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August 24, 2021

SUBJECT: FENCELINE MONITORING - CORRECTIVE ACTION PLAN
40 CFR PART 63, SUBPART CC – RMACT
EQUILON ENTERPRISES LLC d/b/a SHELL OIL PRODUCTS US - NORCO REFINERY
LDEQ AGENCY INTEREST NUMBER 1406

Dear Madam or Sir:

In accordance with 40 CFR §63.658(h), Equilon Enterprises LLC d/b/a Shell Oil Products US – Norco Refinery (Shell) hereby submits the enclosed Corrective Action Plan per the Fenceline Monitoring Provisions of 40CFR 63 Subpart CC, Refinery MACT I. This plan reflects the benzene fenceline monitoring data for the 14-day sampling period beginning May 20, 2021 through June 3, 2021.

If you have any questions related to this submittal, please contact Sarah Hudson at (504) 465-6041.

I certify to the best of my knowledge and belief that the information submitted is true, accurate, and complete.

Sincerely,

Jack Holden
Production Manager – Norco Manufacturing Complex

SEH/mlc

Enclosure

cc: Louisiana Department of Environmental Quality
Southeast Regional Office
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New Orleans, LA 70123

bc: via e-mail w/Attachment
Tammy Little (General Manager)
Jack Holden (Production Manager)
Martin Padilla (HSSE Manager)
Cory Bazile (Production Unit Manager - Utilities)
GX SOPUS NR - ENV

File 701-00-15 Refinery MACT RC-EC OIL

Electronic Copies:
\Shell\Environmental - Environmental Team Documents\PROGRAMS\Benzene Fenceline Monitoring\RCA Documents\EPA Corr Action Submittals

Reviewed by:
Renee Toups
Jacob Foy

Appendix A
Corrective Action Plan

Appendix A
Corrective Action Plan

SHELL NORCO MANUFACTURING COMPLEX

CORRECTIVE ACTION PLAN

Benzene Fenceline Monitoring
40 CFR 63 Subpart CC
Reporting Period: 5/20/21 - 6/3/21

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I. EXECUTIVE SUMMARY

The Shell Norco Manufacturing Complex (Shell) consists of both the refinery owned by Equilon Enterprises d/b/a Shell Oil Products US (SOPUS) and the chemical manufacturing plant owned by Shell Chemical LP (Shell Chemical).

As part of the Fenceline Monitoring Program required under 40 CFR 63 Subpart CC -- National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries, Shell is required to complete a Root Cause Analysis (RCA) per 40 CFR 63.658(g) and a Corrective Action Plan per 40 CFR 63.658(h) for the 14-day sample period from May 20, 2021 to June 3, 2021.

Additionally, as part of the Shell Chemical Consent Decree, Civil Action No. 2:18-cv-1404-EEF-JVM, Shell is required to complete an RCA and a Corrective Action Plan in accordance with Paragraph 18 and Appendix 1.8, Paragraphs 3(g) and (h) for the 14-day sample period from May 20, 2021 to June 3, 2021.

For clarity and completeness, this report is broken out into a timeline of the affected monitoring periods with the periods' respective root cause analyses and corrective actions. The conclusion of this document includes the Corrective Action Plan requirements.

II. REGULATORY BACKGROUND

As required in 40 CFR 63.658(g) and Paragraph 18 and Appendix 1.8, Paragraphs 3(g) of the Shell Chemical Consent Decree, the RCAs discussed herein were begun within 5 days of determining the action level had been exceeded, and the RCAs and initial corrective action analyses were completed and initial corrective actions were taken within 45 days after determining the exceedance.

While corrective actions were completed within 45 days, the period Δc for the next 14-day sampling period for which the sampling start time began after completion of the corrective actions was greater than benzene action level of 9 µg/m3. As such, a Corrective Action Plan was required to be developed per 40 CFR 63.658(h) and Paragraph 18 and Appendix 1.8, Paragraphs 3(h) of the Shell Chemical Consent Decree and submitted to the Administrator within 60 days after receiving the analytical results indicated that the Δc value for the 14-day sampling period following completion of the initial corrective action(s) was greater than 9 µg/m3. This document serves to meet the Corrective Action Plan submittal requirements and includes the following:

- Corrective actions completed to date;
- Additional measures proposed to reduce benzene fenceline emissions; and,
- A schedule of implementation for such measures.

