

**Public Utilities Committee  
Meeting Agenda  
Wednesday, July 22, 2015  
4:00 P.M.**

To be held in the  
Rocky Mount Municipal Building  
345 Donald Avenue  
Rocky Mount, VA 24151

- I. Roll Call
- II. Approval of agenda
- III. Discussion regarding refuse collection policies
- IV. Discussion regarding disinfection byproducts (DBPs)
- V. Adjournment

This meeting is open to the public, but is not a public forum. The Town Council offers the public a forum for public comment during the "Hearing of Citizens" portion of its regular monthly meetings, which are held on the second Monday of each month. The next regular monthly meeting will be on Monday, August 10, 2015 at 7:00 p.m. in the Council Chambers of the Rocky Mount Municipal Building located at 345 Donald Avenue.

## Town of Rocky Mount Water System DBP Report

**Report by: Bob Deitrich, Water Plant Superintendent**

**Date: July 8, 2015**

**Disinfection Byproducts (DBPs)** are a group of chemical compounds that form when chlorine reacts with natural organic compounds that are dissolved in water. The greenish or brown color of water in rivers and lakes comes from organic compounds like algae, decayed leaves and whatever lives in or falls into the water.

EPA requires that we sample the levels of DBPs in the water in the distribution system at certain locations and that we keep the levels of DBPs below limits they have determined. New federal regulations, referred to as the Stage 2 Disinfectants and Disinfection Byproducts Rule, went into effect for water systems of our size beginning in the fourth calendar quarter of 2014. As a result our water department began testing for Disinfection Byproducts at a new location selected by the Virginia Department of Health in November. While our original DBP sample site continues to give satisfactory test results, the samples from our new site have been erratic and higher than expected.

### DBP Testing and Investigation

Immediately after receiving poor test results from our new location last November, plant staff resampled and collected extra samples at locations upstream and downstream in order to verify the water quality in the area. Test results were much improved. Since the initial round of samples some hydrant flushing was conducted and an auto-flush valve was placed on a nearby hydrant to flush water daily to encourage water turnover.

Samples collected in February were acceptable but not to the point where compliance is assured. Typically, November and February are our best months for DBPs due to the cooler weather. In May 2015, the third round of sample results from the new site were again high enough that a good four quarter average is unlikely. With our hottest month of sampling on the way, we do not expect to be in compliance at the end of the initial four quarters of sampling. Based on results to date, VDH has required us to perform an operation evaluation, (basically a check list) to begin the process of making improvements.

### The issues we face

Our DBP testing, historically, has been very variable, mainly due to seasonal temperatures and a lack of circulation. We expected some variability at the new location but not to this degree. Poor DBP results are mainly attributed to old water, source water quality and/or water treatment methods. Working at both ends can improve water quality for our customers.

**On the distribution side**, our South Water Tank is our largest tank and it is located in a part of town that uses relatively little water. Staff performed a water age study by shutting down our fluoride treatment and testing water at the water tank, the wastewater plant and points in between to see how long it took for the level of fluoride in the water to drop. This commonly used and inexpensive test revealed that the water in the south tank is greater than 2 weeks old. Since the water plant only runs half the day, water in the problem area can be from the plant, from the tank or a combination of both at any given moment. This factor contributes to the variability in our test results.

Disinfection Byproducts are made worse by time and heat. During warmer months when our DBP numbers are there highest, we have both time and heat working against us in the South tank. Depending on demand we could very likely be pumping the same old water in and out of the tank, creating our own DBP production facility.

*Flushing fire hydrants will not likely solve the problem. While strategic flushing might improve sample results, the problem of stale water in the tank would remain. One foot of water from the South Tank equates to 20,450 gallons of water. A great deal of water would need to be flushed on a routine basis to even put a dent in the level of the 55 foot tall tank. There would also be issues about when to flush and where to put all of that water.*

**At the water treatment plant** the use of chlorine to disinfect water creates DBPs. In the summer when water is warm and contains more algae, more DBPs are formed. How chlorine is used at the plant can make a difference but we must keep in mind that the reason for chlorine is to kill bacteria and other water borne microbes that cause disease. Other chemical options are available for use in the raw water that can reduce DBP formation.

### **Where we stand**

We are not currently in Violation of the waterworks DPB limits. Compliance is based on a four quarter running average and we will not know for sure where we stand until September of 2015. But, water quality should not be a crap shoot. We have an issue that needs to be addressed so that our customers have good water all year long and not just during the cooler months or certain times of day.

Many communities including our neighbors in Henry County and Bedford County have had these same issues: old water, dead end lines, poor turn over in a water tank, causing DBP violations. Many ideas have been tried to alleviate the problem and there are plenty of options. Attached is a recent article about the Town of Louisa County and their experiences trying to comply with the DBP standards. I strongly recommend you read the article to gain a true appreciation for what some water systems have gone through.

My intention is to make our efforts as simple and effective as possible, and unlike Louisa, I do not intend to reinvent the cycle of spend and waste in an effort to improve our water quality.

