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	APPL. NO. 561635, 561636, 561637, 562543, 562545	DATE April 14, 2014
APPLICATION PROCESSING AND CALCULATIONS	PROCESSED BY: Thomas Lee	CHECKED BY

HYDROGEN PRODUCTION PLANT (P1/S1) & FLARE (P3/S1)
PERMITS TO CONSTRUCT (MODIFICATION)

COMPANY NAME: Air Products and Chemicals, Inc.
(Wilmington Hydrogen Plant)

COMPANY ID: 101656

MAILING ADDRESS: 700 N. Henry Ford Avenue
Wilmington, CA 90744

EQUIPMENT LOCATION: 700 N. Henry Ford Avenue
Wilmington, CA 90744

CONTACT INFORMATION: Mr. Jim Reebel
Sr. Environmental Engineer
(310) 847-7300 x13
reebeljc@airproducts.com

PROPOSED CHANGES TO PERMITS:

Proposed deletions are shown in ~~strikeouts~~. Proposed additions are in **bold and underlined**.

SECTION H: FACILITY DESCRIPTION AND EQUIPMENT SPECIFIC CONDITIONS (In addition to the following changes to Process 1, System 1 in Section H, the permit for the equipment under Process 3, System 1 will be moved from Section D to Section H).

Equipment	ID No.	Connected To	Source Type/ Monitoring Unit	Emissions And Requirements	Conditions
Process 1: HYDROGEN PRODUCTION PLANT (Refinery Gas/Steam Reforming)					
System 1: HYDROGEN PRODUCTION – 88.0 MMSCFD MAXIMUM RATED CAPACITY					S2.1, S13.1, <u>S15.x</u> , S31.1
VESSEL, V-119, FEED COMPRESSOR SUCTION, LENGTH: 11 FT 4 IN; DIAMETER: 6 FT A/N: 547681 <u>561635</u> Permit to Construct Issued: 01/02/14 <u>yy/vv/14</u>	D1				

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Equipment	ID No.	Connected To	Source Type/ Monitoring Unit	Emissions And Requirements	Conditions
Process 1: HYDROGEN PRODUCTION PLANT (Refinery Gas/Steam Reforming)					
VESSEL, V-133, PROCESS OILY WATER, HEIGHT: 11 FT 10 IN; DIAMETER: 3 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D2				E336.2
FILTER, X-110A/B, FEED GAS COMPRESSOR, 2 TOTAL, 20 CU.FT. CAPACITY EACH A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D3				
COMPRESSOR, C-101A/B, DUAL SERVICES, 2 TOTAL, 7,500 HP EACH WITH BUFFERED PACKING SEALS A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D4				E336.3
HEAT EXCHANGER, E-101/E-104, FG 1A/1B 1ST STAGE FEED DISCHARGE COOLER, 2 TOTAL, 2.81 MMBTU/HR EACH A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D6				
KNOCK OUT POT, V-131A/B, FEED INTERSTAGE, 2 TOTAL, HEIGHT: 9 FT; DIAMETER: 3 FT 6 IN; A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D8				
HEAT EXCHANGER, E-102/E117, FEED COMPRESSOR DISCHARGE COOLER, 2 TOTAL, 2.74 MMBTU/HR EACH A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D10				
VESSEL, COALESCER, V-102A/B, FEED COMPRESSOR DISCHARGE, 2 TOTAL, HEIGHT: 5 FT; DIAMETER: 1 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D12				
REACTOR, V-104, HYDROGENATION, WITH CHLORIDE GUARD, LENGTH: 20 FT; DIAMETER: 8 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D14				

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Process 1: HYDROGEN PRODUCTION PLANT (Refinery Gas/Steam Reforming)					
VESSEL, V-105A/B, FEED DESULFURIZER, 2 TOTAL, LENGTH: 19 FT; DIAMETER: 9 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D15				
REACTOR, H101, REFINERY GAS/STEAM REFORMING, TUBULAR TYPE A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D49				
HEAT EXCHANGER, E-103, PROCESS GAS, 163.5 MMBTU/HR, SHELL AND TUBE TYPE A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D17				
REACTOR, V-109, HIGH TEMPERATURE SHIFT, LENGTH: 19 FT; DIAMETER: 11 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D18				
HEAT EXCHANGER, E-105, FEED PRETREATER II, 12.76 MMBTU/HR, SHELL AND TUBE TYPE A/N: 547681 561635 Permit to Construct Issued: 01/02/04 yy/vv/14	D19				
HEAT EXCHANGER, E-106A, BFW PRETREATER I, 47.0 MMBTU/HR, SHELL AND TUBE TYPE A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D20				
HEAT EXCHANGER, E-106B/C, BFW PRETREATER II, 67.01 MMBTU/HR, SHELL AND TUBE TYPE, 2 TOTAL A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D21				
REACTOR, V-110, LOW TEMPERATURE SHIFT, LENGTH: 16 FT; DIAMTER: 11 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D22				

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Process 1: HYDROGEN PRODUCTION PLANT (Refinery Gas/Steam Reforming)					
HEAT EXCHANGER, E-107, FEED PRETREATER I, 5.0 MMBTU/HR, SHELL AND TUBE TYPE A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D23				
HEAT EXCHANGER, E-108, BFW MAKEUP HEATER, 49.0 MMBTU/HR, SHELL AND TUBE TYPE A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D24				
HEAT EXCHANGER, E-109, PSA FEED AIR COOLER, 47.57 MMBTU/HR, FIN- FAN TYPE A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D25				
HEAT EXCHANGER, E-110, PSA FEED TRIM COOLER, 15.85 MMBTU/HR, SHELL AND TUBE TYPE A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D26				
KNOCK OUT POT, V-112, COLD CONDENSATE, LENGTH: 11 FT 10 IN; DIAMTER: 7 FT 3 IN A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D27				
ADSORBER, X-101A-J, PRESSURE SWING ADSORPTION (PSA) UNIT, 10 TOTAL, DIAMETER: 10 FT 6 IN; HEIGHT: 21 FT 6 IN EACH A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D28				D90.3, E336.1
VESSEL, V-113A/B, PSA PURGE GAS, 2 TOTAL, DIAMETER: 12 FT; HEIGHT: 80 FT EACH A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D29				
HEATER, E-451, METHANATOR PRE- HEAT, 75 KW ELECTRICALLY HEATED A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D66				

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Equipment	ID No.	Connected To	Source Type/ Monitoring Unit	Emissions And Requirements	Conditions
Process 1: HYDROGEN PRODUCTION PLANT (Refinery Gas/Steam Reforming)					
REACTOR, V-451, METHANATOR, LENGTH: 5 FT; DIAMETER: 4 FT 6 IN A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D67				
HEAT EXCHANGER, SHELL AND TUBE TYPE, E-452, ECONOMIZER, METHANATOR PRODUCT, 0.461 MMBTU/HR A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D68				
COOLER, E-455, PURE H2 PRODUCT CONDENSER, CRYOQUIP MODEL NO. VAI-1248-SSBL23, 0.092 MMBTU/hr., AMBIENT VAPORIZER A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D69				
VESSEL, V-452A/B, MOLECULAR SIEVE DRIER, WITH REGENERATION VENT TO ATMOSPHERE, 2 IN PARALLEL, LENGTH: 7 FT; DIAMETER: 2 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D70			CO: 2000 PPMV (5) [RULE 407, 4-2-1982]	D28.2, D332.1, E336.4
COMPRESSOR, E-453/454, PURE H2 PRODUCT, 2 TOTAL, 100 HP EACH A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D71				
LOADING ARM, H2 TRAILER, STANCHIONS A/B, PURE H2 PRODUCT, 2 TOTAL A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D72				
VESSEL, V-114, STEAM DEAERATOR, TWO SECTIONS, WITH UPPER SECTION VENTED TO ATMOSPHERE, LENGTH: 22 FT; DIAMETER: 9 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D31			CO: 2000 PPMV (5) [RULE 407, 4-2-1982]	D332.1, D29.x , <u>II.x</u>
TANK, V-137, CONDENSATE BREAK, VENTED TO ATMOSPHERE , HEIGHT: 7 FT; DIAMETER: 6 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vy/14	D32	<u>C46</u>		CO: 2000 PPMV (5) [RULE 407, 4-2-1982]	D332.1 , <u>D90.x</u> , <u>E336.2</u> , <u>II.x</u>

