MEMORANDUM

TO: Lisa A. Vest – Hearing Officer

THROUGH: Angela D. Marconi, P.E. – Division Director, DAQ
Amy S. Mann, P.E. – Program Administrator
Phanuel C. K. Bediako, Ph.D.

FROM: Eric S. Rowland – Engineer

SUBJECT: **Technical Response Memorandum for Croda Inc.**
Permit: APC-2023/0098-CONSTRUCTION (FE)
Permit Application for the Construction of a Flare System

DATE: August 26, 2024

BACKGROUND

Lisa Vest, Public Hearing Officer, requested a Technical Response Memorandum (TRM) on May 13, 2024, to provide expert technical assistance for the Hearing Officer's Report and recommendations to the Secretary with regard to the pending construction permit application to install a new 20" diameter steam assisted natural gas flare with a 3" diameter steam assisted piggyback flare (the Flare System) at Croda Inc.'s (Croda or the Company) Atlas Point facility located at 315 Cherry Lane in New Castle, Delaware.

Detailed below are the Department of Natural Resources and Environmental Control's (DNREC or the Department) Division of the Air Quality's (AQ) responses to the comments provided during the April 24, 2024, Virtual Public Hearing and the comments received prior to the May 10, 2024, closing of the administrative public hearing record for Croda's proposed activity.

REVIEW OF APPLICATION AND PUBLIC HEARING

The 7 DE Admin. Code 1102 Construction Permit Application was received on June 16, 2023. Additional information was requested on November 7, 2023, and the information was received on November 20, 2023. A Pre-Notification Draft of **Permit: APC-2023/0098-CONSTRUCTION (FE)** was supplied to Croda on March 6, 2024, and Croda's written response was received on March 15, 2024.

Croda's construction permit application preemptively requested a public hearing to be held regarding this Flare System. A public notice was issued on March 24, 2024, advertising both the application and the April 24, 2024, Public Hearing, in the **News Journal** and the **Delaware State News** for 30 days.

On behalf of DNREC, Lisa Vest conducted the virtual public hearing, which was held on April 24, 2024, beginning at 6:00 PM. AQ's Engineer, Eric Rowland, presented an overview of the application and provided information on the air permitting actions that would be associated with the construction permit application. Josh Dube, Site Director for Croda, presented an overview of Croda and the proposed project on behalf of the company.

The public comment period remained open after the public hearing and closed on May 10, 2024. Croda provided a response to the public hearing and submitted comments on May 24, 2024 (attached as

Appendix A). The Department requested additional information from Croda on June 18, 2024 (attached as Appendix B). Croda responded to the request for additional information on July 15, 2024 (attached as Appendix C).

REVIEW OF COMMENTS

Many of the comments received during the public hearing (and via written response after the public hearing) expressed similar concerns. These comments have been combined, where possible, and edited for clarity and brevity. Verbatim statements can be found in the *Public Hearing: Croda Flare System Permit April 24, 2024*, Hearing Transcript prepared by VeriText Legal Solutions, as well as the submitted written comments received after the hearing.

General Public Comment Summary	DAQ Response

Bill Dunn, John Irwin, Marrisa McClinton, Dora Williams:
(Verbal comments dated 04/24/24)
• Concerns related to air monitoring to include:
  ○ Monitoring currently performed by Croda
  ○ Fenceline monitoring
  ○ Public access to monitoring data
	The air monitoring conducted by Croda at its Atlas Point facility is performed to ensure area safety and worker safety.
	
	Area monitoring is accomplished primarily with LEL (Lower Explosion Limit) monitors which measure % LEL. These monitors are calibrated with methane and are not specific to Ethylene Oxide (EtO).
	
	Additional monitoring in areas where equipment in EtO service is present is accomplished with volatile organic compound (VOC) monitors calibrated to EtO in the range of 0 to 10 ppm. As with the LEL monitors, these are not specific to EtO, other VOCs, if present, will produce a reading on these monitors.
	
	Personnel monitoring is accomplished by personal monitors worn by individuals operating in areas where equipment in EtO service is present. These monitors are VOC monitors calibrated to EtO in the low ppm range, but as above, are not specific to EtO, other VOCs, if present, will produce a reading on these monitors.
	
	The monitors currently in use at Croda are not specific to EtO, nor are they capable of measuring the extremely low levels necessary for fenceline monitoring, and therefore are not suitable to be repurposed for this task.