### **Possible Options:**

- Change the pretreatment process at the water plant. (This is already in the works as part of the bleach project)
- Take the South Tank out of service. (Not an option as it represents almost 50% of our water storage/fire flow)
- Loop the water lines. (Looping the system in a meaningful way would be difficult as there are no significant water users in the area.)
- Creating a way to pump out of the tank to the system (expensive and would be complicated to manage)
- Lengthy engineering study to determine the best methods. (expensive and delays solutions that are commonly used and known to be effective)
- Replace the South Tank with a smaller tank. (This would be helpful but time consuming and expensive, not to mention the reduction in our storage capacity)

At the annual Virginia Rural Water Association conference in April, I had the luxury of having access to representatives from VDH, Southern Corrosion (our tank maintenance contractor), and representatives of tank mixing equipment companies and engineering consultants who have been involved in these kinds of projects. While it is a practical impossibility to reduce the age of the water due to the tanks location and size, we can preserve the water better. Tank mixers of various types are available. VDH favors one that circulates water from the bottom and sprays the circulated water from a nozzle from above, back into the tank. This spraying aeration action strips out DBPs. Better mixing of the water will reduce the age of stratified and stale layers of the tank that don't normally mix. The equipment can be installed to the tank through existing access points without emptying the tank. Power is already available at the site. A ventilation system may be added to circulate air from the top of the tank.

### **Recommendations:**

1. Reduce the use of chlorine in the treatment process as much as is safe and practical (in progress)
2. Proceed with treatment changes at the water treatment plant related to the bleach project. (This will include moving the chlorination point downstream of the current raw water mix chamber)
3. Begin use of Potassium Permanganate (a preoxidant) that will reduce the DBP precursors before they come in contact with chlorine. (The plant is already equipped to feed this chemical without the need for new equipment)
4. Purchase and install the tank mixing and aeration equipment, \$95,000. This includes installation. (Comes with a guarantee of DBP reduction)
5. Work with Thompson and Litton to prepare submittals for VDH.
6. Interior wash out and paint is scheduled for August and this will remove any biofilm on the tank interior that might contribute to the problem.
7. Extra DBP samples have been collected (and will continue to be collected) to give a better picture of the actual water quality in this part of our distribution system.

The preliminary estimate for the entire project is between \$95,000 and \$135,000.



**Medora Corporation**  
3225 Highway 22 • Dickinson, ND 58601  
Tel: (701) 225-4495 • www.MedoraCo.com



**Quotation for GridBee™ Trihalomethane (THM) Removal Equipment for the Town of Rocky Mount, Virginia**

**Date:** May 26, 2015

**Project #:** 7040

**To:** Bob Deitrich

Town of Rocky Mount Water Dept  
345 Donald Ave, Rocky Mount VA 24151  
bdeitrich@rockymountva.org, 540-483-8830  
540-483-5747 / 540-525-5842

**From:** Michelle McCadden, Medora Corporation Regional Manager, Stillwater, NY  
michelle.m@medoraco.com • 518-541-3543

Darren Tessier, Medora Corporation Sales Engineering Dept., Dickinson, ND  
darren.t@medoraco.com • 866-437-8076

Mr. Deitrich,

Thank you for requesting this quotation. We are very pleased to work with Town of Rocky Mount Water Dept to provide high quality THM removal equipment for your Morningside Tank. This project fits our capabilities well, and we will do everything possible to ensure your project flows smoothly and meets your goals and expectations. If you have any questions, please call any of the Medora representatives shown above.

Best regards,

Darren Tessier  
SolarBee / GridBee Team

For simplification, we have broken this quotation down into sections:

**A. The Floating Spray Nozzle Equipment, Supplemental Mixing Equipment, and Ventilation System.**

**B. The Electrical Supply System.** Medora can supply motor control panels for the THM removal system components, or the City can elect to supply the entire electrical system itself. Please see this section of the quotation for further details.

**C. Sales Terms.**

**Next Steps:** As soon as it is determined this project is moving forward, notify Medora Corp. to avoid a potentially long delivery time.

- a. Since most of this equipment is proprietary to Medora, bidding is generally not required for the City to purchase this equipment, but please consult your local rules. Medora will provide a sole-source letter upon request.
- b. The key part of this equipment, the floating spray nozzle machines and supplemental mixer, are portable equipment. Therefore the City should use a standard purchase order, the same as would be for purchasing parts or other portable equipment. The purchase order should request that factory shipment as soon as possible.
- c. The City Engineer should start working on State permitting requirements for this project as soon as possible.

## **A. THM Removal Equipment.**

### **1. Tank Name & Location**

Rt. 220 South Tank (Morningside Tank), 11637 Virgil H. Goode Hwy, Rocky Mount, VA

### **2. Tank Description**

Rt. 220 South Tank (Morningside Tank) is a 1 MG tank with a 52-foot overflow height, two 24" x 24" hatches, a peak daily flow volume of 400,000 gallons, and maximum fill rate of 800 gpm.

### **3. Description of Existing Water Quality Problems**

Water in this tank has THMs as high as 145 µg/L during peak times, ranging down to a low of 49.7 µg/L during non-peak times.

### **4. Medora Co. Objectives for this Installation**

THM Reduction Note: Design based on maximum usage of 400,000 gpd, a maximum fill rate of 800 gpm and the high THM level listed above. The Floating Spray Nozzle and Supplemental Mixing equipment shown below, is designed to achieve a 45% reduction of THMs in this tank, comparing untreated water entering the tank to treated water leaving the tank.

System Summary: The THM removal system shown in this quotation includes 10-hp of Floating Spray Nozzle equipment, 0.75-hp of supplemental mixing, and 2 hp of blowers with air filter, for a total of 12.75 hp of equipment.

A ventilation air system is required, for the headspace of the tank or clearwell, so that THMs which are volatilized by the nozzles do not re-condense back into the surface of the water.

Of the total hp of equipment, it is expected that 12.75 hp will be operated during peak THM and flows, for five months per year, and 0.75 hp will be operated the other seven months of the year, for an annual average energy usage of 5.8 hp. These figures are estimates only, and will vary based on exact flow volumes and THM levels in the raw water.

