UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

SUBJECT:	CLEAN AIR ACT INSPECTION REPORT NLC Energy, Denmark, Wisconsin
FROM:	Matthew Walters, Environmental Engineer AECAB (MN/OH)
THRU:	Brian Dickens, Section Supervisor AECAB (MN/OH)
TO:	File

BASIC INFORMATION

Facility Name: NLC Energy (f/k/a N E W Organic Digestion LLC)

Facility Location: 6601 County Road R, Denmark, Wisconsin 54208

Date of Inspection: August 24, 2023

EPA Inspector(s):
1. Natalie Schulz, Environmental Engineer
2. Matthew Walters, Environmental Engineer
3. Tess Russell, Environmental Engineer

Other Attendees:
1. Tim May, Plant Manager – NLC
2. Jody Anderson, VP of Operations – NLC (by phone)
3. Ted Summer, Safety Consultant – Riskill
4. Holden Kramper, Maintenance and Safety Manager – NLC
5. Ben Kleist, Quality Specialist – NLC
6. Perry Winkler, Engineering Project Manager – NLC
7. Melanie Riley, Documents Specialist – NLC (closing conference only)
8. Jay Riker, COO – NLC (by phone)
9. Mike Major, Regulatory Compliance Manager – NLC (by phone)
10. Jonathan Cooperman, legal – Kelley Drye & Warren LLP (by phone)
11. Bill Guerry, legal – Kelley Drye & Warren LLP (by phone)
12. Bill Tyndall, legal advisor – NLC (by phone)
13. Kevin Bradley, business development team – NLC

Contact Email Address: tmay@nlcenergy.com, janderson@nlcenergy.com

Purpose of Inspection: Anaerobic digester system inspection

Facility Type: Anaerobic digesters

Regulations Central to Inspection: Construction and Synthetic Minor Operation Permit (Construction Permit No. 19-SMW-033, Operation Permit No. 405219100-F10)

Arrival Time: 11:40 a.m.
Departure Time: 2:30 p.m.

Inspection Type:
☒ Unannounced Inspection
☐ Announced Inspection

OPENING CONFERENCE

☒ Presented Credentials
☒ Stated authority and purpose of inspection
☒ Provided Small Business Resource Information Sheet
☐ Small Business Resource Information Sheet not provided
☒ Provided CBI warning to facility

The following information was obtained verbally from facility representatives unless otherwise noted.

Company Ownership: NLC was originally an investor in the facility when it was previously operated by BigOx. In July 2020, NLC took over ownership and operation of the facility.

Process Description: The facility is a biomethane plant consisting of four plug-flow anaerobic digesters and a biogas upgrade system. Digester 1 processes food waste (1.8M gallon capacity) and Digesters 2A, 2B, and 3 process dairy manure (1.45M gal, 1.94M gal, and 2.6M gal capacities, respectively). The facility also receives upgraded biomethane via truck for pipeline injection. The pipeline interconnection is located onsite. All raw waste is trucked to the facility. There are two partially covered feedstock receiving tanks where food waste is stored prior to being transferred to Digester 1. Dairy manure is dumped in the loadout building into two holding pits and is pumped to Digesters 2A, 2B, and 3. Ferric chloride is added during manure receiving for H_2S control; no ferric chloride is added to Digester 1.

The digesters have fixed concrete roofs, and the facility maintains approximately 2–2 ½ feet of headspace within the digesters. The retention time is about 15 to 25 days (season dependent) at a temperature of 101°F. There are eight natural gas boilers to heat the digesters. Digester 1 has submersible mixers, which are raised and lowered through hatches on the digester roof using a

winch. The hatch opening extends into the digester liquid so that the liquid head prevents the bulk digester vapor from escaping through the hatch. A water spray is also applied at the hatches to maintain the proper consistency within Digester 1. Digesters 2A, 2B, and 3 are equipped with fixed roof-mounted mixers. There are also sampling hatches on the roofs of the manure digesters. Each digester has pressure relief valves (PRVs) that can release gas to the atmosphere. Digester 1 has 2 PRVs; Digesters 2A and 2B each have 4 PRVs; and Digester 3 has 6 PRVs.

