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

DATE: MAY 16 2019

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
East Dubuque Nitrogen Fertilizers, East Dubuque, Illinois

FROM: Marie St. Peter, Environmental Engineer
AECAB (MN/OH)

THRU: Brian Dickens, Section Chief
AECAB (MN/OH)

TO: File

BASIC INFORMATION

Facility Name: East Dubuque Nitrogen Fertilizers (FKA Rentech)

Facility Location: 16675 Highway 20 West, East Dubuque, Illinois

Date of Inspection: March 15, 2019

EPA Inspector(s):
1. Marie St. Peter, Environmental Engineer
2. Alexandra Letuchy, Environmental Engineer

Other Attendees
1. Philip G. Crnkovich, Environmental and Security Staff, East Dubuque Nitrogen Fertilizers
2. John Williams, Turnaround Superintendent, East Dubuque Nitrogen Fertilizers

Contact Email Address: pcrnkovich@cvrenergy.com

Purpose of Inspection: Clean Air Act inspection

Facility Type: Nitrogenous fertilizer production

Arrival Time: 9:45 AM
Departure Time: 2:30 PM

Inspection Type:

☒ Unannounced Inspection

☐ Announced Inspection

Opening Conference

☒ Credentials Presented

☒ CBI warning to facility provided

The following information was obtained verbally from East Dubuque Fertilizer Staff.

Process Description:

East Dubuque Nitrogen Fertilizers ("the Facility") is a nitrogenous fertilizer manufacturer which produces multiple products. Due to EPA's inspection focusing specifically on the production of ammonia and urea, which are continuous processes, only those processes are described herein.

Regarding ammonia, the production process begins with the delivery of natural gas via a pipeline which must first be desulfurized. Then, the desulfurized natural gas, along with steam, is sent to the primary reformer for the purpose of converting the natural gas to hydrogen and carbon dioxide. Once converted, this process gas is routed to the secondary reformer, wherein air is also added for the purpose of having a final synthesis gas with a sufficient nitrogen to hydrogen ratio i. The process gas is then cooled before being sent to two shift converters. The high temperature shift convertor, which is an iron catalyst bed, is first and converts carbon monoxide (which is also produced in the primary reformer) to carbon dioxide. The low temperature shift convertor, which is a copper catalyst bed, is next. Passing the process gas over the catalyst bed reduces its temperature before being routed through a hot potassium carbonate scrubber. The purpose of this scrubber is to absorb a large amount of the carbon dioxide in the shift gas. This absorbed carbon dioxide is then released from the scrubbant by being sent through a desorption column. Once the carbon dioxide is removed, the shift gas is sent through a methanator which converts any remaining residual carbon dioxide back to natural gas. After this step is completed, the final synthesis gas is compressed to 4300 psi and then passed through a 3-bed iron conversion catalyst which results in the formation of ammonia. This ammonia is then dropped out from the synthesis gas, and stored or immediately used elsewhere.

For the production of urea, the raw materials required are ammonia and carbon dioxide. These two materials are first mixed together in a high-pressure reactor to create ammonium carbamate. Given some time, and some mixing, a large portion of the ammonium carbamate then becomes urea (and water). This mixture is then sent through a series of three decomposers and heated to drive off any remaining ammonium carbamate. The liquid urea-water mixture is then separated out, and can be further refined in a granulation process or used in the production of urea ammonium nitrate (UAN). The granulation process produces a solid type of urea and is created by first pumping urea into an evaporator bed. Then, the urea melt along with UF-85, a type of formaldehyde-containing resin, is sent through the granulation drum. The production of UAN consists of blending urea and ammonium nitrate (which is also made on site) together.

Staff Interview: The low temperature shift convertor used by the Facility is a low-methanol catalyst. According to an engineering study completed by the Facility, the Facility was able to establish its 55 tons per hour/1320 tons per day (tpd) ammonia production limit because it correlates to a volatile organic matter (VOM) emission rate of 8 pounds VOM per hour. The facility's actual daily production rate, however, is lower than this amount. Of the ammonia produced, more than half of it is immediately sent to storage. The remaining ammonia is immediately directed elsewhere within the plant, including the urea service area. Though rare, in situations where necessary the urea service area is able to receive ammonia which is located in a storage tank. It was estimated that the majority of carbon dioxide produced during the ammonia production process is consumed by the urea service area. The only area of the plant subject to any form of an LDAR program is the granulation process.

For planned turnarounds, all areas of the Facility go down at the same time. If the ammonia service area goes down due to a malfunction or other similar scenario, the urea service area is also required to stop due to its consumption of carbon dioxide produced during the ammonia production process.

TOUR INFORMATION

EPA toured the facility: Yes

Data Collected and Observations: US EPA toured the ammonia and urea service areas.

Photos and/or Videos: were not taken during the inspection.

Field Measurements: were not taken during this inspection.

CLOSING CONFERENCE

EPA stated that it would likely request the following documents following the inspection:

- Copy of methanol testing
- LDAR start date

SIGNATURES

Report Author: [signature] Date: 5/14/2019

Section Chief: [signature] Date: 5/16/19