

<b>SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT</b>  <i>ENGINEERING &amp; COMPLIANCE</i>  <b>APPLICATION PROCESSING AND CALCULATIONS</b>	PAGES	PAGE
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**Permit to Construct**  
**P2/S2: Reforming, Air Pollution Control System**

**COMPANY NAME, MAILING AND LOCATION ADDRESS:**

**Name:** Air Products and Chemicals, Inc.  
SCAQMD ID # 003417

**Mailing:** 23300 South Alameda Street  
Carson, CA 90810

**Location:** 23300 South Alameda Street  
Carson, CA 90810

**Contact Person:** Jim Reebel  
Senior Environmental Engineer  
(310) 847-7300 ext 13

**EQUIPMENT DESCRIPTION:**

Additions to the equipment description and condition are noted in underlines. Deletions are noted in ~~strikeouts~~.

**Section H of Title V Permit, ID# 003417**

<b>Process 2: REFORMING</b>					
<b>System 2: AIR POLLUTION CONTROL SYSTEM</b>					
SELECTIVE CATALYTIC REDUCTION, X-102, <u>HALDOR</u> TOPSOE, POROUS BLOCKS DNX <u>939 OR APPROVED EQUIVALENT</u> CATALYST, 42 MODULES, WITH AMMONIA INJECTION, <del>499</del> <u>1610</u> CU FT; WIDTH: <del>6</del> <u>10</u> FT <del>4</del> IN; HEIGHT: <del>3</del> <u>4</u> FT <u>10</u> IN ; LENGTH: <del>3</del> <u>45</u> FT <del>2</del> IN  A/N: <u>557218</u>	C32	D30		<b>NH3:</b> 20 PPMV (4) [ <b>RULE 1303(a)(1)-</b> <b>BACT, 5-10-1996;</b> <b>RULE 1303(a)(1)-</b> <b>BACT, 12-6-2002]</b>	D12.3, D29.1, <u>E71.x, E193.x,</u> H23.1

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**DEVICE CONDITIONS:**

D12.3 The operator shall install and maintain a(n) temperature gauge to accurately indicate the temperature across the SCR catalyst bed.

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

**[RULE 2005, 4-20-2001]**

[Devices subject to this condition : C32]

D29.1 The operator shall conduct source test(s) for the pollutant(s) identified below.

Pollutant(s) to be tested	Required Test Method(s)	Averaging Time	Test Location
CO emissions	Approved District method	1 hour	Outlet of the SCR serving this equipment
NOX emissions	Approved District method	1 hour	Inlet and outlet of APC equipment serving this equipment
PM10 emissions	Approved District method	District-approved averaging time	Outlet of the SCR serving this equipment
ROG emissions	Approved District method	1 hour	Outlet of the SCR serving this equipment
NH3 emissions	Approved District method	1 hour	Outlet of the SCR serving this equipment

The test shall be conducted at least annually for CO, NOx, PM10 and ROG.

The test shall be conducted at least quarterly for NH3. The test frequency shall become annual after four successive quarterly tests demonstrating compliance after the initial start up of the purge gas pre-heat exchanger (E-515).

The test shall also be conducted within 60 days of continuous operation from the startup of SCR catalyst replacement for NOx and NH3.

The facility permit holder shall submit the protocol to the AQMD source test engineer no later than 45 days prior to the proposed test date and notify the District of the date and time of the test at least 10 days prior to the test.

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After AQMD approval of the source test protocol, the test shall be conducted no later than 180 days after the initial start up of the purge gas pre-heat exchanger (E-515) and, at least, annually thereafter for CO, NO<sub>x</sub>, PM<sub>10</sub> and ROG and, at least, quarterly thereafter for NH<sub>3</sub> until four successive tests have demonstrated compliance, after which the NH<sub>3</sub> test shall be conducted at least annually along with CO, NO<sub>x</sub>, PM<sub>10</sub> and ROG.

Notwithstanding the above, the required 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.

The source test results shall be submitted to the District no later than 60 days after the source test has been conducted.

Testing and sampling facilities shall be provided and maintained in accordance with District Source Test Method 1.1 or 1.2 and District Guidelines for Construction of Sampling and Testing Facilities.

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

The test shall determine and report the concentrations and mass emission rates for NO<sub>x</sub>, CO, PM<sub>10</sub>, ROG, and the following:

- a) NO<sub>x</sub> in lb/MMBTU of heat input, from the inlet and outlet of the SCR unit
- b) Excess oxygen in percent dry basis, from the SCR unit outlet
- c) Ammonia in ppmv, from the SCR unit outlet
- d) Flue gas flow rate in scf/hr, from the SCR unit outlet
- e) Fuel gas flow rate in scf/hr, to the hydrogen reforming heater
- f) Heating value (HHV), in BTU/SCF, of fuel gases supplied to the hydrogen reforming heater
- g) Control efficiency of the SCR unit

**[RULE 1303(b)(2)-Offset, 5-10-1996; RULE 1303(b)(2)-Offset, 12-6-2002; RULE 2005, 4-20-2001]**

[Devices subject to this condition : D30, C32]

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E71.x The operator shall only inject ammonia into this equipment if the flue gas inlet temperature is at least 570 degrees F.

