Successful Regionalization of Wastewater Utility – Central Iron Range Sanitary Sewer District

Presented by:

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Participating Communities (continued)
Participating Communities

“A Centralized Solution to an Immediate Need”

…and the Minnesota Discovery Center
Participating Communities (continued)

- **Chisholm**
  - 2012 Population: 5,025
  - Historic mining town
  - Includes Minnesota Discovery Center
  - Final home of “Moonlight” Graham, a.k.a “Doc” Graham

- **Buhl**
  - 2010 Population: 1,000
  - Historic mining town
  - “Finest Water in America”
Participating Communities (continued)

- Kinney – mining town
  - 2010 Population: 170
  - 1977 - Tongue-in-cheek succession to receive “foreign aid” for infrastructure improvements

- Great Scott Township
  - 2010 Population: 600+
  - Buhl and Kinney within Twp.
Participating Communities (continued)

Largest museum complex in MN, outside of the Twin Cities
Chisholm WWTP Background

- Mechanical Plant Rated for 1.0 mgd
  - Daily flows averaged 1.0 mgd in 2009 (planning)
  - 800,000 gpd current average flows
  - Moratorium on construction in Chisholm
  - Excess flow lagoons handle peak flows and those exceeding mechanical plant (known daily peaks up to 5 mgd)
- Facilities experiencing rapid deterioration of equipment and structures
- Sludge handling and digestion facilities deteriorated and unused
Chisholm WWTP Background (continued)

- **Main Processes:**
  - Bar screen
  - Grit removal
  - Primary clarifiers
  - Trickling filter (not used)
  - Conventional Activated Sludge
  - Secondary Clarifiers
  - Chlorine Disinfection and Dechlorination
  - Sludge Storage
  - Excess flow pump station to secondary treatment ponds
Chisholm WWTP Background (continued)

- Chisholm WWTP
- Aeration Tank >30 yrs old
- Primaries, Trickling Filter, Digester ~ 60 yrs old
- Deteriorated and Collapsing Concrete Structures
Chisholm WWTP Background (continued)

- Chisholm WWTP
- Deteriorated Equipment and Piping

Leaking and Patched Wastewater Influent Pipe

Badly Corroded Grit Removal Equipment
Chisholm WWTP Background (continued)

- Failed and abandoned equipment
- Deteriorated and Antiquated Electrical Equipment
- Failed and abandoned Anaerobic Digester

- Lack required reliability and redundancy
- Chisholm Biosolids trucked to Grand Rapids at high cost for Treatment and Disposal
Demolition and relocation of the Chisholm WWTP will preserve the quality of Longyear Lake and Barber Creek.
Buhl WWTP Background

- Mechanical Plant Rated for 193,000 gpd
  - Daily flows average 90,000 gpd
  - Peak flows exceed hydraulic capacity
- Main Liquid Processes:
  - Bar screen and aerated grit removal (ineffective)
  - Primary clarifier
  - Trickling filter (used occasionally for peak flows)
  - RBC and Secondary clarifiers (risk of shaft failure)
  - Chlorine Disinfection and Dechlorination
- Facilities 30 years old or more, generally in worse condition compared to Chisholm WWTP
Buhl WWTP Background (continued)

- Lack of required reliability and redundancy

Failed and Abandoned Clarifier Drive Mechanism

Temporary Disinfection Facility

Failed and Abandoned Biosolids Facility

Makeshift Biosolids Stabilization Facility
Buhl WWTP Background (continued)

Rotating Biological Contactors (RBC) Failed Technology

Deteriorating Concrete Structures

History of RBC Shaft Failures

Antiquated Equipment and Technology
Decommissioning and demolition of the Buhl WWTP, and eliminating the discharge point will protect nearby wetlands and water quality of Buhl Creek.
Background Summary

- Facilities experiencing rapid deterioration of equipment and structures
- Many replacement parts unavailable or obsolete, antiquated and inefficient equipment
- Facilities experience MPCA permit violations
- Unable to meet current capacity, growth and development needs as well as future and more stringent GLI discharge limits
- Rehabilitation not a cost effective solution
- Catastrophic failure at WWTPs a possibility with significant environmental consequences and loss of service
Formation of CIRSSD

