

## Investigation Update

November 2024

This document provides an update on the CSB's investigation of the October 10, 2024, incident at the Deer Park Refining, Limited Partnership's (DPRLP's) facility in Deer Park, Texas, hereafter referred to as the PEMEX Deer Park Refinery.

### Incident Summary

- On October 10, 2024, at 4:23 p.m., approximately 27,000 pounds of hydrogen sulfide gas were released during a maintenance activity at the PEMEX Deer Park Refinery in Deer Park, Texas, shown in **Figure 1** [1]. The release fatally injured two contract workers. Officials in the neighboring cities of Deer Park, Texas, and Pasadena, Texas, issued shelter-in-place orders that lasted several hours.



**Figure 1.** PEMEX Deer Park Refinery (Credit: CSB)

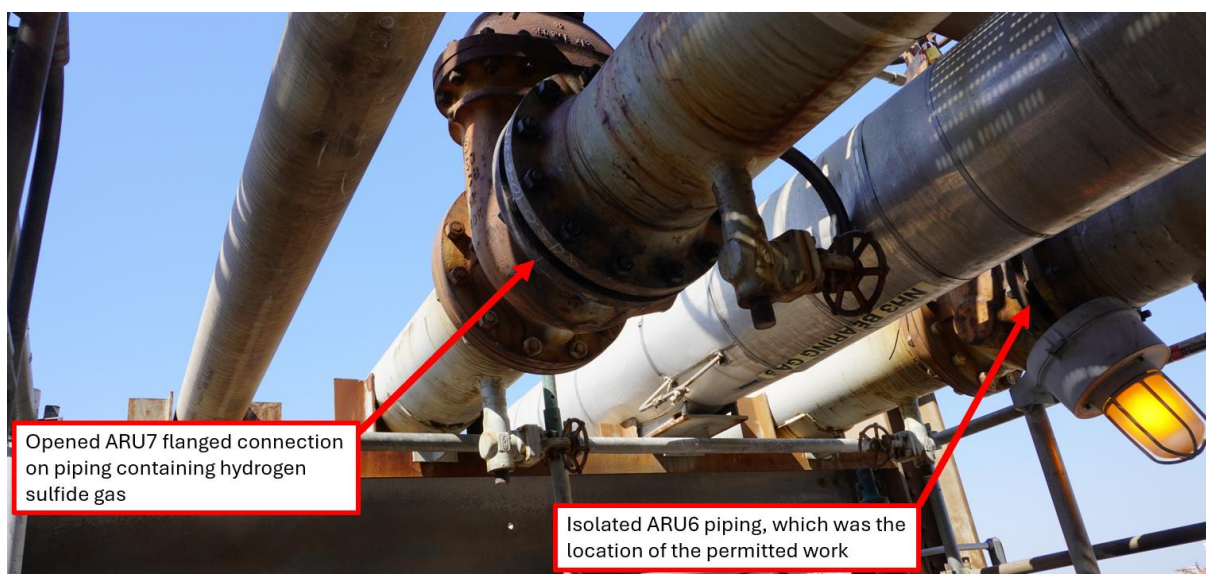
### Background Information

- The PEMEX Deer Park Refinery is a petroleum refinery located in Deer Park, Texas [2]. DPRLP is an indirect subsidiary of Pemex, a petroleum company headquartered in Mexico City, Mexico, that is wholly owned by the Federal Government of Mexico [3]. Pemex owns seven refineries, including six in Mexico and the PEMEX Deer Park Refinery in the United States [2, 4].
- The Deer Park, Texas, refinery was originally founded by Shell Oil Company (Shell) in 1929 and became a joint venture between Shell and Pemex in 1993, known as DPRLP [2, 5]. Pemex acquired Shell's share of DPRLP and became the sole owner in 2022, at which time the refinery began operating as the PEMEX Deer Park Refinery [2, 6].
- The PEMEX Deer Park Refinery employs approximately 1,000 personnel and 1,200 contract workers [2]. The United Steelworkers union represents Pemex hourly maintenance and operations employees at the PEMEX Deer Park Refinery [2].
- Repon, Inc. (Repon) is an industrial services contractor headquartered in Baton Rouge, Louisiana, that provides mechanical, maintenance, and construction services [7]. Repon is a subsidiary of EMCOR Industrial Services, Inc., a construction and maintenance contractor of process facilities headquartered in League City, Texas [8]. The PEMEX Deer Park Refinery contracted Repon to conduct maintenance activities as part of a scheduled unit shutdown, called a turnaround, that included a Sulfur Recovery Unit (SRU).

