includes (1) platform with handrails, and stairs for raised MCC door access and (2) removable steps for pump room doors. Skid includes 2" poly spray foam insulation underneath for an ~R-13 insulating factor and (6) lifting eyes.
- (1) **Steel Building:** to have dimensions of 18'W x 80'L with a gable style roof, 26-gauge ribbed metal panel exterior Carlsbad Canyon Tan in color and interior walls White in color. Building to include insulation in walls and roof, with an ~R-13 insulation factor, (2) 6090 double doors w/ ½ glass and panic hardware, (2) 3'x3' sliding windows, (1) 8'W x 9'H uninsulated roll up door for pump room and (1) 3090 single door w/ ½ glass and panic hardware for MCC room. Building will also include a sealed partition wall to separate pump room (Class 1 Div. 2) and raised electrical room (non-classified) with (1) 3'x3' fixed viewing window. Electrical room will be 18'W x 23'L. Pump Room includes filter platform painted Safety Yellow with removable grating and (1) 3-ton trolley crane with chain hoist to run full length of process area. Pump room will have (1) inlet louver mounted low with snorkel hood and (1) exhaust fan mounted high with weather hood. ****Snorkel and weather hood will be shipped loose to be installed in the field by others.***
- (1) **LOT Electrical to include the following:** *PSI will provide and electrically install the following equipment unless otherwise noted:*
- Unit will be wired with conduit and wired to NEC Class 1 Division 2 Standards.
 - Electrical room will be Non-Hazardous/Unclassified.
 - Unit will include electrical state filing documentation for the state of North Dakota.

The following equipment will be mounted on the exterior of the Electrical Room:

- 1 ea. NEMA 4 Power Distribution Junction Box
 - For Switchboard Connection
- 1 ea. NEMA 4 Well Side AC Junction Box
 - (2) Terminal Blocks
- 1 ea. NEMA 4 Well Side DC Junction Box
 - (2) Terminal Blocks
- 1 ea. NEMA 4 Tank Side DC Junction Box
 - (2) Terminal Blocks
 - DIN Rail Adapter – RJ45 Coupling for the Distribution Ethernet Cables
 - Coaxial RF Surge Protector
- 1 ea. NEMA 4 Tank Side AC Junction Box
 - (2) Terminal Blocks
 - 120/480V Separated

The following equipment will be mounted in the Non-Hazardous Electrical Room:

- 1 ea. NEMA 12 Control Cabinet – REF D-40902
 - Allen Bradley ControlLogix PLC
 - 120VAC/60Hz/1ph/20A

- 10" PanelView Plus 7 Touch Screen
- Ethernet Switch 14 Ports
- Siemens Circuit Breakers
- Exhaust Fan Starter
- Sump Pump Starter
- (2) Oil Cooler Contactor
- 2 ea. Eaton 700 HP, 18-Pulse VFD's, NEMA 1
- 1 ea. Switchboard Power Panel 480VAC
 - 2500A Bus - 65kAIC
 - (2) Feeder Breakers 480V, 800 HP VFD
 - (3) Feeder Breakers for HVAC Units – Electrical Room
 - (2) Feeder Breakers for 15kW Heaters – Pump Room
 - (1) 400-AMP Feeder Breaker for MCC
- 1 ea. NEMA 1 MCC Panel 480VAC
 - 600A Bus – 65kAIC
 - (2) Size 3 FVNR Starters – Charge Pumps
 - (2) Size 1 FVNR Starters – Sump Pump and Spare
 - (1) 30kVA Transformer 480/120-240VAC
 - (1) 120/240VAC Panel
- 1 ea. Cameleon Beacon (Red, Green, Amber), XL-502
- 3 ea. 6-Ton HVAC Units
- 1 ea. Lot: Non-Hazardous LED Lights with Light Switch
- 1 ea. Duplex GFCI Receptacle

The following equipment will be installed in the Class 1, Div. 2 Pump Room:

- 2 ea. 800 HP Injection Pumps, P-700 / 710
- 2 ea. Metrix Vibration Transmitters, VT-700 / 710
- 2 ea. 30 HP Charge Pumps, P-500 / 510
- 1 ea. Sump Pump, ½ HP, P-800
- 1 ea. Fork Density Meter, FE-701
- 2 ea. Rosemount 2120 Sump Level Switches
 - Sump West, LSHH-800A
 - Sump East, LSHH-800B
- 1 ea. Hand Switch Station – Sump Pump, HS-800
- 1 ea. Inlet Valve, MOV-500
- 2 ea. Filter Inlet Valves, MOV-600 / 610
- 1 ea. Pressure Control Valve, PCV-700
- 1 ea. Discharge Valve, ESD-700
- 1 ea. Rosemount 8705, 4" 900# Magnetic Flow Meter, with 8732 Transmitter, FE / FIT-700
- 8 ea. Rosemount 2088 Indicating Pressure Transmitters w/ Chemoil Manifold Valves
 - (2) Charge Pump Suction, PIT-500 / PIT-510
 - (1) Charge Pump Discharge, PIT-501
 - (2) Injection Pump Suction, PIT-701 / PIT-711
 - (2) Injection Pump Discharge, PIT-702 / PIT-712
 - (1) Skid Discharge, PIT-720

- 1 ea. Rosemount 2051CD Indicating Differential Pressure Transmitter w/ Manifold Valve
 - Filter Differential, DPT-600
- 1 ea. Dwyer Flow Switch, FS-700
- 2 ea. Kayden Flow Switches
 - Charge Pump Discharge, FS-500 / 510
- 1 ea. Detcon LEL Gas Detector, AE / AIT-501
- 1 ea. Detcon H2s Gas Detector, AE / AIT-500
- 2 ea. Cameleon Beacons (Red, Green, Amber)
 - One mounted inside Pump Room, XL-501
 - One mounted on the exterior of the Pump Room, XL-500
- 2 ea. Ruffneck FX6, 15kW Explosion Proof Forced Air Heaters, H-500 / H-501
- 1 ea. Exhaust Fan, B-500
- 3 ea. Hand Switch Stations
 - Exhaust Fan (Inside Building), HS-500
 - Exhaust Fan (Mounted on Building Exterior), HS-501
 - Sump Pump, HS-800
- 1 ea. Lot: Class 1 Div. 2 LED Lights with Light Switches
- 2 ea. Emergency Shutdown Switches (next to each door)
- 2 ea. Hand Switch Stations (next to each door)

1.3 Item 3 – NOV Injection Pumps (Optional DEDUCT):

(2) Injection Pumps: NOV 862-18000 Series, 31-stg, Ni-Resist Impellers/Diffusers, Inconel Shaft, Carbon Steel Housing, Suction/Discharge Head: 316 Stainless Steel, 1.5T-2 SC/SC/316SS/Aflas Mechanical Seal, Thrust Chamber - Angular Contact Ball Bearings, Oil Dip Lubrication, Type 3 Bearing (Oil Cooler), Unlaub Spacer Type Disk Pack Coupling, OSHA Type Coupling Guard, 316SS 8" 150# RF Suction/ 4" 1500# RF Discharge flanged connections, GE 800HP, 460V/3/60, Electric Motor, TEFC, 3600RPM, 5013ST Frame, Class F Insulation, CSA Certified, CL. 1 Div. 2, Includes Space Heater, Insulated NDE Bearing & Winding RTDs. ****Note: NOV pump is an exact replacement to the REDA, the NOV barrel can be used on the REDA and the REDA barrel can be used on the NOV.***