- Central Iron Range Initiative (CIRI) championed by Oberstar – CIRI looks to shape regional economy
- CIRSSD formed in 2002
  - Also included Hibbing and Balkan Twp.
  - Planning work moved forward
  - CIRSSD originally planned to expand Hibbing WWTP
- CIRSSD dissolved 2008
- CIRSSD reformed in 2009 by MN legislature – political subdivision of State
- Significant political and funding support from MN legislature, MPCA, PFA and IRRRB participants
Formation of CIRSSD (continued)

- Centralization of treatment provides several benefits to communities
  - Concerted effort of multiple communities for common goals
    - Kinney and Buhl already regionalized
  - Consolidates permitting, funding, engineering, staffing, operations and discharge to one location (3 locations currently)
  - Newly increased capacity and central location promote development/infill, redevelopment, and connection of un-sewered residents
  - Non-sewer residents also benefit from CIRSSD participation in low-interest loans for septic systems
Project Planning / Schedule

- **2009 Planning revisited based on previous alternatives**
  - Focus on low capital costs and local skill level and experience
- **2009 – WWTP Site Selection, Closed on Fraser Site 2010**
  - Vacation/Condemnation Proceedings completed in 2011
- **2009 – 2011 → Permitting/Environmental Review**
- **2009 – 2010 → Design**
- **2010 - 2011 → Bidding**
  - (Rebid WWTP in 2011 – Funding Delays)
- **2011 – 2014 → Construction**
Siting the new WWTP
Project Permitting/Environmental Review

- **Phase 1 and Phase 2 Environmental Site Assessments**
  - No contamination, no significant archeological findings

- **EAW**
  - Work began in July 2009
  - EAW published May 2010
  - Negative Declaration August 2010

- **NPDES**
  - Final Issue concurrent with EAW August 2010

- **Wetland Permitting**
  - Work began July 2010
  - County – no loss, incidental Jan 2011
  - Army Corp - concluded with wetland banking in Aug 2011
Project Partnership Funding

• Phase I – Planning and Development
  ▫ State of Minnesota WIF Grant $1,700,000
  ▫ IRRRB Taconite Tax Relief Funds $5,000,000

• Phase II – Construction
  ▫ State of Minnesota WIF Grant $12,036,133
    • IRRRB $500,000
  • TOTAL STATE GRANTS $19,236,133

  ▫ Low Interest Loan @ 1.79% $8,120,383
## Project Bids

<table>
<thead>
<tr>
<th>Description</th>
<th>Apparent low bidder</th>
<th>Apparent Low Bid Amount</th>
<th>Bid Date</th>
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<tbody>
<tr>
<td>Bid Package No. 1 - Kinney Lift Station Improvements</td>
<td>Hibbing Excavation, Inc. (Hibbing, MN)</td>
<td>$210,000.00</td>
<td>November 4, 2010</td>
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<tr>
<td>Bid Package No. 2 - Wastewater Treatment Plant</td>
<td>Gridor Construction, Inc. (Buffalo, MN) REBID</td>
<td>$17,561,500.00</td>
<td>July 12, 2011</td>
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<td>Bid Package No. 3 - Buhl Lift Station</td>
<td>Utility Systems of America, Inc. (Eveleth, MN)</td>
<td>$695,000.00</td>
<td>September 30, 2010</td>
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<tr>
<td>Bid Package No. 4 - Buhl Forcemain</td>
<td>Utility Systems of America, Inc. (Eveleth, MN)</td>
<td>$545,264.00</td>
<td>November 4, 2010</td>
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<td>Bid Package No. 5 - Chisholm Lift Station</td>
<td>Gridor Construction, Inc. (Buffalo, MN)</td>
<td>$1,884,000.00</td>
<td>September 9, 2010</td>
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<td>Total</td>
<td></td>
<td>$20,895,764.00</td>
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- Total Change Orders ~ 1.3% of all Contracts
New Collection Facilities

