

TECHNICAL REVIEW: AIR PERMIT BY RULE

Permit No.:	126849	Company Name:	Air Products LLC	APD Reviewer:	Mr. Raymond Lay
Project No.:	223776	Unit Name:	Mont Belvieu II Hydrogen Recovery Facility	PBR No(s).:	106.261, 106.262, 106.532

GENERAL INFORMATION			
Regulated Entity No.:	RN107885600	Project Type:	Permit by Rule Application
Customer Reference No.:	CN602299257	Date Received by TCEQ:	December 11, 2014
Account No.:		Date Received by Reviewer:	January 05, 2015
City/County:	Mont Belvieu, Chambers County	Physical Location:	At intersection of Crosby Road & Hatcherville Road Proceed ~1.3-miles N. on Hatcherville Road; Plant site is ~1,000-feet to the E. of the road at 13345 Hatcherville Road, Mont Belvieu.

CONTACT INFORMATION					
Responsible Official/ Primary Contact Name and Title:	Mr. Jim Kourpas Air Products & Chemicals La Porte Area Manager Global Operations	Phone No.:	(281) 478-7533	Email:	Kourpadt@AirProducts.com
Technical Contact/ Consultant Name and Title:	Ms. Lisa Ann Cich Lead Environmental Engineer	Phone No.:	(610) 481-0561	Email:	Cichla@AirProducts.com
		Fax No.:	(610) 706-5166		
		Fax No.:	(610) 706-8532		

GENERAL RULES CHECK	YES	NO	COMMENTS
Is confidential information included in the application?		X	Non-confidential information was submitted.
Are there affected NSR or Title V permits for the project?		X	
Is each PBR > 25/250 tpy?		X	
Are PBR sitewide emissions > 25/250 tpy?		X	
Are there permit limits on using PBRs at the site?		X	
Is PSD or Nonattainment netting required?		X	The Mont Belvieu II Hydrogen Recovery Facility (MBIIHRF) is not one of the 28 named sources and emissions are below the federal significance as major source levels.
Do NSPS, NESHAP, or MACT standards apply to this registration?		X	No standards referenced by the company.
Does NOx Cap and Trade apply to this registration?		X	The MBIIHRF is located in Houston/Galveston area. The proposed facility or group of facilities will obtain required allowances for NOx if they are subject to 30 TAC Chapter 101, Subchapter H, Division 3.
Is the facility in compliance with all other applicable rules and regulations?	X		Air Products, LLC (Air Products) has demonstrated that the MBIIHRF is in compliance under Title 30 Texas Administrative Code (TAC) §§ 106.261, 106.262, and 106.532.

DESCRIBE OVERALL PROCESS AT THE SITE

Air Products plans to construct a new hydrogen recovery facility (MBIIHRF) that purifies a hydrogen-rich offgas stream produced and supplied via pipeline from Enterprise Products Propylene Dehydrogenation Unit (PDH). The MBIIHRF is capable of producing up to 40-MMSCFD of purified hydrogen from up to 54-MMSCFD of hydrogen-rich offgas feed from the PDH unit.

The hydrogen purification process includes the use of multi-stage gas compression equipment and a series of Pressure Swing Adsorption (PSA) vessels to remove impurities such as nitrogen, carbon dioxide, carbon monoxide, propylene, and other hydrocarbons. Operating at near-ambient temperatures, pressure swing adsorption vessels separate hydrogen from the offgas stream under pressure based on hydrogen's affinity for the adsorbent material in the PSA. The vessels then swing to low pressure to desorb or purge the other gases adsorbed from the feed.

The purified product hydrogen will be injected into the Air Products Gulf Coast pipeline network for distribution to regional industrial customers. The unrecovered hydrogen and rejected purge gas from the MBP will be compressed in the above stated multi-stage compressor and returned to Enterprise Products to be used as a fuel. There are no combustion sources in the proposed MBIIHRF. All process and manual vents are returned to the Enterprise flare system. All emissions from startup, shutdown, and purging equipment for maintenance, will be returned to the Enterprise flare.