**Guaranteed Performance:** Due to a wide range of variables in all city water systems, exact THM reduction levels are impossible to determine in advance of installation. However, Medora guarantees that its THM reduction system will lower the THM concentration in the tank where located, and also lower the THM formation potential downstream. If the Medora equipment does not meet the design criteria throughout the first year following installation, Medora will, at the customer's option, either (1) add additional Medora THM reduction equipment, at the customer's cost for the equipment and at Medora's cost to install it into the tank, or (2) remove its THM reduction equipment at Medora's cost for removal, and refund 70% the cost paid to Medora for the removed equipment.

## 5. Equipment Description

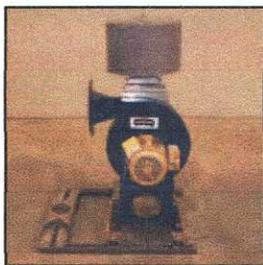
The recommended equipment consists of one (1) SN10 Floating Spray Nozzle machine, one (1) GS-12 mixer for supplemental mixing during non-peak THM times, and one (1) BAF-2hp Ventilation System.



**SN10:** 10-hp floating, grid powered, circulation and Trihalomethane (THM) removal equipment for potable water tanks and reservoirs. Materials of construction include 316 stainless steel frame, nozzle pressure transducer, hardware, fittings, stainless steel pump, ANSI 61 Approved Motor and other NSF Approved Materials. Designed for continuous operation and installed through 24-inch minimum clear roof opening. The spray unit direct flow rate is 660,000 GPD. Operating footprint: 120 inches diameter and a minimum 36 inches headspace required. Shipping crate size: 70 inches length x 46 inches width x 53 inches height. Shipping weight: 700 lbs.



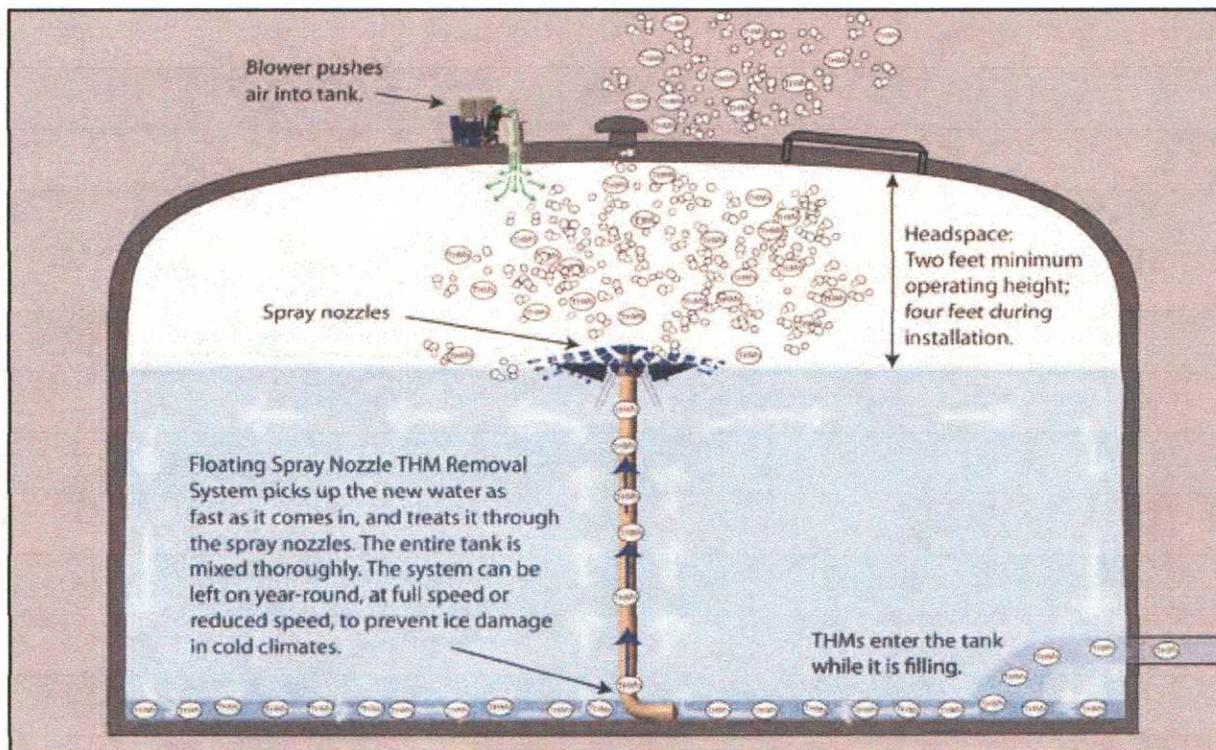
**GS-12:** High-flow submersible mixer, electric, nominal power 0.75-hp, 316 stainless steel and non-corrosion polymer construction. This mixer rests on the tank floor with polymer support pads. It can easily be installed by the factory, contractor or City through a standard hatch with 12" diameter minimum unobstructed clearance. Comes standard with 75' of submersible cable, tank/roof junction box, through tank fitting for the power cord, pigtail & splice kit and shipping box. Operating footprint: 36 inches length x 10 inches width. Shipping box size: 42 inches length x 15 inches width x 10 inches height. Shipping weight: 105 lbs.



**BAF-2hp-3PH or BAF-2hp-1PH Ventilation System.** Turbine blower and air filter unit, for 750 CFM at 8 water column inches. Include baseplate, mounting, 2 hp dual voltage TEFC close-coupled motor, and 5 micron x 1,100 CFM intake air filter. Working dimensions are 36 inches long x 30 inches wide x 48 inches tall. Available in single or three phase. Shipping weight is approximately 250 lbs., in a crate approximately 42 inches length x 36 inches width x 54 inches height.

