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ENVIRONMENTAL PROTECTION DIVISION

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NARRATIVE

TO: Eric Cornwell

FROM: Heather Brown

DATE: July 21, 2020

Facility Name:	Innovative Chemical Technologies, Inc.
AIRS No.:	01500142
Location:	Cartersville, GA (Bartow County)
Application #:	27375
Date of Application:	December 18, 2019; Revised January 2020 and April 2020

Background Information

Innovative Chemical Technologies, Inc. (ICT) owns and operates a chemical mixing and manufacturing facility located at 103 Walnut Grove Road, Cartersville, Georgia 30120 (Bartow County). The facility is exempt from permitting in accordance with Air Quality Rules Chapter 391-3-1-.03(6) based on the operation of exempt equipment and on facility wide potential to emit calculations. However, because the facility uses ethylene oxide (EtO), EPD requested a permit application. The application was received on December 27, 2019. A revised application was received via email on January 16, 2020 and on April 3, 2020.

Purpose of Application

The purpose of Application no. 27375 is to permit and establish limits for the use of EtO at the source. A public advisory was not required because there is no change in emissions from the facility as a result of the application.

Facility Description
The ICT facility consists of 15 storage tanks, 11 mix tanks, 13 reactors of various sizes, and two natural gas-fired boilers (5.02 MMBtu/hr and 5.86 MMBtu/hr). ICT primarily conducts chemical manufacturing and mixing operations. Some of the reactors are connected to a wet scrubber system for workplace odor control. ICT manufactures a large number of liquid products including Flexisperse and Flexipel series products. The primary hazardous air pollutant (HAP) in the product lines is methyl methacrylate (MMA). The raw material MMA is stored in a bulk storage tank. Other raw materials are received and stored in smaller containers such as totes, drums, and/or bags. Process losses and the use of storage tanks result in emissions of volatile organic compounds (VOC) and HAPs. In addition, the operation of the natural gas-fired boilers results in combustion emissions.

EtO Emissions

EtO emissions are related to the manufacture of non-ionic surfactant products. They are produced only in Reactor No. 11 (Source Code R-11).

ICT typically receives 7 cylinders of EtO at a time. Each cylinder contains 400 pounds of EtO, for a total of 2,800 pounds. The facility palletizes the cylinders and bands them together. They are then placed into a holding area for up to a week. When the facility is ready to use EtO, the cylinders are placed on a scale and hooked up to the delivery lines. Each line is pressurized with nitrogen and soap tested. A sniffer test using a Draeger tube is also conducted around the fittings.

The facility then places catalysts and specific alcohols into the reactor. The reactor is then inerted and soap tested. Heat is added, held, then EtO is added under pressure. There is an additional sniff test during the EtO addition. As each cylinder is emptied, nitrogen begins entering with the EtO. The operator will shut the line from the cylinder based on the mixing/flow in the line between EtO and nitrogen.

Each batch uses 1,400 pounds of EtO. After the reaction is complete (about 9 hours per batch), a vacuum is pulled on the tank. The vacuum vent is sent to a receiver tank. A condenser is used to phase change the vacuum gas. The empty lines from the cylinders are also evacuated to the reactor prior to removing the lines between the cylinder and reactor.

The non-ionic surfactant product is sold as is or is used as a raw material for other products made at the facility.

Equipment List

Mixing Tanks and Reactors

Emission Units		Associated Control Devices	
Source Code	**Description**	**Source Code**	**Description**
MT-1	Mixing Tank No. 1 – 400 gallons	None	None
MT-2	Mixing Tank No. 2 – 600 gallons	None	None
MT-3	Mixing Tank No. 3 – 8,400 gallons	None	None
MT-4	Mixing Tank No. 4 – 1,500 gallons	None	None
MT-5	Mixing Tank No. 5 – 2,500 gallons	None	None
MT-6	Mixing Tank No. 6 – 5,500 gallons	None	None
MT-7	Mixing Tank No. 7 – 5,500 gallons	None	None
MT-8	Mixing Tank No. 8 – 400 gallons	None	None
MT-9	Mixing Tank No. 9 – 1,000 gallons	None	None
MT-10	Mixing Tank No. 10 – 300 gallons	None	None
MT-11	Mixing Tank No. 11 – 10 gallons	None	None
R-1	Reactor No. 1 – 5,000 gallons	None	None
R-2	Reactor No. 2 – 1,750 gallons	None	None
R-3	Reactor No. 3 – 1,000 gallons	None	None

