

Engineering Analysis
Nelson Brothers, LLC
414-0010

Introduction

On April 29, 2021, the Department received an air permit application from ALL4, LLC on behalf of Nelson Brothers, LLC which is located in Parrish, Alabama. The application requested that Nelson Brothers be allowed to expand its existing specialty chemicals production facility by adding two new batch reactors (R-700 and R-900) with an associated process heater, a new solvent recovery unit, and 5 new storage tanks. An evaluation of the potential emissions from the entire facility after the proposed expansion has led to the determination that enforceable restrictions would now be required for the facility in order for the plant to be considered a synthetic minor source for both PSD and Title V. Therefore, the facility is requesting that Synthetic Minor Operating Permits (SMOP) be issued to ensure that the facility continues to be considered a minor source. Additional information concerning this project was received on June 11, 2021, August 10, 2021, September 15, 2021, September 23, 2021, October 13, 2021, and October 19, 2021.

Process Equipment

The following major equipment would be associated with the Nelson Brothers Facility after the proposed expansion:

- 1) 11 Batch Reactors (R-50, R-100, R-150, R-200, R-300, R-400, R-500, R-600, R-700, R-800, and R-900)
- 2) 57 Fixed Roof Storage Tanks
- 3) Two – 2.94 MMBTU/hr propane fired boilers
- 4) Ten Hot Oil Heaters ranging in size from 1.36 MMBTU/hr to 5.37 MMBTU/hr
- 5) Five Blend Tanks
- 6) Solvent Recovery Unit
- 7) Seven emergency generators ranging in size from 122 HP to 583 HP

Control Equipment

Batch Reactors (R-50, R-150, R-300, R-400, R-600, R-700, and R-900) would each be required to send its process vent to a static scrubber for control when producing products that utilize the raw material maleic anhydride. The facility currently utilizes a total of three scrubbers to control emissions. The scrubbers include the R-50 scrubber, the R-150/600 scrubber, and the R-300/400 scrubber. The facility also currently utilizes a fourth scrubber (R-800). However, this scrubber is only utilized to reduce ammonia emissions and has no control for VOCs. The expansion project would add two additional scrubbers to control emissions from the R-700 and R-900 Reactors. Nelson Brothers would be required to take restrictions on scrubbers R-50, R-150/600, R-300/400, R-700, and R-900 in order to limit the potential emission rate of the HAP maleic anhydride to below the significance threshold of 10 TPY. Batch Reactors R-100, R-200, and R-500 do not utilize the raw material maleic anhydride and vent to the atmosphere. Scrubbers R-

50, R-150/600, R-300/400, R-700, and R-900 would be required to maintain a pH greater than 4.0 in order to ensure a control efficiency of 90% is maintained when receiving maleic anhydride emissions.

In order to ensure the potential emissions from the facility are less than major source thresholds for both PSD and Title V, Nelson Brothers has committed to the implementation of an LDAR program similar to 40 CFR Part 60, Subpart VVa for all components in VOC service. The proposed LDAR program emphasizes the monitoring of heavy liquid components which make up a majority of the components in VOC service at the facility. The implementation of the LDAR program would result in a minimum control efficiency of 87% for fugitive VOC emissions compared to average SOCOMI Emission Factors.

Emissions

The emissions from the reactors, associated tanks, boilers, and emergency generators would consist of VOCs (HAP & Non-HAP), Particulate Matter (PM/PM10/PM2.5), NOx, CO, and SO2. The controlled emission rates from all emission sources at Nelson Brothers are included in the table below.

Pollutant (TPY)	Reactors	Tanks	Boilers/Heaters	**Generators	Fugitives
PM/PM10/PM2.5			1.50	0.18	
*VOC	61.61	0.41	2.11	3.48	9.68
NOx			27.38	3.48	
CO			15.79	3.20	
SO2			0.04	1.07	
Total HAP	2.01	0.16	0.01	0.01	3.10

*VOC estimates include HAP - VOC emissions

**Based on 500 hr/yr of operation

The total controlled emission rates in TPY from the facility by pollutant are listed in the table below. Potential minor discrepancies from this analysis to the application are due to rounding/emission factor differences.

