

AGENDA ITEM FORM

SUBJECT: Request Authorization to Issue Purchase Order for Carbon Dioxide (CO₂) Storage and Feed Equipment for Army Post Road Aquifer Storage and Recovery Well

SUMMARY:

- At the April 2015 Board meeting, the Board of Water Works Trustees approved and authorized execution of an Agreement, according to Chapter 28E of the Iowa Code, among the Des Moines Water Works (DMWW), the City of West Des Moines, and the West Des Moines Water Works (WDMWW) for construction of a new aquifer storage and recovery (ASR) well on old Army Post Road.
- In June, the City of West Des Moines approved the award of a contract by the Board of Water Works Trustees for the 2016 Army Post Road Aquifer Storage and Recovery Well – Well House and Piping contract in the amount of \$2,235,000. This resulted in a revised total cost estimate for the project of \$4,655,000.
- Staff has solicited proposals from two manufacturers for purchase of a carbon dioxide (CO₂) storage and feed system. A CO₂ storage and feed system is needed to adjust the quality of the water, in terms of pH, as it is recovered from the ASR facility. This water quality adjustment is necessary in order to meet requirements of our discharge and water use permits issued by the Iowa Department of Natural Resources (IDNR) and groundwater treatment rules promulgated by IDNR.
- Following is a summary of the proposals received for purchase of the CO₂ storage and feed equipment:

Vendor	Bid	Purchase Order to Receipt of Shop Drawings	Review of Shop Drawings to Delivery of Equipment
TOMCO2 Systems	\$195,000	8 Weeks	12 Weeks
BlueInGreen, LLC	\$179,000	6 Weeks	16 Weeks

- The CO₂ storage and feed system proposed by TOMCO2 Systems is identical to the system TOMCO2 Systems provided for the McMullen Water Treatment Plant. The system has provided over 15 years of successful service.
- The CO₂ storage and feed system proposed by BlueInGreen, LLC, is configured differently from the system proposed by TOMCO2. Staff does not have any experience with the CO₂ storage and feed system proposed by BlueInGreen, LLC.
- Based on past, long-term successful operation of a similar CO₂ storage and feed system at the McMullen Water Treatment Plant, staff recommends a Purchase Order in the amount of \$195,000 be issued to TOMCO2 Systems for purchase of the CO₂ storage and feed equipment.
- Additional costs associated with CO₂ storage and feed equipment for the Army Post Road ASR Well includes installation of the purchase equipment which is estimated at \$50,000. This results in a total cost for purchasing and installing the CO₂ storage and feed equipment of \$245,000.
- The engineer's estimate for the well equipment portion of this project, prepared in December 2014, was \$20,000.
- Now that costs have been determined to be \$245,000 for the well equipment portion of the Army Post Road ASR Well project, the revised total cost estimate for the project is now \$4,938,212.

FISCAL IMPACT:

- The City of West Des Moines and WDMWW will reimburse Des Moines Water Works for 100 percent of the costs associated with design and construction of this project up to \$4,655,000.
- The balance of the remaining \$4,938,212 will come from funds budgeted for other capital improvement projects in 2017 that will not be completed.

