



SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

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PERMIT TO OPERATE

COMPANY NAME: BP West Coast Products LLC - Facility ID: 131003

MAILING ADDRESS: P.O. Box 6210
Carson, CA 90749

EQUIPMENT ADDRESS: 2350 East 223rd Street
Carson, CA 90810

Equipment	ID No.	Connected To	RECLAIM Source Type/ Monitoring Unit	Emissions and Requirements	Conditions
Process 13: SULFUR RECOVERY					
System 1: CLAUS SULFUR RECOVERY UNIT "A"					S13.10, S15.30, S18.5, S53.X
FURNACE, MUFFLE, RPV-4146, ACID GAS, NATURAL GAS, PROCESS GAS, WITH WASTE HEAT BOILER, 22.165 MMBTU/HR A/N 397368	D2654	C896 C2406		H2S: 10 PPMV (5) [RULE 468, 10-8- 1976]	
REACTOR, CLAUS A, RPV-4128, HYDROGEN SULFIDE, THREE STAGES, LENGTH: 44 FT 6 IN; DIAMETER: 13 FT A/N 397368	D879				
CONDENSER, SULFUR, RPV-4143, THREE STAGES, SHELL AND TUBE TYPE, LENGTH: 18 FT; DIAMETER: 2 FT 6 IN A/N 397368	D2602				



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CONDENSER, FINAL SULFUR, RPV-4149, SHELL AND TUBE TYPE, LENGTH: 18 FT; DIAMETER: 2 FT 6 IN A/N 397368	D881			H2S: 10 PPMV (5) [RULE 468, 10-8-1976]; HAP: (10) [40CFR63 Subpart UUU, #4, 4-20-2006]; SOX: 250 PPMV (8) [40CFR60 Subpart J, 6-24-2008]; SOX: 500 PPMV (5)[RULE 407, 4-2-1982]	E193.6
TANK, SULFUR DEGASSING, RW-6844 PRESSURIZED WITH TWO SULFUR CIRCULATION PUMPS; VENTED TO TAIL GAS UNIT, LENGTH: 13 FT 6 IN; DIAMETER: 6 FT 6 IN A/N 397368	D2645	C896 C2406		H2S: 10 PPMV (5) [RULE 468, 10-8-1976]	D182.5
KNOCK OUT POT, RPV 4125, <u>SOUTH AREA</u> , ACID GAS COMMON TO CLAUS PLANTS A, B, C, & D, HEIGHT: 12 FT; DIAMETER: 4 FT 6 IN A/N 397368	D877				
KNOCK OUT POT, RPV 4126, <u>NORTH AREA</u> , ACID GAS COMMON TO CLAUS PLANTS A, B, C, & D, HEIGHT: 12 FT; DIAMETER: 4 FT 6 IN A/N 397368	D878				
VESSEL, COS/CS2 CONVERTER, "A", RPV-4134, LENGTH: 19 FT; DIAMETER: 10 FT A/N 397368	D880				
VESSEL, RPV 5497, FUEL GAS, HEIGHT: 18 FT; DIAMETER: 4 FT A/N 397368	D882				
FUGITIVE EMISSIONS, MISCELLANEOUS A/N 397368	D2613			HAP: (10) [40CFR63 Subpart CC, #5A, 6-23-2003]	H23.3
System 2: CLAUS SULFUR RECOVERY UNIT "B"					S13.10, S15.30, S18.5, S53.X



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FURNACE, MUFFLE, RPV-4147, ACID GAS, NATURAL GAS, PROCESS GAS, WITH WASTE HEAT BOILER, 22.165 MMBTU/HR A/N 397363	D2655	C896 C2406		H2S: 10 PPMV (5) [RULE 468, 10-8-1976]	
REACTOR, CLAUS B, RPV-4130, HYDROGEN SULFIDE, THREE STAGES, LENGTH: 44 FT 6 IN; DIAMETER: 13 FT A/N 397363	D883				
CONDENSER, SULFUR, RPV-4144, SHELL AND TUBE TYPE, LENGTH: 18 FT; DIAMETER: 2 FT 6 IN A/N 397363	D2604				
CONDENSER, FINAL SULFUR, RPV-4150, SHELL AND TUBE TYPE, LENGTH: 18 FT; DIAMETER: 2 FT 6 IN A/N 397363	D885			H2S: 10 PPMV (5) [RULE 468, 10-8-1976]; HAP: (10) [40CFR63 Subpart UUU, #4, 4-20-2006]; SOX: 250 PPMV (8) [40CFR60 Subpart J, 6-24-2008]; SOX: 500 PPMV (5)[RULE 407, 4-2-1982]	E193.6
TANK, SULFUR DEGASSING, RW-6842, PRESSURIZED WITH TWO SULFUR CIRCULATION PUMPS; VENTED TO TAIL GAS UNIT, LENGTH: 13 FT 6 IN; DIAMETER: 6 FT 6 IN A/N 397363	D2646	C896 C2406		H2S: 10 PPMV (5) [RULE 468, 10-8-1976]	D182.5
KNOCK OUT POT, RPV 4125, SOUTH AREA, ACID GAS COMMON TO CLAUS PLANTS A, B, C, & D, HEIGHT: 12 FT; DIAMETER: 4 FT 6 IN A/N 397368	D877				
KNOCK OUT POT, RPV 4126, NORTH AREA, ACID GAS COMMON TO CLAUS PLANTS A, B, C, & D, HEIGHT: 12 FT; DIAMETER: 4 FT 6 IN A/N 397368	D878				



