



**Region 6 Compliance Assurance and Enforcement Division
INSPECTION REPORT**

Inspection Date(s):	09/27/2018		
Media:	Water		
Regulatory Program(s)	Clean Water Act		
Company Name:	Linde Gas North America, LLC		
Facility Name:	Linde Syngas Plant		
Facility Physical Location:	11603 Strang Rd		
(city, state, zip code)	La Porte, TX 77571		
Mailing address:	11603 Strang Rd		
(city, state, zip code)	LaPorte, TX 77571		
County/Parish:	Harris County		
Facility Contact:	Terry Phipps	Plant Manager	
	713-767-4150		
FRS Number:			
Identification/Permit Number:	TX0118389		
Media Number:			
NAICS:			
SIC:	2899		
Personnel participating in inspection:			
Michael Williams	EPA/ 6EN-WMH	Inspector	281-983-2150
Chelsey Cobb	Linde Syngas	Environmental	713-767-4175
EPA Lead Inspector Signature/Date			
	Michael D. Williams		Date
Supervisor Signature/Date			
	Carol Peters		Date

Section I - Introduction

PURPOSE OF THE INSPECTION

EPA Region 6 inspector, Michael Williams, arrived at Linde Syngas Plant at 11:24 am on September 27, 2018 for an unannounced inspection. I met with Plant Manager, Terry Phipps. I presented my credentials to Mr. Phipps and informed him that this was an EPA lead Compliance Evaluation inspection to determine compliance with the facility's National Pollutant Discharge Elimination System (NPDES) permit and the Clean Water Act. The scope of the inspection was with permit TX0118389, facility operations and maintenance under the Clean Water Act. The inspection was conducted under the authority of the NPDES permit program, in accordance with the Federal CWA.

The information presented in this report is based on the materials and information supplied by Linde Gas North America, LLC., representatives (the permittee), observations made during the inspection and records and reports maintained by the permittee.

FACILITY DESCRIPTION

The Linde Syngas Facility in La Porte, Texas produces synthesis gas, or syngas, which is a mixture of carbon monoxide and hydrogen. Linde provides the adjacent La Porte Methanol Company, LP facility¹ with carbon monoxide and hydrogen to produce methanol. La Porte Methanol Company is a joint venture between Linde and LyondellBasell, operated by Linde. Crude methanol can also be received from offsite for refining at La Porte Methanol.

The primary process wastewater is from three Syngas partial oxidation units (POX), the Syngas methanol water column bottoms, methanol stripper tail wastewater from methanol production, miscellaneous steam condensate, process area wash downs, and safety shower drains. The miscellaneous steam condensate and process area wash downs are routed to process sewer collection hubs.

The POX wastewater contains ammonia and trace amounts of total organic carbon and total suspended solids. The POX wastewater is routed to an ammonia stripper, then to the neutralization tank, then to the diversion tank. Wastewater in the diversion tank can be routed to the equalization tank. Wastewater from the diversion tank can be provided with additional treatment if needed before routing to the Mid Basin; alternatively, wastewater from the diversion tank can be routed offsite for treatment. Wastewater in the Mid Basin can be transferred to either the West Basin or Aeration Basin and then back to the Mid Basin. Discharge from the Mid Basin is routed to Outfall 001.

The methanol water column bottoms wastewater is generated in the Rectisol Syngas treatment unit. Methanol is used as a solvent in the Rectisol process to absorb acid gas components and remove impurities from raw syngas and the methanol water column removes the final impurities from the loaded methanol stream. The methanol water column bottoms wastewater is routed either to the Mid Basin for discharge to Outfall 001 or can be transferred offsite for treatment. This wastewater is pH controlled to prevent corrosion and contains trace amounts of methanol.

Utility wastewaters discharged through Outfall 001 include cooling tower blowdown, boiler blowdown, steam condensate, demineralizer regenerate wastewaters, belt press wash water, raw or filtered water, and sample cooler water. Boiler blowdown is normally routed to the

bulk recirculating cooling tower, but in some cases such as when there is an issue with a pump, it may be routed to Outfall 001 via the clear water sewer.

The methanol stripper tail wastewater from the distillation step is currently transferred offsite for treatment to the Gulf Coast Waste Disposal Authority Bayport Facility (GCA Bayport) for further treatment under the Bayport Facility's TPDES Permit No. WQ0001054000

Section II- Observations

This inspection revealed the following observations:

- The site recently built and was operating a membrane bio-reactor (MBR) because of previous permit exceedance. The MBR was built in 2017 (Appendix A). Linde was not able to send the same amount of process water to Gulf Coast Waste Disposal and the exceedance was from the wastewater restriction. The restriction required Linde to treat the additional 140 gpm flow onsite. Linde built and tied the MBR into the existing process to treat the additional flow. No exceedance has occurred since MBR operation has started.
- The facility needs to provide a certified thermometer inside the compositor. On the day of the inspection, Linde was utilizing a digital thermometer. A certified thermometer is needed to verify and ensure accuracy of digital readings and recordings.