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Process 1: HYDROGEN PRODUCTION PLANT (Refinery Gas/Steam Reforming)					
VESSEL, V-107, BLOWNDOWN, LENGTH: 11 FT 4 IN; DIAMETER: 4 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D33				
VESSEL, V-108, STEAM, HEIGHT: 50 FT; DIAMETER: 9 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D34				
VESSEL, V-129, INTERMITTENT BLOWDOWN, VENTED TO ATMOSPHERE, HEIGHT: 11 FT 4 IN; DIAMETER: 4 FT A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D35			CO: 2000 PPMV (5) [RULE 407, 4- 2-1982]	D332.1, <u>D29.x, 11.x</u>
CONDENSER, E-130, SURFACE, LENGTH: 32 FT; DIAMETER: 8 FT 8 IN A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D36				
TURBINE, T-101, STEAM, GENERAL ELECTRIC, DOUBLE EXTRACTION, NON-FIRED TYPE WITH A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14 GENERATOR, ELECTRIC, 31.9 MW	D37				
FUGITIVE EMISSIONS, MISCELLANEOUS (PUMPS, COMPRESSORS, VALVES, FLANGES, PRV) A/N: 547681 561635 Permit to Construct Issued: 01/02/14 yy/vv/14	D52				H23.2
Process 3: FLARE					
System 1: FLARE					
FLARE, X-113, GROUND LEVEL, WITH A CYCLONE SEPARATOR, HEIGHT: 68 FT; DIAMETER: 32 FT A/N: 293123 561636 Permit to Construct Issued: yy/vv/14	C46	<u>D32</u>		CO: 2000PPMV (5) [RULE 407, 4- 2-1982]; PM (9) [RULE 404, 2-7- 1986]; PM: 0.1 GRAINS/SCF (5) [RULE 409, 8-7- 1981]	B61.1, D12.3, D12.4, D90.3, H23.11

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Process 1: HYDROGEN PRODUCTION PLANT (Refinery Gas/Steam Reforming)					
FUGITIVE EMISSIONS, MISCELLANEOUS, (PUMPS COMPRESSORS, VALVES, FLANGES, PRV) A/N: 293423 561636 Permit to Construct Issued: yy/vv/14	D56				H23.2

CONDITIONS:

Facility Conditions:

F52.x This facility is subject to the applicable requirements of the following rules or regulation(s):

40CFR 60 Subpart A

[40CFR 60 Subpart A, 4-4-2014]

*Note: Please see Federal Regulation discussion for 40CFR 60, Subpart A in **Rule Evaluation** section for the basis to add this facility condition.*

System Conditions:

S2.1 The operator shall limit emissions from this system as follows

CONTAMINANT	EMISSION LIMIT
VOC	Less than 2.5 lbs / mmscf of hydrogen produced

A totalizing flow meter shall be installed and maintained to accurately indicate and record the flow rate of hydrogen produced.

[RULE 1189, 1-21-2000]

[Systems subject to this condition: Process 1, System 1]

S13.1 All devices under this system are subject to the applicable requirements of the following rules or regulations:

Contaminant	Rule	Rule/Subpart
VOC	District Rule	1189

[RULE 1189, 1-21-2000]

[Systems subject to this condition: Process 1, System 1]

S15.x The vent gases from all affected devices of this process/system shall be vented as follows:

All vent gases shall be directed to the flare system except Devices IDs D31, D35 and D70 that vent to the atmosphere.

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This process/system shall not be operated unless the flare system is in full use and has a valid permit to receive vent gases from this system.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996]

[Systems subject to this condition Process 1, System 1]

S18.x All affected devices listed under this process/system shall be used only to receive, recover and/or dispose of vent gases routed from the system(s) or process(es) listed below, in addition to specific devices identified in the “connected to” column:

Hydrogen Production Plant (Process: 1, System: 1)

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996]

[Systems subject to this condition: Process 3, System 1]

S31.1 The following BACT requirements shall apply to VOC service fugitive components associated with the devices that are covered by application number(s) 310073, 310075 & 293123:

All new components in VOC service as defined in Rule 1173, except valves and flanges, shall be inspected quarterly using EPA reference Method 21. All new valves and flanges in VOC service, except those specifically exempted by Rule 1173, shall be inspected monthly using EPA Method 21.

All new components in VOC service, except pressure relief devices for which a leak in excess of 200 ppmv shall be repaired within 5 days of detection, a leak greater than 500 ppmv but less than 1,000 ppmv, as methane, measured above background using EPA Method 21 shall be repaired within 14 days of detection. Components shall be defined as any valve, fitting, pump, compressor, pressure relief valve, diaphragm, hatch, sight-glass, and meter, which are not exempted by Rule 1173.

All new valves greater than 2-inch size and major components in VOC service as defined by Rule 1173, except those specifically exempted by Rule 1173, shall be distinctly identified from other components through their tag numbers (e.g., numbers ending in the letter "N"), and shall be noted in the records.

All new valves in VOC service, except those specifically exempted by Rule 1173, shall be bellows seal valves for 2-inch and smaller sizes, except as approved by the District, in the following applications: heavy liquid service, control valve, instrument piping/tubing, applications requiring torsional valve stem motion, applications where valve failure could pose safety hazard (e.g., drain valves with valve stems in horizontal position), retrofits/special applications with space limitations, and valves not commercially available.

If 98.0 percent or greater of the new valve and the new flange population inspected is found to leak gaseous or liquid volatile organic compounds at a rate less than 500 ppm for two consecutive months, then the operator shall revert to a quarterly inspection program with the approval of the executive officer. This condition shall not apply to bellow sealed valves.

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The operator shall keep records of the monthly inspection (and quarterly where applicable), subsequent repairs and reinspections, in a manner approved by the District.

The operator shall provide to the District, no later than 60 days after initial startup, a plot plan or piping and instrumentation diagrams with a listing showing by functional grouping, location, type, accessibility, and application of each new valve in VOC service.

[RULE 1303(a)(1)-BACT, 5-10-1996]

[Systems subject to this condition: Process 1, System 1, 2; Process 3, System1]

Device Conditions:

B. Material/Fuel Type Limitations

B61.1 The operator shall not use gaseous fuel containing the following specified compounds:

Compound	ppm by volume
Total Sulfur greater than	40

The total sulfur compounds, calculated as hydrogen sulfide, are averaged over 4-hour period.

[RULE 431.1, 6-12-1998]

[Devices subject to this condition: C46]

D. Monitoring/Testing Requirements

D12.3 The operator shall install and maintain a(n) thermocouple to accurately indicate the presence of a flame at the pilot light.

The operator shall also install and maintain a device to continuously record the parameter being measured.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 3004(a)(4)-Periodic Monitoring, 12-12-1997; RULE 407, 4-2-1982]

[Devices subject to this condition: C46]

D12.4 The operator shall install and maintain a(n) thermocouple to accurately indicate the temperature at the flare stack.

The thermocouple shall extend into the flare a minimum of 8 inches beyond the flare wall insulation.

The thermocouple shall be located at a height of 5 to 8 feet from the top of the flare stack.

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The operator shall also install and maintain a device to continuously record the temperature during any time that there is flow of syngas or PSA offgas to the flare. For the purpose of this condition, continuous recording is defined as once every 60 seconds.

[RULE 1303(a)(1)-BACT, 5-10-1996]

[Devices subject to this condition: C46]

D28.2 The operator shall conduct source test(s) in accordance with the following specifications:

The test shall be conducted during the first drier regeneration following startup of this equipment while H2 product is being vented.

The District shall be notified of the date and time of the test at least 10 days prior to the test.

The test shall be conducted to determine the CO emissions.

The test shall be conducted to determine the CH4 emissions.

The test shall be conducted to determine the VOC emissions.

[RULE 1301(b)(1), 12-7-1995; RULE 1703 - PSD Analysis, 10-7-1988; RULE 1714, 11-5-2010]

[Devices subject to this condition: D70]

D29.x The operator shall conduct source test(s) for the pollutant(s) identified below:

<u>Pollutant(s) to be tested</u>	<u>Required Test Method(s)</u>	<u>Averaging Time</u>	<u>Test Location</u>
<u>CO</u>	<u>District Approved</u>	<u>15 Mins</u>	<u>Combined Atmospheric Vent</u>

The test shall determine and report the concentration and mass emission rate for CO.

The test may commence without prior approval from the District, if it is conducted according to a source test protocol previously approved by the District for this equipment. A copy of the approval letter shall be submitted to the District at least 30 days prior to the test.

With AQMD approval of the source test protocol, the test shall be conducted within 60 days after the atmospheric vent stream of condensate break tank (V-137) has been re-routed to ground flare (C46) for disposal. The test shall be conducted annually thereafter (with a minimum interval of 10 months between tests) to demonstrate compliance with the CO concentration limit of Rule 407.

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The source test shall be conducted when the hydrogen plant is operating at least 80 percent of the maximum rated capacity or within a capacity range approved by the District.

The operator shall comply with all general testing, monitoring, reporting, and recordkeeping requirements in Sections E and K of this permit.

The requirement of this condition shall no longer be applicable after two successive annual tests demonstrating compliance with the CO concentration limit of Rule 407.

[RULE 3004(a)(4)-Periodic Monitoring, 12-12-1997; RULE 407, 4-2-1982]

[Devices subject to this condition: D31, D35]

D90.3 The operator shall continuously monitor the H₂S concentration of fuel gas before being burned in this device according to the following specifications:

The operator shall use a total sulfur fuel gas analyzer approved by the District to monitor the parameter.

