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

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Nouryon Surface Chemistry, Morris, Illinois

FROM: Natalia Vazquez, Environmental Engineer
AECAB (MI/WI)

THRU: Sarah Marshall, Section Supervisor
AECAB (MI/WI)

TO: File

BASIC INFORMATION

Facility Name: Nouryon Surface Chemistry

Facility Location: 8005 Tabler Rd, Morris, Illinois 60450

Date of Inspection: May 9, 2022 through May 11, 2022

EPA Inspectors:
1. Veronica Fischer, Environmental Engineer
2. Karina Kuc, Environmental Scientist
3. Victoria Nelson, Environmental Engineer
4. Natalia Vazquez, Environmental Engineer

Other Attendees:
1. Jorge Garcia, Site Director
2. Kyle Puracchio, HSEH Manager
3. Jim Cheney, PQC Manager
4. Collin Jepsen, Production Superintendent
5. Quinn Alexander, Regional Environmental Manager for North America (Corporate)
6. Jim Smith, Training Manager and Day Shift Superintendent
7. Vanessa Madrigal, Reliability Engineer

Contact Email Address: kyle.puracchio@nouryon.com and jim.cheneyjr@nouryon.com

Purpose of Inspection: to assess compliance with the Clean Air Act

Facility Type: chemical manufacturing plant

Regulations Central to Inspection: Processes covered by National Emission Standards for Hazard Air Pollutants: Miscellaneous Organic Chemical Manufacturing (NESHAP MON) at 40 C.F.R. Part 63 Subpart FFFF and Chemical Accident Prevention Provisions (CAPP) at 40 C.F.R. Part 68.

Arrival Time: 10:00 A.M on May 9, 2022
Departure Time: 3:15 P.M. on May 9, 2022

Arrival Time: 8:30 A.M on May 10, 2022
Departure Time: 4:00 P.M. on May 10, 2022

Arrival Time: 8:30 A.M on May 11, 2022
Departure Time: 9:30 A.M. on May 11, 2022

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. Reason: Not a small business
☒ Provided CBI warning to facility

The following information was obtained verbally from Jorge Garcia, Kyle Puracchio, Jim Cheney, Colin Jepsen, Vanessa Madrigal unless otherwise noted.

Company Ownership:

Nouryon is a manufacturing facility that produces primary, secondary and tertiary amines, diamines, esteramines, and quarternary ammonium compounds. These intermediates and products are used as surfactants in detergents, fabric softeners, agricultural products, and personal care products. Nouryon started operations in 1973. In 2018, the facility changed name from Akzo Nobel Surface Chemistry to Nouryon Surface Chemistry (Nouryon). Nouryon is owned by Carlisle, a private equity group. The facility has between 105 and 110 employees, not including contractors. The facility operates 24 hours, seven days of the week, and it has four shifts.

Process Description:

The raw materials include fatty acids from animal fats, hydrogen, anhydrous ammonia, methyl chloride, acrylonitrile and formaldehyde in a methanol-based solution. The processing units include the fat splitter, nitrile unit, continuous and batch hydrogenation units, amine and fatty acid distillation units, amine esterification unit and a quaternization unit.

The animal fats are processed in the fat splitter, distillation column and an esterification unit where fatty acids and glycerin are produced. The distillation column is controlled by a forced draft combustion chamber (FDCC). The esterification unit is controlled by thermal oxidizer (TO). The fatty acids are transferred to the nitrile unit where it reacts with ammonia in the presence of a catalyst to form fatty nitrile. The nitrile unit is controlled by the FDCC. The fatty nitrile reacts with hydrogen in the presence of a catalyst in either the continuous or the batch hydrogenation units to form primary, secondary, or tertiary amines. Acrylonitrile or formaldehyde solutions are also added in the batch hydrogenation unit to form secondary and tertiary amines. The continuous hydrogenation units are controlled by the FDCC. Finally, in the quaternization unit tertiary amines react with methyl chloride to form quarternary ammonium compounds. The quaternization units are controlled by the TO and 3 scrubbers that control emissions from the various reactors. Furthermore, the methyl chloride unloading process emissions are routed to the TO. The facility also has a flare that is used as a backup control to the FDCC.

The facility treats wastewater from the nitrile process and quarternization unit on-site. Also, the facility has a utilities section that includes at least two boilers. The FDCC is located near the boilers.