Section III- Areas of Concerns

This inspection revealed the following areas of concerns:

- No major areas of concern

Section IV – LIST OF APPENDICES

- Appendix A – MBR Technical Details

Appendix A

MBR – Technical Details

Technical Details

Background

Linde produces 180gpm of process wastewater that is discharged via a pipeline to an offsite treatment plant. This pipeline is now restricted to <40 gpm requiring Linde to provide an alternative treatment process for the 140 gpm of process wastewater.

A temporary RO was installed to process the water, but is not adequate in the event of a Plant upset. A design review was completed and recommended the installation of a membrane bio-reactor (MBR). Linde developed a process flow diagram to tie-in the existing process wastewater stream to the proposed MBR.

Project Requirements

Vendor shall provide a MBR / UF or alternative wastewater treatment package to match the following objectives.

- Reduce cBOD levels to <10 ppm in order to discharge
- Produce an average flow rate of 140 gpm
- Implement solution within 90 days of the order
- Provide trained personnel to manage the system 24/7
- Wastewater system shall be leased to Linde for a period of 2 years.

Process Flow Description

See attached high level isometric drawing. Process wastewater from the existing neutralization tank shall be treated to correct pH and piped to the existing North Clarifier (biological reactor pond). An aeration grid and blowers shall aerate the pond. Nutrients shall also be pumped into the pond as needed to maximized bio reaction. From the bioreactor, feed pumps will feed the bio-reacted water to the ultra filtration skids. Antifoam injection shall be pumped into the UF skids or Clarifier as needed. Return activated sludge (RAS) pumps will recirculate the concentrated water back to the diversion tank with a side stream going to Linde's existing sludge thickener for dewatering. The permeate water from the ultra filtration skid will feed the mid-basin where the water will eventually be sent to the outfall.

Operational Basis

Please specify guaranteed uptime

Water Flow Data

Raw water – flow rate, pressure and temperature expected at the inlet to the equipment

	Minimum	Maximum
Flow rate (GPM)	90	140
Pressure (psi)	15	25
Temperature (°F)	70	95

Influent Water Quality

Influent water may vary, the following presents tested data to be used for design basis

Cations		Anions		Other	
Total Hardness, as CaCO ₃	<1	Alkalinity, "P", as CaCO ₃	<2	Specific Conductance, at 25°C, µS/cm	3270
Calcium Total hardness as CaCO ₃ , ppm	<0.5	Alkalinity, "M", as CaCO ₃	183	Total Organic Carbon (TOC), as C	68.9
Magnesium Total hardness as CaCO ₃ , ppm	<0.5	Chloride	<2	Total Dissolved Solids (TDS)	2220
Sodium	743	Sulfur, Total, as SO ₄	1290		
Potassium	<0.5	Nitrate, as NO ₃	<1		
		Reactive Silica, Total, as SiO ₂	<0.5	Turbidity, NTU	1.9
Strontium, Total	<0.01	Phosphate, Total, as PO ₄	0.9	pH, standard units	7
Copper, Total	<0.05				
Aluminum, Total	<0.1				
Manganese, Total	<0.01	Fluoride	<1	Total Suspended Solids (TSS)	<10
Iron, Total	0.08	Ammonia, Free and Fixed as N	13.8	Hexane Extractable Material	<5
cBOD ¹	Average: <120 Max: <235	Ammonia, Fixed Organic, as N	12.1	Ammonia, Free as N	1.7
BOD5	<187*	TKN	<12.5*	FOG	See note 3

Source of Test and Date	Laboratory, 2/26/2016
Feed Water Source	FA-7

Notes:

1. The Influent cBOD should average <120 ppm over the course of a month. Over 120 ppm and up to a maximum value of 235 can be handled over a 24 hour period; beyond the 24 hour period or over 235 ppm, will make best commercial effort to make quality and flow. See section 2.6 for more details with out of spec water requirements.
2. Parameters marked with an asterisk have been assumed. Please confirm these values.
3. Maximum allowable limit is 150 mg/l emulsified oil with no free oil and less than 10 mg/L of mineral or non -biodegradable oil.