The operator shall also install and maintain a device to continuously record the parameter being monitored.

The operator may monitor the H₂S concentration at a single location for fuel combustion devices, if monitoring at this location accurately represents the concentration of H₂S in the fuel gas being burned in this device.

The operator shall install and maintain a totalizing fuel meter to accurately indicate the amount of fuel being used at the facility.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996; RULE 431.1, 6-12-1998]

[Devices subject to this condition: D28, C46]

D90.x The operator shall periodically monitor the composition and HHV of the vent gas from condensate break tank V-137 according to the following specifications:

For the purpose of this condition, ‘periodically monitor’ shall be defined as source testing within 60 days after the vent from V-137 (D32) has been rerouted to the flare (C46) and once per year thereafter to determine and record the parameter being monitored.

The source test shall be conducted in accordance with AQMD-approved test protocol and test method using EPA TO-15 and ASTM D3588/D1945 for gas composition and HHV, respectively.

The operator shall maintain records in a manner approved by the District to demonstrate compliance with this condition.

The requirement of this condition shall no longer be applicable after two successive annual tests demonstrating the gas composition and HHV remain fixed.

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[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996]

[Devices subject to this condition: D32]

D332.1 The operator shall determine compliance with the CO emission limit(s) by conducting a test at least once every five years using a portable analyzer and AQMD-approved test method or, if not available, a non-AQMD approved test method. The test shall be conducted when the equipment is operating under normal conditions to demonstrate compliance with the CO emission limit. The operator shall comply with all general testing, reporting, and recordkeeping requirements in Sections E and K of this permit.

[RULE 3004(a)(4)-Periodic Monitoring, 12-12-1997, RULE 407, 4-2-1982]

[Devices subject to this condition: D31, ~~D32~~, D35, D70]

E. Equipment Operation/Construction Requirements

E336.1 The operator shall vent the vent gases from this equipment as follows:

All PSA purge gases shall be vented to the heater (Device D38) except during emergencies, process upset, startup, or shutdown.

This equipment shall not be operated unless the heater is in full use and has a valid permit to receive vent gases from this equipment.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996]

[Devices subject to this condition: D28]

E336.2 The operator shall vent the vent gases from this equipment as follows:

All vent gases shall be vented to the flare (Process 3, System 1).

This equipment shall not be operated unless the flare is in full use and has a valid permit to receive vent gases from this equipment.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996]

[Devices subject to this condition: D2, D32]

E336.3 The operator shall vent the vent gases from this equipment as follows:

All vent gases from the buffered packing seals shall be vented to the flare (Process 3, System 1).

This equipment shall not be operated unless the flare is in full use and has a valid permit to receive vent gases from this equipment.

[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(b)(2)-Offset, 5-10-1996]

[Devices subject to this condition: D4]

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E336.4 The operator shall vent the vent gases from this equipment as follows:

The drier regeneration vent shall vent to atmosphere only during periods of drier regeneration. Drier regeneration shall occur no more than once per day.

[RULE 1714, 11-5-2010]

[Devices subject to this condition: D70]

H. Applicable Rules

H23.2 This equipment is subject to the applicable requirements of the following rules or regulations.

Contaminant	Rule	Rule/Subpart
VOC	District Rule	1173

[~~RULE 1173, 6-1-2007~~; **RULE 1173, 2-6-2009**]

[Devices subject to this condition: D52, D56]

H23.11 This equipment is subject to the applicable requirements of the following rules or regulations:

Contaminant	Rule	Rule/Subpart
SOX	District Rule	1118

[**RULE 1118, 11-4-2005**; ~~40CFR60 Subpart A, 4-9-1993~~]

[Devices subject to this condition: C46]

*Note: Please see Federal Regulation discussion for 40CFR 60, Subpart A in **Rule Evaluation** section for the basis to remove this underlying rule from this condition.*

II.x The operator shall comply with all the requirements of the condition and compliance schedule as specified in the variance case no. 4276-14, issued on February 20, 2014, in accordance with the order and decision of the Hearing Board or as subsequently modified by the Hearing Board. The operator shall submit progress reports at least semi-annually, or more frequently if specified in the order and decision. The progress reports shall contain dates for achieving activities, milestones or compliance required in the schedule of compliance and dates when such activities, milestones or compliance were achieved; and an explanation of why any dates in the schedule of compliance were not, or will not be met, and any preventative or corrective measures adopted.

The variance (or Order for Abatement) referenced in this condition does not affect federal or citizen enforceability of the underlying SIP approved rules for which the applicant is receiving the variance (or Order for Abatement).

[**RULE 3004(a)(10)(C), 12-12-1997**]

[**Devices subject to this condition: D31, D32, D35**]

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BACKGROUND:

Air Products and Chemicals, Inc. (AP) operates an 88 MMSCFD capacity hydrogen production plant in Wilmington, CA. This plant was initially constructed in 1996 to supply hydrogen for the nearby Ultramar Refinery (currently Valero Wilmington Refinery) for use in its CARB Reformulated Fuels Program. Since construction, this plant (along with another hydrogen plant operated by AP in Carson, CA) now supplies hydrogen to many local refineries, including Ultramar, Tesoro, Phillips 66 and ExxonMobil. In addition to using commercial grade Natural Gas (NG), the Wilmington plant also receives refinery fuel gas from Valero as its feedstock to produce 99% purity hydrogen using a process commonly known as Steam Methane Reforming (SMR).

AP Wilmington is currently in RECLAIM for NO_x and first entered RECLAIM as a Cycle 2 facility on June 30, 1999. The facility was issued an initial Title V (TV) permit on February 2, 2009 and is currently operating under the provision of an ‘application shield’ pursuant to Rule 3002(b). The facility is located in the coastal zone and is designated with a Standard Industrial Classification (SIC) of 2813 for “Industrial Gases”.

The subject applications were submitted on 3/20/14 by the facility to modify the hydrogen production plant (P1/S1), the flare (P3/S1) and change permit condition D332.1 pursuant to a stipulated condition for District Hearing Board (HB) Case No. 4276-14 discussed below. The proposed modifications involve rerouting the V-137 process condensate break tank (D32) vent in P1/S1 to the existing clean service flare (C46) in P3/S1. This vent stream currently comingles with two other vent streams [V-114 Deaerator (D31) and V-129 Intermittent Blowdown Drum (D35)] prior to venting through a common atmospheric vent stack.

The facility’s desire to secure Permits to Construct (PC) for this project was prompted by discovery through source testing on 1/31/14 that CO emissions from the common atmospheric vent stack significantly exceeded the concentration limit of District Rule 407. Two subsequent source tests performed on 2/10/14 and 2/17/14 confirmed the source of CO was predominately from the V-137 vent, which tested at well over 4,400 ppmvd (rule limit is 2,000 ppmvd). CO from D31 and D35 was determined to be insignificant (in the single ppmvd range). Copies of the source test reports are contained in application folder 561635 for reference.

The source test performed on 1/31/14 was the first time the common vent stack for D31, D32 and D35 was ever tested for CO to determine compliance with Rule 407. The test was conducted to comply with permit condition D332.1, which was tagged to the affected devices during the issuance of AP Wilmington’s initial TV permit on 2/2/09, requiring source testing “at least once every five years”. Hence, 2/2/14 was the due date for the initial source test. Condition D332.1 was added as part of the TV cleanup effort by the District during initial TV permit issuance to “gap-fill” SIP-approved and federally enforceable SCAQMD rules, such as Rule 407, that have emissions limit(s) but do not specify adequate monitoring to demonstrate compliance. The test frequency of “at least once every five years” stated in condition D332.1 was derived from the “Title V Periodic Monitoring Guidelines for Title V Facilities” published by the District in November 1997 for non-ICEs and non-emergency equipment.

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During initial construction of the hydrogen plant in 1996, CO emissions in excess of 2,000 ppmvd from the common vent stack of these three devices was not expected based on thermodynamic modeling and process simulation conducted by AP Wilmington. In fact, the facility concluded that the CO concentration expected from the V-137 vent would be in the single digit ppmvd range during normal operations after the District raised concerns on CO from this source (See correspondences between District and AP on 12/26/95 and 1/3/96, respectively, during initial PC stage contained in Appendix 1). Hence, no special requirements for CO monitoring were included in the permit when the facility was issued its initial PC in 1996. The source test performed on 1/31/14 was solely to satisfy the requirement of D332.1 as the 5 year clock was due to expire on 2/2/14.

In its effort to keep the hydrogen plant operating and meet its contractual obligations to customers after the failed test, the facility filed a petition (Case No. 4276-14) with the District HB on 2/3/14 for an Interim Variance/Alternative Operating Condition (AOC). The petition was heard on 2/20/14 by the HB and relief was granted with conditions set forth in the HB Minute Order for Case No. 4276-14 (a copy is contained in application folder 561635). The hearing for the Regular Variance/AOC was initially set for 5/15/14 but was later (on 4/22/14) rescheduled for 5/20/14.

