WELCOME TO THE AUGUST EDITION OF THE 2017 M&R SEMINAR SERIES
BEFORE WE BEGIN

• SAFETY PRECAUTIONS
  – PLEASE FOLLOW EXIT SIGN IN CASE OF EMERGENCY EVALUATION
  – AUTOMATED EXTERNAL DEFIBRILLATOR (AED) LOCATED OUTSIDE

• PLEASE SILENCE CELL PHONES

• QUESTION AND ANSWER SESSION WILL FOLLOW PRESENTATION

• PLEASE FILL EVALUATION FORM

• SEMINAR SLIDES WILL BE POSTED ON MWRD WEBSITE (www.MWRD.org: Home Page ⇒ Reports ⇒ M&R Data and Reports ⇒ M&R Seminar Series ⇒ 2017 Seminar Series)

• STREAM VIDEO WILL BE AVAILABLE ON MWRD WEBSITE (www.MWRD.org: Home Page ⇒ MWRDGC RSS Feeds)
Mr. Chris Finton

Chris Finton is the Treatment Plant Manager and Chief-Plant-Operator for the Central Marin Sanitation Agency, a regional wastewater treatment facility in San Rafael, California. The Agency is dedicated to the health of its community and the environment.

Chris is a graduate of Sonoma State University, where he received a BA in Environmental Studies and Urban Planning. He is also a California certified Grade V Wastewater Treatment Plant Operator. After spending nearly two decades working in treatment plants, Chris has performed start-up and commissioning, and developed standard techniques, guidelines, procedures, and criteria on several Agency projects.

In addition to managing a WW treatment facility, Chris chairs the Water/Wastewater Technical Advisory Committee at the Santa Rosa Junior College, a steering committee dedicated to water/wastewater utility workforce development. He currently lives in Rohnert Park with his wife Melinda. He can be contacted at cfinton@cmsa.us.
MANAGING CENTRAL MARIN SANITATION AGENCY’S ORGANIC WASTE RECEIVING FACILITY

Metropolitan Water Reclamation District of Greater Chicago
August 25, 2015
PRESENTATION OUTLINE

• CMSA Organic Waste Program History
• Facility Design Considerations
• Operating an Organic Waste Receiving Station
• Maintaining an Organic Waste Receiving Station
• Lessons Learned and Key Takeaways
• On the Horizon
• Questions?
CMSA Organic Waste Program History

• 2008-2009
  – Local Utility Grants for Green House Gas Emission Reduction Studies/Projects

• 2009-2010
  – Incorporated Organic Waste Receiving Facility into Planned Digester Improvements
  – Public Outreach

• 2011
  – Public/Private Partnership between Marin Sanitary Service and CMSA

• 2013
  – CMSA and MSS constructed F2E facilities
  – Delivery of FOG and food waste began in late 2013/early 2014
Facility Design Considerations

- FW quantity and characterization
- MSS Service Area--15 tons/day
- Digester capacity to accept FOG and food wastes
- Cogenerator capacity to utilize additional biogas
- Digester improvements to receive FOG/FW
Why Look at Food Waste

- Food is the largest single source of waste in California
- In Marin Sanitary Service’s (MSS) Service Area, 27.1% of the solid waste sent to Redwood Landfill is food waste.
- There are over 250 food waste generators (restaurants, delis, grocery stores) in the MSS service area.
CMSA FOG and Food Waste Capacity

**Digester Solids Treatment Capacity**
- 100%
- 68%
- 54%
- 27%

**Biogas**
- Excess Capacity
- Additional Food Waste: 20 tons
- FOG & Food Waste: 5,000-gal FOG and 20 tons

**WW Solids**
- Two Existing Digesters (with improved mixing)

**Cogen**
- 750 kW (Existing Cogen capacity)
- 600 kW (Plant load)
- 2nd Cogen unit, fuel cell, or Microturbine

**Electrical Power to Plant**
- Export Power Above 600 kW Plant Load

**FOG & Food Waste**
- 54%
- 600-gal FOG and 20 tons of Food Waste
2013 Digester Improvements Project

Replaced Digester Covers
• Original Floating Covers at 130,700 cf
• New Membrane Covers at 374,400 cf

New Sulfatreat Adsorption H2S Scrubbers

New External Pump Mixing System

Organic Waste Receiving Station
2013 Marin Sanitary Improvements

2013 As Built

2008 Design Concept
2013 Marin Sanitary Improvements
CMSA - Conventional Advanced Secondary Treatment Plant

ADWF Design 10 MGD – Actual ADWF 7.0 MGD  Treatment Capacity Design – 30 MGD
Design Peak Wet Weather Flows 155 MGD – Actual 125+ MGD

