CERTIFIED MAIL #7018 0360 0000 7300 7125
U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards, Sector
Policies and Programs Division
U.S. EPA Mailroom (E143-01)
Attention: Refinery Sector Lead
109 T.W. Alexander Drive
Research Triangle Park, NC 27711

Shell Chemical LP
Norco Plant
P.O. Box 10
Norco, LA 70079-0010
Tel +1 (504) 465 6480
Fax +1 (504) 465 6360
Internet http://www.shell.com

August 10, 2021

SUBJECT: UNITED STATES V. SHELL CHEMICAL LP
CIVIL ACTION NUMBER 2:18-cv-1404-EEF-JVM
FENCELINE MONITORING - CORRECTIVE ACTION PLAN
LDEQ AGENCY INTEREST NUMBER 26336

Dear Madam or Sir:

In accordance with the requirements in Section V, Paragraph 18 of Civil Action Number 2:18-cv-1404-EEF-JVM which became effective on February 6, 2019, Shell Chemical LP (Shell) hereby submits the enclosed Corrective Action Plan. This plan reflects the benzene fenceline monitoring data for the 14-day sampling period beginning March 26, 2021 through April 9, 2021.

If you have any questions related to this submittal, please contact Renee Toups at (504) 465-6058.

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
Attorney in Fact – Shell Chemical LP

RAT/mlc

Enclosure

cc: Louisiana Department of Environmental Quality
Office of Environmental Compliance
P. O. Box 4312
Baton Rouge, LA 70821-4312

Louisiana Department of Environmental Quality
Southeast Regional Office
201 Evans Rd, Bldg. 4, Suite 420
New Orleans, LA 70123

cc: W/Attachments

Director, Air Enforcement Division
Office of Civil Enforcement
U.S. Environmental Protection Agency
Mail Code 2242-A
1200 Pennsylvania Avenue, N.W.
Ariel Rios Building
Room 1119
Washington, DC 20460-0001

Celena Cage
Enforcement Administrator
Office of Environmental Compliance
Louisiana Department of Environmental Quality
P.O. Box 4312
Baton Rouge, LA 70821-4312

Dwana C. King
Deputy General Counsel
Legal Division
Louisiana Department of Environmental Quality
P.O. Box 4302
Baton Rouge, LA 70821-4302

Via Email in PDF Format
parrish.robert@epa.gov
foley.patrick@epa.gov
celena.cage@la.gov
dwana.king@la.gov
Chrystal.kain@shell.com
Pierre.espejo@shell.com

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

Chemical File: 706-15 Semi-Annual Reports

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

Reviewed by:
Nick Reine
Jacob Foy

Appendix A
Corrective Action Plan

SHELL NORCO MANUFACTURING COMPLEX

CORRECTIVE ACTION PLAN

Benzene Fenceline Monitoring
40 CFR 63 Subpart CC

TABLE OF CONTENTS

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 March 26, 2021 to April 9, 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 March 26, 2021 to April 9, 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 March 26, 2021 through April 9, 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
3/26/21 – 4/9/21	99.13	11.32	99.13	10.32	Initial period in which the period Δc and annual rolling average Δc were both above the action level.	Section IV
4/9/21 – 4/22/21	7.97	11.49	7.97	10.52	Period Δc was under action level.	N/A
4/22/21 – 5/6/21	20.52	12.13	20.52	11.16	Determined to be same Root Cause as 3/26-4/9.	Section V
5/6/21 – 5/20/21	3.70	12.14	3.70	11.16	Period Δc was under action level.	N/A
5/20/21 – 6/3/21	24.62	12.75	24.62	11.75	1st sample period after completion of corrective actions for 3/26 – 4/9 and 4/22 – 5/6. Root cause determined to be different than previous periods.	Section VI