III. MONITORING RESULTS AND TIMELINE

Tables III-1 and III-2 below outlines the timeline beginning with the May 20, 2021 through June 3, 2021 period and includes sample results and regulatory requirements for clarity.

Table III-1: Monitoring Results						
	Refinery RMACT		Chemical CD			
14-Day Period	Period Δc [µg/m³]	Annual Rolling Average Δc [µg/m³]	Period Δc [µg/m³]	Annual Rolling Average Δc [µg/m³]	Comments	Reference Section in Document
5/20/21 – 6/3/21	24.62	12.75	24.62	11.75	Initial period in which the period Δc and annual rolling average Δc were both above the action level.	Section IV
6/3/21 – 6/17/21	15.00	13.18	15.00	12.18	Root cause determined to be different than previous periods.	Section V
6/17/21 – 7/1/21	7.45	13.22	7.45	12.22	Period Δc was under action level.	N/A

Table III-2: Timeline and Regulatory Dates					
14-Day Period	Date Sample Results Received	RCA Start Date *(Regulatory Req't Date)*	RCA Complete Date *(Regulatory Req't Date)*	Corrective Action(s) Completion Date	Corrective Action Plan Required & Due Date
5/20/21 – 6/3/21	6/14/21	6/14/21 *(6/19/21)*	6/19/2021 *(7/29/21)*	5/21/21	Yes – 1st period after completion of corrective actions was above action level. Due 8/24/21.
6/3/21 – 6/17/21	6/25/21	6/27/21 *(6/30/21)*	6/14/21 *(7/29/21)*	7/26/21	Corrective Action Plan for this period is not required but included for clarity.
6/17/21 – 7/1/21	7/14/21	N/A	N/A	N/A	N/A

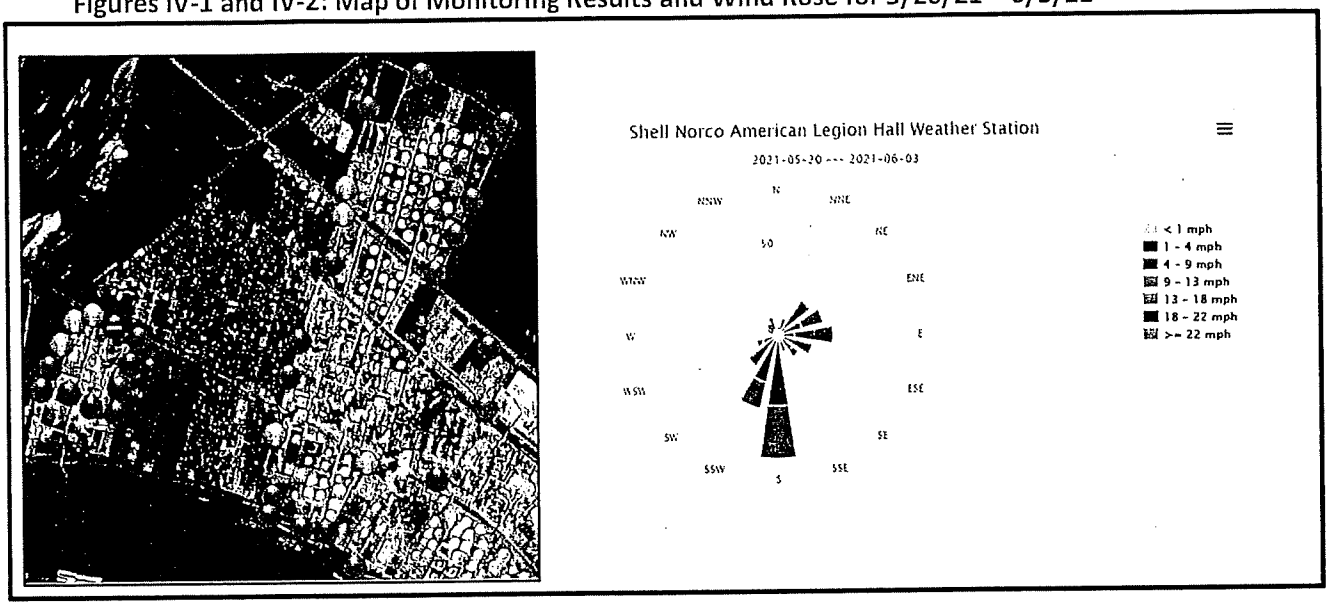
IV. RCA AND CORRECTIVE ACTION: MAY 20, 2021 – JUNE 3, 2021

A. 14-Day Period Background

During the 14-day sample period from 5/20/21 – 6/3/21, the period Δc was above the action level, and the annual rolling Δc with the inclusion of this period exceeded the action level. A wind rose and map of the monitoring locations is provided below wherein the red points show the monitors above the action level.

