MA & VT Regulatory Violations from Co-Digesters Owned by Vanguard Renewables

Digester Details	Regulatory Issues & Violations
Hadley AD1 Barstow Longview Farms 172 Hockanum Rd Hadley, MA Electricity for grid	**Environmental Violations** ● An unannounced inspection of facility on August 22, 2021 revealed violations of MassDEP air-quality and hazardous waste management requirements. ● Failed to manage waste oil in accordance with provisions of Massachusetts regulations including proper signage "Waste Oil." ○ Failed to complete hazardous waste manifests accurately for waste oil ○ Failed to properly mark and label container(s) accumulating waste oil. ○ Failed to develop and implement requirements governing emergency procedures, prevention, and response. ○ Failed to perform required inspections of waste oil container(s) and accumulations area(s) **Failure to Monitor and/or Keep Accurate Records** ● Failed to conduct routine checks of the Carbon Monoxide catalyst on each engine for efficiency on a quarterly basis using hand held combustion gas analyzer. ● Related to flare: Failed to conduct compliance testing for total particulate matter required within 90 days of commencement of continuous operation of EU8. ● Related to receiving tank: Failed to conduct weekly monitoring of hydrogen sulfide content entering and leaving the first drum in the series to determine when to replace drums. ● Related to biofilter: Did not properly monitor moisture sensors to control optimal moisture control and did not notify MassDEP of a change in protocol. ● Failed to monitor the differential pressure gauge to measure pressure drop across the biofilter. ● Failed to routinely record the moisture level of biofilter media or confirm that the biofilter media was uniformly wetted. ● Failed to record the pressure drop across the biofilter media on a weekly basis. ● Did not maintain records required by the Plan Approval onsite for a minimum of five (5) years ● Did not make records required by the Plan Approval available to MassDep and personnel upon request. Notice of Non-Compliance: 2 additional NON's; 10/14/2016 4/30/2018. Fined $2000 by MassDEP in 2020 https://fileservice.eea.comacloud.net/V1.4.0/FileService.Api/file/CETracker/fcdgfihj https://eeaonline.eea.state.ma.us/Portal#!/enforcements/24849877 10/14/2016 https://eeaonline.eea.state.ma.us/Portal#!/enforcements/2972070 4-30-2018 https://eeaonline.eea.state.ma.us/Portal#!/enforcements/2998586 9-12-2018
Salisbury AD1 Goodrich Farms 589 Shard Villa Rd	**Environmental Violations** ● On May 27, 2021 staff from the Vermont Environmental Agency visited the Goodrich Farm site due to a reported spill of 25,000-30,000 gallons digestate into stormwater drain leading to the gravel wetland area due to operator error.

Salisbury, VT	Additional digestate was present in a constructed stormwater gravel wetland area adjacent to the facility parking lot. ● Vermont Environmental Agency staff conducted a follow-up visit on June 21, 2021 and observed two to four inches of digestate present at the bottom of the constructed stormwater gravel wetland area. Agency staff issued a Notice of Alleged Violation directing removal and proper disposal of the digestate waste from the stormwater gravel wetland area. ● September 8, 2021, Salisbury AD 1 removed 11.43 tons of material from the stormwater gravel wetland area and it was disposed of at the Addison County Solid Waste Management District Transfer Station. The digestate spilled from the facility is classified as solid waste as defined by Vermont SWMR 6201. ○ Agency alleged conduct constituted violations of Vermont Solid Waste Management Rules ■ Disposal of solid waste outside of a certified facility is prohibited ■ Discharge reporting with 24 hours requirement ■ Solid Waste Management Facility Certification Condition 9: Owner and Operator shall take all steps necessary to prevent and/or control spills. ○ Respondents admitted the factual findings in order to resolve the case. **Failure to Report Violations** ● First digestate spill happened on April 21, 2021 but was not reported until May 26, 2021 in violation of discharge reporting within 24 hours requirement. Fined $4500.00[1]
Deerfield AD1 Bar Way (Garelick) Farms 188 Mill Village Rd Deerfield, MA	**2020[2]** **Environmental Violations** ● The facility exceeded their hydrogen sulfide emissions limit (over 200 ppm) multiple times between August 2019-April 2020. ○ Document did not say exactly how many times these exceedances occurred and how high the levels went. ● "For a period of approximately 24 hours, respondent did not achieve 98% hydrocarbon destruction while routing biogas to flare 1." ● Facility failed to properly handle waste oil from generators according to hazardous waste regulations. **Failure to Monitor and/or Record Emissions** ● Facility failed to monitor the hydrogen sulfide concentration of the activated carbon filter on a weekly basis. ● Facility failed to conduct routine checks of the carbon monoxide catalyst's control efficiency on a 90-day schedule. ● Facility did not maintain an audible alarm to alert the operator of the absence of a