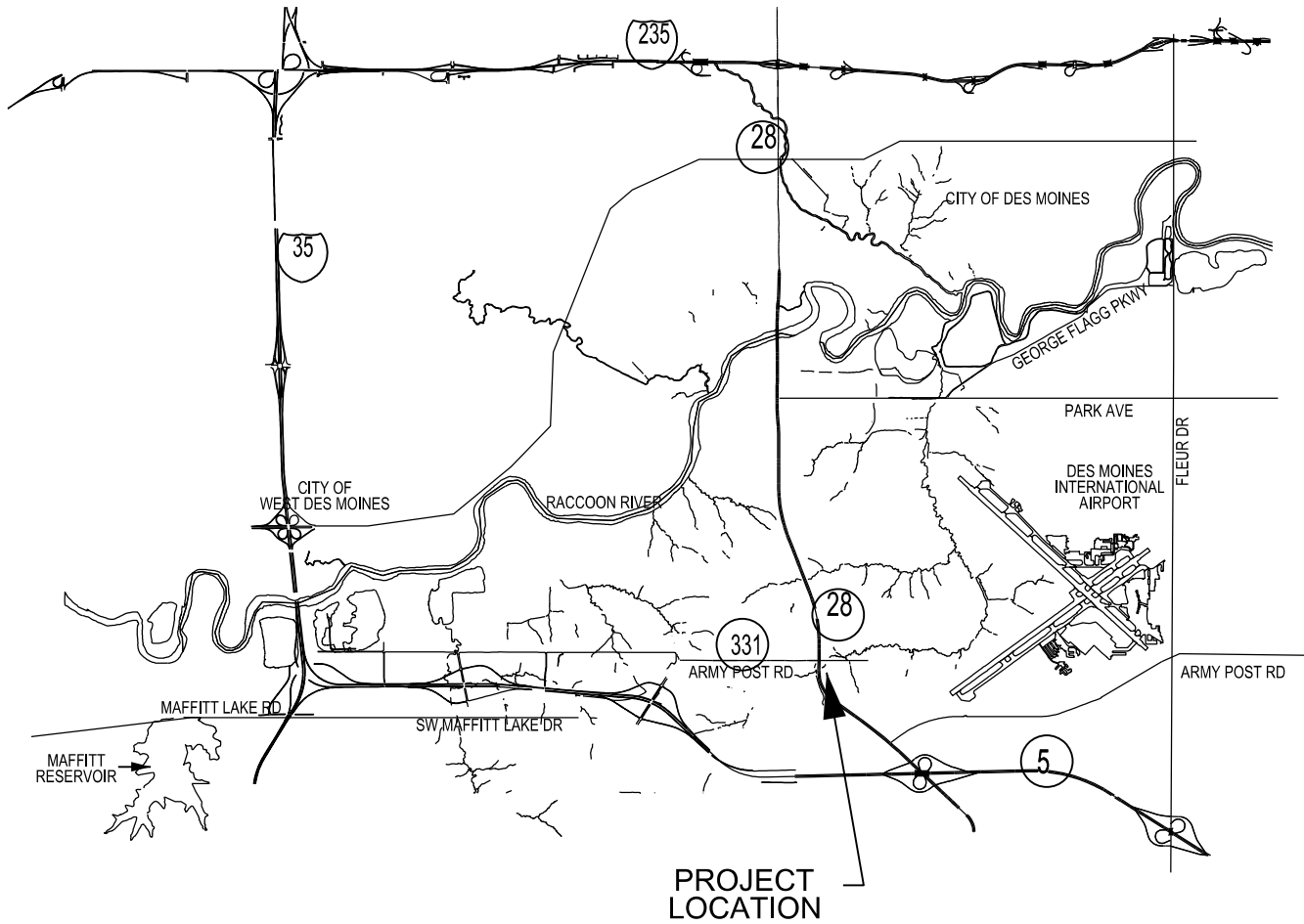
RECOMMENDED ACTION:

Authorize the CEO and General Manager to execute an agreement with TOMCO2 Systems for providing CO₂ storage and feed equipment for the Army Post Road Aquifer Storage and Recovery Well and authorize staff to issue a Purchase Order in the amount of \$195,000 to TOMCO Systems for purchase of the CO₂ storage and feed equipment.

BOARD REQUIRED ACTION:

Motion to authorize the CEO and General Manager to execute an agreement with TOMCO2 Systems for providing CO₂ storage and feed equipment for the Army Post Road Aquifer Storage and Recovery Well and authorize staff to issue a Purchase Order in the amount of \$195,000 to TOMCO Systems for purchase of the CO₂ storage and feed equipment.