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<p>VESSEL, COS/CS2 CONVERTER, RPV-4135, LENGTH: 19 FT; DIAMETER: 10 FT</p> <p>A/N 397363</p>	D884				
<p>FUGITIVE EMISSIONS, MISCELLANEOUS</p> <p>A/N 397363</p>	D2614			HAP: (10) [40CFR63 Subpart CC, #5A, 6-23-2003]	H23.3
<p>Process 13: SULFUR RECOVERY</p> <p>System 3: CLAUS SULFUR RECOVERY UNIT "C"</p>					
					S13.10, S15.30, S18.5, S53.X
<p>FURNACE, MUFFLE, RPV-4148, ACID GAS, NATURAL GAS, PROCESS GAS, OXYGEN ENRICHMENT, WITH WASTE HEAT BOILER, 29 MMBTU/HR</p> <p>A/N 461441</p>	D2656	C896 C2406		H2S: 10 PPMV (5) [RULE 468, 10-8-1976]	
<p>REACTOR, CLAUS C, RPV-4132, HYDROGEN SULFIDE, THREE STAGES, LENGTH: 44 FT 6 IN; DIAMETER: 13 FT</p> <p>A/N 461441</p>	D886				
<p>CONDENSER, SULFUR, RW-6687, SHELL AND TUBE TYPE, LENGTH: 18 FT; DIAMETER: 2 FT 6 IN</p> <p>A/N 461441</p>	D2605				
<p>CONDENSER, FINAL SULFUR, RW-6688, SHELL AND TUBE TYPE, LENGTH: 18 FT; DIAMETER: 2 FT 6 IN</p> <p>A/N 461441</p>	D889			H2S: 10 PPMV (5) [RULE 468, 10-8-1976]; HAP: (10) [40CFR63 Subpart UUU, #4, 4-20-2006]; SOX: 250 PPMV (8) [40CFR60 Subpart J, 6-24-2008]; SOX: 500 PPMV (5)[RULE 407, 4-2-1982]	E193.6



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TANK, SULFUR DEGASSING, RW-6845, PRESSURIZED WITH TWO SULFUR CIRCULATION PUMPS; VENTED TO TAIL GAS UNITS, LENGTH: 13 FT 6 IN; DIAMETER; 6 FT 6 IN A/N 461441	D888	C896 C2406		H2S: 10 PPMV (5) [RULE 468, 10-8-1976]	D182.5
KNOCK OUT POT, RPV 4125, <u>SOUTH AREA</u> , ACID GAS COMMON TO CLAUS PLANTS A, B, C, & D, HEIGHT: 12 FT; DIAMETER: 4 FT 6 IN A/N 397368	D877				
KNOCK OUT POT, RPV 4126, <u>NORTH AREA</u> , ACID GAS COMMON TO CLAUS PLANTS A, B, C, & D, HEIGHT: 12 FT; DIAMETER: 4 FT 6 IN A/N 397368	D878				
FUGITIVE EMISSIONS, MISCELLANEOUS A/N 461441	D2675			HAP: (10) [40CFR63 Subpart CC, #5A, 6-23-2003]	H23.3
System 4: CLAUS SULFUR RECOVERY UNIT "D"					S13.10, S15.30, S18.5, S53.X
KNOCK OUT POT, RPV 5438, AMINE ACID, HEIGHT: 16 FT 6 IN; DIAMETER: 5 FT A/N 461442	D890				
VESSEL, CATALYTIC CONVERTER, RPV 5439, HEIGHT: 44 FT; DIAMETER: 12 FT A/N 461442	D891				
REACTOR, RW-0005440.01, REACTION FURNACE, HYDROGEN SULFIDE, OXYGEN INJECTION, WITH ONE BABCOCK DUKER SIZE 300 BURNER A/N 461442	D892				



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<p>PIT, ACCUMULATOR, SULFUR, 130 LONG TONS CAPACITY, WIDTH: 8 FT; DEPTH: 14 FT 8 IN; LENGTH: 38 FT</p> <p>A/N 461442</p>	<p>D893</p>	<p>C910 C2413</p>		<p>H2S: 10 PPMV (5) [RULE 468, 10-8-1976]; HAP: (10) [40CFR63 Subpart UUU, #4, 4-20-2006]; SOX: 500 PPMV (5)[RULE 407, 4-2-1982]</p>	
<p>CONDENSER, SHELL AND TUBE, RPV-5448, NO. 4 SULFUR FINAL, LENGTH: 15 FT; DIAMETER: 2 FT 8 IN</p> <p>A/N 461442</p>	<p>D894</p>			<p>H2S: 10 PPMV (5) [RULE 468, 10-8-1976]; HAP: (10) [40CFR63 Subpart UUU, #4, 4-20-2006]; SOX: 250 PPMV (8) [40CFR60 Subpart J, 6-24-2008]; SOX: 500 PPMV (5) [RULE 407, 4-2-1982]</p>	
<p>CONDENSER, SHELL AND TUBE TYPE, RPV-5442, NO. 1, SULFUR, "D", LENGTH: 18 FT; DIAMETER: 2 FT 6 IN</p> <p>A/N 461442</p>	<p>D2606</p>				
<p>CONDENSER, SHELL AND TUBE TYPE, RPV-5444, NO. 2, SULFUR, "D", LENGTH: 18 FT; DIAMETER: 2 FT 6 IN</p> <p>A/N 461442</p>	<p>D2607</p>				
<p>CONDENSER, SHELL AND TUBE TYPE, RPV-5446, NO. 3, SULFUR, "D", LENGTH: 18 FT; DIAMETER: 2 FT 6 IN</p> <p>A/N 461442</p>	<p>D2608</p>				
<p>FUGITIVE EMISSIONS, MISCELLANEOUS</p> <p>A/N 461442</p>	<p>D2615</p>			<p>HAP: (10) [40CFR63 Subpart CC, #5A, 6-23-2003]</p>	<p>H23.3</p>
<p>KNOCK OUT POT, RPV 4125, SOUTH AREA, ACID GAS COMMON TO CLAUS PLANTS A, B, C, & D, HEIGHT: 12 FT; DIAMETER: 4 FT 6 IN</p> <p>A/N 397368</p>	<p>D877</p>				