	While the Department appreciates the public's concern and desire for fenceline monitoring for Ethylene Oxide (EtO), the Department does not possess either the statutory or the regulatory authority to impose this monitoring on the facility at this time. In addition, current fenceline monitoring technology does not provide real-time data. For any fenceline monitoring requirements to be added to the permit, a voluntary, cooperative agreement between Croda and the Department would need to be developed. This agreement would need to include how the fenceline monitoring data would be shared with the public.
Bill Dunn, Robin Bullock, Silvana Dominioni: **(Verbal comments dated 04/24/24, Written comments dated 05/08/24, 05/10/24)** • Concerns related to: o The location of the Flare System in relation to the EtO Plant, DRBA bridge infrastructure. o The modeled Maximum Downwind Concentration o The potential for smoke and steam from the Flare System o The visibility of an open flame from the Flare System o The permitting of the Flare System for 876 hrs/yr	Croda has stated that several factors were considered in the placement of the Flare System. Notable considerations included the design elevation, the proximity to the fenceline, fire code regulations, and space limitations created by existing on-site infrastructure. In addition, the Flare System location is outside of the National Fire Protection Association (NFPA) regulated area, away from the production unit it serves, and is as far from the bridge and bridge infrastructure as is practical. Commenters mentioned that the Maximum Downwind Concentration (MDC) found through modeling occurs at 174 meters from the Flare System, and that it is doubtful that Delaware River and Bay Authority (DRBA) and community properties are outside of this distance. It should be noted that the modeling performed showed that normal operation of the Flare System, at the MDC distance of 174 meters, was protective of public health, safety and welfare based on Department criteria. Comments concerning the potential for black smoke were made regarding the Flare System. The Proposed Construction Permit addresses these concerns, with the addition of a permit condition limiting visible emissions to no greater than 20% opacity for more than an aggregate of 3 minutes per hour, or 15 minutes per 24-hour period in accordance with 7 DE Admin. Code 1114 Section 2.0. Smoke

	that is measured at 20% opacity does not block visibility to a degree that would cause a safety hazard. It should be noted that uncombined steam emissions are not considered visible emissions. Steam emissions from other emission units are not pertinent to the discussion of the Flare System. However, the Department is available to discuss any safety concerns separately. Comments regarding aesthetic and driver safety concerns were brought up, specifically concerning the visibility of an open flame. During standby or idle conditions, the pilots used by the Flare System are unlikely to be visible at ground level or on the Bridge. When fully activated, the presence of a flame is likely, however, it would be difficult to shroud this flame completely given the relative differences in elevation of the Bridge and Flare System (The Bridge has an approximate clearance of 174 feet and the proposed elevation of the Flare System is 65 feet). These aesthetic and driver safety concerns are outside the scope of an air emissions permit. However, the Department is available to discuss any of these concerns separately with Croda, DRBA, and other relevant parties. Comments were given regarding the 876 hours per year of allowed activated use of the Flare System. The applicant (Croda) may request for an emission source to be used at all times or may ask for operational limitations (in this case, limits in the hours per year of operation). In the case of the Flare System, Croda requested that the system operate in idle state at all times (8760 hours per/year) and then at an activated state for no more than 876 hours per year. The choice of 876 hours per year is a highly conservative estimate of the amount of time it will be operated in an activated state. Permitting of the Flare System for 876 hours per year does not indicate that the Department is not concerned about unpredictable emissions. It is an effort by the Department to reduce emissions when these situations occur.

Bill Dunn, Marissa McClinton, Jeanette Swain, Silvana Dominioni: **(Verbal comments dated 04/24/24, Written comments dated 04/24/24, 05/10/24)** • Concerns related to the explosion risk posed by the Flare System and the pilots used	Croda has stated that risks such as these are mitigated by utilizing a Flare System designed by a manufacturer with experience with Ethylene Oxide. Croda states that the Flare System has been designed by and procured from John Zinc Hamworthy Combustion, which has installed 21 flares in EtO service worldwide, with most of these located in the United States. The Flare System has been designed to the latest American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), and NFPA guidance.
Bill Dunn: **(Verbal comments dated 04/24/24)** • Concerns related to 04/23/24 meeting between DNREC and Croda	The meeting held on April 23, 2024, at 2:30 PM, between Croda and Department personnel was a "test run" for the public hearing. The purpose of this meeting was to ensure that all persons from Croda and DNREC who were expected to present at or have a role in the public hearing had the proper software, permissions, and computer knowledge to participate. Test runs of this sort are commonly held for any public hearing or public meeting conducted by DNREC. Public citizens may contact the Department at any time if they require additional information regarding a facility's permit(s), or a scheduled public meeting or hearing. Contact with the Department can be accomplished via web, email, phone, or in-person (an appointment for in-person meetings is suggested, but not required, to ensure the appropriate personnel are available).