_____/_____ Vern Rash, P.E., L.S. (date) Project Manager	_____/_____ Danny J. Klopfer, P.E. (date) Engineering Services Manager	_____/_____ William G. Stowe (date) CEO and General Manager
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VICINITY MAP

NOT TO SCALE

Des Moines
Water Works
 Water You Can Trust for Life
 ENGINEERING DEPARTMENT
 Des Moines, Iowa

2015 ARMY POST ROAD
 AQUIFER STORAGE AND RECOVERY WELL



TF 1-800-832-4262

PH 770-979-8000

FX 770-985-9179

TOMCOsystems.com

3340 Rosebud Road

Loganville, GA 30052 USA

CARBON DIOXIDE STORAGE AND CARBONIC ACID FEED EQUIPMENT

Bid Specifications

For

ARMY POST ROAD AQUIFER STORAGE AND RECOVERY WELL

DES MOINES, IA

TOMCO₂ Quotation # 2244

December 27, 2016

SCOPE

- A. Work Included: This section covers the work necessary to furnish the equipment and materials required for the carbon dioxide storage, feed, and pH control system. The system, as specified herein, shall be furnished by one supplier, with at least 20 years of prior experience in supplying carbon dioxide systems of the type specified.
- B. The basic system consists of the following equipment and materials:
1. One (1) TOMCO₂ Model 675CAND 6 ton capacity Liquid Carbon Dioxide storage tank system complete with refrigeration unit.
 2. One (1) TOMCO₂ Model M-3CI, 3 kW electric vaporizer.
 3. One (1) TOMCO₂ Model CVH-2ss CO₂ vapor heater.
 4. One (1) First stage CO₂ pressure regulator.
 5. One (1) TOMCO₂ PSF™ carbonic acid feed panel.
 6. One (1) TOMCO₂ Carbonic Acid Solution Diffuser.
 7. One (1) CO₂ gas detector and alarm panel.
 8. Instrumentation and control equipment, as specified herein.

MANUFACTURER

The Manufacturer shall submit proof of the following qualifications:

The Manufacturer is the actual manufacturer of the equipment being supplied.

The Manufacturer has successfully designed and manufactured similar equipment for the proposed application for at least 20 years.

The names of at least ten references who are current successful users of similar CO₂ systems designed, assembled and furnished by the Manufacturer in service for at least five (5) years.

The Manufacturer has the required financial capability

The Manufacturer maintains a qualified technical engineering staff and design office.

The Manufacturer operates a physical plant and employs fabricating personnel to complete the work specified.

The Manufacturer operates an ASME Pressure Vessel Shop and employs certified welders to produce the pressure vessel to ASME standards, inspection and testing as required.

The Manufacturer has and will maintain competent and trained factory service personnel employed by the Manufacturer to start-up and service the equipment furnished.

The Manufacturer is an active member of CGA (Compressed Gas Association).

The Manufacturer of the carbon dioxide system shall be TOMCO₂ Systems, Loganville, GA, USA.

Dimensions and locations shown on drawings for the CO₂ storage and feed system are based on TOMCO₂ manufactured equipment. Any change in the dimensions or location of equipment or accessories or type of accessories required to accommodate alternate CO₂ feed system manufacturers and models shall be at the contractor's expense.

All costs associated with modifying the design and construction of the building, structural, piping, electrical, mechanical, plumbing and instrumentation systems required to accommodate alternate CO₂ feed system manufacturers and models shall be the responsibility of the contractor.

STATEMENT OF CONFORMANCE

The manufacturer of the carbonic acid feed system shall inspect the completed installation and provide written certification that the system will operate as designed and specified herein.

LIQUID CARBON DIOXIDE STORAGE TANK

The storage tank shall consist of a welded steel pressure vessel designed and constructed in accordance with Section VIII, Division 1 of the ASME "Code for Unfired Pressure Vessels". The Manufacturer shall fabricate the pressure vessel in its own ASME pressure vessel shop. A pressure vessel manufactured by a different manufacturer from the tank supplier will not be accepted. It is the intention for the complete storage tank, pressure vessel, and vaporizer to be fabricated by the same manufacturer in the same facility.

The storage tank shall be capable of holding 12,000 lbs of liquid carbon dioxide at 300 psig and 0°F.

