Shell Chemical Appalachia LLC
300 Frankfort Rd
Monaca, PA 15061

September 7, 2023

Mark Gorog P.E., Regional Manager Air Quality Program
Pennsylvania Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222

U.S. EPA Office of Emergency Management
Ariel Rios Building (51404A)
1200 Pennsylvania Avenue, NW
Washington, DC, 20460

RE: PA-04-00740C 1,3-Butadiene Release Malfunction Report for National Response Center Incident #1375755 and #1375907

Dear Mr. Gorog,

Shell Chemical Appalachia LLC ("Shell") is submitting this malfunction report to the Pennsylvania Department of Environmental Protection (PADEP) for a release of 1,3-butadiene to the atmosphere over the reportable quantity at the Shell Polymers facility in Monaca, PA.

This event triggered notification to the following agencies, in addition to PADEP: The National Response Center and PA Emergency Management.

- **Name and location of the facility**
  Shell Polymers Monaca
  300 Frankfort Road, Monaca PA, 15061

- **Nature and cause of the incident**
  On the night of August 9, 2023, 1,3-butadiene was released from railcar SCMX4082 to the atmosphere during efforts to address a pinhole leak discovered on the car's pressure relief valve body. Note that the railcar was not full at the time of the release and contained a heel of material.

  After investigation, it was determined that the 1,3-butadiene release was from the de-pressuring of the railcar to atmosphere that took place to facilitate the repair of the relief valve.

- **Time when the malfunction or breakdown was first observed**
  The pinhole leak was identified at approximately 15:00 on August 9, 2023.

- **The date and time that the malfunction started and ended**
  The release of material from the railcar ceased at appropriately 20:30 on August 9, 2023.

- **An estimate of the emissions associated with the malfunction**

Substance	Emissions (pounds)
1,3-butadiene	1,044

- **The calculations that were used to determine that quantity**
  The 1,3-butadiene release quantity was based on the following:
  1.) Starting and ending pressures of railcar before and after the de-pressuring activities
  2.) Lab composition data of the material last contained within the railcar
  3.) Ambient conditions to determine the density of the material at both starting and ending pressures.

- **The steps, if any, that the facility took to limit the duration and/or quantity of emissions associated with the malfunction**
  Once it was determined that 1,3-butadiene was being released from the railcar, the de-pressuring activity ceased. Onsite and offsite odor rounds were conducted by the site's Emergency Response Team and none were identified.

- **A detailed analysis that sets forth the Root Cause of the malfunction, to the extent determinable**
  To help with some logistical constraints at other Shell plants, the Shell Polymers site acquired 15 railcars with a 1,3-butadiene heel that would be used to load C3+ product on top of the heel. Normally, C3+ is loaded onto railcars with C3+ priors.

  On the afternoon of August 9, 2023, during maintenance activities to prepare one of the 15 railcars, SCMX4082, to load C3+, an odor was identified coming from the car by the maintenance technicians. Upon further investigation, the technicians discovered a pinhole size leak on the railcar's relief valve body. The issue was elevated to the site's Emergency Response Team (ERT).

  The decision was made to move the car from the railcar maintenance building to the hydrocarbon rack to prepare for the car's controlled de-pressure, which was needed to repair the faulty relief valve. The de-pressuring activities involved venting the railcar to atmosphere in a controlled fashion over the course of ~5 hours. Water spray was utilized to knock down any potential vapors. Due to concerns with the atypical priors on this car, venting to flare was believed to not be an option at the time.

- **An analysis of the measures, if any, that are available to reduce the likelihood of a recurrence of a malfunction resulting from the same Root Cause or contributing causes in the future**
  The following corrective actions have been implemented to avoid future similar events going forward:
  1.) Complete- training of all ERT shifts, which focused on the event and key learnings (see above).
  2.) In progress- Developed a new draft procedure to cover preparing pressure cars in hydrocarbon service for maintenance, which covers venting to flare if needed. The procedure will be finalized within the next 30-45 days.

- **To the extent that investigations of the causes and/or possible corrective action(s) still are underway on the due date of the report, a statement of the anticipated date by which a follow-up report will be submitted**
  No follow-up report is anticipated.

- **Corrective action is final or timeline for implementation**
  N/A

If you have any questions regarding this matter, please contact me at (724) 709-2467 or kimberly.kaal@shell.com.