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

[Devices subject to this condition: C32]

**E193.x** The operator shall construct, operate, and maintain this equipment according to the following specifications:

To establish equivalency of a catalyst, the operator shall submit the following information for the catalyst to the District permitting engineer: manufacturer, description (type), configuration, dimensions (per block), number of blocks, total volume, space velocity, life, vendor performance guarantee, performance curve (versus temperature), minimum operating temperature, estimated SO<sub>2</sub> to SO<sub>3</sub> conversion, estimated NO to NO<sub>2</sub> conversion, and concentration of Rule 1401 TACs.

The operator shall not install and use an “equivalent” catalyst until approval is received in writing from the District.

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

[Devices subject to this condition: C32]

H23.1 This equipment is subject to the applicable requirements of the following rules or regulations:

Contaminant	Rule	Rule/Subpart
CO	District Rule	407

This rule applies during normal operation, startup, shutdown, and unforeseen turndown of hydrogen demand.

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

[Devices subject to this condition : D30, C32]

**BACKGROUND:**

Air Products & Chemical, Inc. operates a Hydrogen (H<sub>2</sub>) production facility in the city of Carson that produces 99.9% pure H<sub>2</sub> for dedicated ‘over the fence’ sales (via pipeline) to several neighboring refineries. The facility, known as the Air Products (AP) Carson, began operations in late 1999 and has the capacity to produce up to 96 MMSCFD of ‘pure’ H<sub>2</sub> gas for use in refinery operations.

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AP Carson is currently in the SCAQMD's RECLAIM program for NO<sub>x</sub> only and first entered RECLAIM as a Cycle 1 facility on September 11, 1998. The facility was issued an initial Title V permit on September 4, 2008. It is located in the coastal zone. Air Products & Chemical, Inc. also owns and operates a similar hydrogen plant in the neighboring city of Wilmington.

The hydrogen production process at AP Carson involves the reforming of NG (methane) with water vapor (steam) to produce a synthesis gas ('syngas') consisting of CO, CO<sub>2</sub> and H<sub>2</sub> over a catalyst bed in the reformer heater. This intermediate product stream goes through several purification processes by utilizing additional steam to convert the CO component of the syngas to CO<sub>2</sub> while producing additional H<sub>2</sub> via high temperature shift conversion. In the final purification process, residual CO, CO<sub>2</sub> and un-reacted methane are removed by adsorption in the Pressure Swing Adsorbers (PSA). The PSA is regenerated by pressure swings and purged with hydrogen gas to remove most impurities from the product stream. The PSA purge gas is used, along with NG (as trim fuel), by the reformer heater as combustion fuel to generate the elevated temperature needed for the endothermic reaction of reforming methane to produce H<sub>2</sub>.

**PROJECT SCOPE**

The subject applications were submitted on October 18, 2013 by AP Carson to gain approval to replace the catalyst in the SCR unit (C32) that service reformer heater (D30) with a similar catalyst supplied by a different manufacturer. AP Carson proposes to replace the Cormetech CM-33 catalyst in C32 with Haldor Topsoe's DNX 939 catalyst during the upcoming facility turnaround scheduled for February 2014. Note that the CM-33 in C32 is the original catalyst load installed in 1998 when the SCR was constructed. In order to finalize its plans for the turnaround, AP Carson has requested expedited processing/approval of this project from the SCAQMD.

Based on periodic performance evaluation by AP Carson, the Cormetech CM-33 catalyst load is approaching the end of its useful life and needs to be replaced soon. Such indication has been validated by the SCR's increasing difficulty in complying with the 5 ppmv NO<sub>x</sub> emission limit of D30, which has resulted in three NOV's in late 2012 (see Table 1). According to AP Carson, the decision to switch to the Haldor Topsoe DNX 939 catalyst was made largely due to the proven success of this same catalyst, currently in use with over 7 years of ongoing operation, at its sister facility in the Wilmington.