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KNOCK OUT POT, RPV 4126, NORTH AREA, ACID GAS COMMON TO CLAUS PLANTS A, B, C, & D, HEIGHT: 12 FT; DIAMETER: 4 FT 6 IN A/N 397368	D878				
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BACKGROUND

The purpose of this evaluation is convert Permits to Construct (PC), issued for Claus Units "A", "B", "C", and "D" into Permits to Operate (PO). This equipment is listed under Process 13, Systems 1, 2, 3, and 4 of the Title V permit issued to BP West Coast Products LLC (Facility ID 131003). A Title V permit was issued to this facility on September 1, 2009. The applications under which open Permits to Construct have been issued for these systems, are as follows: Claus Unit "A" – 397368, 337455; Claus Unit "B" – 397363, 337456; Claus Unit "C" – 461441, 397365, 337454; and Claus Unit "D" – 461442, 337457. The modifications associated with each application are discussed in the table below. A further reason for this conversion is the elimination of condition E193.6. This condition was intended to be temporary, until it was verified that the subject modifications did not result in exceedance of regulatory limitations. Elimination of this condition is discussed in the following section, "Process Description." In each case (i.e. for each open PC) the subject modifications have been completed and the equipment has been found to be in compliance with all applicable permit conditions. Attachment #1 is a report for a site visit, conducted on January 14, 2010, to verify that equipment construction was in accord with the issued PCs and to verify compliance with PC conditions.

BP submitted A/N 500263, 500264, 500265, 500266 and 500267 for Change of Condition, seeking amendment of condition S15.30. These applications have been cancelled and the requested permit change is incorporated in this evaluation. As currently written, condition S15.30 requires that vent gas from the sulfur recovery units (Claus Units) first be vented to Tail Gas Unit Nos. 1 or 2, then to Incinerators Nos. 1 or 2 (Thermal Oxidizers, device IDs C910 and C2413), at all times except during emergency. Amendment of the condition is sought to allow venting of Claus Units, directly to Incinerators Nos. 1 or 2, during startup or shutdown. This permit change is sought because in practice the Claus Units vent directly to the incinerators during startup/shutdown. This is required because during startup the vent stream from the Claus Units has oxygen and would degrade/contaminate the amine in the Tail Gas Units, if vented there. Therefore, during a portion of the startup procedure of Claus Units, the Tail Gas Units must be bypassed and the vent gas sent directly to Incinerators No. 1 or 2. BP has submitted SO₂ emissions data, which indicates that during periods of Tail Gas Unit bypass, emissions do not exceed the previously calculated potential-to-emit for the Claus Units. This permit amendment does not result in an increase in criteria or hazardous air pollutant emissions.



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BP filed A/N 435125 for an Administrative Change to Claus Unit "A". The amendment sought is to describe device ID D877 - Knock Out Pot - as a South Area Knock Out Pot and to describe device ID D878 - Knock Out Pot - as a North Area Knock Out Pot. A/N 435125 has been cancelled and these Administrative Changes are incorporated in this evaluation. The equipment description, shown above, includes these changes.

The application/permit history of this equipment follows below:

Application No.	Process No.	System No.	Previous P/O	Date	Permit History
397368	13	1	435135/Cancelled 397368/PC 337455/PC C03141/P66971	6/12/2002 6/5/98 7/20/76	<p>A/N 435135 was filed for an Administrative Change. This application was cancelled and the requested permit amendments are being implemented under this evaluation.</p> <p>A PC was issued for Claus Unit "A" on June 12, 2002, under A/N 397368. Under this application, this equipment was modified by removal of an existing storage pit, addition of a pressurized degassing tank, and sweeping of vent gas from the tank to tail gas unit Nos. 1 and 2.</p> <p>Under A/N 337455 a PC was issued for this equipment on June 5, 1998. This application involved modification of Claus Unit "A" by connection to a new tail gas unit.</p> <p>Previously, the equipment was permitted under Permit No. P66971 (A/N C03141) issued on July 20, 1976. Under this application, the original Permit to Operate was issued.</p>
397363	13	2	397363/PC 337456/PC C03243/P66973	6/12/2002 6/5/98 7/20/76	<p>A PC was issued for Claus Unit "B" on June 12, 2002, under A/N 397363. Under this application, this equipment was modified by removal of an existing storage pit, addition of a pressurized degassing tank, and sweeping of vent gas from the tank to tail gas unit Nos. 1 and 2.</p> <p>Under A/N 337456 a PC was issued for this equipment on June 5, 1998. This application involved modification of Claus Unit "B" by connection to a new tail gas unit.</p> <p>Previously, the equipment was permitted under Permit No. P66973 (A/N C03243) issued on July 20, 1976. Under this application, the original Permit to Operate was issued.</p>
461441	13	3	461441/PC 397365/PC 337454/PC C03244/P66974	8/1/07 6/12/02 6/5/98 7/20/76	<p>A PC was issued for Claus Unit "C" on August 1, 2007, under A/N 461441. Under this application, the unit was modified for oxygen enrichment, which involves injection of oxygen into the combustion air line of the Muffle</p>