The tank shall be insulated with a minimum of 4 inches of urethane foam insulation, which shall be covered with a 0.063" factory painted white aluminum shell. The ends are to be covered with aluminum performed flanged and dished heads. The thermal conductivity (overall U-factor) for the insulated tank wall shall not be greater than 0.040 Btu per hour per square foot per °F.

The tank shall be complete with a liquid level gauge calibrated to read in pounds, 0 to 600 psig pressure gauge and all necessary Schedule 80 pipe connections for filling and withdrawal of CO₂ from the storage tank.

A complete environmentally safe R-404A refrigeration system shall be provided with the storage tank that will automatically maintain the storage tank at 0°F and 300 psig. The evaporator coil of the refrigeration unit shall be located inside of the top portion of the storage tank, with the compressor and air-cooled condensing coil mounted on the frame at the end of the tank. The refrigeration unit shall be equipped with a condensing unit driven by a 1 HP, 480 volt, 60 cycle, 3-phase hermetically sealed compressor and provided with a circuit breaker with operating handle, motor starter, and a 120-volt control voltage transformer in a NEMA 4X type 304 stainless steel electrical enclosure. The condensing unit will include a sight glass, refrigerant line, solenoid valve, expansion valve and a refrigeration coil mounted internally in the storage tank. Automatic controls shall be provided to start and stop the compressor, thereby controlling the temperature of the CO₂ in order to maintain the proper operating pressures.

The storage tank shall be protected from being subjected to pressures greater than the maximum allowable working pressure by means of two ASME approved, spring actuated

safety relief valves and two bleeder type relief valves, complete with three way switching valves.

The tank shall be provided with a pressure switch to sound an alarm automatically in the event of excessive high or low pressure in the tank. The alarm horn and indicating lights shall be mounted on the refrigeration control panel located in the storage tank cabinet. The panel shall be complete with an alarm silence circuit to shut off the audible alarm. Contacts shall be provided for remote indication of high and low tank pressure alarm.

All nozzles on the vessel shall be schedule 80 stainless steel. All piping and fittings provided internal to the storage tank system shall be Schedule 80 carbon steel. All piping and fittings provided external to the vessel and supplied as part of the storage system shall be Schedule 80 type 304 stainless steel, with 2,000 psi rated threaded fittings. Type 316 stainless steel ball valves shall be provided where the connections for the liquid fill, vapor return, vaporizer, tank interconnect and vapor process lines connect to the tank. 1-1/2" liquid CO₂ and 1" vapor balance fill couplings shall be standard CGA brass threaded connections for CO₂ service.

The storage tank shall be provided with an enclosure at one end, which shall provide weather protection for the refrigeration unit, vaporizer, vapor heater, electrical panels and fill valves. The enclosure shall consist of a structural frame, which shall be covered with aluminum sheet, minimum thickness 0.04 inches (1 mm). The storage tank, enclosure, frame, and other exposed metal surfaces shall be painted according to Manufacturers' Standards.

Adequate vent area shall be provided to allow cooling air circulation for the refrigeration system. A lockable, hinged door to provide access to the enclosure shall be provided.

The overall tank dimensions are 16'-0" long x 6'- 2" wide x 8'-3" high. The shipping weight is approximately 10,500 lbs.

The storage tank shall be TOMCO₂ **Model No. 675CAND** as manufactured by TOMCO₂ Systems of Loganville, Georgia.

CARBON DIOXIDE ELECTRIC VAPORIZER

The tank shall be provided with one complete electric vaporizer unit, capable of vaporizing 80 lbs of liquid carbon dioxide per hour at 300 psig. Automatic controls shall be provided to control the vaporizer to maintain the tank pressure above 245 psig. An adjustable differential pressure switch shall activate the vaporizer at 245 psig and shall deactivate the unit at 255 psig. Liquid carbon dioxide shall be drawn off of the bottom tank, with the resulting vapor returning to the top of the tank. A purging valve for easy removal of accumulated impurities, safety controls consisting of a safety relief valve, a thermostat for overheat protection and a fused control circuit for coil protection shall be provided. Electrical requirements shall be 3 kW, 480-volt, 3-phase, 60-Hz, and shall be provided with a circuit breaker with operating handle in a NEMA 4X type 304 stainless

steel electrical enclosure. The vaporizer shall be supplied as an integral part of the storage tank; pre-piped, pre-wired and pre-insulated and located in the equipment enclosure.