Table IV-1: Data for 5/20/21 - 6/3/21	
ΔC	**Benzene (µg/m³)**
Period ΔC	24.62
Refinery Annual Rolling ΔC	12.75
Chemical Annual Rolling ΔC	11.75
Sample point(s) higher than action level:	**Benzene (µg/m³)**
WB-01	25.00

Figures IV-1 and IV-2: Map of Monitoring Results and Wind Rose for 5/20/21 – 6/3/21



B. Root Cause Analysis

Shell utilizes several electronic gas chromatographs (eGCs) around the property as a tool for finding root causes to elevated benzene emissions. Upon notification of the sample results, an immediate review of data from #1 and #4 eGC trailer mounted benzene monitors which are deployed in the vicinity of the monitors WB-01 and WB-12 was conducted. A field investigation was also conducted to identify if there were any potential sources of benzene emissions that would impact the sample point location with the elevated reading. Winds were primarily out of the South during this sample period (Figure IV-2 above), and the investigation began with potential sources in that vicinity of the above referenced sample point location (Figure IV-1 above).

C. Source Description

Materials are received into the sour water system from multiple production areas. The Shell Chemical Utilities unit operates the sour water system, whereby hydrocarbons are removed from the sour water through gravity separation, sour water stripping, and flash vessels. The sour water system has 2 separate streams, referred to as Bypass Stream and Feed Stream. The Feed Stream is routed to the sour water strippers for hydrogen sulfide and ammonia stripping prior to entering the sour water system, whereas the Bypass stream is routed directly to the sour water system. The Bypass Stream and the Feed Stream are combined in the East Site feed tank and routed to the West Site bio-treater.

The OL-5 Unit is a contributor to the East Site sour water system via steam injected into the furnaces to promote ethane cracking. The feed from the furnaces, which is a mixture of steam and cracked ethane, is routed to the

Pyrofractionator (PV-1720). The overhead stream from the Pyrofractionator is routed to the Process Gas Compressor (PGC). The removal of liquid from this stream is necessary prior to entering the PGC. This is accomplished by routing the stream through the Reflux Drum (PV-1724) and the PGC 1st Stage Suction Drum (PV-1736) which collect condensed liquids (water and hydrocarbon) and allow the water and hydrocarbon to separate into distinct layers. The water portion from these drums is sent through filters and coalescers and into the Degasser. Steam is injected into the Degasser to remove contaminants such as benzene from the water, which are stripped out by the steam and carried overhead back to the PGC 1st Stage Suction Drum, while the water is then routed from the lower section of the Degasser into the sour water header via a Degasser level control valve. This OL-5 stream then enters the Bypass Stream where it is combined with other sour water streams before being routed to the West Site bio-treater.

D. Events

On May 20th at 7:45 pm, Operations were notified of potential gasoline in the unit sour water. It was identified that the PGC 1st Stage Drum did not have an interface level and that gasoline had been sent to the water outlet from the drum. The loss of interface level within the PGC 1st Stage Suction Drum caused gasoline to be sent to the water outlet of the Drum. At 10:30 pm the water outlet was closed, which stopped the gasoline flowing out with the water while troubleshooting of the instrumentation issue continued. The new instrumentation that had been installed during the recent unit turnaround was found to be incorrectly calibrated and not working as expected. With the water outlet closed, the instrument was re-calibrated allowing the interface to be seen correctly.

While the Degasser was recovering from receiving gasoline from the 1st Stage, the Degasser Preheater was placed from manual to auto with a temperature setpoint of 220 deg. F. Prior to this change, the temperature exiting the Degasser Preheater was 250 deg. F. The change in temperature within the Degasser Preheater caused the injected steam to condense to raise the temperature to the saturation point of steam at the Degasser pressure, resulting in no steam left to strip out Benzene. This is evidenced by the Degasser Overhead vapor rate dropping to zero as the water exiting the Degasser Preheater dropped from 250 deg F to 220 deg F. The Degasser stripping steam is controlled by a manual valve in the field. As a result, it was not until approximately 09:30AM on 5/21/21 that it was determined the Overhead vapor flow had been lost. Once the overhead vapor flow had been lost, operations opened the steam valve to increase the stripping steam to the Degasser which resulted in the Degasser bottoms outlet temperature to recover and return to the normal value of 240 deg F.

