Information Update
Biosolids Master Plan, PS15-01

April 2017
Operations Committee
Administration Committee
What are Biosolids?

INCOMING Residential, Industrial and Commercial

Preliminary Treatment

Primary Sludge

Solids Processing

Offsite Reuse / Disposal

Secondary Sludge

GWRS or Ocean

Biosolids Facilities
Drivers for Biosolids Master Plan

- Biosolids require large capital and on-going costs
- Condition and seismic issues with Plant 2 digesters
- Previous Biosolids Master Plan completed in 2003
- Opportunity for greater resource recovery
- State requirement to divert organics in trash from landfills
Biosolids Costs

• Biosolids reuse / disposal
  • ~$17 million /year
  • 12% of net operating requirements

• Biosolids-related capital projects
  • >$500 million currently budgeted
  • 17% of total capital program
  • 28% of proposed budget update for 2017/18
Plant 1 Solids Facilities  good with completion of current projects (P1-100 & P1-101)
Digester
Dewatering, Storage, & Loading
Thickening

Plant 2 digesters need replacement
Newport-Inglewood Fault Runs Through Plant No. 2/ Liquefaction Hazard Zone
Market Research

- Agriculture and Horticulture users
- 83 potential users contacted
- 36 meetings
- Samples of potential products showed to potential users
- Data collected to determine cost and capacity for various reuse options
Key Market Findings

• Bulk products to agriculture key component
  • California will require Class A for direct land application
  • Arizona expected continue to accept Class B into future
  • Class A provides more options, but not a goal by itself

• Horticulture markets are much smaller, but high quality products would be more valued
Plant 2 Biosolids Facilities

Alternative Selection
End-to-End Alternative Combinations Evaluated

- 27 combinations of processing and products with end use
Screening narrowed to 3 alternatives

These alternatives eliminated on non-economic criteria

Bar chart showing NPV ($ Million) for different alternatives:
- Baseline Mesophilic Class B
- Thermophilic Class A
- TPAD Class A
- THP
- Partial Drying
- Thermal Drying
Tiebreaker Considerations

1. Diversity for biosolids program
   - Plant 1 produces Class B biosolids – no plans to change
   - Providing Class A at Plant 2 diversifies reuse options
     ➢ Eliminated Baseline Mesophilic Class B Alternative

2. Early mitigation for seismic risk
   - All alternatives will meet seismic standards
   - TPAD Class A addresses seismic risk after first project.
     • Maximizes life of existing digesters
     • Allows subsequent project to be delayed
     • Allows keep existing digesters if they can be rehabilitated
Layout of Proposed Facilities
TPAD Class A – Minimum Initial Project

- Initial project includes:
  - Six 110-ft digesters, 30 ft tall
  - Batch tanks for Class A (~$25 million)
  - Sludge feed facility
  - Cooling system
  - Relocation of warehouse, collections yard
- Meets Class A without existing digesters, but with less gas production
- Construction cost $194 million (2017)
- Total project cost $419 million
  - Escalation to mid-point of construction
  - Non-construction costs
  - Contingency
Proposed Plant 2 Biosolids Projects

• Preparation Projects
  • Southwest Perimeter Screening, P2-125
  • Warehouse Relocation, P2-126
  • Collections Yard Relocation, P2-127

• TPAD Digester Facility at Plant 2, P2-128

• Digester P, Q, R, & S Replacement, P2-129

• Subsequent projects
  • Replace 3 existing small digesters
  • Demolish remaining digesters
AquaCritox Demonstration Project Evaluation Study, Project No. SP-125-17

Alternative Selection
AquaCritox

- Uses high heat and pressure
- Complex processes and equipment
- No existing full scale facilities
- Pilot plant in Valencia, Spain in progress
AquaCritox Demonstration Project Evaluation Study

- Report prepared by vendor (SCFI Group Limited)
  - Proposed a facility at Plant 2
  - Concept layouts, sizing developed
  - Construction and operating costs estimated
- Biosolids Master Plan consultant assigned to review report, technology, and economic case for a project
Conclusions from Review of SCFI Report

- Underlying technology is proven for other applications
- Significant operational concerns
  - Corrosion, scaling, material compatibility
  - Highly specialized equipment
  - Equipment reliability not known
  - Pilot plant has not been in continuous and reliable operation
- Life cycle costs reviewed
# AquaCritox Demonstration Project Economics

<table>
<thead>
<tr>
<th>Expense</th>
<th>SCFI</th>
<th>Biosolids Master Plan Consultant Costs and Comments</th>
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<tbody>
<tr>
<td>Construction Cost (unescalated)</td>
<td>$26,500,000</td>
<td>$34,500,000</td>
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<tr>
<td></td>
<td></td>
<td>• Ground improvements</td>
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<tr>
<td></td>
<td></td>
<td>• Building for process equipment</td>
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<tr>
<td>Operations &amp; Maintenance (NPV)</td>
<td>$19,700,000</td>
<td>$46,600,000</td>
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<tr>
<td></td>
<td></td>
<td>• 24/7 Operator required</td>
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<td>Repair and Replacement (NPV)</td>
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<td>$11,700,000</td>
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<tr>
<td></td>
<td></td>
<td>• 15-year equipment life assumed</td>
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<tr>
<td>Power Generated NPV</td>
<td>-$6,000,000</td>
<td>-$6,000,000</td>
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<tr>
<td><strong>Total NPV</strong></td>
<td><strong>$40,200,000</strong></td>
<td><strong>$86,800,000</strong></td>
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<td>NPV Unit Cost, $/ton</td>
<td>$505</td>
<td>$1,090</td>
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For reference, unit cost for full digester replacement is $540/ton, but at a much larger scale.
Recommendations

• Do not pursue a Demonstration Project at this time
• Visit pilot plant in Spain when SCFI reports consistent and continuous operation
• Continue to monitor for key concerns
• Staff will seek grant opportunities and operating partners