

**ENGINEERING EVALUATION**  
**Shell Oil Products US – Martinez Refinery, Plant: 11**  
**Application: 9879**

**BACKGROUND**

Shell Oil Products US – Martinez Refinery (Shell) has submitted this permit application under the District’s Accelerated Permitting Program (APP) to obtain a Permit to Operate (PO) for alterations they plan to make at the following source:

**S-1765**            OPCEN<sup>1</sup> Sulfur Plant 3 (SRU<sup>2</sup>3); 73 long tons/day

A Consent Decree (Civil Action No. H-01-0978) between Equilon Enterprises LLC and the US EPA requires Shell to re-route all SRU sulfur pit emissions to an abatement device such that unabated emissions from the sulfur pit are either eliminated, or are included and monitored as part of the applicable sulfur recovery plant’s emissions subject to the 40 CFR 60, Subpart J (NPS J) limit for sulfur dioxide (SO<sub>2</sub>), a 12-hour rolling average of 250 ppmvd SO<sub>2</sub> at 0% oxygen, as required by 40 CFR 60.104(a)(2).

Please refer to copies of the pertinent sections in the Consent Decree that are attached to this evaluation.

As it currently exists, vapors from the SRU3 sulfur pit at Shell are conveyed to a preheater to the catalytic oxidizer **A-1518** “F-109 Catalytic Oxidizer for SCOT<sup>3</sup> No. 3” via two steam eductors. The unabated sulfur pit emissions are vented to the atmosphere from a manually-operated valve in the line when S-1765 is down for maintenance, etc. In light of the Consent Decree discussed in the preceding paragraph, Shell plans to alter S-1765 by constructing additional piping to allow vapors from the SRU3 sulfur pit to vent to **A-4181** “Thermal Oxidizer for Sulfur Plant 4” located at S-4180 “OPCEN Sulfur Plant 4 (SRU4)”. On receiving the District’s approval to alter S-1765, Shell intends to maintain the option of abating vapors from the SRU3 sulfur pit at either A-1518 or A-4181<sup>4</sup>. Please refer to Figure 1 attached with this evaluation.

Following is a summary of a recent permitting activity at Shell and is discussed in the context of this application to provide clarity. The District issued Shell an Authority to Construct (AC) under Application 4106 on July 24, 2002 to perform certain modifications at S-1765.

The AC authorized Shell to perform the following:

- Replace a Stretford Unit (A-75) with an Exxon Mobil Flexsorb Gas Treatment System (A-751); and
- Modify S-1765, which used to be a conventional Claus unit, to an Oxy-Claus unit; and
- Perform minor modifications on the SCOT Unit No. 3 (A-76).

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<sup>1</sup> OPCEN - Operations Central

<sup>2</sup> SRU- Sulfur Recovery Unit

<sup>3</sup> SCOT - Shell Claus Offgas Treatment

<sup>4</sup> Unlike SRU4 (S-4180) and the sulfur pit at SRU4 (S-4347) that have their own unique source numbers, the SRU and sulfur pit at OPCEN Sulfur Plant 3 are collectively referred to as S-1765.

Supporting information submitted by Shell with Application 4106 indicated that the above changes would result in a substantial increase in the amount of elemental sulfur recovered at S-1765 i.e. from 73 long tons per day to 150 long tons per day, and would therefore reduce plant wide emissions of hydrogen sulfide (H<sub>2</sub>S) and SO<sub>2</sub>. Specifically, H<sub>2</sub>S laden Flexigas fuel (FXG) from the Flexicoker (S-1759) is routed to A-751, which selectively removes H<sub>2</sub>S from FXG fuel. The FXG fuel is then combusted and the sulfur compounds in the fuel are oxidized to SO<sub>2</sub> in the various refinery heaters and other combustion devices. The acid gas containing H<sub>2</sub>S removed at A-751 is sent to S-1765 and A-76 where approximately 99.9% of the reduced sulfur is converted to elemental sulfur. Residual H<sub>2</sub>S gas remaining after treatment at S-1765 and A-76 is oxidized to SO<sub>2</sub> at catalytic oxidizer A-1518. In a letter dated March 11, 2004, Shell notified the District that it started-up the modified S-1765 and the new A-751 on March 20, 2004, and April 20, 2004, respectively. Please refer to Figures 4 and 5 attached with this evaluation.