E. Corrective Actions

Table IV-2: Corrective Actions for 5/20/21 – 6/3/21 Period

Corrective Actions	Completion Date	Comments
Re-calibrate new interface instrumentation.	5/21/2021	The new instrumentation that had been installed during the recent unit turnaround was found to be incorrectly calibrated and not working as expected. With the water outlet closed, the instrument was re-calibrated allowing the interface to be seen correctly.

Table IV-2: Corrective Actions for 5/20/21 – 6/3/21 Period		
Corrective Actions	**Completion Date**	**Comments**
Change Overhead Degasser flow to PGC (FI2211_OL) alarm priority from target to standard.	7/25/2021	Target alarm on the stripping steam is in place for adequate stripping steam.

F. Conclusion

The corrective actions for this period were completed in real-time on 5/21/21, with additional measures to prevent reoccurrence completed on 7/25/21. The first full sample period after completion of the corrective actions (6/3/21 – 6/17/21) was over the action level, as discussed in Section V below. The additional requirements for the Corrective Action specified in 40 CFR 63.658(h) are addressed in Section VI.

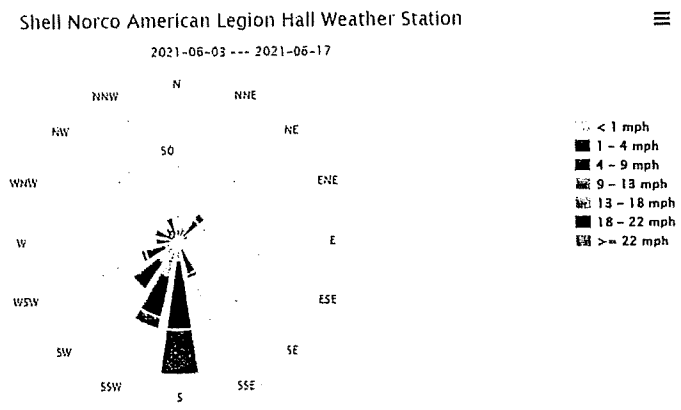
V. RCA AND CORRECTIVE ACTION: JUNE 3, 2021 – JUNE 17, 2021

A. 14-Day Period Background

During the 14-day sample period from 6/3/21 – 6/17/21, the period Δc was above the action level, and the annual rolling Δc with the inclusion of this period exceeded the action level. A wind rose and map of the monitoring locations is provided below wherein the red points show the monitors above the action level.

Table V-1: Data for 6/3/21 – 6/17/21	
ΔC	**Benzene (µg/m³)**
Period ΔC	15.00
Refinery Annual Rolling ΔC	13.18
Chemical Annual Rolling ΔC	12.18
Sample point(s) higher than action level:	**Benzene (µg/m³)**
WB-01	15.00
B-11	12.00

Figures V-1 and V-2: Map of Monitoring Results and Wind Rose for 6/3/21 – 6/17/21



B. Root Cause Analysis

Upon notification of the sample results, an immediate review of data from #1 and #4 eGC trailer mounted benzene monitors, which are deployed in the vicinity of the monitors WB-01, was conducted. Winds were primarily out of the South during this sample period (Figure V-2 above), and the investigation began with potential sources in that vicinity of the above referenced sample point location (Figure V-1 above).

Additionally, an immediate review of data readings of the #2 eGC Trailer mounted benzene monitor, which is deployed in the vicinity of the B-11 monitor, was conducted. A field investigation was also conducted to identify if there were any potential sources of benzene emissions that would impact the sample point location with the elevated reading. Winds were primarily out of the South during this sample period (see Figure V-1 above), so the investigation began with potential sources in that vicinity of the above referenced sample point.

C. Source Description

Monitor B-11

Different materials from the refinery and chemical process units are received into the storage tanks in the vicinity of Fenceline monitor B-11. A field visit to the area with handheld benzene meters was conducted around the possible sources; however, no elevated readings were detected. Storage tanks located in the area include the following:

- K-558, which stores spent sulfide and spent caustic,
- XC-429, which is an IFR storing Slop oil and equipped with vent gas compressors routed to a Flare system for control,
- W-414, napthenic caustic,
- F-483, Diesel feedstock, HVGO Feedstock, and Light Naphtha Feedstock, and
- F-438, F-436, and F-487, storing Heavy Gas Oils.