**APPLICATION SUMMARY**

The applications submitted for this project are summarized in Table 1 below:

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**Table 1 – Application Submittals**

A/N	Project Scope	Process	System	Evaluation Type
557217	Title V Permit Amendment.	-	-	-
557218	Replace existing SCR catalyst with catalyst manufactured by Haldor Topsoe.	2	2	PC

**FEE SUMMARY**

As mentioned earlier, Air Products Carson requested the applications be processed expeditiously pursuant to Rule 301(v) and has paid the appropriate expediting fees. Table 2 is a summary of the fees paid:

**Table 2 - Application Fee Summary**

A/N	Equipment	Device ID	Type	Status	Requested Action	Deemed Complete	Fee Schedule	Fee Required	Expedite Fee	Fee Paid
557217	TV Permit Revision	NA	85	21	Revise TV permit	10/31/13	-	\$1,824.90	-	\$1,824.90
557218	SCR	C32	10	20	Change Catalyst Type	10/31/13	C	\$3,508.86	\$1,754.43	\$5,263.29
<b>Total</b>								<b>\$5,333.76</b>	<b>\$1,754.43</b>	<b>\$7,088.19</b>

**PERMIT HISTORY**

The permitting history of the SCR is summarized in the Table 3:

**Table 3 - Permit History of SCR (P2/S2) (A/N 557218)**

Permit to Construct		Permit to Operate		Description of Modification
No.	Issue Date	No.	Issue Date	
337980	9/11/1998	-	-	Original construction of the SCR to control NOx emissions from the reformer furnace for the newly constructed AP Carson H <sub>2</sub> plant.
491312	10/15/2009	G15452	10/20/2011	Construction of a preheat exchanger for PSA purge gas to the reformer furnace to improve efficiency and operation.
<b>557218</b>	-	-	-	Propose to replace Cormetech CM-33 catalyst with Haldor Topsoe DNX 939 catalyst.

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### **COMPLIANCE RECORD REVIEW**

The facility's 3-year compliance history, shown in Table 4, indicates there are no outstanding compliance issues currently at Air Products Carson. All NOV's issued since November 1, 2010 are 'in compliance'.

**Table 4 - List of Air Products Carson NOV's Issued Since November 1, 2010**

Notice No.	Notice Type	Violation Date	Status	Violation
P34684	NOV	12/31/2011	In Compliance	Inaccurate certification of quarterly emissions for 1ST, 2ND, 3RD AND 4TH quarters. Failure to report data by means of the data acquisition and handling system for the missing hours in accordance with the applicable procedures for substituting missing data.
P58213	NOV	11/12/2011	In Compliance	The operator shall vent this equip. to an APC consisting of a SCR which wasn't in full use. If the heater exhaust reaches 570 deg F, the flue gas shall be vented through the SCR system using ammonia injection on 11/12/11. The facility also is in violation of the 3 hour average 5 ppm NOx emission limit which was exceeded on 11/25/11.
P58220	NOV	11/05/2012	In Compliance	The facility is in violation of the 3 hour average 5 ppm NOx emission limit.
P58221	NOV	12/03/2012	In Compliance	The facility is in violation of the 3 hour average 5 ppm NOx emission limit.
P58222	NOV	11/08/2012	In Compliance	The facility didn't operate the flare in such a manner that minimized all flaring on 11/8 - 11/9/12. The facility is in violation of the 3 hour average 5 ppm NOx emission limit on 11/9/12.

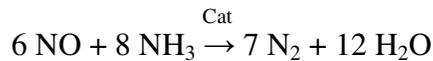
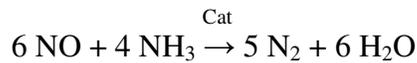
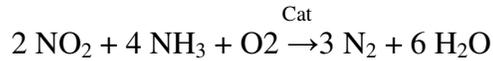
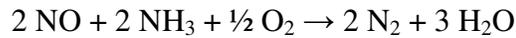
### **PROCESS DESCRIPTION**

In summary, AP Carson uses steam reforming with high temperature shift reactor followed by purification through PSA to produce high purity H<sub>2</sub> from a feed of natural gas (methane) from the local utility company. The following discussion focuses solely on the SCR unit.

Air Products Carson employs Selective Catalytic Reduction with aqueous ammonia injection to control NOx emissions to less than 5 ppmvd and NH<sub>3</sub> slip to less than 20 ppmvd at 3% O<sub>2</sub>. These emission limits are specified on the reformer furnace and SCR permits, respectively. The reformer furnace and SCR were constructed in the late 1990s and were subjected to NSR. The use of SCR for NOx control to 5 ppmvd was considered LAER/BACT at the time of initial permit and, to this date, this limit still applies. The SCR has been operating with Cormetech CM-33 catalyst since construction.