In addition to the offgas purification in the PSA, the site will also utilize an oil water separator. Rainwater contacting the compression equipment will be routed to the oil water separator prior to discharge to Enterprise for treatment and/or disposal. An operator station and power distribution center (PDC) building will also be constructed onsite. The process at this facility will run unattended. The plant will be monitored from the Operating Service Center (OSC) control room located in Pasadena, Texas 24-hours a day, 7-days a week. An operator from the OSC will perform regular maintenance actions weekly at the site.

DESCRIBE PROJECT AND INVOLVED PROCESS

Air Products intend to construct a hydrogen recovery facility (MBIIHRF) at the existing Enterprise facility in Mont Belvieu, Texas. This MBIIHRF will employ a ten bed PSA clean-up of an off-gas from Enterprise to produce hydrogen for Air Products' merchant pipeline customers in the region. The MBIIHRF is considered an industrial gas manufacturing plant (SIC Code 2813 - Industrial Gases) and at the expanded capacity will produce up to 40-MMSCFD of 99.9% hydrogen.

The feed stream for the MBIIHRF is an off-gas from Enterprise located adjacent to the site. The off-gas contains hydrogen, carbon monoxide and low levels of small-chain hydrocarbons. The tail gas (PSA Reject) is returned to Enterprise for their use. The site operations include:

- PSA Clean-up;
- Compression; and

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- Oil-Water Separation.

The MBIIHRF will include the installation of a ten bed PSA, surge vessel, reciprocating compressors, an oil-water separator and auxiliary equipment.

Air Products has an existing off-gas purification facility at Enterprise that was constructed under the former Standard Exemptions 80 and 106. The existing facility and the new proposed facility are independent of both Enterprise as well as each other for the following reasons:

- The new Air Products facility will supply hydrogen directly to our merchant pipeline not the Enterprise facility for use by customers in the region.
- The new Air Products unit will be located over a mile away from the existing Air Products facility. The new Mont Belvieu facility will process an off gas from a different Enterprise unit than the existing Air Products facility. Neither Air Products unit's operation will be controlled or related to the other unit's operation. The units will operate independently.

Mont Belvieu Fugitive Emissions Compliance (EPN FUG)

Emission Factors Units	Concentration	Valves	Flanges	Compressors	Instruments	Meters	Pressure Relief Devices	Sampling Connections	Total Emissions (kg/hr)
		(kg/ hr)	(kg/ hr)	(kg/ hr)	(kg/ hr)	(kg/ hr)	(kg/ hr)	(kg/ hr)	
Feedgas Components	Mass Fraction	70	65	1	30	1	6	2	
Ethylene	0.01400000	0.00585060	0.00333060	0.00319200	0.00369600	0.00012320	0.00873600	0.00042000	0.02534840
Propylene	0.02000000	0.00835800	0.00475800	0.00456000	0.00528000	0.00017600	0.01248000	0.00060000	0.03621200
H2S	0.00002200	0.00000919	0.00000523	0.00000502	0.00000581	0.00000019	0.00001373	0.00000066	0.00003983
Acetylene	0.00014000	0.00005851	0.00003331	0.00003192	0.00003696	0.00000123	0.00008736	0.00000420	0.00025348
Carbon Monoxide	0.16700000	0.06978930	0.03972930	0.03807600	0.04408800	0.00146960	0.10420800	0.00501000	0.30237020
Tailgas Components	Mass Fraction	50	65	1	25	1	4	2	
Ethylene	0.02100000	0.00626850	0.00499590	0.00478800	0.00462000	0.00018480	0.00873600	0.00063000	0.03022320
Propylene	0.03000000	0.00895500	0.00713700	0.00684000	0.00660000	0.00026400	0.01248000	0.00090000	0.04317600
H2S	0.00003300	0.00000985	0.00000785	0.00000752	0.00000726	0.00000029	0.00001373	0.00000099	0.00004749
Acetylene	0.00020000	0.00005970	0.00004758	0.00004560	0.00004400	0.00000176	0.00008320	0.00000600	0.00028784
Carbon Monoxide	0.24900000	0.07432650	0.05923710	0.05677200	0.05478000	0.00219120	0.10358400	0.00747000	0.35836080
PSA Gas Components	Mass Fraction	100	40	0	60	0	4	3	
Ethylene	0.01190000	0.00710430	0.00174216	0.00000000	0.00628320	0.00000000	0.00495040	0.00053550	0.02061556
Propylene	0.02770000	0.01653690	0.00405528	0.00000000	0.01462560	0.00000000	0.01152320	0.00124650	0.04798748
H2S	0.00003300	0.00001970	0.00000483	0.00000000	0.00001742	0.00000000	0.00001373	0.00000149	0.00005717
Acetylene	0.00020000	0.00011940	0.00002928	0.00000000	0.00010560	0.00000000	0.00008320	0.00000900	0.00034648
Carbon Monoxide	0.15770000	0.09414690	0.02308728	0.00000000	0.08326560	0.00000000	0.06560320	0.00709650	0.27319948

