Update on Containment Spill Response Program at Reservoirs

December 19, 2018
Roadway Threats:
- Over 100 miles of roadway combined in watersheds
- Fuel oil/heating oil trucks
- Saddle tanks on large trucks

Railroad (Wachusett only):
- Staff reviews RR cargo manifests
- Response operations depend on the type of spill
Equipment: 8 Response Trailers Staged at Quabbin and Wachusett

Boom deployment support equipment

Terrestrial Spill Response equipment
Equipment: Several MWRA, DCR and FD Boats Available
Rt 202 threat at this location
Equipment: Cosgrove Intake Boom Staged For Rapid Boat Response

Boom definition cans anchored off the intake for quick connection
Prepositioned Boom Anchor Points For Strategic Collection
Training: Experienced, Engaging Trainer Key For Skills Reinforcement
Training: Night Operations Take More Detailed Planning Due To Safety Concerns
Training: Local Watershed Fire Departments Important Partner
Booming Techniques: Vary To The Spill And Conditions
Booming: Open Water Floatable Contaminant Collection
Booming: MWRA ESU Metro Training At Spot Pond
• 2008 - Rt 140 diesel release at Wachusett Reservoir

• 2010 - Discarded 55-gal. drum discovered at Quabbin watershed

• 2016 - Car in water at Spot Pond

• 2018 – Vehicle accident at Ware River Shaft 8 Intake
Response: Watershed Staff Played A Crucial First Responder Role On January 2, 2008 Diesel Spill
Response: Discarded Drum In Quabbin Watershed In 2010
Response: Vehicle Accidents At MWRA Facilities

Spot Pond 2016

Ware River Shaft 8 Intake 2018
Removal of Direct Discharges from Roadways at Wachusett

Phase I, Cosgrove Intake area: Completed

Phase II areas: Completed 2017
Direct Discharge Basins, Dry And Post-storm Detention
Remaining Challenges - Railroad Crossing Watershed
Northern Intermediate High Service
Redundant Pipeline
Contract 6906, Amendment 3

December 19, 2018
NIH Contract 6906 Stantec Consulting Services

- **Contract 7066: ($2,230,715)**
  - 2,400 linear feet of 36-inch pipeline
  - Completed May 2015.

- **Contract 7471: (12,230,715)**
  - 8,800 linear feet of 36-inch pipeline
  - Completed December 2017

- **Contract 7478: ($18,512,415)**
  - 7,800 linear feet of 48-inch pipeline
  - 2,600 linear feet of 16 and 12-inch pipeline
  - Completed September 2018

- **Contract 7067: ($22,737,300)**
  - 14,000 linear feet of 48-inch pipeline
  - NTP June 2017/Completion June 2020
  - 7,500 linear feet installed to date

Total Construction Cost $55,700,000
## Amendment 3 Summary

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out of Scope Changes</td>
<td>$285,500</td>
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<tr>
<td>Additional Local Record Drawings</td>
<td>$137,500</td>
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<tr>
<td>Re-Stationing of Section 110</td>
<td>$45,000</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$468,000</strong></td>
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</table>

* Offset by settlement agreement of $80,000 for design error on Oak Street drain line rework
NIH Stoneham Meter 122 Installation
NIH Additional Drawing Updates

Re-Stationing of MWRA Section 110 Drawings

• 13,100 linear feet of 36-inch pipeline
• 21,800 linear feet of 48-inch pipeline
• 2,600 linear feet of 12/16-inch pipeline
• Five separate construction contracts
• Three separate design consultants