Permitted Discharges to SF Bay:
• cBOD 25mg/l monthly – 2016 cBOD Average 5.0 mg/l
• TSS 30mg/l monthly - 2016 TSS Average 4.8 mg/l
• Removal cBOD and TSS 85% minimum – 2016 Average removal cBOD 98.0% TSS 98.3%
• Total Ammonia, as N 60mg/l monthly - 2016 average 28.8 mg/l
Organic Waste Receiving Facility
Receiving a FOG Load – Nov. 2013
Facility Equipment
Operating an OWRF

SWRCB Executive Order for Co-digestion of FW with FOG/OW

CMSA Regulated Under NPDES Permit

CMSA NPDES Permit No. CA0038628

Fats, Oils & Grease (FOG)/Food-to-Energy (F2E) Receiving Facility Operations Document

December 9, 2014

Purpose

This operating procedure (SOP) is intended to ensure that the delivery and processing of Fats, Oils, and Grease (FOG) and Food Waste (FW) transported to the CMSA Treatment Plant are conducted in a safe, efficient manner that protects the physical facilities, maintains adequate treatment capacity, ensures proper overall operation, maximizes beneficial reuse, and maintains acceptable effluent quality. This procedure is designed to comply with the requirements in Special Provisions section C, subsection 5d in CMSA’s NPDES permit, relating to Fats, Oils, and Grease, or food processing waste, for injection into anaerobic digesters, and the SOP content requirement listed in the September 25, 2013 letter from the State Water Resources Control Board (SWRCB) for publicly-owned treatment works (POTW) receiving hauled-in anaerobically digestible waste for co-digestion.
Equipment Start-up

- FOG delivery testing period started November 2013
- Began receiving January 2014 10,000 gallons per day
- Now ~23,000 gpd
- Food waste delivery began February 2014 4.2 tons per day
- Now ~7.0 tons/day

SCADA Overview Screen of the FOG/OW Station
First Delivery in January 2014

First Official Delivery in February 2014
Baseline Data
July 17 Data Collection and Performance Measurements

FOG/ FW Delivery Information

- Number of Loads: 76, 30
- Avg. Size of Load: 4,913 Gal., 6.56 Tons
- Pomace Bins and Reject Material: 12 Bins or 5.9% of Total Loading

Participants in the Program: 191 FSE’s in July

FOG/FW Slurry Feed to Digesters: %TS 5.9, %VS 89

Digester health has remained stable and has not been affected by the addition of FW

- Total Dig. Loading: % of Total VS Loading
  - Primary Sludge: 36%
  - TWAS: 40%
  - Organic Slurry: 24%
- Digester HRT / days: 38

---

### PROCESS LAB DATA METRICS

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<tr>
<th></th>
<th>Digester #1</th>
<th>range</th>
<th>Digester #2</th>
<th>Sample Date: 7/28/17</th>
<th>Sample Date: 7/31/17</th>
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<tr>
<td><strong>DIGESTER SAMPLING</strong></td>
<td></td>
<td></td>
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<tr>
<td>Total Solids (%)</td>
<td>2.2</td>
<td>1.7 – 2.8</td>
<td>2.5</td>
<td>4300 – 5500</td>
<td>5800</td>
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<td>Volatile Solids (%)</td>
<td>72</td>
<td>65-72</td>
<td>71</td>
<td>5800</td>
<td>86</td>
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<td>Volatile Solids Reduction (%)</td>
<td>72.1</td>
<td>&gt;45</td>
<td>72.1</td>
<td>4300 – 5500</td>
<td>86</td>
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<tr>
<td>Total Alkalinity (mg/L)</td>
<td>5800</td>
<td>4300 – 5500</td>
<td>5800</td>
<td>85 - 129</td>
<td>86</td>
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<tr>
<td>Volatile Acids (mg/L)</td>
<td>86</td>
<td>85 - 129</td>
<td>86</td>
<td>85 - 129</td>
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<tr>
<td>Ratio: VA/TA</td>
<td>0.0148</td>
<td>0.018 – 0.029</td>
<td>0.0148</td>
<td>7/31/17</td>
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Facility Processes Control When Operating an OWRF

Primary Sedimentation
• Blanket Depths

Secondary System
• MLSS Inventory

Digester Feeding
• Fill and mix slurry during the day
• Feeding in afternoon
• Empty and clean in late evening

Solids Handling
• No Significant Increase in Biosolids
• Dewatering Operations
• Managing Biogas

<table>
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<tr>
<th>CENTRIFUGE SAMPLING</th>
<th>Unit # / Date</th>
<th>#1-7/24</th>
<th>#1-7/25</th>
<th>#3-7/26</th>
<th>#1-7/27</th>
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<tr>
<td>Feed (%)</td>
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<td>2.5</td>
<td>2.4</td>
<td>2.4</td>
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<td>Centrate (TSS mg/L)</td>
<td></td>
<td>124</td>
<td>148</td>
<td>308</td>
<td>188</td>
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<td>Cake (%)</td>
<td></td>
<td>28.1</td>
<td>27</td>
<td>26.8</td>
<td>25.9</td>
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<tr>
<td>Capture Rate (%)</td>
<td></td>
<td>99.5</td>
<td>99.4</td>
<td>98.8</td>
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Maintaining an OWRF
Facility Equipment