Operational Design Note: See the System Summary above. During off-peak THM season when maximum THM removal is no longer needed, to save energy the Floating Spray Nozzle equipment can be operated at less intensity, only as needed for compliance, while keeping the low-energy Tank Mixing equipment operating continuously to mix the untreated water with the treated water and to ensure that no untreated water ever leaves the tank.

Note: Below, for illustrative purposes only, is a schematic diagram of a THM Removal System. This quotation is only the in-tank water-handling equipment, namely the Floating Spray Nozzle equipment, any Tank Mixing equipment required (not shown), and the Ventilation System as mentioned above. For information on the other items the City needs to provide, namely the Electrical Supply system, see section B.



## 6. Equipment Cost

Quantity	Equipment Description	Purchase Cost Each	Purchase Cost Total
1	SN10-3P-460 Floating Spray Nozzle machine, described above, 10 hp, 3 phase, 460 volt.	\$49,690	\$49,690
1	GS-12 120v Submersible Mixer, described above, 0.75 hp, 1 phase, 120 volt.	\$8,875	\$8,875
1	BAF-2hp-1PH/3PH Ventilation System, described above, 2 hp, 1 phase/3 phase.	\$6,620	\$6,620
Equipment Subtotal:			\$65,185
Applicable Taxes:			-to be determined -
Factory delivery and placement:			\$23,100
<b>Equipment, Delivery, and Placement Total:</b>			<b>\$88,285</b>

### Medora Scope of Supply for delivery and placement of this equipment:

- a) Manufacture, deliver and place the above equipment into the tank; including supplying any crane or lifting assistance that may be needed. Mount the air through-wall fitting through the roof of the tank. Connect the air drop hose to the interior side of the tank through-wall fitting.
- b) Bring the electric cord from each piece of equipment to the outside of the tank, via a through-wall fitting Medora will supply and install through a tank wall, roof, or vertical side of a raised hatch. The THM spray nozzle unit contains a separate power cord and a separate pressure sensor signal cord, each exiting through the roof.
- c) If the City electrician connects this equipment to the power system while Medora's crew that is placing the equipment is still on site, Medora's crew will assist in startup of this equipment to check for proper motor rotation and to confirm the equipment is operating correctly. If the City electrician cannot make the final electrical connection to this equipment while Medora's crew is on site, then the City will need to start up the equipment without Medora present, which is generally not a problem. However, if the City requests Medora to make a special trip for system startup, then the City must issue a separate purchase order to cover Medora's cost for the special trip.

### Customer Scope of Supply for Medora delivery and placement of the above equipment:

- a) Confirm in advance that the roof can handle the weight loading of the blower(s).
- b) Supply the magnetic starters and electrical connections to the blower(s).

## 7. Special Provisions

All blower system components will have the warranty of the component manufacturer, not Medora's standard warranties for GridBee™ or SolarBee® equipment. Please ask if more information is needed on blower component warranties.

## ***B. The Electrical Supply System.***

Medora can supply motor control panels for the THM removal system components, or the City can elect to supply the entire electrical system itself. One motor control panel is usually needed for each floating spray nozzle machine, supplemental mixer, and air blower. This section has further details on the motor control panels.

### **1. In designing the electrical system, the City should consider or determine:**

- a. Whether the power company's existing neighborhood transformers are adequate for the new load.
- b. The voltage and phase that will be used for each motor.
- c. Whether to use across-the-line starters or soft starts, phase converters, or VFDs.
- d. Where to locate the electrical panels.
- e. Whether to add timers into various motor panels, so that during off-peak THM seasons the Floating Spray Nozzle hours of operation can be reduced for energy savings; this subject is discussed in the "Equipment Description" section of the quotation for Floating Spray Nozzle machines.
- f. Whether to add SCADA and remote controls to some or all motors. Note: Medora does not get involved with adding SCADA to any equipment except GridBee™ or SolarBee® mixers.

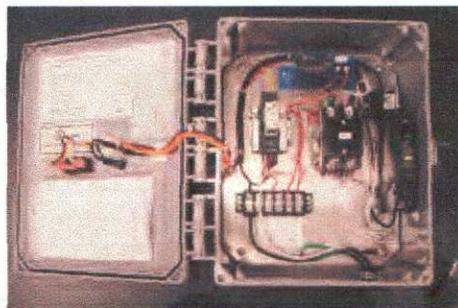
### **2. Specifications of motor control panels and motor protectors that Medora can supply**

Medora can offer the City the following motor control panels and motor protectors for this project. This equipment has a standardized design that meets the basic needs of most industrial users. Because of the standardized design, requests for modifications cannot be accommodated by Medora, though Medora will refer the City to other electrical supply vendors that could possibly accommodate any special requests by the City.

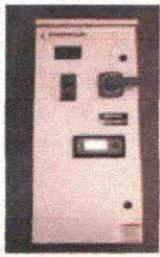
**GS-12 120v Control Panel Specification:** Completely assembled, NEMA 4X enclosure, contactor, control, hinged door with hasp for padlock, Hand-Off-Auto switch, run indicator on exterior of door, 4-20 mA current transducer, 24 VDC relay for automatic operation, complete panel as shipped is UL508A certified.