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					<p>Furnace (D2656). This enables the unit to operate continuously at its design sulfur recovery capacity.</p> <p>A PC was issued for Claus Unit "C" on June 12, 2002, under A/N 397365. Under this application, this equipment was modified by removal of an existing storage pit, addition of a pressurized degassing tank, and sweeping of vent gas from the tank to tail gas unit Nos. 1 and 2.</p> <p>Under A/N 337454 a PC was issued for this equipment on June 5, 1998. This application involved modification of Claus Unit "C" by connection to a new tail gas unit.</p> <p>Previously, this equipment was permitted under Permit No. P66974 (A/N C03244) issued on July 20, 1976. Under this application, the original Permit to Operate was issued.</p>
461442	13	4	461442/PC 337457/PC 193665/D72519	9/6/07 6/5/98 4/20/93	<p>A PC was issued for modification of Claus Unit "D" on September 6, 2007, under A/N 461442. Under this application the unit was modified for oxygen injection, which involves injection of oxygen into the burner of the reaction furnace (D892). This enables the unit to operate continuously at its design sulfur recovery capacity.</p> <p>Under A/N 337457, Claus Unit "D" was modified by connection to the new Tail Gas Unit.</p> <p>Previously, this equipment was permitted under Permit No. D72519 (A/N 193665) issued on April 20, 1993. It is under this application that the equipment was originally constructed.</p>

Based on a review of District records, there have been no Notices of Violation (NOV) or Notices to Comply (NTC) issued for the subject equipment over the past three years.

PROCESS DESCRIPTION

Offgases, or Acid Gases, from MDEA Regeneration Units are composed mostly of H₂S and are sent to the Sulfur Plant. Certain refinery process water streams which have absorbed H₂S and NH₃, known as sour water, are sent to the Sulfur Plant via tanks TK 710 and TK 774. Sour water is stripped of H₂S and NH₃ at the sour water strippers and these vent gases are also sent to the Sulfur Plant.

The Sulfur Plant is used to convert H₂S and NH₃ rich acid gases into elemental sulfur, water and nitrogen via a partial combustion (Claus) reaction. H₂S and NH₃ are burned in the Claus



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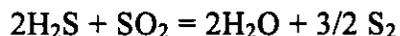
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Plant muffle furnace and reacted to form elemental sulfur and water. Natural gas is used in the reactor to combust H₂S. One third of H₂S is converted to SO₂ (sulfur dioxide) and water. This results in an optimum ratio of H₂S:SO₂ for conversion to elemental sulfur. The reaction of H₂S and SO₂ to form elemental sulfur, is shown in the following equation:



Further Claus reactions occur in three catalytic converters, to achieve greater sulfur conversion. The District guidelines require that Claus units achieve minimum sulfur conversion efficiency of 95%.

Tail gas from the Claus Units is directed to one of two Tail Gas Units, where SO₂ (which is not converted to sulfur in the Claus Plant) is converted to H₂S in the presence of a cobalt/molybdenum catalyst. The H₂S is absorbed in an amine solution, then stripped off and recycled back to the Claus Units. The vent stream from the Tail Gas Units is very low in H₂S content and is fed to the tail gas incinerators (thermal oxidizers, devices C910 and C2413) for destruction. Recovered sulfur is collected in either pressure vessels (in Claus Units "A", "B", "C") or in an accumulator pit (in Claus Unit "D"). Molten sulfur is pumped to Tanks 619 and 620 for storage, prior to loading into transportation trucks.

Claus Units "A", "B", and "C" were constructed in 1973, while Claus Unit "D" was constructed in 1988. These units vent to two Tail Gas Units, designated No. 1 and No. 2. During normal operation Claus Units "A" and "D" vent to Tail Gas Unit No. 2 and Claus Units "B" and "C" Vent to Tail Gas Unit No. 1. Claus Units "A" and "B" each has a sulfur production capacity of 89.4 long tons per day, "C" has a capacity of 120.33 long tons per day, while Claus Unit "D" has a permitted capacity of 150.2 long tons per day. Under A/N 397363, 397365, and 397368, Claus Units "A", "B", and "C" were modified by replacement of the sulfur storage pits with pressurized sulfur storage vessels. Sulfur vapor from these storage vessels are swept to Tail Gas Units No. 1 or No. 2. Each storage vessel has a diameter of 6 feet 6 inches and length of 13 feet 6 inches. The vessels are steam jacketed and insulated and are each equipped with two pumps for transfer of molten sulfur to storage tanks (Tanks 619 and 620) and for re-circulation. The pumps, which are driven by 10 HP motors, can transfer 50 gpm of molten sulfur at a pressure of 65 psi. At design conditions for each Claus unit, approximately 10 to 12 gpm of sulfur is transferred to storage tanks and 40 gpm of sulfur is recirculated to the pressurized vessels for degassing. This is expected to reduce H₂S dissolved in liquid sulfur, from approximately 300 ppm down to 50 ppm. This project was required under the Consent Decree (CD) between BP West Coast Products LLC and the USEPA, lodged on January 18, 2001.

More recently (under A/Ns 461441 and 461442) Claus Units "C" and "D" were modified for oxygen enrichment and oxygen injection, respectively, to enable these sulfur recovery units to operate continuously at their permitted capacities (rather than intermittently as previously



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experienced). This involves either injection of oxygen directly into the burner of the Claus reactor furnace (oxygen injection), or mixing of oxygen with combustion air of the Claus reactor furnace (oxygen enrichment). The modifications are expected to result in overall sulfur conversion of 98% by these Claus Units, exceeding the District BACT requirement of 95% minimum conversion efficiency.