	*PM (TPY)	SO2 (TPY)	NO2 (TPY)	VOC (TPY)	CO (TPY)	**HAPS
Reactors				61.61		2.01
Tanks				0.41		0.16
Boilers/Heaters	1.50	0.04	27.38	2.11	15.79	0.01
Generators	0.18	1.07	3.48	3.48	3.20	0.01
Fugitives				10.18		3.60
Total Emissions	1.68	1.11	30.86	77.79	18.99	5.79

*In order to be conservative, it is assumed that all PM emitted from the facility would be smaller than PM10 & PM2.5. A more refined breakdown of PM emissions would be unnecessary since the allowable PM emissions would be less than 100 TPY.

**Since the potential total HAP emissions would be less than 10 TPY a detailed breakdown of HAPs would not be required.

PSD

Nelson Brothers is listed as a chemical process plant under ADEM Rules and Regulations. Therefore, in order for the facility by itself to be considered a major source with respect to PSD, the potential emissions of criteria pollutants from this facility would be required to be greater than 100 TPY. The definition of a major stationary source may be found under 335-3-14-.04 of the ADEM Code of Regulations. Since there would be no pollutant's that would be potentially emitted in amounts greater than the major source threshold, this facility would be considered a synthetic minor source with respect to PSD.

Title V

In order to be considered a major source with respect to Title V, a facility must have the potential to emit either greater than 100 TPY of any criteria pollutant, greater than 10 TPY of any one hazardous air pollutant (HAP), or greater than 25 TPY of total HAPs. The Nelson Brothers facility would not exceed any of these thresholds. Therefore the facility would be considered a synthetic minor source with respect to Title V.

NSPS

Several New Source Performance Standards were reviewed for possible applicability to this facility. These are summarized below.

Subpart NNN

Since there are no distillation columns associated with this facility, it would not be subject to 40 CFR Part 60, Subpart NNN.

Subpart RRR

Nelson Brothers would utilize ten reactor systems that produce products for the explosives industry. A review of 40 CFR Part 60, Subpart RRR was performed and it was determined that no product listed in this Subpart would be produced at the facility. Additionally, all reactors utilized at the facility are batch processes which are exempt from the requirements of this regulation. Therefore Subpart RRR would not apply to any part of this facility.

Subpart VVa

The proposed facility would not be subject to 40 CFR Part 60, Subpart VVa since it will not produce as an intermediate or final product any compound listed in 40 CFR 60.489.

However, in order to limit VOC/HAP emissions to levels below the significance threshold (100 TPY VOC, 10 TPY single HAP, and 25 TPY total HAPs), Nelson Brothers would implement an LDAR program that has been deemed equivalent to Subpart VVa by the Department. By implementing this program, Nelson Brothers would be allowed to reduce its potential VOC/HAP emissions from components in VOC/HAP service by 87%.

Kb

After the proposed expansion, Nelson Brothers would maintain 57 VOC containing storage tanks at the facility. Twenty-four of these tanks would not meet the minimum size capacity (19,810 gallons) to be potentially subject to 40 CFR Part 60, Subpart Kb. Thirty-one of these storage tanks would have a capacity greater than 19,810 gallons but less than 39,890 gallons. All these vessels would store a material with a vapor pressure less than 2.18 psia and, therefore, would not be subject to Subpart Kb. The remaining vessel is greater than 39,890 gallons but would store a VOC with a vapor pressure less than 0.51 psia. Therefore, all tanks at the facility would not be subject to 40 CFR Part 60, Subpart Kb.

Dc

Nelson Brothers would operate two 2.9 MMBTU/hr propane boilers. Subpart Dc is potentially applicable to boilers that are greater than 10 MMBTU/hr. Therefore, this regulation would not apply to these boilers.

III

The seven emergency generators at the facility would be subject to 40 CFR Part 60, Subpart III. Nelson Brothers would be required to maintain a certificate of conformity documenting that the proposed generators are certified and capable of meeting the emission standards for VOC, NO_x, CO, and PM specific to the size of each generator.

JJJ

None of the seven generators utilized at the facility would be classified as Spark Ignition Generators. Therefore Subpart JJJ would not apply to any of these generators.

NESHAPs

No regulations listed in 40 CFR Part 61 were determined to apply to this facility.