Biogas moves from the digesters to the biomethane upgrade equipment for treatment, which consists of carbon treatment for hydrogen sulfide and volatile organic compound (VOC) removal, carbon dioxide removal, compression, and cooling. The removed carbon dioxide is sent to liquid carbon dioxide processing on-site for dry ice manufacturing. Gas quality measurement locations include at each digester, after blending the raw gas streams, and at the treatment skid outlet. Biogas that does not meet the pipeline specifications is sent to one of two flares. The flares operate with a pilot light. Digestate from Digester 1 is sent to one of three uncovered, concrete-lined lagoons at the facility (referred to as the North, South, and round lagoons). The residence time in these lagoons is about 6-10 months before land application. The facility has a screw press for de-watering food digestate, but it is rarely used. Manure digestate from Digesters 2A, 2B, and 3 is trucked out of the facility without de-watering.

Staff Interview:

- Gas quality, gas flow, and flowrate to the flare are monitored at a 15-minute frequency.
- The PRVs, vacuum breakers, and flame arrestors are inspected regularly.
- Leak detection is performed using handheld meters.
- The Facility operates under a Level 3 Risk Management Program.
- Typical H_2S concentration in the raw biogas is about 50–70 ppm for the manure digesters and 10 ppm for the food waste digester. Item I.A.3.a(1) of the facility's Construction and Synthetic Minor Operation Permit states that the sulfur content of the biogas combusted by the flares may not exceed 3,000 ppm; records of the H_2S levels were requested for later review.
- The capacity of each flare is 3,650 SCFM low-pressure gas and 1,560 SCFM high-pressure gas. Facility representatives stated that one flare could control the flow of gas from the entire facility.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations: As a limitation for H_2S pollution, item I.A.3.a(4) of the facility's Construction and Synthetic Minor Operation Permit states that all biogas generated shall be vented to the flares, biogas conditioning system, or an approved alternative location. Inspectors used a flame ionization detector (Thermo Scientific TVA2020 toxic vapor analyzer) and/or FLIR GFx320 optical gas camera to detect fugitive emissions that were not vented to the flares or biogas conditioning system, as listed in the appendices and summarized below. The toxic vapor analyzer was only used at Digester 1.

- *Digester 1*: Detectable emissions were present on the digester roof at mixer hatches, pH probe penetrations, and digester exit weir. Inspectors observed covers that were not closed on hatches and missing covers on pH probes.
- *Digesters 2A, 2B, and 3:* The three digesters have a continuous roof in the shape of the letter "D," with internal walls dividing the three units and a lagoon in the center for food waste digestate storage. Detectable emissions were present at mixer flanges, visible roof sealant cracks, and pressure relief valves. Detectable emissions were also present on Digester 2B at a covering where the facility had removed a mixer for repair. Inspectors observed covers that were not closed on hatches.

Item I.A.2.a(1) of the facility's Construction and Synthetic Minor Operation Permit limits visible emissions from the flares; inspectors did not observe visible emissions at the flares while onsite.

Photos and/or Videos: were taken during the inspection.

See Appendix A for FLIR Video Log

Field Measurements: were taken during this inspection.

See Appendix B for TVA Measurement Data

CLOSING CONFERENCE

☒ Provided U.S. EPA point of contact to the facility

Requested documents:

- Documentation of biogas leak detection and/or repair at the facility, for the month prior to EPA's site visit and any efforts made to repair leaks after EPA's site visit
- H_2S analyzer data for the month prior to the inspection, for the locations both before and after treatment
- Preventive maintenance records for the manure digester mixers

Concerns: Inspectors discussed the leaks found on both the food waste and manure digesters, which constituted uncontrolled digester emissions.

