Massachusetts Water Resources Authority

MASSACHUSETTS WATER RESOURCES AUTHORITY

Board of Directors Report
on
Key Indicators of MWRA Performance
for
Third Quarter FY2014

Frederick A. Laskey, Executive Director
Michael J. Hombrook, Chief Operating Officer
May 14, 2014
Total Energy Pricing
(includes spot energy price, ancillary costs, and NSTAR's transmission & distribution costs)

FY14 Energy Unit Price
FY13 Energy Unit Price
FY14 Energy Budget Unit Price
Treated Water – Disinfection Effectiveness

*Giardia CT and Cryptosporidium Inactivation*

**Giardia CT Percent Achievement**
Carroll Water Treatment Plant

**Cryptosporidium Inactivation**
Carroll Water Treatment Plant

MWRA Operating Goal
### Water Distribution System Pipelines

#### Miles Surveyed for Leaks

- **Monthly**
- **Cumulative**
- **Target**

<table>
<thead>
<tr>
<th>Month</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaks Detected</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaks Repaired</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backlog</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avg. Lag Time</td>
<td>1.0</td>
<td>20.0</td>
<td>27.3</td>
<td>13.7</td>
<td>15.3</td>
<td>16.4</td>
<td>20.0</td>
<td>22.0</td>
<td>21.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Presentation to

MWRA Board of Directors

Update on the Operation and Maintenance of the Pelletizing Plant

David Duest
Director, Deer Island

May 14, 2014
Pellet Plant – Contract O&M Since 1991

• Process 103 Dry Tons/Day
  – Receive Digested Sludge
  – Dewater with Centrifuges
  – Dry with Thermal Dryers
  – Produce Class A Fertilizer Pellet

• Develop and Maintain Diverse Markets for beneficial reuse
  – Land Application
  – Fertilizer Blenders
  – Alternate Fuels

• Maintain Facility and Equipment
Condition Assessment Findings

*Study conducted by AECOM*

- Facility is in excellent condition
  - 20-year life remaining
    (with continued maintenance)

- Some Electrical Equipment Outdated
  - NEFCo replaced all but one PLC
  - NEFCo replaced every centrifuge control panel
Technology Options Assessment

*Study conducted by CDM Smith*

*(Recommendations impacting Pellet Plant)*

- Several Pilot Scale Evaluations Recommended at DITP
  - Co-Digestion
  - Secondary Sludge Pre-Treatment
    - Using Open-Cel Technology
  - Struvite Mining
Pellet Plant – Contract Renewal Preparation Step 2 (cont.)

Pellet Plant Recommendations

– Same Process
  • Consider larger, more efficient Dryer Trains

– Evaluate impacts of pilot programs at DITP
– Given long remaining life of facility, any capital expense decisions must rely on payback
– Suggested next long-term bid package – 20 years
– Recommended 5-year extension to quantify impacts of pilots and new dryer ops
Current Contract Cost Structure

- Fixed Fee first 90 dtpd (~$400/ton)
- Variable Fee >90 dtpd (~$280/ton)

- Fixed yearly capital dollar value (pre-determined)
- No pass-throughs for utilities
  - Includes adjustments for inflation

- FY13 Avg - ~$380/ton
• Competitive Bid, 20-year

• Competitive Bid 5-year
  – Followed by a competitive bid 20-year contract

• 5-year extension to NEFCo contract
  – Followed by a competitive bid 20-year contract
Presentation to

MWRA Board of Directors

Power Outage at MWRA Pelletizing Plant
May 7, 2014

David Duest
Director, Deer Island

May 14, 2014
May 7, 2014 Power Outage

- Initiated by truck accident
• Unique outage:
  – Power went out and came back on several times in a 15-minute window

• Equipment Damage:
  - Four centrifuge 300 hp variable frequency drives damaged

• All Impacted Equipment Repaired within 5 days
  - One unit repaired, three units replaced under warranty

