Summary

• Project Overview and Objectives
• Background
• Design
• Operations and Maintenance provisions
• Performance and Feedback from Plant
Overview and Project Objectives

• Grease delivered by privately owned trucking companies

• Grease was unloaded from the trucks into the septage receiving location upstream of the headworks

• Grease and septage were handled in the same manner

• **Project Objectives:** Do not dilute concentrated grease, preserve for reuse, reduce the downstream O&M issues of weir clogging

**Note:** The existing Septage Receiving Station will remain as a backup discharge location
Southerly WWTC Overview

Historical accumulation at primary settling tank weirs

Fluidized Bed Incinerators

Existing DAFT and Skimmings Concentration

New Grease Unloading Facility

Existing Septic Discharge Locations

Southerly WWTC Aerial Map
Background - Existing Septage/Grease Unloading
### Design Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Number of Trucks per Day</td>
<td></td>
</tr>
<tr>
<td>• Average / Max Day</td>
<td>8 /17</td>
</tr>
<tr>
<td>Volume per Truck, gallons</td>
<td>3,000 to 4,000</td>
</tr>
<tr>
<td>Grease Total Solids, %</td>
<td>2 to 5</td>
</tr>
<tr>
<td>Grease Specific Weight, lbs/gal</td>
<td>8.3</td>
</tr>
<tr>
<td>Estimated Flow per Day</td>
<td></td>
</tr>
<tr>
<td>• Average / Max Day, gpd</td>
<td>25,200 / 38,800</td>
</tr>
<tr>
<td>Two Tanks Provided</td>
<td>13,000 gal each</td>
</tr>
</tbody>
</table>
Design Process Schematic

Object Traps, Grinders and Unloading Pumps → Grease Storage Tanks → Metering Pumps to DAF Tanks → Hopper to Concentrated Skimmings Tanks → Transfer Pump to Fluidized Bed Incinerators

Existing Facility

Existing Unloading for Skimmings from NEORSD Westerly and Easterly Plants
General Layout

Challenge: Protect stormwater system during unloading process.

Spill containment berm and trench drain

Object Trap, Grinder and Unloading Pump

Garage Bay

Grease Storage Tanks

Metering Pumps to DAF Tanks and Concentration Tanks

Heating and Mechanical Room

Air Mixing System

Electrical Room
New Grease Unloading Facility

• Keeps concentrated waste product separate from the liquid treatment process and avoids downstream removal and pumping
• Preserves the grease, a waste product with relatively high BTU content for use as a fuel in the fluidized bed incinerators
• Improves hydraulic distribution at weirs and within conduits
Safety Features - Combustible and Methane Gas Detectors

Combustible Gas Indicator (H₂S)

Methane Gas Indicator (Sensor at Ceiling)

Floor Level Combustible Gas Sensing Head
Unloading Stations / Docks

2 Grease Unloading Stations

A sample is collected from every truck

Challenge: Assure contract haulers are only unloading grease
Unloading Station

Challenge: Make the unloading panels intuitive for non-NEORSD staff
**Rock Traps and Grinders**

Manuf.: JWC Environmental

No. 2

Capacity per Trap: 600 gpm, 5 HP

**Purpose:**

To collect heavy material before reaching the grinder, which then grinds remaining debris and protect the pumps.
Rock Trap with Basket and Grinder

- Solids Collection Basket
- Seal Ring
- Open/Close Grip Knob
- Bar Screens
- Flow In
- Rock Trap
- Water Supply
- Davit for Basket

Davit for Basket
In-line Grinder Control Panel

The Grease Storage Room is classified as an explosion proof area (Class 1, Div 1) and the Electrical Room is unclassified.
Grease Unloading Pumps

Qty: 1 per Tank
Manufacturer: Moyno (NOV)
Series: 2000
No. of Pumps: 2
Type: Positive displacement, progressive cavity
Capacity per Pump: 350 gpm
Discharge Head: 100 ft
Motor Hp: 20
Liquid Grease Storage and Mixing Tanks

Manufacturer: International Production Specialists (IPS)

No. of Tanks: 2

Unheated

Dimensions

- Diameter – 13.5 ft.
- Side Height – 12 ft.
- Max. Liquid Depth – 10 ft.
- Cone Depth – 6.75 ft.