The following are the units covered by the Chemical Accident Prevention Provisions (CAPP a.k.a. RMP regulation): nitrile unit, continuous and batch hydrogenation units, and quaternization unit. The nitrile process uses ammonia. The quaternization process uses methyl chloride. The continuous and batch hydrogenation processes use hydrogen, ammonia, and nitrile feed. The batch hydrogenation unit also uses formaldehyde and acrylonitrile.

Staff Interview:

<u>CAA Title V and NESHAP MON</u>

The facility had an in-house Environment, Health and Safety (EHS) position until the summer of 2021 and now they have a third-party, off-site consultant to assist in managing environmental compliance. The leak detection and repair (LDAR) program is managed by a third-party contractor. Facility representative did not know what sections of the manufacturing process were subject to LDAR requirements.

EPA inspectors had a copy of a Title V permit issued on August 11, 2000. The facility representatives stated that there was a more recent version of the Title V permit but couldn't recall in what year it was issued.

Production levels were higher in 2017-2018 compared to the past 3 years, but the production is increasing and is approaching 2017-2018 levels.

Recent upgrades include the debottlenecking of the nitrile process and the addition of pressure swing adsorbers. The debottlenecking of the nitrile process consisted of adding on to the existing ammonia recovery system which enables the facility to run the process unit more. This recovery system has rarely been used since it was first installed in 2016. The pressure swing adsorbers allow the facility to separate hydrogen from the gas stream (containing a mixture of hydrogen, methane, and ethane) provided by a neighboring facility. Nouryon returns the methane and ethane to the neighboring facility. The hydrogen is used by the batch hydrogenation process.

The FDCC was installed in 1973 when the facility first started up. The plant management confirmed that the plant has increased in capacity since the initial installation of the FDCC. The FDCC control efficiency is 99.9 percent, although the facility has not performed an emission test in over 10 years. The FDCC uses natural gas and the high-molecular weight fatty acids from the fatty acid or amine distillation bottoms (pitch) and nitrile waste as fuel. The facility monitors how much organic material (fat or distillation column bottoms) is sent to the FDCC, FDCC temperature, FDCC BTU, and natural gas usage. The stormwater captured and stored on site, is used as quenching water in the FDCC. This helps lower the temperature of the FDCC as it has an upper temperature operating limit of 696 °F. In addition to the processes mentioned in the process description section, the storage tanks for nitrile process, finished products and raw materials (fats) are controlled by FDCC. The previously mentioned storage tanks share a header that routes the gas/vapor stream to the FDCC.

The facility normally staggers the batch process to prevent the FDCC overheating. If the FDCC were to overheat, hydrogen is vented to a flare instead of the FDCC. This flare is always on, but hydrogen is vented to it about once a month, for a few hours. The facility representatives stated that they do not believe that any waste gas goes to the flare. This flare is not an air-assisted or a steam-assisted flare. Only velocity is monitored at the flare.

The facility monitors the temperature in the TO. The facility assumes a control efficiency of 99.9 percent for the TO. Nouryon's representatives believes the TO has not had a performance test in the past 10 years. The facility bypasses the TO if the TO has a downtime, during a deviation or during annual preventative maintenance that can last 10 days and is outside of the facility's turnaround. One of the quaternization units vent to a water scrubber before the TO. The other quaternary unit vents to the TO, but the TO outlet is vented to a caustic scrubber to neutralize the by-products from the TO combustion.

The facility treats wastewater, mostly from the nitrile process, on site. The wastewater process includes four aerobic digestors which are open to the air. The facility monitors BOD, COD, and suspended solids. After the wastewater is treated, it goes to a 17-acre pond, then to an 8-acre pond, and finally the water is sprayed onto a grass field (owned by the facility) which eventually drains to a creek. Water from the scrubber (DEQ quaternization unit) is diverted to the wastewater system.

Arquad-Reactor 1, within the quaternization unit, and its associated scrubber was out of service during the inspection.

CAPP

The facility representatives confirmed that the same chemical compounds identified in the May 14, 2015, Risk Management Plan (RMP) are still present at the facility above the regulatory threshold. The process description within the RMP has not changed. EPA inspectors notified the facility representatives that the last RMP on file with the agency was submitted in 2015 by the previous owner Akzo Nobel Surface Chemistry. The facility's representatives were not aware that the facility was late in its RMP submission. The nitrile unit use ammonia. The quaternization unit has three reaction vessels known as Arquad 1 DEQ, and Arquad 2 and 3; they use methyl chloride. The continuous hydrogenation units use hydrogen and ammonia. The batch hydrogenation has six pressurized vessels, and this process uses hydrogen, ammonia, formaldehyde and acrylonitrile.