• No long term operational impacts
  - Short term disruption at Pellet Plant, no impacts to DITP Operation
<table>
<thead>
<tr>
<th>Centrifuge #</th>
<th>Dryer Train #</th>
<th>Status Before Outage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Offline but available</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>Offline but available</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Out for maintenance</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>In operation</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>In operation</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>In operation</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>In operation</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>Dryer out for maintenance (bearing failure)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Centrifuges available</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>6</td>
<td>In operation</td>
</tr>
<tr>
<td>12</td>
<td>6</td>
<td>In operation</td>
</tr>
</tbody>
</table>

* 3 Dryer trains (6 centrifuges) required for normal operation.
## Equipment Status After Outage

<table>
<thead>
<tr>
<th>Centrifuge #</th>
<th>Dryer Train #</th>
<th>Status Before Outage</th>
<th>Impact due to Outage</th>
<th>Current Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Offline but available</td>
<td>None</td>
<td>In operation within one hour of trip</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Offline but available</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>Out for maintenance</td>
<td>None</td>
<td>Out for maintenance</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>In operation</td>
<td>Tripped; No damage</td>
<td>In operation within three hours of trip</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>In operation</td>
<td>Tripped; No damage</td>
<td>VFD replaced 5/12; Available</td>
</tr>
<tr>
<td>7</td>
<td>4</td>
<td>In operation</td>
<td>Tripped; VFD damage</td>
<td>VFD replaced; Available</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>In operation</td>
<td>Tripped; VFD damage</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>Dryer Out for Maintenance;</td>
<td>None</td>
<td>Dryer bearing repaired; Train available if needed 5/12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Centrifuges available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>6</td>
<td>In operation</td>
<td>Tripped; VFD damage</td>
<td>Repaired 28 hours after trip; On-line</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>In operation</td>
<td>Tripped; Minor VFD damage</td>
<td>Repaired 24 hours after trip; On-line</td>
</tr>
</tbody>
</table>

* 3 Dryer trains (6 centrifuges) required for normal operation.
Scorching Visible on House of Damaged VFDs
Damage to Centrifuge Panel No. 7
Lessons Learned

• Pelletizing Plant susceptible to damage from major power failures
• NEFCo is working with OEM to prevent issue from reoccurring

Impacts

• No DITP Operational Impacts
• Minor impacts to NEFCo operating schedule over weekend
• Zero financial impact –equipment warranty covered expenses
Massachusetts Water Resources Authority

Presentation to

MWRA Board of Directors

Valve and Piping Replacements
Various Facilities
Deer Island Treatment Plant

Richard Adams
Manager, Engineering Services

May 14, 2014
Contractor: Carlin Construction Company

Contract Price: $16,960,425

Contract Duration: 1,095 days

• Scope: Replace Valves and Piping at the following Deer Island facilities:
  1. North Main Pump Station: Butterfly Valves (20) and Flow Meters (10)
  2. Winthrop Terminal Facility: Knife Gates(6), Plug Valves(9), Check Valves(6) & Flow Meters(6)
  3. South System Pump Station: Dashpots on Slanting Disc Check Valves (8)
  4. Primary Clarifiers & Gravity Thickener Complex: Sludge Piping (6,500 lf), Scum Piping (2,000 lf) and Valves (107)
  5. Secondary Clarifiers: RSL Plug Valves (81), WSL Plug Valves(3)
• Several existing valves do NOT provide complete isolation

• Up to 50 shutdowns of the North Sewer System required to replace the valves at both the North Main Pump Station and Winthrop Terminal Facility:
  
  – North Main Pump Station (30 shutdowns)
  – Winthrop Terminal Facility (18 shutdowns)
  – Installation and Removal of temporary dewatering system (2 shutdowns) on Deer Island
North Sewer System Shutdowns and Temporary Dewatering System

- North Sewer System shutdowns will be scheduled during nighttime hours (11PM-7AM) and only when conditions allow

- Contractor will only be allowed to work on one pump at a time
North Main Pump Station

Receives the North Sewer System Flow from Boston Main Drainage Tunnel and North Metropolitan Relief Tunnel