Motor Control Panel Exterior



Motor Control Panel Interior



Exterior



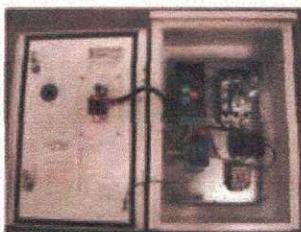
Interior

### **Three-Phase Motor/Pump Control Panel Specification: (SubMonitor Starter)**

Industrial grade construction which includes a door mounted heavy-duty HOA switch, run light, lockable handle for safety, housed in an outdoor rated, gasketed, NEMA 3R enclosure, multi-tap transformer accommodates common voltages and includes integrated secondary protection (no fuses required), surge protection device, 120V control power for field devices, NEMA/IEC rated magnetic contactors feature 2.5 million electrical cycles at full rated current. Service entrance rated UL 489 circuit breaker disconnect provides branch and short circuit protection. Integrated electronic motor and pump protection with Class 10 electronic overload, underload (dry-run protection), over/under voltage, current phase unbalance, cycle fault, reverse phase through the onboard SubMonitor three-phase motor protection device with door mounted display. SubMonitor records up to 502 faults, records changes to parameter settings, records total pump operating time. A door mounted pressure LCD digital panel display meter with built in 24VDC power supply is included. All components UL/CUL certified, and the complete panel as shipped is UL508A certified. Operating Temp of -4° to 140°F (-20° to 60°C), 10% to 95% non-condensing relative humidity. Dimensions: 32"H x 15"W x 10"D.



Exterior



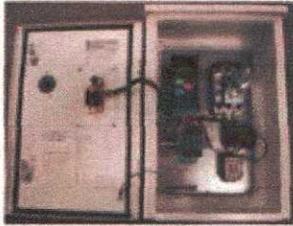
Interior

### **Single-Phase Blower Control Panel Specification: (Intelligent Pump Starter)**

Industrial grade construction which includes a door mounted heavy-duty HOA switch, run light, lockable handle for safety, housed in an outdoor rated, gasketed, NEMA 3R enclosure, multi-tap transformer accommodates common voltages and includes integrated secondary protection (no fuses required), surge suppressor, 120V control power for field devices, NEMA/IEC rated magnetic contactors feature 2.5 million electrical cycles at full rated current. Service entrance rated UL 489 circuit breaker disconnect provides branch and short circuit protection. Includes SmartStart™ Motor Protection with Integrated Tru-power™ electronic motor and pump protection featuring a wide-range, adjustable, class 5-30 electronic overload, and provides superior motor protection from over/under power (dry-run), over/under voltage protection, voltage phase loss, voltage and current unbalance, stalled/locked rotor, cycle fault, and ground fault (UL 1053 certified). Includes built-in power monitoring and fault logging for easy troubleshooting to view voltage, current, power factor, and more through an intuitive display and records the last 15 fault types with power condition values, stores how many times each fault type has occurred (up to 255 count), and logs changes to parameter settings. All components are UL/CUL certified, and the complete panel as shipped is UL508A certified. Operating Temp of -5° to 140°F (-20° to 60°C), 5% to 95% non-condensing relative humidity. Dimensions: 22"H x 15"W x 10"D.



Exterior



Interior

**Three-Phase Blower Control Panel Specification: (Intelligent Pump Starter)**

Industrial grade construction which includes a door mounted heavy-duty HOA switch, run light, lockable handle for safety, housed in an outdoor rated, gasketed, NEMA 3R enclosure, multi-tap transformer accommodates common voltages and includes integrated secondary protection (no fuses required), surge suppressor, 120V control power for field devices, NEMA/IEC rated magnetic contactors feature 2.5 million electrical cycles at full rated current. Service entrance rated UL 489 circuit breaker disconnect provides branch and short circuit protection. Includes SmartStart™ Motor Protection with Integrated Tru-power™ electronic motor and pump protection featuring a wide-range, adjustable, class 5-30 electronic overload, and provides superior motor protection from over/under power (dry-run), over/under voltage protection, voltage phase loss, voltage and current phase unbalance, stalled/locked rotor, cycle fault, ground fault (UL 1053 certified), and voltage phase reversal. Includes built-in power monitoring and fault logging for easy troubleshooting to view voltage, current, power factor, and more through an intuitive display and records the last 15 fault types with power condition values, stores how many times each fault type has occurred (up to 255 count), and logs changes to parameter settings. All components are UL/CUL certified, and the complete panel as shipped is UL508A certified. Operating Temp of -5° to 140°F (-20° to 60°C), 5% to

### 3. Cost of electrical equipment that can be supplied by Medora

Quantity	Description	Purchase Cost Each	Purchase Cost Total
----------	-------------	--------------------	---------------------

For the Floating Spray Nozzle machine(s) referred to in Section A. :

1	10-HP, Three-Phase Motor/Pump Control Panel. Dimensions: 32 inches tall x 15 inches wide x 10 inches deep. FOB Medora factory in Dickinson, ND	\$2,400	\$2,400
---	---	---------	---------

For the Mixer(s) referred to in Section A. :

1	MP-1HP-1P-120 GS-12 120v Motor Control Panel. Dimensions: 10 inches tall x 8 inches wide x 4 inches deep. FOB Medora factory in Dickinson, ND	\$1,070	\$1,070
---	--	---------	---------

For the Blower(s) or Fan(s) referred to in Section B.:

1	2-HP 1ph or 3ph Blower Control Panel. Dimensions: 22 inches tall x 15 inches wide x 10 inches deep. FOB Medora factory in Dickinson, ND	\$1,800	\$1,800
---	--	---------	---------

<b>Total Cost:</b>			<b>\$5,270</b>
--------------------	--	--	----------------

Applicable Taxes: To Be Determined			
------------------------------------	--	--	--

Note: If City changes voltage or phase of above equipment, panels of many other hp and voltage ratings can also be supplied. Call for pricing for any size of motor control panel not shown above.

### 4. Special Provisions

All electrical panels will have the warranty of the manufacturer, not Medora's standard warranties for GridBee™ or SolarBee™ equipment. Please ask if more information is needed on warranties.

