From: Havalda, Robert
To: Braganza, Bonnie
Subject: FW: Air Permit-Happy 2018
Date: Monday, January 08, 2018 8:56:35 AM

The methanol tanks are the following:

- One (1) 250 bbl
- One (1) 100 bbl

From: Havalda, Robert
Sent: Friday, January 5, 2018 12:58 PM
To: 'Braganza, Bonnie' <Braganza.Bonnie@epa.gov>
Subject: FW: Air Permit-Happy 2018

Please send over a copy of the revised permit.

Thank you,

Robert Havalda, P.E. | Sr. Environmental Engineer
Enterprise Products | 1100 Louisiana St., Houston, TX 77002-5227
713.381.6698 office | 832.589.7084 cell | rmhavalda@eprod.com

---

From: Havalda, Robert
Sent: Friday, January 5, 2018 12:57 PM
To: 'Braganza, Bonnie' <Braganza.Bonnie@epa.gov>
Subject: RE: Air Permit-Happy 2018

Attached are the pages for the catalyst we are currently using. As noted in our meeting, if we change catalyst the specific operating parameters may change but the pollutant reductions previously represented will continue to be met.

I am currently verifying the size of the methanol tanks.

Thank you,

Robert Havalda, P.E. | Sr. Environmental Engineer
Enterprise Products | 1100 Louisiana St., Houston, TX 77002-5227
713.381.6698 office | 832.589.7084 cell | rmhavalda@eprod.com

---

From: Braganza, Bonnie [mailto:Braganza.Bonnie@epa.gov]
Sent: Friday, January 5, 2018 11:11 AM
To: Havalda, Robert <rmhavalda@eprod.com>
Subject: Air Permit-Happy 2018

Robert, I hope you had a great celebration during the holidays. Please let me know the status of that below and also can you let me know the size of the methanol tanks. Please see above. Need to

have this information by COB 1-8-18 Thank you

Positions or views expressed here do not represent official EPA policy.
Bonnie Braganza P.E
EPA Region 6
1445 Ross Ave
Dallas TX 75202
Tel: 214-665-7340

Resending my message, realizing it is Holiday time- please let me know your progress on getting information on the catalyst being used by Enterprise. I am moving forward with the permit and technical support document, but will need the information for the administrative documents. Thank you and hope all is going well with you.

Positions or views expressed here do not represent official EPA policy.
Bonnie Braganza P.E
EPA Region 6
1445 Ross Ave
Dallas TX 75202
Tel: 214-665-7340

Robert; I just want to remind you that at the last conference call, it was decided that you would give me the catalyst manufacturer's information to attach to our technical support document. You may note that I have copied the catalyst manufacturer from the T5 permit that may not be current. So let me have this information soon, preferably at the end of this week.

Hope you have a nice holiday.

Positions or views expressed here do not represent official EPA policy.
Bonnie Braganza P.E
EPA Region 6
1445 Ross Ave
Dallas TX 75202
Tel: 214-665-7340

From:	Havalda, Robert
To:	Braganza, Bonnie
Cc:	Cooley, Bradley
Subject:	RE: Additional information for the Synthetic minor Permit
Date:	Monday, July 17, 2017 5:33:03 PM
Attachments:	Attachment 1.pdf Atachment 2.xlsx

Dear Ms. Braganza;

Thank you for your emailed questions regarding the Lindrith Compressor Station. Below I have the following answers to your questions.

1. If the quantity of inlet gas flow determines the need for compression, how do you determine which compressor to use? Do you run the compressors at full load, half load and does that effect the emission rate?

   Response: The compressor engines are scheduled based on need and availability (i.e., outages for maintenance). Enterprise endeavors to operate the engines at full load, but that may operate at partial load. Operating the engine at partial load does not increase the emissions beyond what is calculated at full load. Refer to the Technical Data Sheet in Attachment 1.

2. What is the frequency for startup and shutdown for each compressor per year, based on past operations? What is the duration for startup?

Response: Through May of 2017, the compressors at Lindrith have shut down and started up 218 times. The duration of a startup event is less than 30 minutes.

3. How do you determine/meter the fuel usage to the engines to calculate emissions? (See Title Section 3.2.5)

Response: Fuel consumption for Unit Nos. A-01, A-02, and A-03 is monitored monthly using hours of operation and metered fuel consumption.

4. What meters are used when the compressor engines are operating? Do you monitor the BHP for each compressor since the emission factors are based on BHP?

   Response: Fuel gas is metered when the engines are operating. Enterprise is capable of calculating horsepower based on fuel use. The load has nominal impact on the emission factors. Refer to Attachment 1.

5. What is the maintenance schedule for the compressors?

Response: Maintenance is scheduled per the attached operating plan. (Refer to Attachment 2).

6. How do you monitor catalyst efficiency on the two engines, temperature/pressure drop?

   Response: Catalyst efficiency is monitored quarterly using a portable engine analyzer.

7. When is the catalyst replaced or how often does it need to be replaced? Do you test after catalyst replacement on the engines?

Response: The catalyst is replaced when the quarterly engine analyzer results indicate a sufficient drop in catalyst efficiency. Enterprise tests the emissions after the catalyst is replaced.

8. The MSS emissions seem to only include VOC emissions. Are the startup and shutdown emissions from the compressor engines included in the annual emission estimates for NOx, CO etc?

Response: NOx and CO emissions are not significantly impacted by startup and shutdown event. The VOC emissions are from compressor blowdowns and gas used to spin the starter.

9. The process flow diagram figure (pg. 7/21.pdf) in the application shows an inlet separator/slug separator. Please describe this equipment.

Response: The inlet separator removes the entrained liquids from the gas stream so it will not damage the compressors. The inlet separator operates at pipeline pressure (i.e., closed vessel) with no emissions.

10. Also entering the slug catcher are liquids from interstage coolers/scrubbers. Is this part of the facility's equipment? What is the origin of this stream?

Response: The natural gas is compressed in multiple stages, and the gas is cooled between the stages to remove the liquids so it will not damage the next stage of the compressor. The interstage coolers are part of the compressor skid. The origin of this stream is the behavior of the gas when it is compressed (i.e., the Ideal Gas Law). The interstage coolers/scrubbers are closed vessels with no emissions.

11. The condensate enters the tanks (tank battery). Is this a main header to maintain the same level of liquid in all tanks? Is this the assumption in the tank emission calculations which based the turnover rates to be identical for each tank?

Response: The condensate tanks can operate as a single unit (i.e., common header) or independent of each other. Since the tanks are identical in size, it does not matter if the working losses occurs in a single tank (while breathing losses occur in all 8 tanks) or if occurs in multiple tanks. The overall emissions remain the same. That is why there is a single emission limit for all the tanks (EPN: TBATTERY).

12. Where is the flow of condensate metered to the tanks and loading operations to be able to calculate the emissions and rate of condensate? (Section 3.2.6.5-6 of the Title V permit)

Response: The condensate throughput for TBATTERY and TLOAD are measured at the truck loadout.

13. The application indicates submerged loading of trucks. Is there a possibility for vapor balance loading since there is a threefold increase in rate and resultant emissions?

Response: Enterprise is requesting 3.32 TPY of VOC emissions for the truck loadout under this modification. The current permit limit is 2.23 TPY, so the increase is 1.1 TPY. Enterprise would consider vapor balance to economically infeasible at this time.

In addition to the new questions, you had requested Enterprise to readdress Items No. 1-3 from a previous email request.

1. Please explain the basis for the increase in condensate throughput from 20,000 barrels/year

to 60,000 barrels/year. Is the feed to the facility from the same source as noted in the R6NM-03-R1 permit application and its supporting documents, or is there a different or new feed source entering the facility?

Response: The proposed change is a result of a change in gas composition. The feed to the facility is from the same source.

2. What is causing the change in feed stock composition that will increase the VOC emissions from the facility?

Response: This site received natural gas from a gathering system for which the composition of the gathered gas will vary.

3. Region 6 EPA intends to streamline the permitting process by issuing a synthetic minor permit in accordance with 40 CFR 49.158(c)(2) and processing the Part 71 permit modification in one action. In addition, the statement of basis will indicate that PSD permit NM -1644-M-1 issued by Region 6 to El Paso Field Services on April 10, 1997, will be rescinded in accordance with 40 CFR§52.21(w)(3). Does Enterprise Products have any objections to EPA potentially taking this approach in processing this permit application as one action?

Response: Enterprise does not have any objections to EPA rescinding the PSD permit and issuing a synthetic minor permit.

Thank you for your questions and if you need any further clarification, please let me know.

Thank you again,

Robert Havalda, P.E. | Sr. Environmental Engineer
Enterprise Products | 1100 Louisiana St., Houston, TX 77002-5227
713.381.6698 office | 832.589.7084 cell | rmhavalda@eprod.com

---

From: Braganza, Bonnie [mailto:Braganza.Bonnie@epa.gov]
Sent: Friday, June 30, 2017 8:33 AM
To: Havalda, Robert
Cc: Robinson, Jeffrey
Subject: Additional information for the Synthetic minor Permit

Per our discussion yesterday morning, I am sending the list of additional questions which I need to draft the synthetic minor permit. As we discussed, I have already started drafting the documents and need this information to support the regulatory requirements both in the technical support document and the draft permit. I appreciate if you respond by July 18th.

I am also attaching an earlier email of 4-15-17 which requires your attention, specifically on items 1-3. I believe you gave me some information regarding item 4.

For item 3 we will need a letter signed by your Responsible Officer for the facility requesting the rescission of the existing PSD permit NM-1644-M1. See 40 CFR 52.21(w)(2) and EPA's response to comments at FR 78046 :

"The amended regulatory text in the Permit Rescission provision does not allow either the EPA or

Routine PM / Quarterly Inspection

A

Facility:

Maintenance Procedure	Complete	Incomplete	Rescheduled
01. Make all required notifications.			
02. Fill out all required permits.			
03. Follow all safety policies and procedures.			
04. Follow all Lockout / Tagout procedures.			
05. Close out work order upon completion of work.			
A) Routine PM / Quarterly Inspection			
With Air Filter Change			
Before Shutdown			
01. Perform monthly inspection			
02. Review current oil sample report.			
03. Review engine/ compressor analysis (Windrock) including vibration analysis.			
Engine Down			
01. Shut down / LOTO unit as needed.			
02. Measure & Record Cylinder Pressure.			
03. Perform valve recession and record measurements.			
04. Adjust Valve Lash & Valve Bridges.			
05. Adjust Gas Admission Valves.			
06. Inspect and test All Engine Protection Devices.			
07. Replace Filters.			
A. Engine Oil Filter.			
B. Engine Air Filter.			
08. Inspect and replace Spark Plugs.			
09. Inspect / Lubricate/ and/ or replace all Actuator Bearings & Linkages.			
10. Fill Lubricators On Starting Motors, Pre-Lube Pumps.			
11. Inspect & lubricate Pillow Bearings & Falk Coupling on Fan & Fan Drive.			
12. Check & Adjust Fan Belt On Fan Drive.			
13. Check Torque On Engine Mounts.			
14. Check Flexible Couplings On Fan Drive For Wear.			
Annual PM Section			
01. Replace Ion Plugs (combustion sensor) and Pre Chamber with Check Valve.			
02. Engine Oil Change (Drain and Replace Engine Oil)			
Compressor			
01. Review all items on monthly inspection sheet.			
02. Review latest analyzer report (Windrock) and open work orders.			
03. Review engine/ compressor analysis (Windrock) including vibration analysis.			
Before shutting unit down			
01. Record compressor valve cap temperatures			
02. Review current oil sample report.			
Before blowing compressor down			
01. Test lubricator check valves by loosening tubing fitting on oil end.			
02. Check packing vents for leaking packing.			
With compressor down			
Change oil filter.			
Final			
01. Record Any Preventive Maintenance Performed.			
02. Record Any Future Corrective Maintenance Required			
03. Inspect/Replace Air Inlet Filters/Pre-filters as needed			
04. Complete all documents.			
05. Remove LOTO/Start Unit Inspect for leaks.			
06. Adjust and tune unit to OEM Specs.			
07. Clean up location after PM is completed.			
I&E PM			
Engine Recip-Shutdown Test			
Engine/ Compressor Shutdown Inspection/Testing			
1. NOTIFY OPERATIONS - of scheduled work activities.			
2. Obtain/generate any required permits.			
3. Lock Out, Tag Out and secure area and all relative equipment prior to work commencement.			
4. Inspect/test all engine and compressor discrete shutdown devices for correct function/trip set points.			

From: Havalda, Robert
To: Braganza, Bonnie
Subject: FW: Additional information for the Synthetic minor Permit
Date: Friday, July 14, 2017 11:34:39 AM
Attachments: Lindrith Synthetic Minor Source Permit Application NM-15440M1 October 2013.pdf

---

I am continuing to work on getting the requested letter for Item No. 3; however, a question has come up regarding the necessity of the requested letter. Attached is a previous submittal to the EPA requesting the Synthetic Minor Permit which was signed by the RO at the time.

Would the attached application be sufficient for the EPA to convert the PSD permit to the requested Synthetic Minor Permit?

Due to the 4th of July holiday and personal holiday schedules, obtaining all of the required management approvals for the RO signature may take a little longer than next Tuesday. The rest of the requested information is being reviewed and will be sent by the 18th.

Please let me know about the RO signature.

Thank you,

Robert Havalda, P.E. | Sr. Environmental Engineer
Enterprise Products | 1100 Louisiana St., Houston, TX 77002-5227
713.381.6698 office | 832.589.7084 cell | rmhavalda@eprod.com

---

From: Braganza, Bonnie [mailto:Braganza.Bonnie@epa.gov]
Sent: Friday, June 30, 2017 8:33 AM
To: Havalda, Robert
Cc: Robinson, Jeffrey
Subject: Additional information for the Synthetic minor Permit

Per our discussion yesterday morning, I am sending the list of additional questions which I need to draft the synthetic minor permit. As we discussed, I have already started drafting the documents and need this information to support the regulatory requirements both in the technical support document and the draft permit. I appreciate if you respond by July 18th.

I am also attaching an earlier email of 4-15-17 which requires your attention, specifically on items 1-3. I believe you gave me some information regarding item 4.

For item 3 we will need a letter signed by your Responsible Officer for the facility requesting the rescission of the existing PSD permit NM-1644-M1. See 40 CFR 52.21(w)(2) and EPA's response to comments at FR 78046 :

"The amended regulatory text in the Permit Rescission provision does not allow either the EPA or any other reviewing authorities to unilaterally rescind or suspend a duly issued CAA NSR permit without the request of the permittee."

Thanking you for your cooperation, in providing your response to the above by July 18th.

Have a Happy July 4th.

5. Verify all discrete shutdown trip set points back to the PLC are active and functioning correctly.			
6. Inspect/test all output I/O to the compressor pocket loaders. Verify all pockets function properly.			
7. Inspect/test all output I/O to the unit valves and verify valve position feedback.			
8. Document all test results and retain records of the Inspection/Test.			
9. Verify that all remote I/O cabinet/enclosure terminations points are secure and show no signs of ware/damage.			
10. Inspect all electrical conduits for damaged, missing supports, and covers.			
11. Inspect all instrument tubing for worn areas and missing support clamps.			
12. Correct any/all abnormal conditions found during the inspection/testing procedures.			
13. Once Inspection is complete, assure that the equipment will operate correctly and remove all LOTO measures.			
14. NOTIFY OPERATIONS of work completion and monitor equipment on start up to assure it will function safely.			
Control Systems Check-Test & Inspect			
Test/Inspect Control Trips, Alarms, Switches, Level, and Timer Devices			
Record Any Preventive Maintenance Performed			
Record Any Future Corrective Maintenance Required			
Spreadsheet Containing a List of Devices Is Available			
Document and Retain Records			
ESD-Test & Inspect			
Test ESD System			
Inspect ESD System			
Record Any Preventive Maintenance Performed			
Record Any Future Corrective Maintenance Required			

Comments:

Completed By:

Date:

Braganza, Bonnie

From: Braganza, Bonnie
Sent: Friday, June 30, 2017 8:33 AM
To: Havalda, Robert
Cc: Robinson, Jeffrey
Subject: Additional information for the Synthetic minor Permit
Attachments: 6-20-17Questions for Lindrith permit.docx; 4-13-17evaluation-Lindrith Compressor Station Minor Modification Request.pdf

Tracking:

Recipient	Delivery
Havalda, Robert	
Robinson, Jeffrey	Delivered: 6/30/2017 8:33 AM
Bartley, Richard	
Bartley.Richard@epa.gov	Delivered: 6/30/2017 8:33 AM

Per our discussion yesterday morning, I am sending the list of additional questions which I need to draft the synthetic minor permit. As we discussed, I have already started drafting the documents and need this information to support the regulatory requirements both in the technical support document and the draft permit. I appreciate if you respond by July 18th.

