

Moorhead Ozone Generator Replacement: Best Value Procurement

Surface Water Treatment Workshop | April 23, 2025







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Overview

- Moorhead Water Treatment Plant
- Ozonation Process
- Ozone Generator Issues
- MPS Initiation of RFP
- Best Value Procurement
- Ozone Generator Selection
- Design
- Remaining Schedule

Moorhead Water Treatment Plant

Moorhead Water Treatment Plant

- Constructed in 1994
- Capacity: 10 MGD
 ADD = 4.35 MGD (2024)
 - -MDD = 5.75 MGD (2024)
- Supplies water to Moorhead, Dilworth, Oakport
 - Population Served: ≈49,000
 - Connections Served: 13,343

Moorhead Source Water



Moorhead WTP Process Schematic



Ozonation Process

Why Use Ozone?

- Primary Disinfectant for MPS Since 1994
- Reduce chlorinated DBPs (THM & HAAs)
- Oxidation Benefits
 - Taste and Odor Reduction
 - Color Reduction
 - $_{\odot}$ Iron and Manganese

Solvents/Pesticides/PCPs & Endocrine Disruptors

- High pH oxidation for OH- radical formation at head of contact chamber
- Sequentially dose CO2 for pH reduction/recarbonation
- Studied extensively with several graduate students

- Recent MPS ozone optimization studies
- Phase I Storlie 2012
 - Bromate formation in summer months
 - Linked to operational controls and changes to raw water
- Phase II Young 2014
 - Optimization of operational strategies to minimize bromate formation, particularly during summer months and high demand
 - Moorhead Aquifer discontinued in summer months due to bromide concentration



• Two 400 ppd Ozone Generators

 Pressure Swing Adsorption (PSA) System with Liquid Oxygen Backup for O2 Supply





Ozone Generator Issues

MPS Legacy Equipment



MPS Legacy Equipment



MPS Legacy Equipment



Cooling Water Jacket Failure





MPS Initiation of RFP for Ozone Selection and Design Services

RFP Process

- MPS staff visited area utilities that also use ozone

 Conducted tours on site with staff
 Discussed Operations for multiple systems
- Developed RFP with a "Selection First" criteria for new generation equipment with final design to follow
- Significant Reduction in Procurement Lead Times

Best Value Contracting/Procurement

Best Value Contracting

- Minnesota Statute 161.3206
- Definition: "... 'best value' describes the result by a procurement method that considers price and other criteria..."
- Establishment and purpose:
 - State recognizes the importance of having an alternative to the low-bid system of procurement.
 - May only be used for one project annually, or 20% of projects, whichever is greater for the first three fiscal years in which it is used.

Best Value Contracting

- Procedures:
 - Evaluation criteria must be included in solicitation documents
 - Must be evaluated in an open and competitive manner
- Training:
 - Personnel administering procurement must be trained in the request for proposals process for best value contracting

Suggested Evaluation Criteria

- 1. Quality of the vendor's or contractor's performance on previous projects;
- 2. Timeliness of the vendor's or contractor's performance on previous projects;
- 3. Level of customer satisfaction with the vendor's or contractor's performance on previous projects;
- 4. Vendor's or contractor's record of performing previous projects on budget and ability to minimize cost overruns;
- 5. Vendor's or contractor's ability to minimize change orders;
- 6. Vendor's or contractor's ability to prepare appropriate project plans;
- 7. Vendor's or contractor's technical capabilities;
- 8. Individual qualifications of the contractor's key personnel; or
- 9. Vendor's or contractor's ability to assess and minimize risks.

Ozone Generator Selection

Vendor Review

- Robust Dielectrics Design and Materials
- Similar Setup to Existing Equipment
- Compatibility with Support Equipment Key
- Helped Narrow Search



Project Evaluation Criteria

- Capital cost (10%),
- Annual energy cost (5%),
- Quality of Bidder's performance on previous projects (30%),
- Bidder's technical capabilities for assistance of ongoing Operations and Maintenance (25%),
- Ability of Bidder to perform project in a timely manner (15%), and
- Bidder's ability to prepare appropriate project plans to incorporate the equipment within the existing infrastructure (15%).