The facility evaluated various options (see AP Wilmington letter dated 3/18/14 in application folder) to bring the facility (and specifically this vent) in compliance and has concluded that the most feasible and cost effective way is to reroute the V-137 vent away from the common vent stack to the ground flare (C46) to control the CO emission (by thermally oxidizing CO → CO₂).

AP Wilmington operates a non-assisted clean service ground flare C46 at the facility under the provisions of Rule 1118. Per the rule, a clean service flare ‘is one that is designed and configured by installation to combust only NG, hydrogen gas and/or liquefied petroleum gas, or any other gas(es) with a fixed composition vented from specific equipment which has been determined to be equivalent and approved in writing by AQMD’. Rule 1118 only allows flaring of vent gas(es) during the 5 operational parameters summarized below:

- Emergencies**
- Shutdowns**
- Startups**
- Turnarounds**
- Essential Operational Need (EON) activities**

To determine whether the V-137 vent can be routed to the flare under the provisions of EON in Rule 1118 subparagraph (b)(4)(D), AP Wilmington performed two successive source tests 10 days apart (on 3/18/14 and 3/28/14) to determine whether this stream qualifies as a ‘clean service’ stream. The test results verified that the gas composition and HHV are essentially fixed, with no sulfur compounds and, hence, meet the definition of a clean stream under Rule 1118. Table 1 below summarizes the result of the source tests. A complete copy of the source test report dated 4/2/14 is also contained in application folder 561635 for reference.

**Table 1 - HHV and Composition of V-137 Vent Stream
Source Test Summary**

PARAMETER	UNIT	3/18/14	3/28/14
Methanol	ppb	124000	124000
Ethanol	ppb	2370	2310

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FUEL ANALYSIS RESULTS			
PARAMETER	UNIT	3/18/14	3/28/14
H2	%	16.6	16.6
O2		0.3	0.2
N2		1.1	1.1
CO		0.5	0.4
CO2		79.6	79.6
CH4		2.0	2.0
HHV	Btu/lb	788	791
	Btu/dscf	74	74

AP Wilmington has consulted with the flare manufacturer, Callidus, to ensure that adding this vent stream to the flare system does not compromise its operation in any way and is feasible for CO (and MeOH, EtOH) destruction. Based on an expected maximum volumetric flow of 119 DSCFM and composition data of this stream from source testing, Callidus has determined that the 1st stage burner of the flare (total 6 stages) alone can readily handle this vent stream from V-137 to achieve 99+ % destruction efficiency (DE) without compromising the flare’s overall design capacity to handle a worst case flaring scenario where the PSA purge gas valve is stuck closed. This additional vent stream only takes up less than 1% of the flare’s maximum rated capacity. Note that even under a worst case flaring scenario (343,900 lb/hr of PSA purge gas to the flare caused by a blocked PSA valve), only 21% of the flare’s capacity is utilized. The engineering analysis conducted by Callidus is contained in Appendix 2 for reference.

According to the facility, the modification can be accomplished without shutting down the affected permit units and, hence, allow compliance to be achieved in the most expeditiously manner. In hoping that the modification can be completed prior to the Regular Variance/AOC scheduled for mid-May, expedited permit processing has been requested. AP Wilmington has paid the required expediting fee in its attempt to secure the PCs in a timely manner.

APPLICATIONS:

The applications and fee submitted for the proposed modification are summarized below in Table 2 and 3.

Table 2 – AQMD Applications Submitted

A/N	Equipment	Device ID	Type	Status	Date Received	Requested Action
561635	Hydrogen Production Plant (P1/S1)	D31, D32, D35	50	20	3/20/14	Modification to reroute D32 vent to the flare.
561636	Flare (P3/S1)	C46	50	20	3/20/14	Modification to accept vent gas from D32.
561637	Title V Revision	--	85	21	3/20/14	Revise Title V permit

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A/N	Equipment	Device ID	Type	Status	Date Received	Requested Action
562543	Hydrogen Production Plant (P1/S1)	D31, D32, D35	60	20	3/20/14	Change condition D332.1 from testing once every 5 years to once every year until two successive annual tests demonstrate compliance.
562545	Title V Revision	--	85	21	3/20/14	Revise Title V permit

Table 3 – Fee Summary

A/N	Equipment Description	B/CCAT	Type	Fee Sch	Fee Paid	Permit Fee Required	Balance Due
561635	Hydrogen Production Plant	252560	50	F	\$16,638.02 ¹	\$11,092.01	\$0.00
561636	Flare	08	50	C	\$5,263.29 ¹	\$3,508.86	\$0.00
561637	Title V Revision	555009	85	C	\$1,824.90	\$1,824.90	\$0.00
562543 ²	Hydrogen Production Plant	252560	60	F	\$6,972.66	\$6,972.66	\$0.00
562545	Title V Revision	555009	85	C	\$1,824.90	\$1,824.90	\$0.00
Total Fees Paid					\$32,523.77		

¹Note that AP Wilmington requested expedited permit processing for these applications and has paid the additional 50% permit processing fee pursuant to Rule 301(v)(1).

²The requested change of condition for A/N 562543 will be incorporated under A/N 561635 and A/N 562543 will be canceled (w/ fee refunded). Refunding the fee is recommended because condition D332.1 needed to be changed anyway as part of the modification for A/N 561635. The accompanying Title V revision A/N 562545 for A/N 562543 will also be canceled (w/ fee refunded) because the changes will be made under Title V Revision A/N 561637.

PERMIT HISTORY:

Table 4 below provides a brief permitting history of the permits units that are seeking permits under this evaluation.

Table 4 - Permit History

Permit Unit: Hydrogen Production Plant (Process 1/System1)			
Application No. [Permit No.]	Date Received Or (Issued)	Application Type	Purpose
562543 ¹	3/20/14	60	Submitted application for C of C pursuant to HB Case No. 4276-14 to increase CO test frequency for V-137 vent from every 5 years to 1 year until two successive test results 10 months apart demonstrate compliance.
561635	3/20/14	50	Submitted application to modify the Hydrogen plant by rerouting the atmospheric vent of V-137 to the flare.

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547681	2/26/13 (PC 1/2/14)	50	Submitted application to modify the Hydrogen plant by installing loading station and equipment to produce up to 1 MMSCFD of ultra-high purity hydrogen for use as transportation fuel.
310073 [G15792]	12/26/95 (3/20/96)	50	Submitted application before construction was completed to modify (add condensate break tank V-137) and change condition to the PC issued on 9/9/94 for initial construction of the hydrogen plant.
293114	5/23/94 (PC 9/9/94)	10	Submitted application for initial construction of new hydrogen plant.
Permit Unit: Flare (Process 3, System 1)			
Application No. [Permit No.]	Date Received Or (Issued)	Application Type	Purpose
561636	3/20/14	50	Submitted application to modify the flare to receive vent gas from V-137 to control CO and VOC emissions.
293123 [G15819]	5/23/94 (PO 11/16/11)	10	Submitted application for initial construction of new flare.

¹Application will be cancelled and requested changes will be merged with A/N 561635.

PROCESS DESCRIPTION:

The AP Wilmington hydrogen plant uses SMR with high temperature shift reactor (HTS) followed by purification through pressure swing adsorption (PSA) units to produce gaseous hydrogen from a feed of NG, refinery gas and steam. The product hydrogen is distributed to local refineries via pipelines. Steam is generated in the hydrogen plant by heat recovery. The hydrogen production process primarily consists of four basic process steps: (1) feedstock hydrogenation and sulfur removal; (2) reforming in the SMR; (3) shift conversion; and (4) hydrogen purification.

The hydrocarbon feedstock is initially treated for sulfur in a hydrogenator (D14) and desulfurizer (D15) to eliminate any sulfur compounds such as mercaptans and carbonyl sulfide, which are contaminants that can easily poison catalyst in the downstream HTS reactor (D18). Pure superheated steam is added to the desulfurized feed upstream of the SMR heater at a molar ratio of ~3.5 times the carbon content of the feed. Some of the steam is consumed in the reforming reaction, which takes place in the nickel catalyst-filled reformer tubes. The product of reaction is a 'syngas', which is mostly hydrogen, with lesser amounts of CO, CO₂, CH₄ and N₂. Any unreacted steam passes through the reforming heater and exits with the syngas at 1575°F. The syngas and steam mixture then goes through the HTS reactor which increases the overall yield of hydrogen by reacting CO and steam to produce additional hydrogen and CO₂. The syngas and steam mixture exiting the HTS reactor is cooled for final purification in the PSA unit (D28) at ambient temperature. From the cooling process, any remaining steam is condensed and separated out from the syngas in the Cold Condensate Knockout Vessel V-112 (D27). The condensate separated from the syngas in V-112 contains several dissolved gases as a result of its association with the syngas and its contact with the process catalysts in the reformer and shift reactor. The condensate may also contain some organics such as methanol and ethanol. Redundant level controls on V-112 maintain a liquid seal which prevents the syngas from exiting through the drain line to the subject Condensate Break

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Tank V-137 (D32). The syngas exits through the overhead of V-112 to the PSA unit where the hydrogen purification process takes place to produce 99.9% purity hydrogen. The resulting purge gas from the purification process in the PSA unit is routed to the SMR furnace and used as primary fuel.