Emission Units		Associated Control Devices	
Source Code	**Description**	**Source Code**	**Description**
R-4	Reactor No. 4 – 400 gallons	None	None
R-5	Reactor No. 5 – 3,800 gallons	None	None
R-6	Reactor No. 6 – 150 gallons	None	None
R-7	Reactor No. 7 – 500 gallons	None	None
R-8	Reactor No. 8 – 350 gallons	None	None
R-9	Reactor No. 9 – 80 gallons	None	None
R-10	Reactor No. 10 – 30 gallons	None	None
R-11	Reactor No. 11 – 350 gallons	None	None
R-14	Reactor No. 14 – 130 gallons	None	None
R-15	Reactor No. 15 – 2,000 gallons	None	None

Storage Tanks

Source Code	Capacity (gallons)	Contents	True Vapor Pressure
BT-1	9,500	Methacrylic Acid	<10 mmHg
BT-2	9,500	Stearyl Acrylate	<10 mmHg
BT-3	7,500	Sulfuric Acid	<10 mmHg
BT-4	9,500	Methyl Methacrylate	28 mmHg
BT-5	6,500	Wastewater	<10 mmHg
BT-6	9,500	Wastewater	<10 mmHg
BT-7	12,000	Flexisperse PM-25	<10 mmHg
BT-9	4,400	Empty	<10 mmHg
BT-10	4,400	Caustic Soda, 50%	<10 mmHg
BT-11	4,400	Zinc/Metals Rinse	<10 mmHg
BT-14	4,400	DI Water	n/a
BT-15	4,400	DI Water	n/a
BT-19	4,400	Flexipel HR-A Series PHM*	<10 mmHg
BT-20	10,000	Flexisperse PM-25*	<10 mmHg
BT-21	10,000	Flexipel SR-30*	<10 mmHg

*These solutions are mixtures of polymers in water.

Fuel Burning Equipment

Source Code	Input Heat Capacity (MMBtu/hr)	Description
B-1	5.02	Boiler No. 1 – Natural Gas Fired
B-2	5.86	Boiler No. 2 – Natural Gas Fired

Emissions Summary

VOC, HAP, and Combustion Emission Calculations

The ICT facility manufactures a large number of products. The facility examined the top 25 products manufactured in 2018 (by pounds produced) to estimate the site's VOC and HAP emissions. The top 25 products comprise 78% of the facility's total production. The production weight of the products was then scaled up to estimate the weight as if the products were equal to the facility's total production. The weights were also increased further to account to potential growth. Process emissions were calculated based on process losses, batch data, and safety data sheets for each product. A control efficiency from the odor control scrubber was not included in the calculations. Emissions from tank BT-4 were estimated using EPA Tanks 4.0.9d. All other bulk storage tanks are exempt from permitting; therefore, the negligible emissions are not included in the table. The boilers are also exempt from permitting because they are rated at less than 10 MMBt/hr and burn natural gas. These emissions are also not included in the table below.

EtO Calculations

EtO is used in Reactor No. 11 (R-11) as a reactant for the production of non-ionic surfactants. The reactor is pressurized during the reaction. Following reaction, the reactor is vented to the atmosphere. Most EtO emissions from this process occur from the venting of any remaining EtO vapors in the reactor's headspace. The reactor is purged with nitrogen to remove any remaining vapors. EtO emission rates were estimated from stack testing performed at the facility on November 6, 2019. During this stack test, concentrations were determined for the reactor stack during venting and the reactor vacuum pump exhaust during purging of the reactor. In addition, concentrations were determined for several sample collection points around the site to account for any fugitive emissions.

The reactor stack and vacuum pump exhaust samples were collected for the duration of one hour. Short term (hourly) emissions rates were determined by multiplying the sample concentration by the sample volume. Long term (annual) emissions were determined by multiplying the hourly rate by the number of batches per year.