Emission Totals and Permit by Rule Applicability

Pollutant	Annual Totals by			TCEQ 106.261	TCEQ 106.262 E=L/K = lbs/hr
	Hourly Totals by Pollutant (kgs/hr)	Hourly Totals by Pollutant (lbs/hr)	Pollutant (tons/year)		
Ethylene	0.07619	0.16761	0.73414	6 lbs/hr & 10 TPY	NA
Propylene	0.12738	0.28023	1.22739	6 lbs/hr & 10 TPY	NA
H2S	0.00014	0.00032	0.00139	NA	0.032 lbs/hr
Acetylene	0.00089	0.00195	0.00855	6 lbs/hr & 10 TPY	NA
Carbon Monoxide	0.93393	2.05465	8.99935	6 lbs/hr & 10 TPY	NA

Sample Calculation

(No. of Components) x (Mass Fraction) x (Emission Factor [kg/hr]) = Emissions (kg/hr)

Mont Belvieu Oil Water Separator (EPN OWS)

Maximum Flow Rate (gpm)	Emission Factor (lb/1000 gal)	Time Conversion (min/hr)	Maximum Operating Hours/Yr	Annual Emissions (lbs/yr)	Hourly Emissions (lbs/hr)	Annual Emissions (tons/yr)
250	0.024	60	8760	3153.6	0.36	1.58

The oil water separator will be covered and thus the "Controlled Emissions" Factor applies.

Source: AP-42, Section 5.1 Petroleum Refining

Sample Calculation

(Flowrate [gal/min]) x (Conversion Factor [1/1,000-gal]) x (Emission Factor [lb/1,000-gal]) x (Conversion Factor [60-min/hr]) = Hourly Emission (lbs/hr)

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TECHNICAL SUMMARY - DESCRIBE HOW THE PROJECT MEETS THE RULES

§ 106.261 Facilities (Emission Limitations)

- (a)(1) The facilities are located 1,000-feet from the nearest off-site receptor.
- (2) The emissions of Ethylene, Propylene, Acetylene, & Carbon Monoxide under this paragraph will not exceed 6-lb/hr and 10-tpy.
- (3) There are no emissions claimed under this paragraph.
- (4) Air Products represents there are no changes to or additions of any existing air pollution abatement equipment.
- (5) Air Products represents that visible emissions, except uncombined water, emitted to the atmosphere from any point or fugitive source will not be in amounts greater than 5.0% opacity in any six-minute period.
- (6) NA, emissions are increasing by less than 5-tpy.
- (7) Emissions are increasing by less than 5-tpy. The Form PI-7 was submitted.
- (b)(1) & (2) These sections are not being used to authorize the construction of a facility authorized in another section or for which a standard permit is in effect.

§ 106.262 Facilities (Emission and Distance Limitations)

- (a)(1) The facilities are located 1,000-feet from the nearest off-site receptor.
- (2) Total emissions of Hydrogen Sulfide (H₂S) contaminants claimed under this paragraph will not exceed 5-tpy or the value of E as determined by the equation E = L/K (See PBR Emission Limits below).
- (3) A Form PI-7 was submitted.
- (4) NA, none of the listed compounds is handled as part of the project.
- (5) There are no changes to or additions of any existing air pollution abatement equipment.
- (6) Air Products represents that visible emissions, except uncombined water, emitted to the atmosphere from any point or fugitive source will not be in amounts greater than 5.0% opacity in any six-minute period.
- (b) & (c) These sections are not being used to authorize the construction of or any change to a facility authorized in another section, but not meeting the requirements of that section, or for which a standard permit is in effect.