I am also attaching an earlier email of 4-15-17 which requires your attention, specifically on items 1-3. I believe you gave me some information regarding item 4.

For item 3 we will need a letter signed by your Responsible Officer for the facility requesting the rescission of the existing PSD permit NM-1644-M1. See 40 CFR 52.21(w)(2) and EPA's response to comments at FR 78046 :
"The amended regulatory text in the Permit Rescission provision does not allow either the EPA or any other reviewing authorities to unilaterally rescind or suspend a duly issued CAA NSR permit without the request of the permittee."

Thanking you for your cooperation, in providing your response to the above by July 18th.

Have a Happy July 4th.

Bonnie Braganza P.E.
Air Permits
US Environmental Protection Agency
Region 6
1445 Ross Ave, Dallas TX 75202
214-665-7340

In the end it all comes to Choices to turn stumbling blocks into stepping stones….Scott Peterson

Questions on Lindrith's application.

Since this is a synthetic minor permit, the emission limits and conditions from the PSD permit needs sufficient monitoring and recordkeeping. Some questions are:

1. If the quantity of inlet gas flow determines the need for compression, how do you determine which compressor to use? Do you run the compressors at full load, half load and does that effect the emission rate?
2. What is the frequency for startup and shutdown for each compressor per year, based on past operations? What is the duration for startup?
3. How do you determine/meter the fuel usage to the engines to calculate emissions? (Title Section 3.2.5)
4. What meters are used when the compressor engines are operating? Do you monitor the BHP for each compressor since the emission factors are based on BHP?
5. What is the maintenance schedule for the compressors?
6. How do you monitor catalyst efficiency on the two engines, temperature/pressure drop?
7. When is the catalyst replaced or how often does it need to be replaced? Do you test after catalyst replacement on the engines?
8. The MSS emissions seem to only include VOC emissions. Are the startup and shutdown emissions from the compressor engines included in the annual emission estimates for NOx, CO etc?
9. The process flow diagram figure (pg. 7/21.pdf) in the application shows an inlet separator/slug separator. Please describe this equipment.
10. Also entering the slug catcher are liquids from interstate coolers/scrubbers. Is this part of the facility's equipment? What is the origin of this stream?
11. The condensate enters the tanks (tank battery). Is this a main header to maintain the same level of liquid in all tanks? Is this the assumption in the tank emission calculations which based the turnover rates to be identical for each tank?
12. Where is the flow of condensate metered to the tanks and loading operations to be able to calculate the emissions and rate of condensate? (Section 3.2.6.5-6 of the Title V permit)
13. The application indicates submerged loading of trucks. Is there a possibility for vapor balance loading since there is a threefold increase in rate and resultant emissions?

Braganza, Bonnie

From: Havalda, Robert <rmhavalda@eprod.com>
Sent: Tuesday, May 16, 2017 9:57 AM
To: Braganza, Bonnie
Subject: RE: Lindrith Permit information update
Attachments: Form NEW - Lindrith Compressor Station.docx; Evaluation - Lindrith Compressor Station.pdf

Sorry about not getting back with you yesterday to get you the status.

As requested, I have the Administrative form filled out. When applicable, we reference the previous submittal to avoid confusion.

At the moment I am waiting on a signature for the Evaluation of Threatened and Endangered Species and Historic Properties Form. Attached is a PDF of the supporting documentation for the form.

If you have any additional questions, please let me know.

Thank you,

Robert Havalda, P.E. | Sr. Environmental Engineer
Enterprise Products | 1100 Louisiana St., Houston, TX 77002-5227
713.381.6698 office | 832.589.7084 cell | rmhavalda@eprod.com

---

From: Braganza, Bonnie [mailto:Braganza.Bonnie@epa.gov]
Sent: Monday, May 15, 2017 7:51 AM
To: Havalda, Robert
Subject: Lindrith Permit information update

Robert: Please let me know the status of providing the additional information as requested. If you need help please let me know and we can discuss the timeline for the draft permit. I need some data to start drafting the permit. The ESA and NHPA information for an existing operation is usually not very times consuming and if there are questions, please contact me regarding the forms.

Have a nice weekend and look forward to hearing back from you.

Bonnie Braganza P.E.
Air Permits
US Environmental Protection Agency
Region 6
1445 Ross Ave, Dallas TX 75202
214-665-7340

In the end it all comes to Choices to turn stumbling blocks into stepping stones….Scott Peterson

---

From:	Havalda, Robert
To:	Braganza, Bonnie
Cc:	Cooley, Bradley
Subject:	Lindrith Compressor Station
Date:	Tuesday, March 21, 2017 3:25:48 PM
Attachments:	Lindrith Permit R6NM-03-R1 Minor Modification (USEPA) March 2017.pdf

As requested by phone this afternoon, I have attached an electronic copy of the application.

If you have any questions, please let me know.

Thank you,

Robert Havalda, P.E. | Sr. Environmental Engineer
Enterprise Products | 1100 Louisiana St., Houston, TX 77002-5227
713.381.6698 office | 832.589.7084 cell | rmhavalda@eprod.com

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY
40 CFR 49.151

Application for New Construction

(Form NEW)

Please check all that apply to show how you are using this form:

- ☐ **Proposed Construction of a New Source**
- ☐ **Proposed Construction of New Equipment at an Existing Source**
- ☐ **Proposed Modification of an Existing Source**
- ☒ **Other – Please Explain INCREASE IN THROUGHPUT (NO CONSTRUCTION)**

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 6 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 6
1445 Ross Ave., suite 1200
Dallas, TX 75202
R6airpermits@epa.gov

For more information, visit:
http://www2.epa.gov/caa-permitting/tribal-nsr-implementation-epas-south-central-region

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact:

R6airpermits@epa.gov

A. GENERAL SOURCE INFORMATION

1. (a) **Company Name** (Who owns this facility?) **Enterprise Products Company** (b) **Operator Name** (Is the company that operates this facility different than the company that owns this facility? What is the name of the company?) **Enterprise Products Company**		2. **Facility Name** **Lindrith Compressor Station**	
3. Type of Operation **Natural Gas Compressor Station**		4. Portable Source? ☐ Yes ☒ No 5. Temporary Source? ☐ Yes ☒ No	
6. NAICS Code **211111**		7. SIC Code **1311**	
8. Physical Address (Or, home base for portable sources) **20 miles west of Lindrith, NM**			
9. Reservation* **Jicarilla Apache**	10. County* **Rio Arriba**	11a. Latitude (decimal format)* **36.308857**	11b. Longitude (decimal format)* **-107.395834**
12a. Quarter Quarter Section* **East 1/2 of the SE 1/4**	12b. Section* **18**	12c. Township* **24N**	12d. Range* **5**

*Provide all proposed locations of operation for portable sources

B. PREVIOUS PERMIT ACTIONS (Provide information in this format for each permit that has been issued to this source. Provide as an attachment if additional space is necessary)

Facility Name on the Permit **Lindrith Compressor Station**
Permit Number (xx-xxx-xxxxx-xxxx.xx) **R6NM-03-R1**
Date of the Permit Action **November 4, 2015**

Facility Name on the Permit **Lindrith Compressor Station**
Permit Number (xx-xxx-xxxxx-xxxx.xx) **R6FOPP-71-03**
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

Facility Name on the Permit
Permit Number (xx-xxx-xxxxx-xxxx.xx)
Date of the Permit Action

C. CONTACT INFORMATION

Company Contact (Who is the primary contact for the company that owns this facility?**)** **Robert Havalda**	Title **Senior Environmental Engineer**
Mailing Address **P.O. Box 4324, Houston, TX 77210-4324**	
Email Address **rmhavalda@eprod.com**	
Telephone Number **713-381-6698**	Facsimile Number **832-799-3033**

Operator Contact (Is the company that operates this facility different than the company that owns this facility? Who is the primary contact for the company that operates this facility?) **N/A**	Title **N/A**
Mailing Address **N/A**	
Email Address **N/A**	
Telephone Number **N/A**	Facsimile Number **N/A**

Permitting Contact (Who is the person primarily responsible for Clean Air Act permitting for the company? We are seeking one main contact for the company. Please do not list consultants.) **Robert Havalda**	Title **Senior Environmental Engineer**
Mailing Address **P.O. Box 4324, Houston, TX 77210-4324**	
Email Address **rmhavalda@eprod.com**	
Telephone Number	Facsimile Number **832-799-3033**

Compliance Contact (Is the person responsible for Clean Air Act compliance for this company different than the person responsible for Clean Air Act permitting? Who is the person primarily responsible for Clean Air Act compliance for the company? We are seeking one main contact for the company. Please do not list consultants.) **Robert Havalda**	Title **Senior Environmental Engineer**
Mailing Address **P.O. Box 4324, Houston, TX 77210-4324**	
Email Address **rmhavalda@eprod.com**	
Telephone Number **713-381-6698**	Facsimile Number **832-799-3033**

D. ATTACHMENTS

Include all of the following information (see the attached instructions)

*Please do not send Part 71 Operating Permit Application Forms in lieu of the check list below.

SEE COVERLETTER & ATTACHMENTS

□ **FORM SYNMIN -** New Source Review Synthetic Minor Limit Request Form, if synthetic minor limits are being requested.

□ Narrative description of the proposed production processes. This description should follow the flow of the process flow diagram to be submitted with this application.

□ Process flow chart identifying all proposed processing, combustion, handling, storage, and emission control equipment.

□ A list and descriptions of all proposed emission units and air pollution-generating activities.

□ Type and quantity of fuels, including sulfur content of fuels, proposed to be used on a daily, annual and maximum hourly basis.

□ Type and quantity of raw materials used or final product produced proposed to be used on a daily, annual and maximum hourly basis.

□ Proposed operating schedule, including number of hours per day, number of days per week and number of weeks per year.

□ A list and description of all proposed emission controls, control efficiencies, emission limits, and monitoring for each emission unit and air pollution generating activity.

□ **Criteria Pollutant Emissions -** Estimates of Current Actual Emissions, Current Allowable Emissions, Post-Change Uncontrolled Emissions, and Post-Change Allowable Emissions for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates.

These estimates are to be made for each emission unit, emission generating activity, and the project/source in total. Note, there are no insignificant emission units or activities in this permitting program, only exempted units and activities. Please see the regulation for a list of exempted units and activities.

□ **Air Quality Review**

□ **ESA (Endangered Species Act)**

□ **NHPA (National Historic Preservation Act)**

E. TABLE OF ESTIMATED EMISSIONS SEE COVERLETTER & ATTACHMENTS

The following tables provide the total emissions in tons/year for all pollutants from the calculations required in Section D of this form, as appropriate for the use specified at the top of the form.

E(i) – Proposed New Source

Pollutant	Potential Emissions (tpy)	Proposed Allowable Emissions (tpy)	
PM			PM - Particulate Matter PM_{10} - Particulate Matter less than 10 microns in size $PM_{2.5}$ - Particulate Matter less than 2.5 microns in size SO_2 - Sulfur Oxides NOx - Nitrogen Oxides CO - Carbon Monoxide VOC - Volatile Organic Compound Pb - Lead and lead compounds Fluorides - Gaseous and particulates H_2SO_4 - Sulfuric Acid Mist H_2S - Hydrogen Sulfide TRS - Total Reduced Sulfur RSC - Reduced Sulfur Compounds
PM_{10}			
$PM_{2.5}$			
SO_2			
NO_x			
CO			
VOC			
Pb			
Fluorides			
H_2SO_4			
H_2S			
TRS			
RSC			

Emissions calculations must include fugitive emissions if the source is one the following listed sources, pursuant to CAA Section 302(j):

(a) Coal cleaning plants (with thermal dryers);
(b) Kraft pulp mills;
(c) Portland cement plants;
(d) Primary zinc smelters;
(e) Iron and steel mills;
(f) Primary aluminum ore reduction plants;
(g) Primary copper smelters;
(h) Municipal incinerators capable of charging more than 250 tons of refuse per day;
(i) Hydrofluoric, sulfuric, or nitric acid plants;
(j) Petroleum refineries;
(k) Lime plants;
(l) Phosphate rock processing plants;
(m) Coke oven batteries;
(n) Sulfur recovery plants;
(o) Carbon black plants (furnace process);
(p) Primary lead smelters;
(q) Fuel conversion plants;
(r) Sintering plants;
(s) Secondary metal production plants;
(t) Chemical process plants
(u) Fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input;
(v) Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels;
(w) Taconite ore processing plants;
(x) Glass fiber processing plants;
(y) Charcoal production plants;
(z) Fossil fuel-fired steam electric plants of more that 250 million British thermal units per hour heat input, and
(aa) Any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.

E(ii) – Proposed New Construction at an Existing Source or Modification of an Existing Source

SEE COVERLETTER & ATTACHMENTS

Pollutant	Current Actual Emissions (tpy)	Current Allowable Emissions (tpy)	Post-Change Potential Emissions (tpy)	Post-Change Allowable Emissions (tpy)
PM				
PM_{10}				
$PM_{2.5}$				
SO_2				
NO_x				
CO				
VOC				
Pb				
Fluorides				
H_2SO_4				
H_2S				
TRS				
RSC				

PM - Particulate Matter
PM_{10} - Particulate Matter less than 10 microns in size
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in size
SO_2 - Sulfur Oxides
NOx - Nitrogen Oxides
CO - Carbon Monoxide
VOC - Volatile Organic Compound
Pb - Lead and lead compounds
Fluorides - Gaseous and particulates
H_2SO_4 - Sulfuric Acid Mist
H_2S - Hydrogen Sulfide
TRS - Total Reduced Sulfur
RSC - Reduced Sulfur Compounds

The public reporting and recordkeeping burden for this collection of information is estimated to average 20 hours per response, unless a modeling analysis is required. If a modeling analysis is required, the public reporting and recordkeeping burden for this collection of information is estimated to average 60 hours per response .Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, Collection Strategies Division, U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW, Washington, D.C. 20460. Include the OMB control number in any correspondence. Do not send the completed form to this address.

Instructions

(Please do not include a copy of these instructions in the application you submit to us.)

Use of This Form

- Proposed new construction or modifications should first be evaluated to determine if the change is major under the major NSR program using the procedures at 40 CFR 52.21 (i.e., baseline actual to projected actual applicability test). If the proposed construction does not qualify as a major under that test, then it may be subject to the requirements of the minor NSR rule at 40 CFR 49.151.

Helpful Definitions from the Federal Minor NSR Rule (40 CFR 49) – This is not a comprehensive list.

- *40 CFR 49.152(d) - Modification* means any physical or operational change at a source that would cause an increase in the allowable emissions of the affected emissions units for any regulated NSR pollutant or that would cause the emission of any regulated NSR pollutant not previously emitted.

  The following exemptions apply:

  (1) A physical or operational change does not include routine maintenance, repair, or replacement.