Under A/Ns 397363, 397365, and 397368, permit condition E193.6 was added to the facility permit. This condition limits concentrations of H₂S and SO₂, at the outlet of Claus Unit condensers (devices D881, D885, and D889) to 1.69% and 0.81%, respectively. The condition also requires continuous monitoring of these pollutants and averaging over 60 minutes. Attachment #7 shows these data over a one year period. Limiting H₂S/SO₂ to these levels was expected to result in continued compliance with NSPS Subpart J requirements (limitation of exhaust of Tail Gas Units to 300 ppm Total Reduced Sulfur, calculated as SO₂ at 0% excess air and averaged over 12 hours, and limitation of Tail Gas Incinerators to 250 ppm SO₂ @ 0% excess air, averaged over 12 hours). The BP permit contains both limitations, since the thermal oxidizers receive vent gas from sources other than the Claus Units (e.g. process waste gas, loading and storage vent gas). Condition E193.6 was intended as a temporary condition, to be retained in the permit until the Total Reduced Sulfur compound analyzers were on-line to verify that the NSPS Subpart J limit is met. The facility has, for the past several years, maintained the TRS analyzers in operation. Attachments #2 has TRS and SO₂ concentrations (12-hour averages) for Tail Gas Unit No. 1 and No. 2 for a one year period (September 1, 2008 to September 1, 2009). These data show that these limitations are consistently met, except during one malfunction event for each Tail Gas Unit during this year-long period. BP has submitted Startup, Shutdown, and Malfunction Report Forms indicating that the malfunctions were as follows: quench pump on Tail Gas Unit No. 2 failed (resulting in SO₂ exceedance of Tail Gas No. 1 on January 13, 2009) and heat stable salts formed in the amine of Tail Gas Unit No. 2 (resulting in SO₂ exceedance of Tail Gas No. 2 on June 17, 2009). Since TRS and SO₂ data submitted indicate consistent compliance with the NSPS Subpart J limitations, condition E193.6 may now be eliminated from the permit.

The source test required by condition D182.5 has been completed (see Attachment #3). The purpose of this test was to verify that sulfur vapors were effectively swept from sulfur storage/degassing tanks (devices D888, D2645, and D2646). Testing included measurement of Total Sulfur, as H₂S, both in the vent gas and dissolved in liquid sulfur at the inlet and outlet of tanks serving Claus Units "A", "B", and "C". The results do not conclusively show that effectiveness of the degassing function of the subject tanks. However, repeating of the source test, which involves temporary venting of tail gas to atmosphere and may be dangerous to testing personnel, may not yield more clear-cut results. Therefore, the District accepts the results of the August, 2005 source test as meeting the requirements of condition D182.5.

Most recently, BP submitted A/Ns 500263, 500264, 500265, 500266 and 500267 for Change of Condition, seeking amendment of condition S15.30. As currently written, the condition



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requires that vent gas from the sulfur recovery units (Claus Units) first be sent to Tail Gas Unit Nos. 1 or 2, then to Incinerators Nos. 1 or 2 (Thermal Oxidizers C910 or C2413), at all times except during emergency. Amendment of the condition is sought to allow venting of Claus Units directly to Incinerators Nos. 1 or 2, during startup or shutdown. This permit change is sought because in practice the Claus Units are vented directly to the incinerators during startup/shutdown. This is required because during startup, the vent stream from the Claus Units has oxygen which would degrade/contaminate the amine in the Tail Gas Units, if vented there. Therefore, during a portion of the startup process of Claus Units, the Tail Gas Units must be bypassed and the vent gas sent directly to Incinerators No. 1 and 2. Failure to bypass the Tail Gas Unit during Claus Unit startup, can result in sulphation of the catalyst in the Tail Gas Unit reactor bed as well as heat stable salt formation in the Gas Absorber Tower. This condition degrades the amine and can result in plugging of the packing in the tower. The Claus Unit is switched to venting to the Tail Gas Unit, when the muffle furnace runs at no excess oxygen (i.e. achieves stoichiometric operation), which ensures that the oxygen is consumed before it reaches the Tail Gas Unit. BP operations personnel determine this by taking samples for oxygen concentration measurement at the back end of the last reactor.

Permit condition S53.X is added to address requirements during startup and shutdown of the Claus Units. This condition states that during periods of Tail Gas Unit bypass, the Claus Units may not process sour/acid gas. Sour/acid gas is processed in the Claus Units, only when they are lined up to Tail Gas Unit No. 1 or 2. This condition is consistent with a variance condition, associated with the variance granted under Case No. 5357-61.

Under the normal operating schedule, the equipment operates 52 weeks per year, 7 days per week, and 24 hours per day.

EMISSIONS

The modifications of Claus Units "A", "B", "C", and "D", which are the subject of this evaluation, did not result in an increase in criteria pollutant or toxic air contaminant emissions. The potential-to-emit of SO₂ from these units was calculated previously, under A/Ns 397363, 397365, and 397368, and 461441/461442. These data are summarized below.



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Potential-to-Emit for SO₂ from Claus Units

SO ₂ Emissions	Claus Unit "A"	Claus Unit "B"	Claus Unit "C"	Claus Unit "D"
Uncontrolled Emissions				
Hourly (lbs/hr)	330	308	359	397
Daily (lbs/day)	7,920	7,392	8,616	9,528
Controlled Emissions				
Hourly (lbs/hr)	16.50	15.38	17.88	19.83
Daily (lbs/day)	396	369	429	476

Note: Uncontrolled emissions are based on 95% conversion efficiency.