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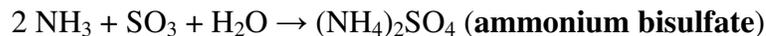
Selective Catalytic Reduction uses ammonia in the presence of a catalyst to reduce NO<sub>x</sub> to produce N<sub>2</sub> and H<sub>2</sub>O. The process is 'selective' because the ammonia reacts primarily with NO and NO<sub>x</sub> via the following reactions:



Diluted ammonia vapor is injected into the exhaust gas stream via a grid of nozzles located upstream of the SCR catalyst module to allow mixing of the ammonia and flue gas NO<sub>x</sub>. With proper ammonia and flue gas distribution, NO<sub>x</sub> reduction can easily exceed 90% when the exhaust gas temperature is maintained between 570 to 750°F. If these variables are outside the optimum range, lower NO<sub>x</sub> conversion and higher NH<sub>3</sub> slip can be expected. Ammonia for the SCR unit is supplied from an existing aqueous ammonia storage tank (V-135) permitted under A/N 337981.

The formation of sulfate and nitrate (which are PM<sub>10</sub>) from the secondary reactions below are anticipated to be insignificant since negligible SO<sub>x</sub> formation is expected from the combustion of sulfur free PSA purge gas and Rule 431.1 compliant natural gas and the expected NO<sub>x</sub> to NO<sub>2</sub> conversion for this catalyst is zero according to the catalyst manufacturer.

Secondary reactions:



During AP Carson's upcoming turnaround, ~1610 ft<sup>3</sup> of the Haldor Topsoe DNX 939 catalyst will be loaded in C32 in lieu of Cormetech CM-33. The manufacturer's specifications for the DNX 939 catalyst are summarized in Table 5 below, which are contained in the application folder.

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**Table 5 - Specifications for Selective Catalyst Reduction (SCR) Catalyst**

Catalyst Properties	Specifications
Manufacturer	Haldor Topsoe or equivalent
Catalyst Description <sup>1</sup>	TiO <sub>2</sub> - V <sub>2</sub> O <sub>5</sub> - WO <sub>3</sub>
Catalyst Dimensions <sup>2</sup> (per module - top)	4 ft 10 in (l) x 3 ft 1.24 in (w) x 2 ft 7.42 in (d)
Number of Modules	21
Catalyst Dimensions <sup>2</sup> (per module - btm)	4 ft 10 in (l) x 3 ft 1.24 in (w) x 3 ft 7.54 in (d)
Number of Modules	21
Total No. of Modules	42
Configuration	Porous Blocks
Catalyst Volume – Total	1,610 ft <sup>3</sup> or 45.6 m <sup>3</sup>
Space Velocity	6,500 hr <sup>-1</sup>
Catalyst Life (performance guarantee)	Continuous 3-year service life
Optimum Operating Temperature	570 – 750 °F
Ammonia Injection Rate	60 lb/hr aqueous ammonia (30 % by weight)
NOx Removal efficiency	~ 90 percent
NOx Concentration @ Stack Outlet	5 ppmvd, 1-hr average, 3% O <sub>2</sub>
NH <sub>3</sub> Concentration @ Stack Outlet	20 ppmvd, 1-hr average, 3% O <sub>2</sub>

<sup>1</sup>Specific composition of the catalyst ingredients are shown in the MSDS (section 3) for Haldor Topsoe DNX catalyst contained in the application folder.

<sup>2</sup>The overall catalyst module height shown in HT drawing DNX-13-6113-03 in the application folder is 58.27" (~ 4' 10"), not 6' 2.25" as indicated in application material submitted. According to AP Carson (see email dated 11/18/13), the 4' 10" height dimension is correct and, hence, was used in the equipment description column of the permit.

SCR catalysts are commercially available in two basic geometric shapes, honeycomb and plate, or a hybrid of these. According to HT, the DNX 939 can be considered a 'hybrid plate' shape with porous blocks configuration catalyst.

## **EMISSIONS**

Similar to the CM-33 catalyst currently in use, the DNX 939 catalyst by Haldor Topsoe is formulated with Vanadium Pentoxide (V<sub>2</sub>O<sub>5</sub>) and Tungsten Oxide (WO<sub>3</sub>) as active metals impregnated on a high surface area ceramic substrate, which is totally or primarily composed of activated Titanium Oxide (TiO<sub>2</sub>) as the carrier. The DNX 939 is the same catalyst currently in use at the AP Wilmington Hydrogen plant with over seven (7) years of continuous performance. Additionally, Haldor Topsoe has provided a manufacturer's guarantee (a copy contained in Attachment 1) that the DNX 939 catalyst will achieve reformer furnace stack outlet concentrations of 5 ppmvd NOx @ 3% O<sub>2</sub> and 20 ppmvd NH<sub>3</sub> @ 3 % O<sub>2</sub> for a continuous 3-year service life. As such, the reformer furnace/SCR is expected to comply with the NOx and NH<sub>3</sub>

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emission limits after the catalyst change with a comfortable margin of compliance. To verify compliance, a new child condition has been added to condition D29.1 to perform source test within 60 days after the SCR is put back in service with the new catalyst. No increase in NOx and NH<sub>3</sub> emissions are expected from this change and no impacts on CO, PM10, SOx and ROG emissions are associated with the project.