PBR Emission Limits: D = 1,000-feet; K = 34						
Chemical	PBR Claimed	L, mg/m³	Emission Limit lb/hr	Emission Limit tpy	Actual Emissions lb/hr	Actual Emissions tpy
Ethylene	106.261(a)(2)	N/A	6.00	10.00	0.16761	0.73414
Propylene	106.261(a)(2)	N/A	6.00	10.00	0.28023	1.22739
Acetylene	106.261(a)(2)	N/A	6.00	10.00	0.00195	0.00855
Carbon Monoxide	106.261(a)(2)	N/A	6.00	10.00	2.05465	8.99935
Hydrogen Sulfide	106.262(a)(2)	1.1	0.032353	0.141706	0.00032	0.00139

§ 106.532 Water and Waste Water Treatment Units

Rainwater which contacts the multi-service compressor will be collected in the curbed area around the compressor and flow through the oil water separator before being discharged to Enterprise for additional treatment and disposal. Given the partial pressure of oil is less than 1.5 psia in the rainwater, Air Products claims Permit by Rule 30 TAC § 106.532 for the oil water separator. The maximum potential VOC emissions from the OWS will be 1.58-tons per year.

- 1. All the facilities claimed for exemption specifically named or described in § 106.532: Oil Water Separator (EPN OWS).
- 2. No stripping or aeration units used at the site.
- 3. There are no combustion units at the site.
- 4. The partial pressure of oil in the rainwater is less than 1.5-psia.
- 5. Air Products has checked to ensure that none of the facilities claimed for exemption fall in any of the categories of prohibited units listed in § 106.532.

COMMUNICATION LOG			
Date	Time	Name/Company	Subject of Communication
1/6/15	900	Ms. Lisa A. Cich, Lead Environmental Engineer	Called and spoke with Ms. Cich about the information needed and clarification on the 106.261 & 106.262 Checklists, and the Core Data Form. Informed her that a request email will be coming forth.
	937		Sent an email stating: "Good Morning Ms. Cich, I recently received your permit application for the Air Products LLC - Mont Belvieu II Hydrogen Recovery Facility / PERMIT No. 126849. After review, there are some additional items/information that will be necessary in order for me to continue my review. Please provide the following. <ol style="list-style-type: none"> 1. Please verify the address of the location of the Mont Belvieu II Hydrogen Recovery Facility and, the Latitude (N) & Longitude (W) coordinates on the Core Data Form. 2. Please revise and submit the 106.261 and 106.262 Checklists as discussed in the phone conversation. 3. Please enter the Regulated Entity No. 107885600 on the first page of the Core Data Form and first page of the PI-7 Form. TCEQ has a 5 day policy on missing/deficient information http://www.tceq.texas.gov/assets/public/permitting/air/memos/voidguide06.pdf . Please provide the above information before Close of Business 01/13/2015. Thank you and I look forward to working with you to resolve these issues. Regards, Raymond D. Lay"
1/13/15	1256	Ms. Lisa A. Cich	Received an email stating: "Hi Raymond, We will be emailing the requested information to you, today. A quick question.. we mailed the original packet to four addresses. Which address should we mail our information with the original signature? Thank you for your help. Lisa Ann Cich"