• Chisholm Lift Station – 7.5 mgd peak flow
  ▫ New quadplex submersible lift station with wet well storage and VFD’s
  ▫ Generator on site
  ▫ Communication with WWTP
New Collection Facilities (continued)

• Chisholm Lift Station - Complete except …
  ... final tie-in to influent this year

• Kinney L.S. 190,000 gpd peak flow
  ▪ Refurbished lift station – Completed and Operational since 2012
New Collection Facilities (continued)

- **Buhl Lift Station and Forcemain - 430,000 gpd peak flow**
  - New triplex submersible lift station – Completed in 2013
  - Peak flow storage in wet well, flow metering, variable frequency drives
  - Generator, communication with WWTP
  - New 3.2 mile forcemain to new WWTP – Completed in 2012
New WWTP

- Design Peak Hour Flow – 6.7 mgd
  - Pretreatment Screening and Grit – 10 mgd cap.
    → handles Chisholm and Buhl L.S. max output
  - Automatic overflow bypass if equipment fails

- Design Average Wet Weather – 2.5 mgd (to SBR)
  - Initially ~ 1 mgd to SBR’s on average
  - Peak Hour Flow to SBR – 5.0 mgd
  - Flows > 5.0 mgd diverted to equalization ponds
### New WWTP (continued)

- **Design Parameters & Limits**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Avg. Influent (mg/l)</th>
<th>Monthly Avg. Limit (mg/l - uno)</th>
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<tbody>
<tr>
<td>CBOD5</td>
<td>84</td>
<td>15.0</td>
</tr>
<tr>
<td>TSS</td>
<td>100</td>
<td>30.0</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>3</td>
<td>1.0</td>
</tr>
<tr>
<td>Ammonia as N</td>
<td>25</td>
<td>3.5 (June - Sept)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.0 (Oct - Nov)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18.0 (Dec - March)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24.0 (April-May)</td>
</tr>
<tr>
<td>pH</td>
<td></td>
<td>6.0 – 9.0</td>
</tr>
<tr>
<td>Fecal Coliform</td>
<td></td>
<td>200 MPN / 100 ml</td>
</tr>
<tr>
<td>Residual Chlorine</td>
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<td>0.038 mg/l</td>
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</table>
New WWTP (continued)

• Processes
  ▫ 10 MGD Fine Screen (Vulcan) and Vortex Grit Removal (S & L)
  ▫ 2.5 MGD SBR post EQ (Sanitaire)
    → Automation, no RAS = simple operation
  ▫ Chlorine Disinfection / Dechlorination
    → Known technology, “relatively” safe
  ▫ WAS Holding and Aerobic Digestion
    → Simple to operate, insulated covers
  ▫ Rotary Drum Thickening
  ▫ Sludge Storage
  ▫ Reed Beds
    → Simple, flexible
New WWTP (continued)

- Construction Begins fall 2011

Building the Access Road

Pretreatment Bldg Excavation

Site Drain Lift Station
New WWTP (continued)

- Const. Continues – 2012 - 2013

Control and Blower/Chem Bldgs, Sludge Storage

SBR Complex
New WWTP (continued)

- Angle Well and Testing
- Sherman Pit just North of WWTP
Current Status

- **Construction Completion**
  - Liquid Treatment Processes Substantially Complete
  - Solids Handling near Substantial Completion
  - Reed Beds near completion
Current Status (continued)

Startup and Testing

- Seed sludge from Buhl and Chisholm WWTP sludge storage
- Divert Buhl wastewater flows to CIRSSD in November
- Pump Chisholm WWTP MLSS to CIRSSD WWTP
- Full liquid treatment operation in November, compliance in December.
Next Steps

- Final Completion, Staffing and Establishment of CIRSSD
- Decommission Chisholm and Buhl WWTP’s
- Mercury Treatment Study Phase 2
Acknowledgements

- CIRSSD Board and Member Communities
- Norm Miranda,
  - Executive Director
  - Funding Expert
  - Lead Operator
- MPCA - Permitting and PFA staff
- IRRRB
- HR Green Engineering and Operations Staff
Thank You!

Questions???

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