### **TOXIC AIR CONTAMINANT EMISSIONS**

V<sub>2</sub>O<sub>5</sub> and NH<sub>3</sub> are listed as Toxic Air Contaminants (TACs) in Table 1 of Rule 1401. However, because the V<sub>2</sub>O<sub>5</sub> is impregnated into the catalyst and is not volatile at the operating temperature of the SCR, no quantifiable amount of V<sub>2</sub>O<sub>5</sub> emissions is expected. The only method by which significant amounts of V<sub>2</sub>O<sub>5</sub> could potentially become airborne is through abrasion of the catalyst by solid PM in the flue gas. Flue gas generated by gaseous fuel combustion contains very low levels of solid PM so the amount of catalyst abrasion is expected to be insignificant. Using PM10 emissions measured from the most recent four (4) source tests and assuming a worst case scenario of a 1:1 ratio PM10 to V<sub>2</sub>O<sub>5</sub> airborne release, a REG XIV Tier 2 Risk Analysis was performed by AP Carson. The analysis is contained in Attachment 2 for reference. As shown, the expected risk is well below the risk thresholds of Rule 1401. Therefore, no adverse health impacts are anticipated from this TAC. Additionally, NH<sub>3</sub> concentrations from the last four source tests were well below the 20 ppmvd NH<sub>3</sub> emission limit for the SCR, which was established during the initial construction of the unit to be LAER/BACT. Therefore, no quantifiable health impacts are expected for this TAC as well.

### **RULE EVALUATION**

Although the subject evaluation is solely for the control equipment (SCR) used to control NOx emissions from the reformer heater (basic equipment), this rule review section will encompass both devices since they are functionally connected and, on certain pollutants, dependent on each other for rule compliance.

#### ***PART 1 SCAQMD REGULATIONS***

<b>Rule 212</b>	<b>Standards for Approving Permits</b>	<b>November 14, 1997</b>
	<p>This project meets all criteria in Rule 212 for permit approval. The SCR is expected to operate without emitting air contaminants in violation of Division 26 of the State Health &amp; Safety Code or in violation of AQMD rules and regulations with the DNX 939 catalyst. Public notice pursuant to Rule 212 is not required because of the following:</p> <ol style="list-style-type: none"> <li>1. 212(c)(1) – The facility is well beyond 1000 feet from the outer boundary of a school as shown in Attachment 3 (aerial view to nearby school).</li> <li>2. 212(c)(2) – The proposed catalyst replacement will not result in any emission increase of air pollutants listed in 212(g).</li> </ol>	

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3. 212(c)(3) –There is no expected increase in calculated health risk from the proposed catalyst replacement.

<b>Rule 401</b>	<b>Visible Emissions</b>	<b>November 9, 2001</b>
<p>This rule prohibits the discharge of emissions from a source for a period or periods aggregating more than three minutes in any one hour with opacity greater than 20%, which is designated as No. 1 on the Ringelmann Chart.</p> <p>Visible emissions from the reformer stack are not expected under normal operations of the reformer furnace and SCR. Continued compliance is expected.</p>		

<b>Rule 402</b>	<b>Nuisance</b>	<b>May 7, 1976</b>
<p>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.</p> <p>Nuisance complaints are not expected under normal operating conditions since the reformer furnace only combust fuel (PSA purge gas and NG) which are extremely low in sulfur and the SCR is tagged with a NH<sub>3</sub> emission limit that is deemed BACT at the time of construction. Continued compliance is expected.</p>		

<b>Rule 404</b>	<b>Particulate Matter - Concentration</b>	<b>February 7, 1986</b>
<p>This rule sets concentration limits for total PM (solid and condensable) emissions. The rule limit varies based on the quantity of exhaust gas (dry basis) discharged from a source and are identified in Table 404(a) of this rule.</p> <p>Using the flue gas volumetric flow rate of ~ 155,000 SCFM (from reformer furnace PC A/N 491312), the concentration limit for compliance is determined to be 0.028 grain/scf (from Table 404(a)). Based on the previous four source test results for the reformer furnace, an averaged PM10 emission of 20.2 lb/day (from Attachment 2) is used to determine compliance:</p> $\text{Emissions Conc.} = \frac{(20.2 \text{ lbs / day})}{(20.9 - 3)} \frac{(20.9)}{(24 \text{ hrs / day})} \frac{(7000 \text{ grains / lb})}{(60 \text{ min / hr})} \frac{(1)}{(155,000 \text{ SCFM})}$ $= 0.0007 \text{ grain/scf, which is } < 0.028 \text{ grain/scf}$ <p>As shown, compliance is demonstrated. Continued compliance is expected because the SCR catalyst replacement is not expected to have any impact on PM10 emissions and is verified by source test pursuant to condition D29.1.</p>		