[1] State of Vermont Superior Court Environmental Division Assurance of Discontinuance Agreement dated March 15, 2023. Vermont Superior Court Filing 10/10/23 Environmental Division. https://anrweb.vt.gov/PubDocs/DEC/CED/AOD-Archive/2023/Goodrich Family Farm, LLC and Salisbury AD 1, LLC; Docket No. 23-ENV-00100.pdf

[2] https://fileservice.eea.comacloud.net/V1.4.0/FileService.Api/file/CETracker/fcdgfige

	flame while biogas was routed to the flare. ● Respondent failed to maintain onsite records for each time the ferric chloride/ferric hydroxide system for hydrogen sulfide control was implemented including but not limited to time and date. ● Facility failed to record the hourly block average hydrogen sulfide concentrations at the outlet of the digester, leading to the generator set. **Failure to Report Violations** ● The facility failed to notify the MassDEP about any of the hydrogen sulfide exceedances when they should have reported them within 3 business days. Fined $2,000 by MassDEP in 2020 **2022**[3] **Environmental Violations** ● Deerfield AD 1, LLC has reported 58 exceedances of its daily average hydrogen sulfide emission limit. ● After evaluation of these exceedances, the MassDEP has determined that there were 15 emission limit exceedances that appeared to have been preventable and/or the result of operator error, in noncompliance with Section III. Paragraph 7. A. as follows: ○ Deerfield AD 1, LLC has reported thirteen (13) exceedances of the H2S emission limit starting 10/28/2020 and continuing to 11/11/2020. The exceedances were the result of higher levels of gas production by the anaerobic digester and failure of the operator(s) to make an adjustment to the system when the levels of H2S became elevated. ○ Deerfield AD 1, LLC has reported two (2) exceedances of the H2S emission limit starting 2/23/2020 and continuing to 2/24/2020 that were, according to Deerfield AD 1, LLC, due to a failure of the ferric chloride H2S control system because the supply of ferric chloride was not maintained and was depleted (operator error). Fined $7,500 by MassDEP in 2022
Spencer AD1 Jordan Dairy Farm 56 Northwest Rd Spencer, MA Low cost energy, hot water, heat biogas	**Inaccurate Documentation**[4] ● Facility failed to include EPA certificate of conformity stating that the engine at the facility meets the applicable emission standards. ● Facility failed to conduct a sound survey within 180 days of continuous operation of their combined heat and power engine generator which was required as a condition of their permit. ● Facility failed to conduct a stack test within 180 days of continuous operation of their combined heat and power engine generator which was required as a condition of their permit. ● Facility, "...failed to submit an Environmental Results Program Certification for an emergency engine within 60 days of the date of commencement of operation.

[3] https://fileservice.eea.comacloud.net/V1.4.0/FileService.Api/file/CETracker/gbjbdbhj
[4] https://fileservice.eea.comacloud.net/V1.4.0/FileService.Api/file/CETracker/gedecfej

	Specifically, Respondent installed and began operating a 300-kW emergency engine at the facility in 2013 but did not submit an ERP certification form to MassDEP until June 28, 2021." **Environmental Violations** ● Emitted over their permitted threshold for hydrogen sulfide for 25 days between April 17, 2020 and October 27, 2021. **Failure to Report Violations** ● Emissions reports from April 2019-2020 did not include emissions from an emergency engine that was installed in 2018 and operated for 105 hours in 2019. **Failure to Monitor and/or Record Emissions** ● Facility failed to "...continuously monitor and average over an hourly block basis the methane, hydrogen sulfide, oxygen, and carbon dioxide concentrations of the gas stream exiting the anaerobic digester at the facility, as required by the Plan Approval, on **559 days** between April 17, 2020 and October 27, 2021." ● Facility failed "to keep specified records in compliance with the Plan Approval…on at least 559 days between April 17, 2020 and October 27, 2021 respondent was not maintaining complete hourly on-site records of methane, hydrogen sulfide and carbon dioxide concentrations and temperature of the gas stream exiting the anaerobic digester before combustion…" Fined $13,788 by MassDEP in 2022
Rutland AD1 Jordan Dairy Farms 51 Muschopauge Rd Rutland, MA Electricity for grid	**Environmental Violations** [5] ● From 2020-2021, MassDEP found that this facility violated their air permit by emitting more hydrogen sulfide than their permit allowed for **87 days in a row.** ● The facility was in violation of their air permit for the month of November 2021 when it emitted 0.29 tons of VOCs and the limit is 0.23 tons. **Failure to Report Violations** ● Facility failed to report excess emissions of VOC from the flare at the facility within 3 business days after discovery of the exceedance and with a written report within 10 days. ● Facility failed to report excess emissions of hydrogen sulfide from the facility within 3 days and with a written report within 10 days thereafter on 12 of the 87 days between March 4, 2020 and November 8, 2021. **Failure to Monitor/ Measure Emissions** ● Facility failed to continuously monitor and average over an hourly block basis the methane, hydrogen sulfide, oxygen, and carbon dioxide concentrations of the gas stream exiting the anaerobic digester at the facility, as required by the Plan Approval, on **615 days** between March 4, 2020 to November 8, 2021. ● "Respondent failed to continuously measure the biogas consumption rate of the flare and did not monitor the run-time of the flare in hours as required by Plan Approval on **122 days** between September 1 2021 and December 31, 2021." ● "Respondent failed to keep specified records in compliance with the Plan Approval… on at least 165 days between March 4, 2020 to November 8, 2021,