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
3/26/21 – 4/9/21	4/21/21	4/22/21 *(4/26/21)*	Note 1 *(6/5/21)*	5/11/21	Yes – 1st period after completion of corrective actions was above action level. Due 8/13/21.
4/9/21 – 4/22/21	4/30/21	N/A	N/A	N/A	N/A
4/22/21 – 5/6/21	5/17/21	5/18/21 *(5/22/21)*	6/14/21 *(7/1/21)*	5/11/21	Same as 3/26/21 – 4/9/21. Due 8/13/21.
5/6/21 – 5/20/21	6/7/21	N/A	N/A	N/A	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)*	6/30/21 *(7/29/21)*	5/21/21	Yes – 1st period after completion of corrective actions was above action level. Due 8/24/21. See Note 2.
Note 1: RCA was finalized with inclusion of the 4/22/21 – 5/6/21 period. Note 2: The Corrective Action Plan for 5/20/21 – 6/3/21 will be submitted separately from this document as it was found to be a separate root cause. The 5/20/21 – 6/3/21 period is still discussed in this submittal for clarity and completeness.					

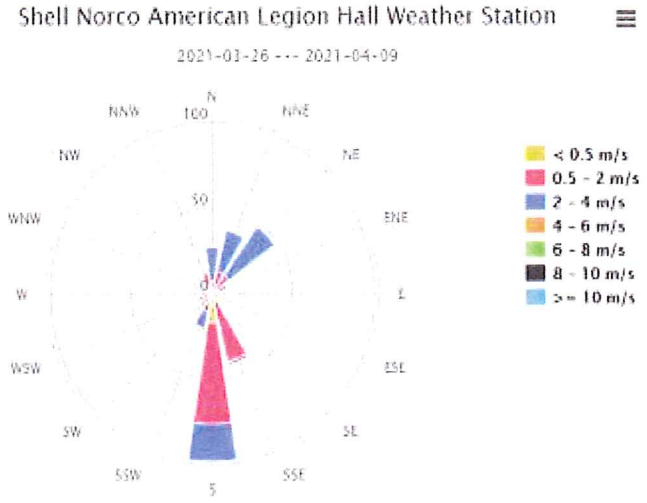
IV. RCA AND CORRECTIVE ACTION: MARCH 26, 2021 – APRIL 9, 2021

A. 14-Day Period Background

During the 14-day sample period from 3/26/21 – 4/9/21, 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 3/26/21 - 4/9/21	
ΔC	**Benzene (µg/m³)**
Period ΔC	99.13
Refinery Annual Rolling ΔC	11.32
Chemical Annual Rolling ΔC	10.32
Sample point(s) higher than action level:	**Benzene (µg/m³)**
WB-01	100.00
WB-12	14.30

Figures IV-1 and IV-2: Map of Monitoring Results and Wind Rose for 3/26/21 – 4/9/21



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

Based on the wind direction, the sources directly south of the monitoring points were reviewed for root causes of elevated benzene materials. The Shell Chemical wastewater treatment plant (bio-treater), located at Shell's West Site, is directly south of those points. The bio-treater processes wastewater from both the SOPUS refinery and Shell Chemical plant. This wastewater contains material processed in Shell's sour water system.

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 two 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.

One of the streams routed to the sour water system is the water separated from the three crude desalter units. Crude oil is fed to the desalters with a water mixture for dilution of dissolved salts. The oil-water mixture is then routed to a settling tank to allow the salt-containing water to separate and be drawn off and an electric field is used to encourage water separation via a system of grids. The desalters and its internal components are in a

periodic maintenance schedule and are continuously monitored as they are an integral part of the refining process.

D. Events

One of the unit desalters, PV-780, had a level transmitter acting erratically resulting in reading very high and low levels in a short period of time. The level probe for PV-780 had a disadvantage at its current length which only spans 16 inches. This did not allow actual reading of the oil/water level to be communicated accurately. The actual water level was much lower and allowed oil to slip out of the bottom of the desalter to the Bypass Stream which feeds the West Site sour water system. The oil in the Bypass Stream (rich in benzene content) reached the bio-treater causing sampling points to have elevated readings for the period.