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<b>Rule 407</b>	<b>Liquid and Gaseous Air Contaminants</b>	<b>May 7, 1976</b>
	<p>This rule limits the CO emissions to 2000 ppmv max and the sulfur content of the exhaust to 500 ppmv for equipment not subject to the emission concentration limits of Rule 431.1, 40 CFR Subpart J, or RECLAIM.</p> <p>Since the primary PSA purge gas fuel is sulfur free and the trim fuel is commercial natural gas (Rule 431.1 compliant), only the 2000 ppmv CO limit of this rule applies. However, a BACT CO emission limit of 10 ppmv was imposed on this furnace when it was constructed in the late 90s under NSR. This is well below this rule's limit of 2000 ppmv CO. Compliance with this rule is expected.</p>	

<b>Rule 409</b>	<b>Combustion Contaminants</b>	<b>August 7, 1981</b>
	<p>This rule contains limit on combustion contaminants from the combustion of fuel of 0.23 gram per cubic meter (0.1 grain per cubic foot) of flue gas (15 minute avg. at 12% CO<sub>2</sub>).</p> <p>Compliance with this limit has been demonstrated by annual source test. Continued compliance is expected.</p>	

<b>Rule 431.1</b>	<b>Sulfur Content of Gaseous Fuels</b>	<b>June 12, 1998</b>
	<p>The purpose of this rule is to reduce SO<sub>x</sub> emissions from the burning of gaseous fuels in stationary equipment.</p> <p>AP Carson uses pipe line quality natural gas from the local utility company for its reformer feed stream and heater which contain sulfur compounds (calculated as H<sub>2</sub>S) below 16 ppmv as stipulated in facility condition F14.1 for compliance with this rule. Continued compliance is expected.</p>	

<b>Rule 474</b>	<b>Fuel Burning Equipment - NO<sub>x</sub></b>	<b>December 4, 1981</b>
	<p>This rule is subsumed by RECLAIM [Rule 2001(j)] for NO<sub>x</sub> RECLAIM facilities such as Air Products Carson.</p>	

<b>REG X</b>	<b>NESHAP</b>	
<b>Part 63</b>	<b>National Emissions Standards for Hazardous Air Pollutants</b>	
<b>Subpart VVVVVV</b>	<b>for Chemical Manufacturing Sources</b>	
	<p>AP Carson is an area source of HAP. Metallic HAP, including nickel and chromium compounds, can potentially be emitted during catalyst changing operations. According to Air Products, catalyst replacement can occur approximately every 3-5 years but the emission of these HAPs is expected to be minimal because they are impregnated in the catalyst substrate and are essentially non-volatile at catalyst loading and operating temperatures. The 400 lb/yr</p>	

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emission threshold in Table 4 of this Subpart is not expected to be breached. Therefore, AP Carson is not subject to any emission limits or performance requirements specified by this subpart. Additionally, the EPA has made an applicability determination and officially notified AP-Carson that this NESHAP for Chemical Manufacturing Area Source does not apply to the catalyst change out activities at the Air Products Carson Plant after the facility submitted its Notification of Compliance for Subpart VVVVVV to the EPA on October 29, 2012. A copy of the applicability determination by the EPA, dated June 24, 2013, is in Attachment 4 for reference.

<b>REG XI</b>	<b>SOURCE SPECIFIC STANDARDS</b>	
<b>Rule 1146</b>	<b>Emissions of Oxides of Nitrogen from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters</b>	<b>September 5, 2008</b>
	<p>This regulation contains NO<sub>x</sub> and CO emission limits for certain boilers, steam generators, and process heaters. According to 1146(b), this rule applies to boilers, steam generators, and process heaters of equal to or greater than 5 million Btu per hour rated heat input capacity used in all industrial, institutional, and commercial operations with the exception of:</p> <ul style="list-style-type: none"> <li>(1) boilers used by electric utilities to generate electricity; and</li> <li>(2) boilers and process heaters with a rated heat input capacity greater than 40 million Btu per hour that are used in petroleum refineries; and</li> <li>(3) sulfur plant reaction boilers.</li> </ul> <p>For CO, this rule specifies the emissions limit to not exceed 400 ppmv. Compliance with this limit has always been met since the reformer furnace also has to comply with the more stringent 10 ppmv BACT limit. Source tests have verified compliance and continued compliance is expected.</p> <p>All NO<sub>x</sub> related requirements of this rule have been subsumed by RECLAIM per 2001(j) for NO<sub>x</sub> RECLAIM facilities such as Air Products Carson.</p>	