Rob Bullock, John Irwin, Dora Williams, Jeanette Swain, Robin Bullock:
(Verbal comments dated 04/24/24, Written comments dated 04/24/24, 05/08/24)
• Concerns related to emissions from the Flare System, to include:
  ○ Greenhouse gas emissions (CO_2)
  ○ Volatile Organic Compound (VOC) emissions
	The Department understands the public's concerns with any additional emissions from the Atlas Point facility as well as in the Route 9 Corridor as a whole.
	
	While the Department agrees that prevention should always be the primary focus for reducing emissions from the EtO plant, there are certain unpredictable situations which create upsets in the process and lead to excess emissions. (Sudden loss of power or steam are some examples of such unpredictable situations.) When these types of unpredictable excess emissions occur, the use of an emergency flare can help reduce the excess emissions by at least 98% (in the case of this Flare System). Permitting of the Flare System does not indicate

	that the Department is not concerned about unpredictable emissions. It is an effort by the Department to reduce emissions when these situations occur. It should be noted that emissions occurring from the operation of the Flare System can be broken into 2 categories: those emissions occurring from the Flare System at an idle state, and those emissions occurring from the Flare System at an activated state. The emissions presented in the public notice are a combination of the idle state emissions for a full year and the activated state emissions for 876 hours/year. The emissions at the idle state for a full year are roughly one-fifth to one-eighth of those listed in the public notice. (Further information can be found in Exhibit 3: Technical Memorandum for Flare System.)
Rob Bullock, Robin Bullock: **(Verbal comments dated 04/24/24, Written comments dated 05/08/24)** • Concerns related to visual monitoring of plant equipment	Visual monitoring is currently performed on Croda's EtO plant and is monitored within the control room. Additionally, a gas cloud imaging system is in use on the North-East side of the EtO plant. Croda has stated that visual monitoring of the Flare System will be performed.
Rob Bullock: **(Verbal comments dated 04/24/24)** • Concerns related to open control systems (could a closed system be used?)	Croda states that multiple options for the control of VOCs were evaluated, but only combustion-based controls were found to be effective for the destruction of all process VOCs (including, but not limited to, ethanol, ethylene, and ethylene oxide). Croda states that the choice of an elevated flare system balanced selection factors such as safety risks (lower with elevated flare systems), VOC destruction efficiency (higher with elevated flare systems), and natural gas use/emissions during idle/standby (lower with elevated flare systems).
John Irwin, Jakim Mohammed, Marissa McClinton: **(Verbal comments dated 04/24/24)** • Concerns related to the prevention of Ethylene Oxide (EtO) or Volatile Organic Compound (VOC) releases as opposed to installation of the Flare System	While the Department agrees that prevention should always be the primary focus for reducing emissions from the EtO plant, there are certain unpredictable situations which create upsets in the process and lead to excess emissions. (Sudden loss of power or steam are some examples of such unpredictable situations.) When these types of unpredictable excess emissions occur, the use of an emergency flare

	can help reduce the excess emissions by at least 98% (in the case of this Flare System).

RECOMMENDATIONS

The Flare System application was reviewed and determined to be administratively and technically complete in accordance with all relevant statutes and regulations. The proposed permit was drafted in accordance with applicable state and federal regulations, and was determined to be protective of human health, welfare, and the environment. No comments or questions were received on the "Draft" version of the permit from the EPA Region III office. The Division of Air Quality recommends transmittal of the "Proposed" **Permit: APC-2023/0098-CONSTRUCTION (FE)** to the EPA Region III office.