In light of the Consent Decree and the discussion in the preceding paragraph, Shell could potentially avail of the following benefits by rerouting vapors from the sulfur pit at S-1765 to A-4181:

- Operational flexibility to maintain venting during S-1765 sulfur pit vent maintenance; and
- Reduction in load at A-1518; and
- Availability of either A-1518 or A-4181 in the event the other is offline for maintenance at S-1765 or other reasons.

It should be noted that the alternative to this project is to simply vent the sulfur pit vapors to the atmosphere, as Shell used to do before the vents were routed the oxidizers in 2003. This project will prevent the routing of the vapors back to the atmosphere by routing them to SRU 4.

### **EMISSIONS CALCULATION**

Alterations to S-1765 will entail physical modifications to SRU3 that will not result in an increase in emissions beyond permitted levels. Therefore, the alteration to S-1765 is not a modification to SRU3 as defined under Section 234 in Regulation 2, Rule 1.

There are not other identified pollutants other than H<sub>2</sub>S and SO<sub>2</sub> associated with this alteration. One of the intentions of this project is to prevent H<sub>2</sub>S from the pit vents going to the atmosphere during shutdown. Re-routing the vapors from the S-1765 sulfur pit will have a negligible effect on the fuel usage at A-4181 because the volume flow from the pit vents is inconsequential and negligible.

### **TOXIC RISK SCREEN ANALYSIS (RSA)**

Alterations to S-1765 will not result in an increase in toxic air contaminant emissions from existing levels. Therefore, a Toxic RSA is not required.

### **CUMULATIVE INCREASE**

Alterations to the control device serving the sulfur pit at SRU 3 will reduce H<sub>2</sub>S emissions to the atmosphere. This project does not modify or alter SRU 3 and its sulfur pit, it only affects the control device. The project will not result in any emission increases, and SRU 3 and SRU 4 will continue to operate within currently permitted limits. Therefore, there is no increase in emissions at Shell associated with this application.

**BACT**

Alterations to the control device serving the sulfur pit at SRU 3 will reduce H<sub>2</sub>S emissions to the atmosphere. This project does not modify or alter SRU 3 and its sulfur pit, it only affects the control device. The project will not result in any emission increases, and SRU 3 and SRU 4 will continue to operate within currently permitted limits. Therefore, there is no increase in emissions at Shell associated with this application. Therefore, BACT is not triggered.

**OFFSETS**

Alterations to the control device serving the sulfur pit at SRU 3 will reduce H<sub>2</sub>S emissions to the atmosphere. This project does not modify or alter SRU 3 and its sulfur pit, it only affects the control device. The project will not result in any emission increases, and SRU 3 and SRU 4 will continue to operate within currently permitted limits. Therefore, there is no increase in emissions at Shell associated with this application. Therefore, emission offsets are not warranted.

**STATEMENT OF COMPLIANCE**

The Consent Decree between Equilon Enterprises LLC and the US EPA requires Shell to re-route all SRU sulfur pit emissions to an abatement device such that unabated emissions from the sulfur pit are either eliminated, or are included and monitored as part of the sulfur recovery plant's emissions subject to NSPS J limit for SO<sub>2</sub>, a 12-hour rolling average of 250 ppmvd SO<sub>2</sub> at 0% oxygen, as required by 40 CFR 60.104(a)(2).