<b>REG XIII</b>	<b>New Source Review (NSR)</b>	<b>December 7, 1995</b>
	<p>This rule requires the Executive Officer to deny a Permit to Construct for any new, modified or relocated source which results in an emission increase of any nonattainment air contaminant, any ozone depleting compound, or ammonia, unless BACT is used. This rule also requires modeling and offset (among other requirements) if there is a net increase in any nonattainment air contaminants for any new or modified source. The definition of "Source" in Rule 1302(ao) is "any permitted individual unit, piece of equipment, article, machine, process, contrivance, or combination thereof, which may emit or control an air contaminant. This includes any permit unit at any non-RECLAIM facility and</p>	

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	<p>any device at a RECLAIM facility.</p> <p>The South Coast Air Basin is currently in attainment for NO<sub>2</sub>, SO<sub>2</sub>, CO and PM10, but nonattainment for ozone and PM2.5. The status for lead (for Los Angeles County only) is nonattainment. VOC and NO<sub>x</sub> are precursors for ozone, while VOC, NO<sub>x</sub>, and SO<sub>x</sub> are precursors for PM2.5. Therefore, emissions of NO<sub>x</sub>, SO<sub>x</sub>, PM2.5 and VOC are evaluated for compliance with NSR.</p> <p>As discussed in the Emissions section of this evaluation, the DNX 939 catalyst is expected to perform just as well as the Cormetech CM-33 according to AP Carson and Haldor Topsoe has provided a manufacturer's guarantee that it will control reformer furnace stack emissions to the permit limit of 5 ppmvd NO<sub>x</sub> @ 3% O<sub>2</sub> and 20 ppmvd NH<sub>3</sub> @ 3% O<sub>2</sub>. Hence, no increase in NO<sub>x</sub> and NH<sub>3</sub> emissions is expected from this catalyst replacement and no impact on ROG, CO, SO<sub>x</sub> and PM2.5 emissions is affected by this change. As such, NSR is not triggered by this catalyst replacement.</p>	
<b>1303(a)</b>	<b>BACT</b>	<b>December 6, 2002</b>
	<p>BACT means the most stringent emission limitation or control technique which: (1) has been achieved in practice; or (2) is contained in any State Implementation Plan; or (3) is any other emission limitation or control technique approved by the EO and cost effective as compared to measures listed in the AQMP.</p> <p>The use of SCR with ammonia injection is considered BACT for NO<sub>x</sub> emissions. This 5 ppmvd limit was established at the time of the SCR construction when it was subject to NSR and was considered BACT at the time. Until future modifications trigger NSR again, AP Carson will continue to comply with this BACT limit for NO<sub>x</sub>. Continued compliance is expected.</p>	
<b>1303(b)(1), 1303(b)(2)</b>	<b>Modeling Offsets</b>	<b>December 6, 2002</b>
	As stated earlier, this project is not subject to the Modeling and Offset requirements of REG XIII because there is no emissions increase of air pollutants.	

#### REG XIV

<b>Rule 1401</b>	<b>New Source Review of Toxic Air Contaminants</b>	<b>September 10, 2010</b>
	<p>This rule specifies limits for MICR, cancer burden, and non-cancer acute/chronic hazard index as &lt; 1 in a million, 0.5 and 1.0, respectively, for new permit units, relocations, or modifications to existing permit units which emit toxic air contaminants listed in Table I of this rule.</p> <p>As discussed in the TAC Emissions section of this evaluation, the SCR catalyst</p>	

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contains Vanadium Pentoxide, which is a Rule 1401 TAC. However, this vanadium compound is impregnated into the catalyst and it is not volatile at the operating temperatures for the SCR. The only method by which significant amounts of the Vanadium Pentoxide (VP) could potentially be emitted to the atmosphere is abrasion of the catalyst by solid PM in flue gas. Assuming a 1:1 ratio of PM to VP air borne release, a Tier 2 risk analysis was conducted by AP Carson to demonstrate the associated risk is below the risk threshold in the rule (see Attachment 2). In reality, the amount of VP emissions caused by catalyst abrasion can be expected to be less than the assumed 1:1 ratio.

Ammonia emission (another TAC in Table 1 of this rule) is expected to be well below the 20 ppmvd limit as demonstrated by source tests (see most recent results for test conducted in 2012 in Attachment 5) and will be confirmed by source test within 60 days of startup from the catalyst replacement. Therefore, no quantifiable health impacts from the change in SCR catalysts are expected since no increase in ammonia emission is expected.