Other samples were collected from different locations around the site. Fugitive emissions were conservatively estimated based on the maximum concentration collected within one hour. Short term (hourly) emissions rates were determined by multiplying the sample concentration by the volume of the building where Reactor No. 11 is located. Long term (annual) emission rates were determined by multiplying the hourly rate by the number of batches per year and the hours per batch (conservatively assuming that fugitive emissions occur during the entire batch).

The potential EtO emissions are based on 60 batches of surfactant per year with 1,400 pounds of EtO used per batch. These limits have been placed in the permit.

Facility-Wide Emissions
(in tons per year)

Pollutant	Potential Emissions
$PM/PM_{10}/PM_{2.5}$	0.21[1]
NOx	0
SO_2	0
CO	0
VOC	2.25
Max. Individual HAP	1.64[2]
Ethylene Oxide	1.9E-5 (0.038 lb/yr)
Total HAP	1.99

[1]Metal PM related to the process; [2]Methyl methacrylate.

Regulatory Applicability

There are no specific rules or regulations that apply to the use of EtO at this source. The permit limits batches of non-ionic surfactants using EtO and the amount of EtO used in each batch such that potential emission are 0.038 pounds of EtO per year.

40 CFR 63 Subpart VVVVVV – National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chemical Manufacturing Area Sources

In accordance with 40 CFR 63.11494(a), 40 CFR 63 Subpart VVVVVV applies to a facility if it operates a chemical manufacturing process unit (CMPU) that is located in an area source of HAP, and if the CMPU uses, processes, or produces any HAP listed in Table 1 of the rule. The facility satisfies the definition of a CMPU, and it does process/produce chromium compounds in the Flexipel manufacturing processes. Therefore, the rule is applicable.

The facility does not use a federally-enforceable control device to maintain emissions at area source levels. Therefore, 40 CFR Part 70 Title V requirements do not apply to the facility.

Management Practices: The management practices listed in 40 CFR 63.11495(a) are not applicable as the process vessels used in the Flexipel manufacturing processes contain only metal HAP (chromium compounds) that are in a liquid solution or other form that will not result in particulate emissions of metal HAP. The facility will follow the General Duty clause as listed in 40 CFR 63.11495(d) at all times by following good air pollution control practices for minimizing emissions.

Standards and Compliance for Process Vents: The process vent standards and compliance requirements listed in 40 CFR 63.11496 do not apply as the process vents from CMPU containing only metal HAP are in liquid solution or other form that will not result in particulate matter emissions of metal HAP (40 CFR 63.11496(f)).

Notification Requirements: An initial notification and a notification of compliance status (NOCS) are required to be submitted. Application No. 27375 application acts as an initial notification as per 40 CFR 63.9(b)(1)(iii) and a notification of actual date of startup of the Flexipel manufacturing operations as required by 40 CFR 63.9(b)(4)(v) to Georgia EPD. In addition, the application acts as a NOCS. The facility complies with the General Duty clause as listed in 40 CFR 63.11495(d) at all times by following good air pollution control practices for minimizing emissions. A separate notification will be submitted to EPA Region IV.

Recordkeeping: The facility will maintain all documentation related to the Flexipel production operations for a period of 5 years.

Georgia Rule 391-3-1-.02(2)(b) – Visible Emissions
Georgia Rule (b) limits visible emissions from processes to less than 40 percent opacity. The facility is expected to be in compliance with this rule because particulate materials are used in liquid solutions.

Georgia Rule 391-3-1-.02(2)(d) – Fuel-burning Equipment
Georgia Rule (d) limits the opacity of emissions from the boilers and limits particulate matter emission from the boilers. The facility is in compliance with these requirements because the boilers only burn natural gas. The rule will not appear in the permit because the boilers are exempt from permitting.

Georgia Rule 391-3-1-.02(2)(e) – Particulate Emissions from Manufacturing Processes
Georgia Rule (e) limits particulate matter emissions from manufacturing process based on in the input rate weight. The facility is expected to be in compliance with this rule because particulate materials are used in liquid solutions.

Georgia Rule 391-3-1-.02(2)(g) – Sulfur Dioxide
Georgia Rule (g) limits the sulfur content of fuel burned in the boilers to less than 2.5% by weight. The facility is in compliance with these requirements because the boilers only burn natural gas. The rule will not appear in the permit because the boilers are exempt from permitting.