Shell has indicated that SO<sub>2</sub> emissions from A-4181 will not exceed the level of emissions allowed under permit condition 12271 that governs the operation of SRU4 and the thermal oxidizer A-4181. A-4181 will oxidize H<sub>2</sub>S gas into SO<sub>2</sub>. Part 68 of the above permit condition limits the concentration of SO<sub>2</sub> in A-4181's exhaust to 50 ppm by volume (dry) calculated at zero percent oxygen when abating SRU4 emissions and 100 ppm by volume (dry) calculated at zero percent oxygen when abating SRU4 and SRU4 sulfur pit emissions<sup>5</sup>. The SO<sub>2</sub> continuous emissions monitors and H<sub>2</sub>S annual testing required by permit condition 12271, part 69, will ensure that the SO<sub>2</sub> emissions from A-4181 will comply with the NSPS J limit for SO<sub>2</sub> and the permit conditions.

Following are the textual descriptions of parts 63 and 68 of permit condition 12271<sup>6</sup>:

“63. The sulfur pit for sulfur plant 4 (S4347) shall be fixed roof and vented to the Thermal Oxidizer for Sulfur Plant 4 (A4181) at all times during operation of A4181. [basis: BACT]

68. The SCOT Thermal Oxidizer shall achieve a minimum of 95 %weight conversion of reduced sulfur compounds to SO<sub>2</sub>. The concentration of H<sub>2</sub>S in the exhaust from A4181 SCOT Thermal Oxidizer for Sulfur Plant 4 shall not exceed 2.5 ppm, dry, at 0% oxygen, averaged over 24 hours. The concentration of SO<sub>2</sub> in the exhaust from A4181 SCOT Thermal Oxidizer for

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<sup>5</sup> Unlike S-1765, SRU4 (S-4180) and the sulfur pit at SRU4 (S-4347) have their own unique source numbers.

<sup>6</sup> Document “A0011A-1.doc” modified on May 14, 2004 located in H:\PUB\_DATA\TITLEV\PERMIT\F-DRAFT folder.

Sulfur Plant 4 shall not exceed 50 ppm, dry, at 0% oxygen, averaged over 24 hours. The 50 ppm SO<sub>2</sub> limit excludes the sulfur contribution from the Sulfur Pit. Because Condition No. 63 requires the sulfur pit to be controlled by A4181, the 50 ppm SO<sub>2</sub> limit will be adjusted to include an additional 50 ppm SO<sub>2</sub> emissions from controlling the Sulfur Pit. If for some reason the sulfur pit is not being vented to the SCOT Thermal Oxidizer, SO<sub>2</sub> will be limited to 50 ppm as indicated above. [basis: BACT]”

Shell is not requesting the District to change the existing SO<sub>2</sub> emission limits in part 68 of the above permit condition nor are they requesting an increase in the natural gas firing rate at A-4181 above the current permitted level of 25 MMBTU/hr, as outlined in Table B-3 of the Clean Fuels Project Application 8407. Therefore, re-routing vapors from the SRU3 sulfur pit to A-4181 is not a modification of SRU4 or A-4181.

On December 1, 2003, the District issued Shell a Title V operating permit. This permit application to grant Shell a PO to perform alterations at S-1765 qualifies as an administrative amendment i.e. Section 2-6-201, a non-substantive amendment to a major facility review permit. This permit application is an administrative amendment because it represents: (1) a change in the descriptions of applicable requirements that add detail but do not affect substantive requirements and (2) changes in source descriptions that are not alterations of applicable requirements.

Per Section 2-6-413.4, the APCO shall submit a copy of the revised permit to EPA. Per Section 2-6-413.5, Shell may implement the changes covered by this administrative permit amendment immediately.

As previously discussed in the “Emissions Calculation” section and also above, alterations to S-1765 will entail physical modifications to SRU3 that will not result in an increase in emissions beyond permitted levels. Therefore, the alteration to S-1765 is not a modification to SRU3 as defined under Section 234 in Regulation 2, Rule 1. In light of the above, there will no change to the applicable requirements for S-1765, as they exist in Tables IV-AQ, AQb, and AR in Shell’s existing Title V permit.