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Appendix A

Croda – Response to Flare Public Hearing (May 24, 2024)

CRODA

RECEIVED
MAY 30 2024
Division of Air Quality

Croda Inc
315 Cherry Lane
New Castle DE 19720
Tel +1 (302) 429 5200
Fax +1 (302) 429 5304

Via Certified Mail – Return Receipt Requested

May 24, 2024

Eric Rowland
Engineer
State of Delaware
Department of Natural Resources and Environmental Control
Division of Air Quality
Engineering Compliance Branch
Attn: Eric Rowland
State Street Commons
100 West Water Street, Suite 6A,
Dover, DE, 19904
Submitted via E-mail to (Attn: Docket #2024-P-A-0005):

Eric.Rowland@delaware.gov
daqpermitting@delaware.gov
DNRECHearingComments@delaware.gov

RE: Response of permit applicant Croda, Inc. to public comments on Croda Flare System Permit APC-2023-0098-CONSTRUCTION (FE) Docket #2024-P-A-0005

Dear Mr. Rowland/DNREC Hearing Officer:

Croda, Inc submitted an application (APC-2023/0098) to DNREC to voluntarily install a flare system to reduce VOC emissions from malfunctions to reduce air emissions at the Atlas Point facility - ECO plant located at 315 Cherry Lane in New Castle. As part of this application, Croda voluntarily requested a public hearing to be held.

During this public hearing on Wednesday April 24, 2024 and subsequent written comments being provided, inaccurate statements were made and/or clarifications requested that we would like to address in accordance with 7 DE Admin. Code 1130 Section 7.10.6. We would like to submit a more complete response, but the Delaware code reference above only provides 15 days to respond. Accordingly, Croda reserves its right as permit applicant to supplement this response as part of any subsequent communications/proceedings involving the permit application, including without limitation, in the event the Commenters or other parties seek to challenge the permit following its issuance as final and/or file with EPA a petition to object to the final Permit Application.

Why is Croda building a flare?

Croda is committed to reducing our environmental footprint and being a good neighbor. While not required by regulators, we would like to reduce the environmental impacts from malfunctions or upset conditions. This flare is not being built in anticipation of new emissions releases. We recognize our neighbors want reduced emissions and this is the most effective way to significantly reduce VOC emissions. The addition of this flare will not detract from other emissions reduction initiatives at our site. In fact, it is a key step in our overall emissions reduction plan.

How is the flare a benefit to the community?

The flare will allow Croda to reduce its air emissions from malfunctions by 98%.

Will emissions be released from the flare?

The flare will have a continuous pilot flame supplied by natural gas. This will give off emissions similar to any natural gas burner (i.e. gas stove, gas furnace, etc).

If there is a malfunction or upset that sends VOCs to the flare, 98% of the VOCs will become CO2, leaving 2% of the VOCs going to the air. Without the flare, 100% of the VOCs would enter the air. For example:

> If a relief valve releases 100 lb of ethylene today, all 100 lb will be emitted to the air
>
> Once the flare is installed only 2 lbs of ethylene would be emitted to the air.

I live nearby and am concerned for the safety of my family and my home. Is this a fire or public health hazard? What if the wind is blowing at hurricane levels?

Absolutely not. As a neighbor of the facility, you should sleep safer knowing that a flare has been installed to reduce the air emissions from emergency or upset conditions. The flare is designed for windspeeds of 160 mph and rainfall of 30" per hour.

I'm concerned with the environment. You are so close to the Delaware River. Can the flare accidently leak pollutants into the river, groundwater, or soil nearby? What if the flare explodes?

The flare is designed for to process gases not liquids. It will have a piece of equipment to ensure that liquid is removed from the gas stream and will drain to existing site containment for proper disposition.

How does a flare improve safety?

The flare allows process gases containing VOCs to be collected and sent to a common emission point destroying 98% before venting to the atmosphere. Currently the gases vent to the atmosphere at elevated locations so they can be dispersed into the air safely.

Is the construction and operations of a flare regulated by any government agency?

Croda has requested a permit from DNREC and the EPA and is using EPA's current best practices in designing the flare.

How will Croda ensure the flare remains safe in the future for employees and the community around Atlas Point?

Croda will have a maintenance and inspection plan to ensure this multimillion-dollar investment is around for many years to come.

What is a flare? How will your proposed flare work?

A flare is an environmental control device that can reduce emissions and protect manufacturing equipment. Due to unplanned interruptions, like loss of power or equipment shutdown, materials (specifically Volatile Organic Compounds – or VOCs) from our processing operations will be routed to our flare system. There, these materials will be mixed with steam and burned off, minimizing the VOC air emissions that can occur from these interruptions by 98%. Atlas Point's flare system will be used minimally – only during an unplanned disruption in processing or when other equipment is undergoing maintenance.