The facility has a union, Chemical Workers, and EPA extended an invitation to participate through management. Mr. Garcia informed EPA that he had relay the information at 10 a.m. on May 10, 2022.

Nouryon is a non-responding facility. The facility's responder is Minooka Fire Protection District in Morris, Illinois.

Jim Cheney has been covering the PSM lead position since February of this year. The previous PSM lead left the facility since July 2021 and Nouryon has an open vacancy to hire a new PSM lead.

Nouryon uses Enablon as the incident tracking system for the facility.

For the Process Hazard Analysis (PHA), the facility splits the analysis among units. Nouryon uses Hazard and Operability Study (HAZOP) as the PHA methodology. "Procedure 6" is a corporate PSM standard that includes the risk ranking for PHA and Management of Change (MOC). The facility used to have an engineer that was trained as PHA facilitator but left about a year ago. Now the facility uses a third-party contractor for the PHA facilitator position.

The facility's policy is to include a risk analysis in its operational changes proposed by its engineers. This is part of its MOC policy, and it includes a Layer of Protection Analysis (LOPA) for the highest-ranking risk. The permanent operational changes that required an MOC, also requires a training on the change once the MOC is completed. Replacement in kind and temporary MOC do not require operator training.

Operator training is tracked in an excel sheet. New hire training uses a 3-page checklist that includes emergency response, code of conduct, and work practice items, such as lock and tag out, respirator, confined entry. Furthermore, a new hire has peer-to-peer training by a qualified operator and has to pass both a written and field test before being assigned to a process.

Vanessa Madrigal oversees the Mechanical Integrity (MI) program onsite. In January 2022, the facility hired an internal API Inspector to do some of the mechanical integrity inspections and help interpret analyses completed by third party contractor. Nouryon uses a third-party contractor to do non-destructive testing (NDT) on various types of equipment. The facility uses a variety of NDT inspection methods including, but not limited to, ultrasonic testing (UT), sheer wave, eddy current, dye penetrant, and radiographic testing (RT). The inspection frequency depends on the type of equipment and RAGAGEP used by the facility, however pressure vessels are inspected every 5 or 10 years. If deficiencies were found in its equipment, the facility modifies the frequency of inspections. Inspections are tracked through SAP software and a Master e-sheet. The SAP software has been used by the facility since approximately 2012.

TOUR INFORMATION

EPA Tour of the Facility: Yes

Data Collected and Observations:
On May 9, 2022, EPA did a site tour with a focus on compliance with the MON and the facility's Title V permit. EPA inspectors observed the FDCC, TO and other equipment with an intrinsically safe FLIR GFx-320 camera. EPA notified the facility that VOC emissions were observed coming from the top of product vessels A11 and A12. These emissions were coming from the access (taping) port at each respective vessel (images 8 and 9). Both ports were covered in spilled product and the integrity of the seals appeared compromised. The facility confirmed that tanks A11 and A12 and their components are subject to LDAR inspections. The facility claimed all FLIR videos as CBI. EPA inspectors saw a puddle of liquid that appeared to be water mixed with oil or fat. This puddle of liquid was draining into the water trench near the base of tank A10 in ARQUAD (quaternization unit) (images 10 and 11). Using the FLIR, EPA observed hydrocarbons emitting from the trench. The facility representatives believed this was wastewater from stormwater drains which was atypical from extra washout of Reactor 4. EPA also carbon drums with rusted out bottoms which are used by the facility as backup to the TO for the unloading process of methyl chloride. During the inspection, EPA noticed an odor throughout the facility. Nouryon employees indicated that they occasionally receive odor complaints from the community and they have an odor committee that investigates the source of the odors.

On May 10, 2022, EPA did a site tour with a focus on compliance with the CAPP. EPA inspectors requested a list of the completed MOC records for the last 5 years and chose two MOC. These two MOC were related to the batch hydrogenation unit. EPA compared the P&ID to actual field equipment related to vessels 1 and 2 such as piping, monitoring devices, and valves. EPA interviewed control room operators for the batch hydrogenation unit and the quaternization unit, as well as a field operator for the batch hydrogenation unit. All alarms in the control rooms for both units are visual indications only, including alarms for the ammonia detection system in the batch hydrogenation unit and the methyl chloride detection system in the quaternization unit. No additional indications, such as audible indications, occur when an alarm is ignored. If an alarm is ignored by an operator, the visual indication remains on the screen. EPA confirmed that there are no audible field alarms for lower explosive limit (LEL), other than when operators carry personal LEL detectors. Field operators rely on board operators to

communicate the presence of an alarm to them by radio when they are in the unit. Board operators are always present in the control room.