## C. Sales Terms.

The below sales terms apply to this quotation in its entirety:

**A. Equipment Purchase, Not a Construction Project:** This equipment is portable, and can be easily relocated or removed entirely from the premises at any time. It does not become an integral part of any building or other structure, or part of "real estate." Therefore, to purchase it, the City should use the same procedure as for purchasing other portable equipment, such as a forklift, a drill press, or an office desk. Medora reserves the right not to accept an order if the purchase is incorrectly characterized as a "construction" project." Medora has not found any State or other jurisdiction where construction or contractor statutes apply to portable equipment that is sold by a factory, with on-site final assembly and placement performed by factory personnel.

**B. Assumptions:** This quotation may be based on worksheets, calculations or other information that has been provided by the City. The City should bring to Medora's attention any discrepancies, errors in data, or false assumption that Medora may have made while preparing this quotation.

**C. Expiration:** This quotation expires in 90 days, or on the date of any new quotation for this project, whichever is sooner.

**D. Delivery Time:** Delivery is scheduled at time of order, and is usually between 90 and 150 days.

**E. Payment Terms:** For a federal, state, or local government purchaser with a good credit rating, full payment is due in US dollars 30 days after invoice date, which is generally the date when the goods leave the Medora factory. For a non-government purchaser, full payment must be made by credit card or cashier's check before the goods leave the Medora factory though, in some cases, based on availability of a payment bonding or a bank Letter of Credit, 30 day credit terms may be extended upon special request by the purchaser. If there are any issues with these payment terms, please do not rely on this quotation until the issues have been resolved with Medora.

**F. Add for Taxes and Any Governmental Fees:** Except as indicated above, no taxes, tariffs or other governmental fees are included in the quote shown above, nor are there any costs added for special insurance coverage the customer may require. It is the customer's responsibility to pay all local, state, and federal taxes, including, sales and use taxes, business privilege taxes, and fees of all types relating to this sale, whether they are imposed on either Medora or the customer, or whether these taxes and fees are learned about after the customer orders the equipment. The customer's purchase order should indicate any taxes or fees due on equipment and/or services, and whether the customer will pay them directly to the governing body or include the tax payment with the purchase for Medora to submit them to the governing body.

**G. Add for Special Insurance Requirements:** Medora Corporation maintains adequate liability and workman's compensation insurance to generally comply with its requirements for doing business in all fifty U.S. states, and will provide at no charge certificates of insurance when requested. However, if additional insurance or endorsements beyond the company's standard policy are required by the customer, then the costs of those additional provisions and/or endorsements will be invoiced to the customer after the costs become known.

**H. Add for Special Training, Safety, Signage, or Other Requirements:** Medora has a very strong safety training program for its employees. If any special training classes for Medora personnel are required by the customer, please notify Medora well in advance. The cost of this training will be added to this quotation or invoiced to the customer separately. The same applies to any other special requirements the customer may have, including providing of project signage or any other requirement.

**I. Safe and Accessible Tank Condition Required.** This quotation is based on the best information made available to us by the above date. If this equipment is ordered, Medora's engineering and installation team will need detail information and photographs to plan the installation. If the detail information changes the installation scope significantly, Medora reserves the right to withdraw or alter this quotation, even if the equipment has already been ordered. To avoid surprises, the City should supply detailed tank information and photos as soon as possible. To ensure the safety of Medora's installation crews, it is the City's responsibility to make sure that all antennas (radio, cell phone, other) located at or near the tank site are inactivated during the installation and/or service of this equipment.

**J. Customer to Follow Medora's Maintenance and Safety Guidelines:** The customer agrees to follow proper maintenance, operating, and safety instructions regarding the equipment as contained in the safety manual that accompanies the equipment or is sent to the customer's address.

**K. Regulatory Compliance.** The customer must comply with all applicable Federal and State governmental regulations. It is the customer's sole responsibility to inquire about governmental regulations and ensure that GridBee and SolarBee equipment is deployed and maintained so as to remain in compliance with these regulations and guidelines, and to hold Medora harmless from any liability caused by non-compliance with these regulations and guidelines.

**L. Medora Corporation's Limited Replacement Warranty:** Medora Corporation has the best parts and labor warranties that we are aware of in the industry. The details of the Warranty which applies to this project are either attached to this document or are available at: <http://potablewater.medoraco.com/potablewater/product-information>

**M. Other Limitation of Liability.** Many of the employees at Medora Corporation have extensive scientific and practical knowledge relating to solving water quality problems. From time to time, they may offer solicited or unsolicited advice, ideas, judgment or opinions on how to deal with certain situations, none of which offers a guarantee of future events. Due to the many factors, complexity and uncertainty involved in solving water problems, the City agrees to release Medora Corporation and its affiliates, employees and agents from and against any and all claims, liabilities, costs and expenses which the City may incur or become subject to related to or arising out of any services or products furnished by Medora Corporation to the City, except to the extent that any claim, liability or expense results from the gross negligence or intentional misconduct of Medora as determined in a final judgment by a court of competent jurisdiction. In no event will Medora Corporation or its affiliates be liable for any damages caused by failure of buyer to perform buyer's responsibilities or for failure to follow Medora Corporation's advice. In no event will Medora Corporation or its affiliates be liable for any lost profits or use or other punitive, special, exemplary, consequential, incidental or indirect damages, however caused, on any theory of liability, whether or not Medora Corporation has been advised of such damages, or reasonably could have foreseen the possibility of such damages, or for any claim against buyer by another party.