BP has submitted SO₂ emissions data for startup of each Claus Unit (which includes periods of Tail Gas Unit bypass). Attachment #4 is an e-mail message from BP, followed by SO₂ emissions data. The data are summarized below. The measured SO₂ emissions during periods of bypass of the Tail Gas Unit are shown as shaded in Attachment #4.

SO₂ Emissions Measured for Days of Startup of Claus Units (lbs/day)

Measured SO ₂ Emissions	12/11/06	12/12/06	5/29/08	5/30/08	4/20/06	4/21/06	10/30/04	10/31/04
A Claus	229	386						
B Claus			173	172				
C Claus					191	435		
D Claus							64	220

The data show that there is no spike in SO₂ emissions during periods of Tail Gas Unit bypass. In fact in only one case were the measured emissions exceeding the calculated potential-to-emit (C Claus – April 21, 2006). The data in Attachment #4 from this date indicate that elevated SO₂ emissions were not observed during the period of bypass of the Tail Gas Unit. Further, according to the evaluation under A/N 397363, the incinerators (thermal oxidizers) from which SO₂ emissions are measured, also receive process waste gas, loading and storage vent gas (in addition to the vent gas from Claus Units) which contribute to the SO₂ emissions recorded from these incinerators.

Attachment #5 includes additional SO₂ emissions data from Tail Gas Unit #2, obtained during a sulfur recovery unit shutdown from January through March, 2008. The SO₂ emissions measured during shutdown and startup of the sulfur recovery unit (i.e. the time immediately preceding shutdown and the time immediately following startup) do not show a spike in SO₂ emissions (when any bypass could have occurred). In the three days immediately preceding shutdown of the sulfur recovery units, the measured SO₂ emissions ranged from 48 to 248 lbs/day and in the three days immediately following startup, the measured SO₂ emissions ranged from 71 to 78 lbs/day. BP states that startup of a sulfur recovery unit can typically occur within one day, but may take as long as two days.



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Based on the data submitted, bypass of Tail Gas Units during Claus Unit startup/shutdown is not expected to result in SO₂ emissions exceeding the previously calculated potential-to-emit. Therefore, amendment of condition S15.30 is not expected to result in an increase in criteria or toxic air contaminant emissions.

RULE EVALUATION

CEQA – California Environmental Quality Act

Under CEQA, a significant project is one associated with the emissions levels stated below, during the operation phase of the project:

CO 550 lbs/day
VOC 55 lbs/day
NOx 55 lbs/day
SOx 150 lbs/day
PM10 150 lbs/day

The project does not have a potential for a significant environmental impact. A CEQA analysis, in the form of an Environmental Impact Report (EIR), is not required since there is no increase in emissions of any criteria air pollutants and there are no other significant environmental impacts.

Rule 212 – Standards for Approving Permits

This rule requires public noticing for a modification or a new source located within 1000 feet of a school, if the project results in a Maximum Individual Cancer Risk (MICR) of 1×10^{-6} or greater during a lifetime (70 years), or if the project results in an emissions increase exceeding limits stated in Rule 212(g). The equipment is not within 1000 feet of a school, there will be no emissions increase exceeding the limits stated in 212(g) and the subject projects do not have the potential to increase TAC emissions, therefore a screening Health Risk Assessment (HRA) is not required. Therefore, public notice requirement under Rule 212 is not triggered.

Rule 401 – Visible Emissions

Operation of Claus Units “A”, “B”, “C” and “D” is not expected to result in emissions with a shade as dark as or darker than that designated Ringelmann No. 1, by the US Bureau of Mines, for a period of 3 minutes in any hour. Compliance with this rule is expected.

Rule 402 – Nuisance

Operation of Claus Units “A”, “B”, “C” and “D” is not expected to result in a public nuisance. These units function to recover H₂S and NH₃, thereby reducing or eliminating pollutants which may be a source of nuisance. Further, for Claus Units



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“A”, “B” and “C” the sulfur pits were replaced with a pressure vessels with closed vent system, such that H₂S emissions are controlled from these storage devices. Compliance with this rule is expected.

Rule 404 – Particulate Matter - Concentration

This rule limits particulate matter concentration to a maximum of 0.196 grains per cubic foot. Operation of Claus Units “A”, “B”, “C” and “D” is not expected to result in particulate matter emissions in excess of the limit stated in this rule. Attachment #6 has source testing results for incinerator C2413, for a test conducted on November, 3, 1999. An average particulate matter concentration of 0.00682 grains/dscf was determined in this test. Compliance with this rule is expected.

Rule 407 – Liquid and Gaseous Air Contaminants

This rule limits emissions of carbon monoxide (CO) to 2000 ppm, measured on a dry basis and averaged over 15 minutes and emissions of sulfur, calculated as sulfur dioxide (SO₂) and averaged over 15 minutes, to 500 ppm. Since the BP Carson Refinery is a part of the District’s RECLAIM program for SO_x, the sulfur dioxide limit stated in this rule does not apply to the Claus Units. The November, 3, 1999 test of incinerator C2413 determined an average CO concentration of 52.4 ppmv @ 3% O₂. Compliance with the CO concentration limit of this rule is expected.

Rule 468 – Sulfur Recovery Units

This rule states requirements for sulfur recovery units including that they not emit sulfur compounds expressed as SO₂ of 500 ppm or more averaged over 15 consecutive minutes, hydrogen sulfide of 10 ppm or more averaged over 15 consecutive minutes, and 198.5 pounds per hour of sulfur compounds expressed as sulfur dioxide. Since the BP Carson Refinery is a SO_x RECLAIM facility, rule requirements limiting sulfur dioxide emissions do not apply. Hydrogen sulfide is combusted by tail gas incinerators to SO_x. Therefore, H₂S concentration in the tail gas incinerator stack is expected to be below 10 ppm. The November, 3, 1999 source test of incinerator C2413 determined an average H₂S concentration of 0.68 ppm @ 3% O₂. Continued compliance with this rule is expected.