  (2) An increase in the hours of operation or in the production rate is not considered an operational change unless such increase is prohibited under any federally-enforceable permit condition or other permit condition that is enforceable as a practical matter.

  (3) A change in ownership at a source is not considered a modification.

- *40 CFR 49.152(d) - Allowable emissions* means ‘‘allowable emissions’’ as defined in §52.21(b)(16), except that the allowable emissions for any emissions unit are calculated considering any emission limitations that are enforceable as a practical matter on the emissions unit’s potential to emit.

- *52.21(b)(16) - Allowable emissions* means the emissions rate of a stationary source calculated using the maximum rated capacity of the source (unless the source is subject to federally enforceable limits which restrict the operating rate, or hours of operation, or both) and the most stringent of the following:

  (i) The applicable standards as set forth in 40 CFR parts 60 and 61;

  (ii) The applicable State Implementation Plan emissions limitation, including those with a future compliance date; or

  (iii) The emissions rate specified as a federally enforceable permit condition, including those with a future compliance date.

A. General Facility Information

1. Company Name & Operator Name (if the operator of the facility is different than the owner, please provide this information): Provide the complete company and operator names. For corporations, include divisions or subsidiary names, if any.

2. Facility Name: Provide the facility name. Please note that a facility is a site, place, location, etc… that may contain one or more air pollution emitting units.

3. Type of Operation: Indicate the generally accepted name for the operation (i.e., asphalt plant, gas station, dry cleaner, sand & gravel mining, oil and gas wellsite, tank battery, etc.).

4. Portable Source: Will this facility operate in more than one location? Some examples of portable sources include asphalt batch plants and concrete batch plants.

5. Temporary Source: A temporary source, in general, would have emissions that are expected last less than 12 months.

6. NAICS Code: North American Industry Classification System. The NAICS Code for your facility can be found at the following link → North American Industry Classification System (http://www.census.gov/epcd/naics/nsic2ndx.htm#S1).

7. SIC Code: Standard Industrial Classification Code. Although the new North American Industry Classification System (NAICS) has replaced the SIC codes, much of the Clean Air Act permitting processes continue to use these codes. The SIC Code for your facility can be found at the following link → Standard Industrial Classification Code (http://www.osha.gov/pls/imis/sic_manual.html).

8. Physical Address: Provide the actual address of where you are proposing to construct the new facility, not the mailing address. Include the State and the ZIP Code.

9. Reservation: Provide the name of the Indian reservation within which the facility will be constructed.

10. County: Provide the County within which the source will be constructed.

11a & 11b. Latitude & Longitude: These are GPS (global positioning system) coordinates.

12a – 12d. Section-Township-Range: Please provide these coordinates in 1/4 Section/Section/Township/Range. (e.g., SW ¼, NE ¼ S36/T10N/R21E).

B. Current Permit Information

Provide a list of all air quality permits that have been issued for this facility. This should include any Federal Minor New Source Review (MNSR), Prevention of Significant Deterioration (PSD) or Non-Attainment New Source Review (NA NSR) permits, in addition to the most recent Part 71 permit. The permit number must be included with each permit identified.

C. Contact Information

Please provide the information, requested, in full.

1. Company Contact: Provide the full name of the primary contact for the company that owns the facility.

2. Operator Contact: Provide the name of the primary contact for the company that operates the facility if the company operating the facility is different from the company that owns the facility.

3. Permitting Contact: Provide the name of primary contact, for permitting decisions, at the company that owns the facility or the company that operates the facility.

4. Compliance Contact: Provide the name of primary contact, responsible for compliance of the facility, at the company that owns the facility or the company that operates the facility. If this is the same as the Permitting Contact please note this on the form.

D. Attachments

This section lists the information needed to complete the requested approval. This information should be accompanied by the supporting information listed on the form and described below. The information should be presented in enough detail to document how the facility is currently operating and/or how it is proposed to be operated.

☐ FORM SYNMIN

If synthetic minor limits are being requested, a synthetic Minor Limit Application should be included with this application.

☐ Narrative description of the proposed production processes.

1. The narrative description should follow the flow of the process flow diagram to be submitted with this application. This needs to be as comprehensive as possible to help in understanding the proposed facility and how it will be operated. For example:

What are the raw materials?
What are the properties of the raw materials?
Does the production process include heating, drying, the application of chemicals, etc?
How will the raw materials be affected by this process?
What are the out puts from each step of the process (i.e., crushed ore, dry gas, water, etc…)?
Etc….

2. The proposed operating schedule presented in terms of hours per day, days per week, and weeks per year.
3. A list of the type and quantity of fuels and/or raw materials used. Each fuel and raw material should be described in enough detail to indicate its basic chemical components.

☐ A process flow chart identifying all proposed processing, combustion, handling, storage, and emission control equipment. This flow chart should illustrate the detailed narrative description requested above.

☐ List and describe all proposed units, emission units and air pollution-generating activities. At a minimum, provide the following:

1. The hourly, daily and annual maximum operating rates for each operating unit, production process, and activity.
2. The hourly, daily and annual maximum firing rates for each fuel and combustion equipment.
3. The capacity for storage units and the hourly, daily and annual maximum throughput of material in the storage units.
4. Material and product handling equipment and the hourly, daily and annual maximum throughput of material and product.
5. Tank designs, tank storage capacities, hourly, daily and annual maximum throughput of material and product.

☐ Type and quantity of fuels, including sulfur content of fuels, proposed to be used on a daily, annual and maximum hourly basis.

☐ Type and quantity of raw materials used or final product produced proposed to be used on a daily, annual and maximum hourly basis.

☐ Proposed operating schedule, including number of hours per day, number of days per week and number of weeks per year.

☐ A list and description of all proposed emission controls, control efficiencies, emission limits, and monitoring for each emission unit and air pollution generating activity.

1. Include manufacturer specifications and guarantees for each control device.

Criteria Pollutant Emissions Estimates

☐ Estimates of Current Actual Emissions, Current Allowable Emissions, Post-Change Uncontrolled Emissions, and Post-Change Allowable Emissions for the following air pollutants: particulate matter, PM_{10}, $PM_{2.5}$, sulfur oxides (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compound (VOC), lead (Pb) and lead compounds, ammonia (NH_3), fluorides (gaseous and particulate), sulfuric acid mist (H_2SO_4), hydrogen sulfide (H_2S), total reduced sulfur (TRS) and reduced sulfur compounds, including all calculations for the estimates.

1. These estimates are to be made for each emission unit, emission generating activity, in addition to total emissions.

2. The information should include all of the supporting calculations, assumptions and references. Emission estimates must address all emission units and pollutants proposed and/or affected by the limitation and be presented in short term (e.g. pounds per hour) as well as annual (tons per year) units.

3. Any emission estimates submitted to the Regional Administrator must be verifiable using currently accepted engineering criteria. The following procedures are generally acceptable for estimating emissions from air pollution sources:

   - Unit-specific emission tests;
   - Mass balance calculations;
   - Published, verifiable emission factors that are applicable to the unit. (i.e. manufacturer specifications)
   - Other engineering calculations; or
   - Other procedures to estimate emissions specifically approved by the Regional Administrator.

4. Guidance for estimating emissions can be found at http://www.epa.gov/ttn/chief/efpac/index.html.

Current Actual Emissions: Current actual emissions for a pollutant is expressed in tpy and generally is calculated by multiplying the actual hourly emissions rate in pounds per hour (lbs/hr) times actual hours operated (which is the number of hours in a year) and dividing by 2,000 (which is the number of pounds in a ton).

1. For an **existing air pollution source (permitted and unpermitted)** that operated prior to the application submittal, the current actual emissions are the actual rate of emissions for

the preceding calendar year and must be calculated using the actual operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted during the preceding calendar year. The emission estimates must be based upon actual test data or, in the absence of such data, upon procedures acceptable to the Regional Administrator.

Current Allowable Emissions: Current allowable emissions for a pollutant is expressed in tpy and generally is calculated by multiplying the allowed hourly emissions rate in pounds per hour (lbs/hr) times allowed hours (which is the number of hours in a year) and dividing by 2,000 (which is the number of pounds in a ton).

1. "Allowed" means the source is restricted by permit conditions that limit its emissions and are enforceable as a practical matter (i.e., allowable emissions). The allowable emissions for any emissions unit are calculated considering any emissions limitations that are enforceable as a practical matter on the unit's PTE.

2. For an **existing permitted air pollution source** that operated prior to the application submittal, the current allowable emissions are the allowable rate of emissions for the preceding calendar year and must be calculated using the permitted operating hours, production rates, in-place control equipment, and types of materials processed, stored, or combusted during the preceding calendar year.

3. For an **existing air pollution source** that does not have an established allowable emissions level prior to the modification must report the pre-change uncontrolled emissions.

Post-Change Potential Emissions (Potential uncontrolled emissions from proposed project): This is the maximum capacity of a source to emit a pollutant under its physical and operational design. This is expressed in tpy and generally is calculated by multiplying the maximum hourly emissions rate in pounds per hour (lbs/hr) times 8,760 hours (which is the number of hours in a year) and dividing by 2,000 (which is the number of pounds in a ton).

Post-Change Allowable Emissions: A source's allowable emissions for a pollutant is expressed in tpy and generally is calculated by multiplying the allowed hourly emissions rate in pounds per hour (lbs/hr) times allowed hours (which is the number of hours in a year) and dividing by 2,000 (which is the number of pounds in a ton).

1. Unless the source is restricted by permit conditions or other requirements that are enforceable as a practical matter, the post-change allowable emissions would be equivalent to post-change uncontrolled emissions. For the post-change allowable emissions a lower level of allowable emissions may be proposed.

2. For physical or operational changes at minor sources and for minor physical or operational changes at major sources, the total increase in allowable emissions resulting from your proposed change would be the sum of following:

    - For each new emissions unit that is to be added, the emissions increase would be the potential to emit of each unit.
    - For each emissions unit with an allowable emissions limit that is to be changed or replaced, the emissions increase would be the allowable emissions of the emissions unit after the change or replacement minus the allowable emissions prior to the change or replacement. However, this may not be a negative value. If the allowable emissions of an emissions unit would be reduced as a result of the change or replacement, use zero in the calculation.

- For each unpermitted emissions unit (i.e., a unit without any emissions limitations before the change) that is to be changed or replaced, the emissions increase would be the allowable emissions of the unit after the change or replacement minus the potential to emit prior to the change or replacement. However, this may not be a negative value. If the allowable emissions of an emissions unit would be reduced as a result of the change or replacement, use zero in the calculation.

☐ **Air Quality Review**

Provide a narrative description of the current air quality conditions and the expected impact the permitted source would have on that air quality. Factors to include in the qualitative discussion are meteorology, terrain, elevation, distance to ambient air, expected emissions, stack heights, etc…

Your reviewing authority may require you to provide additional information used to determine impacts that may result from your new source or modification. You may be required to conduct and submit an Air Quality Impact Analysis (AQIA) using dispersion modeling in accordance with 40 CFR part 51, Appendix W. If required, and the AQIA demonstrates that construction of your source or modification would cause or contribute to a NAAQS or PSD increment violation, you will also required to further reduce its impact before you could obtain a permit.

☐ **ESA**

The Endangered Species Act requires us, in consultation with the U.S. Fish and Wildlife Service and/or the NOAA Fisheries Service, to ensure that actions we authorize are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species.

To expedite the approval of your proposed construction, we encourage you to identify any listed species that you may be readily aware of that could be affected by your proposal. The following website has been provided to assist you: http://www.fws.gov/endangered/

Simply enter the State and County in which you propose to construct to obtain a general listing.

☐ **NHPA**

The National Historic Preservation Act requires us, in consultation with State and/or Tribal Historic Preservation Officers to ensure that actions we authorize are not likely to affect cultural resources.

To expedite the approval of your proposed construction, we encourage you to identify any cultural resources that you may be readily aware of that could be affected by your proposal. The following website has been provided to assist you:
http://nrhp.focus.nps.gov/natreghome.do?searchtype=natreghome

Simply enter the State and County in which you propose to construct to obtain a general listing.

FUEL USAGE GUIDE

DERATE FACTOR vs CATERPILLAR METHANE NUMBER

Methane Number	30	35	40	45	50	55	60	65	70>=100
Rating Factor	0.00	0.00	0.00	0.76	0.82	0.87	0.93	0.98	1.00

Minimum Methane Number for Full Rating = 66.3

Fuel System Limit (minimum Wobbe Index) = 1128 BTU/SCF

TOTAL DERATION FACTORS - ALTITUDE & COOLING

AIR TO TURBO (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	0.93	0.89	0.85	0.81	0.78	0.74	0.71	0.68	0.65	0.61	0.58	0.56	0.53
120	0.98	0.94	0.90	0.86	0.82	0.79	0.75	0.72	0.68	0.65	0.62	0.59	0.56
110	1.00	1.00	0.95	0.91	0.87	0.83	0.80	0.76	0.73	0.69	0.66	0.63	0.60
100	1.00	1.00	1.00	0.97	0.93	0.89	0.85	0.81	0.77	0.73	0.70	0.67	0.63
90	1.00	1.00	1.00	1.00	0.98	0.94	0.90	0.86	0.82	0.78	0.74	0.71	0.67
80	1.00	1.00	1.00	1.00	1.00	0.99	0.95	0.91	0.87	0.83	0.79	0.75	0.72
70	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.94	0.90	0.86	0.83	0.80	0.76
60	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.95	0.92	0.88	0.85	0.81	0.78
50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.94	0.90	0.86	0.83	0.79

ALTITUDE (FEET ABOVE SEA LEVEL)

AFTERCOOLER HEAT REJECTION FACTORS

AIR TO TURBO (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	1.42	1.49	1.56	1.63	1.70	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77
120	1.34	1.40	1.47	1.54	1.61	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68
110	1.25	1.32	1.38	1.45	1.52	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
100	1.17	1.23	1.30	1.36	1.43	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
90	1.08	1.14	1.21	1.27	1.34	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41
80	1.00	1.06	1.12	1.18	1.25	1.31	1.31	1.31	1.31	1.31	1.31	1.31	1.31
70	1.00	1.00	1.03	1.09	1.16	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
60	1.00	1.00	1.00	1.00	1.07	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
50	1.00	1.00	1.00	1.00	1.00	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04

ALTITUDE (FEET ABOVE SEA LEVEL)

MINIMUM SPEED CAPABILITY AT MAX SITE TORQUE (RPM)

AIR TO TURBO (°F)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
130	760	780	800	850	850	850	850	850	850	850	850	850	850
120	760	770	790	850	850	850	850	850	850	850	850	850	850
110	750	770	780	800	850	850	850	850	850	850	850	850	850
100	750	760	770	790	850	850	850	850	850	850	850	850	850
90	750	750	770	780	800	850	850	850	850	850	850	850	850
80	750	750	760	770	790	850	850	850	850	850	850	850	850
70	750	750	750	770	780	800	850	850	850	850	850	850	850
60	750	750	750	760	770	790	850	850	850	850	850	850	850
50	750	750	750	750	770	780	800	850	850	850	850	850	850

ALTITUDE (FEET ABOVE SEA LEVEL)

ALLOWABLE INERTS IN THE FUEL:
The maximum amount of free inerts in the fuel is limited to 5%.

FUEL SYSTEM LIMIT:
Fuels with a Wobbe index lower than the limit, require a custom fuel system and engine control system mapping from the factory. The Wobbe index is determined using the Caterpillar Methane Number Calculation program.

FUEL USAGE GUIDE:
This table shows the derate factor required for a given fuel. Note that deration occurs as the methane number decreases. Methane number is a scale to measure detonation characteristics of various fuels. The methane number of a fuel is determined by using the Caterpillar Methane Number Calculation program.