Local Water, Drain, and Sewer Drawings

• 18,750 linear feet of 4 to 30 inch diameter
Delegated Authority Report

December 19, 2018
## MSRP vs. Bid Price

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>MSRP</th>
<th>Liberty Chevrolet</th>
<th>Colonial Ford</th>
</tr>
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<tbody>
<tr>
<td>2019 GM K3500 Double Cab</td>
<td>$77,915.00</td>
<td>$65,464.00</td>
<td>$64,389.50</td>
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<tr>
<td>Equinox SUV</td>
<td>$33,001.25</td>
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<td>GM Bolt</td>
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<td>$40,656.00</td>
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<td>GM 2500 155“ WB Series Van</td>
<td>$49,281.25</td>
<td>$40,560.00</td>
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*Prices include Fees, Options, and Outfitting*

## Competition Across Bid Items

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<tr>
<th>Vehicle</th>
<th>Quantity</th>
<th>Liberty Chevrolet</th>
<th>Colonial Ford</th>
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<td>$64,389.50</td>
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<tr>
<td>K1500 Double Cab</td>
<td>1</td>
<td>$35,121.50</td>
<td>$32,086.10</td>
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<tr>
<td>K2500 Double Cab, no plow</td>
<td>1</td>
<td>$37,660.00</td>
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<td>K1500 Double Cab (slightly different lighting package than line #2)</td>
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<td>Colorado Crew Cab</td>
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<td>K2500 Crew Cab</td>
<td>3</td>
<td>$193,972.80</td>
<td>$205,231.50</td>
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Electric Vehicles
Change Order Requests on Active Construction Projects

December 19, 2018
FY2020 Proposed Capital Improvement Program

December 19, 2018
• FY20 Proposed CIP complies with the Cap requirements

• Focus on Asset Protection and Long-Term Redundancy

• Metropolitan Tunnel Redundancy
FY20 Proposed CIP

- **FY19 – Beyond FY29 Program**
  - $3.9B

- **FY19-FY23 5yr Cap Period**
  - $984.6M

- **FY20**
  - $249.8M
## FY20 Proposed CIP - FY19-23 Base-Line Cap

<table>
<thead>
<tr>
<th>FY20 Proposed</th>
<th>FY19</th>
<th>FY20</th>
<th>FY21</th>
<th>FY22</th>
<th>FY23</th>
<th>Total FY19-23</th>
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<td>Projected Expenditures</td>
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<td>$258.7</td>
<td>$218.8</td>
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<td>(25.7)</td>
<td>(25.0)</td>
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<td>Water Loan Program</td>
<td>(22.4)</td>
<td>(9.7)</td>
<td>(5.2)</td>
<td>(4.4)</td>
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<td>122.9</td>
<td>214.4</td>
<td>228.5</td>
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<td>$911.6</td>
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<th>FY19 Final</th>
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<td>Water Loan Program</td>
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<td>MWRA Spending</td>
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<td>Project</td>
<td>Contract</td>
<td>FY20 Proposed Spending</td>
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<td>---------------------------------------------------------------</td>
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<td>DI Treatment Plant Asset Protection</td>
<td>Clarifier Rehab Phase 2 - Construction</td>
<td>$23.1</td>
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<td>Facility Asset Protection</td>
<td>Chelsea Creek Upgrades - Construction</td>
<td>$19.3</td>
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<td>Facility Asset Protection</td>
<td>Prison Point Rehabilitation Construction</td>
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<td>Corrosion &amp; Odor Control</td>
<td>Nut Island Odor Control HVAC Improvement Construction Ph 2</td>
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<td>DI Treatment Plant Asset Protection</td>
<td>HVAC Equipment Replacement Construction</td>
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<td>SEH Redundancy &amp; Storage</td>
<td>Redundancy Pipeline Sect 111 - Construction 3</td>
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<td>Residuals Electrical/Mechanical/Drum Dryer Replacement</td>
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<td>DI Treatment Plant Asset Protection</td>
<td>Gravity Thickener Rehabilitation</td>
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<tr>
<td>New Connecting Mains - Shaft 7 to WASM 3</td>
<td>CP3 Sections 23, 24, 47 Rehabilitation</td>
<td>$6.0</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>$104.7</strong></td>
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<tr>
<td><strong>% of Total FY20 Proposed MWRA Spending</strong></td>
<td></td>
<td><strong>41.9%</strong></td>
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</table>
# FY20 Proposed CIP