- Hydrogen sulfide is created as a byproduct of the crude oil refining process from sulfur that naturally exists in crude oil [9, p. 833]. Hydrogen sulfide is a colorless, highly toxic gas which can cause damage to the eyes and the respiratory system [10, 11]. Exposure to concentrations as low as 100 parts per million (ppm) are considered immediately dangerous to life or health [10]. Concentrations over 1,000 ppm can cause a near-immediate fatality [11]. Hydrogen sulfide is heavier than air and tends to travel near the ground during a release [10]. Hydrogen sulfide forms a flammable mixture with air between concentrations of 4.3 percent and 45 percent [10].
- The incident occurred in an area of the refinery called the Amine Regeneration Units, which remove hydrogen sulfide gas from aqueous amine used in the refining process. The hydrogen sulfide gas is transferred by process piping to the downstream SRUs to convert the hydrogen sulfide into sulfur.

## Incident Description

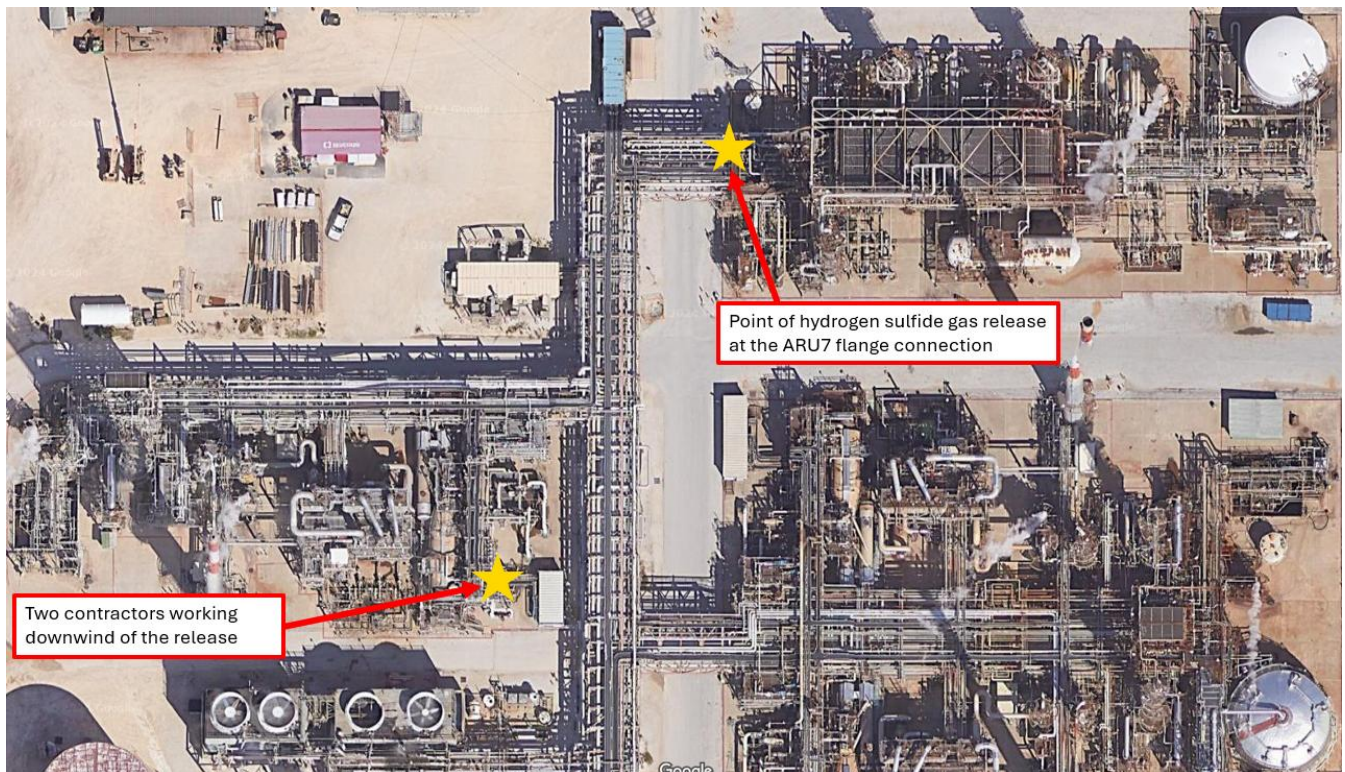
- On October 2, 2024, Repcon began work at the PEMEX Deer Park Refinery for the scheduled maintenance activities that were part of the turnaround.
- On October 8 and October 10, PEMEX Deer Park operations personnel requested assistance from Repcon workers and issued permits allowing Repcon workers to isolate piping segments in Amine Regeneration Unit 6 (ARU6), which is adjacent to the SRU involved in the turnaround.<sup>a</sup> The maintenance activities on process equipment in ARU6 were not part of the work Repcon was performing for the turnaround. Amine Regeneration Unit 7 (ARU7), which had piping segments adjacent to ARU6 (**Figure 2**), was operational. The adjacent ARU7 piping segment contained approximately 90 percent hydrogen sulfide gas at gauge pressure of approximately 15 pounds per square inch.