DIGITAL SIGNATURES

Report Author: MATTHEW WALTERS Digitally signed by MATTHEW WALTERS Date: 2023.10.20 12:34:55 -05'00'

Section Supervisor: DAVID SUTLIN Digitally signed by DAVID SUTLIN Date: 2023.10.20 12:39:30 -05'00' Acting for Brian Dickens

APPENDICES

A. FLIR Video Log
B. TVA Measurement Data

APPENDIX A: FLIR VIDEO LOG

1. **Inspector Name:** Natalie Schulz	2. **Archival Record Location:** ***R5 Electronic Record Center***

Image Number	File Name	Date and Time (CDT)	Description of Image
1	MOV_3248.mp4	August 24, 2023 1:08 pm CDT	Food waste digester weir
2	MOV_3249.mp4	August 24, 2023 1:10 pm CDT	Food waste digester mixer hatch
3	MOV_3250.mp4	August 24, 2023 1:12 pm CDT	Food waste digester mixer hatch
4	MOV_3251.mp4	August 24, 2023 1:13 pm CDT	Food waste digester mixer hatch
5	MOV_3252.mp4	August 24, 2023 1:17 pm CDT	Food waste digester mixer hatch
6	MOV_3253.mp4	August 24, 2023 1:18 pm CDT	Food waste digester mixer hatch
7	MOV_3254.mp4	August 24, 2023 1:48 pm CDT	Digester 2B hatch #1 (open; hatch not seated nor bolted down)
8	MOV_3255.mp4	August 24, 2023 1:51 pm CDT	Digester 2B mixer #3 (in repair)
9	MOV_3256.mp4	August 24, 2023 1:52 pm CDT	Digester 2B mixer #3 (in repair)
10	MOV_3257.mp4	August 24, 2023 1:54 pm CDT	Digester 2B roof crack (near liquid sampling ports & air sampling port)
11	MOV_3258.mp4	August 24, 2023 1:56 pm CDT	Digester 2B roof crack (near liquid sampling ports & air sampling port)
12	MOV_3259.mp4	August 24, 2023 1:58 pm CDT	Digester 2B, mixer #2
13	MOV_3260.mp4	August 24, 2023 1:59 pm CDT	Digester 2B hatch #3 (open; hatch not seated nor bolted down)
14	MOV_3261.mp4	August 24, 2023 2:01 pm CDT	Digester 2B, mixer #1
15	MOV_3262.mp4	August 24, 2023 2:02 pm CDT	Digester 2A, pressure relief valve #5
16	MOV_3263.mp4	August 24, 2023 2:03 pm CDT	Digester 2A roof cracks (near flowrate monitor)
17	MOV_3264.mp4	August 24, 2023 2:06 pm CDT	Digester 2A, pressure relief valve #8
18	MOV_3265.mp4	August 24, 2023 2:08 pm CDT	Digester 2A, mixer #3
19	MOV_3266.mp4	August 24, 2023	Digester 2A roof cracks

		2:09 pm CDT	
20	MOV_3267.mp4	August 24, 2023 2:10 pm CDT	Digester 2A, pressure relief valve #9
21	MOV_3268.mp4	August 24, 2023 2:13 pm CDT	Digester roof cracks (at beginning of Digester 3 and in front of "Stage 3 North")

APPENDIX B: TVA MEASUREMENT DATA

TVA Measurements

Location	EPA Reading	Notes	Associated Video # in Appendix A, if any
Digester 1 Mixer Hatch	3,200 ppm	Open hatch	2
Digester 1 pH Probe Penetration	1,300 ppm	---	---
Digester 1 Pressure Relief Valve	30 ppm	---	---

Calibration and Instrument Information

EPA used one ThermoFisher Toxic Vapor Analyzer 2020 (TVA2020)

	SL1555
12:45 calibration reading, 500 ppm	537 ppm
12:45 calibration reading, 0.2%	1,977 ppm
12:45 calibration reading, 1%	9,900 ppm

EPA Calibration Gases

Manufacturer	Composition	Lot #	Expiration
Air Systems International	Ultra Zero Air (THC < 0.1 ppm)	304-402520136-1	8/22/24
Gasco	503.1 ppm	304-402518883-1	8/15/2026
Gasco	1960 ppm	304-402741854-1	5/9/2027
Calgaz	1% Methane	A0437580	6/2026