Since Nelson Brothers would be considered an area source (less than 10 TPY of any single HAP and less than 25 TPY of total HAPs), only the area source MACTs found in 40 CFR Part 63 were reviewed for potential applicability.

JJJJJ

The two 2.94 MMBTU/hr propane fired boilers at Nelson Brothers were reviewed for potential applicability to Subpart JJJJJ. Subpart JJJJJ does not apply to boilers that fire Gas 1 fuels. Propane is defined as a Gas 1 fuel. Therefore, these boilers would not be subject to this regulation

VVVVVV

The National Emission Standards for Hazardous Air Pollutants for Chemical Manufacturing Area Sources was reviewed for possible applicability to this facility. Nelson Brothers does not produce or use any of the HAP compounds listed in this regulation; therefore, the regulation would not apply.

ZZZZ

The proposed generators would be subject to 40 CFR Part 63, Subpart ZZZZ. 40 CFR 63.6590(c)(1) states that new emergency generators at an area source must meet the requirements of ZZZZ by meeting the requirements of 40 CFR Part 60 Subpart III. Since Nelson Brothers would be considered an area source for HAPs, the facility would comply with Subpart ZZZZ by complying with 40 CFR Part 60, Subpart III.

Since the proposed generators have been defined as emergency use only, the generators would be required to operate less than 100 hours per year for maintenance checks and testing. The proposed generators would also be required to keep records of hours of operation and a log book explaining each use of the generator. Nelson Brothers has also chosen to limit the usage of each generator to less than 500 hours per year for PSD applicability.

State Regulations

None of the storage tanks at Nelson Brothers would be subject to ADEM Administrative Code 335-3-6-.03(1) since the vapor pressures of all the materials stored in these tanks would be less than 1.5 psia.

The two boilers and the 10 process heaters at the facility would be subject to the fuel burning regulations found in ADEM Administrative Code 335-3-4-.03(1) for particulates and 335-3-5-.01(1)(b) for SO₂. Nelson Brothers would comply with these restrictions by limiting the boilers and heaters to burning propane only.

Nelson Brothers would be subject to the Opacity Standards list in ADEM Admin Code 335-3-4-.01(1). All emission sources would be limited to an opacity standard of 20% based on a six minute average except for one six minute period each hour which may exceed 20% but cannot exceed 40%.

Class I

Nelson Brothers is located approximately 64 km from the nearest Class I area (Sipsey). Since the emissions from this facility are below levels considered significant for PSD, there should not be any significant impact on this Class I area.

Odors

Odors from the Nelson Brothers facility would be minimized by the use of 4 scrubbers and by the implementation of a Subpart VVa equivalent LDAR program. Additionally, the Department is not aware of any odor complaints being received concerning Nelson Brothers. Therefore, odors should not be an issue concerning this facility.

112(r)

Nelson Brothers submitted information concerning the applicability of the requirements found in 112(r) – Chemical Accident and Prevention Provisions to its proposed facility. Nelson Brothers currently uses one chemical (ammonia) listed in these regulations. Nelson Brothers would utilize this chemical in sufficient quantities that the facility would be required to prepare a risk management program for this compound. Nelson Brothers would also be subject to the General Duty Clause of 112(r) and has designed the facility to meet all EPA and OSHA standards. The 112(r) program is currently under the authority of the EPA and not the State of Alabama.

Recommendation

Since it appears that this facility would be capable of meeting all applicable State and Federal regulations, I recommend that permits with the attached provisos be issued to Nelson Brothers, pending the results of a public notice. The description of the permitted units and corresponding permit numbers are included below.

414-0010-X001 – Specialty Chemicals Production Facility with 11 Batch Reactors (R-50, R-100, R-150, R-200, R-300, R-400, R-500, R-600, R-700, R-800, and R-900) with associated Heating Equipment, Storage Tanks, and Solvent Recovery System with 6 Scrubbers (R-50, R-150/600, R-300/400, R-700, R-800, and R-900 for Control

414-0010-X002 – Seven Emergency Compression Ignition Diesel-Fired Reciprocating Internal Combustion Engines (122 HP, 158 HP, 232 HP, 237 HP, 237 HP, 511 HP, and 583 HP)

Will Bacon
Chemical Branch
Air Division

October 22, 2021
Date

WAB:wab