Additional information can be found on our website to help educate and answers questions about the flare: https://www.croda.com/en-gb/about-us/where-we-operate/north-america/usa/atlas-point

Croda supports the Draft/Proposed Construction Permit as issued by DNREC and requests that DNREC submit the permit to EPA for final approval. Croda appreciates this opportunity to provide its response addressing the Comments and looks forward to continuing relevant discussions with both DNREC and the community.

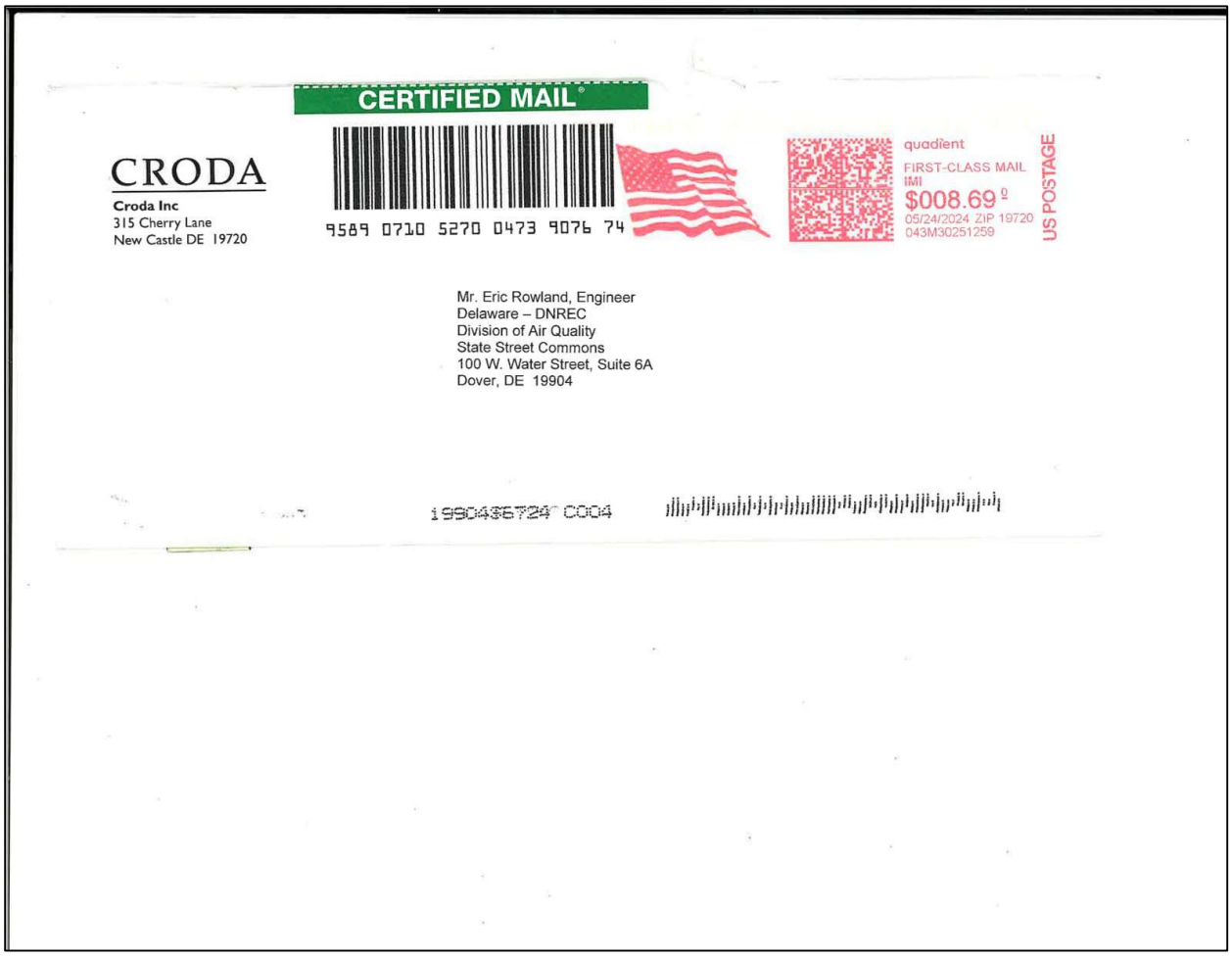
If you have any questions or require any additional information, please contact Margaret Rescavage at margaret.rescavage@croda.com 302-429-5249.