## Spending Composition

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Ongoing Awarded Contracts</td>
<td>$67.3M</td>
</tr>
<tr>
<td>Proposed Contract Awards</td>
<td>$182.5M</td>
</tr>
<tr>
<td>Total Proposed Expenditures</td>
<td>$249.8M</td>
</tr>
</tbody>
</table>
Total Proposed FY20 Expenditures: $249.8 million

- Wastewater: $169.7 million (68%)
- Waterworks: $65.4 million (26%)
- Business and Ops: $14.7 million (6%)
Total New Projects Added in FY20: $54.5 million

- Wastewater: $48.8 million
- Waterworks: $0.8 million
- Business & Operations Support: $5.0 million
FY20 Proposed CIP – New Projects

• Pump Stations & CSO Facility Rehabilitation: $45.0 million
• As-Needed Design Contracts 18 and 19: $5.0 million
• Deer Island Resident Engineering Inspection: $3.0 million
• Carroll Water Treatment Plant Emergency Generator No. 1 Replacement (Electric Portion) - $0.8 million
• Sections 191 & 192 Charles River Valley Sewer - $0.5 million
• Clinton Wastewater Treatment Plant Equipment & Supplies Storage Building - $0.3 million
FY20 Proposed CIP – Top New Project

• Pump Stations & CSO Facility Rehabilitation: $45.0 million
### FY20 Proposed CIP – Asset Protection and Water Redundancy

<table>
<thead>
<tr>
<th>Project Category</th>
<th>FY14-18</th>
<th>FY19-23</th>
<th>FY24-28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Protection</td>
<td>$284.6</td>
<td>$773.4</td>
<td>$1,095.4</td>
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<tr>
<td>Water Redundancy</td>
<td>174.6</td>
<td>213.2</td>
<td>$373.5</td>
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<tr>
<td>CSO</td>
<td>64.7</td>
<td>7.7</td>
<td>$0.0</td>
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<tr>
<td>Other</td>
<td>61.7</td>
<td>89.6</td>
<td>$109.5</td>
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<tr>
<td><strong>Total</strong></td>
<td>$585.6</td>
<td>$1,083.9</td>
<td>$1,578.4</td>
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<table>
<thead>
<tr>
<th>Project Category</th>
<th>FY14-18</th>
<th>FY19-23</th>
<th>FY24-28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Protection</td>
<td>48.6%</td>
<td>71.4%</td>
<td>69.4%</td>
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<tr>
<td>Water Redundancy</td>
<td>29.8%</td>
<td>19.7%</td>
<td>23.7%</td>
</tr>
<tr>
<td>CSO</td>
<td>11.0%</td>
<td>0.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Other</td>
<td>10.5%</td>
<td>8.3%</td>
<td>6.9%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
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</table>

- Asset Protection and Redundancy are the principal drivers of future capital expenditures.
• Preserve the condition of assets
  – Asset Protection in CIP
  – Day to Day Maintenance in CEB
Clarifier Rehabilitation Phase 2 Construction

FY 20 Budget: $23.1M
Total Contract: $135.0M
NTP: February 2019
SC: November 2022
Chelsea Creek Headworks Upgrade Construction

FY20 Budget: $19.3M
Total Contract: $81.8M
NTP: November 2016
SC: November 2020
Prison Point Rehabilitation Construction

FY 20 Budget: $18.6M
Total Contract: $36.3M
NTP: July 2019
SC: July 2021
Nut Island Odor Control & HVAC Improvements Construction

FY 20 Budget : $10.0M
Total Contract: $39.9M
NTP: May 2019
SC: September 2022
Deer Island HVAC Equipment Replacement Construction

FY 20 Budget : $8.0M
Total Contract:  $40.2M
NTP: March 2019
SC: September 2022
• Southern Extra High Redundancy
  Section 111 Construction 3