TOTAL DERATION FACTORS:
This table shows the deration required for various air inlet temperatures and altitudes. Use this information along with the fuel usage guide chart to help determine actual engine power for your site. The total deration factor includes deration due to altitude and ambient temperature, and air inlet manifold temperature deration.

ACTUAL ENGINE RATING:
It is important to note that the Altitude/Temperature deration and the Fuel Usage Guide deration are not cumulative. They are not to be added together. To determine the actual power available, take the lowest rating between the Altitude/Temperature Deration and the Fuel Usage Guide Deration.

AFTERCOOLER HEAT REJECTION FACTORS:
Aftercooler heat rejection is given for standard conditions of 77°F and 500 ft altitude. To maintain a constant air inlet manifold temperature, as the air to turbo temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor to adjust for ambient and altitude conditions. Multiply this factor by the standard aftercooler heat rejection. Failure to properly account for these factors could result in detonation and cause the engine to shutdown or fail.

MINIMUM SPEED CAPABILITY AT MAX SITE TORQUE
This table shows the minimum allowable engine operating speed for site-specific ratings as determined by the Total Deration Factor chart. The minimum allowable engine operating speed cannot be lowered even if the actual engine power falls below the site-specific rating allowed by the Total Deration Factor chart. Turbocharger compressor surge or damage will result if the engine is operated lower than the minimum allowable speed.

Braganza, Bonnie

From: Robinson, Jeffrey
Sent: Thursday, June 29, 2017 7:03 AM
To: Braganza, Bonnie
Subject: FW: Lindrith Compressor Station Minor Modification Request

---

From: Robinson, Jeffrey
Sent: Thursday, April 13, 2017 7:07 AM
To: 'rmhavalda@eprod.com' <rmhavalda@eprod.com>
Cc: Braganza, Bonnie <Braganza.Bonnie@epa.gov>
Subject: Lindrith Compressor Station Minor Modification Request

Mr. Havalda,

EPA received the Lindrith Compressor Station application for a Part 71 permit modification on March 13, 2017. We are requesting additional information prior to drafting the permit and prior to determining that the permit application is complete in accordance with 40 CFR § 49.154(b) and 40 CFR § 71.5(a)(2). The additional information we are requesting is listed below:

(1) Please explain the basis for the increase in condensate throughput from 20,000 barrels/year to 60,000 barrels/year. Is the feed to the facility from the same source as noted in the R6NM-03-R1 permit application and its supporting documents, or is there a different or new feed source entering the facility?

(2) What is causing the change in feed stock composition that will increase the VOC emissions from the facility?

(3) Region 6 EPA intends to streamline the permitting process by issuing a synthetic minor permit in accordance with 40 CFR 49.158(c)(2) and processing the Part 71 permit modification in one action. In addition, the statement of basis will indicate that PSD permit NM -1644-M-1 issued by Region 6 to El Paso Field Services on April 10, 1997, will be rescinded in accordance with 40 CFR § 52.21(w)(3). Does Enterprise Products have any objections to EPA potentially taking this approach in processing this permit application as one action?

(4) Please fill out the following forms to support the permit application: https://www.epa.gov/sites/production/files/2016-05/documents/procedures_to_address_threatened_and_endangered_species_and_historic_properties.pdf

If you have any questions, please contact Bonnie Braganza of my staff at 214-665-7340 or braganza.bonnie@epa.gov. Thank you for your response.

Jeff Robinson, Section Chief
Air Permits Section
EPA Region 6
214-665-6435

Enterprise Products

ENTERPRISE PRODUCTS PARTNERS L.P.
ENTERPRISE PRODUCTS HOLDINGS LLC
(General Partner)

ENTERPRISE PRODUCTS OPERATING LLC

March 8, 2017

7015 1520 0002 7267 0373
Return Receipt Requested

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 6
1445 Ross Ave., Suite 1200
Dallas, TX 75202

Re: Enterprise Field Services, LLC
Lindrith Compressor Station
Lindrith, Rio Arriba County, New Mexico
Minor Modification of Permit Number R6NM-03-R1

Dear Sir of Madam:

Enterprise Field Services, LLC (Enterprise) is submitting this application for a minor permit modification to Permit Number R6NM-03-R1 which was issued on November 4, 2015.

AIR EMISSIONS IMPACT

The change proposed in this application involves increasing the following limits within the current air permit:

	Page	Current Limit	Proposed Limit
TBATTERY	3	37.39 tons/year	102.63 tons/year
TLOADING	3	2.23 tons/year	4.98 tons/year
MSS	3	25.00 tons/year	30.00 tons/year
Condensate Throughput	7	20,000 barrels/year	60,000 barrels/year

The increase of emissions is explained in detail in the attached calculation spreadsheets. The activities which generate these VOC emissions are the storage of condensate and loading of trucks to remove the condensate to off-site destinations.

REGULATIONS IMPACT

This application has been prepared in accordance with EPA guidance. The current permit, page 18, paragraph 5.9, lists the limitations of the minor modification procedure as follows:

5.9.1.1 Do not violate any applicable requirement. **This application does not.**

5.9.1.2 Do not involve significant changes to existing monitoring, reporting, or recordkeeping requirements in the permit. **This application does not.**

P. O. BOX 4324
HOUSTON, TX 77210-4324
713.381.6500

1100 LOUISIANA STREET
HOUSTON, TX 77002-5227
www.enterpriseproducts.com

5.9.1.3 Do not require or change a case-by-case determination of an emission limitation or standard, or a source-specific determination for temporary sources of ambient impacts, or visibility, or increment analysis. **This application does not.**

5.9.1.4 Do not seek to establish or change a permit term or condition for which there is no corresponding underlying applicable requirement to which the source would otherwise be subject. **This application does not.**

If you should have questions or need additional information regarding this application, please contact Robert Havalda at 713-381-6698 or by email at rmhavalda@eprod.com or Brad Cooley at 713-381-5828.

Sincerely,

Robert Havalda
Senior Environmental Engineer

Bradley Cooley
Senior Manager, Environmental Permitting

/bjm
Attachments
EPA Administrative Permit Amendment Request (Form AMEND)
Process Flow Diagram
Detailed Emission Calculations
HYSYS Flash Analysis
TANKS 4.09d Output
Site Gas Analysis

cc: Mr. Jim Lieb – Enterprise Products Operating

Tribal Environmental Contact – Jicarilla Apache
Attn: Ms. Bonnie Braganza P.E.
U.S. EPA, Region 6
1445 Ross Ave., Suite 1200
Dallas, TX 75202

Mr. Cordell Tecube
Environmental Protection Office
Jicarilla Apache Tribe
P.O. Box 507
Dulce, New Mexico 87528

Enterprise Field Services LLC
Lindrith Compressor Station
Rio Arriba County, New Mexico

Minor Permit Modification
Permit No. R6NM-03-R1

MARCH 2017

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
FEDERAL MINOR NEW SOURCE REVIEW PROGRAM IN INDIAN COUNTRY

Administrative Permit Amendment Request
(Form AMEND)

Please check box to show how you are using this form

- ☐ **Correction to a Typographical Error**
- ☐ **Incorporation of More Frequent Monitoring or Reporting**
- ☒ **Increase in Allowable Emissions (SEE INSTRUCTIONS!)**
- ☐ **Other**

Use of this information request form is voluntary and not yet approved by the Office of Management and Budget. The following is a check list of the type of information that Region 6 will use to process information on your proposed project. While submittal of this form is not required, it does offer details on the information we will use to complete your requested approval and providing the information requested may help expedite the process. Use of application forms for this program is currently under Office of Management and Budget review and these information request forms will be replaced/updated after that review is completed.

Please submit information to following two entities:

Federal Minor NSR Permit Coordinator
U.S. EPA, Region 6
1445 Ross Ave., suite 1200
6MM-AP
Dallas, TX 75202
R6airpermits@epa.gov

For more information, visit:
http://www2.epa.gov/caa-permitting/caa-permitting-epas-south-central-region

The Tribal Environmental Contact for the specific reservation:

If you need assistance in identifying the appropriate Tribal Environmental Contact and address, please contact:

R6airpermits@epa.gov

A. COMPANY INFORMATION

Company Name (Who owns this facility?) **Enterprise Field Services LLC**	
Company Contact (Who is the primary contact at the company that owns this facility?) **Robert Havalda**	Title **Sr. Environmental Engineer**
Mailing Address **P.O. Box 4324, Houston TX 77210-4324**	
Email Address rmhavalda@eprod.com	
Telephone Number **713-381-6698**	Facsimile Number **713-381-6811**

B. FACILITY INFORMATION

Facility Name on the Permit to Be Amended **Lindrith Compressor Station**
Minor Source Permit To Construct Number Not Applicable
Date of Most Recent Permit Action (this should be the same permit to which you are requesting the amendment) **November 4, 2015 (Permit Number R6NM-03-R1)**

C. DESCRIPTION OF THE PROPOSED AMENDMENT

Provide a narrative description of the requested amendment to the permit and the following:

1. Why the proposed change can be made through this form. (See instructions).

   Enterprise Field Services. LLC (Enterprise) is proposing to increase the allowable emission rate for the following emissions units:

   1. **Increase the annual throughput for condensate tank battery (Unit ID: TBATTERY) from 20,000 barrels per year (bbl/yr) to 60,000 bbls/yr (TBATTERY consists of eight 454-bbl fixed roof storage tanks);**
   2. **Increase truck loading (Unit ID: TLOAD), emissions from 20,000 to 60,000 bbl/yr to accommodate the increased throughput from TBATTERY; and**
   3. **Increase Maintenance, Startup, and Shutdown (Unit ID: MSS) emissions to accommodate the increase in the natural gas VOC content.**

   The proposed change in gas composition will add 72.98 TPY of VOCs to the facility. This facility is currently and will remain a minor NSR source.

2. Information presented in enough detail to document how the facility is currently operating and how it is proposed to operate. A narrative description of all of the facility processes along with a process flow diagram to enable EPA to understand the effect the proposed change has on emission unit or (pollutant generating activity).

   The Lindrith Compressor Station is a natural gas compression and transmission facility that receives natural gas from a gathering system and compresses that gas for transmission via pipeline. The emissions units at the facility consists of three reciprocating internal combustion engines (RICE) that drive the compression units (Unit IDs: A-01, A-02, and A-03), the emergency RICE generator (Unit ID: EMERGEN), emissions from engine starts, compressor blowdowns, vessel and piping blowdowns and pipeline pigging activities, including the pipeline pigging location (Unit ID: MSS), fugitive emissions from valves, flanges, compressors, pumps, etc. (Unit ID: FUGVOC), eight 454-bbl fixed roof condensate storage tanks (Unit ID TBATTERY), and condensate truck loading (Unit ID TLOAD). There are no physical changes to the emission units in this permitting action. A process flow diagram is included in the attachments.

3. Emissions calculations and all supporting data necessary to establish the proposed post-change allowable emission limits. The requested information must be provided for each emissions unit (or pollutant-generating activity).

   Attachment 2 contains emissions calculations tables and supporting documentation for each change requested.

4. The proposed changes to be made to specific terms and conditions of the permit. A redline/strike out version of the permit may be used for this purpose.

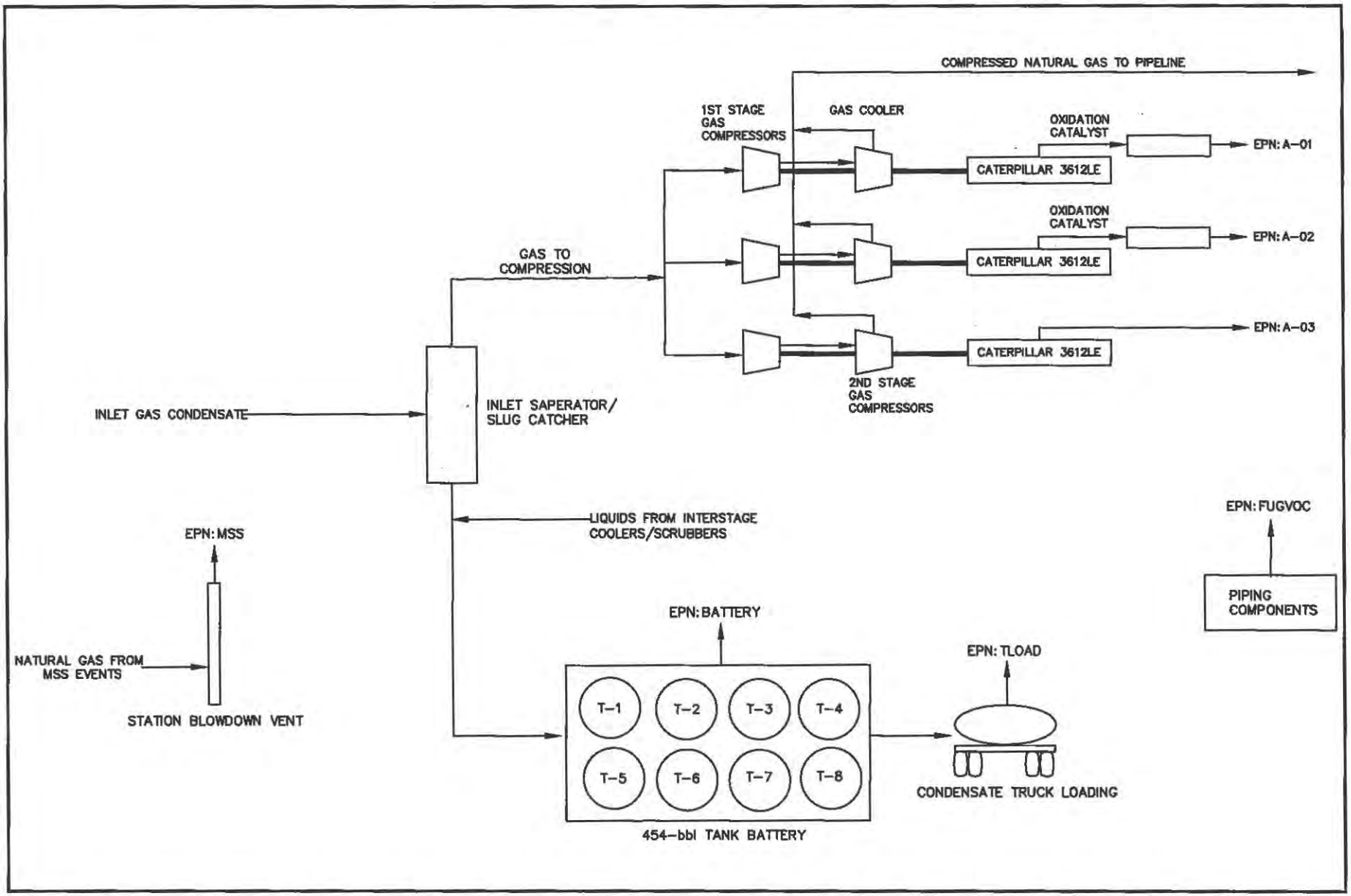
   Enterprise is proposing the following changes to the specific terms and conditions of the permit:

	Page	Current Limit	Proposed Limit
TBATTERY	**3**	**37.39 tons/year**	**102.63 tons/year**
TLOADING	**3**	**2.23 tons/year**	**4.98 tons/year**
MSS	**3**	**25.00 tons/year**	**30.00 tons/year**
Condensate Throughput	**7**	**20,000 barrels/year**	**60,000 barrels/year**

5. The following table with Facility-wide Emission Estimates:

Pollutant	Pre-Change Allowable Emissions (tpy)	Post Change Allowable Emissions (tpy)
PM	2.91	2.91
PM_{10}	2.91	2.91
$PM_{2.5}$	2.91	2.91
SO_2	4.26	4.26
NO_x	66.29	66.29
CO	102.57	102.57
VOC	138.36	211.34
Pb	0	0
Fluorides	N/A	N/A
H_2SO_4	N/A	N/A
H_2S	N/A	N/A
TRS	N/A	N/A
RSC	N/A	N/A