The row entry corresponding to A-4181 in Table II-B “Abatement Devices” in Shell’s existing Title V permit reads as follows:

**Table II B – Abatement Devices**

<b>Abatement Device</b>	<b>Description</b>	<b>Source(s) Controlled</b>	<b>Applicable Requirement</b>	<b>Operating Parameters</b>	<b>Limit or Efficiency</b>
A4181	Thermal Oxidizer for Sulfur Plant 4	S4180, S4347	Condition # 12271 Part 68	None	Conversion Efficiency ≥ 95 weight%

The alterations to S-1765 will result in the following changes to the row entry corresponding to A-4181 in Table II-B:

**Table II B – Abatement Devices**

Abatement Device	Description	Source(s) Controlled	Applicable Requirement	Operating Parameters	Limit or Efficiency
A4181	Thermal Oxidizer for Sulfur Plant 4	S4180, S4347	Condition # 12271 Part 68	None	Conversion Efficiency $\geq$ 95 weight%
<b>A4181</b>	<b>Thermal Oxidizer for Sulfur Plant 4 and sulfur pit in Sulfur Plant 3</b>	<b>S1765 sulfur pit,</b> <u>S4180,</u> <u>S4347</u>	<b>NSPS J 40 CFR 60.104(a)(2)</b>	<b>None</b>	<b>&lt; 250 ppmvd SO<sub>2</sub> at 0% oxygen, 12-hour rolling average</b>

Shell has submitted a completed Appendix H “Environmental Information Form” with this application. The alterations to S-1765 will consist of minor, internal alterations to an existing process unit that will primarily involve piping and valve changes. The net result of the above changes will enable SRU3 sulfur pit emissions to be abated by the thermal oxidizer, A-4181, abating SRU4. As previously discussed in the “Emissions Calculation” section, the thermal oxidizer at SRU4 is newer and more efficient at abating SO<sub>2</sub> emissions than the catalytic oxidizer, A-1518, at SRU3. It can be concluded that there will be no increase in emissions at S-1765 from existing levels.

In light of the above, the project to alter S-1765 is exempt from a CEQA review under either of the following sections in Regulation 2, Rule 1:

- Section 312.6 which states “Permit applications relating exclusively to the repair, maintenance or minor alteration of existing facilities, equipment or sources involving negligible or no expansion of use beyond that previously existing.” or
- Section 312.11.1 which states “Projects at an existing stationary source for which there will be no net increase in the emissions of air contaminants from the stationary source and for which there will be no other significant environmental effect”

Source S-1765 is not located within 1,000 feet of the nearest public school and hence the project to permit the source is not subject to the public notification requirements contained in Regulation 2-1-412.

The alterations to S-1765 do not trigger additional PSD, NSPS and/or NESHAP requirements than those already existing in Shell’s existing Title V permit.

### **PERMIT CONDITIONS**

Alterations to S-1765 will not warrant change to permit condition 7618 that governs the operation of S-1765.

**RECOMMENDATION**

Modify the row entry corresponding to A-4181 in Table II-B “Abatement Devices” in Shell’s existing Title V permit as proposed. Please refer to the underline strikeout version of the proposed Table II B in the “Statement of Compliance” section.

A paragraph under Section 106 “Limited Exemption, Accelerated Permitting Program” in Regulation 2, Rule 1 states the following:

“In addition to the above, any alteration of a source is exempt from the Authority to Construct requirements of Section 2-1-301 and will be evaluated under the Accelerated Permitting Program in Section 2-1-302.2, provided that the owner or operator certifies for all pollutants that the alteration does not result in an increase in emissions.”

As previously discussed in this evaluation, Shell has certified that alterations to S-1765 will not result in an increase in emissions. In light of the above, this application qualifies under the District’s APP per Reg. 2-1-106.

Issue Shell a PO to perform alterations at the following equipment:

**S-1765** OPCEN Sulfur Plant 3 (SRU3)  
Sulfur Pit abated by either A-1518 or A-4181

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K. R. Bhagavan  
AQE II

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Date