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

Field Measurements: were not taken during this inspection.

RECORDS REVIEW

On May 9, 2022 the following records were reviewed:

1. CAAPP Annual Compliance Certification, Calendar Year 2021

On May 10, 2022 the following CAPP records were reviewed:

1. List of completed MOC within the past 5 years;
2. MOC 0555 Temporary Pipe Clamp 2" Condensate line – batch Hydrogenation Process;
3. MOC 1579670 Utilize existing formalin line Reactor 1 and 2 – batch Hydrogenation Process; and
4. Procedure 6: Process Safety and Asset Integrity (Document ID: 12.01.6.SP01, version 4).

CLOSING CONFERENCE

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

Requested documents:

- CAA Stationary Source, MON and Title V related records
    1. Clarification on which part of the process is CBI;
    2. The process flow diagram (PFD) used during the inspection;
    3. Most recent Title V permit;
    4. Notice of Compliance Status (NOCS) for MON;
    5. Most recent stack test for the FDCC, TO and the scrubbers;
    6. Log of monitoring parameters (in excel) for the FDCC, scrubbers, TO , flare, and Methyl chloride adsorber from January 2021 to the present;
    7. Log of all downtime for the FDCC, scrubbers, and TO from January 2021 to the present;
    8. Maximum flow capacity of the FDCC, scrubbers, TO and flare;
    9. List of all storage tanks including capacity, material stored and type of control;
    10. Wastewater sample results for January 2022 to present;
    11. LDAR database from January 2021 to present in Microsoft Access or Excel spreadsheet;
    12. Safety Data Sheets for the product 2HD-82E in storage vessels A11 and A12; and
    13. Follow-up (including work orders and photos) on concerns identified during the inspection (A11 and A12 tank leaks, methyl chloride - carbon bed drums).

- CAPP related records
    1. List of current operators in each unit;
    2. List of chemicals present in process(es) that are covered by PSM but not CAPP (RMP);
    3. Procedure 6 – Corporate records (Process safety and asset integrity);
    4. Copy of risk matrix;
    5. PFD for batch hydrogenation;
    6. PFD for continuous hydrogenation;
    7. PFD for nitrile process;
    8. PFD for ARQUAD (quaternization units) RMP applicable reactors;
    9. PFD for storage (if separate from PFD above);
    10. CAPP (RMP) process boundary determinations;
    11. List of equipment;
    12. List of operating procedures including emergency procedures;
    13. Last two compliance audits;
    14. Worst case release scenarios;
    15. Alternative release scenarios;
    16. Emergency response plan
    17. List of incidents for the past 5 years in covered units;
    18. List of MOCs for the covered units for the past five years, including any currently open ones;
    19. MOC policy;
    20. PHA policy;
    21. MI policy;
    22. Organization chart;
    23. P&ID for storage;
    24. P&ID for nitriles
    25. P&ID for batch hydrogenation units;
    26. P&ID continuous hydrogenation units;
    27. P&ID for ARQUAD (quaternization) units;
    28. 2020 compliance audit finding resolutions; and
    29. Procedure 12.01.SP01

Concerns:

1. EPA observed hydrocarbon emissions from the taping ports at product vessels A11 and A12;
2. Hydrocarbon emissions observed emitted from the water trench near the base of tank A10, collected following the blowdown of Reactor 4 the day prior
3. Activated carbon drums which serve as backup to the TO during methyl chloride unloading were rusted out; and
4. The facility only uses visual alarms and relies on control room employees radioing process operators in the field. No audible alarms for gas detection.

DIGITAL SIGNATURES

Report Author: NATALIA VAZQUEZ RIVERA Digitally signed by NATALIA VAZQUEZ RIVERA Date: 2022.06.27 13:34:18 -05'00'

Section Supervisor: SARAH MARSHALL Digitally signed by SARAH MARSHALL Date: 2022.06.28 11:35:19 -05'00'

APPENDICES AND ATTACHMENTS

1. Confidential Business Information Attachment
2. Appendix A Digital Image Log - CBI