PM - Particulate Matter
PM_{10} - Particulate Matter less than 10 microns in size
$PM_{2.5}$ - Particulate Matter less than 2.5 microns in size
SO_2 - Sulfur Oxides
NOx - Nitrogen Oxides
CO - Carbon Monoxide
VOC - Volatile Organic Compound
Pb - Lead and lead compounds
Fluorides - Gaseous and particulates
H_2SO_4 - Sulfuric Acid Mist
H_2S - Hydrogen Sulfide
TRS - Total Reduced Sulfur
RSC - Reduced Sulfur Compounds



PROCESS FLOW DIAGRAM LINDRITH COMPRESSOR STATION ENTERPRISE FIELD SERVICES, LLC 36.31170, -107.08664 LINDRITH, NEW MEXICO			
	Designed By	WY	Date 6/09/16
	Drawn By	WY	6/09/16
	Checked By	LDC	6/10/16
	Approved By	LDC	6/10/16
	PROJECT NO. FLOWDIAGRAM.DWG		
	Figure No. 1		
	Sheet 1 of 1		

Table B-1
Project Emissions Summary (Criteria Pollutants) from Increased Condensate Throughput
Lindrith Compressor Station
Enterprise Field Services LLC

ID	Emissions Source	Description	VOC	HAPs	Condensate Throughput
			tpy	tpy	Bbl/yr
Limits in Current Permit Number R6NM-03-R1					
TBATTERY	Tanks	Condensate Storage	37.39	1.07	20,000
TLOAD	Truck Loading	Truck Loading	2.23	0.07	20,000
MSS	MSS	Maintenance, Startup, Shutdown	25.00	0.64	n/a
		Total	64.62	1.78	
Proposed Permit Limits					
TBATTERY	Tanks	Condensate Storage	102.63	1.32	60,000
TLOAD	Truck Loading	Truck Loading	4.98	0.14	60,000
MSS	MSS	Maintenance, Startup, Shutdown	29.98	0.59	n/a
		Total	137.59	2.05	

Table B-2
Tank Emissions from Increased Condensate Throughput
Lindrith Compressor Station
Enterprise Field Services LLC

ID	Material Stored	Tank Capacity (Gallons)	No. of Turnovers per year	VOC Annual Emissions Rates			
				TANKS 4.0 Total VOC (lbs/yr)	TANKS 4.0 Total VOC (tpy)	Flash Emissions (tpy)	Overall (tpy)
T1	Condensate	18,900	16.67	4,210.56	2.11	10.72	12.83
T2	Condensate	18,900	16.67	4,210.56	2.11	10.72	12.83
T3	Condensate	18,900	16.67	4,210.56	2.11	10.72	12.83
T4	Condensate	18,900	16.67	4,210.56	2.11	10.72	12.83
T5	Condensate	18,900	16.67	4,210.56	2.11	10.72	12.83
T6	Condensate	18,900	16.67	4,210.56	2.11	10.72	12.83
T7	Condensate	18,900	16.67	4,210.56	2.11	10.72	12.83
T8	Condensate	18,900	16.67	4,210.56	2.11	10.72	12.83
	Total	**151,200**		**33,684.48**	**16.84**	**85.79**	**102.63**

(1) See TANKS 4.0 Report Results
(2) Gasoline RVP 7 properties are used to estimate condensate emissions.
(3) See HYSIS Flash Analysis. Flash emissions = Condensate Throughput x (VOC Mass Flow, lb/hr x 24 hr / Std. Ideal Liq. Vol. Flow, bbl/day)
(4) Speciation method below is the same as used for the renewal application for current Permit Number R6NM-03-R1
(5) Refer to "Lindrith Compressor Station_Winter Case 3.hsc" analysis dated 7/28/2016

Speciated Emissions Based on Aspen Analysis of vapor phase (normalized by deleting all non-voc compounds)

Compound	Weight %	tons/year
Non HAPs	98.7180	101.31
n-Hexane	1.2720	1.31
Benzene	0.0050	0.01
Toluene	0.0030	0.00
Ethylbenzene	0.0010	0.00
Xylenes	0.0010	0.00
HAPs Total:	1.28%	1.32

Table B-3
Truck Loading Emissions from Increased Condensate Throughput
Lindrith Compressor Station
Enterprise Field Services LLC

Basis
Emissions calculated based on loading loss factors from EPA's AP-42, Table 5.2-1, Section 5.2, June, 2008.
VP based on maximum expected liquid temperature for the short-term and annual average liquid temperature for the annual basis.

Product	Loading Type	MW	Short-Term Max VP	Annual Average VP	Saturation Factor, S	Short-Term Loading Loss Factor		Annual Loading Loss Factor		Throughput (gal/hr)	Throughput (gal/yr)	lb/hr	tpy
Condensate	Submerged	68.00	5.24	4.04	0.6	4.8398	lb/1000 gal	3.9496	lb/1000 gal	18,000	2,520,000	87.12	4.98
										Totals:	**2,520,000**	**87.12**	**4.98**

Notes:

Emissions are based on the loading losses equation from EPA's AP-42, Section 2, 5th Edition, June, 2008, Equation 1: L = 12.46 x S x P x M / T

L = Loading Losses, lb/1000 gallons
S = Saturation Factor, see Table 5.2-1 in AP-42, Section 5.2.
P = True vapor pressure, psia
M = Molecular weight of vapors, lb/lb-mol
T = Temperature of bulk liquid loaded, R (F + 46 -5.24

Speciated Emissions Based on Aspen Analysis of vapor phase (normalized by deleting all non-voc compounds)

Compound	Weight %	lb/hr	tons/year
Non HAPs	97.1343	84.62	4.83
n-Hexane	2.2491	1.96	0.11
Benzene	0.3333	0.29	0.02
Toluene	0.2833	0.25	0.01
Ethlybenzene	0.0000	0.00	0.00
Xylenes	0.0000	0.00	0.00
Total:	100.00		
VOC Total:	100.00	87.12	4.98
HAPs Total:	2.87	2.50	0.14

1) Speciation method is the same as used for the renewal application for current Permit Number R6NM-03-R1
2) All non-HAPs assumed VOC.
3) Used Gasoline RVP 7 properties for condensate loading emissions.
4) See attachedTANKS 4.0.9d monthly runs for short term max vapor pressure values, and annual runs for average vapor pressure.

Table B-4
Maintenance, Startup & Shutdown (MSS) Emissions, ID MSS
Emissions from Scheduled/Routine & Predictable Events
Lindrith Compressor Station
Enterprise Field Services LLC

Event Description	Volume Per Event (MCF)	Events per hour	Events per year	Hourly Volume (MCF)	Annual Volume (MMCF)	Material Vented	Standard scf/lbmol	Total lbmol/hr	Total lbmol/yr
Blowdowns	9.88	1	300	9.88	2.96	Nat. Gas	379.482	26.04	7,810.65
Planned maintenance and emergency shutdown	13.75	1	15	13.75	0.21	Nat. Gas	379.482	36.23	543.50
Compressor Engine Startup	1.61	1	512	1.61	0.82	Nat. Gas	379.482	4.23	2,166.83
				Total	3.99				

Compound	Dry Basis Mole %	MW	lb/lb-mol	lb/hr	tons/yr
CO_2	0.4520	44.01	0.20	13.23	1.05
N_2	1.6971	28.01	0.48	31.62	2.50
Methane	75.2957	16.04	12.08	803.31	63.55	
Ethane	11.6789	30.07	3.51	[illegible]	[illegible]
Propane	6.5968	44.10	2.91	193.45	15.30
i-butane	0.8947	58.12	0.52	34.58	2.74
n-butane	1.8481	58.12	1.07	71.43	5.65
i-pentane	0.4973	72.15	0.36	23.86	1.89
n-pentane	0.4323	72.15	0.31	20.74	1.64
n-Hexane	0.1013	86.18	0.09	5.81	0.46
Benzene	0.0133	78.11	0.01	0.69	0.05
Toluene	0.0108	92.14	0.01	0.66	0.05
Ethylbenzene	0.0006	106.17	0.00	0.04	0.00
Xylenes	0.0035	106.17	0.00	0.25	0.02
$C6^+$	0.4801	86.117	0.41	27.49	2.17
Total:	100.00	Avg. MW =	21.97		
			VOC Total:	379.01	29.98
			HAP Total:	7.45	0.59

1) See attached extended natural gas analysis dated March 9, 2016.

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Enterprise - Lindrith 450-bbl VFR
City:	Rio Ariba County
State:	New Mexico
Company:	Enterprise Products
Type of Tank:	Vertical Fixed Roof Tank
Description:	450 bbl Condensate (Gasoline RVP 7)

Tank Dimensions

Shell Height (ft):	20.00
Diameter (ft):	12.75
Liquid Height (ft) :	20.00
Avg. Liquid Height (ft):	8.00
Volume (gallons):	18,900.00
Turnovers:	16.67
Net Throughput(gal/yr):	315,063.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	0.00
Slope (ft/ft) (Cone Roof)	0.06

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meterological Data used in Emissions Calculations: Albuquerque, New Mexico (Avg Atmospheric Pressure = 12.15 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Enterprise - Lindrith 450-bbl VFR - Vertical Fixed Roof Tank
Rio Arriba County , New Mexico

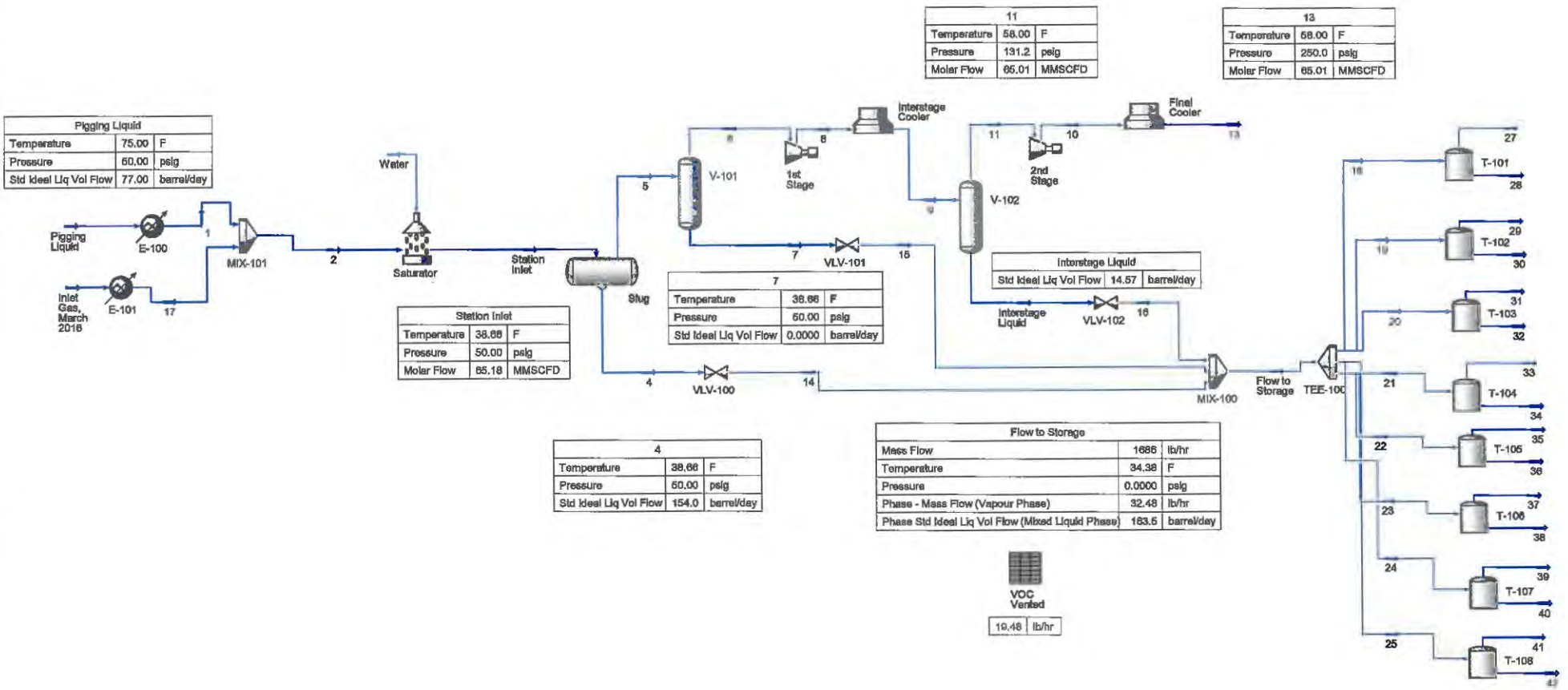
Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Natural Gas Condensate (RVP 7)	All	67.36	53.93	80.79	59.23	5.2095	4.0863	6.5618	50.0000			207.00	
1,2,4-Trimethylbenzene						0.0273	0.0160	0.0451	120.1900	0.0033	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Benzene						1.4274	0.9846	2.0237	78.1100	0.0060	0.0068	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1396	0.0876	0.2162	106.1700	0.0040	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.3100	1.6303	3.2059	86.1700	0.0040	0.0073	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Isooctane						0.7508	0.4629	1.1167	114.2200	0.0010	0.0006	114.22	Option 1: VP60 = .58 VP70 = .812
Isopropyl benzene						0.0670	0.0406	0.1072	120.2000	0.0010	0.0001	120.20	Option 2: A=6.963, B=1460.793, C=207.78
Toluene						0.4136	0.2726	0.6120	92.1300	0.0100	0.0033	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.6730	5.6439	5.6446	49.5769	0.9567	0.9901	218.17	
Xylene (-m)						0.1165	0.0728	0.1813	106.1700	0.0140	0.0013	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Enterprise - Lindrith 450-bbl VFR - Vertical Fixed Roof Tank
Rio Ariba County , New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Benzene	9.97	18.68	28.66
Isooctane	0.87	1.64	2.51
Toluene	4.82	9.02	13.84
Ethylbenzene	0.65	1.22	1.87
Unidentified Components	1,436.31	2,690.47	4,126.78
Natural Gas Condensate (RVP 7)	1,465.46	2,745.10	4,210.56
Xylene (-m)	1.90	3.56	5.46
Isopropyl benzene	0.08	0.15	0.22
1,2,4-Trimethylbenzene	0.10	0.20	0.30
Hexane (-n)	10.76	20.16	30.92


Pigging Liquid
Temperature 75.00 F
Pressure 60.00 psig
Std Ideal Liq Vol Flow 77.00 barrel/day
Pigging Liquid
E-100
Inlet Gas, March 2016
E-101
MIX-101
Water
Saturator
Station Inlet
Temperature 38.66 F
Pressure 50.00 psig
Molar Flow 65.18 MMSCFD
Slug
V-101
1st Stage
Interstage Cooler
V-102
2nd Stage
Final Cooler
VLV-101
VLV-100
VLV-102
7
Temperature 38.66 F
Pressure 50.00 psig
Std Ideal Liq Vol Flow 0.0000 barrel/day
Interstage Liquid
Std Ideal Liq Vol Flow 14.57 barrel/day
Interstage Liquid
4
Temperature 38.66 F
Pressure 50.00 psig
Std Ideal Liq Vol Flow 154.0 barrel/day
11
Temperature 58.00 F
Pressure 131.2 psig
Molar Flow 65.01 MMSCFD
13
Temperature 58.00 F
Pressure 250.0 psig
Molar Flow 65.01 MMSCFD
MIX-100
Flow to Storage
TEE-100
Flow to Storage
Mass Flow 1686 lb/hr
Temperature 34.38 F
Pressure 0.0000 psig
Phase - Mass Flow (Vapour Phase) 32.48 lb/hr
Phase Std Ideal Liq Vol Flow (Mixed Liquid Phase) 183.5 barrel/day
VOC Vented
19.48 lb/hr
T-101
T-102
T-103
T-104
T-105
T-106
T-107
T-108

aspentech	ENTERPRISE PRODUCTS OPER Bedford, MA USA	Case Name:	Lindrith Compressor Station_Winter Case 3.hsc
		Unit Set:	NewUser1
		Date/Time:	Thu Jul 28 15:10:52 2016