Facility capacity is 788 MGD

Ten 3,500 hp Raw Wastewater Pumps rated at 110-150 MGD each

RWW Pumps, Piping and Valves installed during Boston Harbor Project in 1995
North Main Pump Station: Isolation Butterfly Valves

- Ten 60-inch Isolation Butterfly Valves and flanges located at Level B1
- These valves isolate each pump riser from the 96-inch RWW header which connects to the North System Tunnels
- Electrically Operated Valves
North Main Pump Station: Magnetic Flow Meters

- Ten 60-inch Magnetic Flow Meters located at Level B2
- Existing electronics for these flow meters are now obsolete
• Ten 60-inch Butterfly Check Valves located on pump discharge at Level B5

• These valves will be replaced while the 96-inch RWW header is isolated with a blind flange
Winthrop Terminal Facility

Receives North Sewer System Flow from North Metropolitan Trunk Sewer

Facility capacity is 125 MGD

Six 600 hp Raw Wastewater Pumps rated at 32 MGD each

RWW Pumps, Piping and Valves installed during Boston Harbor Project in 1995
Winthrop Terminal Facility: Force Mains

- Three 48-inch Electrically Operated Plug Valves on WTF Force Mains

- Valves do not provide positive shutoff preventing safe isolation at facility
Winthrop Terminal Facility: Pump Suction

- Six electrically operated Knife Gates and Piping on RWW Pump Suction
  - Two 36-inch (#2&5)
  - Four 30-inch (#1,3,4,6)
Winthrop Terminal Facility: Pump Discharge

- Each of the six Pump Discharge Lines Include:
  - 30-inch Magnetic Flow Meter
  - Existing electronics for these flow meters are now obsolete
South System Pump Station: Dashpot Replacement

- Replace eight hydraulic dashpots on Slanting Disc Check Valves on RWW Pump Discharge
- Existing Dashpots are worn and require replacement
- Does not require shutdown of South System Pump Station
- One pump at a time will be isolated
Primary Sludge and Scum Piping Replacement

- Existing Primary Sludge and Primary Scum lines are leaking due to failed glass lining and pipe corrosion

- Pipes were televised and revealed glass lining failures and significant corrosion at pipe joints and along the crown throughout the entire system
Primary Sludge and Scum Piping and Valve Replacement

- Replace ~6,500 linear feet of Primary Sludge Piping and 96 plug valves from Primary Clarifiers to Gravity Thickener Distribution Box (4” -14”)

- Replace ~2,000 linear feet of Scum Piping and eleven plug valves in Residuals Connecting Gallery (10” - 12”)

Return Sludge Plug Valve Replacement

- Replace 81 16-inch manual operated RSL Plug Valves and 3 16-inch WSL Plug Valve on RSL header (28 valves per battery)

- Each Secondary Battery must be taken out of service one at a time to complete this work.

- Contractor is allowed up to 7 days per battery to complete this work
Presentation to

MWRA Board of Directors

CVA Leak Repairs
Shea Avenue, Belchertown

Fred Brandon
Assistant Director of Engineering

May 14, 2014
Leak Repair Schematic

Leak Repair Schematic
August 13, 2013
2012 CVA Average Daily Demand
CVA Emergency Connection, West Street, Ludlow

MWRA DISCHARGE CONNECTION FROM MOBILE PUMPING UNIT

CLOSED VALVE

SPRINGFIELD SUCTION CONNECTION TO MOBILE PUMPING UNIT

MASSACHUSETTS WATER RESOURCES AUTHORITY

CHICOPEE VALLEY AQUEDUCT EMERGENCY CONNECTION WEST STREET – LUDLOW, MASS.

DWG. NO.
1
1 OF 1
CVA Emergency Connection, West Street, Ludlow
36-Inch Linestop And 24-Inch Bypass
Demolition Of Existing Valves And Fittings
How The Linestop Works

36” diameter folding head allows for insertion through 24” hole. When fully inserted the leafs fold completely out. The pressure side of the stopped main is behind the gasket and folding leafs making an even tighter seal.

Live side of main when deployed
36-Inch Bag Installation
12-Inch Outlet To Relieve Pressure On Bag
Leakage Control