V-137 was installed solely for safety reasons. A break tank is typical in industrial applications, such as a hydrogen plant, whenever there is a high pressure system containing flammable gas and a level control off that system. In the event of a failure of the level control system on a high pressure vessel, the break tank serves to safely discharge the flammable gas through a controlled vent and then collect any liquid and discharge it safely through a seal loop to the sewer. The seal loop is an inherently safe system if it is properly designed for the maximum pressure that the internals of the high pressure vessel can feed. The system was designed to be intrinsically safe with respect to preventing flammable gas to the sewer with several layers of protection. First, there are automatic shutoff valves on the liquid line exiting both V-112 and V-137 before the liquid goes to the sewer. Second, a seal loop prevents liquid from going to the sewer if the automatic shutoff valves malfunction. Proper operation of the seal loop requires V-137 to remain below 1.5 psig, which is accomplished with connection to a common atmospheric vent stack shared by 2 steam generating equipment; Deaerator V-114 (D31) and Intermittent Blowdown Drum V-129 (D35).

As discussed in the Background section, CO emissions in excess of Rule 407 limit has been verified by source testing from the V-137 vent during normal operations, which AP did not expect based on the process simulations and thermodynamic modeling during initial plant construction.

As part of the modification to divert the V-137 vent to the flare, a new water seal loop will be added to the V-137 vent line upstream of the combined vent to ensure no gases can escape to the atmosphere except during an extreme upset situation where syngas is pushed through V-112 into V-137 or when no liquid is present in the new seal loop. The first scenario, where process gas is pushed through a process condensate KO drum bottom, is highly unlikely based on many years of operation at all of Air Products' hydrogen production facilities and would likely result in an unplanned shutdown of the hydrogen plant. CO emission from V-137 under such emergency venting, caused by equipment failure or process upset, is exempt under Rule 407 (b)(3). According to AP Wilmington, the second scenario can be prevented by incorporating mechanisms such as manual level gauge, level indication/control with tie-in to plant DCS, site glass, constant/periodic water addition (if necessary) and seal loop design to ensure the seal loop is full automatically as part of this modification to ensure a continuous liquid seal is maintained.

Tie-in to the flare system can be accomplished via hot tapping from the V-137 vent outlet with connection to the flare's 1st stage combustion burners. Details of this inter-connection and restaging of the flare's combustion stages to accommodate this new vent stream are further described in the Callidus engineering report contained in Appendix 2. A schematic showing the proposed changes is contained in Appendix 3.

COMPLIANCE RECORD REVIEW:

The facility is currently operating under an Interim Variance/AOC approved by the District HB under Case No. 4276-14. The Interim Variance is set to expire on 5/20/14 and the Regular Variance/AOC hearing is scheduled on that same day. With the timely issuance of the requested permits, AP Wilmington is hoping the modification and initial post-modification source test can be completed to demonstrate compliance prior to the scheduled 5/20/14 hearing.

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A review of the facility's compliance status for the past 5 years shows that AP Wilmington has been issued six NOV's (see Table 5 below) that have been resolved and are now listed as 'INCOMP' or 'CLO' in the District's CLASS database.

Table 5
AP Wilmington NOV's Issued Since 2009

Notice No.	Notice Type	Violation Date	Status	Violation
P55519	NOV	7/1/09	Closed	NOx emissions from 2009 compliance year through the end of the 3rd quarter exceeded the annual NOx emissions allocation in effect at the end of the reconciliation period for that quarter. Failure to reconcile quarterly NOx emissions 3rd quarter.
P61005	NOV	4/1/11	In Compliance	(1) Failure to submit accurate QCER for 2nd Qtr of RECLAIM Cycle 2 Compliance year 2011. 2) Failure to maintain and operate a direct monitoring device to continuously measure O2 conc for D38. 3) Failure to report data by means of data acquisition and handling system for missing hours. 4) Failure to accurately calculate on a daily basis the percent data availability from the flow monitoring system for stack exhaust gas flow rate.
P34691	NOV	7/1/12	In Compliance	1. Failure to submit accurate QCER for all 4 quarters of the RECLAIM audit period. 2. Failure to report data for the missing hours in accordance with the applicable procedures. 3. Failure to accurately calculate daily the percent data availability.
P34692	NOV	7/1/12	In Compliance	NOx emissions from the beginning of the 2012 compliance year through the end of the second quarter exceeded the annual NOx emissions allocation in effect at the end of the reconciliation period for that quarter.
P61006	NOV	12/7/12	In Compliance	Operating a cooling tower without a written permit to operate.
P61014	NOV	12/9/12	In Compliance	Failure to comply w/2000 ppmv CO limit per rule 407(a)(i). Purchasing gaseous fuel from Tesoro Refinery containing sulfur compounds greater than 40 ppm as H2S. Failure to submit an accurate annual compliance certification report for year 2012 as required by Sec K.

EMISSIONS:

Based on the recent source tests conducted on February 10 and 17, 2014, the highest vent gas flow from V-137 was determined to be 112 dscfm at a H2 production rate of 82.5 MMSCFD. To determine maximum PTE, the flow was linearly scaled upward using the facility's maximum H2 production

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capacity of 88 MMSCFD. As shown in Table 6 below, a vent gas flow of 119 dscfm was determined and used to calculate emissions.

**Table 6
Vent Gas Flow Determination**

Testing Dates/Times	Measured V-137 Vent Gas Flow	Plant H2 Production Rate
	DSCFM	MMSCFD
2/10/14 noon – 1pm	82	82.4
2/17/14 10am – 11am	110	83.4
2/17/14 7pm – 8pm	112	82.5
Scaled to 88 MMSCFD Production Rate	119	88

Using the worst case vent gas composition data obtained from the 3/18/14 source tests (see Table 1) and the maximum potential vent gas flow of 119 dscfm, the emissions impact of this project was calculated in accordance with Rule 1306, subparagraph (b). Pre-modification emissions were calculated using the following equation. A DE of 99+ % at the flare was used to determine post modification emissions. The expected increase in NOx and CO2 emissions, combustion by-products, were based on the study conducted by Cadillus, the flare manufacturer (see Appendix 2). The emissions impact of this project is discussed in the Rule Evaluation section.

$$\frac{ppmv}{1,000,000} \times \frac{lb}{lbmole} \times \frac{lbmole}{379 dscf} \times \frac{119 dscf}{min} \times \frac{60 min}{hr} \times \frac{24 hr}{day} = \frac{lb}{day}$$

A summary of the pre- and post modification emissions is shown in Table 7 below.

Table 7 - Emissions Summary

POLLUTANT	Max Conc.	MW	V-137 Pre-mod Emissions To Atmosphere		V-137 Post-mod Emissions at the Flare		Emissions Reduction (-) or Increase (+)
	ppmv	lb/lbmole	daily, lb/day	30-day avg., lb/day	daily, lb/day	30-day avg., lb/day	(%)
Regulated							
NOx					0.57 ²	0.58	+100
SOx							
MeOH ¹	124	32.04	1.79	1.78	0.018	0.018	-99
EtOH	2.37	46.07	0.05	0.05	0.0005	0.0005	-99
ROG Total			1.84	1.87	0.019	0.019	-99
PM10					Negligible		
CO	5,000	28.01	63.30	64.18	0.63	0.64	-99
Toxic (TAC)							
NH3	< 0.56		Negligible		Negligible		
GHG							
CO2	796,000	44.01	15,835.65	NA	16,611.60	NA	4.9
CH4	20,000	16.04	145.01	NA	1.45	NA	-99

¹ ROG that is also a TAC.

² 0.02 lb/hr x $\frac{119}{110}$ x 24 hr/day = 0.57 lb/day

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NSR baseline emissions for the flare were determined during initial construction under PC 293123 but were updated (using more updated emission factors with better calculation methodology) when PO 293123 was issued on 11/16/11. The NSR emissions impact from this project is summarized in Table 8 below and discussed further under REG XIII of the Rule Evaluation section:

Table 8 - NSR Emissions Summary

Pollutant	R1/R2 (lb/hr)			30 DA (lb/day)			Yearly (lb/yr)		
	Pre-mod ¹	Post-mod	Δ	Pre-mod	Post-mod	Δ	Pre-mod	Post-mod	Δ
ROG	0.29	0.291	0.0008	7.06	7.08	0.02	2541.6	2548.8	7.2
NOx	0.21	0.23	0.02	5.11	5.60	0.49	1839.6	2016.0	176.4
CO	0.06	0.086	0.026	1.46	2.09	0.63	525.6	752.4	226.8
PM10	0.01	0.01	0.00	0.24	0.24	0.00	86.4	86.4	0.00
SOx	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

¹NSR baseline emissions for flare C46 obtained from A/N 293123.