- Pure Air Filtration System
  - Model: V8S-4-P-BT-MG
  - RPM: 3465 RPM
  - Flow: 600

- Two Watson Marlow Hose Pumps
  - Model: SPX65.70064
  - RPM: 2-35 RPM
  - Flow: 3.5-62 GPM

- Vaugh Recirculation Pump
  - Model: PE4L60S
  - RPM: 1750 RPM
  - Flow: 300 GPM

- Two Wemco Mixing Pumps
  - Model: CF4 8x6
  - RPM: 1165 RPM
  - Flow: 1100

- Brown International
  - Model: Model 202, Series 207
  - Flow Rate: 50 to 100
Preventative Maintenance

Daily

- Hose down Down Equipment and Receiving Station
- Rinse out Pumps and Piping
- Cleanout Heavy Object Trap (FOG Screen)
Preventative Maintenance

Weekly
• Pomace Bins
• Rock Trap Grinder
• Equipment Area

Monthly
• Pumps
• Paddle Finisher

Quarterly
• Receiving Tank Cleaning and Coating Inspection
Corrective Maintenance

Mixing Pumps
Corrective Maintenance

Tank Coating Failure
Corrective Maintenance
Quarterly Cleaning
Quarterly Cleaning
Unplanned Corrective Maintenance

Feed Pump Hoses

• Most unpredictable failure regardless of hose material
  – $2,000 per hose labor/material
  – Average 6 hose replacements per year
  – Paddle Finisher Feed Pump Leads Hose Replacements
  – Two Hoses and Five Gallons of Glycerin - Critical Inventory
Critical Spare Inventory – Risk Analysis

- Equipment Name and Function
- Options Available if Equipment was Out of Service (OOS)
- Can we Operate the Station w/o Equipment for 72 hours
- Consequences if Equipment is OOS
- Recommendation for Spare in Inventory (Yes / No)
- List of Spare Parts Onsite
- Estimated Equipment Delivery time for purchase to shipment

<table>
<thead>
<tr>
<th>Equipment Name</th>
<th>Function</th>
<th>Options Available</th>
<th>Can Operate</th>
<th>Consequences</th>
<th>Recommendation</th>
<th>List of Spare Parts</th>
<th>Estimated Delivery Time</th>
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<tbody>
<tr>
<td>Exhaust Fan</td>
<td>Exhaust</td>
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<td>Yes</td>
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<td>Paddle Finisher Feed Pump</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Paddle Finisher Feed Pump</td>
<td>Feed Pump</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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Lessons Learned and Key Takeaways

• OW Program Coordinator a Must
• Accepting Non-Traditional Wastes

Operator demonstrating Safe Access Gates
• Leaver and Chain
• Paddle Finisher Chute
Hazardous Atmosphere Monitoring
• Ladder Cleats and Scrubber Fan
Budget Considerations

OWRF Maintenance Consumables Budget
• 2014 = $20,000
• 2017 = $45,000 or 55.5% increase

Biogas Conditioning Media

Total Revenue and Expenses
• OW Program Staff Levels 1.6 FTE
• Breaking Even on Revenue versus Expenses
OWRF Construction Cost = $1.9 million

2016 Tipping Fee Revenue: $146,056
   – FOG / Foodwaste / Soy-Whey / Brewery Waste

2016 Biogas Energy Value (NG =) $122,397

79% Reduction in Natural Gas Procurement*
Self-Sustainable Biogas Production

98.9% of Agency Power Produced in July by Cogenerator

91.6% Produced w/ Biogas

Methane Content 64%

<table>
<thead>
<tr>
<th>TABLE I - TREATMENT/PROCESS METRICS – July 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Metric</strong></td>
</tr>
<tr>
<td>1) Wastewater Treated</td>
</tr>
<tr>
<td>2) Biosolids Reuse</td>
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<tr>
<td>3) Conventional Pollutant Removal</td>
</tr>
<tr>
<td>4) Priority Pollutants Removal</td>
</tr>
<tr>
<td>4) Priority Pollutants Removal</td>
</tr>
<tr>
<td>5) Biogas Production</td>
</tr>
<tr>
<td>6) Energy Produced</td>
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<tr>
<td>7) Efficiency</td>
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<tr>
<td>7) Efficiency</td>
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On the Horizon

Achieve Energy Self-Sufficiency

Deliver Power to Local Utility
• Interconnection Agreement
• Improvements to Export Power
• Power Sale Agreements

Expand Program
• Find Additional Sources of OW
• Produce More Biogas
Questions?

Chris Finton – Treatment Plant Manager
  cfinton@cmsa.us

Brian Thomas PE – Technical Services Manager
  bthomas@cmsa.us

David Ernst – Operations Department
  dernst@cmsa.us

MaryJo Ramey – OW Program Coodinator
  mramey@cmsa.us