Material Stream: Flow to Storage

Fluid Package: Basis-1

Property Package: Peng-Robinson

CONDITIONS

	Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Vapour / Phase Fraction	0.0517	0.0517	0.9109	0.0373
Temperature: (F)	34.38	34.38	34.38	34.38
Pressure: (psig)	0.0000	0.0000	0.0000	0.0000
Molar Flow (MMSCFD)	0.1701	8.800e-003	0.1549	6.352e-003
Mass Flow (lb/hr)	1686	32.48	1641	12.56
Std Ideal Liq Vol Flow (barrel/day)	168.6	5.076	162.7	0.8621
Molar Enthalpy (Btu/lbmole)	-8.863e+004	-4.197e+004	-8.984e+004	-1.238e+005
Molar Entropy (Btu/lbmole-F)	18.16	43.58	16.99	11.29
Heat Flow (Btu/hr)	-1.655e+006	-4.056e+004	-1.529e+006	-8.638e+004
Liq Vol Flow @Std Cond (barrel/day)	165.7 *	5.904	160.7	0.8478

PROPERTIES

	Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Molecular Weight	90.27	33.62	96.45	18.02
Molar Density (lbmole/ft3)	4.895e-002	2.806e-003	0.4603	3.552
Mass Density (lb/ft3)	4.419	9.432e-002	44.39	63.98
Act. Volume Flow (barrel/day)	1631	1472	158.0	0.8395
Mass Enthalpy (Btu/lb)	-981.9	-1249	-931.5	-6874
Mass Entropy (Btu/lb-F)	0.2011	1.296	0.1762	0.6267
Heat Capacity (Btu/lbmole-F)	42.67	13.68	45.31	18.61
Mass Heat Capacity (Btu/lb-R)	0.4727	0.4070	0.4698	1.033
LHV Molar Basis (Std) (Btu/lbmole)	1.723e+006	6.704e+005	1.853e+006	1.425e-004
HHV Molar Basis (Std) (Btu/lbmole)	1.847e+006	7.270e+005	1.986e+006	1.763e+004
HHV Mass Basis (Std) (Btu/lb)	2.046e+004	2.163e+004	2.059e+004	978.7
CO2 Loading	—	—	—	—
CO2 App ML Con (lbmole/ft3)	—	—	4.882e-005	1.804e-005
CO2 App WT Con (lbmol/lb)	—	—	1.100e-006	2.820e-007
LHV Mass Basis (Std) (Btu/lb)	1.909e+004	1.994e+004	1.922e+004	7.909e-006
Phase Fraction [Vol. Basis]	3.011e-002	3.011e-002	0.9648	5.113e-003
Phase Fraction [Mass Basis]	1.927e-002	1.927e-002	0.9733	7.453e-003
Phase Fraction [Act. Vol. Basis]	0.9026	0.9026	9.688e-002	5.147e-004
Mass Exergy (Btu/lb)	1.046	—	—	—
Partial Pressure of CO2 (psig)	-14.62	—	—	—
Cost Based on Flow (Cost/s)	0.0000	0.0000	0.0000	0.0000
Act. Gas Flow (ACFM)	5.740	5.740	—	—
Avg. Liq. Density (lbmole/ft3)	0.4735	0.8137	0.4471	3.458
Specific Heat (Btu/lbmole-F)	42.67	13.68	45.31	18.61
Std. Gas Flow (MMSCFD)	0.1698	8.783e-003	0.1547	6.340e-003
Std. Ideal Liq. Mass Density (lb/ft3)	42.75	27.36	43.12	62.30
Act. Liq. Flow (USGPM)	4.633	—	4.609	2.448e-002
Z Factor	—	0.9879	6.022e-003	7.805e-004
Watson K	12.60	15.93	12.56	8.510
User Property	—	—	—	—
Partial Pressure of H2S (psig)	-14.70	—	—	—
Cp/(Cp - R)	1.049	1.170	1.046	1.119
Cp/Cv	1.003	1.178	1.046	1.129
Heat of Vap. (Btu/lbmole)	2.960e+004	—	—	—
Kinematic Viscosity (cSt)	—	5.904	0.7928	1.640
Liq. Mass Density (Std. Cond) (lb/ft3)	43.49	23.52	43.64	63.35
Liq. Vol. Flow (Std. Cond) (barrel/day)	165.7	5.904	160.7	0.8478
Liquid Fraction	0.9483	0.0000	1.000	1.000

* Specified by user.

Material Stream: Flow to Storage (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

PROPERTIES

		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Molar Volume	(ft3/lbmole)	20.43	356.4	2.173	0.2816
Mass Heat of Vap.	(Btu/lb)	327.9	—	—	—
Phase Fraction [Molar Basis]		0.0517	0.0517	0.9109	0.0373
Surface Tension	(dyne/cm)	—	—	21.26	76.17
Thermal Conductivity	(Btu/hr-ft-F)	—	1.159e-002	7.144e-002	0.3300
Viscosity	(cP)	—	8.920e-003	0.5637	1.681
Cv (Semi-Ideal)	(Btu/lbmole-F)	40.69	11.70	43.32	16.62
Mass Cv (Semi-Ideal)	(Btu/lb-R)	0.4507	0.3480	0.4492	0.9226
Cv	(Btu/lbmole-F)	42.56	11.61	43.32	16.48
Mass Cv	(Btu/lb-R)	0.4715	0.3454	0.4492	0.9147
Cv (Ent. Method)	(Btu/lbmole-F)	—	—	—	15.79
Mass Cv (Ent. Method)	(Btu/lb-R)	—	—	—	0.8764
Cp/Cv (Ent. Method)		—	—	—	1.178
Reid VP at 37.8 C	(psig)	21.48	723.9	4.190	-13.50
True VP at 37.8 C	(psig)	87.06	1223	14.82	-13.50
Liq. Vol. Flow - Sum(Std. Cond)	(barrel/day)	167.5	5.904	160.7	0.8478
Viscosity Index		-0.6055	—	—	—

COMPOSITION

Overall Phase

Vapour Fraction 0.0517

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
CO2	0.0071	0.0004	0.3113	0.0002	0.0258	0.0002
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0023	0.0001	0.0647	0.0000	0.0055	0.0000
Oxygen	0.0000	0.0000	0.0011	0.0000	0.0001	0.0000
Methane	0.3900	0.0209	6.2572	0.0037	1.4310	0.0085
Ethane	0.4154	0.0222	12.4903	0.0074	2.4045	0.0143
Propane	0.9795	0.0524	43.1918	0.0256	5.8370	0.0346
i-Butane	0.3788	0.0203	22.0181	0.0131	2.6828	0.0159
n-Butane	1.1583	0.0620	67.3275	0.0399	7.9045	0.0469
i-Pentane	0.8590	0.0460	61.9742	0.0368	6.8066	0.0404
n-Pentane	1.0401	0.0557	75.0420	0.0445	8.1596	0.0484
Cyclopentane	0.0887	0.0048	6.2241	0.0037	0.5691	0.0034
n-Hexane	2.7841	0.1491	239.9238	0.1423	24.7912	0.1470
Cyclohexane	0.3987	0.0213	33.5562	0.0199	2.9389	0.0174
n-Heptane	2.2957	0.1229	230.0423	0.1364	22.9343	0.1360
Mcyclohexane	0.9336	0.0500	91.6710	0.0544	8.1263	0.0482
224-Mpentane	0.0015	0.0001	0.1716	0.0001	0.0169	0.0001
Benzene	0.1185	0.0063	9.2534	0.0055	0.7182	0.0043
Toluene	0.3179	0.0170	29.2874	0.0174	2.3049	0.0137
E-Benzene	0.0461	0.0025	4.8969	0.0029	0.3854	0.0023
p-Xylene	0.2950	0.0158	31.3206	0.0186	2.4815	0.0147
n-Octane	2.2371	0.1198	255.5483	0.1516	24.8068	0.1471
H2O	0.7060	0.0378	12.7183	0.0075	0.8726	0.0052
n-Nonane	0.4291	0.0230	55.0392	0.0326	5.2325	0.0310
n-Decane	2.7947	0.1496	397.6499	0.2359	37.1604	0.2204
Total	18.6772	1.0000	1685.9812	1.0000	168.5966	1.0000

Material Stream: Flow to Storage (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

COMPOSITION

Vapour Phase

Phase Fraction 5.173e-002

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
CO2	0.0053	0.0054	0.2317	0.0071	0.0192	0.0038
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0022	0.0023	0.0630	0.0019	0.0053	0.0011
Oxygen	0.0000	0.0000	0.0011	0.0000	0.0001	0.0000
Methane	0.3521	0.3644	5.6485	0.1739	1.2918	0.2545
Ethane	0.2309	0.2389	6.9418	0.2137	1.3364	0.2633
Propane	0.2160	0.2235	9.5235	0.2932	1.2870	0.2536
i-Butane	0.0328	0.0340	1.9076	0.0587	0.2324	0.0458
n-Butane	0.0687	0.0711	3.9943	0.1230	0.4689	0.0924
i-Pentane	0.0183	0.0189	1.3201	0.0406	0.1450	0.0286
n-Pentane	0.0157	0.0162	1.1313	0.0348	0.1230	0.0242
Cyclopentane	0.0010	0.0010	0.0681	0.0021	0.0062	0.0012
n-Hexane	0.0108	0.0112	0.9292	0.0286	0.0960	0.0189
Cyclohexane	0.0012	0.0013	0.1018	0.0031	0.0089	0.0018
n-Heptane	0.0024	0.0025	0.2391	0.0074	0.0238	0.0047
Mcyclohexane	0.0012	0.0012	0.1144	0.0035	0.0101	0.0020
224-Mpentane	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
Benzene	0.0004	0.0005	0.0346	0.0011	0.0027	0.0005
Toluene	0.0003	0.0003	0.0277	0.0009	0.0022	0.0004
E-Benzene	0.0000	0.0000	0.0012	0.0000	0.0001	0.0000
p-Xylene	0.0001	0.0001	0.0065	0.0002	0.0005	0.0001
n-Octane	0.0006	0.0006	0.0716	0.0022	0.0070	0.0014
H2O	0.0062	0.0064	0.1121	0.0035	0.0077	0.0015
n-Nonane	0.0000	0.0000	0.0044	0.0001	0.0004	0.0001
n-Decane	0.0001	0.0001	0.0094	0.0003	0.0009	0.0002
Total	0.9663	1.0000	32.4832	1.0000	5.0758	1.0000

Liquid Phase

Phase Fraction 0.9109

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
CO2	0.0018	0.0001	0.0794	0.0000	0.0066	0.0000
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0001	0.0000	0.0017	0.0000	0.0001	0.0000
Oxygen	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
Methane	0.0379	0.0022	0.6087	0.0004	0.1392	0.0009
Ethane	0.1845	0.0108	5.5484	0.0034	1.0681	0.0066
Propane	0.7635	0.0449	33.6684	0.0205	4.5500	0.0280
i-Butane	0.3460	0.0203	20.1105	0.0123	2.4504	0.0151
n-Butane	1.0896	0.0640	63.3332	0.0386	7.4356	0.0457
i-Pentane	0.8407	0.0494	60.6541	0.0370	6.6617	0.0410
n-Pentane	1.0244	0.0602	73.9107	0.0450	8.0366	0.0494
Cyclopentane	0.0878	0.0052	6.1559	0.0038	0.5629	0.0035
n-Hexane	2.7733	0.1630	238.9946	0.1456	24.6952	0.1518
Cyclohexane	0.3975	0.0234	33.4544	0.0204	2.9300	0.0180
n-Heptane	2.2933	0.1348	229.8032	0.1400	22.9105	0.1409
Mcyclohexane	0.9325	0.0548	91.5566	0.0558	8.1162	0.0499
224-Mpentane	0.0015	0.0001	0.1714	0.0001	0.0169	0.0001
Benzene	0.1180	0.0069	9.2188	0.0056	0.7155	0.0044

Material Stream: Flow to Storage (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

COMPOSITION

Liquid Phase (continued)

Phase Fraction 0.9109

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
Toluene	0.3176	0.0187	29.2598	0.0178	2.3028	0.0142
E-Benzene	0.0461	0.0027	4.8957	0.0030	0.3853	0.0024
p-Xylene	0.2950	0.0173	31.3142	0.0191	2.4810	0.0153
n-Octane	2.2365	0.1315	255.4767	0.1557	24.7998	0.1525
H2O	0.0023	0.0001	0.0414	0.0000	0.0028	0.0000
n-Nonane	0.4291	0.0252	55.0348	0.0335	5.2321	0.0322
n-Decane	2.7947	0.1643	397.6405	0.2423	37.1595	0.2285
Total	17.0135	1.0000	1640.9331	1.0000	162.6587	1.0000

Aqueous Phase

Phase Fraction 3.734e-002

COMPONENTS	MOLAR FLOW (lbmole/hr)	MOLE FRACTION	MASS FLOW (lb/hr)	MASS FRACTION	LIQUID VOLUME FLOW (barrel/day)	LIQUID VOLUME FRACTION
CO2	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
H2S	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Nitrogen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Oxygen	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Methane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ethane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Propane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
I-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Butane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
i-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Pentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclopentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Hexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Cyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Heptane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mcyclohexane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
224-Mpentane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Toluene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
E-Benzene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
p-Xylene	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Octane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
H2O	0.6975	1.0000	12.5648	1.0000	0.8621	1.0000
n-Nonane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
n-Decane	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	0.6975	1.0000	12.5649	1.0000	0.8621	1.0000

K VALUE

COMPONENTS	MIXED	LIGHT	HEAVY
CO2	53.38	51.38	1073
H2S	—	—	—
Nitrogen	680.5	654.1	4.798e+004
Oxygen	274.9	264.1	5.985e+005
Methane	170.1	163.4	8.934e+008
Ethane	22.93	22.03	8.494e+010
Propane	5.185	4.981	2.835e+013

* Specified by user.