The eGC trailer #2 data was found to be unreliable during this period and has since been remedied. Investigation activities also included gathering relevant operational information on conditions and or actions relevant to the tanks adjacent to the monitor B-11 to identify any process abnormalities as potential contributing factors to the elevated readings on the eGC and the Fenceline monitor.

After careful consideration and analysis, the cause of the spikes at B-11 could not be attributed to a specific event or piece of equipment. Due to the location of this monitor, this area could have been impacted by outside activities occurring in the vicinity of the monitor, including mowing lawn, train and traffic movements, third party neighbors, etc. that would be outside of Shell's control.

Monitor WB-01

Upon notification of the sample results, an immediate review of data from #1 and #4 eGC trailer mounted benzene monitors, which are deployed in the vicinity of the WB-01 benzene sampling shelter, was conducted. A field investigation was also conducted to identify if there were any potential sources of benzene emissions that would impact the sample point location with the elevated reading. As stated above, winds were primarily out of the S during this sample period, so the investigation began with potential sources in that vicinity of the above referenced sample point location.

Upon review of the data, no known process abnormalities took place during the two week sampling period nor were there any work activities in the area that could have contributed to the high benzene results. Process data for the West Site bio-treater system was within normal operating limits.

D. Events

No specific events related to the first period, 5/20/2021 – 6/3/2021, were identified during this root cause investigation and no additional events during this sampling period, 6/3/21 – 6/17/21, were noted.

E. Corrective Actions

Table V-2: Corrective Actions for 6/3/21 – 6/17/21 Period

Corrective Actions	Completion Date	Comments
Identify any and all activities which took place in the affected area during this time.	7/19/2021	No known work activities took place during the 2-week sample period. There is a gate entrance utilized by contractors to a laydown yard adjacent (South) of monitor B-11 that is accessed by truck. Work activities in this area include scaffold storage/retrieval, pipe fitting and other activities unknown currently.
Site-wide Sour Water Sampling Plan initiated.	7/19/2021	Upstream sour water points were identified as potential contributors to benzene in the sour water system. The flows and concentrations of the potential contributors were evaluated in order to help prioritize sampling.

Table V-2: Corrective Actions for 6/3/21 – 6/17/21 Period		
Corrective Actions	Completion Date	Comments
Identify any process abnormalities as potential contributing factors to the elevated readings on the eGC and the fenceline monitor (B-11).	7/26/2021	Not known process abnormalities took place during the 2-week sample period: Tank integrity inspections did not note any deficiencies. LDAR monitoring data did not note any leaks in this are for the period.
Utilize handheld monitoring devices for visual field observations.	7/26/2021	Handheld devices did not show elevated readings in the above described area.

F. Conclusion

The corrective actions for the 6/3/21 – 6/17/21 sampling period were completed by 7/26/21. As stated above, the investigation did not reveal any known sources of elevated benzene for this period. The period ΔC for the next sample period following these results (6/17/21 – 7/1/21) was below the action threshold.

VI. CORRECTIVE ACTION PLAN

As required in 40 CFR 63.658(h), the following sections address the Corrective Action Plan Requirements.

A. Corrective Actions Completed to Date

All corrective actions completed thus far have been identified in the respective periods' sections (Sections IV – V).

B. Additional Measures

In addition to the immediate corrective actions identified in the RCA periods above, Shell has begun implementing additional sampling of the sour water system to gain a better understanding of the potential contributors of benzene. Upstream sour water sources have been identified and a baseline benzene concentration will be established once sufficient data is available. Due to the large number of streams contributing to the sour water system, additional sampling will help to more accurately identify any streams that may have elevated benzene concentrations.

Shell has also begun investigating the installation of benzene analyzers on the sour water streams which can provide real time data and accurately identify the sources of high benzene. This will allow a quicker response time to identify and correct any excursions in the sour water system.

C. Schedule of Implementation

The following outlines the proposed schedule for implementation of these additional measures:

Task	Target Date
Began increased sour water sampling	8/1/2021
Determine baseline benzene concentrations in the sour water system from the individual contributing streams	10/1/2021

Task	Target Date
Determine feasibility of installing online benzene analyzers	12/1/2021
Installation of benzene analyzers, if deemed feasible	12/1/2022