

Engineering Analysis
Linde Gas North America, LLC
Facility No. 712-0072
Synthetic Minor Operating Permit

On October 29, 2018, Linde Gas North America, LLC (Linde) submitted an air permit application requesting synthetic minor permit limitations for the entire facility located in Decatur, Alabama. Due to the previous rules concerning greenhouse gas (GHG) emissions, Linde currently holds a title V Major Source Operating Permit; however, the facility's current potential emissions of all criteria pollutants are below the respective major source thresholds.

Permit Background

Linde was issued a synthetic minor operating permit on September 27, 2000 for the construction of a hydrogen gas generation plant which would include 2 hydrogen reformers, a low pressure boiler, and pressure swing absorption (PSA) towers.

Due to an increase in production and adiponitrile flasher tails (AFT) firing, Linde was issued a PSD Permit on November 12, 2002. Linde was classified as a major source with respect to PSD and Title V for NO_x. The BACT analysis resulted in permit limits for NO_x for the hydrogen reformers of 45.0 lb/hr (3-hour average) and 0.31 lb/MMBtu (3-day rolling average). The BACT analysis for the low pressure boiler required the facility to operate the boiler with good combustion practices.

Due to the facility being classified as a major source of NO_x, Linde was issued a Title V Operating Permit on September 11, 2006.

The Department made an administrative amendment to the Title V and issued the modified Title V on January 25, 2008. It was noted that the modification was a name change.

Linde was issued synthetic minor operating permits 712-0072-X001 (hydrogen reformers) and X002 (low pressure boiler) on February 22, 2010. Linde had ceased firing the AFT fuel in the low pressure boiler. Additionally, the SNCR controls required by BACT had reduced the NO_x emissions from the facility to below major source thresholds. Since Linde had historically had issues with catalyst poisoning in the SCR due to phosphorous in the AFT fuel, the facility had proposed to remove the SCR and control the emissions from the reformer and low pressure boiler with the SNCR only. Linde proposed a 23.1 lb/hr (99 TPY) limit on the reformers and the low pressure boiler in order to remain below major source thresholds. It is noted that since the unit was physically modified by removing the SCR, that the BACT permit requirements were

removed for the reformers only. The low pressure boiler maintained the requirement to operate with good combustion practices.

On February 22, 2013, Linde was issued Air Permit 712-0072-X003 for the No. 2 Hydrogen Gas Generation Plant. Based on new data, increased purity of the AFT fuel, and better combustion practices, Linde proposed to include the entire facility (No. 1 Hydrogen Gas Generation Plant, No. 2 Hydrogen Gas Generation Plant, and Low Pressure Boiler) under the 99 TPY NO_x limit previously taken on the units on site.

On May 19, 2014, Linde was issued its current Title V permit due to applicability of the facility to the major source thresholds of greenhouse gases (GHG).

On March 2, 2015, a 502(b)(10) and administrative modification to the Title V was issued to Linde in order to modify the net heating value for the No. 2 Hydrogen Gas Generation Plant and fix various erroneous references and typos.

On May 10, 2018, Linde was issued its current Air Permits X004 and X005 for the No. 1 Hydrogen Gas Generation Plant with Low Pressure Boiler and No. 2 Hydrogen Gas Generation Plant, respectively. Linde proposed to remove the requirements to monitor the ammonia injection rate and to determine compliance for NO_x emissions through the existing continuous emissions monitoring system (CEMS).

Process Changes

Linde has not proposed any additional changes to the facility's current processes. Since Linde had previously limited the NO_x emissions to less than major source thresholds (see Engineering Analysis dated May 10, 2018), no additional changes to the permit are required as a result of the proposed modification.

Emissions

There is expected to be no increase in emissions as a result of the proposed modification. The plant wide emission totals are presented below for informational and reference purposes for the discussion in the Title V section below. It is noted that the NO_x emission rate listed below is the maximum allowed by regulation (99 TPY in order to remain a synthetic minor source).

Linde has stated that the reason for the decrease in NO_x emissions from previous estimates is due to the continually increasing quality in the by-product fuel (AFT) and increased accuracy in the data which has been collected during the life of the plant using the NO_x CEMS associated with the No. 1 Hydrogen Gas Generation Plant's reformer and low pressure boiler.

Pollutant	Emissions (TPY)
PM ¹	4.74
CO	15.74
NO _x	99 ²
SO ₂	1.98
VOC	10.35
HAP	7.69
Single HAP	3.58
GHG (as CO ₂ e)	269,436

Note 1: Linde conservatively assumes all PM is equal to PM_{2.5}/PM₁₀.

Note 2: Based on permit limit of potential emissions of 99 TPY.