Reg. IX - New Source Performance Standards

Claus Units “A”, “B”, “C” and “D” are subject to New Source Performance Standards (NSPS) under 40 CFR 60, Surpart J. This regulation is applicable to Claus units with a capacity of 20 long tons per day or more, which were constructed or modified after October 4, 1976. The applicability of the regulation is through a Consent Decree, which resulted from a settlement reached between BP Carson Refinery and EPA in 2001. This regulation limits SO₂ emissions to 250 ppm (dry basis, at zero percent excess air) at Tail Gas Unit Incinerators No. 1 and 2. However, at BP the incinerators receive vent gases from other sources, beside the tail gas from



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the Claus Units (e.g. process waste gas, loading and storage vent gas). Therefore, the facility has agreed to also comply with a limit of 300 ppm Total Reduced Sulfur (calculated as ppm SO₂, dry basis, at zero percent excess air), at the discharge overhead of the amine absorber, in addition to the 250 ppm SO₂ limit at the incinerator stack. BP continues to monitor both the SO₂ emissions from Tail Gas Incinerators No. 1 and 2 and Total Reduced Sulfur compound emissions at the outlet of Tail Gas Unit absorbers, with continuous analyzers. Monitoring indicates continued compliance with both limits (note: Attachment #2 has one year of TRS/SO₂ data showing compliance).

Reg. XIII - New Source Review:

This rule has requirements for the utilization of Best Available Control Technology (BACT), providing emissions offsets for an increase in emissions, and performing air quality modeling to assess the impacts of the project on ambient air quality. Since the subject projects do not result in increase in criteria pollutants, they are exempt from the requirements of this rule.

Rule 1401 – New Source Review of Carcinogenic Air Contaminants

This rule has requirements including that the Maximum Individual Cancer Risk (MICR) associated with the project be under 1×10^{-6} if T-BACT is not used, or 10×10^{-6} if T-BACT is applied, that the hazard indices be less than 1.0 and the cancer burden be under 0.5. The subject projects do not have the potential to increase TAC emissions and are therefore exempt from the requirements of this rule (Section 1401(g)(1)(B)).

Reg XVII – Prevention of Significant Deterioration

This regulation applies to emissions of pollutants for which compliance with ambient air standards has been attained in the South Coast Air Basin. These include NO₂, SO₂, CO and lead. The subject projects do not result in an increase in the emissions of these pollutants and therefore the projects are not subject to the requirements of this regulation.

Reg. XX - RECLAIM

This facility is subject to Reg. XX, RECLAIM with respect to NO_x and SO_x emissions. The subject projects do not impact emissions of these pollutants, and therefore there are no additional requirements for Claus Units "A", "B", "C" and "D" under this regulation.

Reg. XXX - TV Operating Permits

The facility is subject to Reg XXX and a Title V permit was issued on September 1, 2009. The project is a Significant Permit Revision of the Title V permit since it involves removal of permit condition requiring continuous pollutant measurement

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(condition E193.6). As a Significant Permit Revision, the project is subject to a 30 day public notice and a 45 day EPA review and comment period.

Rule 3006 addresses public notice requirements. It requires that a public notice be published in a newspaper serving the county where the source is located, or that a notice be sent by mail to those who request in writing to be on a list, and any other means as determined by the Executive Officer to ensure adequate notice to the affected public. This rule requires that the notice contain the following:

- i) The identity and location of the affected facility;
- ii) The name and mailing address of the facility's contact person;
- iii) The identity and address of the South Coast Air Quality Management District as the permitting authority processing the permit;
- iv) The activity or activities involved in the permit action;
- v) The emissions change involved in any permit revision;
- vi) The name, address, and telephone number of a person whom interested persons may contact to review additional information including copies of the proposed permit, the application, all relevant supporting materials, including compliance documents as defined in paragraph (b)(5) of Rule 3000, and all other materials available to the Executive Officer which are relevant to the permit decision;
- vii) A brief description of the public comment procedure; and,
- viii) The time and place of any proposed permit hearing which may be held or a statement of the procedure to request a proposed permit hearing if one has not already been requested.

The District plans to meet all public notice and EPA review and comment requirements for this project. Compliance with this regulation is expected.

40 CFR 63, Subpart CC, NESHAPs for Petroleum Refineries

This regulation has requirements for fugitive components in organic Hazardous Air Pollutant (HAP) service. This project does not involve an emissions increase of HAPs and therefore, there are no new requirements for Claus Units "A", "B", "C" and "D" under this regulation.