**N. To Accept This Quotation**

**To order the equipment**, please issue a purchase order to Medora Corporation, 3225 Hwy. 22, Dickinson, ND 58601. The purchase order can be mailed to the address above, faxed to 866-662-5052, or emailed to the home office at [orderprocessing@medoraco.com](mailto:orderprocessing@medoraco.com). The purchase order should refer to the date of this quotation, and will be assumed to include this entire quotation by reference.

If purchase orders are not utilized, please sign and date below, provide billing information, and fax to 866-662-5052 or email to [orderprocessing@medoraco.com](mailto:orderprocessing@medoraco.com).

Signing below acknowledges acceptance of this quotation. Please indicate which of the following options have been chosen:

Proposal Date: May 26, 2015

Project #: 7040

Section A - THM Spray Nozzle and Ventilation System

Section A - Supplemental Mixer (GS-12-120v mixer)

Section B - Electrical Supply System

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title



## A Disinfection Byproducts Odyssey

**IN 1998 THE** Environmental Protection Agency (EPA) adopted the Stage 1 Disinfectants and Disinfection Byproducts Rule (DBP). The purpose of the Stage 1 Rule was to strengthen control of chemical disinfectants like chlorine (the known disinfectant for over 100 years) and the potentially cancer-causing byproducts in drinking water.

The Stage 1 DBP Rules sets limits on two contaminants in drinking water created when chlorine is added to surface water with high levels of Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC).

The Stage 1 DBP Rules sets limits on two contaminants in drinking water created when chlorine is added to surface water with high levels of Total Organic Carbon (TOC) and Dissolved Organic Carbon (DOC). Total Trihalomethanes (TTHM) and Haloacetic Acids (HAA5) form in chlorinated (a disinfectant) water as a result of the reaction that occurs when chlorine is added to water with high organic materials (decaying leaves, branches, grasses, trees etc.).

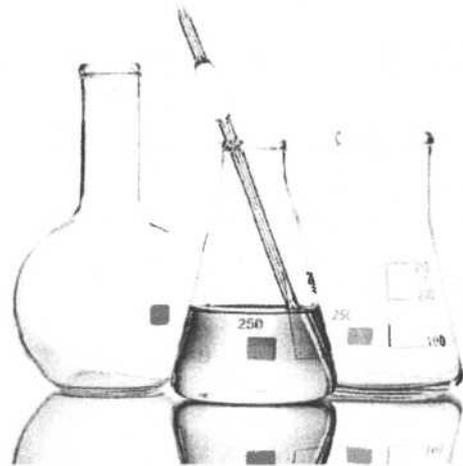
The Stage 2 DBP Rules came into effect during the third quarter of 2014, further tightening the limits set by the Stage 1 DBP Rules, by implementing site specific compliance as opposed to a running annual average.

Louisa County Water Authority (LCWA) remained in compliance, for the most part, with Stage 1 DBP Rules; however, when the stage 2 DBP Rules came into effect, the LCWA found it difficult to impossible to meet the regulation without some combination of water age reduction and Dissolved Organic Carbon removal.

What did we do?

In late 1999, the LCWA and the County of Louisa (County) negotiated Addendum 3 to the Buy-Sell Agreement with the Town of Louisa (Town). In that agreement, the Town agreed to allow a lease for 15 years at no cost to LCWA for the use of the wells and springs owned by Town. The cost to upgrade, maintain and operate the wells and springs would be the responsibility of LCWA and the County. LCWA intended to use the wells and springs as a supplemental source to blend with the Northeast Creek Water Treatment Plant (NECWTP) water. However, during our evaluation in 2010 of the wells, it was determined that the wells were contaminated with Tetrachloroethylene and also influenced by surface water; rendering them unsuitable for human consumption.

In 2004, the first of two outside engineering reviews was conducted. This evaluation consisted of review of the current processes at the plant and distribution system. The evaluation consisted of historical data and treatability studies (jar testing).



In 2009, LCWA contracted for an engineering report to evaluate DBP Reduction and the development of control strategies.

Initially process changes were implemented at the NECWTP including enhanced coagulation (the reduction of pH in the treatment process). 6.2 Standard Units pH was indicated as the desirable level. Higher doses of Alum were also fed. Finally, the chlorine feed was relocated from pretreatment to applied treatment to reduce the contact time between the TOC and the chlorine.

Simulated Distribution System testing (SDS) was conducted on the use of an alternative disinfectant called chloramines. The SDS testing with the use of chloramines did show a decrease in DBPs, but not significantly enough to ensure compliance. The Virginia Department of Health (VDH) determined that due to the operational schedule (start-up and shut-down daily) at the NECWTP, Chloramines would not be a viable option. Chloramines also produce DBPs that are currently unregulated, but will be within the next seven years; those DBPs are known in the utility business as "super bugs" and chloramines can cause corrosion in the distribution system, leading to lead and copper issues.

VDH approved replacing 18" of the anthracite filter media with 18" of granular activated carbon on each of the two final filters. This was done on two separate occasions. The VDH approved going back to anthracite media in the filters because significant results were not being realized.

VDH also approved a chemical addition of Re-OX. The Re-OX was fed into the clear well finished water to help reduce any organic build up in the distribution system that could be adding to the DBP

issues. Re-OX quickly became too costly for the minimal benefit received.

In 2013, an additional PER was commissioned. This PER provided several new options that were unknown or unavailable in 2004. Based on jar testing, operation and distribution evaluations conducted, this PER recommended a smaller water tank to reduce the water age from approximately 30 days to a more appropriate seven to nine days and an Anion Exchange Vessel System. This is a post-treatment or polishing of the water.

Since the engineering firm was only under contract to develop the PER, the implementation of the bid/contract implementation/construction upgrades and pilot testing (required by the VDH) was bid out and a third engineering firm hired.