PSD

As stated in ADEM Admin. Code r. 335-3-14-.04(k)1. “GHGs...shall not be utilized in determining if a source is a major stationary source...or in determining if a modification is a major modification...” Additionally, ADEM Admin. Code r. 335-3-14-.04(k)2. states “GHGs shall only be subject to the requirements of this Rule if: (i) A new stationary source or major modification causes a significant emissions increase of GHGs...and a significant net emissions increase of GHGs...and (ii) The new major stationary source or major modification is required to obtain a permit subject to the requirements of this Rule as a result of emissions of regulated NSR pollutants other than GHGs.”

Linde has proposed to limit the potential emissions from the facility to less than the major source thresholds for all pollutants, except GHG, as indicated in the table above. Since the emissions from the facility for all regulated pollutants, except GHG, are less than 100 TPY, Linde would be classified as a minor source with respect to PSD. Therefore, no PSD review would be required.

Linde had previously conducted a PSD review and best available control technology (BACT) review for the No.1 Hydrogen Reformer. It is noted that these requirements were removed during a previous modification in which the reformer was physically modified (see Engineering Analysis dated February 22, 2010).

Administrative Permit Changes

The following permit changes were made since the last issuance of the permits on May 10, 2018.

X006 - No. 1 Hydrogen Gas Generation Plant with Low Pressure Boiler

- 1) *Permit wide* – clarified unit name on each requirement. Any reference to hydrogen reformers within the permit has been replaced with “the No. 1 steam methane reformer”.
- 2) *Proviso No. 27* – Changed language from “common stack of reformers” to “common stack of No. 1 steam methane reformer and low pressure boiler...”.
- 3) *Proviso No. 23* – Added the SO₂ emission rate for fuel burning equipment listed in ADEM Admin. Code r. 335-3-5-.01. This limit was erroneously excluded from the previous permit.
- 4) *Proviso No. 31* – Added requirements for the emergency flare. The flare must meet the minimum design requirements as stated in 40 CFR 60.18. This requirement was erroneously excluded from the previous permits.
- 5) *Proviso No. 42* – The requirement to submit quarterly excess emissions report has been removed. Linde would still be required to submit excess emissions report semiannually as stated in Proviso No. 74. However, since the facility utilizes a continuous emissions rate monitoring system (CERMS) as a compliance determiner and cylinder gas audits (CGA) are required quarterly, no additional reporting should be required. Furthermore the facility would still be required to report any process malfunctions of greater than 1 hour to the Department as stated in Proviso No. 6.
- 6) *Proviso No. 45* – The requirement to submit a quarterly report has been modified to submit semiannual reports detailing the 12-month rolling total NO_x emissions and monitoring systems within 30 days following each semiannual period.

X007 - No. 2 Hydrogen Gas Generation Plant

- 1) *Permit wide* – clarified unit title. Any reference to “hydrogen reformers” within the permit has been changed to “No. 2 hydrogen reformer”.
- 2) *Proviso No. 40* – Changed the syntax of “The average daily input...” to “The total daily input...” in order to accurately represent the compliance indicator for the MMBtu/day limitation on this unit.
- 3) *Proviso No. 41* – The requirement to submit a quarterly report has been modified to submit semiannual reports detailing the 12-month rolling total NO_x emissions and monitoring systems within 30 days following each semiannual period.

Linde is currently subject to 40 CFR Part 60, Subpart Dc. The proposed permit modification would not affect the current applicability of Subpart Dc to the facility. Additionally, since Linde has limited the facility's potential emissions to less than major source thresholds, the facility would not be subject to any regulations applicable to major sources; therefore, no additional changes would be required.

Title V

Linde currently holds a Title V Major Source Operating (Title V) Permit. It is noted that Linde was previously required to obtain a Title V Permit due to the facility emitting greater than the Title V threshold for GHG emissions. Linde has stated that the current potential emissions of the facility would result in the facility being below major source threshold for all pollutants except GHG emissions. ADEM Admin. Code r. 335-3-16-.01(q)3. states "No source shall be considered a major stationary source for the purposes of this Chapter due solely to the emissions of greenhouse gas emissions." Therefore, the facility would be classified as a Synthetic Minor Source with respect to Title V.

SMOP

Since Linde would be a new synthetic minor source, the permit would be required to undergo a 15 day public notice period.

Class I

This facility is located within 100 km of a Class I area, the Sipsey Wilderness Area. Since there is expected to be no increase in emissions as a result of the proposed project, there should be no effect on any Class I area.

Recommendations

Since it appears there would not be a significant increase in emissions as a result of the proposed project, and the facility would be capable of meeting all applicable state and federal regulations, I recommend that an Synthetic Minor Air Permits be issued to Linde for the No. 1 Hydrogen Gas Generation Plant with Low Pressure Boiler and No. 2 Hydrogen Gas Generation Plant. The description of the proposed permits are included below.

712-0072-X006 – No. 1 Hydrogen Gas Generation Plant with Low Pressure Boiler

712-0072-X007 – No. 2 Hydrogen Gas Generation Plant

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Draft
Date