E. Corrective Actions

Once the root cause was identified, it was determined that a level probe with a larger span could result in a more accurate reading of the oil and water level in PV-780. In addition to the new probe installation, a new shield was installed which sits around the new larger span level probe. The shield reduces the interference by deflecting the distribution header in the desalter away from the probe to achieve accuracy without becoming interfered.

Additionally, operations began to increase the frequency of removing the oil from the weir in the sour water drum. This helps reduce possible residual oil in the sour water bypass stream.

It was also noted that at this time Shell was undergoing a turnaround on several units that normally route higher flow but smaller concentrations of benzene to the sour water system. These streams help the sour water system by diluting the streams that it processes allowing it to filter out the oil that should not be going to the bio-treater. Since these units were shut down due to a turnaround, the sour water system flow was reduced and included higher concentrations of benzene than during normal operations.

Table IV-2: Corrective Actions for 3/26/21 – 4/9/21 Period

Corrective Actions	Completion Date	Comments
Identify any and all activities which took place in the affected area during this time.	4/30/2021	Site steam loss incident (April 7th)
Identify any process abnormalities as potential contributing factors to the elevated readings on the eGC and the fenceline monitor (WB-01 and WB-12).	5/21/21	• Plant turnaround activities for Olefins Unit, S2, BD5, and DHT were occurring • Oil carryover from desalter to Bypass Stream • No additional process abnormalities were identified (review of shift reports) • LDAR did not show any leaks around this area during these periods.
Increase dumping of the weir in the sour water drum to once per shift.	5/12/2021	Additional level of control to help monitor possible residual oil in the stream.
Level Transmitter re-ranged on the desalter (PV-780). The span was	5/11/2021	Greater span helps generate greater accuracy in oil/water level of the desalter.

Table IV-2: Corrective Actions for 3/26/21 – 4/9/21 Period		
Corrective Actions	**Completion Date**	**Comments**
increased to a 48 inch span from a previous 16 inch span on the 10' diameter tank.		
Shield Addition to the Desalter (PV-780) Level Transmitter	5/11/2021	Shield reduces interference of the level from other objects in the tank.

F. Conclusion

The corrective actions for this period were completed by 5/12/21. The additional requirements for the Corrective Action Plan for this period are addressed in Section VII.

Section V below discusses the sample periods affected by the same root cause (4/22/21 – 5/6/21), and Section VI below discusses the first full sample period after completion of the corrective actions (5/20/21 – 6/3/21). Note that the period immediately following this period (4/9/21 – 4/22/21) had a period Δc less than the action level.

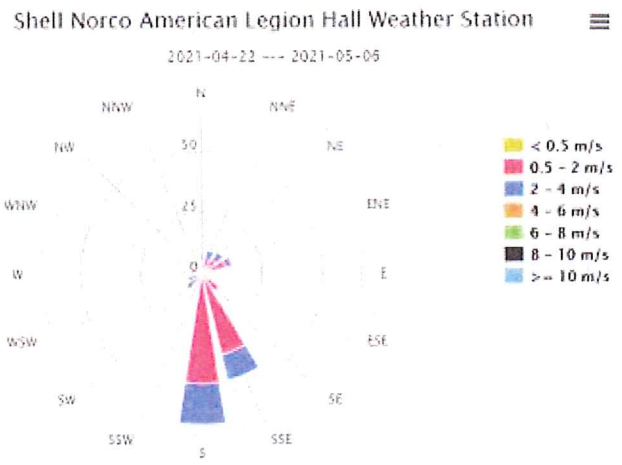
V. RCA AND CORRECTIVE ACTION: APRIL 22, 2021 – MAY 6, 2021

A. 14-Day Period Background

During the 14-day sample period from 4/22/21 – 5/6/21, 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 4/22/21 – 5/6/21	
ΔC	**Benzene (µg/m³)**
Period ΔC	20.52
Refinery Annual Rolling ΔC	12.13
Chemical Annual Rolling ΔC	11.16
Sample point(s) higher than action level:	**Benzene (µg/m³)**
WB-01	21.00
WB-12	13.00

Figures V-1 and V-2: Map of Monitoring Results and Wind Rose for 4/22/21 – 5/6/21



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 and WB-12, 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).