**Figure 2.** Adjacent sections of 12-inch piping that supply hydrogen sulfide to SRUs at the PEMEX Deer Park Refinery. (Credit: CSB)

<sup>a</sup> PEMEX Deer Park operations personnel had previously depressurized and nitrogen-purged the piping segments that were to be isolated.

- On October 10, 2024, at 4:23 p.m., two Repcon contract workers partially opened a flanged connection on ARU7 piping where hydrogen sulfide was flowing (**Figure 2**), resulting in the release of hydrogen sulfide gas and fatally injuring one of the workers. The depressurized, purged, and isolated ARU6 piping segment, which was the location of the permitted work, was approximately five feet from the ARU7 piping flange that was opened, as shown in **Figure 2**.
- Two contract workers from a separate company, unrelated to the ARU task, were working on equipment less than 250 feet away and downwind from the release (**Figure 3**). One of these workers was also fatally injured from the hydrogen sulfide release.



**Figure 3.** Overhead view of hydrogen sulfide release location and adjacent units with gold stars indicating the approximate location of the fatally injured. (Credit: Google Maps, annotated by CSB)

- The release continued for approximately one hour until PEMEX Deer Park Refinery operators and emergency responders isolated the leak by closing upstream valves. The PEMEX Deer Park Refinery reported that approximately 27,000 pounds of hydrogen sulfide were released into the atmosphere.
- Thirteen other contract workers were transported to nearby hospitals for medical evaluation. The neighboring cities of Deer Park, Texas, and Pasadena, Texas, issued shelter-in-place orders that lasted several hours.

## Path Forward

- The CSB is continuing to gather facts and analyze several key areas, including:
  - Permit-to-work practices
  - Energy isolation procedures
  - Contractor management systems
  - Emergency preparedness and response systems
  - Emergency communication practices
  - Hazard analyses and risk assessments
  - Maintenance procedures
  - Training programs
  - Respiratory protection policies and procedures
  - Remote isolation capability
- The investigation is ongoing. Complete findings, analyses, and recommendations, if appropriate, will be detailed in the CSB's final investigation report.

## References

- [1] Texas Commission on Environmental Quality, "Air Emission Report Database Incident 430966," 11 October 2024. [Online]. Available: <https://www2.tceq.texas.gov/oce/eer/index.cfm?fuseaction=main.getDetails&target=430966>. [Accessed 24 October 2024].
- [2] PEMEX Deer Park, "About Us," 7 October 2024. [Online]. Available: <https://www.pemex.com/deerpark/en/aboutus/Paginas/default.aspx>. [Accessed 23 October 2024].
- [3] PEMEX, "PEMEX," 13 December 2022. [Online]. Available: <https://www.pemex.com/en/about-pemex/business-plan/Paginas/default.aspx>. [Accessed 23 October 2024].
- [4] Pemex, "Pemex Industrial Transformation," Petroleos Mexicanos, 2 May 2024. [Online]. Available: <https://www.pemex.com/en/operations/Paginas/tir.aspx>. [Accessed 7 November 2024].
- [5] Shell, "Shell completes sale of interest in Deer Park refinery to partner Pemex," 20 January 2022. [Online]. Available: <https://www.shell.com/news-and-insights/newsroom/news-and-media-releases/2022/shell-completes-sale-of-interest-in-deer-park-refinery-to-partner-pemex.html>. [Accessed 28 October 2024].
- [6] PEMEX Deer Park, "Site History," [Online]. Available: [https://www.pemex.com/deerpark/en/aboutus/Paginas/site\\_history.aspx](https://www.pemex.com/deerpark/en/aboutus/Paginas/site_history.aspx). [Accessed 28 October 2024].
- [7] Repcon, "Contact," [Online]. Available: <https://repcon.com/contact>. [Accessed 28 October 2024].
- [8] EMCOR Industrial Services, Inc., "Services," [Online]. Available: <https://emcoris.com/services>. [Accessed 06 November 2024].
- [9] J. G. Speight, Chemistry and Technology of Petroleum, Taylor & Francis, 2014.
- [10] CAMEO Chemicals, "Hydrogen Sulfide," [Online]. Available: <https://cameochemicals.noaa.gov/chemical/3625>. [Accessed 29 October 2024].
- [11] Occupational Safety and Health Administration, "Hydrogen Sulfide," [Online]. Available: <https://www.osha.gov/hydrogen-sulfide/hazards>. [Accessed 29 October 2024].