RULE EVALUATION:

PART 1: SCAQMD REGULATIONS

REG II: PERMITS

Rule 212: Standards for Approving Permits

11/14/97

Rule 212 requires public notice if any of the following subparts are applicable

- (c)(1): The source is located within 1000 feet of a school
- (c)(2): The source has emission increases exceeding the following thresholds from 212(g), all in lbs/day:

CO: 220	ROG: 30	PM10: 60
NOx: 40	Pb: 3	
- (c)(3): The source generates emissions of toxic air contaminants for which the MICR is above one in a million for the subject equipment OR for which MICR is above ten in a million for the facility.

AP Wilmington is located beyond 1,000 feet of a school. The proposed modification will not result in an emission increase greater than any of the thresholds in 212(c)(2), and there is no expected increase in calculated health risk (see REG XIV discussion below for more details). Therefore, no public notice is required.

REG IV: PROHIBITIONS

Rule 401: Visible Emissions

11/9/01

This rule prohibits the discharge of emissions with greater opacity than Ringelmann No. 1, with some exemptions.

Visible emissions are not anticipated as a result of the proposed modification.

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Continued compliance is expected.

Rule 402: Nuisance

5/7/76

This rule prohibits the discharge of air contaminants that cause injury, detriment, nuisance, or annoyance to a considerable number of persons; endanger the comfort, health, or safety of any person; or cause injury to property.

Nuisance-causing emissions are not expected from the proposed modification.

Continued compliance is expected.

Rule 407: Liquid and Gaseous Air Contaminants

4/2/82

This rule limits atmospheric emissions of equipment.

(a)(1): *CO Emissions*

This subpart prohibits the discharge of CO emissions into the atmosphere greater than 2,000 ppmv averaged over 15 minutes.

Within the hydrogen plant permit unit, there will only be 3 potential sources of CO emissions after the V-137 vent is rerouted to clean service flare C46 during normal operations. They are D31, D35 and D70. Source tests on 1/31, 2/10 and 2/17 have demonstrated that CO emissions from D31 and D35 are in the single digit ppmvd range and, hence, are in compliance with Rule 407. CO emissions from D70, molecular sieve driver (V-452A/B) that requires monthly regeneration, are expected to be less than 1 ppmvd based on engineering evaluation for the recently issued PC 547681. Confirming source test condition D28.2 is expected to verify compliance with Rule 407 for this drier's regeneration vent.

Post modification, V-137 (D32) will vent to the flare and is not expected to be a source of CO emissions. As such, the equipment description for V-137 has been edited by the removal of "**vented to atmosphere**" and condition D332.1 has been replaced by E336.2 to facilitate the routing of this vent to the flare. Additionally, the flare (device C46) has been added in the '**Connected To**' column of the permit for D32. The other three devices are tagged with D-Type monitoring conditions (new D29.x for D31/D35 and existing D28.2/D332.1 for D70) to ensure Rule 407 compliance is met.

Rule 407 exempts emergency venting due to equipment failure or process upset, but does not exempt venting during periods of startup and shutdown (SU/SD). As such, the facility vents various streams that can potentially exceed CO limit during SU/SD to the flare in a manner that reduce CO well below the 2,000 ppmvd rule. Defined SU/SD procedures and protocols intended to maximize efficiency and minimize flaring (while controlling CO emissions) are strictly followed by operators during such time at AP Wilmington.

During a cold startup, nitrogen is initially circulated to heat up the equipment. Then feedstock is slowly introduced, and syngas is generated. The syngas exiting the HTS is directed to the flare until the CO concentration is low enough to be directed to the PSA beds (i.e. until the temperature in the HTS reactor reaches the point at which the water-

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gas shift reaction begins to convert the CO into CO₂). A portion of the syngas is also directed to the reformer furnace as fuel. Once the PSA beds are operating, the purge gas generated is slowly directed to the reformer heater (with a portion being sent to the flare until the reformer heater is fully on-line). The majority of the product hydrogen is vented to the flare until the production and demand are equalized. Startup operations are handled delicately, with each step slowly progressing to the next in order to avoid tripping the plant. The flare is used to control all emissions generated during a plant startup (with the exception of the deaerator and intermittent blow down overhead vent, which contains only trace quantities of CO). At no point is syngas or PSA purge gas emitted directly to the atmosphere.

During a planned shutdown, production is slowly decreased by cutting back on the feed and fuel and redirecting load to the other AP hydrogen plant in Carson. Some purge gas is vented to the flare at this point. The PSA is then tripped, which immediately shuts down the production of hydrogen and purge gas. Some syngas is vented to the flare at this point. The PSA beds are then depressed one at a time and the released gases are directed to the flare. A nitrogen sweep then removes any remaining flammables from the system. As with startups, the flare is used to control all emissions generated during a planned shutdown (with no syngas or PSA purge gas emitted directly to the atmosphere).

During an unplanned shutdown, any plant trips will result in a full PSA shutdown. The shutdown procedures then progress similarly as for a planned shutdown. However, certain unplanned failures allow AP Wilmington to transition the PSA to 8- or 5-bed reduced modes, avoiding a full plant trip. In this case, purge gas would be flared as the plant transitioned back up to normal 10 bed mode, but a significant reduction in flaring would be realized as compared to a full plant shutdown.

By following these procedures, AP Wilmington controls all emissions during planned startups and shutdowns in compliance with Rule 407. At no point are syngas or PSA purge gas sent directly to atmosphere. The deaerator and intermittent overhead are the only streams vented to atmosphere, but these streams contain only trace amounts of CO and are expected to be well under the 2,000 ppmv CO limit in Rule 407.

Continued compliance is expected.

(a)(2)(A): Sulfur Emissions

This subpart limits sulfur emissions, measured as SO₂, to less than 500 ppmv in the South Coast Air Basin.

The subject equipment is exempt from this subpart as a facility in compliance with Rule 431.1 per Rule 407(c)(2) and no SO₂ emissions are expected since no sulfur compounds are expected downstream of the SMR reactor as described in the Process Description section of this evaluation.

Continued compliance is expected.

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REG XI: SOURCE SPECIFIC STANDARDS

Rule 1173: Control of Volatile Organic Compound Leaks and Releases from Components at Petroleum Facilities and Chemical Plants

2/6/09

The purpose of this rule is to control VOC leaks from components and releases from atmospheric process pressure relief devices. It applies to components at refineries, chemical plants, lubricating oil and grease re-finers, marine terminals, oil and gas production fields, natural gas processing plants, and pipeline transfer stations.

AP Wilmington is subject to this rule for equipment in the plant which contacts refinery fuel gas. The rest of the plant is not subject to the requirements of Rule 1173 per 1173(l)(1)(D), as these components handle fluids with a VOC content of less than 10% by weight. Generally, components upstream of the reformer reactor *are* subject to Rule 1173 because they contact refinery fuel gas, while components downstream of the reformer reactor *are not* subject to Rule 1173 because the hydrocarbons in the refinery fuel gas have been converted to hydrogen in the reformer reactor.

Since the subject condensate break tank V-137 is located downstream of the reformer reactor, it does not contain VOC in excess of 10% by weight (as verified by source tests conducted on 3/18/14 and 3/28/14 shown in Table 1). Therefore, the new fugitive components used for this project to reroute the V-137 vent to the flare are not subject to Rule 1173 because they are not in VOC service (i.e. new components will not come in contact with fluids with VOC content greater than 10%).

Continued compliance with this rule is expected.

Rule 1118: Control of Emissions from Refinery Flares

11/4/05

The purpose of this rule is to monitor and record data on flaring and flare related emissions for petroleum refineries, sulfur recovery plants and hydrogen plants.

AP Wilmington operates a 'clean service' flare (C46) that is subject to the requirements of this rule under PO 293123. Per Rule 1118(b)(1), a 'clean service' flare is designed and configured by installation to combust only natural gas, hydrogen gas and/or liquefied petroleum gas, or any other gas(es) with a fixed composition vented from specific equipment which has been determined to be equivalent and approved in writing by the Executive Officer.

As described in the Process Description section of this evaluation, V-137 is located downstream of the hydrogenator (D14) and desulfurizer (D15), where sulfur compounds such as mercaptans and carbonyl sulfide are removed from the hydrocarbon feedstock, and, therefore, is not expected to contain any sulfur compounds. The facility has recently demonstrated through two successive source tests (conducted two weeks apart) that the V-137 vent is fixed in composition and contains no sulfur compounds (see Table 1), which qualifies as a 'clean' stream that is allowed to be combusted by C46 under the parameters of EON pursuant to subparagraphs (b)(4)(D) and (c)(4) of Rule 1118. As such, rerouting this stream to C46 for the purpose of controlling CO is allowed by the rule.