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	1402		Sent an email stating: "Afternoon Lisa, Mail the original signature to me at the following address: Texas Commission on Environmental Quality NRC Building, Suite 1200; 6300 Ocean Drive, Unit 5839; Corpus Christi, Texas 78412-5839; Attention: Mr. Raymond D. Lay Thank you! Regards, Raymond D. Lay"
	1405		Received an email response stating: "Thanks for the information, Raymond. We will send the package to you as well as email it. Lisa Ann Cich, Environmental Lead, Materials Technology, Air Products & Chemicals Inc."
	~1500	Ms. Tammy Grover	Ms. Grover called and said the original requested information will be sent via US mailed and sent via email.
	1643		Received an email response stating: "Hi Raymond, As we discussed, I'm sending you an electronic copy and also a hard copy in the mail today of the updated PBR package for Air Products Mont Belvieu site. Regards Tammy B. Grover, P.E."
1/15/15	917	Ms. Tammy Grover; Ms. Lisa Ann Cich; Mr. Gerard Thompson	Sent a response email stating: "Good Morning Ms. Grover, You have Acetylene, Carbon Monoxide, Ethylene and Propylene listed under 106.261(a)(2) On the second page of the 106.261 Checklist you list Ethylene and Propylene under 106.261(a)(3) for emissions rates less than or equal to 1-lb/hr. The contaminant that should be listed under 106.261(a)(3) is Volatile Organic Compounds not Ethylene and Propylene. Please revise the second page of the 106.261 Checklist listing Volatile Organic Compounds not Ethylene and Propylene. Thank you for your cooperation in this request. Regards, Raymond D. Lay"
	933		Sent a response email stating: "Ms. Grover, What is the Maximum Operating Schedule: hours/day, days/week, weeks/year, & hours/year? Regards, Raymond D. Lay"
	1015	Ms. Tammy Grover;	Received an email response stating: "Mr. Lay, It is expected that this site will run continuously: 24 hours/day, 7 days a week, 52 weeks/year. Regards, Tammy B. Grover, P.E"
	1026	Ms. Lisa Ann Cich	Received an email response stating: "Good morning Mr. Lay: Please find the attached updated checklist for PBR 106.261. I have removed Ethylene and Propylene from 106.261(a)(3) and listed "VOCs". Please let us know if you have any further questions on our submittal. Thank you. Lisa Ann Cich"
1/26/15	834	Ms. Lisa Ann Cich	Sent an email stating: "Good Morning Ms. Cich, Would you please revise the Table 1(a) to have the emissions from the Oil Water Separator listed separate from the Site Fugitive emissions and with its own EPN. Please email the first page to me. Thank you for your cooperation in this request. Regards, Raymond D. Lay"
1/27/15	834	Ms. Lisa Ann Cich	Received an email response with one attachment and stating: "Good Morning Mr. Lay, Please find the attached Table 1(a) with a separate EPN listed for the oil water separator. I also updated the second page of the table to include OWS, however given the fugitive nature of the emissions; the coordinates are the same as those listed for the Site Fugitives. Please let me know if you have any additional questions on our information. Have a good day, Lisa Ann "

ESTIMATED EMISSIONS												
EPN / Emission Source	VOC		CO		H ₂ S		Ethylene		Propylene		Acetylene	
	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy	lbs/hr	tpy
OWS / Oil Water Separator	0.36	1.58										
FUG / Site Fugitives			2.05	9.00	<0.01	<0.01	0.17	0.73	0.28	1.23	<0.01	0.01
TOTAL EMISSIONS (TPY):		1.58		9.00		<0.01		0.73		1.23		0.01
MAXIMUM OPERATING SCHEDULE:	Hours/Day	24	Days/Week	7	Weeks/Year	52	Hours/Year	8,760				

SITE REVIEW / DISTANCE LIMIT	Yes	No	Description/Outcome	Date	Reviewed by
Site Review Required?		X			
PBR Distance Limits Met?	X		>1,000-feet to the nearest property line and >1,000-feet to the nearest off-property structure.	01/20/2015	Per company's PI-7 Form.

	TECHNICAL REVIEWER	PEER REVIEWER	FINAL REVIEWER
SIGNATURE:			
PRINTED NAME:	Mr. Raymond D. Lay	Ms. Julie Steger	Mr. Dominic Ruggeri, P.E., Manager
DATE:	January 27, 2015	January 29, 2015	January 29, 2015

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BASIS OF PROJECT POINTS	POINTS
<i>Base Points: 106.261</i>	1.50
<i>Project Complexity Description and Points:</i>	
106.262	0.50
106.532	0.50
Communications	1.00
Technical Reviewer Project Points Assessment:	3.50
Final Reviewer Project Points Confirmation:	