Sincerely,

J Dube

Josh Dube

Site Director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Mr. Eric Rowland, Engineer
Delaware – DNREC
Division of Air Quality
State Street Commons
100 W. Water Street, Suite 6A
Dover, DE 19904
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Appendix B

DNREC DAQ – Request for Additional Information (June 18, 2024)

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF AIR QUALITY
STATE STREET COMMONS
100 W. WATER STREET, SUITE 6A
DOVER, DELAWARE 19904

ENGINEERING & COMPLIANCE

PHONE
(302) 739-9402

June 18, 2024

Croda Inc.
315 Cherry Lane
New Castle, DE 19720

ATTENTION: Josh Dube
Site Director

SUBJECT: **Request for Additional Information**
Permit: APC-2023/0098-CONSTRUCTION (FE)
Permit Application for the Construction of a Flare System – Public Hearing Response

Dear Mr. Dube:

The Department has received Croda Inc.'s response to public comments related to the Flare System construction permit, dated May 24, 2024. The Department appreciates the responses provided, and requests additional information from Croda on the following topics:

- A discussion regarding the placement (location) of the Flare System and its vicinity to plant and non-plant (for example, bridge) infrastructure.
- A discussion regarding the explosion risks involved with the installation and use of flare installations similar to the Flare System.
- A discussion related to the use of open control systems (flares were given as an example in the comments) versus closed control systems (based on the comments, presumed to mean capture or storage devices).

Please contact Eric Rowland at (302) 739-9402 or eric.rowland@delaware.gov if you have any questions or concerns regarding this request for additional information.

Sincerely,

Amy S. Mann, P.E.
Program Administrator
Engineering & Compliance Section

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pc: Dover File
Phanuel C. K. Bediako, Ph.D.
Eric S. Rowland

Appendix C

Croda – Response to Request for Additional Information (July 15, 2024)

CRODA

Croda Inc
315 Cherry Lane
New Castle DE 19720
Tel +1 (302) 429 5200
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RECEIVED
JUL 15 2024
Division of Air Quality

Hand Delivered

July 15th, 2024

State of Delaware
Department of Natural Resources and Environmental Control
Division of Air Quality
Engineering Compliance Branch
Attn: Eric Rowland
100 W Water St
Suite 6A
Dover, DE 19904

Subject: **Croda Inc. Atlas Point Facility**
RE: esr24075 Request for Additional Information
Permit: APC-2023/0098-CONSTRUCTION (FE)
Permit Application for the Construction of a Flare System – Public Hearing Response

Dear Mr. Rowland

On June 18, 2024 Croda received a request for additional information regarding the construction permit for APC-2023/0098-CONSTRUCTION (FE). This letter includes our response to the questions posed in that request.

If you have any questions or require additional information, please contact Margaret Rescavage at 302-429-5249, or margaret.rescavage@croda.com.

Sincerely,

Margaret Rescavage
SHE Advisor

Q: A discussion regarding the placement (location) of the Flare System and its vicinity to plant and non-plant (for example, bridge) infrastructure.