[5] https://fileservice.eea.comacloud.net/V1.4.0/FileService.Api/file/CETracker/gfbdahae

	respondent was not maintaining complete hourly on-site records of methane, hydrogen sulfide and carbon dioxide concentrations and temperature of the gas stream exiting the anaerobic digester before combustion…" ● "Respondent failed to follow a specified monitoring schedule and protocol… Respondent sampled gas exiting the digester at the facility using a portable analyzer instead of a sorbent tube on 36 days… when the in-line analyzer was not working properly. In addition, the Respondent sampled stale gas rather than fresh gas on 90 days from March 4, 2020 to June 1, 2020, producing erroneous readings of the concentration of hydrogen sulfide in the gas." Fined $28,201 by MassDEP in 2022
Haverhill AD1 Crescent Farms 75 Willow Avenue Haverhill, MA Electricity for grid	**Inaccurate Documentation**[6] ● Facility failed to conduct a sound survey within 180 days of continuous operation of their combined heat and power engine generator which was required as a condition of their permit. ● Facility failed to conduct emissions testing within 180 days of continuous operation of their combined heat and power engine generator which was required as a condition of their permit. ● 2018- MassDEP found during an inspection that the facility was operating an emergency engine for non-emergency purposes for 5,370 hours (which continuously would be over 7 months). ● 2021- MassDEP found during an inspection that since 1/21 the facility had installed and operated a temporary diesel boiler to maintain the temperature of the digester at the same time the CHP was running. The heat from the CHP was not being recovered. **Environmental Violations** ● As a result of their failure to construct a secondary control system to control potential hydrogen sulfide emissions, this resulted in numerous exceedances of their permit (see chart on p. 5) ○ 52 permit violations for exceedance of hydrogen sulfide in 3 years, 8 months ■ 2/11/19-10/05/22 ● In November 2021, part of the digester failed and released 51,309 cf of biogas into the environment. ● In March 2022, the facility released around 1.3 million gallons of digestate on ground surfaces adjacent to the operation. **Failure to Report Violations** ● …for the period of 10/14/20 to 10/15/20, respondent failed to send an email to MassDEP stating that the facility had returned to compliance. ○ For that day, hydrogen sulfide emissions were over twice (537 ppm) as high as the threshold (200 ppm). **Failure to Monitor/ Measure Emissions** ● Inspection uncovered that the digester did not have a secondary control system for

[6] https://fileservice.eea.comacloud.net/V1.4.0/FileService.Api/file/CETracker/ghgfjdgj

	hydrogen sulfide emissions. ● Facility failed to produce any records of emissions for CHP and backup flares during inspection on 5/13/2021. Fined $77,950 by MassDEP in 2022

Hydrogen Sulfide Exceedances for Haverhill AD1

Dates of Exceedance	Reported Concentration Limit > 200 ppm
2/11/19	211
2/12/19	212
2/13/19	236
3/11/19	612
3/12/19	765
8/05/20	240
8/06/20	207
10/14/20	537
10/15/20	403
10/27/20	312
10/28/20	278
3/16/21 (AM)	600
3/16/21 (PM)	400
3/22/21	460
5/07/21	302
10/15/21	224
10/18/21	254
10/20/21	204
10/21/21	340
10/22/21	230
10/25/21	368
10/26/21	334
10/27/21	201
10/28/21	213
1/03/22	204
1/06/22	206
1/07/22	228
1/12/22	238
1/13/22	201
1/19/22	296
1/20/22	293
1/21/22	258
1/24/22	311
1/25/22	323
1/26/22	324
1/27/22	245
1/28/22	292
1/31/22	297
2/01/22	297
2/02/22	300
2/03/22	300
2/04/22	250
6/22/22	400
9/09/22	250
9/16/22	210
9/19/22	250
9/20/22	270
9/21/22	220

Agency for Toxic Substances and Disease Registry Profile for Hydrogen Sulfide

Three Exposure periods: Acute (14 days or less); Intermediate (15-364 days); and Chronic 365 days or more)