Material Stream: Flow to Storage (continued)

Fluid Package: Basis-1
Property Package: Peng-Robinson

K VALUE

COMPONENTS	MIXED	LIGHT	HEAVY
i-Butane	1.739	1.670	3.492e+016
n-Butane	1.156	1.110	1.898e+016
i-Pentane	0.3989	0.3832	3.467e+019
n-Pentane	0.2806	0.2695	2.856e+019
Cyclopentane	0.2029	0.1949	2.072e+015
n-Hexane	7.126e-002	6.846e-002	7.119e+022
Cyclohexane	5.578e-002	5.359e-002	8.814e+017
n-Heptane	1.907e-002	1.832e-002	3.108e+026
Mcyclohexane	2.290e-002	2.200e-002	4.311e+021
224-Mpentane	2.109e-002	2.026e-002	—
Benzene	6.886e-002	6.614e-002	4.709e+014
Toluene	1.733e-002	1.664e-002	2.036e+018
E-Benzene	4.553e-003	4.373e-003	3.354e+021
p-Xylene	3.788e-003	3.638e-003	1.123e+022
n-Octane	5.139e-003	4.936e-003	—
H2O	0.1630	47.72	6.442e-003
n-Nonane	1.459e-003	1.402e-003	—
n-Decane	4.344e-004	4.173e-004	—

Inlet Gas Analysis

Meter Number:	--	**Flow Pressure:**	51
Meter Name:	SJ Lindrith Inlet 3-9-16	**Flow Temp:**	49
Location:	Lindrith CS	**H20, Lb/MMCF:**	--
Sample Date:	3/9/2016	**H2S, ppmmol:**	--
File name	SJ LINDRITH INLET 3-9-16_1.D	**Type:**	Spot
		Pulled by:	Blaine Ellis

Component	Mol%	Wt%	LV%
Carbon Dioxide	0.4520	0.9050	0.3971
Hydrogen Sulfide	0.0000	0.0000	0.0000
Nitrogen	1.6971	2.1630	0.9612
Oxygen	0.0110	0.0160	0.0050
Methane	75.2957	54.9594	65.7186
Ethane	11.6789	15.9780	16.0803
Propane	6.5968	13.2352	9.3568
Isobutane	0.8947	2.3660	1.5073
n-Butane	1.8481	4.8872	2.9996
Isopentane	0.4973	1.6325	0.9363
n-Pentane	0.4323	1.4189	0.8067
Cyclopentane	0.0272	0.0867	0.0414
n-Hexane	0.1013	0.3973	0.2145
Cyclohexane	0.0388	0.1487	0.0680
Other Hexanes	0.2320	0.9040	0.4737
Heptanes	0.0876	0.3972	0.2022
Methylcyclohexane	0.0455	0.2031	0.0940
2,2,4 Trimethylpentane	0.0000	0.0000	0.0000
Benzene	0.0133	0.0472	0.0191
Toluene	0.0108	0.0451	0.0185
Ethylbenzene	0.0006	0.0028	0.0012
Xylenes	0.0035	0.0170	0.0070
C8+ Heavies	0.0356	0.1897	0.0913
Total	**100.0000**	**100.0000**	**100.0000**

Certificate of Analysis

Number: 1030-15080180-001A

Houston Laboratories
8820 Interchange Drive
Houston, TX 77054
Phone 713-660-0901

Gary Turner
Enterprise Products
614 Reilly Ave
Farmington, NM 87401

Aug. 11, 2015

Station Name: Lindrith Compressor
Sample Point: Pigging Liquids into Plant
Cylinder No: 8963
Analyzed: 08/06/2015 17:15:20

Sampled By: GT
Sample Of: Liquid Spot
Sample Date: 07/28/2015 11:45
Sample Conditions: 50 psig, @ 75 °F
Method: GPA 2103M

Analytical Data

Components	Mol. %	MW	Wt. %	Sp. Gravity	L.V. %
Nitrogen	0.012	28.013	0.002	0.807	0.002
Methane	1.524	16.043	0.149	0.300	0.400
Carbon Dioxide	0.026	44.010	0.007	0.817	0.007
Ethane	1.823	30.069	0.334	0.356	0.755
Propane	3.989	44.096	1.072	0.507	1.703
Iso-Butane	1.253	58.122	0.444	0.563	0.635
n-Butane	4.181	58.122	1.481	0.584	2.043
Iso-Pentane	2.625	72.149	1.154	0.625	1.487
n-Pentane	3.116	72.149	1.370	0.631	1.750
i-Hexanes	1.718	85.084	0.891	0.668	1.075
n-Hexane	2.422	86.175	1.272	0.664	1.544
2,2,4-Trimethylpentane	0.070	114.231	0.049	0.697	0.057
Benzene	0.464	78.114	0.221	0.885	0.201
Heptanes	11.984	94.444	6.897	0.722	7.692
Toluene	1.991	92.141	1.118	0.872	1.033
Octanes	12.970	107.994	8.537	0.740	9.293
Ethylbenzene	0.351	106.167	0.227	0.872	0.210
Xylenes	2.241	106.167	1.450	0.872	1.341
Nonanes	6.842	125.606	5.240	0.749	5.634
Decanes Plus	40.398	276.586	68.085	0.869	63.138
	100.000		100.000		100.000

Physical Properties	Total	C10+
Specific Gravity at 60°F	0.8058	0.8689
API Gravity at 60°F	44.110	31.350
Molecular Weight	164.088	276.586
Pounds per Gallon (in Vacuum)	6.718	7.244
Pounds per Gallon (in Air)	6.710	7.236
Cu. Ft. Vapor per Gallon @ 14.696 psia	15.536	9.939

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Certificate of Analysis

Number: 1030-15080180-001A

Houston Laboratories
8820 Interchange Drive
Houston, TX 77054
Phone 713-660-0901

Gary Turner
Enterprise Products
614 Reilly Ave
Farmington, NM 87401

Aug. 11, 2015

Station Name: Lindrith Compressor
Sample Point: Pigging Liquids into Plant
Cylinder No: 8963

Sampled By: GT
Sample Of: Liquid Spot
Sample Date: 07/28/2015 11:45
Sample Conditions: 50 psig, @ 75 °F

Analytical Data

Test	Method	Result	Units	Detection Limit	Lab Tech.	Analysis Date
Shrinkage Factor	Proprietary	0.9715			JB	08/07/2015
Flash Factor	Proprietary	35.7893	Cu.Ft./STBbl.		JB	08/07/2015
Color Visual	Proprietary	Crude			JB	08/07/2015
API Gravity @ 60° F	ASTM D-4052	40.46	"		LC	08/10/2015

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

6.0 MAINTENANCE

DCL's recommended monitoring and maintenance schedule during operation is given below. Due to large variations in operating conditions, the schedule may change depending on the specifics of the application. In addition to this schedule, additional monitoring and reporting may be needed according to the requirements of your environment permit.

It is recommended that a maintenance log be maintained. Measurements and records of temperature difference (ΔT) and pressure difference (ΔP) should always be made under the same operating conditions (e.g. engine load, speed, ignition timing and exhaust oxygen concentration).

Monitoring and Maintenance Schedule

Item No.	Description	> 4000 hours operation per year	500 – 3999 hours operation per year	< 500 hours operation per year	Directions
1	Check back-pressure (ΔP)	• At time of installation • Every 3 months	• At time of installation • Every 6 months	• At time of installation • Every year	If the (ΔP) is more than 55 mm H_2O (2" H_2O) higher than the initial (ΔP), inspect catalyst for excessive ash build-up. See Section 7 (Troubleshooting).
2	Check temperature change (ΔT)	• At time of installation • Every 3 months	• At time of installation • Every 6 months	• At time of installation • Every year	If the (ΔT) is more than 25°F (14°C) higher than the initial (ΔT), check the engine for misfiring and /or inspect catalyst element for damage or fouling. See Section 7 (Troubleshooting).
3	Conduct emissions test	• As required by operating permit	• As required by operating permit	• As required by operating permit	As required by operating permit.
4	Visual inspection of catalyst element	• Every 2 years	• Every 3 years	• Every 3 years	See Section 7 (Troubleshooting).
5	Chemical cleaning of catalyst element	• Every 2 years	• Every 3 years	• N/A	Contact DCL or authorized dealer for assistance.

Note: Items 1, 2 and 3 can be conducted by utilizing the ports on the inlet and outlet side of the converter.

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

Guidance for Portable Electrochemical Analyzer Testing used for Compliance Monitoring

SECTION I. INTRODUCTION

The Oklahoma Department of Environmental Quality (Department), Air Quality Division administers the Part 70 as well as the minor source permitting program, and issues Part 70 source permits, minor source permits, and applicability determinations. The permits issued by the Department impose emission limitations and restrictions on operations to ensure that the National Ambient Air Quality Standards (NAAQS) are not violated. All Part 70 permits and most other permits require periodic source compliance monitoring tests to assure continuing compliance with the emissions limitations. Portable electrochemical (EC) analyzer testing has been utilized to comply with these monitoring requirements. Air Quality rules require that (OAC 252:100-43-2) "All tests should be made and the results calculated in accordance with test procedures approved by the Executive Director." This guidance has been developed to ensure consistency in performing emissions testing and to provide a minimum level of quality assurance in determining results. It is not intended to replace the reference methods of 40 CFR Part 60, Appendix A, but rather to facilitate the measurement of emissions from sources that require periodic emission tests as part of their monitoring schedules. The Department reserves the right to withdraw or modify this guidance without advance notice.

This guidance is applicable to the determination of nitrogen oxides (NO and NO_2), carbon monoxide (CO), and oxygen (O_2) concentrations in controlled and uncontrolled emissions from combustion sources using fuels such as natural gas, propane, butane, and fuel oils. A gas sample is extracted from a stack and is conveyed to an EC analyzer for determination of the NO, NO_2, CO, and O_2 gas concentrations. Additions to, or modifications of, vendor supplied EC analyzers (e.g., heated sample lines, thermocouples, flow meters, etc.) may be required to meet the specifications indicated in this guidance. The instrument and EC cell design will determine the analytical range (span) for each gas component. The minimum detectable limit depends on the span and resolution of the EC cell and the signal to noise ratio of the measurement system.

SECTION II. EC ANALYZER APPARATUS

A. Use any measurement system that meets the performance and design specifications of this guidance. The sampling system should maintain the gas sample at conditions that will prevent condensation in the lines or when it contacts the EC cells. A diagram of an acceptable measurement system is shown in Figure 2. Some of the components of the measurement system are described below.

B. The **sample probe** and **sample line** should be made of glass, stainless steel or other non-reactive material and should be designed to prevent condensation.

C. The **calibration assembly** should introduce calibration gases at ambient pressure to the sample probe during calibration checks. The assembly should be designed such that only the calibration gases are processed and that the calibration gases flow through all the filters in the sampling line.

D. The **moisture removal** system should be used to remove condensate from the sample gas while maintaining minimal contact between the condensate and the sample gases.

E. **Particulate filters** should be utilized before the inlet of the EC analyzer to prevent accumulation of particulate material in the measurement system and to extend the useful life of the EC analyzer. All filters should be fabricated of materials that are non-reactive to the gases being sampled.

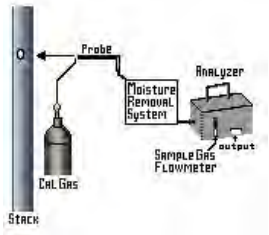
F. The **sample pump** should be a leak-free pump that will transport the sample gas to the system at a flow rate sufficient to minimize the response time of the measurement system. If upstream of the EC cells, the pump should be constructed of material that is non-reactive to the gases being sampled.

G. The **sample flow rate** should not vary by more than 10% throughout the calibration, testing, and drift check.

H. **Interference gas scrubbers** should be checked and replenished in accordance with the manufacturer's recommendations. EC analyzers should have a means to determine when the agent is depleted.

I. A **data recorder** should be used for recording the EC analyzer data.

Figure 1 – EC analyzer Measurement System



SECTION III. EC ANALYZER CALIBRATION & TESTING SPECIFICATIONS

A Except for an initial compliance test, all combustion equipment shall be tested "as-found." No tuning or maintenance for the purpose of lowering tested emissions is allowed within 24 hours prior to testing. If tests are conducted before and after maintenance, the test results should be recorded and made available for review.

B. Each EC analyzer should be certified by the manufacturer at least once per year unless waived by the Department. Assemble the measurement system by following the manufacturer's recommended procedures for preparing and preconditioning the EC analyzer. Ensure the system has no leaks and verify that the gas-scrubbing agent is not depleted. When an EC cell is replaced, the EC analyzer should be re-calibrated.

C. Calibration of the EC analyzer should be done using certified calibration gases (EPA Protocol gases). Fresh air, free from ambient CO and NO_X, is permitted for O_2 calibration (20.9% O_2), and as a zero gas for CO and NO_X. Calibration gases for NO, NO_2, and CO should be chosen so that the concentration of the calibration gas is between 20% and 125% of the range of concentrations of the EC analyzer cell for each pollutant. Alternatively, calibration gases should not exceed 200% of the anticipated concentration expected from the emission unit being tested. If the measured concentration exceeds 125% of the span of the EC analyzer, at any time during the sampling run, that test run should be considered invalid. For NO_2 concentrations below 10% of the total NO_X concentration, NO_2 does not have to be measured directly and calibration of the EC analyzer for NO_2 is not required.

D. Individually inject each calibration gas into the EC analyzer and record the start time, response time, and concentrations. Gases should be injected through the entire sample handling system. All EC analyzer output responses should be recorded at least once per minute. The response time is the time it takes for the EC analyzer to get a steady response from a calibration gas after injecting the calibration gas into the measurement system. Actual measurements should not be averaged until the after the response time of the measurement system. After each calibration gas run, the EC analyzer should be refreshed with fresh air, free from CO, NO_X, and other pollutants. Repeat these steps for each calibration gas.

E. For the EC analyzer O_2 cell calibration, the minimum detectable limit should be 0.3%. For the EC analyzer NO_X and CO cells, the minimum detectable limit should be 2% of the calibration gas or 2 ppm whichever is less restrictive. If an invalid calibration is exhibited, corrective action should be taken and the EC analyzer calibration check should be repeated until an acceptable EC analyzer performance is achieved.

F. Calculate the mean of the readings from the EC analyzer for each calibration gas. The average calculated EC analyzer response error, for each calibration gas, should not exceed ±5% of the calibration gas concentration. The maximum allowable deviation of any single reading, after the response time and prior to the refresh period, should not exceed ±2% of the average calculated EC analyzer response. *<u>For Example</u>: For a calibration gas with a concentration of 100 ppm, the calibration gas check should be considered valid only if the average of the measured concentrations for that calibration gas are within □5 ppm of 100 ppm, i.e., 95 to 105 ppm, and if the maximum deviation of any single measurement comprising that average is less than □2% or approximately 2 ppm.*

G. During calibration an interference check should be performed. During the calibration check of a single gas species (e.g., NO & NO_2), record the response displayed by the other EC cells (i.e., CO & NO). Record the interference response for each EC cell to each calibration gas. The CO, NO, and NO_2 interference response should not exceed 5% of the calibration gas concentration. EC analyzers that have been verified for interference response using an interference scrubber are considered to be in compliance with this interference check specification when the interference scrubber is replenished per manufacturers specifications. The potential for interference from other flue gas constituents should be reviewed with the EC analyzer manufacturer based on site-specific data.

H. A post-test calibration check should be performed in the same manner as the pre-test calibration after each emissions unit test. If the post-test calibration checks do not meet the required specifications, all test data for that emissions unit should be considered null and void and re-calibration and re-testing should be conducted. To prevent loss of data, the drift of the analyzer should be determined after each measurement cycle. This should be done by performing a calibration check after each measurement cycle and determining the drift to ensure that it is still within the limit of ±5%. No changes to the sampling system or EC analyzer calibration should be made until all of the post-test calibration checks have been recorded. The difference (% Drift) between the pre-test calibration and the post-test calibration should not exceed 5% for each pollutant.

SECTION IV. EMISSIONS MEASUREMENTS

A. Field testing should be conducted by personnel trained in the use of the specific EC analyzer utilized for the testing. Samples of pollutant concentrations should be taken from sample ports in the stack or using a "Shepard's hook" from a location in the stack such that a representative concentration is measured and bias (e.g., air leakage at weep holes) is prevented. A single sampling location near the center of the duct may be selected.

B. Prior to sample collection, ensure that the pre-test calibration has been performed. Zero the EC analyzer with fresh air, free from ambient CO and NO_X or other combustion gases. Each test for an emission unit should consist of at least three 15-minute measurement cycles. Position the probe at the sampling point and begin the measurement cycle at the same flow rate used during the calibration check. Measurements should not be recorded and averaged until the measurement system response time has passed. The EC analyzer should be "refreshed," the analyzer drift should be determined, and the moisture collection system emptied after each sampling cycle. Use the measurement data to calculate the mean effluent concentration. Record the average gas sample concentration for each pollutant from the cycle on a form similar to the one provided.

C. Conduct the post-test calibration check after testing of each emission unit. If the sampling system is disassembled or if the EC analyzer calibration is adjusted, the EC analyzer should be recalibrated before conducting the next emission unit test.