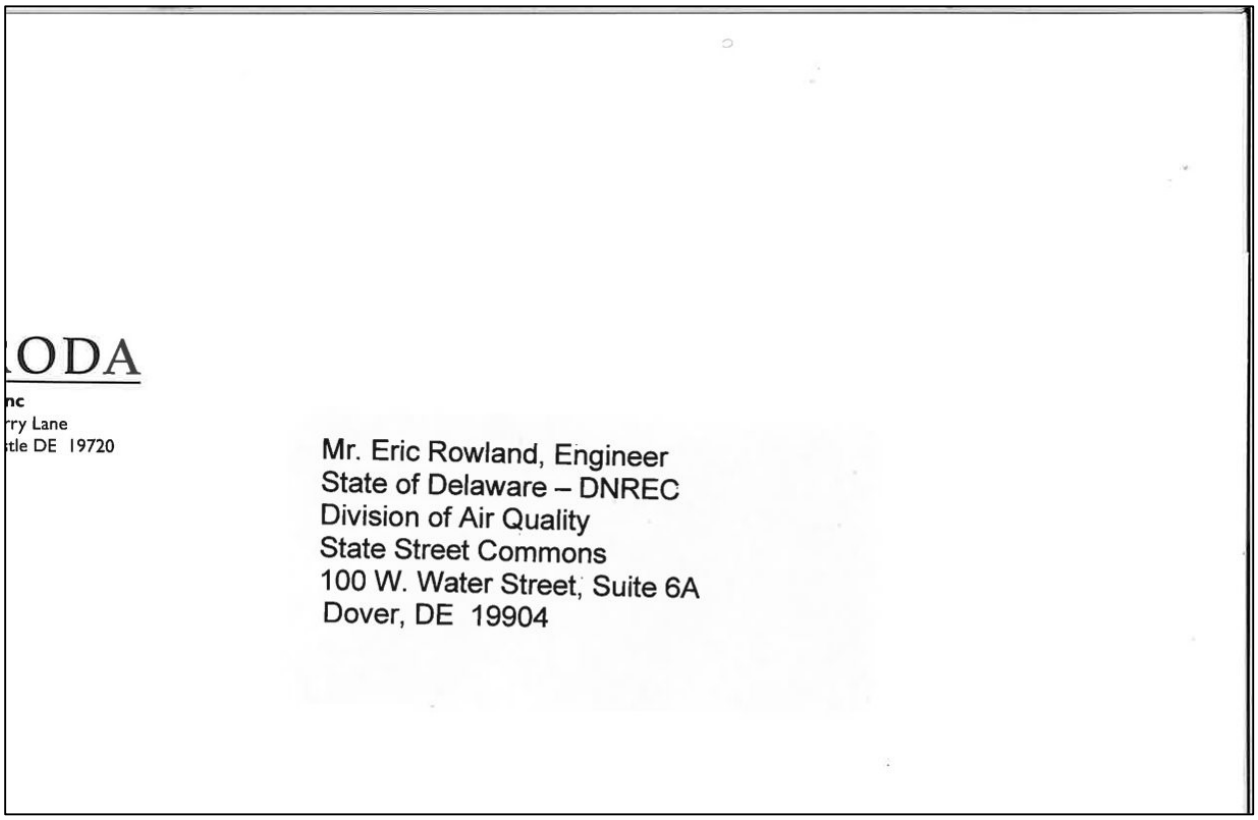
A: Croda evaluated several factors before ultimately deciding on the location for the flare system. Some notable items that were considered during design included elevation, proximity to fence line, existing fire code requirements, and space limitations from existing site infrastructure. The location is outside of the National Fire Protection Association (NFPA) regulated area, away from the production unit, and as far from the bridge as practical.

Q: A discussion regarding the explosion risks involved with the installation and use of flare installations similar to the Flare System.

A: The flare system is designed for use in emergency situations to route flammable materials to the flare so they may safely be destroyed in the most environmentally beneficial way possible. As such, the flare is expected to serve as a further safety enhancement to the existing plant design. Several design features ensure the flare itself will present extremely low risk. First, Croda is purchasing the flare from John Zink Hamworthy Combustion, which has installed 21 flares in Ethylene Oxide (EO) service worldwide, with all but a few located within the United States. The specific flare design selected has extra safety features specifically for processing EO, including gas seals and a flare sweep. The flare is designed to the latest American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), and NFPA guidance, and it is designed to stay lit under even the most extreme circumstances—it can withstand 122 mph winds and 30+ inches of rainfall per hour. Finally, the location of the flare outside of fire code areas will minimize the potential risks in the highly unlikely event of a malfunction.

Q: A discussion related to the use of open control systems (flares were given as an example in the comments) versus closed control systems (based on the comments, presumed to mean capture or storage devices).

A: Croda plans to voluntarily install a dual-stage, elevated smokeless steam-assist flare that is capable of destroying any VOCs routed to it on a non-continuous, as needed basis. This design was chosen following a rigorous 18-month evaluation of multiple options. Scrubbers were evaluated but found to be ineffective for non-EO VOCs like ethylene and ethanol. Only combustion devices were found to be effective for all VOCs. Croda then evaluated Totally Enclosed Ground Flares, Elevated Flares, and Thermal Oxidizers. Totally Enclosed Ground Flares were eliminated from further consideration because the flare vendor confirmed the possibility of elevated safety risks if used in EO service. A Thermal Oxidizer was eliminated from further consideration due to the large amount of Natural Gas that would be required to keep it constantly operating on standby and the resulting air emissions, including CO2. Croda worked with the flare vendor to select the flare that minimizes safety risks, maximizes VOC destruction efficiency, and minimizes the amount of Natural Gas needed for standby.



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Mr. Eric Rowland, Engineer
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