EAST BAY MUNICIPAL UTILITY DISTRICT

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

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 1,500F, 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/MMBtu 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

	Flare 1H	Flare 2H	Limit
NOx (lb/MMBtu)	0.078	0.089	0.06
CO (lb/MMBtu)	0.013	0.011	0.20
H2S (lb/hr)	<0.0009	<0.0016	0.032
Inlet NH3 (ppm)	105	144	NA
Outlet NH3 (ppm)	<2.4	<2.3	NA

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

SCAQMD Emission Limits

Table 1 – Emission Limits

Flare Gas	NOx	CO	VOC
	pounds/MMBtu		
Digester gas[1]:			
Major facility	0.025	0.06	0.038
Minor facility	0.06	N/A	N/A
Landfill gas	0.025	0.06	0.038
Produced gas	0.018	0.01	0.008
Other flare gas	0.06	N/A	N/A
Organic liquid handling:			
Organic liquid storage	0.25	0.37	N/A
	pounds/1,000 gallons loaded		
Organic liquid loading	0.034	0.05	N/A

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

Technology Assessment

- 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