**REG XVII**

<b>Rule 1701</b>	<b>Prevention of Significant Deterioration</b>	<b>August 13, 1999</b>
	<p>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 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 NO<sub>2</sub>, SO<sub>2</sub>, and CO.</p> <p>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,” GHG emissions are also subject to PSD in South Coast. These regulations are implemented in the SCAQMD through Rule 1714 – PSD for GHG.</p> <p>This project will not result in an increase of any PSD pollutants, thus the requirements of PSD do not apply.</p>	

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<b>REG XX</b>	<b>RECLAIM</b>	
<b>Rule 2005</b>	<b>New Source Review for RECLAIM</b>	<b>May 6, 2005</b>
	<p>RECLAIM is a market incentive program designed to allow facilities flexibility in achieving emission reduction requirements for NOx and SOx. AP Carson is a NOx Cycle 1 RECLAIM facility in the Coastal zone.</p> <p>The change in catalyst manufacturer is not expected to result in any NOx emissions increase and, therefore, is not subject to the requirements of this rule. Nevertheless, the reformer furnace is equipped with SCR with ammonia injection as BACT for NOx control and will continue to comply with the BACT limit of 5 ppmvd NOx @ 3% O2 established during initial construction of the unit.</p>	
<b>Rule 2012</b>	<b>Requirement for Monitoring, Reporting and Recordkeeping for Oxides of Nitrogen (NOx) Emissions</b>	<b>May 6, 2005</b>
	<p>This rule establishes the monitoring, reporting, and recordkeeping requirements for NOx emissions under the RECLAIM program. The SCR outlet for the reformer heater is equipped with a NOx CEMS and has been recertified by the District.</p> <p>During shutdowns and startups, AP Carson has indicated it utilizes the missing data procedures specified in Chapter 2, Section E, Subparagraph (1)(d) of Rule 2012 Protocol whenever NOx emissions exceeds the 95% upper range of the meter's capability. According to AP Carson, the nature of their shutdown process allows for the SCR to be operational until fuel combustion ceases so it wouldn't normally expect to see values above 95% during such periods.</p> <p>Compliance with this rule is expected.</p>	

<b>REG XXX</b>	<b>TITLE V PERMITS</b>	
<b>Rule 3002</b>	<b>Requirements</b>	<b>November 14, 1997</b>
	<p>The federal Title V permit program is enforced through the District's REG XXX. AP Carson is designated as a Title V facility. The facility's initial Title V permit was issued on 9-4-08 and has an expiration date of 9-3-13. A TV renewal application was submitted on 3/8/13 under A/N 548463. Pursuant to Rule 3002(b), the facility is currently operating under the permit application shield clause of this rule. AP Carson's TV permit renewal is expected to be issued in the first quarter of 2014.</p> <p>The catalyst replacement is not expected to result in any net increase in emissions and meets all the criteria of Rule 3000(b)(12) and Rule 3005(c). Therefore, the issuance of the permit to construct meets all the parameters of a 'minor' permit revision of the Title V permit. As such, public notice is not required but the</p>	

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	proposed permit and evaluation will be submitted to EPA for a 45 review pursuant to REG XXX. Compliance is expected.
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**PART 2      STATE REGULATIONS**

	<b>California Environmental Quality Act (CEQA)</b>
	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. The CEQA Applicability Form submitted by AP Carson indicated this project should not have any adverse impact to the environment. Therefore, a CEQA analysis is not required.

<b>40CFR 64</b>	<b>Compliance Assurance Monitoring (CAM)</b>
	NOx emissions from the Reformer Furnace D30 are subject to a BACT emission limit and are controlled by venting to the subject SCR C32. Pre-control emissions of NOx are greater than the major source threshold. However, compliance with the NOx emission limit is already monitored via a continuous compliance determination method as defined in §64.1 (a RECLAIM NOx CEMS) as specified by a Part 70 Title V permit. Therefore, CAM requirements of 40 CFR Part 64 are not applicable per the exemption in §64.2(b)(vi).

**CONCLUSION**

The catalyst replacement is not expected to result in any increase in criteria, toxics or hazardous air pollutants and the SCR is expected to continue to operate in compliance with all District, State and Federal rules/regulations. Therefore, a Permit to Construct is recommended with the conditions listed on pages 2-4 of this evaluation.

# Attachments

<b>1</b>	<b>Manufacturer's Guarantee Letter from Haldor Topsoe</b>
<b>2</b>	<b>Facility's Reg XIV Risk Analysis</b>
<b>3</b>	<b>Aerial Map of AP Carson</b>
<b>4</b>	<b>40CFR 63 Subpart VVVVVV applicability determination by EPA</b>
<b>5</b>	<b>2012 Source Test Report Summary for D30, C32</b>

# **Attachment 1**

## **Attachment 2**

## **Attachment 3**

# **Attachment 4**

# **Attachment 5**

**End of Evaluation**