Before pilot testing the Anion Exchange system, several other, less expensive options were tested.

Our chemical supplier at the time conducted three days of jar testing at the plant with different coagulants with no positive results.

Powdered Activated Carbon (PAC) was used as a pretreatment and fed next to the potassium permanganate. It proved to be of little help in the removal of TOC and DOC, but did aid the treatment process. The PAC was very difficult to feed at a constant rate due to continued pumping issues and the inconsistency of the PAC slurry during the pilot test.

A full scale pilot of chlorine dioxide caused taste and odor issues, as well as elevated the manganese, turbidity and color.

LCWA drilled one well on the NECWTP 14 acre site, but the well water had high levels of iron and manganese, currently being removed from the reservoir water by the water plant, but it was determined that the amount of water needed would be difficult to find on the land owned by LCWA.

Hydrant flushing at the furthest point in the system continues today. Approximately 22,500 gallons of treated water is flushed per day.

The Anion Exchange Vessel system was piloted on five separate occasions with three different resin compounds. The Anion Exchange provided removal to the target level of 1.4 mg/L, but could only sustain that level for two days. After two days, the resin needed to be backwashed and regenerated. The backwash and regeneration created a waste product that would need to be pumped and hauled to the Regional WWTP or a forcemain and pump station would need to be constructed from the NECWTP to the Regional WWTP. Either method of disposal would require a significant cost and capacity used at the WWTP. At the conclusion of the pilot testing, the Anion Exchange system was still considered an option, but not a desirable one.

## PUTTING IT IN — EASY. GETTING THE DATA YOU NEED OUT — EVEN EASIER.

The ultimate answer to high bill complaints is Neptune's E-Coder® R900i™, combining the field-proven R900® RF MIU and the E-Coder® solid state absolute encoder into **one easy-to-install, wireless package.** Putting it in is simple, saving time and labor — while advanced leak detection and timely meter data keep the savings coming.



**NEPTUNE**  
TECHNOLOGY GROUP

TAKE CONTROL | [neptunetg.com](http://neptunetg.com)

ARR® UTILITY  
MANAGEMENT  
SYSTEMS™

LEARN MORE ON HOW NEPTUNE PROVIDES 1-OF-A-KIND CONFIDENCE  
THROUGH THE MIGRATABLE R900® SYSTEM AT [NEPTUNETG.COM](http://NEPTUNETG.COM).

Earthtec was fed into the plant's raw water line prior to any other chemical addition to aid in the removal of DOC, minimal results were realized.

A pretreatment with a magnetic resin exchange was also considered. Two separate pilot tests were performed with one covering a 10 day period and the second covering a 5 day period, both with BV of 600 producing a removal level of approximately 1.6 mg/L, just short of the target removal rate specified in the PER. The magnetic resin exchange system also created a waste product that would need to be pumped and hauled or a forcemain and pump station would need to be constructed from the NECWTP to the Regional WWTP. Due to the cost and the cost/impact to treat the byproduct produced for backwash and regeneration of the resin at the Regional WWTP and the marginal removal results, this process was considered unreliable and unable to meet the regulations.

LCWA requested a second opinion from an expert in the field of water treatment or water chemistry. The expert recommended the use of chloramines.

Ozone treatment was considered, but due to the high electrical cost to generate the ozone onsite, the safety concerns associated with ozone and the need to continue adding a disinfectant made the operational costs of ozone also an undesirable alternative.

A Nanofiltration/RO pilot test took place over the course of a month beginning on January 26, 2015. The first two weeks tested the filters with 100% of the piloted flow. The third week tested the pilot flow with a 75%/25%, 50%/50%, and 25%/75% blend. The fourth week tested the pilot flow with a 2/3/1/3 and a 1/3 2/3 blend. The blends offer a reduction in operating costs. All SDS test results have been received and it appears that a 75% nano-filtered water and 25% NECWTP water blend will work to meet the regulations.

LCWA hired another outside consultant, an expert in water chemistry and engineer to evaluate all of the data collected from all of the PERs and pilot tests; he provided his expert opinion to the LCWA April 8, 2015; verifying we reached the most logical

conclusion and confirmed that we have tried everything to meet the regulation.

LCWA has applied for Financial and Construction Assistance Funding through the VDH. Planning, design and implementation are ongoing, but large capital projects take time and money.

On December 8, 2014, a smaller multi-leg storage tank (200,000 gallons) was brought online to replace our large standpipe tank (600,000 gallons). The smaller tank also included mixing and aeration equipment. Water age has been reduced; part of the

problem solved. LCWA is actively working on two Request for Proposals, one for Nanofiltration/RO equipment and one for a general contractor to construct the building to house the equipment and controls. Everyone involved in this process agrees that the Nanofiltration/RO will, or maybe should, remove the DOC to levels that will minimize the opportunity for TTHM and HAA5 to form.

This entire process has been challenging to say the very least, but it is good to finally have a direction! ♠



MECC offers an AAS Degree in Water/Wastewater Specialization that can be completed entirely online. MECC also offers online licensing renewal courses, awarding the CEUs needed for renewal of all licensure classes. Along with the AAS Degree, MECC also offers Career Studies Certificates in Water Treatment and Wastewater Treatment.

Visit our website to view course material and other valuable resources at <http://water.mecc.edu>.

**Online Water/Wastewater AAS Degree**

For any of the above programs, please contact one of the following faculty contacts:

Dr. Chuks Ogbonnaya cogbonnaya@me.vccs.edu 276-523-2400 ext. 276	Ms. Rosa-lee Cooke rcooke@me.vccs.edu 276-523-2400 ext. 364
--	---