  FY 20 Budget: $7.0M
  NTP: June 2018
  SC: September 2020
Residuals Electrical/Mechanical/Drum Replacement

FY 20 Budget: $6.4M
NTP: June 2019
SC: December 2020
Gravity Thickener Rehabilitation

FY 20 Budget: $6.3M
NTP: May 2018
SC: February 2021
New Connecting Mains CP3 Sections 23, 24,27
Rehabilitation

FY 20 Budget: $6.0M
NTP: April 2019
SC: March 2022
FY20 Proposed CIP – Proposed FY20 Contract Awards

- 54 FY20 Contract Awards
- Total Contract Value: $182.5 million

- Waterworks, $68.8
- Wastewater, $111.0
- Business & Operations, $4.7

- Waterworks, 19
- Wastewater, 22
- Business & Operations, 13
## FY20 Proposed CIP - Projected Contract Awards ($s in millions)

<table>
<thead>
<tr>
<th>Project</th>
<th>Subphase</th>
<th>Notice to Proceed</th>
<th>Total Contract Amount</th>
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</thead>
<tbody>
<tr>
<td>Facility Asset Protection</td>
<td>Prison Point Rehabilitation - Construction</td>
<td>Jul-19</td>
<td>$36.3</td>
</tr>
<tr>
<td>DI Treatment Plant Asset Protection</td>
<td>Fire Alarm System Replacement - Construction</td>
<td>Aug-19</td>
<td>$22.0</td>
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<tr>
<td>Metropolitan Redundancy Interim Improvements</td>
<td>WASM 3 CP-1</td>
<td>Jan-20</td>
<td>$20.4</td>
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<td>NIH Redundancy &amp; Storage</td>
<td>Sections 89 &amp; 29 Replacement - Construction</td>
<td>May-20</td>
<td>$16.0</td>
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<td>Facility Asset Protection</td>
<td>Ward St &amp; Columbus Park Headworks Design/CA</td>
<td>Feb-20</td>
<td>$11.4</td>
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<td>Metropolitan Tunnel Redundancy</td>
<td>Preliminary Design &amp; MEPA Review</td>
<td>Apr-20</td>
<td>$9.3</td>
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<tr>
<td>DI Treatment Plant Asset Protection</td>
<td>Digester &amp; Storage Tank Rehabilitation Design/ESDC</td>
<td>Jan-20</td>
<td>$4.1</td>
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<tr>
<td>DI Treatment Plant Asset Protection</td>
<td>DI Dystor Membrane Replacements</td>
<td>Jul-19</td>
<td>$4.0</td>
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<tr>
<td>Wastewater Meter System-Equipment</td>
<td>WW Metering Asset Protect/Equip. Purchase</td>
<td>Aug-19</td>
<td>$4.0</td>
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<tr>
<td>Watershed Division Capital Improvements</td>
<td>Maintenance Garage/Wash Bay/Storage Building Construction</td>
<td>Apr-20</td>
<td>$3.9</td>
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<tr>
<td><strong>Top 10 Contract Awards</strong></td>
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<td></td>
<td><strong>$131.3</strong></td>
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<td><strong>54 Contract Awards Planned for FY20</strong></td>
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<td><strong>$182.5</strong></td>
</tr>
</tbody>
</table>
Historic and Projected Capital Improvement Spending

Actual
FY90-18 Average
$278M/year

Projected
FY19-23 Average
$217/year

$ millions

FY90 $196
FY91 $304
FY92 $358
FY93 $343
FY94 $333
FY95 $377
FY96 $392
FY97 $413
FY98 $437
FY99 $447
FY00 $498
FY01 $580
FY02 $608
FY03 $504
FY04 $437
FY05 $377
FY06 $300
FY07 $297
FY08 $297
FY09 $297
FY10 $297
FY11 $297
FY12 $297
FY13 $297
FY14 $297
FY15 $297
FY16 $297
FY17 $297
FY18 $297
FY19 $297
FY20 $297
FY21 $297
FY22 $297
FY23 $297
Historic and Projected Capital Improvement Spending by Utility