40 CFR 63, Subpart UUU, NESHAPs for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units

This regulation is applicable to petroleum refineries which are major HAP sources (defined as having an annual potential-to-emit of 10 tons of a single HAP or 25 tons of a combination of HAPs). BP Carson refinery is subject to the requirements of this regulation. Affected equipment include vents from Claus Units (or other sulfur recovery units) and tail gas treatment units serving sulfur recovery plants. Requirements are stated for process vents from Claus Units and Tail Gas Treatment



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Units serving sulfur recovery plants. For sulfur recovery units subject to the NSPS for sulfur oxides, the facility must meet the NSPS emissions limit (i.e. 250 ppm SO₂, dry basis, at zero percent excess air; or 300 ppm Total Reduced Sulfur compounds, expressed as SO₂ concentration, dry basis, at zero percent oxygen). An operation, maintenance and monitoring plan must be implemented to include process and control device parameters to be monitored, along with established operating limits, and procedures for monitoring emissions and process and control device operating parameters. Demonstration of initial compliance and continuous compliance with emissions limits and work practice standards is required. Continuous monitoring systems are required to either measure and record the hourly average SO₂ concentration (dry basis at zero percent excess air) for each stack, or hourly reduced sulfur concentration, calculated as SO₂ on a dry basis at zero percent excess air (for TRS systems). Further requirements include determining 12-hour rolling average concentration limits, maintaining 12-hour rolling average concentrations below applicable limits, and reporting 12-hour rolling average concentrations which exceed the limit, in compliance reports. Submittal of a notification of compliance status, including results of initial compliance demonstration, is also required.

The BP Carson Refinery operates continuous monitors for SO₂ concentration at the Tail Gas Unit incinerators to show compliance with the requirements of this regulation. The facility has reported concentrations, exceeding the regulatory limit, to the EPA. Continued compliance with this regulation is expected.

RECOMMENDATION:

Issue the Permit to Operate with the following conditions:

S13.10 All devices under this system are subject to the applicable requirements of the following rules or regulations:

<u>Contaminant</u>	<u>Rule</u>	<u>Rule/Subpart</u>
SOX	40CFR60, SUBPART	J

[40CFR 60 Subpart J, 6-24-2008]

[Systems subject to this condition: Process 13, System 1, 2, 3, 4]

S15.30 The vent gases from all affected devices of this process/system shall be vented as follows:



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All tail gas from the sulfur recovery unit(s) shall be vented to the tail gas unit No. 1 or No. 2 followed by incinerator No. 1 or No. 2 ~~at all times except during emergency~~ during normal operation. The sulfur recovery unit(s) may bypass tail gas unit No. 1 or No. 2 and vent directly to incinerator No. 1 or No. 2, only during startup/shutdown or emergency. Sour gas or tail gas shall be vented to the flare only during emergency.

All vent gases from the sulfur degassing tank shall be directed to the tail gas unit No. 1 or No. 2.

This process/system shall not be operated unless the tail gas unit No. 1 or No. 2 and the incinerator No. 1 or No. 2 are in full use and have a valid permit to receive vent gases from this system.

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

[Systems subject to this condition: Process 13, System 1, 2, 3, 4]

S18.5 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:

Methyldiethanolamine Regeneration System No. 1 (Process: 12, System: 9)

Methyldiethanolamine Regeneration System No. 2 (Process: 12, System: 10)

Methyldiethanolamine Regeneration System No. 3 (Process: 12, System: 11)

Methyldiethanolamine Regeneration System No. 4 (Process: 12, System: 12)

Methyldiethanolamine Regeneration System No. 5 (Process: 12, System: 13)

North & South Sour Water Treatment Systems (Process: 12, System: 14 & 15)

Claus Tail Gas Treating Unit No. 2 (Process: 13, System: 5)

Claus Tail Gas Treating Unit No. 1 (Process: 13, System 7)

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



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[Systems subject to this condition: Process 13, System 1, 2, 3, 4]

~~§53.X The following conditions shall apply to the equipment in this system:~~

- ~~1. During startup or shutdown of the sulfur recovery unit(s), when tail gas units are bypassed, sour gas shall not be processed by the sulfur recovery unit(s). Sour gas shall be introduced to sulfur recovery unit(s) only when they are lined up to tail gas unit No. 1 or 2.~~

~~[RULE 1303(a)(1)-BACT, 5-10-1996; RULE 1303(a)(1)-BACT, 12-6-2002]~~

~~[Systems subject to this condition: Process 13, System 1, 2, 3, 4]~~

~~D182.5 The operator shall test this equipment in accordance with the following specifications:~~

~~The test shall be conducted to determine the concentrations of all sulfur compounds and sulfur vapor in the tail gas into and out of the sulfur degassing tank.~~

~~The test shall be conducted to determine the effectiveness of sweeping sulfur compounds from the liquid sulfur in the degassing tank.~~

~~The operator shall submit a detail description of the test methods/procedures to the District at least 90 days prior to the test. The tests shall be conducted according to the approved test plan or any subsequently approved revisions.~~

~~The District shall be notified of the date and time of the test at least 15 days prior to the test. A report of the test and operating conditions of the sulfur plant during the test shall be submitted to the District within 60 days of the test.~~

~~During the test, the sulfur plant shall be operated at least 80 percent of the permitted maximum capacity or within a capacity range approved by the District.~~

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

~~[Devices subject to this condition: D888, D2645, D2646]~~



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~~E193.6 The operator shall construct, operate and maintain this equipment according to the following requirements:~~

~~Tail gas from this equipment to the degassing tank or tail gas unit shall not contain more than 1.69 percent H₂S or 0.81 percent SO₂ by volume (as is basis) averaged over 60 consecutive minutes. The operator shall install and maintain a continuous monitoring and recording system to show compliance with this condition. Records shall be made available to District personnel either in an electronic or paper format upon request.~~

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

~~[Devices subject to this condition: D881, D885, D889]~~

H23.3 This equipment is subject to the applicable requirements of the following rules or regulations:

Contaminant	Rule	Rule/Subpart
VOC	District Rule	1173
VOC	40CFR60, SUBPART	GGG

[RULE 1173, 5-13-1994; RULE 1173, 2-6-2009; 40CFR60 Subpart GGG, 6-2-2008]

[Devices subject to this condition: D2613, D2614, D2615, D2675]