D. The emissions testing should produce at least three sets of concentration data for each pollutant of concern. Results from each test represent a "quasi steady-state" measurement of pollutant concentration and the measured pollutant concentrations should be calculated as the mean gas concentration using the emissions data collected during the three test runs. Data from additional tests may be included in the calculation so long as other operational parameters remain relatively unchanged.

E. The measured pollutant concentrations should then be corrected to give actual values using the pre-test calibration and post-test calibration results. The following equation should be used.

$$C_{ACTUAL} = (C_{MEAS} - C_{CZ}) \times \frac{(C_{CAL} - C_{CZ})}{(C_{CM} - C_{CZ})}$$

Where: C_{ACTUAL} = actual pollutant concentration, ppmdv
C_{MEAS} = measured pollutant concentration, ppmdv
C_{CAL} = concentration of the calibration gas, ppmv
C_{CZ} = average of pre-test and post-test calibration zero checks, ppmdv
C_{CM} = average of pre-test and post-test measured concentrations of the calibration gas measurement checks, ppmdv

SECTION V. OPERATIONAL PARAMETER MEASUREMENTS

Emissions testing results, i.e., NO_X, CO, and O_2 concentrations (ppmv), are typically used in conjunction with stack flow to determine compliance with a permitted emissions limitation (lb/hr). Other specific parameters may also need to be documented. The results of any measurements or calculated parameters should also be recorded on a form similar to the one provided in Appendix A.

A. During the emissions testing of the emission unit, the following operational parameters should be measured or determined:
   1. Engine/turbine load and speed (RPM) or power (HP);
   2. Fuel BTU content (BTU/SCF); and
   3. Fuel consumption (SCFH).

B. Sampling of the fuel, that is representative of the fuel combusted in the emission unit, should be performed. The fuel sampling should be conducted within a calendar quarter of the testing. The sampling should determine the C_1 to C_{6+} composition and BTU content. The sample should be taken from the inlet gas line, downstream from any inlet separator, and using a manifold to remove entrained liquids from the sample and a probe to collect the sample from the center of the gas line. GPA standard method 2166 (or similar method) should be used. Emission units utilizing "commercial-grade natural gas" are exempt from the fuel sampling requirements.

C. During emissions testing, the stack velocity (or flow) shall be measured or determined using one of the following methods.

1. EPA Reference Methods 2;
2. EPA Reference Method 19; or
3. An equivalent method, as approved by the Department.

SECTION VI. CALCULATIONS

As mentioned previously, emissions testing results, i.e., NO_X, CO, and O_2 concentrations, are typically used in conjunction with other measured parameters to determine compliance with a permitted emissions limitation. The following issues should be considered in documenting compliance with the various criteria.

A. Calculation of the emissions (lb/hr) to show compliance with the permitted emissions should be calculated as the corrected mean concentration multiplied by the stack flow corrected to zero percent oxygen.

$$E_{MEAS} = C_{ACTUAL} \times Q_{STACK} \times \left(\frac{MW_P}{385.4} \right) \times (1E-6)$$

Where: E_{MEAS} = the measured emissions from the emission unit at standard conditions and 0% O_2, lb/hr;
C_{ACTUAL} = average actual pollutant concentration, ppmdv;
Q_{STACK} = stack flow of the emission unit, DSCFH @ 0% O_2;
MW_P = molecular weight of the pollutant, lb/lb-mole:
= 46 lb/lb-mole for NO_X (as NO_2);
= 28 lb/lb-mole for CO.
For an Ideal Gas at EPA standard conditions: 20 °C (68 °F) and 1 atm (760 mm); there are 385.4 SCF/lb-mole.
The factor of (1E-6) is used to convert ppmdv to a fraction.

B. Calculation of the flow (Q_{STACK}, DSCFH) from the emission unit using the calculations provided in Reference Method 19 is shown below. The stack flow should be corrected to zero percent oxygen.

$$Q_{STACK} = Q_{FUEL} \times F_{BTU} \times F_d \times \left(\frac{20.9\%}{20.9\% - \%O_{2MEAS}} \right) \times (1E-6)$$

Where: Q_{STACK} = stack flow of the emission unit, DSCFH @ 0% O_2;
Q_{FUEL} = flow of the fuel to the emission unit, SCFH;
F_{BTU} = gas heating value, HHV, (from fuel analysis), BTU/SCF;
F_d = stack flow per unit of heat input, SCF/MMBTU;
$\%O_{2MEAS}$ = measured oxygen concentration, % dry basis.
20.9% is the concentration of O_2 in the air.
The factor of (1E-6) is used to convert BTU to MMBTU.

C. Additional calculations that may be helpful during calibration.

$$\text{Calibration Error} \equiv \left(\frac{\text{Analyzer Response} - \text{Calibration Gas Concentration}}{\text{Calibration Gas Concentration}} \right) \times 100\% \quad \leq 5\%$$

$$\%\ \text{Interference} \equiv \left(\frac{\text{Analyzer Response}}{\text{Calibration Gas Concentration}} \right) \times 100\% \quad \leq 5\%$$

$$\%\text{Drift} \equiv \left(\frac{\text{Post - Test Analyzer Response} - \text{Pre - Test Analyzer Response}}{\text{Pre - Test Analyzer Response}} \right) \times 100\% \quad \leq 5\%$$

SECTION VII. RECORDKEEPING REQUIREMENTS

A. Each company performing portable EC analyzer analysis shall develop and maintain a testing protocol. These protocols shall be made available for review by the Department. Each protocol should also contain the following elements:
   1. Information regarding the EC analyzer, including but not limited to, a copy of the make, model, serial number, and manufacturer's EC analyzer specifications.
   2. EC analyzer certification documentation.
   3. Documentation of the EC analyzer operator's training, experience, and other qualifications.

B. A report of each test shall be prepared. Each report should contain, the following items:
   1. Date, place, and time of test, company or entity performing the test, and signature of person conducting the test.
   2. Manufacturer, model, serial number, and emission unit I.D (as listed in an applicable permit) of the emission unit tested.
   3. Emission unit rating (horsepower and RPM) and control device utilized, if applicable.
   4. Applicable permit emissions limitations, e.g., lb/hr.
   5. EC analyzer calibration records: start times, response times, end times, measured concentrations, interference responses, calibration gas concentrations, percent error, and minimum detectable limit.
   6. The testing records: start times, end times, duration test runs, measured concentrations, average concentrations, and corrected concentrations.
   7. Emission unit load (service power) and speed or power during testing. The method of determining the service power for engines and turbines should be described or shown.
   8. Emission unit fuel consumption, fuel BTU analysis, and stack flow.
   9. Copies of the strip chart recording or computer or digital recording of actual measurements taken during the calibration and testing.
   10. Calculated emissions on a lb/hr basis for the emission unit.

C. All testing records shall be maintained for a period of five years for *major sources* and a period of two years for all other *sources*, unless an applicable permit specifies a longer period.

SECTION VIII. REPORTING REQUIREMENTS

A. The person performing emissions testing should promptly report the results of such tests to the permittee so that any notifications required by an applicable regulation or permit condition can be submitted in a timely manner.

B. Testing results that show emissions exceeding those allowed in an applicable permit shall be reported as provided in the permit, and with OAC 252:100-9, Excess Emission Reporting Requirements.

C. A copy of the testing protocol shall be submitted to the Department and updated as necessary.

SECTION IX. REFERENCES

1. USEPA, OAQPS Emissions Measurement Center, "Draft Method for the Determination of O_2, CO_2, & (NO and NO_2) for Periodic Monitoring," September 8, 1999, http://www.epa.gov/ttn/emc/.

2. US EPA 40 CFR, Pt 60, Appendix A, Method 19 - Determination of Sulfur Dioxide Removal Efficiency and Particulate Matter, Sulfur Dioxide and Nitrogen Oxides Emissions Rates.

Appendix A **Revised 3/7/03**

Emission Unit Test Results

Company:_____ **Facility:**_____
Source Tested:_____ **Date:** _____
Source Manufacturer/Model #:_____ **Source Serial #:**_____
Site Rated Horsepower:_____ **Load During Test:** _____
Analyst:_____ **Type of Control:** _____
Analyzer Manufacturer/Model #:_____ **Analyzer Serial #:** _____

Calibration Measurements

	Pre-Test Calibration				Post-Test Calibration Check			
Run #1	**CO**	**NO**	**NO_2**	**% O_2**	**CO**	**NO**	**NO_2**	**% O_2**
Zero Resp., ppmdv/%								
Interference Resp., ppmdv/%								
Min. Det. Resp., ppmdv/%								
Start Time								
Response Time								
End Time								
Avg. Conc., ppmdv/%								
Cal. Gas Conc., ppmdv								
Conc. Difference, ppmdv								
Calibration Error, %								
% Interference, %								
Diff. Pre & Post Test, ppmdv								
%Drift, %								

Interference Response should only be recorded as required for NO and NO_2 interference for CO and NO_2 for NO.

Emission Measurements

					Run #2			
					CO	**NO**	**NO_2**	**% O_2**

Appendix A **Revised 3/7/03**

Testing Results

Engine Parameters

Eng. Speed/Power, rpm/hp	
Fuel Flow, SCFH	
Fuel BTU Content, BTU/SCF	
Fd, SCF/MMBTU	
Calc. Stack Flow, SCFH	
Avg. % O2, %	
Stack Flow at 0% O2, SCFH	

Calculated Emissions & Limits

	28	46

CERTIFICATION: Based on information and belief formed after reasonable inquiry, I certify that the statements and information contained in this report are true, accurate, complete and representative of the emissions from this source.

Print Name **Date**

Signature **Title**

Formatted

RECORD OF COMMUNICATION

Re: Evaluation of the Lindrith Compressor Station Application for a Part 71 (R6NM-03-R1) Modification.

EPA received the Lindrith Compressor Station application for a Part 71 permit modification on March 13, 2017. We are requesting additional information prior to drafting the permit and prior to determining that the permit application is complete in accordance with 40 CFR § 49.154(b) and 40 CFR § 71.5(a)(2). The additional information we are requesting is listed below:

(1) Please explain the basis for the increase in condensate throughput from 20,000 barrels/year to 60,000 barrels/year. Is the feed to the facility from the same source as noted in the R6NM-03-R1 permit application and its supporting documents, or is there a different or new feed source entering the facility?

(2) What is causing the change in feed stock composition that will increase the VOC to the facility?

(3) As a result of the increase in VOC, please provide an air impact analyses for ozone impacts for the VOC emission increase. See below the various options for conducting this analyses. https://www3.epa.gov/ttn/scram/appendix_w/2016/Appendix_W-WebinarPresentation.pdf. Data from the Albuquerque air monitoring sites can be obtained for obtaining past background ozone levels.

(4) Region 6 EPA intends to streamline the permitting process by issuing a synthetic minor permit in accordance with 40 CFR 49.158(c)(2) and processing the Part 71 permit modification in one action. In addition, the statement of basis will indicate that PSD permit NM -1644-M-1 issued by Region 6 to El Paso Field Services on April 10, 1997, will be rescinded in accordance with 40 CFR § 52.21(w)(3). Does Enterprise Products have any objections to EPA potentially taking this approach in processing this permit application as one action?

(5) Please fill out the following forms to support the permit application: https://www.epa.gov/sites/production/files/2016-05/documents/procedures_to_address_threatened_and_endangered_species_and_historic_properties.pdf

If you have any questions, please contact Bonnie Braganza of my staff at 214-665-7340 or braganza.bonnie@epa.gov. Thank you for your response.

Material Stream: CONDENSATE1

Fluid Package: Basis-1
Property Package: Peng-Robinson

CONDITIONS

		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Vapour / Phase Fraction		0.0000	0.0000	0.1928	0.8072
Temperature:	(F)	36.62	36.62	36.62	36.62
Pressure:	(psig*)	0.0000	0.0000	0.0000	0.0000
Molar Flow	(MMSCFD)	0.1286	0.0000	2.479e-002	0.1038
Mass Flow	(lb/hr)	457.5	0.0000	252.1	205.3
Std Ideal Liq Vol Flow	(USGPM)	1.152	0.0000	0.7407	0.4109
Molar Enthalpy	(Btu/lbmole)	-1.168e+005	-4.255e+004	-8.874e+004	-1.235e+005
Molar Entropy	(Btu/lbmole-F)	12.61	44.25	17.78	11.38
Heat Flow	(Btu/hr)	-1.649e+006	0.0000	-2.416e+005	-1.407e+006
Liq Vol Flow @Std Cond	(USGPM)	1.069 *	0.0000	0.7349	0.4043

PROPERTIES

		Overall	Vapour Phase	Liquid Phase	Aqueous Phase
Molecular Weight		32.40	33.76	92.61	18.02
Molar Density	(lbmole/ft3)	1.568	2.238e-003	0.4697	3.548
Mass Density	(lb/ft3)	50.78	7.555e-002	43.50	63.93
Act. Volume Flow	(USGPM)	1.123	0.0000	0.7226	0.4005
Mass Enthalpy	(Btu/lb)	-3604	-1260	-958.3	-6853
Mass Entropy	(Btu/lb-F)	0.3893	1.311	0.1920	0.6314
Heat Capacity	(Btu/lbmole-F)	23.58	13.79	44.45	18.60
Mass Heat Capacity	(Btu/lb-F)	0.7280	0.4083	0.4800	1.033
Lower Heating Value	(Btu/lbmole)	3.438e+005	6.716e+005	1.783e+006	1.342e-004
Mass Lower Heating Value	(Btu/lb)	1.061e+004	1.989e+004	1.926e+004	7.447e-006
Phase Fraction [Vol. Basis]		—	—	0.6432	0.3568
Phase Fraction [Mass Basis]		2.122e-314	0.0000	0.5511	0.4489
Partial Pressure of CO2	(psig*)	-11.80	—	—	—
Cost Based on Flow	(Cost/s)	0.0000	0.0000	0.0000	0.0000
Act. Gas Flow	(ACFM)	—	—	—	—
Avg. Liq. Density	(lbmole/ft3)	1.529	0.8166	0.4582	3.458
Specific Heat	(Btu/lbmole-F)	23.58	13.79	44.45	18.60
Std. Gas Flow	(MMSCFD)	0.1286	0.0000	2.480e-002	0.1038
Std. Ideal Liq. Mass Density	(lb/ft3)	49.52	27.57	42.44	62.30
Act. Liq. Flow	(USGPM)	1.123	—	0.7226	0.4005
Z Factor		—	0.9904	4.718e-003	6.245e-004
Watson K		12.62	15.81	12.62	8.520
User Property		—	—	—	—
Cp/(Cp - R)		1.092	1.168	1.047	1.120
Cp/Cv		1.092	1.175	1.047	1.130
Heat of Vap.	(Btu/lbmole)	2.068e+004	—	—	—
Kinematic Viscosity	(cSt)	2.069	7.446	0.6690	1.579
Liq. Mass Density (Std. Cond)	(lb/ft3)	53.36	23.39	42.78	63.33
Liq. Vol. Flow (Std. Cond)	(USGPM)	1.069	0.0000	0.7349	0.4043
Liquid Fraction		1.000	0.0000	1.000	1.000
Molar Volume	(ft3/lbmole)	0.6379	446.9	2.129	0.2818
Mass Heat of Vap.	(Btu/lb)	638.2	—	—	—
Phase Fraction [Molar Basis]		0.0000	0.0000	0.1928	0.8072
Surface Tension	(dyne/cm)	—	—	20.63	75.96
Thermal Conductivity	(Btu/hr-ft-F)	0.1243	1.175e-002	7.013e-002	0.3314
Viscosity	(cP)	1.683	9.011e-003	0.4661	1.616
Cv (Semi-Ideal)	(Btu/lbmole-F)	21.60	11.80	42.46	16.62
Mass Cv (Semi-Ideal)	(Btu/lb-F)	0.6667	0.3495	0.4585	0.9223

* Specified by user.