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The flare manufacturer, Callidus Technologies, Inc., has determined C46 is capable of taking on this additional load based on the source test flow and stream composition data provided by AP Wilmington. A CO destruction efficiency of 99+% is expected. According to Callidus, the additional vent stream from V-137 represents less than 1% of the flare's maximum rated capacity.

AP Wilmington will submit flare plan amendment to incorporate the V-137 vent stream to the flare and update the revised Flare Monitoring and Recording Plan (FMRP) that was approved on 1/20/11 under A/N 458529. Flare emissions monitoring and reporting at the facility will continue to comply with the requirements of Rule 1118 and its revised FMRP 458529 until the amended FMRP is issued.

Continued compliance is expected.

Rule 1189: Emissions from Hydrogen Plant Process Vents

1/21/00

This rule limits VOC emissions from hydrogen plant process vents. It applies to all hydrogen plants that produce any hydrogen for use in petroleum refining operations.

(c)(3): Requirements for Existing Hydrogen Plants On or After January 1, 2003

This subpart limits hydrogen plants from emitting more than 2.5 lbs VOC per MMSCF hydrogen produced.

According to AP Wilmington, preliminary test result for the most recent Rule 1189 source test conducted in June 2013 showed emissions at 0.045 lb VOC per MMSCF H2 produced. This test report is being finalized by the facility and will be forwarded to District's Source Test Engineering (STE) staff for review/approval once it is received by permitting staff in E&C. The June 2012 test, which also hasn't been reviewed/approved by STE, showed VOC emissions at 1.8 lbs VOC per MMSCF H2 produced (well below the rule limit stated above). Note that prior source tests that have been reviewed/approved by STE have shown that the facility has had no issue in complying with the emissions limit of this rule.

The proposed modification will not result in any new process vents subject to Rule 1189. In fact, the subject V-137 vent stream will no longer vent to the atmosphere but to a control device (the flare) once this project is completed. With the process condensate stream of V-137 diverted away from the cooling tower (which can be considered a process vent if there is VOC in the condensate) during the recent plant turnaround and the proposed V-137 vent reroute to the flare, the only process vent that can potentially contain VOC is the drier regeneration vent for the new ultra purity H2 production/filling station permitted under 547681. However, this vent is not expected to contain any VOCs and will be verified by requiring the facility to coordinate the monthly drier regeneration with the annual Rule 1189 test following construction pursuant to D28.2. Should no VOCs be present in the vent stream, this vent will not be required to be included in subsequent Rule 1189 tests.

Continued compliance is expected.

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(e)(1-5): Monitoring, Reporting, and Recordkeeping Requirements

These subparts lay out the requirements to demonstrate compliance with the limits in this rule.

AP Wilmington has submitted annual reports since the adoption of Rule 1189. Continued compliance with the monitoring, reporting, and recordkeeping requirements is expected.

REG XIII: NEW SOURCE REVIEW (NSR)

This regulation applies to new, modified, or relocated sources that increase emissions of any nonattainment air contaminants, ammonia, or ozone-depleting compounds. The South Coast Air Basin is currently in attainment for NO₂, SO₂, CO and PM₁₀, but nonattainment for ozone and PM_{2.5}. VOC and NO_x are precursors for ozone, while VOC, NO_x, and SO_x are precursors for PM_{2.5}. Therefore, emissions of NO_x, SO_x, PM_{2.5} and VOC are evaluated for compliance with NSR.

With exception to NO_x, the proposed modification is not expected to result in an increase of any nonattainment pollutants (see Table 7), but will have some impact on GHG (CO₂ and CH₄) emissions that will be evaluated under PSD (see REG XVII discussion below) rather than NSR. The decrease in attainment pollutant CO from 64.18 to 0.64 lb/day and the increase of 0.58 lb/day in NO_x are both addressed under Rule 1303(b)(2).

Rule 1303: Requirements

12/6/02

(a)(1): Best Available Control Technology (BACT)

Pursuant to District's BACT guideline, it is SCAQMD's policy that BACT is required only for emission increases that are greater than one (1.0) pound per day. As shown in Table 7, pre-controlled emissions for CO exceeded this threshold. Hence, BACT is required for this project. The facility complies with the requirement of BACT by routing the V-137 vent to the flare to achieve a DE of 99+ %. Note that the ROG emission from V-137 has already been accounted for in NSR (for Rule 1189 compliance) and should not be considered an emission increase triggering BACT.

Note that condition D29.x and D90.x have been tagged to affected devices D31, D32 and D35 which will require the facility to conduct a source test following construction to verify that the modification successfully diverted CO and VOC emissions away from the common atmospheric vent and attained the emissions reduction expected.

(b)(1): Modeling

Since the vent gas of V-137 is routed to the flare for control, the modeling requirement of this rule is not required for the resulting NO_x and CO emissions of 0.58 and 0.64 lb/day, respectively, because they are exempted by Rule 1304(a)(5) – Air Pollution Control Strategies.

(b)(2): Offsets

Unlike the emission threshold for BACT, the threshold that triggers the offset requirement of this rule is post modification emissions ≥ 0.42 lb/day (0.42 lb/day x 1.2

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offset ratio > 0.5 lb/day). As such, the post-controlled NO_x and CO emissions of 0.58 and 0.64 lb/day, respectively, at the flare exceeded this threshold. However, NO_x offsets are exempt pursuant to Rule 1304(a)(5) – Air Pollution Control Strategies and CO offsets are not required because it is an attainment pollutant. The emissions for this project, as shown in Table 8, will be updated in the District’ NSR database to reflect the emission increases even though they are exempt from offsets.

(b)(3): *Sensitive Zone Requirements*
N/A. No ERCs required.

(b)(4): *Facility Compliance*
The compliance status of this facility is discussed in detail in the ‘Compliance Record Review’ section. As mentioned, AP Wilmington is currently operating under a Variance/AOC (Case No. 4276-14) granted by the District HB. Note that Variances/AOCs and Order for Abatements are allowed to satisfy the ‘facility compliance’ requirement of this rule.

(b)(5)(B): *Major Polluting Facilities – Statewide Compliance*
The proposed project does not meet the definition of Major Modification in Rule 1302. Hence, the requirements of this section do not apply.

REG XIV: TOXIC AIR CONTAMINANTS

Rule 1401: New Source Review of Toxic Air Contaminants

This rule specifies limits for MICR, cancer burden, and non-cancer acute/chronic hazard index for new permit units, relocations, or modifications to existing permit units which emit toxic air contaminants listed in Table I of this rule.

(d) *Requirements*

This subdivision limits the calculated health risk resulting from increased toxic emissions to a MICR of less than 1 in a million, cancer burden less than 0.5, and acute and chronic health indices less than 1.0.

(g)(1)(B) *Modification with No Increase in Risk*

This subparagraph exempts projects which cause a reduction or no increase in calculated health risk from the requirements of subpart (d).

As shown in Table 7, this project is not expected to have any increase in health risk because, both, the pre- and post-modification TAC emissions (NH₃ and MeOH) are significantly below the screening emission levels shown in Table 1A of Rule 1401 (See Appendix 4) using the most conservative receptor distance of 25 meters. Hence, a Rule 1401 risk assessment is not required.

Compliance is expected.

REG XVII: PREVENTION OF SIGNIFICANT DETERIORATION (PSD)

The PSD program is a federal preconstruction review and permitting program (40 CFR Part 52) for new major stationary sources and major modifications at existing major

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stationary sources for areas that are designated “attainment” or “unclassifiable” for a National Ambient Air Quality Standard (NAAQS). It works in tandem with “nonattainment” New Source Review (District Regulation XIII) for areas that are not in attainment for a NAAQS. The goal of PSD is to ensure that air quality in attainment areas does not significantly deteriorate while maintaining a margin for future industrial growth. The District has Limited PSD Delegation from EPA (effective July 26, 2007) that gives the District limited responsibility for PSD. The South Coast Air Basin (SCAB) is currently in attainment for NO₂, SO₂, CO and PM₁₀.

In 2009, the EPA made an Endangerment Finding for greenhouse gases (GHG) which lead to the GHG emissions to be evaluated under PSD. Since the status of GHG for the SCAB is “unclassified” (because ambient air quality standards have not yet been released), therefore the SCAB is not in nonattainment. As such, GHG emissions are also subject to PSD in the SCAB. These regulations are implemented in the SCAQMD through Rule 1714 – PSD for GHG.

The newly-promulgated Tailoring Rule specifies that GHG emissions must be evaluated under PSD for permits issued after 1/2/11 for projects at existing PSD or Title V sources in the SCAB according to a phased-in applicability time frame. The subject equipment is located at a Title V facility (AP Wilmington was issued an initial Title V permit effective 2/2/09).