The vaporizer shall be **Model No. M-3CI** as manufactured by TOMCO₂ Systems of Loganville, Georgia.

CARBON DIOXIDE VAPOR HEATER

One 2 kW carbon dioxide vapor heater shall be provided to heat the 0°F CO₂ gas to near room temperature. The vapor heater shall be rated for operation at 480 volts single-phase, 60 Hz. The vapor heater shall be supplied complete with electronic temperature control. Operating control range shall be adjustable from 30° to 110°F. Solid high conductivity aluminum pressure castings containing the electrical resistance heaters and aluminum castings containing the stainless steel tubing for the CO₂ vapor shall be provided. An overheat device shall be supplied to shut off the heating element should the temperature reach 200°F. A manual reset button shall be supplied for restarting the heater after the overheat temperature controller has tripped out. The vapor heater shall be pre-piped and pre-wired with a thru-the-door disconnect switch and type 304 stainless steel cover inside the storage tank aluminum control house.

Vapor heater shall be **Model No. CVH-2SS** as manufactured by TOMCO₂ Systems of Loganville, Georgia.

FIRST STAGE PRESSURE REGULATOR

- A. One (1) carbon dioxide pressure reducing regulator will be supplied, pre-installed in the CO₂ pipeline after the carbon dioxide vapor heater. The regulator shall be used to reduce the pressure from approximately 300 psig to 120 psig. The regulator shall have a malleable iron body, aluminum spring case and lower case, nitrile and aluminum valve disc and holder, nylon fabric coated with nitrile diaphragm, stainless steel valve stem and valve stem guide. The outlet pressure of the regulator shall be easily adjusted through the use of an adjustment screw.
- B. One (1) pressure gauge, 2-1/2" dial, 0 to 600 psig range, complete with isolation valve, shall be provided for indication of the CO₂ pressure downstream of the regulator.
- C. One (1) pressure relief valve shall be provided installed in the pipeline prior to the pressure regulator. Relief valve shall be set for 450 psig.

PSF™ CARBONIC ACID FEED SYSTEM (Patent Numbers: 5487835 & 5514264)

Design Conditions:	CO ₂ Feed Rate (max.):	20 lb/hr.
	CO ₂ Feed Rate (min.):	2 lb/hr.
	Carrier water required:	18 gpm
	Minimum Carrier Water Pressure:	110 psig

One (1) TOMCO₂ PSF™ Carbonic Acid feed panel will be provided. All CO₂ piping and fittings will be 1/2" Type 304 stainless steel, threaded. All water piping and fittings will be 1-1/2-inch schedule 10 Type 304 stainless steel, welded. The panel will be free standing, enclosed style and constructed of type 304 stainless steel with an approximate dimension of 4'-0" wide by 5'-0" high by 20" deep. The carbon dioxide at 125 psig, minimum, will be diffused into the carrier water. The clean, carrier water supply shall be capable of providing 18 gpm at a minimum of 110 psig constant pressure (55 psi over the injection pipeline pressure) and approximately 5° C to 25° C to the panel. The CO₂ feed rate will be automatically adjusted by the panel pH controller. A NEMA 4X type 316 stainless steel electrical panel will be provided on the front of the feed system frame. Electrical service to the control enclosure shall be 120 volt, single phase. The PSF™ panel will contain the following:

One (1) stainless steel "Y" strainer provided on the inlet side of the CO₂ feed panel to remove any debris that might pass through the CO₂ vapor line from the storage cylinder.

One (1) second-stage pressure reducing valve, will be supplied. The regulator will reduce the CO₂ pressure from the first stage cylinder storage manifold pressure regulator to the desired operating pressure. The regulator will have a stainless steel body, spring case and lower case, valve stem and valve stem guide; nitrile valve disc and holder and diaphragm, and zinc plated control spring seat. The outlet pressure of the regulator will be easily adjusted through the use of an adjustment screw.

