EBMUD Flares & SCAQMD Rule 1118.1

BACWA/BAAQMD Joint Meeting
September 9, 2019
EBMUD Project

- Install Two Enclosed Biogas Flares
  - 1,500 cfm each
  - 63 MMBtu/hour
- Oct 2014 – Permit Application for Two Enclosed Flares
- Feb 2017 – Start-up Notification

Existing Flares (Four)
900 cfm each
EBMUD Enclosed Flares

Source Test Port

Lateral from Main DG Header
Key Permit Conditions

- Permitted in S-180 Anaerobic Digesters as Abatement Devices A-194, A-195
- Emission Limits (Basis: RACT)
  - NOx – 0.06 lb/MMBtu
  - CO – 0.20 lb/MMBtu
  - H2S – 0.032 lb/hr
- Combustion zone temperature 1,500°F, 3-hour average
- Source test every 5 years or 8,760 hours of operation
Initial Emissions Data

• Engineering Tests during start-up indicate 0.08-0.09 lb NOx/MBtu in June 2017

• EBMUD learned that ammonia may impact fuel-borne NOx

• Biogas ammonia sampling conducted July-August 2017
  – Raw gas ammonia levels 100-280 ppm
  – Higher than expected or anticipated

• Permit revision application submitted July 2017 for higher NOx limit
Initial Source Test

- Compliance Source Test on 11/9/2017
- Flare Removed from Service
- NOV issued for NOx exceedance 4/26/2018

Source Test Results Summary

<table>
<thead>
<tr>
<th></th>
<th>Flare 1H</th>
<th>Flare 2H</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx (lb/MMBtu)</td>
<td>0.078</td>
<td>0.089</td>
<td>0.06</td>
</tr>
<tr>
<td>CO (lb/MMBtu)</td>
<td>0.013</td>
<td>0.011</td>
<td>0.20</td>
</tr>
<tr>
<td>H2S (lb/hr)</td>
<td>&lt;0.0009</td>
<td>&lt;0.0016</td>
<td>0.032</td>
</tr>
<tr>
<td>Inlet NH3 (ppm)</td>
<td>105</td>
<td>144</td>
<td>NA</td>
</tr>
<tr>
<td>Outlet NH3 (ppm)</td>
<td>&lt;2.4</td>
<td>&lt;2.3</td>
<td>NA</td>
</tr>
</tbody>
</table>
Current Status

• Abutec (flare manufacturer) went out of business in 2017

• Engineering and control system work on flare system in 2018-2019

• Permit modified to allow additional emission measurements (40 hrs/flare)

• Tests in August 2019 indicate no significant change in emissions (data is pending from source test company)
Cause of NOx Issues

• High ammonia concentrations in biogas contribute to fuel-borne NOx emissions

• Unique contributing factors at EBMUD
  – Thermophilic digestion (hotter temp)
  – Extensive resource recovery and co-digestion of organics
SCAQMD Rule 1118.1

- Rule 1118.1 “Control of Emissions From Non-Refinery Flares”
  - Adopted 1/4/2019
  - Establishes emission limits
  - SCAQMD Board also required technology assessment for one year to address issues with food waste diversion and co-digestion
Table 1 – Emission Limits

<table>
<thead>
<tr>
<th>Flare Gas</th>
<th>NOx</th>
<th>CO</th>
<th>VOC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pounds/MMBtu</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Digester gas¹:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major facility</td>
<td>0.025</td>
<td>0.06</td>
<td>0.038</td>
</tr>
<tr>
<td>Minor facility</td>
<td>0.06</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Landfill gas</td>
<td>0.025</td>
<td>0.06</td>
<td>0.038</td>
</tr>
<tr>
<td>Produced gas</td>
<td>0.018</td>
<td>0.01</td>
<td>0.008</td>
</tr>
<tr>
<td>Other flare gas</td>
<td>0.06</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Organic liquid handling:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic liquid storage</td>
<td>0.25</td>
<td>0.37</td>
<td>N/A</td>
</tr>
<tr>
<td>Organic liquid loading</td>
<td>0.034</td>
<td>0.05</td>
<td>N/A</td>
</tr>
</tbody>
</table>

1. Table 1 - Emission Limits shall continue to apply unless amended or otherwise superseded following a technology assessment, caused to be performed by the Executive Officer, to determine potential alternative limits appropriate for digester gas generated from food waste diverted from landfills.
Rule 1118.1 Rulemaking

• Industry groups like SCAP and CASA commented on this rule
  – Concern about SB 1383 implementation
  – Concern about low NOx flare reliability

• Black & Veatch expert presents to SCAQMD workgroup
  – Used EBMUD, ZWEDC, and DC Water as examples that cannot meet NOx limit
Technology Assessment

- SCAQMD staff reached out to EBMUD about this issue
- EBMUD shared
  - Process/co-digestion data
  - RACT Analysis
  - Biogas ammonia results
  - Source testing results
• SCAQMD continues to study issue

• Initial verbal input from SCAQMD
  – Hard to find other plants with thermophilic digestion
  – Hard to find other plants with extensive co-digestion
  – Only found non-WW facilities digesting food and organics
Summary

- Concerns about one-size-fits-all BACT limits and limits in SCAQMD 1118.1
- Co-digestion of organics contributes ammonia to biogas
- Thermophilic anaerobic digestion or thermal hydrolysis contributes ammonia to biogas
- Strict NOx limits may be incompatible with SB 1383 goals in the long term
Conclusion

• Questions
• Discussion