Capital Cost (10%)

• Evaluation of the base bid price

Annual Energy Cost (5%)

- [PPD] x [# of days] x [specific energy] = kWh/yr
- Calculated by design team based on manufacturer provided specific energy for various scenarios:
 - # of Generators Online
 - Total Ozone Production (ppd ozone)
 - Ozone Generation Concentration (% wt)
 - # days/year Under Condition

Quality of Bidder's performance on previous projects (30%),

- Equipment Datasheets
- Scope of Supply
- Previous Installations References

Ability of Bidder to perform project in a timely manner (15%)

- Lead time proposed on Bid Form
- Risk to Lead Time/Reliance on Specialty Parts

Bidder's technical capabilities for assistance of ongoing Operations and Maintenance (25%),

- Evaluation of technical support staff
 - Years of relevant experience
 - Location
 - Total number of staff
- Availability of Replacement Parts
 - Stocked Location
 - Number typically in stock
 - Lead time (including freight)
- Preventative Maintenance Agreement Options

Bidder's ability to prepare appropriate project plans to incorporate the equipment within the existing infrastructure (15%)

- Bidder's description of all modifications necessary to integrate the equipment into the existing ozone system
- Additional floor space requirements



Evaluation

MFR #1		Weight,		In	dividua	Average	Weighted				
		%	1	2	3	4	5	6	Score	Score	
1. Capital Cost	\$1,222,070.00	10	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	
2. Annual Energy		5	10	10	10	10	10	10	10.0	5.0	
3. Performance on Previous Projects		30	10	9	10	10	9	10	9.7	29.0	
4. Technical Capabilities O&M		25	10	8	10	10	8	9	9.2	22.9	
5. Timely Manner		15	8	8	10	10	7	10	8.8	13.3	
6. Existing Infrastructure		15	10	8	9	8	9	10	9.0	13.5	
									TOTAL	92.9	

MFR #2		Weight,		In	dividua	Average	Weighted			
		%	1	2	3	4	5	6	Score	Score
1. Capital Cost	\$1,129,000.00	10	10	10	10	10	10	10	10.0	10.0
2. Annual Energy		5	9.6	9.6	9.6	9.6	9.6	9.6	9.6	4.8
3. Performance on Previous Projects		30	9	6	9	9	6	8	7.8	23.5
4. Technical Capabilities O&M		25	9	7	8	8	7	10	8.2	20.4
5. Timely Manner		15	7	7	8	7	4	7	6.7	10.0
6. Existing Infrastructure		15	8	7	8	8	7	7	7.5	11.3
									TOTAL	80.0

Evaluations completed without scoring team knowing capital costs. MFR #3 missed mandatory pre-bid meeting and could not submit a proposal.



Design Criteria

- Fit new equipment in existing space
- Utilize existing support systems (PSA, LOX, etc.)
- Achieve minimum and maximum ozone production requirements (40-400 ppd/generator)
- Constraints
 - Room Access
 - Sample Pump and Analyzer Rack Relocation
 - Contact Chamber Access Hatches

Design Challenges

- Inaccurate record drawings
 - 3D scanning
- Addition of closed loop cooling water system
- Size of equipment skids / how to get them in place

3D Scanning to Capture Existing Conditions



3D Scanning to Capture Existing Conditions



Existing Conditions



Installation Constraints

Sample Pump/Analyzer Rack & MOCP



Equipment Access Constraints

Separate skids for Generator & PSU



Equipment Access Constraints

• Re-Orientation of skids



Proposed Layout – Fit within Existing System



3D Visualization



3D Visualization



Remaining Project Schedule

Remaining Schedule

	2025									2026				
Task	1	1ay	June	July	August	September	October	November	December	January	February	March	April	May
Bidding														
Contract Award														
Contractor Mob/Generator 1 Demo														
Equipment Delivery														
Generator 1 Installation														
Generator 1 Start-up/Testing														
Milestone 1 (Generator 1 online)														
Generator 2 Removal														
Generator 2 Installation														
Generator 2 Start-up/Testing														
Substantial Completion														
Final Completion														

Questions?

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