Two (2) Pressure gauges, 2-1/2" dial, 0-200 psig range, complete with isolation valves, shall be provided for indication of the CO₂ pressure upstream and downstream of the second stage regulator.

One (1) glass tube-type indicating CO₂ flow meter shall be provided. The frame will be stainless steel with stainless steel end fittings. A glass tube with a stainless steel float will be utilized. Accuracy of the meter will be two percent of full scale. The flow meter shall be sized to correspond with the design rate of carbon dioxide per hour.

One (1) pH indicating PID controller will be provided. The controller will be complete with proportional band, integral, transit time, reset functions, set point, output indication, remote pH transmission, manual/automatic selection and hi/low pH alarms. The controller will receive an electronic signal from the pH probe. The controller will transmit a proportional 4-20 mA D.C. signal to the electro-pneumatic transducer. The pH controller shall be a Series 56 controller specially designed for TOMCO₂ by Rosemount.

One (1) pH electrode assembly will be provided. The electrode assembly will include a pH glass electrode, a reference electrode, a thermo-compensator and a preamplifier, all enclosed in a corrosion-proof PEEK body. The electrode assembly will be located 30 to 60 seconds downstream of the CO₂ application point for measurement of the pH, and then transmits the pH measurement signal to the pH controller. The electrode assembly will be complete with 10 meters of cable and insertion hardware for mounting at a 15° angle from vertical in the raw water pipeline. The electrode shall be specially designed for TOMCO₂ by Rosemount.

One (1) Gas actuated (ATO) CO₂ flow control valve assembly and I/P transducer will be provided. The pneumatically operated, spring opposed diaphragm actuator is controlled via an electronic signal from the electro-pneumatic I/P transducer. The transducer converts a DC current input signal to a directly proportional pneumatic output. The transducer is designed to accept a proportional 4-20 mA D.C. signal from the pH controller. The valve will be supplied complete with a CO₂ gas regulator and pressure gauge for utilizing the CO₂ gas at the panel as the pneumatic source. The valve body shall be 316 stainless steel.

One (1) manually operated by-pass CO₂ flow control valve will be supplied. The valve will be stainless steel construction and designed for positive control of CO₂ flow.

Four (4) CO₂ isolation ball valves will be supplied; one for the panel and two for the control valve by-pass, and one for the solenoid by-pass. The valve bodies will be of Type-316 stainless steel construction with stainless steel trim. The valves will be designed specifically for CO₂ service.

Two (2) Pressure gauges, 2-1/2" dial, 0 - 160 psig range, complete with stainless steel isolation valves, shall be provided for indication of the water pressure on the inlet and outlet of the feed panel.

Two (2) in-line mixers designed to continuously mix carbon dioxide with the carrier water will be supplied. The CO₂ vapor will be injected upstream of the mixer through a stainless steel injector. The mixers shall be constructed of PVC.

One (1) stainless steel ball check valve will be provided in the CO₂ injection line.

Three (3) pressure relief valves shall be provided for protection of the PSF Panel components. The valves shall have a brass body and stainless steel spring. Pressure relief valves shall be set to relieve at 150 psig, 100 psig and 50 psig. The valves will require venting outside (by others).

One (1) carrier water drain valve will be supplied. The valve body will be of stainless steel construction with stainless steel trim.

One (1) H/O/A switch and power light will be provided on the control panel door. The switch will provide 120 Volt AC power to the electronics in the panel. Switch and light module shall be NEMA 4X rated.

One (1) piston actuated CO₂ solenoid valve, with manual by-pass, will be provided for shutting off the CO₂ flow with a signal from the plant control system. The solenoid valve shall have a stainless steel body, CO₂ actuator, CO₂ pressure regulator, speed control and a 120-volt solenoid on the CO₂ pneumatic source.

One (1) Carrier water low pressure switch shall be provided. A low water pressure signal (dry contact) shall be provided to the plant control system.