According to §52.21(b)(49)(i)-(v), the pollutant GHG is subject to requirements under this regulation if either of the following applies:

- A stationary source, which is an existing major stationary source for a regulated non-GHG NSR pollutant, undertakes a “major modification” that subjects the source to PSD permitting requirements for a non-GHG NSR pollutant and the modification will result in an emission increase and net emission increase of at least 75,000 tpy on a CO₂e basis and 0 tpy on a mass basis.
- A stationary source, which is an existing major stationary source that emits or has the potential to emit 100,000 tpy CO₂e, undertakes a modification that will result in an emission increase and net emission increase of at least 75,000 tpy on a CO₂e basis and 0 tpy on a mass basis.

The increase in annual emissions on a ton per year basis as a result of the proposed project is shown in Table 9 below along with the PSD significance thresholds.

Table 9 – PSD Applicability Determination

Pollutant	Emissions Increase (tpy)	PSD Significance Threshold (tpy)	Exceed Threshold?
CO	0.11	100	No
GHG (CO ₂ e)	3,307	75,000	No

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PSD emissions are calculated based on the following:

$$\text{CO}_2\text{e} = \Sigma [(\text{mass of the GHG}) \times (\text{its GWP})]$$

GWP = Global Warming Potential

For CO₂, GWP = 1
For CH₄, GWP = 21

Using the post-modification emissions for CO, CO₂ and CH₄ shown in Table 7,

$$\text{CO} = \left(0.63 \frac{\text{lb}}{\text{day}}\right) \left(365 \frac{\text{day}}{\text{yr}}\right) \left(\frac{\text{ton}}{2000\text{lb}}\right) = \mathbf{0.11 \text{ tpy}}$$

$$\begin{aligned} \text{CO}_2\text{e} &= \left[\left(16,612 \frac{\text{lb}}{\text{day}}\right) (1)\right] + \left[\left(1.45 \frac{\text{lb}}{\text{day}}\right) (21)\right] = 16,642 \frac{\text{lb}}{\text{day}} \\ &= \left(16,642 \frac{\text{lb}}{\text{day}}\right) \left(365 \frac{\text{day}}{\text{yr}}\right) \left(\frac{\text{ton}}{2000\text{lb}}\right) = \mathbf{3,307 \text{ tpy}} \end{aligned}$$

Because all the emission increases for attainment pollutants are far below the PSD significance thresholds, PSD is not triggered for the proposed modification. Further analysis under REG XVII is not required.

Note that AP Wilmington will be required to perform source tests per new conditions D28.x and D90.x after the modification is completed to confirm the emission estimates provided with their application is consistent prior to PO issuance.

Compliance is expected.

REG XX: REGIONAL CLEAN AIR INCENTIVE MARKET (RECLAIM)

RECLAIM is a market incentive program designed to allow facilities flexibility in achieving emission reduction requirements for NO_x and SO_x. AP Wilmington is currently subject to RECLAIM requirements for NO_x only as a Cycle 2 facility primarily because of its reformer heater (D38) is a major source of NO_x. D38 is a separate permit unit operating under PO 310075.

The subject hydrogen plant permit unit does not generate emissions of either NO_x or SO_x and is therefore not subject to any RECLAIM requirements. The 0.58 lb/day of NO_x emissions at the flare is exempt from the monitoring, reporting and recordkeeping requirements of RECLAIM pursuant to Rule 2012 subparagraph (k). Therefore, the subject ground flare is not subject to any RECLAIM requirements.

Continued compliance with REG XX is expected.

REG XXX: TITLE V PERMITS

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The Title V Permit system is the air pollution control permit system required to implement the federal Operating Permit Program as required by Title V of the federal Clean Air Act as amended in 1990. This regulation defines permit application and issuance procedures as well as compliance requirements associated with the program. Air Products Wilmington was issued an initial Title V permit effective 2/2/09.

Pursuant to Rule 3005(e)(1), the issuance of permits for this project qualifies as a **De Minimis Significant** revision of the facility's Title V permit because the proposed modification is expected to result in cumulative emission increases of CO, NO_x, ROG and TAC that are below the respective 220 lb/day, 40 lb/day, 30 lb/day and 30 lb/day emission thresholds referenced in Rule 3000(b)(7). As a **De Minimis Significant** revision, public notice is not required pursuant to Rule 3006(b) but a draft copy of the permit is required to be reviewed by EPA pursuant to Rule 3003(j)(1)(A). A copy of the final permit will also be submitted to the EPA within 5 working days of its issuance per Rule 3003(j)(1)(E).

Note that the tagging of NSPS Subpart A for C46 under permit condition H23.11 (for C46) has been removed and the applicability of this federal rule has been moved to new facility condition F52.x for clarification purposes only. The addition of F52.x should not be interpreted as a new NSPS requirement for the facility or permit units, which would otherwise render this permit revision a **Significant** Title V permit revision requiring public notice. See 40CFR 60, Subpart A discussion below for the reason behind this proposed change.

Compliance is expected.

PART II: STATE REGULATIONS

CEQA: CALIFORNIA ENVIRONMENTAL QUALITY ACT

CEQA requires that the environmental impacts of proposed projects be evaluated and that feasible methods to reduce, avoid, or eliminate identified significant adverse impacts of these projects be considered. CEQA defines "significant" by the following net emission increase thresholds (all in lbs/day):

ROG: 55 PM₁₀: 150 CO: 274

The proposed modification does not result in a "significant" emission increase pursuant to CEQA. As verified by the 400-CEQA screening checklist and additional information submitted by AP Wilmington, the proposed modification does not trigger further CEQA analysis.

PART III: FEDERAL REGULATIONS

40CFR: PROTECTION OF ENVIRONMENT

Part 60 Standards of Performance for New Stationary Sources (NSPS)

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Subpart A General Provisions

This facility operates a flare (C46) that is subject to the requirements in §60.18, subparagraph (b)(3)(i)(A) of this Subpart. As a non-assisted ground flare with a diameter greater than 3”, the facility has demonstrated by source testing (see Table 1) that the H2 content of V-137 vent to the flare complies with the minimum 8% (by volume) requirement of this rule. The flare manufacturer Cadillus has also indicated in its engineering report (see Appendix 2) that this new stream meets the velocity requirements of this subpart, as indicated in the SCAQMD Form 400-E-2c submitted by AP Wilmington.

Note that the tagging of this federal rule for permit condition H23.11 (for C46) has been removed and the applicability of this rule has been moved to new facility condition F52.x for clarification purposes. Leaving this subpart as an underlying federal rule in condition H23.11, which only reference SOx emissions because of Rule 1118, can be misleading as Subpart A contain other requirements for flares. The addition of F52.x should not be interpreted as a new NSPS applicability for the facility or permit units as this NSPS is currently contained in Section K of the Title V permit and tagged as the underlying rule for C46.

Continued compliance is expected.

Part 63 National Emission Standards For Hazardous Air Pollutants For Source Categories

Subpart VVVVVV NESHAP for Chemical Manufacturing Area Sources (CMAS)

The EPA has ruled on 6/24/13 in an applicability determination that this CMAS rule does not apply to the catalyst change out activities (which can potentially emit trace amount of HAP) at the AP Wilmington facility. A copy of this EPA ruling is contained in Appendix 5 for reference.

Part 68 Chemical Accident Prevention Provisions

This part sets out the requirements for owners or operators of stationary sources concerning the prevention of accidental releases. This plant is subject to the requirements of this rule. This part requires eligible facilities to submit a Risk Management Plan (RMP) to EPA. Facility condition F24.1 requires Air Products to submit statements (including any relevant EPA certification of its RMP) as part of an annual compliance certification process. Air Products is currently in compliance with this condition, as they have submitted annual statements since construction certifying that they are in compliance with all requirements of Part 68.

Continued compliance is expected.

CONCLUSIONS & RECOMMENDATIONS:

The proposed modification is expected to comply with all applicable District, State, and Federal rules and regulations. Permit to Construct for the hydrogen plant and the flare under A/N 561635 and 561636,

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respectively, are recommended with the conditions listed in the Conditions section above. Revision A/N 561637 is also recommended for approval to make the appropriate changes to the Title V permit. The issuance of PC 561635 and 561636 will enable AP Wilmington to proceed with modification of the subject permit units to bring the facility in compliance with HB Variance/AOC Case No. 4276-14.

A summary of the permit actions recommended under this evaluation is shown in Table 10 below.

Table 10 – Summary of Recommended Permit Actions

A/N	Requested Action	Device ID	Recommended Action
561635	Modification to reroute D32 vent to the flare	D31, D32, D35	Approve PC
561636	Modification to accept vent gas from D32	C46	Approve PC
561637	Revise Title V permit	P1/S1 and P3/S1 in Sec H	Approve Revision
562543	Change condition D332.1	D31, D32, D35	Cancel ¹
562545	Revise Title V permit	P3/S1 in Sec H	Cancel

¹Requested changes to be incorporated under A/N 561635.