Death

- Death occurring after acute exposure to hydrogen sulfide appears to be the result of respiratory failure or arrest, with most cases initially presenting with respiratory insufficiency, noncardiogenic pulmonary edema, coma, and cyanosis.
- There have been numerous case reports of human deaths after acute exposure to presumably high concentrations (≥500 ppm) of hydrogen sulfide gas (Beauchamp et al. 1984)... Snyder et al. (1995), summarizing 10 years of data (1983–1992) from the Poison Control Centers National Data Collection system, indicated that at least 29 deaths and 5,563 exposures were attributed to hydrogen sulfide during that time period.
- After being exposed to hydrogen sulfide in a bathroom connected to a manure pit, a man developed nausea, vomiting, dizziness, dyspnea, and died a few hours later; hemorrhagic bronchitis and asphyxiation were noted as the cause of death (Parra et al. 1991).
- After developing decerebrate responses to painful stimuli and partial seizures, with subsequent indications of brain stem damage, a 16-year-old boy died (Hagley and South 1983). He was exposed to what was presumed to be hydrogen sulfide in a liquid manure tank; 2 weeks after exposure, hydrogen sulfide concentrations measured 30 cm below the tank manhole were >150 ppm, the detection limit of the equipment.
- In another incident, a 16-year-old boy was 10 meters away from an underground liquid manure storage tank (the contents of which had been agitating for 30–60 minutes) when he began coughing, vomited, lost consciousness, and died (Morse et al. 1981). Autopsy showed tracheobronchial aspiration of stomach contents, focal pulmonary hemorrhages and edema, and small petechial brain hemorrhages. Hydrogen sulfide concentrations were found to be >60 ppm (equipment detection limit) under similar conditions in the vicinity of the accident 2 days later.
- In another report, two maintenance workers at an animal tanning company collapsed and died no more than 45 minutes after entering a sewer manhole. A hydrogen sulfide concentration of 200 ppm was obtained just inside the manhole 6 days after the accident (NIOSH 1989).
- In another case, a worker at a poultry feather processing plant died after being exposed to hydrogen sulfide gas for an estimated 15–20 minutes (Breysse 1961). Testing performed later in the area where the exposure occurred indicated that hydrogen sulfide

concentrations ranged from 2,000 to 4,000 ppm. Pulmonary, intracranial, and cerebral edema along with cyanosis were noted at autopsy.

- Studies performed using laboratory animals exposed to high concentrations of hydrogen sulfide gas have yielded results similar to those observed in humans exposed at high levels. Exposure of Sprague-Dawley rats to 1,655 ppm killed all five animals within 3 minutes (Lopez et al. 1989). All male F-344 rats exposed to 500–700 ppm hydrogen sulfide gas for 4 hours died, while no rats died when exposed to concentrations up to 400 ppm under these conditions (Khan et al. 1990; Lopez et al. 1987, 1988a, 1988b).
- Acute exposure to >500 ppm hydrogen sulfide is considered to cause rapid respiratory failure (Beauchamp et al. 1984). (p. 26).

Chronic Health Effects

- A significant increase in respiratory symptoms (OR=11.92; 95% CI=4.37–12.42) was reported by residents living in two communities (Odessa, Texas and Puna, Hawaii) with chronic low levels of industrial sources of hydrogen sulfide, as compared to residents living in two comparable communities without known sources of hydrogen sulfide pollution (Legator et al. 2001). The most commonly reported respiratory symptoms were wheezing (25–30%), shortness of breath (40–45%), and persistent cough (10%); each of these effects had an incidence of approximately 5% in the referent communities.
- Increases in similar respiratory symptoms were also observed in residents of communities where toxic waste containing high levels of hydrogen sulfide were illegally dumped in Côte d'Ivoire (Dongo et al. 2012), in residents living near sour gas/oil fields (sour gas is natural gas containing significant amounts of hydrogen sulfide) in southeast New Mexico (Kilburn et al. 2010), and in communities near swine feeding operations in east North Carolina (Schinasi et al. 2011). A positive association was found between 12-hour mean hydrogen sulfide atmospheric concentrations and the incidence of self-reported signs of respiratory effects (particularly runny nose, wheezing, and difficulty breathing and nasal irritation) (Schinasi et al. 2011).
- In a study of residents living near a hog manure lagoon, an increased frequency of shortness of breath while climbing stairs was observed when compared to residents living 3 km from the lagoons or residents living in another state. However, there were no increases in the frequency of shortness of breath while at rest or while walking (Kilburn 2012). Expiratory flows and vital capacity were also significantly decreased in the exposed residents; a higher incidence of chest tightness, dry mouth, and throat tightness was also reported.