- **Actual FY90-18**
  - Water $84M/yr
  - Wastewater $192M/yr

- **Projected FY19-23 Average**
  - Water $72M/yr
  - Wastewater $135M/yr

*Note: Values are in millions.*
Outstanding Debt on June 30 by Fiscal Year
FY12-FY23

- 2012: $5.9B
- 2013: $5.8B
- 2014: $5.7B
- 2015: $5.6B
- 2016: $5.4B
- 2017: $5.2B
- 2018: $5.1B
- 2019: $5.0B
- 2020: $5.0B
- 2021: $5.0B
- 2022: $4.8B
- 2023: $4.8B
As of June 30, 2018, the total Indebtedness is $5.1 billion.
Looking Ahead

• Metropolitan Tunnel Redundancy
• Lessons learned from Chelsea Headworks Upgrades
• Continue Asset Protection
## FY19-23 Projected Expenditures

<table>
<thead>
<tr>
<th>Contract Name</th>
<th>Start/Duration (years)</th>
<th>Contract Budget (millions)</th>
<th>FY19-23 Spending (millions)</th>
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<tr>
<td>Program Support Services</td>
<td>FY19/9</td>
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<tr>
<td>Preliminary Design/MEP A Review</td>
<td>FY20/3</td>
<td>$9.3</td>
<td>$9.0</td>
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</table>

*FY20 dollars. Escalation not included.

*NEW 10' dia TUNNEL ~ 4.5 miles

*NEW 10' dia TUNNEL ~ 9.5 miles
Next Steps

- Work with the Advisory Board
- Finalize FY20 CIP
- Submit FY20 Final CIP to Board of Directors for approval in June 2019
Update on Construction of Cross-Harbor Cable

December 19, 2018
Construction (HDD-Conley Terminal)

- Approx. 3300’ HDD on Conley Terminal side
- Approx. 1100’ HDD on Deer Island side
- Four total passes (9-7/8”, 24”, 30” and 36”)

[Images of construction equipment and site]
Construction Methods (Hydroplow)
Construction Methods (Hydroplow)
Construction Methods (Open Excavation-Conley Terminal)
Construction Methods (Open Excavation-Deer Island)
Construction Methods (Open Excavation-Deer Island)
Marine Cable Information

- New 115KV Submarine cable manufactured by Prysmian Group
- Solid Dielectric vs oil filled cable
- Same capacity 90MVA
Construction Progress
Construction Schedule

- HDD drilling: January 2019
- Hydroplowing: February 2019
- Marine cable installation: April 2019
- New cable testing period: August 2019
- Cable placed into service: September 2019
- Existing cable removal: December 2019
Refurbishment of Secondary Reactor Aerator and Mixer Gearboxes at Deer Island
Bid WRA-4594

December 19, 2018
Deer Island Secondary Treatment

- Cryogenic Oxygen Generation
- Secondary Reactors
- Secondary Clarifiers
Deer Island Secondary Reactor Gearboxes

- A Critical Component of Oxygen Reactors
  - Provides for oxygen transfer
  - Promotes biomass growth for treatment

- Mixer/Aerator system:
  - Drives, Motors, Gearboxes & Mixers
    - 9 Trains x 8 Gearboxes = 72 units
    - 6 Trains operate 24/7

- Equipment Age: 17-21 years
- Expected Service Life for Gearboxes: 11 years
Annual refurbishment plan, as required:

- 6 - 50 hp units (18 during contract term)
- 1 - 150 hp unit (3 during contract term)
- 6 - 100 hp units (18 during contract term)

• Competitively Bid
• 2 Vendors submitted bids
• Lowest Bidder: SPX Corporation (incumbent and OEM)
• Not to exceed $885,936
• 3-Year Term