Capacity per Tank: 13,000 gallons

Challenge: Future thickening/subcanting may be desired
Liquid Grease Storage Tank Monitoring

High Level Alarm Sensor

Liquid Level Sensor

Level Indicator
1. System parameters that control mixing efficiency:
   • Air Pressure
   • Pulse Duration
   • Pulse Frequency

2. Compressed air is injected to the diffuser plates at short pulses within the range of 40 to 80 psig.

3. The number of times the air valve opens (Pulse Rate) can be adjusted by the operator to optimize mixing from 1 to 6 times per minute.

4. Pulse duration can be adjusted by the operator between 0.2 to 0.8 seconds.
Grease Transfer Pumps

Manufacturer: Moyno (NOV)
Series: 2000
No. of Pumps: 2
Type: Positive displacement, progressive cavity
Capacity per Pump: 50 gpm
Discharge Head: 230 ft
Motor Hp: 10

No Flow Sensor
(There is a no flow sensor on each of the four grease pumps)
Where can the grease that is removed from the Grease Storage Tanks be pumped?

Challenge: Integrate into existing skimmings handling facility which is not continuously staffed
Existing DAF Tanks and Concentrated Skimmings Tanks

DAF Tank contents transferred to CSKIM Tanks

Heated CSKIM Tank
SCADA Operational Overview Provisions

Three screens developed with Operations Staff
- Unloading
- Transferring
- Mixing

Challenge: remotely monitor DAF tanks to prevent overfilling from other skimmings pumps

Five video cameras for security and to monitor the process
Brown and Caldwell

Maintenance Provisions

Spill containment berm and trench drain

Garage bay allows truck to partially back into the GUS, if a heavy object were trapped or for tank cleaning

4 hot water hose reel stations

Grease Tanks
### Early Performance in Year 2016

<table>
<thead>
<tr>
<th></th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
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</thead>
<tbody>
<tr>
<td># Loads</td>
<td>10</td>
<td>34</td>
<td>103</td>
<td>126</td>
<td>62</td>
<td>138</td>
<td>108</td>
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<tr>
<td>Gallons</td>
<td>40,000</td>
<td>133,000</td>
<td>380,000</td>
<td>440,000</td>
<td>152,000</td>
<td>470,000</td>
<td>405,000</td>
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<tr>
<td># of Vendors</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>11</td>
<td>14</td>
<td>14</td>
<td>10</td>
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<tr>
<td>Loads/day</td>
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<td>2.3</td>
<td>4.7</td>
<td>6.0</td>
<td>6.2</td>
<td>6.0</td>
<td>4.1</td>
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<tr>
<td>Avg gal/load</td>
<td>4,000</td>
<td>3,900</td>
<td>3,700</td>
<td>3,500</td>
<td>2,500</td>
<td>3,400</td>
<td>3,800</td>
</tr>
</tbody>
</table>

*Initial challenge: Building confidence that contract haulers are only unloading grease*
Beneficial Plant Impact

Performance and Discharge Since 2016

- NEORSD Easterly and Westerly Plants direct to DAFT (gal)
- Septage Station Bays 1-4 (gal)
- GUS (gal)

~15,000 BTU/lb volatile solids
11 million gallons and 73% reduction in hauling discharge volume to headworks
Lessons Learned / Operations Feedback

- Two shift operation, 24 hours a day, 28 staff trained
- 5 days a week, operating at 50% capacity
- Loads received during day shift
- Night shift cleans and flushes
- <15 minutes to unload, not every truck is full
- Storage tanks operated in tandem
- Rock trap is efficient but heavy, so davits added
- Tanker weighed, converted to gallons for billing
- SOPs incorporated for winter draining of traps
- Staffing resulted in addition of small operations office

NEORSD currently charges a flat charge of $40.00 per grease truck up to 1000 gallons. Over 1000 gallons, the fee charged is $0.04/gallon.
Lessons Learned / Operations Feedback

- Trucks with “heavy grease” are routed directly to DAFT; some haulers concentrate before delivery
- Grease transferred to DAFT, subcanted and mixed in two skimmings concentration tanks, then discharged to 3rd tank
- Fed to Fluidized Bed Incinerators 1-2 gpm
- Thickened ~54% total solids, 98.5% volatile, heated to 140°F

Existing DAFT and Skimmings Facility