Sincerely,

Kimberly Kaal
Environmental Manager, Attorney-in-Fact

CC:
Scott Beaudway, Air Quality Specialist
Kristin Goddard, Air Quality District Supervisor
Beth Speicher, Environmental Group Manager

Attachment A
Release Calculation Details

Rail Car	SCMX 4082	
Volume of Car	33642	gallons
	127	m3

Starting Car Pressure	25	PSIG
Ending Car Pressure	2	PSIG
Duration	5	hours
Ambient Temperature	25	C

Starting Pressure was 25 psig ---->	6.3	KG/m3	Density of BD at 25C and 25 PSIG
	802.2127	KGs	Weight of material= Volume of car x density of material
	1768.879	lbs	Convert to lbs

Ending Pressure was 2 PSIG ---->	2.58	KG/m3	Density of BD at 25C and 2 PSIG
	328.5252	KGs	Weight of material= Volume of car x density of material
	724.3981	lbs	Convert to lbs

Total 1,3-Butadiene Release= weight at starting pressure (lbs)- weight et ending pressure (lbs)

1044 lbs

Attachment B
SCMX4082 Lab Composition Data

Shell Chemicals

Certificate of Analysis

Ship-To:
FIRESTONE POLYMER LLC
Highway 108 South
LAKE CHARLES LA 70602
USA

Shell Product : **BUTADIENE BASE CHEMICAL**
Shell Spec. No. : **X2137 / 2010**
Customer Product : **BUTADIENE**
Cust PO/Indent : March 2023 BD Railcars
Sales Order/Item : 1002124360 / 110
Delivery Number : 8003739740
Despatch Date : MAR.27.2023
Inspection Lot : 000003171828
Package Type : Bulk
Vehicle/Vessel : SCMX004082
Shipping Loc : US Norco LA

Property	Units	Minimum	Maximum	Result	N	Method
1,2-Butadiene	ppmw		20	7		ASTM D2593
1,3-Butadiene	%w	99.5		99.8		ASTM D2593
Appearance	Clear Colorless Liquid			Pass		Visual
C5	ppmw		500	< 5		ASTM D2593
Total Sulfur	ppmw		5	< 1		ASTM D5453
Carbonyls as Acetaldehyde	ppmw		30	7		ASTM D4423
Organic Chlorides as Cl	ppmw		10	5		ASTM D4929
DEHA	ppmw		10	< 1		ASTM D2426
Dimer	ppmw		500	62		ASTM D2426
Ethylacetylene	ppmw			0	3	ASTM D2593
Inhibitor (TBC)	ppmw	75	150	76		ASTM D1157
Methanol	ppmw		10	10		GC
Methylacetylene	ppmw			0	3	ASTM D2593
Nonvolatile Residue	%w		0.050	< 0.010		ASTM D1025
Oxygen in Headspace	%v		0.1	0.1		Teledyne
Pentadiene	ppmw		5	5		ASTM D2593
Peroxides as H2O2	ppmw		5	< 2		ASTM D5799
Propadiene	ppmw		10	0		ASTM D2593
Total Acetylenes	ppmw		20	< 10		ASTM D2593
Total Atomic Nitrogen	ppmw		2	< 2		ASTM D4629
Vinylacetylene	ppmw			0	3	ASTM D2593
Water	ppmw		500	300		ASTM E203
1-Butene + Isobutene	ppmw			33	3	ASTM D2593
1-Butene	ppmw			14	3	ASTM D2593
trans-2-Butene	ppmw			66	3	ASTM D2593
cis-2-Butene	ppmw			2003	3	ASTM D2593
Isoprene	ppmw		10	< 10		ASTM D2593
Toluene	ppmw		10	10		ASTM D2426
Acetonitrile	ppmw		5	< 1		ASTM D2426

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Property	Units	Minimum	Maximum	Result	N	Method

(N)otes :3-No Specification limits, actual value reported

(1) The Product consistently meets the specification limit noted. Only infrequent tests are conducted for spot-checking.
(2) DEHA is not expected to be present in the Product delivered from the SABINA Petrochemicals LLC plant and, therefore, Product delivered from the SABINA plant will not be tested for DEHA.
(3) "Total Acetylenes"= "Methyl Acetylene" + "Ethyl Acetylene" + "Vinyl Acetylene."
(4) Seller reserves the right to modify or replace without notice any or all of the above-specified test methods; provided however, that any test procedure so modified, or any replacement test procedure, as applicable, provides sensitivity and reproducibility reasonably equivalent to or better than the listed test method.

Shell certifies that its product will meet those specifications designated as such herein.