Georgia Rule 391-3-1-.02(2)(n) – Fugitive Dust
Georgia Rule (n) limits the opacity of particulate matter emissions from fugitive sources to less than 20 percent. A facility will be in compliance with this rule through good housekeeping.

Georgia Rule 391-3-1-.02(2)(vv) – Volatile Organic Liquid Handling and Storage
Georgia Rule (vv) requires a tank greater than 4,00 gallons storing a volatile organic liquid in Bartow county to use submerged fill pipes. The facility uses submerged fill pipes.

Non-Applicable Regulations
40 CFR 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Unit: The facility is not subject to this regulation because the boilers are less than 10 MMBtu/hr.

40 CFR 60 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984: The facility is not subject to this regulation because the capacity of the tanks at the plant are less than 19,813 gallons.

40 CFR 60 Subpart VV – Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for which Construction, Reconstruction, or Modification Commenced After January 5, 1981, and on or Before November 7, 2006 and 40 CFR 60 Subpart VVa – Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006: The facility is not subject to equipment leak provisions for VOC under these regulations because they do not produce any chemicals listed in 40 CFR 60.489.

40 CFR 60 Subpart RRR – Standards of Performance for Volatile Organic Compound Emissions From Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes: This regulation does not apply because the standard does not apply to batch reactors.

40 CFR 63 Subpart JJJJJJ – National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources: The boilers are not subject to this regulation because they only burn natural gas.

40 CFR 63 Subpart BBBBBBB – National Emission Standards for Hazardous Air Pollutants for Area Sources: Chemical Preparations Industry: The rule does not apply because the facility does not operate under the source category that meets the definition of "chemical preparations".

Georgia Rule (lll) – NO_X Emissions From Fuel-Burning Equipment: This rule does not apply because although the boilers are located in Bartow County, they are smaller than 10 MMBtu/hr.

Permit Conditions

Conditions 1.1 through 1.5 are general provisions at apply to minor sources.

Conditions 2.1 and 2.2 limit the number of batches of non-ionic surfactant using EtO to no more than 60 batches during any consecutive 12-month period and limits the amount of EtO used in each batch to 1,400 pounds. This results in total potential EtO emissions of 0.038 pounds per year.

Conditions 2.3 and 2.4 require the facility to comply with 40 CFR 63 Subpart VVVVVV and 40 CFR 63 Subpart A for the operation of the Flexipel Product Series processes.

Condition 2.5 requires the facility to comply with the good operating practice provisions of 40 CFR 63 Subpart VVVVVV.

Conditions 2.6 and 2.7 require the facility to comply with Georgia Rule (b) and Georgia Rule (e) for all applicable processes.

Condition 2.8 requires the facility to use submerged fill pipes as specified in Georgia Rule (vv) for tanks larger than 4,000 and storing a volatile organic liquid.

Condition 3.1 is a general provision that requires the facility to comply with Georgia Rule (n).

Condition 5.1 is general condition that applies to all sources.

Condition 5.2 requires the facility to implement a Leak Detection and Repair Program for the handling and use of EtO. The purpose of the program is to minimize fugitive emissions.

Condition 6.1 is general testing language that applies to all sources.

Conditions 7.1 through 7.5 require the facility to maintain records and provide reports for the number of batches of non-ionic surfactant using EtO produced, the amount of EtO used in each batch, and the total amount of EtO emitted. The records and reports are used to demonstrate compliance with the limits in Conditions 2.1 and 2.2.

Condition 7.6 requires the facility to report all unpermitted releases of EtO to the EPD.

Conditions 7.7 and 7.8 require the facility to maintain records and submit reports as specified in 40 CFR 63 Subpart VVVVVV.

Condition 8.1 is a general provision that applies to all sources.

Toxic Impact Assessment

A TIA is not required because the facility is exempt from permitting and the application is not for an increase in potential emissions.

Summary & Recommendations

I recommend the issuance of Air Quality Permit No. 2843-015-0142-B-01-0 for the operation of the Innovative Chemical Technologies, Inc. facility on Walnut Grove Road, Cartersville, Bartow County. The facility will be inspected by the Stationary Source Compliance Program. The application did not require a public advisory. The permit allows for the operation of the existing equipment and includes limits for the usage of EtO. The facility is classified as a true minor source.