Three (3) alarm lights will be provided on the control panel door. The lights will indicate a low carrier water pressure, high pH and low pH. Light modules shall be 6 volt LED, push-to-test type.

One (1) electric panel heater shall be provided for minimizing moisture condensation on the PSF panel components. Heater shall be Hoffman Series, 800 Watts, 120 volts.

All necessary panel valves, safeties, gauges, pipe, pipe fittings, etc. for the connection of the interior components of the PSF panel will be included as part of the PSF™ Carbonic Acid feed panel.

CARBON DIOXIDE GAS MONITOR

One (1) infrared, photo-acoustic, absorption type CO₂ gas monitor will be supplied to monitor carbon dioxide gas in the building. The monitor shall be capable of detecting the presence of CO₂ in air over the range of 0 to 3 percent. The monitor will include a high-level alarm contact and output a 4-20 mA signal to the control room or other location. A NEMA 4X stainless steel remote alarm panel, with alarm horn and visual alarm beacon, will be provided for installation by others. The monitor will come complete with internal sampling pump and mounting brackets suitable for wall mounting. Monitor to be Ultima-X Series by MSA. The monitor and alarm panel are to be installed by others.

CARBONIC ACID DIFFUSER (Patent Numbers: 6637731 & 6767008)

One (1) TOMCO₂ Carbonic Acid diffuser assembly will be supplied to input carbonic acid into the 12-inch well water pipeline. The diffuser will be constructed of type 304 stainless steel and provided with 2-inch and 1-1/2-inch flanged connections for easy removal from the 12-inch pipeline.

One (1) Pressure gauge, 2-1/2" dial, 0 - 160 psig range, complete with isolation valve, shall be provided for indication of the water pressure just prior to the solution diffuser. The pressure gauge is to be field installed by the contractor.

I/O SIGNALS

The following signals shall be exchanged between the Storage tank, PSF local control panel and plant control system:

From the CO₂ storage tank to the plant control system:

- CO₂ tank low pressure alarm
- CO₂ tank high pressure alarm

From the plant control system to the PSF control panel:

- PSF panel selected (on/off)

From the PSF control panel to the plant control system:

- Carrier water low pressure alarm
- Process pH (4-20mA)

The above components will be factory assembled and all field connections clearly marked. The entire assembly shall be shop tested, calibrated and shipped to the job-site in one shipment. Commissioning, start-up and training by a TOMCO₂ factory technician in one trip will be provided. Detailed drawings, parts list and operating manuals are provided as part of the equipment package. A One-year equipment warranty will be provided from the date of start-up of this equipment.

ITEMS NOT INCLUDED WITH PROPOSED EQUIPMENT

- a) Foundation, concrete pad or anchor bolts for the equipment.
- b) Electrical wire, junction boxes, main disconnect or conduit for the equipment.
- c) Erection and installation; however, complete erection and installation drawings will be provided.
- d) Interconnecting CO₂ piping, between the CO₂ storage tank and the feed panel.
- e) Interconnecting piping between the feed panel and the solution diffuser.
- f) Piping supports or wall sleeves for field piping.
- g) Unloading of the equipment at the jobsite.

- h) Liquid CO₂ for the storage tank.
- i) Carrier water supply and booster pump.
- j) Any special fill connections required by the CO₂ supplier.
- k) Interconnecting pipe, fittings and valves between the carrier water supply and the feed panel.
- l) pH extension cable and junction box.
- m) Freeze protection and canopy for the equipment if located outdoors.
- n) Venting of all relief valves to the outdoors.
- o) Spare parts.
- p) Any additional instrumentation or requirement not specified herein.
- q) Taxes, duties, licenses, permits or any other fees.
- r) Bid bond, supply bond or any other type bonds.

XXXX END OF SECTION XXXX

December 27, 2016

To: Bidding Contractor

RE: TOMCO₂ Proposal #2244 Carbon Dioxide Storage and Feed Equipment for the Army Post Road Aquifer Storage and Recovery Well – Des Moines, IA.