Product Water Quality

Required product water quality

Flow (GPM)	140 gpm
CBOD, as mg/L	<10

Vendor Supplied Equipment / Documentation / Operation

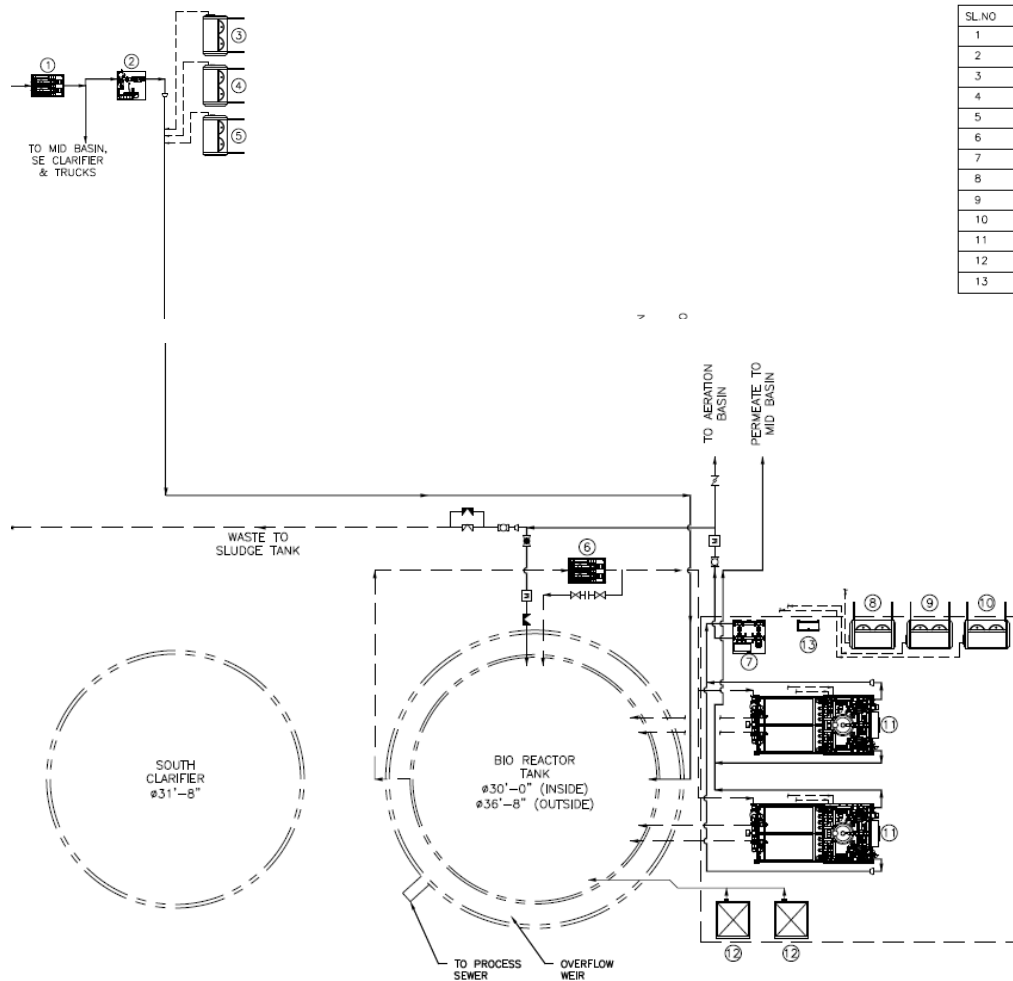
As a minimum, please specify quantity and details

- UF / Membrane filter package
- Nutrient dosing pumps
- Flow meters for influent and product
- Dissolved oxygen and turbidity monitors
- Bioreactor aeration grid assembly
- Blower skid for Bioreactor
- Antifoam dosing pump
- Chemical dosing pumps
- Return Activated Sludge pumps
- Labor and materials to install UF / Membrane package & equipment
- Expected 40 hours/week FSR support
- Remote monitoring and access
- Commissioning and start-up
- Spare parts and consumables for operational continuity
- Labor and equipment for maintenance
- Daily water treatment 40 hrs per week
- Lab sampling
- Monthly reports
- Process flow diagrams
- Piping and instrument drawings
- Equipment sheets

Linde Supplied Equipment

As a minimum, Linde to provide

- Equalization tank
- North Clarifier (Bioreactor) with drain connections
- Acid/caustic pumps
- Level control for bioreactor
- UF feed pumps
- UF filtrate and forwarding pumps
- Sludge tank and forwarding pumps
- Interconnecting piping, electrical wiring and DCS
- Nutrient, antifoam, pH and membrane cleaning chemicals



NOTES:

1. MIXED LIQUOR PUMPS TO DRAW SUCTION FROM THE OPPOSITE END OF THE BIO REACTOR, FROM WHERE FEED ENTERS.
2. BIO REACTOR FEED & RAS OVERFLOW TO ENTER THE TANK AT THE SAME LOCATION.

SL.NO	DESCRIPTION	QUANTITY
1	FEED PUMP SKID (CUSTOMER)	1
2	STRAINER SKID	1
3	25% SODIUM HYDROXIDE DOSING SKID	1
4	UREA DOSING SKID	1
5	PHOSPHORIC ACID DOSING SKID	1
6	MIXED LIQUOR PUMP SKID (CUSTOMER)	1
7	WAS PUMP SKID	1
8	ANTI-FOAM DOSING SKID	1
9	CITRIC ACID DOSING SKID	1
10	SODIUM HYPOCHLORITE DOSING SKID	1
11	M-52	2
12	BLOWER UNITS	2
13	MAIN CONTROL PANEL	1