C. Source Description

The source description is the same as previously discussed in Section IV.C.

D. Events

The events during this period were found to be similar to what occurred in the 3/26/21 – 4/9/21 period as previously discussed in Section IV.D.

E. Corrective Actions

The corrective actions identified are the same as discussed in Section IV.E. The additional requirements for the Corrective Action Plan for this period are addressed in Section VII.

F. Conclusion

The corrective actions for this period were completed by 5/12/21. Section VI below discusses the first full sample period after completion of the corrective actions (5/20/21 – 6/3/21). Note that the period immediately following this period (5/6/21 – 5/20/21) had a period Δc less than the action level.

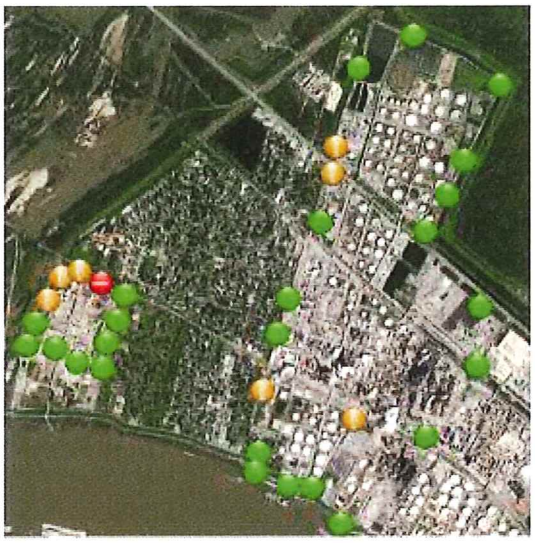
VI. RCA AND CORRECTIVE ACTION: MAY 20, 2021 – JUNE 3, 2021

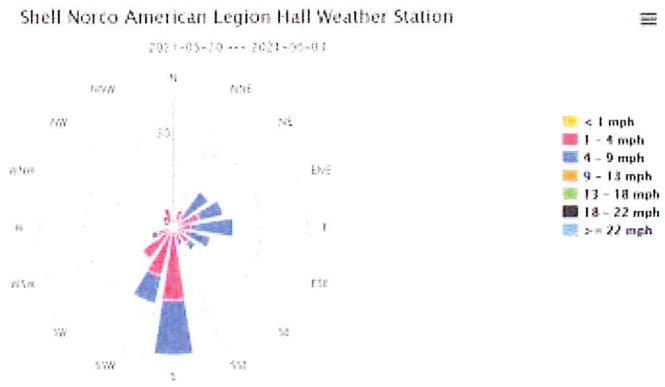
A. 14-Day Period Background

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





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 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. The investigation was initiated on June 7, 2021. Winds were primarily out of the S during this sample period (see Figure VI-2 above), so the investigation began with potential sources in that vicinity of the above referenced sample point location (see Figure VI-1).

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 two 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 system. It was identified that the PGC 1st Stage Drum did not have an interface level and gasoline was sent to the sour water outlet stream from the drum. The loss of the 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 VI-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.
Change Overhead Degasser flow to PGC (FI2211_OL) alarm priority from target to standard.	7/25/2021	Target alarm on the stripping stream is in place for adequate stripping steam. Consider changing from a target alarm to standard or critical

F. Conclusion

The corrective actions for this period were completed in real-time on 5/21/21. The first full sample period after completion of the corrective actions (6/3/21 – 6/17/21) was over the action level. As previously stated, the RCA and Corrective Action Plan for this period will be submitted separately to better address different root causes and corrective actions.

VII. 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 – VI).

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
Begin increased sour water sampling	8/1/2021
Determine baseline benzene concentrations in the sour water system from the individual contributing streams	10/1/2021
Determine feasibility of installing online benzene analyzers	12/1/2021
Installation of benzene analyzers, if deemed feasible	12/1/2022