TOMCO₂ Systems is pleased to submit, our proposal covering the new 6-ton capacity horizontal carbon dioxide storage tank and pressurized solution feed system, to be located at the Des Moines Water Works Army Post Road Aquifer Storage and Recovery Well site. The storage tank will be complete with I-beam frame suitable for installation at grade elevation. The refrigeration unit, vaporizer, vapor heater, and first stage pressure regulator are pre-installed in the front cabinet of the tank. The feed panel should be installed between the storage tank and the feed point. We have attached our equipment scope to this proposal. Please read our scope carefully to be certain as to what TOMCO₂ is proposing to supply.

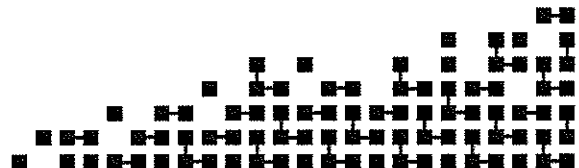
We can send shop drawings and submittals for your review eight (8) weeks after our receipt of your purchase order. Shipment of the equipment can be twelve (12) weeks after our receipt of approved submittals and notice to proceed.

TOMCO₂ Equipment Company will warrant the equipment supplied, as described in the attached scope, for a period of one (1) year from the date of start-up and acceptance of the equipment.

Please note that under no circumstances shall the CO₂ gas feed piping be hydrostatically tested. Hydrostatic testing may void the warranty. All pressure testing of the CO₂ field piping shall be pneumatic per ASME B31.3.

Field installation will require the following, not provided by TOMCO₂:

- 1) Concrete foundation for the CO₂ storage system and feed panel.
- 2) Anchor bolts for the equipment.
- 3) Interconnecting CO₂ pipe between the CO₂ storage system and CO₂ feed system. This pipe can be 1/2 inch schedule 40 stainless steel or black steel, welded, or schedule 80 stainless steel or black steel, threaded, with 2000 lb fittings or 5/8 inch type K copper with silver soldered joints.
- 4) Electrical power to the CO₂ storage tank. This will be a single 480 volt, three phase, 60 Hz 40 amp connection.
- 5) Interconnecting water pipe and valves between the carrier water supply and the PSF feed panel. This 1-1/2-inch pipe can be stainless steel, carbon steel, ductile iron or PVC.
- 6) Interconnecting solution pipe and valves between the PSF feed panel and the diffuser assembly. This 1-1/2-inch pipe can be stainless steel or PVC.
- 7) Electrical power to the PSF feed panel. This will be 120-volt single phase 20 amp service.
- 8) Electrical power to the CO₂ gas monitor and alarm panel. This will be 120-volt single phase 10 amp service each.



- 9) Any signal wiring required between our system and the plant process control system or other control panels or components.
- 10) Liquid CO₂ to fill the storage tank.
- 11) Crane service and rigging to unload the carbon dioxide equipment.

The price for our equipment as proposed in the attached equipment scope is One Hundred Ninety-Five Thousand Dollars (\$195,000.00). The TOMCO₂ representative for this project is Mr. Cory Sonner of VESSCO. Mr. Sonner can be reached at (515) 233-8599 or Email; csonner@vessco.com.

Our purchase price includes the following:

- 1) Equipment as specified.
- 2) Submittals and shop drawings.
- 3) Freight to the jobsite
- 4) Start-up and Training
- 5) Operating and Maintenance Manuals
- 6) One Year Warranty

Our payment terms are net 30 days.

Our price does not include Federal, State or local taxes.

Our price will be good for a period of 90 days from the date of this proposal.

It is understood by your acceptance of TOMCO₂ terms and conditions of this letter, retainage is to be paid in full no longer than 30 days from the date of start-up of our equipment. Payment of the full invoiced amount less retainage is due after shipment and prior to start-up and commissioning of the system.

If you have any questions, please do not hesitate to call Mr. Sonner or me.

Sincerely,

Michael A. Dirth

Michael Dirth
Municipal Water Manager
TOMCO₂ Systems
Water Technologies Division

CC: Cory Sonner

Attachments: TOMCO₂ scope #2244